STANDARD PLANS

STATE OF CALIFORNIA
CALIFORNIA STATE TRANSPORTATION AGENCY
DEPARTMENT OF TRANSPORTATION

2018

PUBLISHED BY
DEPARTMENT OF TRANSPORTATION

Copies of this book may be obtained from:

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PUBLICATION DISTRIBUTION UNIT
1900 ROYAL OAKS DRIVE
SACRAMENTO, CALIFORNIA 95815-3800
Telephone (916) 263-0822
Fax (916) 263-0470
Publication Unit Web site: http://caltrans-opac.ca.gov/publicat.htm

Copyright 2018 California Department of Transportation. All rights reserved.

PREFACE

This 2018 edition of the California Department of Transportation Standard Plans is based on U.S. Customary units. This is the Department's fourth edition Standard Plans since the Department reverted back to U.S. Customary units as its base units. U.S. Customary units ("inch-pound") are defined by the National Institute of Standards and Technology (NIST). The last edition of the Department's Standard Plans published in U.S. Customary units only was the 2015 edition.

This 2018 edition of the Department's Standard Plans is to be used in conjunction with the 2018 edition of the Department's Standard Specifications.

TABLE OF CONTENTS

PLAN TITLE — PLAN NO. — PAGE

ABBREVIATIONS, LINES, SYMBOLS, AND LEGEND

ABBREVIATIONS (SHEET 1 OF 3) ... A3A ... 1
ABBREVIATIONS (SHEET 2 OF 3) ... A3B ... 2
ABBREVIATIONS (SHEET 3 OF 3) ... A3C ... 3
LEGEND - LINES AND SYMBOLS (SHEET 1 OF 5) ... A10A ... 4
LEGEND - LINES AND SYMBOLS (SHEET 2 OF 5) ... A10B ... 5
LEGEND - LINES AND SYMBOLS (SHEET 3 OF 5) ... A10C ... 6
LEGEND - LINES AND SYMBOLS (SHEET 4 OF 5) ... A10D ... 7
LEGEND - LINES AND SYMBOLS (SHEET 5 OF 5) ... A10E ... 8
LEGEND - SOIL (SHEET 1 OF 2) ... A10F ... 9
LEGEND - SOIL (SHEET 2 OF 2) ... A10G ... 10
LEGEND - ROCK ... A10H ... 11

PAVEMENT MARKERS, TRAFFIC LINES, AND PAVEMENT MARKINGS

PAVEMENT MARKERS AND TRAFFIC LINES - TYPICAL DETAILS ... A20A ... 12
PAVEMENT MARKERS AND TRAFFIC LINES - TYPICAL DETAILS ... A20B ... 13
PAVEMENT MARKERS AND TRAFFIC LINES - TYPICAL DETAILS ... A20C ... 14
PAVEMENT MARKERS AND TRAFFIC LINES - TYPICAL DETAILS ... A20D ... 15
PAVEMENT MARKERS AND TRAFFIC LINES - TYPICAL DETAILS FOR CONTRAST STRIPING ... A20E ... 16
PAVEMENT MARKINGS - ARROWS ... A24A ... 17
PAVEMENT MARKINGS - ARROWS AND SYMBOLS ... A24B ... 18
PAVEMENT MARKINGS - SYMBOLS AND NUMERALS ... A24C ... 19
PAVEMENT MARKINGS - WORDS ... A24D ... 20
PAVEMENT MARKINGS - WORDS, LIMIT AND YIELD LINES ... A24E ... 21
PAVEMENT MARKINGS - CROSSWALKS ... A24F ... 22

RUMBLE STRIP

SHOULDER RUMBLE STRIP DETAILS - GROUND-IN INDENTATIONS ... A40B ... 23
EDGE LINE RUMBLE STRIP DETAILS - GROUND-IN INDENTATIONS ... A40C ... 24
CENTERLINE RUMBLE STRIP DETAILS - GROUND-IN INDENTATIONS ... A40D ... 25
RUMBLE STRIP PLACEMENT AT FREEWAY EXIT RAMPS, FREEWAY ENTRANCE RAMPS, AND INTERSECTIONS ... A40E ... 26
RUMBLE STRIP PLACEMENT AT INTERSECTIONS WITH LEFT TURN POCKETS, RAILROAD CROSSINGS, PRIVATE ROADS, AND MAJOR DRIVEWAYS ... A40F ... 27

EXCAVATION AND BACKFILL

EXCAVATION AND BACKFILL - MISCELLANEOUS DETAILS ... A62A ... 28
LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE SURCHARGE AND WALL ... A62B ... 29
LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE ... A62C ... 30
EXCAVATION AND BACKFILL - CONCRETE PIPE CULVERTS ... A62D ... 31
EXCAVATION AND BACKFILL - CONCRETE PIPE CULVERTS - INDIRECT DESIGN METHOD ... A62DA ... 32

PLAN TITLE PLAN No. PAGE

EXCAVATION AND BACKFILL (CONTINUED)

EXCAVATION AND BACKFILL - CAST-IN-PLACE REINFORCED CONCRETE BOX AND ARCH CULVERTS A62E 33
EXCAVATION AND BACKFILL - METAL AND PLASTIC CULVERTS A62F 34
EXCAVATION AND BACKFILL - PRECAST REINFORCED CONCRETE BOX CULVERTS A62G 35

PORTABLE CONCRETE BARRIER

PORTABLE CONCRETE BARRIER (TYPE 60K) A63A 36
PORTABLE CONCRETE BARRIER (TYPE 60K) A63B 37

OBJECT MARKERS, DELINEATORS, CHANNELIZERS, AND BARRICADES

OBJECT MARKERS A73A 38
MARKERS A73B 39
DELINEATORS, CHANNELIZERS AND BARRICADES A73C 40

SURVEY MONUMENTS

SURVEY MONUMENTS A74 41

CONCRETE BARRIER TYPE 60 SERIES

CONCRETE BARRIER TYPE 60M A76A 42
CONCRETE BARRIER TYPE 60M A76B 43
CONCRETE BARRIER TYPE 60MP A76BA 44
CONCRETE BARRIER TYPE 60PR A76BB 45
CONCRETE BARRIER TYPE 60AP A76BC 46
CONCRETE BARRIER TYPE 60MF A76C 47
CONCRETE BARRIER TYPE 60MG A76D 48
CONCRETE BARRIER TYPE 60MG A76E 49
CONCRETE BARRIER TYPE 60MGF A76F 50
CONCRETE BARRIER TYPE 60MS A76G 51
CONCRETE BARRIER TYPE 60MS A76H 52
CONCRETE BARRIER TYPE 60MSF A76I 53

CONCRETE BARRIER WILDLIFE PASSAGEWAY

CONCRETE BARRIER - WILDLIFE PASSAGEWAY (TYPE MS) A76J 54
CONCRETE BARRIER - WILDLIFE PASSAGEWAY (TYPE MM) A76K 55
CONCRETE BARRIER - WILDLIFE PASSAGEWAY (TYPE ML) A76L 56

MIDWEST GUARDRAIL SYSTEM - STANDARD RAILING SECTIONS

MIDWEST GUARDRAIL SYSTEM - STANDARD RAILING SECTION (WOOD POST WITH WOOD BLOCK) A77L1 57
MIDWEST GUARDRAIL SYSTEM - STANDARD RAILING SECTION (STEEL POST WITH NOTCHED WOOD OR NOTCHED RECYCLED PLASTIC BLOCK) A77L2 58
METAL BEAM GUARD RAILING - RECONSTRUCT INSTALLATION A77L3 59

PLAN TITLE PLAN No. PAGE

MIDWEST GUARDRAIL SYSTEM - STANDARD RAILING SECTIONS (CONTINUED)

MIDWEST GUARDRAIL SYSTEM - STANDARD HARDWARE A77M1 60
MIDWEST GUARDRAIL SYSTEM - WOOD POST AND WOOD BLOCK DETAILS A77N1 61
MIDWEST GUARDRAIL SYSTEM - STEEL POST AND NOTCHED WOOD BLOCK DETAILS A77N2 62
MIDWEST GUARDRAIL SYSTEM - TYPICAL LINE POST EMBEDMENT AND HINGE POINT OFFSET DETAILS A77N3 63
MIDWEST GUARDRAIL SYSTEM - TYPICAL RAILING DELINEATION AND DIKE POSITIONING DETAILS A77N4 64

MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM

MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM A77N5 65
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - NARROW VEGETATION CONTROL INSTALLATION A77N5A 66
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - FOR TERMINAL SYSTEM END TREATMENTS A77N6 67
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - AT STRUCTURE APPROACH A77N7 68
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N8 69
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N9 70
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N10 71
MINOR CONCRETE VEGETATION CONTROL - GUARDRAIL SYSTEM - MISCELLANEOUS DETAILS A77N11 72

FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM

FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM A77N12 73
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - NARROW VEGETATION CONTROL INSTALLATION A77N13 74
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - FOR TERMINAL SYSTEM END TREATMENTS A77N14 75
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - AT STRUCTURE APPROACH A77N15 76
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N16 77
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N17 78
FIBER OR RUBBER MAT VEGETATION CONTROL - GUARDRAIL SYSTEM - AT FIXED OBJECT A77N18 79

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P1 80
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P2 81
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P3 82
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P4 83

PLAN TITLE PLAN No. PAGE

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS (CONTINUED)

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P5 84
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR EMBANKMENTS A77P6 85

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURES

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURE APPROACH A77Q1 86
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURE APPROACH AND BETWEEN STRUCTURES A77Q2 87
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURE APPROACH A77Q3 88
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE A77Q4 89
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE A77Q5 90

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR FIXED OBJECTS

MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR FIXED OBJECTS BETWEEN SEPARATE ROADBEDS (TWO-WAY TRAFFIC) A77R1 91
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR FIXED OBJECTS BETWEEN SEPARATE ROADBEDS (ONE-WAY TRAFFIC) A77R2 92
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R3 93
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R4 94
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R5 95
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R6 96
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R7 97
MIDWEST GUARDRAIL SYSTEM - TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS A77R8 98

MIDWEST GUARDRAIL SYSTEM - END ANCHORAGE AND RAIL TENSIONING ASSEMBLY

MIDWEST GUARDRAIL SYSTEM - END ANCHOR ASSEMBLY (TYPE SFT) A77S1 99
MIDWEST GUARDRAIL SYSTEM - RAIL TENSIONING ASSEMBLY A77S2 100
METAL RAILING ANCHOR CABLE AND ANCHOR PLATE DETAILS A77S3 101
METAL RAILING END ANCHOR ASSEMBLY (TYPE CA) A77T1 102
MIDWEST GUARDRAIL SYSTEM - BURIED POST END ANCHOR A77T2 103

MIDWEST GUARDRAIL SYSTEM - CONNECTION DETAILS AND TRANSITION RAILING TO BRIDGE RAILINGS, ABUTMENTS AND WALLS

MIDWEST GUARDRAIL SYSTEM - CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS DETAILS NO. 1 ..... A77U1 104

PLAN TITLE PLAN No. PAGE

MIDWEST GUARDRAIL SYSTEM - CONNECTION DETAILS AND TRANSITION RAILING TO BRIDGE RAILINGS, ABUTMENTS AND WALLS (CONTINUED)

MIDWEST GUARDRAIL SYSTEM - CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS DETAILS NO. 2 ..... A77U2 105
MIDWEST GUARDRAIL SYSTEM - CONNECTIONS TO ABUTMENTS AND WALLS A77U3 106
MIDWEST GUARDRAIL SYSTEM - TRANSITION RAILING (TYPE WB-31) A77U4 107
MIDWEST GUARDRAIL SYSTEM - TRANSITION TO METAL BEAM GUARDRAIL A77U5 108
MIDWEST GUARDRAIL SYSTEM - CONNECTIONS TO BRIDGE RAILINGS WITH SIDEWALKS DETAILS NO. 1 ..... A77V1 109
MIDWEST GUARDRAIL SYSTEM - CONNECTIONS TO BRIDGE RAILINGS WITH SIDEWALKS DETAILS NO. 2 ..... A77V2 110

THRIE BEAM BARRIER - STANDARD BARRIER SECTIONS

THRIE BEAM BARRIER - STANDARD BARRIER RAILING SECTION (WOOD POST WITH WOOD BLOCK) A78A 111
THRIE BEAM BARRIER - STANDARD BARRIER RAILING SECTION (STEEL POST WITH NOTCHED WOOD BLOCK OR NOTCHED RECYCLED PLASTIC BLOCK) A78B 112
THRIE BEAM BARRIER - STANDARD HARDWARE DETAILS A78C1 113
THRIE BEAM BARRIER - POST AND BLOCK DETAILS A78C2 114

MINOR CONCRETE VEGETATION CONTROL - THRIE BEAM BARRIER

MINOR CONCRETE VEGETATION CONTROL - SINGLE THRIE BEAM BARRIER A78C3 115
MINOR CONCRETE VEGETATION CONTROL - DOUBLE THRIE BEAM BARRIER A78C4 116
MINOR CONCRETE VEGETATION CONTROL - THRIE BEAM BARRIER - AT FIXED OBJECTS IN MEDIAN A78C5 117
MINOR CONCRETE VEGETATION CONTROL - THRIE BEAM BARRIER - AT STRUCTURE APPROACH A78C6 118

FIBER OR RUBBER MAT VEGETATION CONTROL - THRIE BEAM BARRIER

FIBER OR RUBBER MAT VEGETATION CONTROL - SINGLE THRIE BEAM BARRIER A78C7 119
FIBER OR RUBBER MAT VEGETATION CONTROL - DOUBLE THRIE BEAM BARRIER A78C8 120
FIBER OR RUBBER MAT VEGETATION CONTROL - THRIE BEAM BARRIER - AT FIXED OBJECTS IN MEDIAN A78C9 121
FIBER OR RUBBER MAT VEGETATION CONTROL - THRIE BEAM BARRIER - AT STRUCTURE APPROACH A78C10 122

THRIE BEAM BARRIER AT FIXED OBJECTS AND ON BRIDGE

THRIE BEAM BARRIER AT FIXED OBJECTS IN MEDIAN A78D1 123
DOUBLE THRIE BEAM BARRIER ON BRIDGE A78D2 124

PLAN TITLE PLAN No. PAGE

THRIE BEAM BARRIER - END ANCHORAGE END TREATMENT AND EMERGENCY PASSAGEWAY

SINGLE THRIE BEAM BARRIER - END ANCHOR ASSEMBLY AND TERMINAL SYSTEM END TREATMENT A78E1 125
DOUBLE THRIE BEAM BARRIER - EMERGENCY PASSAGEWAY AND END ANCHOR ASSEMBLY DETAILS A78E2 126
DOUBLE THRIE BEAM BARRIER - CRASH CUSHION END TREATMENT A78E3 127

THRIE BEAM BARRIER - CONNECTIONS TO BRIDGE RAILINGS, ABUTMENTS, WALLS AND BARRIER

DOUBLE THRIE BEAM BARRIER - CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS A78F1 128
SINGLE THRIE BEAM BARRIER - CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS A78F2 129
SINGLE THRIE BEAM BARRIER - CONNECTIONS TO ABUTMENTS AND WALLS A78G 130
THRIE BEAM BARRIER - TYPICAL LAYOUT FOR CONNECTION TO BRIDGE RAILING A78H 131
DOUBLE THRIE BEAM BARRIER - CONNECTION TO CONCRETE BARRIER A78I 132

THRIE BEAM BARRIER - TRANSITION RAILING

SINGLE THRIE BEAM BARRIER - TRANSITION RAILING (TYPE STB) A78J 133
DOUBLE THRIE BEAM BARRIER - TRANSITION RAILING (TYPE DTB) A78K 134

CRASH CUSHIONS

CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL) A81A 135
CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL) A81B 136
CRASH CUSHION, SAND FILLED (BIDIRECTIONAL) A81C 137

FENCES

TEMPORARY DESERT TORTOISE FENCE A84A 138
DESERT TORTOISE FENCE A84B 139
CHAIN LINK FENCE A85 140
CHAIN LINK FENCE DETAILS A85A 141
CHAIN LINK FENCE DETAILS A85B 142
BARBED WIRE AND WIRE MESH FENCES A86 143
BARBED WIRE AND WIRE MESH FENCE DETAIL ON SHARP BREAK IN GRADE A86A 144
BARBED WIRE AND WIRE MESH FENCE DETAILS A86B 145
BARBED WIRE AND WIRE MESH FENCE DETAILS AT DITCH CROSSING A86C 146
BARBED WIRE AND WIRE MESH FENCE - MISCELLANEOUS DETAILS A86D 147

CURBS, DRIVEWAYS, DIKES, CURB RAMPS AND ACCESSIBLE PARKING

CURBS AND DRIVEWAYS A87A 148
HOT MIX ASPHALT DIKES A87B 149
CURB RAMP DETAILS A88A 150

PLAN TITLE PLAN No. PAGE

CURBS, DRIVEWAYS, DIKES, CURB RAMPS AND ACCESSIBLE PARKING (CONTINUED)

CURB RAMP AND ISLAND PASSAGEWAY DETAILS A88B 151
ACCESSIBLE PARKING OFF-STREET A90A 152
ACCESSIBLE PARKING ON-STREET A90B 153

PAVEMENTS

JOINTED PLAIN CONCRETE PAVEMENT - NEW CONSTRUCTION P1 154
JOINTED PLAIN CONCRETE PAVEMENT (WIDENED LANE) - NEW CONSTRUCTION P2 155
JOINTED PLAIN CONCRETE PAVEMENT - LANE AND SHOULDER ADDITION OR REPLACEMENT P3A 156
JOINTED PLAIN CONCRETE PAVEMENT (WIDENED LANE) - LANE AND SHOULDER ADDITION OR REPLACEMENT P3B 157
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT P4 158
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT (WIDENED LANE) P5A 159
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT (WIDENED LANE) - LANE AND SHOULDER ADDITION OR REPLACEMENT P5B 160
SPALL REPAIR P6 161
DOWEL BAR RETROFIT P7 162
INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE P8 163
CONCRETE PAVEMENT DOWEL BAR DETAILS P10 164
CONCRETE PAVEMENT DOWEL BAR BASKET DETAILS P12 165
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - SINGLE PIECE TRANSVERSE BAR ASSEMBLY P13 166
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - TRANSVERSE CONSTRUCTION JOINT P14 167
CONCRETE PAVEMENT - TIE BAR DETAILS P15 168
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - TIE BARS AND JOINT DETAILS P16 169
CONCRETE PAVEMENT - TIE BAR BASKET DETAILS P17 170
CONCRETE PAVEMENT - LANE SCHEMATICS AND ISOLATION JOINT DETAIL P18 171
JOINT SEALS P20 172
CONCRETE PAVEMENT - END PANEL PAVEMENT TRANSITIONS P30 173
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - TERMINAL JOINT DETAILS P31A 174
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - EXPANSION JOINT AND ANCHOR DETAILS P31B 175
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - WIDE FLANGE BEAM TERMINALS P32A 176
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - WIDE FLANGE BEAM TERMINALS P32B 177
CONCRETE PAVEMENT - LANE DROP PAVING DETAILS NO. 1 ..... P33 178
CONCRETE PAVEMENT - LANE DROP PAVING DETAILS NO. 2 ..... P34 179
CONCRETE PAVEMENT - RAMP TRANSITION PAVING DETAILS P35 180
CONCRETE PAVEMENT - DRAINAGE INLET DETAILS NO. 1 ..... P45 181
CONCRETE PAVEMENT - DRAINAGE INLET DETAILS NO. 2 ..... P46 182
PAVEMENT STRUCTURE - DRAINAGE SYSTEM DETAILS P50 183
EDGE DRAIN OUTLET AND VENT DETAILS P51 184

PLAN TITLE PLAN No. PAGE

PAVEMENTS (CONTINUED)

EDGE DRAIN CLEANOUT AND VENT DETAILS P52 185
CROSS DRAIN INTERCEPTOR DETAILS P53 186
HOT MIX ASPHALT PAVING
(LONGITUDINAL TAPERED NOTCHED WEDGE JOINT) P70 187
PAVEMENT EDGE TREATMENTS P74 188
PAVEMENT EDGE TREATMENTS - OVERLAYS P75 189
PAVEMENT EDGE TREATMENTS - NEW CONSTRUCTION P76 190

CRIB WALLS

REINFORCED CONCRETE CRIB WALL - TYPES A, B AND C C7A 191
REINFORCED CONCRETE CRIB WALL - TYPES A, B AND C -
HEADER AND STRETCHER DETAILS C7B 192
REINFORCED CONCRETE CRIB WALL - FOUNDATION PRESSURE C7C 193

DRAINAGE INLETS, PIPE INLETS AND GRATES

DRAINAGE INLET MARKERS D71 194
CIP DRAINAGE INLETS - TYPES OS, OL AND GOL D72A 195
CIP DRAINAGE INLETS - TYPES G1, G2, G3, G4, G5 AND G6 ..... D72B 196
CIP DRAINAGE INLETS - TYPES G1, G2, G3, G4, G5 AND G6 ..... D72C 197
CIP DRAINAGE INLETS - TYPES GT1, GT2, GT3 AND GT4 ..... D72D 198
CIP DRAINAGE INLETS - TYPES GO AND GDO D72E 199
CIP DRAINAGE INLET NOTES D72F 200
CIP DRAINAGE INLET TABLES D72G 201
PRECAST DRAINAGE INLETS - TYPES OS, OL AND GOL D73A 202
PRECAST DRAINAGE INLETS - TYPES G1, G2, G3, G4, G5 AND G6 ..... D73B 203
PRECAST DRAINAGE INLETS - TYPES G1, G2, G3, G4, G5 AND G6 ..... D73C 204
PRECAST DRAINAGE INLETS - TYPES GT1, GT2, GT3 AND GT4 ..... D73D 205
PRECAST DRAINAGE INLETS - TYPES GO AND GDO D73E 206
PRECAST DRAINAGE INLET NOTES D73F 207
PRECAST DRAINAGE INLET TABLES D73G 208
DRAINAGE INLET DETAILS D74 209
STEEL PIPE INLETS D75A 210
CONCRETE PIPE INLETS D75B 211
PIPE INLETS - LADDER AND TRASH RACK DETAILS D75C 212
GRATE DETAILS NO. 1 ..... D77A 213
GRATE DETAILS NO. 2 ..... D77B 214
ALTERNATIVE HINGED COVER FOR TYPE OL AND OS INLETS AND
TRASH RACK FOR TYPE OCP INLET D77C 215

GUTTER AND INLET DEPRESSIONS

GUTTER DEPRESSIONS D78A 216
INLET DEPRESSIONS - CONCRETE SHOULDERS D78B 217
INLET DEPRESSIONS - HOT MIX ASPHALT SHOULDERS D78C 218

PLAN TITLE PLAN No. PAGE

CONCRETE PIPE - DIRECT DESIGN METHOD

PRECAST REINFORCED CONCRETE PIPE - DIRECT DESIGN METHOD D79 219
PRECAST REINFORCED CONCRETE PIPE - DIRECT DESIGN METHOD D79A 220

BOX CULVERTS

CAST-IN-PLACE REINFORCED CONCRETE SINGLE BOX CULVERT D80 221
CAST-IN-PLACE REINFORCED CONCRETE DOUBLE BOX CULVERT D81 222
CAST-IN-PLACE REINFORCED CONCRETE BOX CULVERT - MISCELLANEOUS DETAILS D82 223
PRECAST REINFORCED CONCRETE BOX CULVERT D83A 224
PRECAST REINFORCED CONCRETE BOX CULVERT - MISCELLANEOUS DETAILS D83B 225
BOX CULVERT WINGWALLS - TYPES A, B AND C D84 226
BOX CULVERT WINGWALLS - TYPES D AND E D85 227
BOX CULVERT WARPED WINGWALLS D86A 228

PIPE AND ARCH CULVERT - ENDWALLS AND WARPED WINGWALLS

PIPE CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS D86B 229
ARCH CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS D86C 230

PIPE DOWNDRAINS, ANCHORAGE SYSTEMS AND OVERSIDE DRAINS

CORRUGATED METAL PIPE DOWNDRAIN DETAILS D87A 231
PLASTIC PIPE DOWNDRAIN DETAILS D87B 232
CABLE ANCHORAGE SYSTEM D87C 233
OVERSIDE DRAINS D87D 234

CONSTRUCTION LOADS ON CULVERTS AND STRUT DETAILS

CONSTRUCTION LOADS ON CULVERTS D88 235
STRUT DETAILS FOR STRUCTURAL STEEL PIPES, ARCHES AND VEHICULAR UNDERCROSSING D88A 236

PIPE CULVERT HEADWALLS, ENDWALLS, WINGWALLS AND JUNCTION STRUCTURE

PIPE CULVERT HEADWALLS - STRAIGHT AND "L" D89 237
PIPE CULVERT HEADWALLS, ENDWALLS AND WINGWALLS - TYPES A, B AND C D90 238
CAST-IN-PLACE REINFORCED CONCRETE JUNCTION STRUCTURE D91A 239
CAST-IN-PLACE REINFORCED CONCRETE JUNCTION STRUCTURE D91B 240

PIPE RISER AND DRAINAGE INLET RISER CONNECTIONS

PIPE RISER CONNECTIONS D93A 241
DRAINAGE INLET RISER CONNECTIONS D93B 242
PIPE RISER WITH DEBRIS RACK CAGE D93C 243

PLAN TITLE PLAN No. PAGE

FLARED END SECTIONS

METAL AND PLASTIC FLARED END SECTIONS D94A 244
CONCRETE FLARED END SECTIONS D94B 245

PIPE COUPLING AND JOINT DETAILS

CORRUGATED METAL PIPE COUPLING DETAILS NO. 1 - ANNULAR COUPLING BAND BAR AND STRAP AND ANGLE CONNECTIONS D97A 246
CORRUGATED METAL PIPE COUPLING DETAILS NO. 3 - HELICAL AND UNIVERSAL COUPLERS D97C 247
CORRUGATED METAL PIPE COUPLING DETAILS NO. 4 - HUGGER COUPLING BANDS D97D 248
CORRUGATED METAL PIPE COUPLING DETAILS NO. 5 - STANDARD JOINT D97E 249
CORRUGATED METAL PIPE COUPLING DETAILS NO. 6 - POSITIVE JOINT D97F 250
CORRUGATED METAL PIPE COUPLING DETAILS NO. 7 - DOWNDRAIN D97G 251
REINFORCED CONCRETE PIPE OR NON-REINFORCED CONCRETE PIPE - STANDARD AND POSITIVE JOINTS D97H 252
CORRUGATED POLYVINYL CHLORIDE PIPE WITH SMOOTH INTERIOR - STANDARD AND POSITIVE JOINTS D97I 253
COMPOSITE STEEL SPIRAL RIB PIPE WITH SMOOTH INTERIOR - STANDARD JOINT D97J 254

SLOTTED AND GRATED LINE DRAINS

SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS D98A 255
SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS D98B 256
SLOTTED PLASTIC PIPE DRAIN DETAILS D98D 257
SLOTTED PIPE GRATE EXTENSION DETAILS D98F 258
GRATED LINE DRAIN DETAILS NO. 1 - POLYMER CONCRETE, 4" NOMINAL WIDTH D98G 259
GRATED LINE DRAIN DETAILS NO. 2 - INLET CONNECTION DETAILS (ALL TYPES EXCEPT 4" NOMINAL WIDTH POLYMER CONCRETE) D98H 260
GRATED LINE DRAIN DETAILS NO. 3 - (ALL TYPES EXCEPT 4" NOMINAL WIDTH POLYMER CONCRETE) D98I 261
GRATED LINE DRAIN DETAILS NO. 4 - CONNECTION TO EXISTING DRAINAGE STRUCTURE D98J 262

GABIONS AND UNDERDRAINS

GABION BASKET DETAILS NO. 1 ..... D100A 263
GABION BASKET DETAILS NO. 2 ..... D100B 264
UNDERDRAINS D102 265

LANDSCAPE AND EROSION CONTROL

LANDSCAPE AND EROSION CONTROL SYMBOLS H1 266
LANDSCAPE DETAILS H2 267
LANDSCAPE DETAILS H3 268
LANDSCAPE DETAILS (RISER SPRINKLER ASSEMBLY) H4 269
LANDSCAPE DETAILS (SWING JOINT AND PROTECTOR) H5 270

PLAN TITLE PLAN No. PAGE

LANDSCAPE AND EROSION CONTROL (CONTINUED)

LANDSCAPE DETAILS H6 271
LANDSCAPE DETAILS H7 272
LANDSCAPE DETAILS H8 273
LANDSCAPE DETAILS H9 274
IRRIGATION CONTROLLER ENCLOSURE CABINET H10 275
EROSION CONTROL DETAILS - FIBER ROLL AND COMPOST SOCK H51 276
ROLLED EROSION CONTROL PRODUCT H52 277

TEMPORARY CRASH CUSHIONS, RAILING AND TRAFFIC SCREEN

TEMPORARY CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL) T1A 278
TEMPORARY CRASH CUSHION, SAND FILLED (BIDIRECTIONAL) T1B 279
TEMPORARY CRASH CUSHION, SAND FILLED (SHOULDER INSTALLATIONS) T2 280
TEMPORARY RAILING (TYPE K) T3A 281
TEMPORARY RAILING (TYPE K) T3B 282
TEMPORARY TRAFFIC SCREEN T4 283
TEMPORARY TERMINAL SECTION (TYPE K) T5 284

TEMPORARY TRAFFIC CONTROL SYSTEMS

TRAFFIC CONTROL SYSTEM TABLES FOR LANE AND RAMP CLOSURES T9 285
TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE
ON FREEWAYS AND EXPRESSWAYS T10 286
TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE
ON FREEWAYS AND EXPRESSWAYS T10A 287
TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE
ON MULTILANE CONVENTIONAL HIGHWAYS T11 288
TRAFFIC CONTROL SYSTEM FOR CHANGEABLE LANE CLOSURE
ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS T11A 289
TRAFFIC CONTROL SYSTEM FOR HALF ROAD CLOSURE
ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS T12 290
TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE
ON TWO LANE CONVENTIONAL HIGHWAYS T13 291
TRAFFIC CONTROL SYSTEM FOR RAMP CLOSURE T14 292
TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE
ON MULTILANE HIGHWAYS T15 293
TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE
ON MULTILANE HIGHWAYS T16 294
TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE
ON TWO LANE HIGHWAYS T17 295

TEMPORARY PEDESTRIAN ACCESS ROUTES

TEMPORARY PEDESTRIAN ACCESS ROUTES -
TYPICAL SIDEWALK CLOSURE AND PEDESTRIAN DETOUR T30 296
TEMPORARY PEDESTRIAN ACCESS ROUTES -
TYPICAL SIDEWALK DIVERSION WITHIN ROADBED T31 297
TEMPORARY PEDESTRIAN ACCESS ROUTES - TYPICAL
SIDEWALK/CROSSWALK CLOSURE AND PEDESTRIAN DETOUR T32 298

PLAN TITLE PLAN No. PAGE

TEMPORARY PEDESTRIAN ACCESS ROUTES (CONTINUED)

TEMPORARY PEDESTRIAN ACCESS ROUTES - RAMP T33 299
TEMPORARY PEDESTRIAN ACCESS ROUTES - CURB RAMP OPTIONS T34 300

TEMPORARY WATER POLLUTION CONTROL

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY SILT FENCE) T51 301
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY STRAW BALE BARRIER) T52 302
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY COVER) T53 303
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY EROSION CONTROL BLANKET) T54 304
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY EROSION CONTROL BLANKET) T55 305
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY FIBER ROLL) T56 306
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CHECK DAM) T57 307
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ENTRANCE) T58 308
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONCRETE WASHOUT FACILITY) T59 309
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY REINFORCED SILT FENCE) T60 310
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION) T61 311
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION) T62 312
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION) T63 313
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION) T64 314
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY HIGH-VISIBILITY FENCE) T65 315
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY LARGE SEDIMENT BARRIER) T66 316
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ROADWAY) T67 317

BRIDGE DETAILS

BRIDGE DETAILS B0-1 318
BRIDGE DETAILS B0-3 319
BRIDGE DETAILS B0-5 320
BRIDGE DETAILS B0-13 321

PLAN TITLE PLAN No. PAGE

PILES

16" AND 24" CAST-IN-DRILLED-HOLE CONCRETE PILE B2-3 322
PILE DETAILS - CLASS 90 AND CLASS 140 ..... B2-5 323
PILE DETAILS - CLASS 200 ..... B2-8 324
LOAD TEST PILE DETAILS (1) B2-9 325
LOAD TEST PILE DETAILS (2) B2-10 326
LOAD TEST PILE DETAILS (3) B2-11 327

RETAINING WALLS

RETAINING WALL TYPE 1 (CASE 1) B3-1A 328
RETAINING WALL TYPE 1 (CASE 2) B3-1B 329
RETAINING WALL TYPE 1 (CASE 3) B3-1C 330
RETAINING WALL TYPE 1A (CASE 1) B3-3A 331
RETAINING WALL TYPE 1A (CASE 2) B3-3B 332
RETAINING WALL TYPE 5 (CASE 1) B3-4A 333
RETAINING WALL TYPE 5 (CASE 2) B3-4B 334
RETAINING WALL TYPE 5 (CASE 3) B3-4C 335
RETAINING WALL DETAILS NO. 1 ..... B3-5 336
RETAINING WALL DETAILS NO. 2 ..... B3-6 337
RETAINING WALL TYPE 6 (CASE 1) B3-7A 338
RETAINING WALL TYPE 6 (CASE 2) B3-7B 339
RETAINING WALL TYPE 6 DETAILS B3-7C 340

T-BEAM DETAILS

T-BEAM DETAILS B6-1 341
UTILITY OPENINGS - T-BEAM B6-10 342

JOINT SEALS

JOINT SEALS (MAXIMUM MOVEMENT RATING = 2") B6-21 343

BOX GIRDER DETAILS

BOX GIRDER DETAILS B7-1 344

DECK DRAINS

DECK DRAINS B7-5 345
DECK DRAINS - TYPES D-1 AND D-2 ..... B7-6 346
DECK DRAIN - TYPE D-3 ..... B7-7 347
DECK DRAINAGE DETAILS B7-8 348

UTILITY OPENING

UTILITY OPENING - BOX GIRDER B7-10 349
UTILITY DETAILS B7-11 350

PLAN TITLE PLAN No. PAGE

CAST-IN-PLACE POST-TENSIONED GIRDER

CAST-IN-PLACE POST-TENSIONED GIRDER DETAILS B8-5 351

STRUCTURE APPROACH

STRUCTURE APPROACH - TYPE N (30) B9-1 352
STRUCTURE APPROACH - TYPE R (30) B9-2 353
STRUCTURE APPROACH - TYPE R (10) B9-3 354
STRUCTURE APPROACH - TYPE EQ (10) B9-4 355
STRUCTURE APPROACH - SLAB DETAILS B9-5 356
STRUCTURE APPROACH - DRAINAGE DETAILS B9-6 357

CHAIN LINK RAILING, CABLE RAILING AND TUBULAR HAND RAILING

CHAIN LINK RAILING B11-7 358
CABLE RAILING B11-47 359
TUBULAR HANDRAILING B11-51 360
CHAIN LINK RAILING TYPE 7 ..... B11-52 361

BRIDGE CONCRETE BARRIERS

CONCRETE BARRIER TYPE 732 ..... B11-55 362
CONCRETE BARRIER TYPE 736 ..... B11-56 363
CONCRETE BARRIER TYPE 742 ..... B11-57 364
CONCRETE BARRIER TYPE 732SW (SHEET 1 OF 2) B11-58 365
CONCRETE BARRIER TYPE 732SW (SHEET 2 OF 2) B11-59 366
CONCRETE BARRIER TYPE 80 (SHEET 1 OF 2) B11-60 367
CONCRETE BARRIER TYPE 80 (SHEET 2 OF 2) B11-61 368
CONCRETE BARRIER TYPE 80SW (SHEET 1 OF 3) B11-62 369
CONCRETE BARRIER TYPE 80SW (SHEET 2 OF 3) B11-63 370
CONCRETE BARRIER TYPE 80SW (SHEET 3 OF 3) B11-64 371

BRIDGE METAL RAIL BARRIERS

CALIFORNIA ST-30 BRIDGE RAIL B11-65 372
CALIFORNIA ST-40 BRIDGE RAIL (SHEET 1 OF 2) B11-66 373
CALIFORNIA ST-40 BRIDGE RAIL (SHEET 2 OF 2) B11-67 374
CALIFORNIA ST-10 BRIDGE RAIL (SHEET 1 OF 3) B11-68 375
CALIFORNIA ST-10 BRIDGE RAIL (SHEET 2 OF 3) B11-69 376
CALIFORNIA ST-10 BRIDGE RAIL (SHEET 3 OF 3) B11-70 377
CALIFORNIA ST-20S BRIDGE RAIL (SHEET 1 OF 4) B11-71 378
CALIFORNIA ST-20S BRIDGE RAIL (SHEET 2 OF 4) B11-72 379
CALIFORNIA ST-20S BRIDGE RAIL (SHEET 3 OF 4) B11-73 380
CALIFORNIA ST-20S BRIDGE RAIL (SHEET 4 OF 4) B11-74 381
CALIFORNIA ST-70 BRIDGE RAIL (SHEET 1 OF 4) B11-75 382
CALIFORNIA ST-70 BRIDGE RAIL (SHEET 2 OF 4) B11-76 383
CALIFORNIA ST-70 BRIDGE RAIL (SHEET 3 OF 4) B11-77 384
CALIFORNIA ST-70 BRIDGE RAIL (SHEET 4 OF 4) B11-78 385

PLAN TITLE PLAN No. PAGE

STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING

STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING B14-1 386

COMMUNICATION AND SPRINKLER CONTROL CONDUITS (BRIDGE)

COMMUNICATION AND SPRINKLER CONTROL CONDUITS (CONDUIT LESS THAN 4") B14-3 387

WATER SUPPLY LINE (BRIDGE)

WATER SUPPLY LINE (BRIDGE) (PIPE SIZES LESS THAN 4") B14-4 388
WATER SUPPLY LINE (DETAILS) (PIPE SIZES LESS THAN 4") B14-5 389

SOUND WALLS

SOUND WALL MASONRY BLOCK ON FOOTING DETAILS (1) B15-1 390
SOUND WALL MASONRY BLOCK ON FOOTING DETAILS (2) B15-2 391
SOUND WALL MASONRY BLOCK ON PILE CAP DETAILS (1) B15-3 392
SOUND WALL MASONRY BLOCK ON PILE CAP DETAILS (2) B15-4 393
SOUND WALL MASONRY BLOCK ON PILE CAP DETAILS (3) B15-5 394
SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (1) B15-6 395
SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (2) B15-7 396
SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (3) B15-8 397
SOUND WALL MASONRY BLOCK MISCELLANEOUS DETAILS B15-9 398
SOUND WALL MASONRY BLOCK ON FOOTING OR PILE CAP - 5'-0" ACCESS GATE DETAILS (1) B15-10 399
SOUND WALL MASONRY BLOCK ON FOOTING OR PILE CAP - 5'-0" ACCESS GATE DETAILS (2) B15-11 400
SOUND WALL MASONRY BLOCK ON BARRIER - 5'-0" ACCESS GATE DETAILS (1) B15-12 401
SOUND WALL MASONRY BLOCK ON BARRIER - 5'-0" ACCESS GATE DETAILS (2) B15-13 402
SOUND WALL MASONRY BLOCK ACCESS GATE LOCKING DETAILS B15-14 403
SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER ON PILE FOOTING FOR SPANNING UTILITIES B15-15 404

ROADSIDE SIGNS

ROADSIDE SIGNS - TYPICAL INSTALLATION DETAILS NO. 1 ..... RS1 405
ROADSIDE SIGNS - WOOD POST - TYPICAL INSTALLATION DETAILS NO. 2 ..... RS2 406
ROADSIDE SIGNS - LAMINATED WOOD BOX POST - TYPICAL INSTALLATION DETAILS NO. 3 ..... RS3 407
ROADSIDE SIGNS - TYPICAL INSTALLATION DETAILS NO. 4 ..... RS4 408

OVERHEAD SIGNS (TRUSS)

OVERHEAD SIGNS - TRUSS, INSTRUCTIONS AND EXAMPLES S1 409
OVERHEAD SIGNS - TRUSS, SINGLE POST TYPE - POST TYPES II THRU IX S2 410
OVERHEAD SIGNS - TRUSS, SINGLE POST TYPE - BASE PLATE AND ANCHORAGE DETAILS S3 411

PLAN TITLE PLAN No. PAGE

OVERHEAD SIGNS (TRUSS) (CONTINUED)

OVERHEAD SIGNS - TRUSS, SINGLE POST TYPE -
STRUCTURAL FRAME MEMBERS DETAILS NO. 1 ..... S4 412
OVERHEAD SIGNS - TRUSS, SINGLE POST TYPE -
STRUCTURAL FRAME MEMBERS DETAILS NO. 2 ..... S5 413
OVERHEAD SIGNS - TRUSS, GUSSET PLATE DETAILS S6 414
OVERHEAD SIGNS - TRUSS, SINGLE POST TYPE -
ROUND PEDESTAL PILE FOUNDATION S8 415
OVERHEAD SIGNS - TRUSS, TWO POST TYPE -
POST TYPES I-S THROUGH VII-S S9 416
OVERHEAD SIGNS - TRUSS, TWO POST TYPE -
BASE PLATE AND ANCHORAGE DETAILS S10 417
OVERHEAD SIGNS - TRUSS, TWO POST TYPE -
STRUCTURAL FRAME MEMBERS S11 418
OVERHEAD SIGNS - TRUSS, STRUCTURAL FRAME DETAILS S12 419
OVERHEAD SIGNS - TRUSS, FRAME JUNCTURE DETAILS S13 420
OVERHEAD SIGNS - TRUSS, TWO POST TYPE -
ROUND PEDESTAL PILE FOUNDATION S15 421
OVERHEAD SIGNS - WALKWAY DETAILS NO. 1 ..... S16 422
OVERHEAD SIGNS - WALKWAY DETAILS NO. 2 ..... S17 423
OVERHEAD SIGNS - WALKWAY DETAILS NO. 3 ..... S17A 424
OVERHEAD SIGNS - WALKWAY SAFETY RAILING DETAILS S18 425
OVERHEAD SIGNS - TRUSS, SIGN MOUNTING DETAILS -
LAMINATED PANEL - TYPE A S19 426
OVERHEAD SIGNS - STEEL FRAMES - REMOVABLE SIGN PANEL FRAMES S20 427
OVERHEAD SIGNS - REMOVABLE SIGN PANEL FRAMES MOUNTING DETAILS S21 428
OVERHEAD SIGNS - TRUSS, REMOVABLE SIGN PANEL FRAMES -
110" AND 120" SIGN PANELS S22 429

OVERHEAD SIGNS (TUBULAR)

OVERHEAD SIGNS - TUBULAR, INSTRUCTIONS AND EXAMPLES S30 430
OVERHEAD SIGNS - TUBULAR, SINGLE POST TYPE -
LAYOUT AND PIPE SELECTION S31 431
OVERHEAD SIGNS - TUBULAR, TWO POST TYPE -
LAYOUT AND PIPE SELECTION S32 432
OVERHEAD SIGNS - TUBULAR, STRUCTURAL FRAME - DETAILS NO. 1 ..... S33 433
OVERHEAD SIGNS - TUBULAR, STRUCTURAL FRAME - DETAILS NO. 2 ..... S34 434
OVERHEAD SIGNS - TUBULAR, SINGLE AND TWO POST TYPE -
BASE PLATE AND ANCHORAGE DETAILS S35 435
OVERHEAD SIGNS - TUBULAR, SINGLE POST AND TWO POST TYPE -
SQUARE PEDESTAL PILE FOUNDATION S36 436
OVERHEAD SIGNS - TUBULAR, SINGLE POST AND TWO POST TYPE -
ROUND PEDESTAL PILE FOUNDATION S37 437

OVERHEAD SIGNS (LIGHTWEIGHT)

OVERHEAD SIGNS - LIGHTWEIGHT POST DETAILS S48 438
OVERHEAD SIGNS - LIGHTWEIGHT FOUNDATION DETAILS S49 439

PLAN TITLE PLAN No. PAGE

OVERHEAD SIGNS (LIGHTWEIGHT) (CONTINUED)

OVERHEAD SIGNS - LIGHTWEIGHT, EXTINGUISHABLE MESSAGE SIGN AND FLASHING BEACONS S50 440

OVERHEAD AND ROADSIDE SIGNS PANELS

OVERHEAD LAMINATED SIGN - SINGLE OR MULTIPLE PANEL (TYPE A, 1" THICK) S81 441
ROADSIDE LAMINATED SIGN - SINGLE OR MULTIPLE PANEL (TYPE B, 1" THICK) S82 442
ROADSIDE LAMINATED SIGN - SINGLE OR MULTIPLE PANEL (TYPE B, 2-1/2" THICK) S83 443
ROADSIDE LAMINATED SIGN - SINGLE OR MULTIPLE PANEL (TYPE H, 2-1/2" THICK) S84 444
SEAM CLOSURE, "H" SECTION EXTRUSION AND POST SPACING TABLES (MULTI-HORIZONTAL LAMINATED PANEL ALUMINUM SIGNS) S85 445
LAMINATED PANEL DETAILS (EXTRUSIONS FOR TYPE A, B AND H PANELS) S86 446
TYPE A-1 MOUNTING HARDWARE FOR OVERHEAD LAMINATED TYPE A PANEL (TRUSS AND LIGHTWEIGHT SIGN STRUCTURES) S87 447
TYPE A-2 MOUNTING HARDWARE FOR OVERHEAD LAMINATED TYPE A PANEL (BRIDGE MOUNTED AND TUBULAR SIGN STRUCTURES) S88 448
ROADSIDE SIGN - FORMED SINGLE SHEET ALUMINUM PANEL S89 449
CHANNEL AND BOLT HOLE LOCATION FOR OVERHEAD FORMED SIGN PANEL S90 450
OVERHEAD SIGN - FORMED SIGN PANEL, TYPE A-3 MOUNTING HARDWARE S91 451
OVERHEAD SIGN - FORMED SIGN PANEL S92 452
FRAMING DETAILS FOR FRAMED SINGLE SHEET ALUMINUM SIGNS, RECTANGULAR SHAPE S93 453
ROADSIDE FRAMED SINGLE SHEET ALUMINUM SIGNS, RECTANGULAR SHAPE S94 454
ROADSIDE SINGLE SHEET ALUMINUM SIGNS, DIAMOND SHAPE S95 455

OVERHEAD SIGN - CHANGEABLE MESSAGE SIGN (MODEL 500)

OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, LAYOUT, UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S101 456
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, STRUCTURAL FRAME DETAILS, UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S102 457
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, PLAN AND UPPER BOLT DETAILS, UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S103 458
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, FRAME JUNCTURE DETAILS, UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S104 459
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, LAYOUT, BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S105 460
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, STRUCTURAL FRAME DETAILS, BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S106 461

PLAN TITLE PLAN No. PAGE

OVERHEAD SIGN - CHANGEABLE MESSAGE SIGN (MODEL 500) (CONTINUED)

OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, PLAN AND UPPER BOLT DETAILS, BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S107 462
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, FRAME JUNCTURE DETAILS, BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S108 463
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, LAYOUT, FULL CANTILEVER CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S109 464
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, STRUCTURAL FRAME DETAILS, FULL CANTILEVER CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S110 465
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, PLAN AND UPPER BOLT DETAILS, FULL CANTILEVER CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S111 466
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, FRAME JUNCTURE DETAILS, FULL CANTILEVER CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S112 467
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, MOUNTING DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S113 468
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, WALKWAY DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S114 469
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, ANCHORAGE AND BASE PLATE DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S115 470
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, FOUNDATION AND MISCELLANEOUS DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 ..... S116 471

OVERHEAD SIGN - CHANGEABLE MESSAGE SIGN (MODEL 500 AND 510)
WALKWAY SAFETY RAILING AND GUSSET PLATE DETAILS

OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, WALKWAY SAFETY RAILING DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 AND 510 ..... S140 472
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, SAFETY CABLE ANCHORAGE DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 AND 510 ..... S141 473
OVERHEAD SIGN - TRUSS, SINGLE POST TYPE, GUSSET PLATE DETAILS, CHANGEABLE MESSAGE SIGNS, MODEL 500 AND 510 ..... S142 474

ELECTRICAL SYSTEMS - LEGEND AND ABBREVIATIONS

ELECTRICAL SYSTEMS (LEGEND) ES-1A 475
ELECTRICAL SYSTEMS (LEGEND) ES-1B 476
ELECTRICAL SYSTEMS (LEGEND AND ABBREVIATIONS) ES-1C 477

ELECTRICAL SYSTEMS - SERVICE EQUIPMENT AND WIRING DIAGRAMS

ELECTRICAL SYSTEMS (SERVICE EQUIPMENT) ES-2A 478
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE, TYPE II SERIES) ES-2B 479
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE NOTES, TYPE III SERIES) ES-2C 480
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III - A SERIES) ES-2D 481

PLAN TITLE PLAN No. PAGE

ELECTRICAL SYSTEMS - SERVICE EQUIPMENT AND WIRING DIAGRAMS (CONTINUED)

ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III - B SERIES) ES-2E 482
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM TYPE III - C SERIES) ES-2F 483
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM TYPE III - D SERIES) ES-2G 484

ELECTRICAL SYSTEMS - CONTROLLER CABINETS

ELECTRICAL SYSTEMS (CONTROLLER CABINET DETAILS) ES-3A 485
ELECTRICAL SYSTEMS (CONTROLLER CABINET ADAPTER, FOUNDATIONS, AND PAD DETAILS) ES-3B 486
ELECTRICAL SYSTEMS (CONTROLLER CABINET FOUNDATION AND PAD DETAILS) ES-3C 487
ELECTRICAL SYSTEMS (CONTROLLER CABINET FOUNDATION AND PAD DETAILS) ES-3C1 488
ELECTRICAL SYSTEMS (CONTROLLER CABINET FOUNDATION DETAILS) ES-3C2 489

ELECTRICAL SYSTEMS - TELEPHONE DEMARCATION CABINETS

ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE A) ES-3D 490
ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE B) ES-3E 491
ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE C) ES-3F 492
ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE C DETAILS) ES-3G 493

ELECTRICAL SYSTEMS - IRRIGATION CONTROLLER ENCLOSURE CABINET

ELECTRICAL SYSTEMS (IRRIGATION CONTROLLER ENCLOSURE CABINET) ES-3H 494

ELECTRICAL SYSTEMS - ELECTRONICS ASSEMBLY CONNECTION DIAGRAMS

ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM WITH BYPASS CONTROL LINE) ES-3I 495
ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM WITH BYPASS CONTROL LINE) ES-3J 496
ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM WITHOUT BYPASS CONTROL LINE) ES-3K 497
ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM WITHOUT BYPASS CONTROL LINE) ES-3L 498

ELECTRICAL SYSTEMS - SIGNAL HEADS, SIGNAL FACES AND MOUNTINGS

ELECTRICAL SYSTEMS (SIGNAL HEADS AND MOUNTINGS) ES-4A 499
ELECTRICAL SYSTEMS (PEDESTRIAN SIGNAL HEADS) ES-4B 500
ELECTRICAL SYSTEMS (SIGNAL HEADS AND MOUNTINGS) ES-4C 501
ELECTRICAL SYSTEMS (SIGNAL HEAD MOUNTING) ES-4D 502

PLAN TITLE PLAN No. PAGE

ELECTRICAL SYSTEMS - SIGNAL HEADS, SIGNAL FACES AND MOUNTINGS (CONTINUED)

ELECTRICAL SYSTEMS (SIGNAL HEADS AND OPTICAL DETECTOR MOUNTING) ES-4E 503

ELECTRICAL SYSTEMS - DETECTORS

ELECTRICAL SYSTEMS (LOOP DETECTORS) ES-5A 504
ELECTRICAL SYSTEMS (DETECTORS) ES-5B 505
ELECTRICAL SYSTEMS (ACCESSIBLE PEDESTRIAN SIGNAL AND PUSH BUTTON ASSEMBLIES) ES-5C 506
ELECTRICAL SYSTEMS (CURB AND SHOULDER TERMINATION, TRENCH, AND HANDHOLE DETAILS) ES-5D 507

ELECTRICAL SYSTEMS - LIGHTING STANDARDS

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 15 AND 21) ES-6A 508
ELECTRICAL SYSTEMS (ELECTROLIER ANCHORAGE AND GROUTING FOR TYPE 15 AND TYPE 21, BARRIER RAIL MOUNTED) ES-6B 509
ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 5 AND 10, OVERHEAD SIGN MOUNTED) ES-6C 510
ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 15D AND 21D, DOUBLE LUMINAIRE MAST ARM) ES-6D 511
ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 30 AND 31) ES-6E 512
ELECTRICAL SYSTEMS (LIGHTING STANDARD, SLIP BASE PLATE) ES-6F 513
ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPE 32) ES-6G 514

ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARD, TYPE TS, AND PUSH BUTTON ASSEMBLY POST

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, TYPE TS, AND PUSH BUTTON ASSEMBLY POST) ES-7A 515

ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARDS

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, TYPE 1 AND EQUIPMENT IDENTIFICATION CHARACTERS) ES-7B 516
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 1 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 30') ES-7C 517
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 2 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 30') ES-7D 518
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 3 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 45') ES-7E 519
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 4 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 25' TO 45') ES-7F 520

PLAN TITLE PLAN No. PAGE

ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARDS (CONTINUED)

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 5 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 50' TO 55') ES-7G 521
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 5 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 60' TO 65') ES-7H 522

ELECTRICAL SYSTEMS - FLASHING BEACONS

ELECTRICAL SYSTEMS (FLASHING BEACON ON A TYPE 1, TYPE 15-FBS AND TYPE 40 STANDARD) ES-7J 523
ELECTRICAL SYSTEMS (FLASHING BEACON WITH TYPE 9, 9A AND 9B SIGN) ES-7K 524
ELECTRICAL SYSTEMS (FLASHING BEACON WITH TYPE 9, 9A AND 9B SIGN) ES-7L 525

ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARD DETAILS

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL NO. 1) ES-7M 526
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL NO. 2) ES-7N 527
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL NO. 3) ES-7O 528

ELECTRICAL SYSTEMS - INTERNALLY ILLUMINATED STREET NAME SIGN

ELECTRICAL SYSTEMS (INTERNALLY ILLUMINATED STREET NAME SIGN) ES-7P 529

ELECTRICAL SYSTEMS - PEDESTRIAN BARRICADES

ELECTRICAL SYSTEMS (PEDESTRIAN BARRICADES) ES-7Q 530

ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING, MISCELLANEOUS ATTACHMENT

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING, MISCELLANEOUS ATTACHMENT) ES-7R 531

ELECTRICAL SYSTEMS - PULL BOX

ELECTRICAL SYSTEMS (NON-TRAFFIC PULL BOX) ES-8A 532
ELECTRICAL SYSTEMS (TRAFFIC PULL BOX) ES-8B 533
ELECTRICAL SYSTEMS (SPLICE VAULTS) ES-8C 534

ELECTRICAL SYSTEMS - STRUCTURE INSTALLATIONS

ELECTRICAL SYSTEMS (STRUCTURE PULL BOX INSTALLATIONS) ES-9A 535
ELECTRICAL SYSTEMS (CONDUIT RISER AND EXPANSION FITTING, STRUCTURE INSTALLATIONS) ES-9B 536
ELECTRICAL SYSTEMS (STRUCTURE PULL BOX) ES-9C 537
ELECTRICAL SYSTEMS (STRUCTURE PULL BOX INSTALLATIONS) ES-9D 538

PLAN TITLE PLAN No. PAGE

ELECTRICAL SYSTEMS - STRUCTURE INSTALLATIONS (CONTINUED)

ELECTRICAL SYSTEMS (FLUSH-MOUNTED SOFFIT, PENDANT SOFFIT AND WALL-MOUNTED LUMINAIRE, STRUCTURE INSTALLATIONS) ES-9E 539
ELECTRICAL SYSTEMS (FLUSH-MOUNTED SOFFIT LUMINAIRE DETAILS) ES-9F 540

ELECTRICAL SYSTEMS - ISOFOOTCANDLE CURVES AND FOUNDATION DETAILS

ELECTRICAL SYSTEMS (ISOFOOTCANDLE CURVES) ES-10A 541
ELECTRICAL SYSTEMS (ISOFOOTCANDLE CURVES) ES-10B 542
ELECTRICAL SYSTEMS (FOUNDATION INSTALLATIONS) ES-11 543

ELECTRICAL SYSTEMS - SPLICE INSULATION METHODS, FUSE RATING, KINKING AND BANDING DETAILS

ELECTRICAL SYSTEMS (SPLICE INSULATION METHODS DETAILS) ES-13A 544
ELECTRICAL SYSTEMS (FUSE RATING, KINKING AND BANDING DETAIL) ES-13B 545

ELECTRICAL SYSTEMS - EXTINGUISHABLE MESSAGE SIGN

ELECTRICAL SYSTEMS (LED EXTINGUISHABLE MESSAGE SIGN, 10" LETTERS) ES-14A 546
ELECTRICAL SYSTEMS (CONTROL ASSEMBLY WIRING DIAGRAMS) ES-14B 547
ELECTRICAL SYSTEMS (EXTINGUISHABLE MESSAGE SIGN ON A FULL CANTILEVER) ES-14C 548

ELECTRICAL SYSTEMS - SIGN ILLUMINATION EQUIPMENT AND CONTROLS

ELECTRICAL SYSTEMS (SIGN ILLUMINATION EQUIPMENT) ES-15A 549
ELECTRICAL SYSTEMS (SIGN ILLUMINATION EQUIPMENT) ES-15C 550
ELECTRICAL SYSTEMS (LIGHTING AND SIGN ILLUMINATION CONTROL) ES-15D 551

ELECTRICAL SYSTEMS - CLOSED CIRCUIT TELEVISION POLE AND FOUNDATION DETAILS

ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 5' TO 15' OVERHEAD SIGN MOUNTED POLE) ES-16A 552
ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 25' TO 45' POLE) ES-16B 553
ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 50' TO 90' HIGH MAST POLE) ES-16C 554
ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION WITH VEHICLE DETECTION SYSTEM, 30' TO 40' POLE) ES-16D 555

ELECTRICAL SYSTEMS - FIBER OPTIC DETAILS

ELECTRICAL SYSTEMS (FIBER OPTIC MARKER DETAILS) ES-17A 556

TEMPORARY WOOD POLES

TEMPORARY WOOD POLES - GENERAL NOTES ES-18A 557
TEMPORARY WOOD POLES - NON-GUYED - NO SIGNALS ON SPANS ES-18B 558
TEMPORARY WOOD POLES - GUYED - NO SIGNALS ON SPANS ES-18C 559

PLAN TITLE PLAN No. PAGE

TEMPORARY WOOD POLES (CONTINUED)

TEMPORARY WOOD POLES - GUYED - WITH SIGNAL FACES ON SPANS ES-18D 560
TEMPORARY WOOD POLES - NON-GUYED - WITH SIGNAL FACES ON SPAN ES-18E 561
TEMPORARY WOOD POLES - DETAILS NO. 1 ..... ES-19A 562
TEMPORARY WOOD POLES - DETAILS NO. 2 ..... ES-19B 563
TEMPORARY WOOD POLES - DETAILS NO. 3 ..... ES-19C 564
TEMPORARY WOOD POLES - DETAILS NO. 4 ..... ES-19D 565
TEMPORARY WOOD POLES - DETAILS NO. 5 ..... ES-19E 566

A

AB	AGGREGATE BASE
ABBC	ASBESTOS BONDED BITUMINOUS COATED
ABM	AIR-BLOWN MORTAR
Abn	ABANDON
ABS	ACRYLONITRILE-BUTADIENE-STYRENE
Abut	ABUTMENT
AC	ASPHALT CONCRETE
AC+	UNGROUNDED CONDUCTOR
ACB	ASPHALT CONCRETE BASE
ACC	ARMOR-CLAD CONDUCTORS
ACP	ASBESTOS CEMENT PIPE
Adj	ADJUST, ADJUSTABLE, ADJACENT
ADL	ADDED DEAD LOAD
ADT	AVERAGE DAILY TRAFFIC
AFES	ALTERNATIVE FLARED END SECTION
Ahd	AHEAD
AIC	AUXILIARY IRRIGATION CONTROLLER
Alt	ALTERNATE, ALTERNATIVE
AM	TIME FROM MIDNIGHT TO NOON
Amend	AMENDMENT
AP	ALTERNATIVE PIPE
APC	ALTERNATIVE PIPE CULVERT
Approx	APPROXIMATE
APS	ACCESSIBLE PEDESTRIAN SIGNAL
APU	ALTERNATIVE PIPE UNDERDRAIN
ARS	ACCELERATION RESPONSE SPECTRUM
ARV	AIR RELEASE VALVE
AS	AGGREGATE SUBBASE
ASP	ALTERNATIVE SLOTTED PIPE
ASRP	ALUMINUM SPIRAL RIB PIPE
Assy	ASSEMBLY
ATPB	ASPHALT TREATED PERMEABLE BASE
ATPM	ASPHALT TREATED PERMEABLE MATERIAL
Auto	AUTOMATIC
Aux	AUXILIARY
AVB	ATMOSPHERIC VACUUM BREAKER
Ave	AVENUE
Avg	AVERAGE

B

B & B	BALLED AND BURLAPPED
BAGR	BRIDGE APPROACH GUARD RAILING
Batt	BATTERY
BB	BEGINNING OF BRIDGE
B/B	BRASS/BRONZE
B/B/Pl	BRASS/BRONZE/PLASTIC
B-B	BACK-TO-BACK
BBS	BATTERY BACKUP SYSTEM
BC	BEGIN HORIZONTAL CURVE, BOLT CIRCLE
BCR	BEGIN CURB RETURN
Beg	BEGIN
BFM	BONDED FIBER MATRIX
Bit Ctd	BITUMINOUS COATED
Bk	BACK
Bkf	BACKFILL
Bldg	BUILDING
Blk	BLACK
BLM	BRIDGE-LOG MILE
Blvd	BOULEVARD
BM	BENCH MARK
BMP	BEST MANAGEMENT PRACTICE
Bot	BOTTOM

B continued

BP	BOOSTER PUMP, BYPASS
BPA	BACKFLOW PREVENTER ASSEMBLY
BPB	BICYCLE PUSH BUTTON
BPE	BACKFLOW PREVENTER ENCLOSURE
B/Pl	BRASS/PLASTIC
Br	BRIDGE
Brg	BEARING
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BVC	BEGIN VERTICAL CURVE
BW	BARBED WIRE

C

C	CONDUIT, CHANNEL (STRUCTURAL STEEL SHAPE)
CAA	CABLE ANCHOR ASSEMBLY
CAP	CORRUGATED ALUMINUM PIPE
CAPA	CORRUGATED ALUMINUM PIPE ARCH
CARV	COMBINATION AIR RELEASE VALVE
CAS	CONSTRUCTION AREA SIGN
CB	CONCRETE BARRIER, CIRCUIT BREAKER, COUPLING BAND, COMPOST BERM
CBW	CONCRETE BLOCK WALL
C-C	CENTER TO CENTER
CCA	CAM COUPLER ASSEMBLY
CCTV	CLOSED CIRCUIT TELEVISION
CEC	CONTROLLER ENCLOSURE CABINET
CG	CENTER OF GRAVITY
CHDPE	CORRUGATED HIGH DENSITY POLYETHYLENE
Chnl	CHANNEL
CI	CAST IRON
CIDH	CAST-IN-DRILLED-HOLE
CIP	CAST-IN-PLACE, CAST IRON PIPE
CIPCP	CAST IN PLACE CONCRETE PIPE
CISS	CAST-IN-STEEL-SHELL
CJP	COMPLETE JOINT PENETRATION
Ckt	CIRCUIT
CL	CHAIN LINK
CL-6	CHAIN LINK FENCE (6 FT)
Cl	CLASS
Clr	CLEAR, CLEARANCE
CM	CENTER MARGIN LIGHT
CMP	CORRUGATED METAL PIPE
CMS	CHANGEABLE MESSAGE SIGN
CNC	CONTROL AND NEUTRAL CONDUCTORS
Cntl	CONTROL
Co	COUNTY
Col	COLUMN
Comm	COMMUNICATION
Conc	CONCRETE
Conn	CONNECTOR
Const	CONSTRUCT, CONSTRUCTION
Cont	CONTINUOUS
Coord	COORDINATE
CP	CANDLEPOWER, CATCH POINT, COPPER PIPE

C continued

Cr	CREEK
CRCP	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
CRSP	CONCRETED ROCK SLOPE PROTECTION
CS	COMPOST SOCK
CSP	CORRUGATED STEEL PIPE
CSPA	CORRUGATED STEEL PIPE ARCH
CST	CENTER STRIP
Ct	COURT
CTB	CEMENT TREATED BASE
CTID	CALTRANS IDENTIFICATION
CTPB	CEMENT TREATED PERMEABLE BASE
CTPM	CEMENT TREATED PERMEABLE MATERIAL
Ctrs	CENTERS
Culv	CULVERT
CV	CHECK VALVE

D

D	DEPTH, DIRECTION (IN PERCENT) OF HEAVIER TRAFFIC FLOW
Dbl	DOUBLE
DD	DOWNDRAIN
Deg	DEGREE
Del	DELINEATOR
Det	DETAIL, DETOUR
DF	DOUGLAS FIR
DG	DECOMPOSED GRANITE
DHV	DESIGN HOURLY VOLUME
DI	DRAINAGE INLET, DROP INLET
Dia	DIAMETER
Diaph	DIAPHRAGM
DIP	DUCTILE IRON PIPE
Dist	DISTANCE, DISTRICT
DIT	DRIP IRRIGATION TUBING
DLC	LOOP DETECTOR LEAD-IN CABLE
DMBB	DOUBLE METAL BEAM BARRIER
DN	DIAMETER NOMINAL
Dr	DRIVE
DTBB	DOUBLE THRIE BEAM BARRIER
DVA	DRIP VALVE ASSEMBLY
Dwy	DRIVEWAY

E

E	EAST
Ease	EASEMENT
EB	END OF BRIDGE, EASTBOUND
EC	END HORIZONTAL CURVE, EROSION CONTROL
ECR	END CURB RETURN
ECTC	EROSION CONTROL TECHNOLOGY COUNCIL
ED	EDGE DRAIN
EDC	EDGE DRAIN CLEANOUT
EDO	EDGE DRAIN OUTLET
EDV	EDGE DRAIN VENT
Elec	ELECTROLIER
Elect	ELECTRIC, ELECTRICAL
Elev	ELEVATION

E continued

Ell	ELBOW
Emb	EMBANKMENT
EMS	EXTINGUISHABLE MESSAGE SIGN
Encl	ENCLOSURE
Engr	ENGINEER
EOD	EDGE OF DECK
EP	EDGE OF PAVEMENT
Eq	EQUATION
ERS	EARTH RETAINING STRUCTURE
ES	EDGE OF SHOULDER
ESA	ENVIRONMENTALLY SENSITIVE AREA
ESAL	EQUIVALENT SINGLE AXLE LOADS
EST	END STRIP
Estb	ESTABLISHMENT
ETW	EDGE OF TRAVELED WAY
EVC	END VERTICAL CURVE
EVUC	EMERGENCY VEHICLE UNIT CABLE
EVUD	EMERGENCY VEHICLE UNIT DETECTOR
EW	ENDWALL
Exc	EXCAVATION
Exist	EXISTING
Exp	EXPANSION
Exp Jt	EXPANSION JOINT
Ext	EXTERIOR
Exwy	EXPRESSWAY

F

F	FILL, FULL CIRCLE
F & C	FRAME AND COVER
F & G	FRAME AND GRATE
FB	FLOOR BEAM, FLASHING BEACON
FBCA	FLASHING BEACON CONTROL ASSEMBLY
FBS	FLASHING BEACON WITH SLIP BASE
FCV	FLOW CONTROL VALVE
Fdn	FOUNDATION
FEBT	FACING EASTBOUND TRAFFIC
Fert	FERTILIZER
FES	FLARED END SECTION
FF	FILTER FABRIC
FG	FINISH GRADE
FH	FIRE HYDRANT, FLEXIBLE HOSE
Fig	FIGURE
FIPT	FEMALE IRON PIPE THREAD
FIS	FERTILIZER INJECTOR SYSTEM
FL	FLOW LINE
FNBT	FACING NORTHBOUND TRAFFIC
FO	FIBER OPTIC
FOB	FREE ON BOARD
FOC	FACE OF CONCRETE
F/P	FULL/PART CIRCLE
FR	FIBER ROLL
Fr Rd	FRONTAGE ROAD
FS	FAR SIDE, FINISHED SURFACE, FLOW SENSOR
FSBT	FACING SOUTHBOUND TRAFFIC
FSC	FLOW SENSOR CABLE
Ftg	FOOTING
FV	FLUSH VALVE
FWBT	FACING WESTBOUND TRAFFIC
Fwy	FREEWAY

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Grace M. Tsushima
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Grace M. Tsushima — No. C49814 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

GENERAL RULES:

1. Words are preferred over abbreviations and acronyms.
2. Use words in notes, except where space is limited on the plan sheet.
3. Do not use abbreviations or acronyms where the meaning may be in doubt.
4. Abbreviations and acronyms may be used in callouts, dimensions, and tables.
5. Use upper and lower case letters for abbreviation of a single word.
   e.g., Misc = miscellaneous
   and Bit Ctd = bituminous coated
6. Use all upper case letters for acronyms.
   e.g., BCR = begin curb return

UNITS OF MEASUREMENT:

1. See Tables A, B and C on Standard Plan A3C.
2. Units of measurement are not part of abbreviations and acronyms. The above abbreviation and acronym general rules do not apply.

SYMBOLS:

1. See Table D on Standard Plan A3C.

SLOPES, FLARES, AND TAPERS:

1. Side slopes:
   X:Y - horizontal:vertical
2. Flares and tapers:
   X:Y - longitudinal:lateral

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ABBREVIATIONS (SHEET 1 OF 3)

A3A

2018 STANDARD PLAN A3A

1-26-18

Return to Table of Contents

G

G	GROOVE, EQUIPMENT GROUNDING CONDUCTOR
g	ACCELERATION DUE TO GRAVITY
Ga	GAUGE
Galv	GALVANIZED
GARV	GARDEN VALVE
GARVA	GARDEN VALVE ASSEMBLY
GB	GROUND BUS
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GM	GRAVEL MULCH
GP	GRADING PLANE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GUARD RAILING
Grn	GREEN
GSP	GALVANIZED STEEL PIPE
Gtr	GUTTER
GV	GATE VALVE

H

H	HEIGHT, HALF CIRCLE
HAR	HIGHWAY ADVISORY RADIO
h, hr	HOUR
HD	HORIZONTAL DRAIN
HDPE	HIGH DENSITY POLYETHYLENE
hdwl	HEADWALL
Hex	HEXAGONAL
Hex Hd	HEXAGONAL HEAD
HMA	HOT MIX ASPHALT
Horiz	HORIZONTAL
HOV	HIGH OCCUPANCY VEHICLE
HP	HINGE POINT, HORSEPOWER
HPL	HIGH PRESSURE LINE
HPS	HIGH PERFORMANCE STEEL, HIGH PRESSURE SODIUM
HS	HIGH STRENGTH
HSS	HOLLOW STRUCTURAL SECTION
HW	HEADWALL, HIGH WATER
HWM	HIGH WATER MARK
Hwy	HIGHWAY

I

IB	IMPORTED BORROW
IC	IRRIGATION CONTROLLER
ICC	IRRIGATION CONTROLLER(S) IN CONTROLLER ENCLOSURE CABINET
ID	INSIDE DIAMETER
IF	INSIDE FACE
IFS	IRRIGATION FILTRATION SYSTEM
IISNS	INTERNALLY ILLUMINATED STREET NAME SIGN
Int	INTERIOR
Inv	INVERT
IPS	IRON PIPE SIZE
IPT	IRON PIPE THREAD
Irr	IRRIGATION
ISL	INDUCTION SIGN LIGHTING

J

Jct	JUNCTION
JP	JOINT POLE
JPCP	JOINTED PLAIN CONCRETE PAVEMENT
JS	JUNCTION STRUCTURE
Jt	JOINT

K

L

L	LENGTH, ANGLE (STRUCTURAL STEEL SHAPE)
Lat	LATITUDE
LCB	LEAN CONCRETE BASE
LED	LIGHT EMITTING DIODE
LMA	LUMINAIRE MAST ARM
Ln	LANE
Loc	LOCATION
LOL	LAYOUT LINE
Long	LONGITUDE
Longit	LONGITUDINAL
LPS	LOW PRESSURE SODIUM
LS	LUMP SUM
Lt	LEFT
Ltg	LIGHTING
Lum	LUMINAIRE

M

M	METERED
Maint	MAINTENANCE
MAS	MAST ARM MOUNTING SIDE ATTACHMENT
MAT	MAST ARM MOUNTING TOP ATTACHMENT
Max	MAXIMUM
MB	METAL BEAM
MBB	METAL BEAM BARRIER
MBGR	METAL BEAM GUARD RAILING
MBPS	MANUAL BYPASS SWITCH
MCV	MANUAL CONTROL VALVE
Med	MEDIAN
MGS	MIDWEST GUARDRAIL SYSTEM
MH	MANHOLE
MIC	MASTER IRRIGATION CONTROLLER
Min	MINIMUM
MIPT	MALE IRON PIPE THREAD
Misc	MISCELLANEOUS
Misc I & S	MISCELLANEOUS IRON AND STEEL
Mkr	MARKER
M/M	MULTIPLE TO MULTIPLE TRANSFORMER
Mod	MODIFIED, MODIFY
Mon	MONUMENT
MP	METAL PLATE
MPGR	METAL PLATE GUARD RAILING
MR	MOVEMENT RATING
MSE	MECHANICALLY STABILIZED EMBANKMENT
Mt	MOUNTAIN, MOUNT
Mtg	MOUNTING
Mtl	MATERIAL
MV	MERCURY VAPOR LIGHTING FIXTURE
MVDS	MICROWAVE VEHICLE DETECTION SYSTEM
MVP	MAINTENANCE VEHICLE PULLOUT

N

N	NORTH, NEUTRAL (GROUNDED CONDUCTOR)
NB	NORTHBOUND, NEUTRAL BUS
NC	NORMALLY CLOSE

N continued

NCN	NO COMMON NAME
NL	NOZZLE LINE
NO	NORMALLY OPEN
No.	NUMBER (MUST HAVE PERIOD)
Nos.	NUMBERS (MUST HAVE PERIOD)
NPS	NOMINAL PIPE SIZE
NPT	NATIONAL PIPE THREAD
NS	NEAR SIDE
NTS	NOT TO SCALE

O

Oblr	OBLITERATE
OC	OVERCROSSING
O/C	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OG	ORIGINAL GROUND
OGAC	OPEN GRADED ASPHALT CONCRETE
OGFC	OPEN GRADED FRICTION COURSE
OH	OVERHEAD
OHWM	ORDINARY HIGH WATER MARK
OL	OVERLAP
O-O	OUT TO OUT
Opp	OPPOSITE
OSD	OVERSIDE DRAIN

P

P	PAGE, PITCH, PART CIRCLE, NUMBER OF POLES FOR A CIRCUIT BREAKER
PAP	PERFORATED ALUMINUM PIPE
PB	PULL BOX
PBA	PUSH BUTTON ASSEMBLY
PC	POINT OF CURVATURE, PRECAST
PCC	POINT OF COMPOUND CURVE, PORTLAND CEMENT CONCRETE
PCMS	PORTABLE CHANGEABLE MESSAGE SIGN
PCP	PERFORATED CONCRETE PIPE, PRESTRESSED CONCRETE PIPE
PCVC	POINT OF COMPOUND VERTICAL CURVE
PE	POLYETHYLENE
PEC	PERMIT TO ENTER AND CONSTRUCT, PHOTOELECTRIC CONTROL
Ped	PEDESTRIAN
Ped OC	PEDESTRIAN OVERCROSSING
Ped UC	PEDESTRIAN UNDERCROSSING
Perm Mtl	PERMEABLE MATERIAL
PEU	PHOTOELECTRIC UNIT
PG	PROFILE GRADE
PI	POINT OF INTERSECTION
PJP	PARTIAL JOINT PENETRATION
Pkt	PACKET
Pkwy	PARKWAY

P continued

PL	PLATE
Pl	PLASTIC
P/L	PROPERTY LINE
PLS	PURE LIVE SEED
Plt	PLANT, PLANTING
Plt Estb	PLANT ESTABLISHMENT
PM	POST MILE, TIME FROM NOON TO MIDNIGHT
PN	PAVING NOTCH
POC	POINT OF HORIZONTAL CURVE
POT	POINT OF TANGENT
POVC	POINT OF VERTICAL CURVE
PP	PIPE PILE, PLASTIC PIPE, POWER POLE
PPL	PREFORMED PERMEABLE LINER
PPP	PERFORATED PLASTIC PIPE
PR	PRESSURE RATED
PRC	POINT OF REVERSE CURVE
PRF	PAVEMENT REINFORCING FABRIC
PRLV	PRESSURE RELIEF VALVE
PRV	PRESSURE REGULATING VALVE
PRVC	POINT OF REVERSE VERTICAL CURVE
PS&E	PLANS, SPECIFICATIONS AND ESTIMATES
PS	PRESTRESSED
P/S	PRESTRESSED
PSP	PERFORATED STEEL PIPE
PT	POINT OF TANGENCY, CONDUIT WITH PULL TAPE
PTR	POWER TRANSFER RELAY
PVC	POLYVINYL CHLORIDE
Pvmt	PAVEMENT

Q

Q	QUARTER CIRCLE
QCV	QUICK COUPLING VALVE
Qty	QUANTITY

R

R	RADIUS
R & D	REMOVE AND DISPOSE
R & S	REMOVE AND SALVAGE
R/C	RATE OF CHANGE
RCA	REINFORCED CONCRETE ARCH
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RCPA	REINFORCED CONCRETE PIPE ARCH
RCV	REMOTE CONTROL VALVE
RCVM	REMOTE CONTROL VALVE (MASTER)
RCVMF	REMOTE CONTROL VALVE (MASTER) W/FLOW SENSOR
RCVP	REMOTE CONTROL VALVE W/PRESSURE REGULATOR
RCW	RECYCLED WATER
Rd	ROAD
Rdwy	ROADWAY
RE	RELOCATED EQUIPMENT
RECP	ROLLED EROSION CONTROL PRODUCT
Reinf	REINFORCED, REINFORCEMENT, REINFORCING

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Grace M. Tsushima
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Grace M. Tsushima — No. C49814 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ABBREVIATIONS (SHEET 2 OF 3)

2018 STANDARD PLAN A3B

A3B

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Grace M. Tsushima
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Grace M. Tsushima — No. C49814 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

R continued

Rel	RELOCATE
Repl	REPLACEMENT
Req	REQUIRED
Ret	RETAINING
Rev	REVISED, REVISION
RHMA	RUBBERIZED HOT MIX ASPHALT
RICS	REMOTE IRRIGATION CONTROL SYSTEM
Riv	RIVER
RM	ROAD-MIXED, RAMP METERING
RP	RADIUS POINT, REFERENCE POINT
RR	RAILROAD
RSP	ROCK SLOPE PROTECTION, REVISED STANDARD PLAN
Rt	RIGHT
Rte	ROUTE
RW	REDWOOD, RETAINING WALL
R/W	RIGHT OF WAY
RWIS	ROADSIDE WEATHER INFORMATION SYSTEM
Rwy	RAILWAY

S

S	SOUTH, SLIP, SUPPLEMENT
SAE	STRUCTURE APPROACH EMBANKMENT
Salv	SALVAGE
SAPP	STRUCTURAL ALUMINUM PLATE PIPE
SB	SOUTHBOUND, SLIP BASE
SC	SAND CUSHION
S/C	SAW CUT LINE
Sch	SCHEDULE
SCSP	SLOTTED CORRUGATED STEEL PIPE
SD	STORM DRAIN
Sec	SECOND, SECTION
Sep	SEPARATION
SG	SUBGRADE
Shld	SHOULDER
Sht	SHEET
SIC	SIGNAL INTERCONNECT CABLE
Sig	SIGNAL
Sim	SIMILAR
SM	SELECTED MATERIAL
SMA	SIGNAL MAST ARM
SNS	STREET NAME SIGN
SP	STAND PIPE, SERVICE POINT
Spec	SPECIAL, SPECIFICATION(S)
SPP	SLOTTED PLASTIC PIPE

S continued

Sq	SQUARE
SS	SLOPE STAKE
SSBM	STRAP AND SADDLE BRACKET METHOD
SSD	STRUCTURAL SECTION DRAIN
SSPA	STRUCTURAL STEEL PLATE ARCH
SSPP	STRUCTURAL STEEL PLATE PIPE
SSPPA	STRUCTURAL STEEL PLATE PIPE ARCH
SSRP	STEEL SPIRAL RIB PIPE
SST	SIDE STRIP
St	STREET
Sta	STATION
STBB	SINGLE THRIE BEAM BARRIER
Std	STANDARD
Str	STRUCTURE
Surf	SURFACING
SW	SIDEWALK, SOUND WALL
Swr	SEWER
Sym	SYMMETRICAL
S4S	SURFACE 4 SIDES

T

T	SEMI-TANGENT, THIRD CIRCLE, THREAD, TRUCK TRAFFIC VOLUME (IN PERCENT) OF DESIGN HOURLY VOLUME
Tan	TANGENT
TB	TERMINAL BOARD
TBB	THRIE BEAM BARRIER
Tbr	TIMBER
T&B	TOP AND BOTTOM
TCB	TRAFFIC CONTROL BOX
TCE	TEMPORARY CONSTRUCTION EASEMENT
TDC	TELEPHONE DEMARCATION CABINET
Temp	TEMPORARY, TEMPERATURE, TEMPERED
TG	TOP OF GRADE
TI	TRAFFIC INDEX
TLS	TRUCK LOADING STAND PIPE
TMS	TRAFFIC MONITORING STATION
TOS	TRAFFIC OPERATIONS SYSTEM
Tot	TOTAL
TP	TELEPHONE POLE
TPB	TREATED PERMEABLE BASE
TPM	TREATED PERMEABLE MATERIAL
TQ	THREE-QUARTER CIRCLE
Trans	TRANSITION
TRM	TURF REINFORCEMENT MAT
TS	TRANSVERSE, TRAFFIC SIGNAL, TUBULAR STEEL
TT	TWO-THIRDS CIRCLE
TWSA	TREE WELL SPRINKLER ASSEMBLY
Typ	TYPICAL

U

UC	UNDERCROSSING
UD	UNDERDRAIN
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
UP	UNDERPASS
UPS	UNINTERRUPTIBLE POWER SUPPLY
UPSC	UNINTERRUPTIBLE POWER SUPPLY CONTROLLER
UPSM	UPS MODE

V

V	VALVE, DESIGN SPEED
Var	VARIABLE, VARIES
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
Veh	VEHICLE
Vert	VERTICAL
Via	VIADUCT
VIVDS	VIDEO IMAGE VEHICLE DETECTION SYSTEM
Vol	VOLUME

W

W	WEST, WIDTH
W/	WITH
W/O	WITHOUT
WB	WESTBOUND
WH	WEEP HOLE
Wht	WHITE
WIM	WEIGH-IN-MOTION
WM	WIRE MESH, WATER METER
WS	WATER SURFACE, WYE STRAINER
WSA	WYE STRAINER ASSEMBLY
WSP	WELDED STEEL PIPE
Wt	WEIGHT
WV	WATER VALVE
WW	WINGWALL
WWLOL	WINGWALL LAYOUT LINE
WWM	WELDED WIRE MESH

X

Xfmr	TRANSFORMER
X Sec	CROSS SECTION
Xing	CROSSING

Y

Yr	YEAR
Yrs	YEARS

Z

UNITS OF MEASUREMENT:

Some of the units used in the project plan quantity tables and in the Bid Item List are:

TABLE A

UNIT	DEFINITION
ACRE	ACRE
CF	CUBIC FOOT
CY	CUBIC YARD
EA	EACH
GAL	GALLON
LB	POUND
LF	LINEAR FOOT
LNMI	LANE MILE
LS	LUMP SUM
SQFT	SQUARE FOOT
SQYD	SQUARE YARD
STA	100 FEET
TON	2,000 POUNDS

Some of the units used in the plans other than in the project plan quantity tables are:

TABLE B

UNIT	DEFINITION
ksi	KIPS PER SQUARE INCH
ksf	KIPS PER SQUARE FOOT
psi	POUNDS PER SQUARE INCH
psf	POUNDS PER SQUARE FOOT
lb/ft^3, pcf	POUNDS PER CUBIC FOOT
tsf	TONS PER SQUARE FOOT
mph, MPH *	MILES PER HOUR
oz	OUNCE
lb	POUND
kip	1,000 POUNDS
cal	CALORIE
ft	FOOT OR FEET
gal	GALLON

* For use on a sign panel only

Some of the units used in the Electrical plans are:

TABLE C

UNIT	DEFINITION
A	AMPERE
bps	BITS PER SECOND
Bps	BYTES PER SECOND
FC	FOOT-CANDLE
Hz	HERTZ
K *	KILO
kV	KILOVOLT
kVA	KILOVOLT-AMPERE
kW	KILOWATT
M *	MEGA
m *	MILLI
mA	MILLIAMPERE
min	MINUTE
p *	PICO
s	SECOND
V	VOLT
VA	VOLT-AMPERE
V(dc)	VOLT (DIRECT CURRENT)
V(ac)	VOLT (ALTERNATING CURRENT)
W	WATT
Ω	OHM
μ *	MICRO

* Prefix to a unit

SYMBOLS:

Commonly used symbols for U.S. customary units

TABLE D

SYMBOL	DEFINITION
@	AT
℄	CENTERLINE
ø	NOMINAL DIAMETER, DIAMETER, PHASE
ℙ	PLATE
ℒ	STATIONLINE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ABBREVIATIONS (SHEET 3 OF 3)

A3C

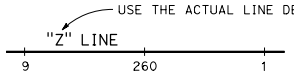
1-26-18

2018 STANDARD PLAN A3C

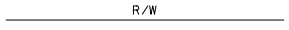
3

Return to Table of Contents

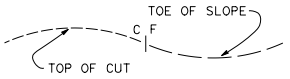
SYMBOLOGY FOR DESIGN FEATURES



ALIGNMENT LINE
(STATION LINE)

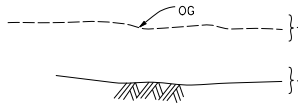


RIGHT OF WAY LINE
(POSITION LABEL OUTSIDE OF CALTRANS R/W)
(NO LEADER LINE OR ARROWHEAD IS NEEDED)

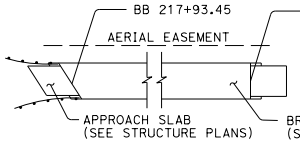


CATCH LINE FOR CUT AND FILL SLOPES

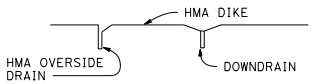
FINISHED GRADE LINE *(USE SOLID LINE)*



(USED FOR PROFILES AND TYPICAL SECTIONS)
ORIGINAL GROUND LINE
(MAY BE USED ON DETAIL SHEETS)

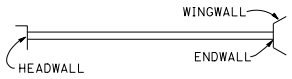


STRUCTURE (BRIDGE)

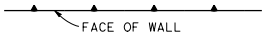


DIKE, DOWNDRAIN AND OVERSIDE DRAIN

PIPE CULVERT - SINGLE LINE
(36" OR LESS IN DIAMETER)
(PLUS - OTHER DRAINAGE FEATURES)

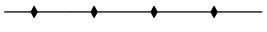


PIPE CULVERT - TWO LINES
(GREATER THAN 36" TO 6' IN DIAMETER
PLUS - OTHER DRAINAGE FEATURES)
(OVER 6' IN DIAMETER, DRAW TO SCALE)


WALL

WALL ON BARRIER

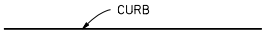
WALL ON RETAINING WALL


CONCRETE (MEDIAN) BARRIER

NEW GUARDRAIL

DOUBLE THRIE BEAM BARRIER

TEMPORARY RAILING (TYPE K)



CURB WITHOUT GUTTER

CURB WITH GUTTER
(CURB-LIP, FLOW LINE, TOP-BACK
OF CURB)

FENCE

EXISTING WALL - USE ONLY WHEN
WORK IS TO BE PERFORMED ON
EXISTING WALL *(DO NOT DROP OUT)*

EXISTING GUARDRAIL - USE ONLY
WHEN WORK IS TO BE PERFORMED ON
EXISTING RAILING *(DO NOT DROP OUT)*

EXISTING CONCRETE BARRIER - USE
ONLY WHEN WORK IS TO BE PERFORMED
ON EXISTING BARRIER *(DO NOT DROP OUT)*

SOLID TRAFFIC LINE

BROKEN TRAFFIC LINE

CURB RAMP

DIRECTION OF TRAFFIC
(ARROWS ARE TO BE HOLLOW)

STRIPING AND SIGNING

ROADSIDE SIGN - ONE POST, TWO POSTS (EMBEDDED)

ROADSIDE SIGN - ATTACHED TO ELECTROLIER, SIGNAL STANDARD,
SIGN STRUCTURE POST OR BARRIER

EXISTING ROADSIDE SIGN - ONE POST, TWO POSTS (EMBEDDED)

OVERHEAD SIGN - ONE POST

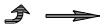
OVERHEAD SIGN - TWO POST

SYMBOL FOR ROADSIDE SIGN NUMBER

SYMBOL FOR OVERHEAD SIGN NUMBERING

SYMBOL FOR TRAFFIC LINE DETAIL

SYMBOL FOR DELINEATOR OR OBJECT MARKER


PAVEMENT MARKING ARROWS
(ARROWS ARE TO BE HATCHED)

BEGIN OR END OF TRAFFIC STRIPE

TRANSITION FROM ONE TRAFFIC STRIPE TO ANOTHER

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Subrahmanyam S. Nujella
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Subrahmanyam S. Nujella
No. C68518
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND
LINES AND SYMBOLS
(SHEET 1 OF 5)

NO SCALE

A10A

1-26-18

2018 STANDARD PLAN A10A

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Subrahmanyam S. Nujella
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Subrahmanyam S. Nujella — No. C68518 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

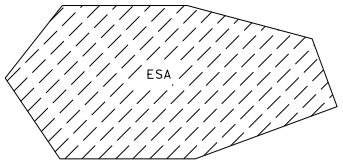
WATER POLLUTION CONTROL

- Temp HIGH-VISIBILITY FENCE (THVF)
- Temp SILT FENCE (TSF)
- Temp Reinf SILT FENCE (TRSF)
- Temp FIBER ROLL (TFR)
- Temp GRAVEL BAG BERM (TGBB)
- Temp STRAW BALE BARRIER (TSBB)
- Temp SLOPE DRAIN FLEX PIPE
- Temp EARTH BERM
- Temp DITCH/SWALE
- Temp CONCRETE WASHOUT (WASH)
- Temp DRAINAGE INLET PROTECTION
- Temp DRAINAGE OUTLET PROTECTION
- Temp CHECK DAM
- Temp CONSTRUCTION ENTRANCE
- Temp STOCKPILE (SP)

BOUNDARY LINE

- STATE OR COUNTRY
- COUNTY OR RESERVATION BOUNDARY
- CITY OR MILITARY BOUNDARY
- FOREST
- SUBDIVISION, SECTION, GRANT
- RANCHO

ENVIRONMENTALLY SENSITIVE AREA (ESA)



DRAINAGE

- DIRECTION FLOW OF WATER
- DRAINAGE SYSTEM SYMBOL
- DRAINAGE UNIT SYMBOL
- DRAINAGE INLET
- DITCH FLOW LINE

DRAFTING

- TILDE - DESIGNATES AN AREA
- NORTH ARROW
- ADDENDUM SHEET SYMBOL (#) *(ADDENDUM NUMBER IS INCLUDED INSIDE THE SYMBOL)*
- MATCH LINE
- BREAK LINE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND
LINES AND SYMBOLS
(SHEET 2 OF 5)

NO SCALE

A10B

2018 STANDARD PLAN A10B

5

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Subrahmanyam S. Nujella
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Subrahmanyam S. Nujella — No. C68518 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

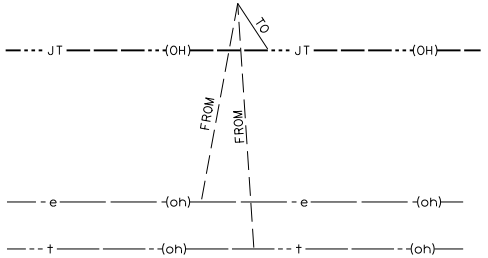
SUBSURFACE FACILITIES

- NEW WATER
- Exist WATER
- NEW NATURAL GAS
- Exist NATURAL GAS
- NEW SEWER
- Exist SEWER
- NEW ELECTRICAL
- Exist ELECTRICAL
- NEW TELEPHONE
- Exist TELEPHONE
- NEW GASOLINE
- Exist GASOLINE
- NEW OIL
- Exist OIL
- NEW TELEVISION
- Exist TELEVISION
- NEW STEAM
- Exist STEAM
- NEW TELEMETER CABLE
- Exist TELEMETER CABLE
- NEW STORM DRAIN
- Exist STORM DRAIN
- NEW FIBER OPTIC
- Exist FIBER OPTIC
- NEW JOINT TRENCH
- Exist JOINT TRENCH
- NEW RECYCLED WATER
- Exist RECYCLED WATER
- Exist IRRIGATION CONDUIT
- Exist ELECTRICAL SYSTEMS CONDUIT

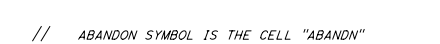
OVERHEAD FACILITIES

- NEW ELECTRICAL
- Exist ELECTRICAL
- NEW TELEMETER CABLE
- Exist TELEMETER CABLE
- NEW TELEPHONE
- Exist TELEPHONE
- NEW TELEVISION
- Exist TELEVISION
- NEW FIBER OPTIC
- Exist FIBER OPTIC
- NEW JOINT OVERHEAD
- Exist JOINT OVERHEAD

SHOWING THE RELOCATION OF EXISTING FACILITIES TO THE NEW LOCATION



ABANDONED FACILITY



// *ABANDON SYMBOL IS THE CELL "ABANDN"*

THERE ARE LINE STYLES FOR ABANDONED UNDERGROUND UTILITIES IN THE CALTRANS LINE STYLE RESOURCE FILE (ctlstyle-553.rsc)

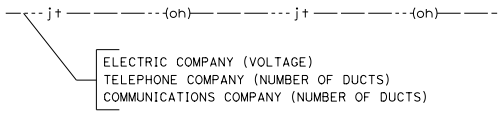
NOTE:

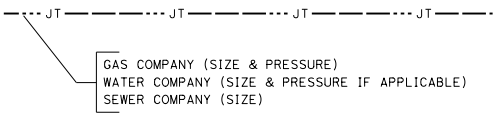
IDENTIFY (LABEL) THE OWNER OF EACH FACILITY PLUS THE SIZE, PRESSURE AND VOLTAGE (IF APPLICABLE) FOR ALL FACILITIES (WHETHER PART OF A JOINT OVERHEAD, JOINT TRENCH OR SOLO INSTALLATION).

THE TYPE OF FACILITY IS IDENTIFIED BY THE SYMBOLOGY OF THE LINE STYLE CHOSEN (SEE LINE STYLES ON THIS STANDARD PLAN SHEET).

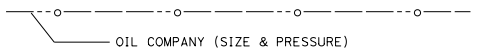
WHEN USING THE JOINT OVERHEAD OR JOINT TRENCH SYMBOLOGY (SEE THE CALTRANS LINE STYLES ON THIS PAGE), USE A BRACKET TO GROUP AND LABEL ALL THE FACILITIES ASSOCIATED WITH THE JOINT OVERHEAD OR TRENCH (SEE THE EXAMPLES BELOW).

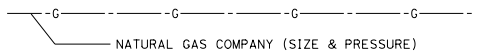
JOINT OVERHEAD/TRENCH





SOLO FACILITY





STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND

LINES AND SYMBOLS (SHEET 3 OF 5)

NO SCALE

A10C

2018 STANDARD PLAN A10C

1-26-18

Return to Table of Contents

EXISTING UTILITY POINT FEATURES

THE LEVEL AND COLOR OF AN EXISTING UTILITY POINT FEATURE SYMBOL MATCHES THE UTILITY TYPE LINE STYLE THAT IT IS ASSOCIATED WITH. THE NAME OF THE STANDARD CELLS FOR EACH SYMBOL VARY SLIGHTLY ACCORDING TO THE FACILITY TYPE [e.g., ut-MH-SEWER, ut-MH-GAS]. MULTIPLE VERSIONS OF A PARTICULAR SYMBOL REPRESENTING AN EXISTING UTILITY POINT FEATURE IS USED WHEN EACH IS ASSOCIATED WITH A DIFFERENT FACILITY [e.g., POWER POLE FOR OVERHEAD-ELECTRICAL, TELEPHONE, FIBER OPTIC, JOINT, ETC.]. THIS DIFFERENTIATION FACILITATES ASSET MANAGEMENT OF EXISTING UTILITY FEATURES WITHIN THE CALTRANS RIGHT OF WAY.

EXISTING UTILITY CELL SYMBOLOGY REPRESENTING UTILITY POINT FEATURES

ATTRIBUTES (METADATA) FOR UTILITY FEATURES WILL BE LOCATED IN UTILITY DATABASE. ONLY AS-BUILT FACILITIES ARE IN THE UTILITY DATABASE. UTILITY DATABASE DOES NOT INCLUDE NEW FACILITIES TO BE CONSTRUCTED.

CABINET:
ELECTRICAL, FIBER OPTIC, TELECOMMUNICATION, TELEPHONE, TELEVISION

DRAINAGE INLET:
SEWER, STORM DRAIN

FIRE HYDRANT:
WATER

LAMP POST:
ELECTRICAL

METER:
ELECTRICAL, NATURAL GAS, WATER

MANHOLE:
ELECTRICAL, FIBER OPTIC, GAS, JOINT FACILITY, NATURAL GAS, OIL, RECYCLED WATER, SEWER, STEAM, STORM DRAIN, TELECOMMUNICATION, TELEPHONE, TELEVISION, WATER

PULL BOX:
ELECTRICAL, FIBER OPTIC, JOINT FACILITY, TELECOMMUNICATION, TELEPHONE, TELEVISION

POWER POLE:
ELECTRICAL, FIBER OPTIC, JOINT FACILITY, TELECOMMUNICATION, TELEPHONE, TELEVISION

TRANSMISSION TOWER:
ELECTRICAL, FIBER OPTIC, JOINT FACILITY, TELECOMMUNICATION, TELEPHONE, TELEVISION

VALVE:
WATER, NATURAL GAS

VENT:
GAS, NATURAL GAS, SEWER, STEAM

VAULT:
ELECTRICAL, JOINT FACILITY

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Subrahmanyam S. Nujella
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Subrahmanyam S. Nujella
No. C68518
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

POSITIVE LOCATION

POSITIVE LOCATION SYMBOL IDENTIFYING THE POTHOLING NUMBER

POTHOLING SYMBOL MARKING THE EXACT LOCATION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND
LINES AND SYMBOLS
(SHEET 4 OF 5)

NO SCALE

A10D

2018 STANDARD PLAN A10D

7

1-26-18

Return to Table of Contents

TOPOGRAPHIC MAPPING LINES AND SYMBOLS

TOPOGRAPHIC MAPPING IS DROPPED OUT ON FINAL CONTRACT PLANS

- CURB
- LANE STRIPE
- EDGE OF TRAVELED WAY (STATE HIGHWAY)
- EDGE OF TRAVELED WAY (OTHER)
- EDGE OF ASPHALT (SHOULDER)
- CONCRETE
- GUARDRAIL
- MEDIAN BARRIER
- FENCE
- MASONRY WALL
- MASONRY WALL AND FENCE
- RETAINING WALL
- RETAINING WALL AND FENCE
- RETAINING WALL AND MASONRY WALL
- FLOWLINE (NATURAL AND MANMADE)
- EDGE OF BODY OF WATER, SURFACE HATCHED AND SPOT ELEVATION ON SURFACE (73.9)
- DECK BUILDING COVERED PORCH OR PARKING (DECK)
- DIRT PILE, ROCK (DP, R)
- POOL, SPA (POOL (P), SPA (S))
- TREES, BRUSH, OR VEGETATION OVER ½ CONTOUR INTERVAL IN HEIGHT
- VINEYARD ROW
- CATTLE GUARD
- OVERHEAD SIGN - SINGLE POST
- OVERHEAD SIGN - TWO POST
- TRAIL
- DIRT ROAD (DIRT)

SYMBOLS

ENLARGED FOR CLARITY

- LEFT TURN LANE ARROW
- HOV LANE (HIGH OCCUPANCY VEHICLE)
- DROP INLET, ROUND DROP INLET
- MANHOLE
- FIRE HYDRANT
- VALVE COVER, STAND PIPE, WELL, UTILITY BOX, RAILROAD CROSSING STANDARD (VC, SP, WELL, UB, RS)
- UTILITY POLE, POLE AND WIRES, POLE WITH WIRES AND ANCHOR
- TRANSMISSION TOWER
- ELECTROLIER, ELECTROLIER ON POLE
- TRAFFIC SIGNAL, RAILROAD SIGNAL (TS, RS)
- CALL BOX
- SIGNS - SINGLE POST, TWO POSTS
- SINGLE TREE, PALM (P)
- MARSH OR SWAMP
- CRASH CUSHION (CC)
- TANK (TANK, T)
- VOID - OBSTRUCTED AREA, UNABLE TO OBTAIN GROUND INFORMATION PHOTOGRAMMETRICALLY

RAILROAD

- SCALE: 1" = 100'
- SCALE: 1" = 50', 1" = 20'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Subrahmanyam S. Nujella
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Subrahmanyam S. Nujella — No. C68518 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CONTROL POINTS

- HORIZONTAL AND VERTICAL CONTROL POINT
- HORIZONTAL CONTROL POINT
- VERTICAL CONTROL POINT

TOPOGRAPHY

- INDEX CONTOUR (180)
- INTERMEDIATE CONTOURS
- INDEX CONTOUR (170) (SCALE: 1" = 50')
- GNV CONTOUR (GROUND NOT VISIBLE)
- DEPRESSION CONTOUR
- GNV DEPRESSION CONTOUR
- SPOT ELEVATION (AT DECIMAL POINT) (657.2)

WATER WAYS

- RIVERS, STREAMS AND CREEKS - SMALL (ONE LINE)
- RIVERS, STREAMS AND CREEKS - LARGE (TWO LINES) (WHICH DEFINES THE WATER EDGE)
- OCEAN - (GRADUATED LINE WEIGHTS) (Land, Ocean)
- WATER EDGE, LAKE, POND, SWAMP

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND

LINES AND SYMBOLS

(SHEET 5 OF 5)

NO SCALE

A10E

2018 STANDARD PLAN A10E

8

1-26-18

Return to Table of Contents

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

CERTIFIED ENGINEERING GEOLOGIST

May 31, 2018
PLANS APPROVAL DATE

REGISTERED GEOLOGIST — CHRIS A. RISDEN — CERTIFIED ENGINEERING GEOLOGIST — No. 2541 Exp. 9-30-19 — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CEMENTATION

DESCRIPTION	CRITERIA
WEAK	CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE.
MODERATE	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE.
STRONG	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE.

ABBREVIATION:

GWS = Ground Water Surface

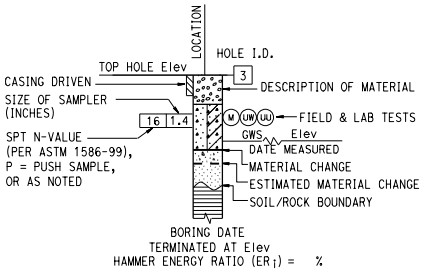
BOREHOLE IDENTIFICATION

SYMBOL	HOLE TYPE	DESCRIPTION
Size	A	AUGER BORING (HOLLOW OR SOLID STEM BUCKET)
Size	R	ROTARY DRILLED BORING (CONVENTIONAL)
	RW	ROTARY DRILLED WITH SELF-CASING WIRE-LINE
	RC	ROTARY CORE WITH CONTINUOUSLY-SAMPLED, SELF-CASING WIRE-LINE
	P	ROTARY PERCUSSION BORING (AIR)
Size	R	ROTARY DRILLED DIAMOND CORE
	RC	ROTARY DRILLED DIAMOND CORE, CONTINUOUSLY SAMPLED
Size	HD	HAND DRIVEN (1-INCH SOIL TUBE)
	HA	HAND AUGER
●	D	DYNAMIC CONE PENETRATION BORING
▲	CPT	CONE PENETRATION TEST (ASTM D 5778)
	O	OTHER (NOTE ON LOTB)

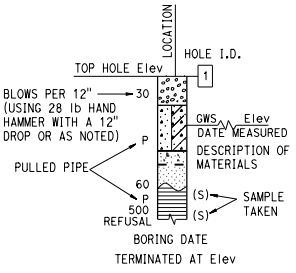
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

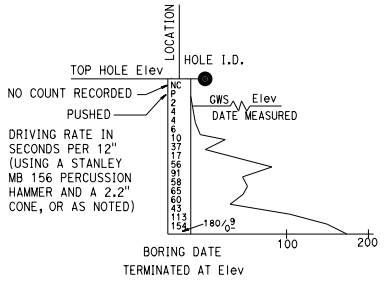
DESCRIPTION	SHEAR STRENGTH (tsf)	POCKET PENETROMETER MEASUREMENT, PP, (tsf)	TORVANE MEASUREMENT, TV, (tsf)	VANE SHEAR MEASUREMENT, VS, (tsf)
VERY SOFT	LESS THAN 0.12	LESS THAN 0.25	LESS THAN 0.12	LESS THAN 0.12
SOFT	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
MEDIUM STIFF	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
STIFF	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
VERY STIFF	1 - 2	2 - 4	1 - 2	1 - 2
HARD	GREATER THAN 2	GREATER THAN 4	GREATER THAN 2	GREATER THAN 2



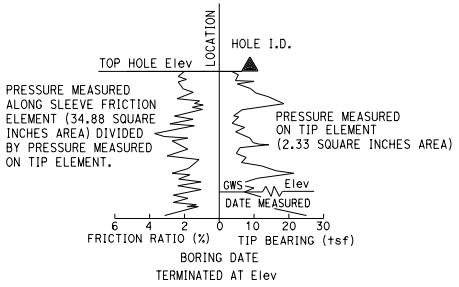
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND - SOIL (SHEET 1 OF 2)

NO SCALE

A10F

2018 STANDARD PLAN A10F

1-26-18

Return to Table of Contents

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

GRAPHIC/SYMBOL	GROUP NAMES
GW	WELL-GRADED GRAVEL WELL-GRADED GRAVEL WITH SAND
GP	POORLY-GRADED GRAVEL POORLY-GRADED GRAVEL WITH SAND
GW-GM	WELL-GRADED GRAVEL WITH SILT WELL-GRADED GRAVEL WITH SILT AND SAND
GW-GC	WELL-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) WELL-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GP-GM	POORLY-GRADED GRAVEL WITH SILT POORLY-GRADED GRAVEL WITH SILT AND SAND
GP-GC	POORLY-GRADED GRAVEL WITH CLAY (OR SILTY CLAY) POORLY-GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL WITH SAND
SW	WELL-GRADED SAND WELL-GRADED SAND WITH GRAVEL
SP	POORLY-GRADED SAND POORLY-GRADED SAND WITH GRAVEL
SW-SM	WELL-GRADED SAND WITH SILT WELL-GRADED SAND WITH SILT AND GRAVEL
SW-SC	WELL-GRADED SAND WITH CLAY (OR SILTY CLAY) WELL-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SP-SM	POORLY-GRADED SAND WITH SILT POORLY-GRADED SAND WITH SILT AND GRAVEL
SP-SC	POORLY-GRADED SAND WITH CLAY (OR SILTY CLAY) POORLY-GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
SM	SILTY SAND SILTY SAND WITH GRAVEL
SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND WITH GRAVEL
PT	PEAT
	COBBLES COBBLES AND BOULDERS BOULDERS

GRAPHIC/SYMBOL	GROUP NAMES
CL	LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL SANDY LEAN CLAY SANDY LEAN CLAY WITH GRAVEL GRAVELLY LEAN CLAY GRAVELLY LEAN CLAY WITH SAND
CL-ML	SILTY CLAY SILTY CLAY WITH SAND SILTY CLAY WITH GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY WITH GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY WITH SAND
ML	SILT SILT WITH SAND SILT WITH GRAVEL SANDY SILT SANDY SILT WITH GRAVEL GRAVELLY SILT GRAVELLY SILT WITH SAND
OL	ORGANIC LEAN CLAY ORGANIC LEAN CLAY WITH SAND ORGANIC LEAN CLAY WITH GRAVEL SANDY ORGANIC LEAN CLAY SANDY ORGANIC LEAN CLAY WITH GRAVEL GRAVELLY ORGANIC LEAN CLAY GRAVELLY ORGANIC LEAN CLAY WITH SAND
OL	ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT WITH GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT WITH SAND
CH	FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL SANDY FAT CLAY SANDY FAT CLAY WITH GRAVEL GRAVELLY FAT CLAY GRAVELLY FAT CLAY WITH SAND
MH	ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL SANDY ELASTIC SILT SANDY ELASTIC SILT WITH GRAVEL GRAVELLY ELASTIC SILT GRAVELLY ELASTIC SILT WITH SAND
OH	ORGANIC FAT CLAY ORGANIC FAT CLAY WITH SAND ORGANIC FAT CLAY WITH GRAVEL SANDY ORGANIC FAT CLAY SANDY ORGANIC FAT CLAY WITH GRAVEL GRAVELLY ORGANIC FAT CLAY GRAVELLY ORGANIC FAT CLAY WITH SAND
OH	ORGANIC ELASTIC SILT ORGANIC ELASTIC SILT WITH SAND ORGANIC ELASTIC SILT WITH GRAVEL SANDY ORGANIC ELASTIC SILT SANDY ORGANIC ELASTIC SILT WITH GRAVEL GRAVELLY ORGANIC ELASTIC SILT GRAVELLY ORGANIC ELASTIC SILT WITH SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL WITH SAND ORGANIC SOIL WITH GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL WITH GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL WITH SAND

FIELD AND LABORATORY TESTING

- (C) CONSOLIDATION (ASTM D2435)
- (CL) COLLAPSE POTENTIAL (ASTM D4546)
- (CP) COMPACTION CURVE (CTM 216)
- (CR) CORROSIVITY TESTING (CTM 643, CTM 422, CTM 417)
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D4767)
- (DS) DIRECT SHEAR (ASTM D3080)
- (EI) EXPANSION INDEX (ASTM D4829)
- (M) MOISTURE CONTENT (ASTM D2216)
- (OC) ORGANIC CONTENT-% (ASTM D2974)
- (P) PERMEABILITY (CTM 220)
- (PA) PARTICLE SIZE ANALYSIS (ASTM D422)
- (PI) PLASTICITY INDEX (AASHTO T 90) LIQUID LIMIT (AASHTO T 89)
- (PL) POINT LOAD INDEX (ASTM D5731)
- (PM) PRESSURE METER
- (R) R-VALUE (CTM 301)
- (SE) SAND EQUIVALENT (CTM 217)
- (SG) SPECIFIC GRAVITY (AASHTO T 100)
- (SL) SHRINKAGE LIMIT (ASTM D4943)
- (SW) SWELL POTENTIAL (ASTM D4546)
- (UC) UNCONFINED COMPRESSION-SOIL (ASTM D2166) UNCONFINED COMPRESSION-ROCK (ASTM D7012 - METHOD C)
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D2850)
- (UW) UNIT WEIGHT (ASTM D7263 - METHOD B)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

CERTIFIED ENGINEERING GEOLOGIST

May 31, 2018
PLANS APPROVAL DATE

REGISTERED GEOLOGIST CHRIS A. RISDEN CERTIFIED ENGINEERING GEOLOGIST No. 2541 Exp. 9-30-19 STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

APPARENT DENSITY OF COHESIONLESS SOILS

DESCRIPTION	SPT N_{60} (BLOWS / 12 INCHES)
VERY LOOSE	0 - 5
LOOSE	5 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	GREATER THAN 50

MOISTURE

DESCRIPTION	CRITERIA
DRY	NO DISCERNABLE MOISTURE
MOIST	MOISTURE PRESENT, BUT NO FREE WATER
WET	VISIBLE FREE WATER

PERCENT OR PROPORTION OF SOILS

DESCRIPTION	CRITERIA
TRACE	PARTICLES ARE PRESENT BUT ESTIMATED TO BE LESS THAN 5%
FEW	5% - 10%
LITTLE	15% - 25%
SOME	30% - 45%
MOSTLY	50% - 100%

PARTICLE SIZE

DESCRIPTION		SIZE
BOULDER		GREATER THAN 12"
COBBLE		3" - 12"
GRAVEL	COARSE	3/4" - 3"
	FINE	1/5" - 3/4"
SAND	COARSE	1/16" - 1/5"
	MEDIUM	1/64" - 1/16"
	FINE	1/300" - 1/64"
SILT AND CLAY		LESS THAN 1/300"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND - SOIL (SHEET 2 OF 2)

NO SCALE

A10G

2018 STANDARD PLAN A10G

1-26-18

Return to Table of Contents

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

CERTIFIED ENGINEERING GEOLOGIST

May 31, 2018
PLANS APPROVAL DATE

REGISTERED GEOLOGIST — CHRIS A. RISDEN — CERTIFIED ENGINEERING GEOLOGIST — No. 2541 Exp. 9-30-19 — STATE OF CALIFORNIA

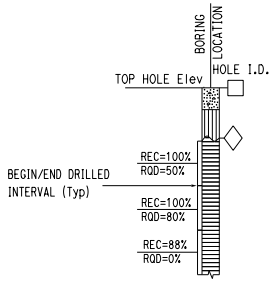
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{LENGTH OF THE RECOVERED CORE PIECES (INCHES)}}{\text{TOTAL LENGTH OF CORE RUN (INCHES)}} \times 100\%$$

$$RQD = \frac{\sum \text{LENGTH OF INTACT CORE PIECES} \geq 4 \text{ INCHES}}{\text{TOTAL LENGTH OF CORE RUN (INCHES)}} \times 100\%$$

RQD* INDICATES SOUDNESS CRITERIA NOT MET.



BEDDING SPACING

DESCRIPTION	THICKNESS / SPACING
MASSIVE	GREATER THAN 10′
VERY THICKLY BEDDED	3′ - 10′
THICKLY BEDDED	1′ - 3′
MODERATELY BEDDED	4" - 1′
THINLY BEDDED	1" - 4"
VERY THINLY BEDDED	1/4" - 1"
LAMINATED	LESS THAN 1/4"

LEGEND OF ROCK MATERIALS

IGNEOUS ROCK
SEDIMENTARY ROCK
METAMORPHIC ROCK

ROCK HARDNESS

DESCRIPTION	CRITERIA
EXTREMELY HARD	CANNOT BE SCRATCHED WITH A POCKETKNIFE OR SHARP PICK. CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS.
VERY HARD	CANNOT BE SCRATCHED WITH A POCKETKNIFE OR SHARP PICK. BREAKS WITH REPEATED HEAVY HAMMER BLOWS.
HARD	CAN BE SCRATCHED WITH A POCKETKNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE). BREAKS WITH HEAVY HAMMER BLOWS.
MODERATELY HARD	CAN BE SCRATCHED WITH POCKETKNIFE OR SHARP PICK WITH LIGHT OR MODERATE PRESSURE. BREAKS WITH MODERATE HAMMER BLOWS.
MODERATELY SOFT	CAN BE GROOVED 1/16 INCH DEEP WITH A POCKETKNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE. BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE.
SOFT	CAN BE GROOVED OR GOUGED EASILY BY A POCKETKNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL. BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE.
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH A POCKETKNIFE. BREAKS WITH LIGHT MANUAL PRESSURE.

FRACTURE DENSITY

DESCRIPTION	OBSERVED FRACTURE DENSITY
UNFRACTURED	NO FRACTURES.
VERY SLIGHTLY FRACTURED	CORE LENGTHS GREATER THAN 3 ft.
SLIGHTLY FRACTURED	CORE LENGTHS MOSTLY FROM 1 TO 3 ft.
MODERATELY FRACTURED	CORE LENGTHS MOSTLY FROM 4 INCHES TO 1 ft.
INTENSELY FRACTURED	CORE LENGTHS MOSTLY FROM 1 TO 4 INCHES.
VERY INTENSELY FRACTURED	MOSTLY CHIPS AND FRAGMENTS.

WEATHERING DESCRIPTORS FOR INTACT ROCK

DESCRIPTION	DIAGNOSTIC FEATURES					GENERAL CHARACTERISTICS
	CHEMICAL WEATHERING-DISCOLORATION AND/OR OXIDATION		MECHANICAL WEATHERING-GRAIN BOUNDARY CONDITIONS (DISAGGREGATION) PRIMARILY FOR GRANITICS AND SOME COARSE-GRAINED SEDIMENTS	TEXTURE AND LEACHING		
	BODY OF ROCK	FRACTURE SURFACES		TEXTURE	LEACHING	
FRESH	NO DISCOLORATION, NOT OXIDIZED.	NO DISCOLORATION OR OXIDATION.	NO SEPARATION, INTACT (TIGHT).	NO CHANGE	NO LEACHING	HAMMER RINGS WHEN CRYSTALLINE ROCKS ARE STRUCK.
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES; SOME FELDSPAR CRYSTALS ARE DULL.	MINOR TO COMPLETE DISCOLORATION OR OXIDATION OF MOST SURFACES.	NO VISIBLE SEPARATION, INTACT (TIGHT).	PRESERVED	MINOR LEACHING OF SOME SOLUBLE MINERALS.	HAMMER RINGS WHEN CRYSTALLINE ROCKS ARE STRUCK. BODY OF ROCK NOT WEAKENED.
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY," FELDSPAR CRYSTALS ARE "CLOUDY."	ALL FRACTURE SURFACES ARE DISCOLORED OR OXIDIZED.	PARTIAL SEPARATION OF BOUNDARIES VISIBLE.	GENERALLY PRESERVED	SOLUBLE MINERALS MAY BE MOSTLY LEACHED.	HAMMER DOES NOT RING WHEN ROCK IS STRUCK. BODY OF ROCK IS SLIGHTLY WEAKENED.
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; ALL FELDSPARS AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT; OR CHEMICAL ALTERATION PRODUCES IN-SITU DISAGGREGATION, SEE GRAIN BOUNDARY CONDITIONS.	ALL FRACTURE SURFACES ARE DISCOLORED OR OXIDIZED, SURFACES FRIABLE.	PARTIAL SEPARATION, ROCK IS FRIABLE; IN SEMIARID CONDITIONS GRANITICS ARE DISAGGREGATED.	TEXTURE ALTERED BY CHEMICAL DISINTEGRATION (HYDRATION, ARGILLATION).	LEACHING OF SOLUBLE MINERALS MAY BE COMPLETE.	DULL SOUND WHEN STRUCK WITH HAMMER, USUALLY CAN BE BROKEN WITH MODERATE TO HEAVY MANUAL PRESSURE OR BY LIGHT HAMMER BLOW WITHOUT REFERENCE TO PLANES OF WEAKNESS SUCH AS INCIPIENT OR HAIRLINE FRACTURES, OR VEINLETS. ROCK IS SIGNIFICANTLY WEAKENED.
DECOMPOSED	DISCOLORED OR OXIDIZED THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; ALL FELDSPARS AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY.		COMPLETE SEPARATION OF GRAIN BOUNDARIES (DISAGGREGATED).	RESEMBLES A SOIL, PARTIAL OR COMPLETE REMNANT ROCK STRUCTURE MAY BE PRESERVED; LEACHING OF SOLUBLE MINERALS USUALLY COMPLETE.		CAN BE GRANULATED BY HAND. RESISTANT MINERALS SUCH AS QUARTZ MAY BE PRESENT AS "STRINGERS" OR "DIKES."

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LEGEND - ROCK

NO SCALE

A10H

2018 STANDARD PLAN A10H

11

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

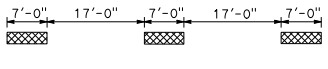
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

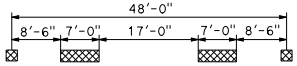
REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

CENTERLINES
(2 LANE HIGHWAYS)

DETAIL 1



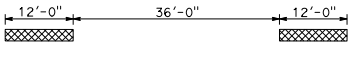
DETAIL 2



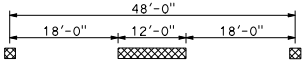
~~DETAIL 3~~ DETAIL 3 DELETED

~~DETAIL 4~~ DETAIL 4 DELETED

DETAIL 5



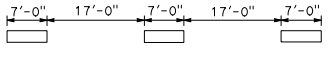
DETAIL 6



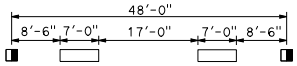
~~DETAIL 7~~ DETAIL 7 DELETED

LANELINES
(MULTILANE HIGHWAYS)

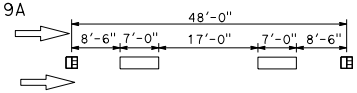
DETAIL 8



DETAIL 9

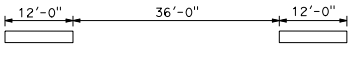


DETAIL 9A
SEE NOTE



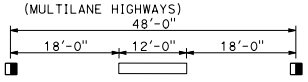
~~DETAIL 10~~ DETAIL 10 DELETED

DETAIL 11

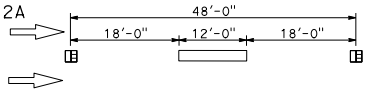


LANELINES (Cont)
(MULTILANE HIGHWAYS)

DETAIL 12



DETAIL 12A
SEE NOTE



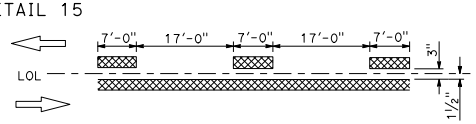
~~DETAIL 13~~ DETAIL 13 DELETED

~~DETAIL 14~~ DETAIL 14 DELETED

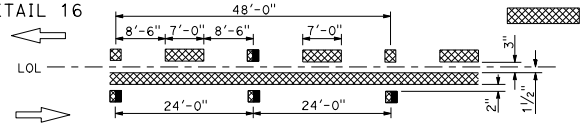
~~DETAIL 14A~~ DETAIL 14A DELETED

NO PASSING ZONES-ONE DIRECTION

DETAIL 15

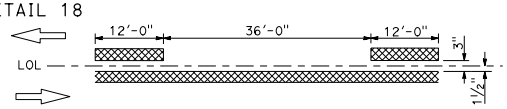


DETAIL 16

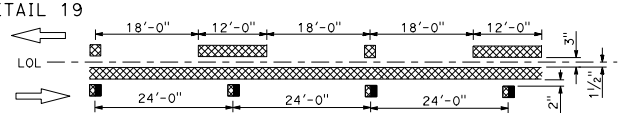


~~DETAIL 17~~ DETAIL 17 DELETED

DETAIL 18



DETAIL 19

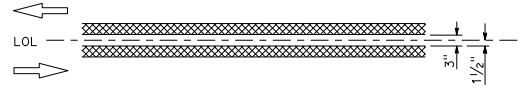


~~DETAIL 20~~ DETAIL 20 DELETED

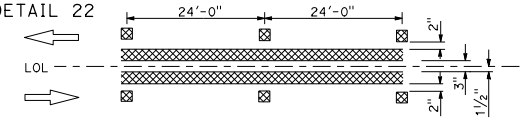
NOTE:
FOR FREEWAY APPLICATION ONLY

NO PASSING ZONES-TWO DIRECTION

DETAIL 21



DETAIL 22



~~DETAIL 23~~ DETAIL 23 DELETED

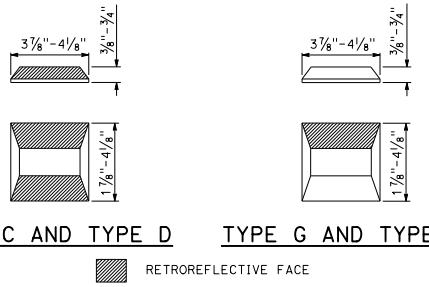
LEGEND

MARKERS

- TYPE C RED-CLEAR RETROREFLECTIVE
- TYPE D TWO-WAY YELLOW RETROREFLECTIVE
- TYPE G ONE-WAY CLEAR RETROREFLECTIVE
- TYPE H ONE-WAY YELLOW RETROREFLECTIVE

LINES

- 6" WHITE
- 6" YELLOW



TYPE C AND TYPE D — TYPE G AND TYPE H

RETROREFLECTIVE FACE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

NO SCALE

A20A

1-26-18

2018 STANDARD PLAN A20A

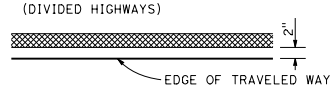
12

Return to Table of Contents

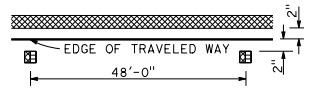
LEFT EDGELINES

(DIVIDED HIGHWAYS)

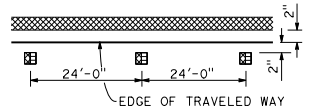
DETAIL 24



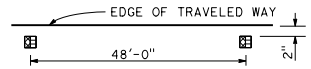
DETAIL 25



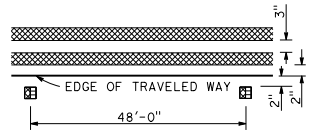
DETAIL 25A



DETAIL 26

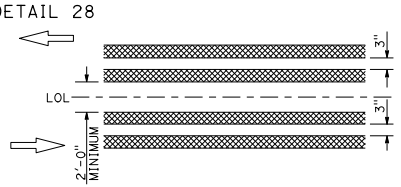


DETAIL 27

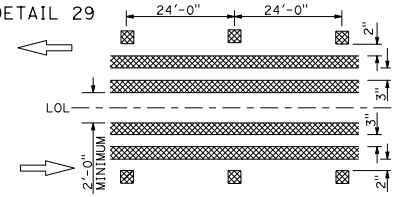


MEDIAN ISLANDS

DETAIL 28



DETAIL 29

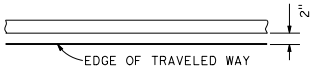


~~DETAIL 30~~ DETAIL 30 DELETED

RIGHT EDGELINES

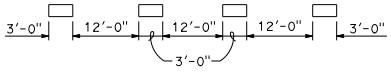
~~DETAIL 27A~~ DETAIL 27A DELETED

DETAIL 27B



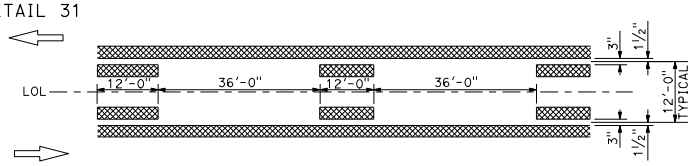
RIGHT EDGELINE EXTENSION THROUGH INTERSECTIONS

DETAIL 27C

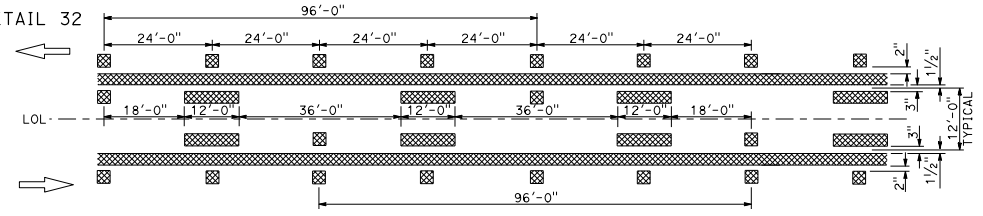


TWO-WAY LEFT TURN LANES

DETAIL 31



DETAIL 32



~~DETAIL 33~~ DETAIL 33 DELETED

LEGEND

MARKERS

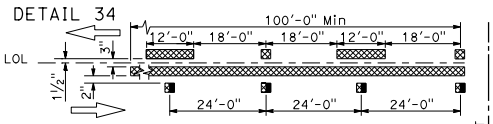
- TYPE D — TWO-WAY YELLOW RETROREFLECTIVE
- TYPE H — ONE-WAY YELLOW RETROREFLECTIVE
- TYPE RY — RED-YELLOW RETROREFLECTIVE

LINES

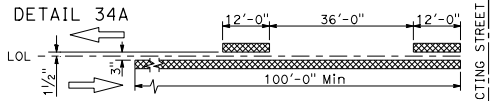
- 6" WHITE
- 6" YELLOW

INTERSECTION TREATMENTS

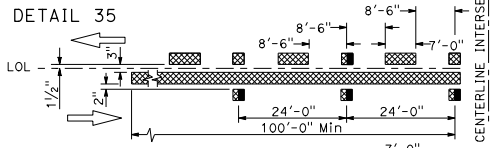
DETAIL 34



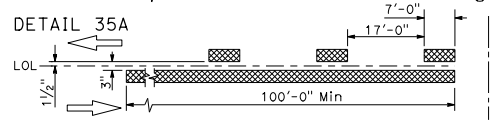
DETAIL 34A



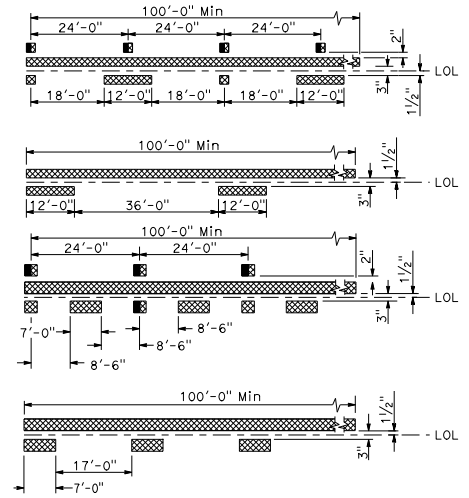
DETAIL 35



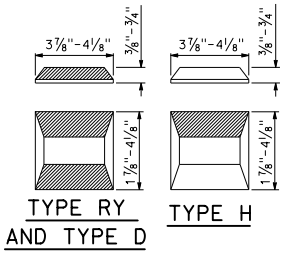
DETAIL 35A



CENTERLINE INTERSECTING STREET



MARKER DETAILS



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

NO SCALE

A20B

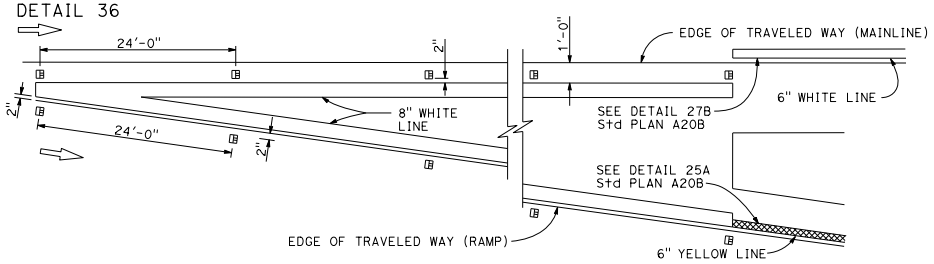
1-26-18

2018 STANDARD PLAN A20B

Return to Table of Contents

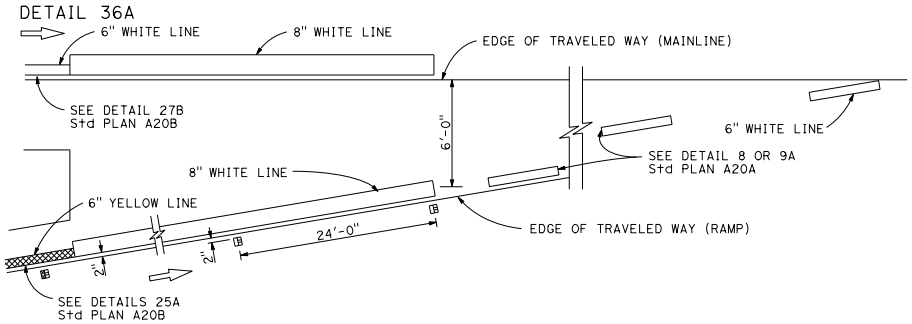
EXIT RAMP NEUTRAL AREA (GORE) TREATMENT

DETAIL 36



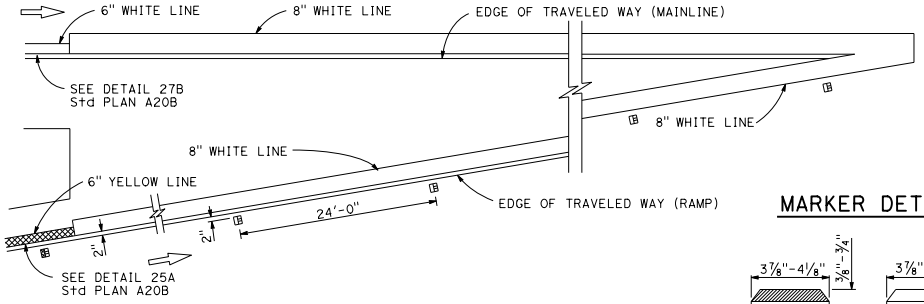
ENTRANCE RAMP NEUTRAL AREA (MERGE) TREATMENT

DETAIL 36A



ENTRANCE RAMP NEUTRAL AREA (ACCELERATION LANE) TREATMENT

DETAIL 36B

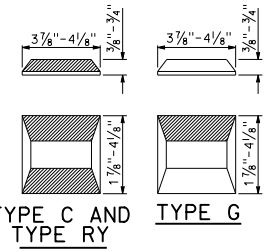


LEGEND:

MARKERS

- TYPE C RED-CLEAR RETROREFLECTIVE
- TYPE G ONE-WAY CLEAR RETROREFLECTIVE
- TYPE RY RED-YELLOW RETROREFLECTIVE

MARKER DETAILS



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

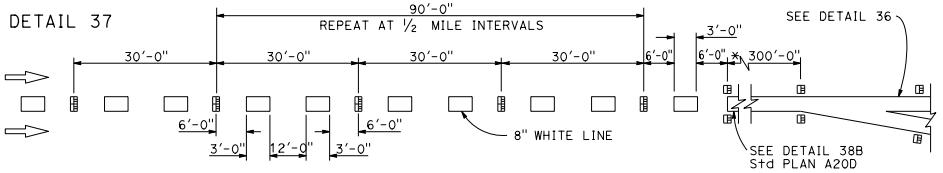
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LANE DROP AT EXIT RAMPS

DETAIL 37

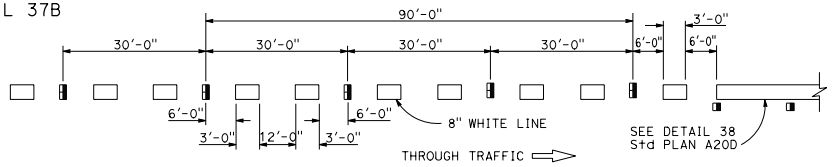


* The solid channelizing line shown may be omitted on short auxiliary lanes where weaving length is critical.

~~DETAIL 37A~~ DETAIL 37A DELETED

LANE DROP AT INTERSECTIONS

DETAIL 37B



~~DETAIL 37C~~ DETAIL 37C DELETED

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

NO SCALE

A20C

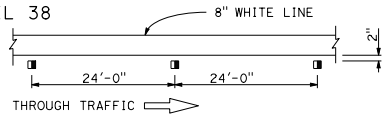
2018 STANDARD PLAN A20C

1-26-18

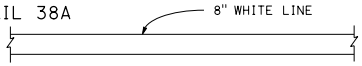
Return to Table of Contents

CHANNELIZING LINE

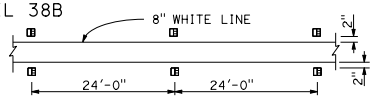
DETAIL 38



DETAIL 38A



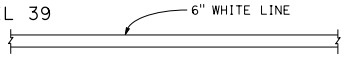
DETAIL 38B



~~DETAIL 38C~~ DETAIL 38C DELETED

BIKE LANE LINE

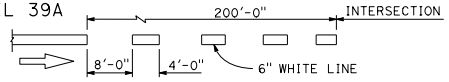
DETAIL 39



INTERSECTION LINE

BIKE LANE

DETAIL 39A



LANE LINE EXTENSIONS THROUGH INTERSECTIONS

DETAIL 40

~~DETAIL 40A~~ DETAIL 40A DELETED

CENTER LINE EXTENSIONS THROUGH INTERSECTIONS

DETAIL 41

~~DETAIL 41A~~ DETAIL 41A DELETED

LEGEND

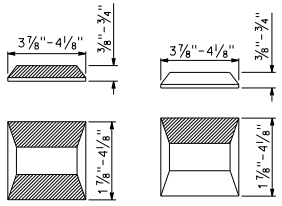
MARKERS

TYPE C RED-CLEAR RETROREFLECTIVE

TYPE G ONE-WAY CLEAR RETROREFLECTIVE

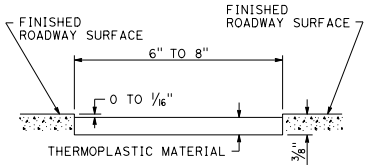
6" YELLOW LINE

MARKER DETAILS



TYPE C TYPE G

RETROREFLECTIVE FACE



DETAIL FOR RECESSED THERMOPLASTIC TRAFFIC STRIPE

See Notes A and B.

RECESSED THERMOPLASTIC NOTES

A. See typical traffic line details for pavement marking patterns.

B. The top of the thermoplastic installed in recessed pavement shall be 0 to 1/16" below the pavement surface.

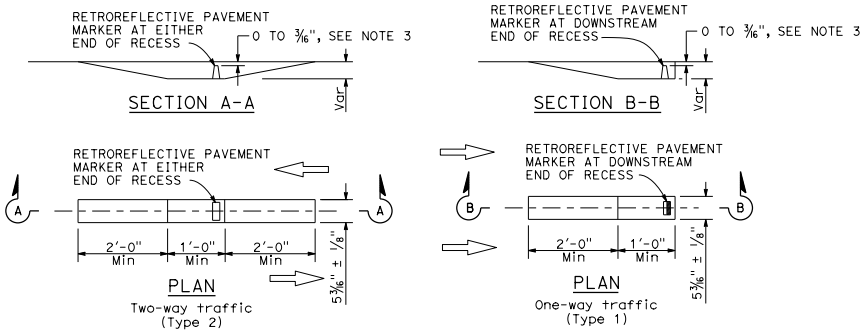
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

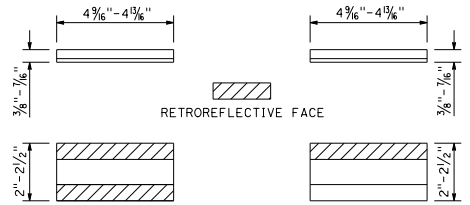
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



RECESS DETAIL FOR RETROREFLECTIVE PAVEMENT MARKER



TYPE C AND TYPE D TYPE G AND TYPE H

See Notes 1 and 2.

RETROREFLECTIVE PAVEMENT MARKER FOR RECESSED INSTALLATION

RECESSED MARKER NOTES:

1. See typical traffic line details for marker patterns to be used with recessed pavement markers. Detail 14A requires a Type 2 recess.
2. The retroreflective pavement markers shown for recessed installations are not to be used for non-recessed installations.
3. The top of pavement markers installed in recesses shall be 0 to 3/16" below the pavement surface.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS

NO SCALE

A20D

2018 STANDARD PLAN A20D

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

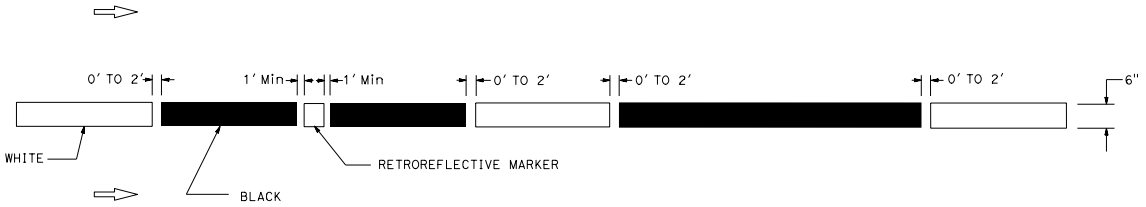
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. See Standard Plans A20A, A20B, A20C, and A20D for pavement markers and traffic lines typical details.
2. Detail 9 traffic stripe shown, see project plans for traffic stripe details.



OPTION 2
TYPICAL LANE LINE CONTRAST DETAIL
See Note 2

OPTION 1
TYPICAL LANE LINE OR RIGHT EDGE LINE CONTRAST DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKERS AND TRAFFIC LINES TYPICAL DETAILS FOR CONTRAST STRIPING

NO SCALE

A20E

2018 STANDARD PLAN A20E

1-26-18

Return to Table of Contents

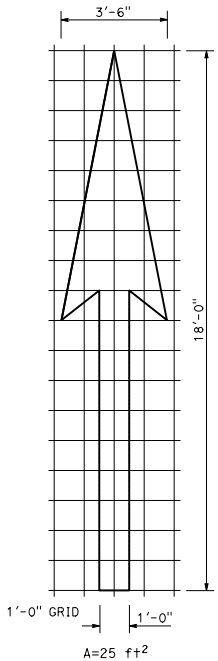
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

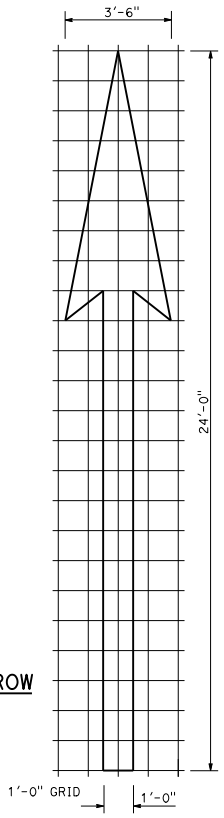
REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



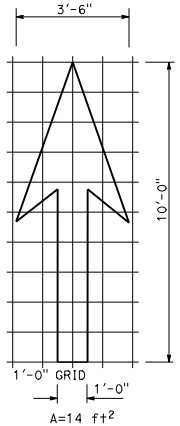
A=25 ft²

TYPE I 18'-0" ARROW



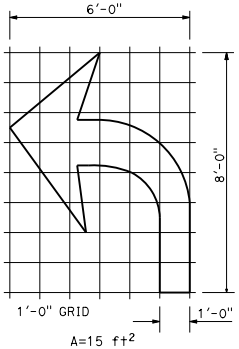
A=31 ft²

TYPE I 24'-0" ARROW



A=14 ft²

TYPE I 10'-0" ARROW

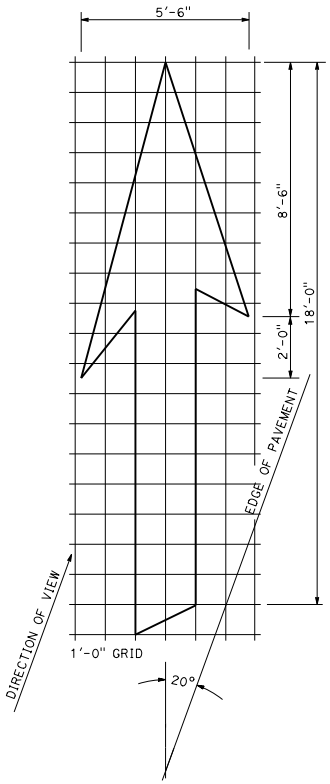


A=15 ft²

TYPE IV (L) ARROW

(For Type IV (R) arrow, use mirror image)

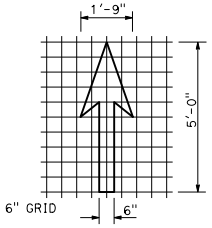
NOTE:
Minor variations in dimensions may be accepted by the Engineer.



A=42 ft²

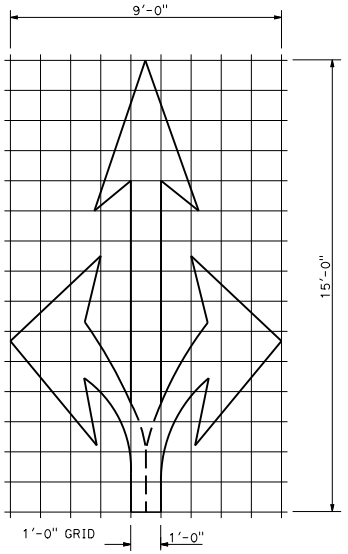
TYPE VI ARROW

Right lane drop arrow (For left lane, use mirror image)



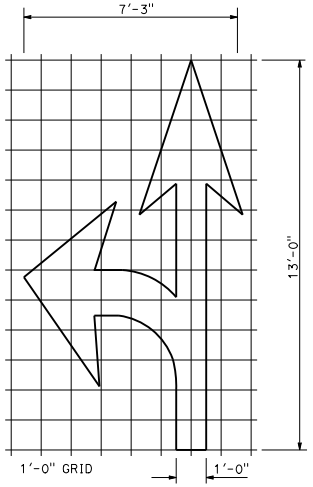
A=3.5 ft²

BIKE LANE ARROW



A=36 ft²

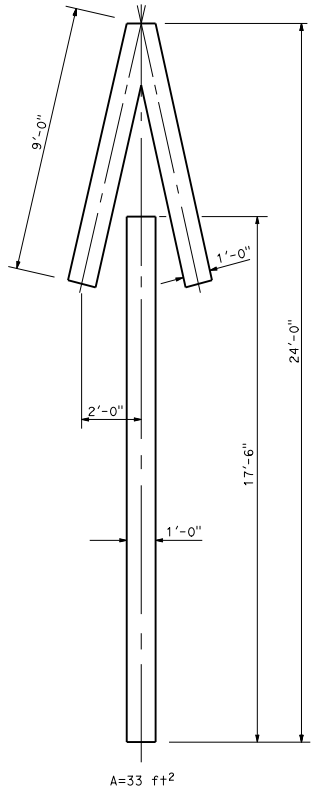
TYPE VIII ARROW



A=27 ft²

TYPE VII (L) ARROW

(For Type VII (R) arrow, use mirror image)



A=33 ft²

TYPE V ARROW

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS ARROWS

NO SCALE

A24A

1-26-18

Return to Table of Contents

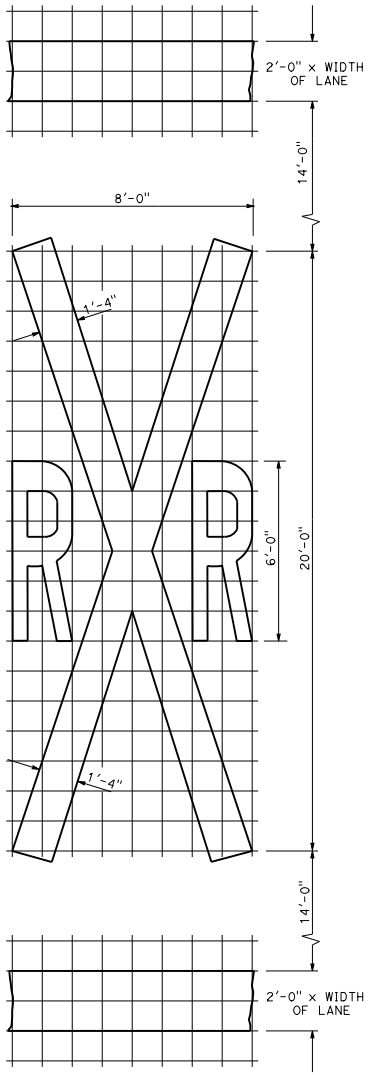
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

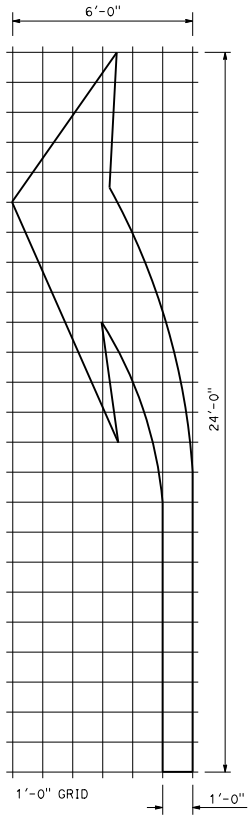
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



A=70 ft² ✳

RAILROAD CROSSING SYMBOL

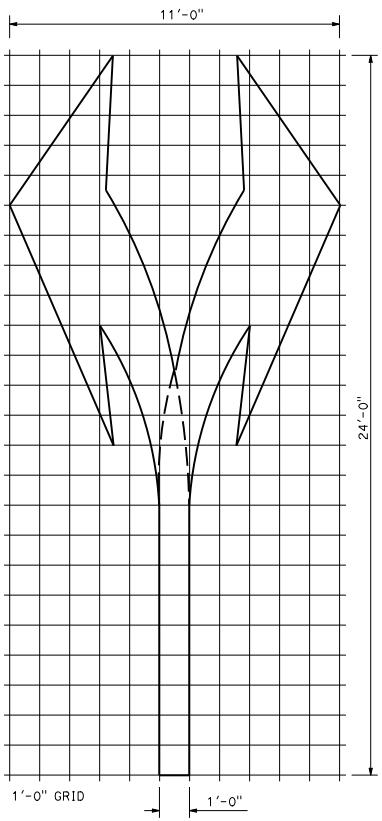
✳ 70 ft² does not include the 2'-0" x variable width transverse lines.



A=42 ft²

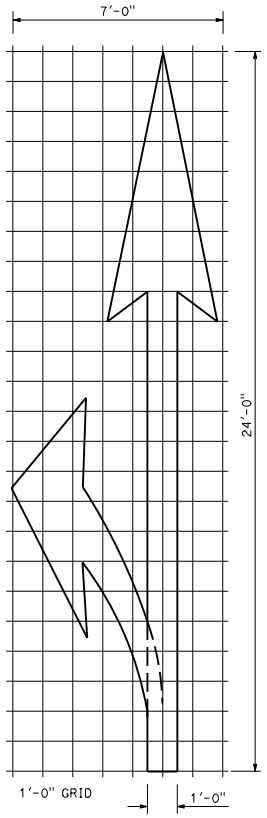
TYPE III (L) ARROW

(For Type III (R) use mirror image)



A=73 ft²

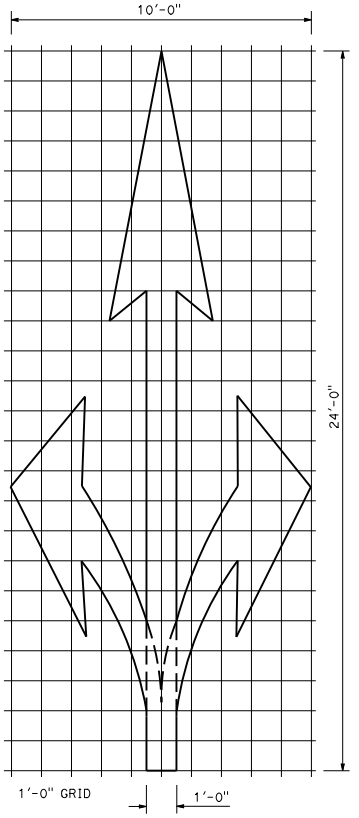
TYPE III (B) ARROW



A=45 ft²

TYPE II (L) ARROW

(For Type II (R) use mirror image)



A=59 ft²

TYPE II (B) ARROW

NOTE:

Minor variations in dimensions may be accepted by the Engineer.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS ARROWS AND SYMBOLS

NO SCALE

A24B

1-26-18

Return to Table of Contents

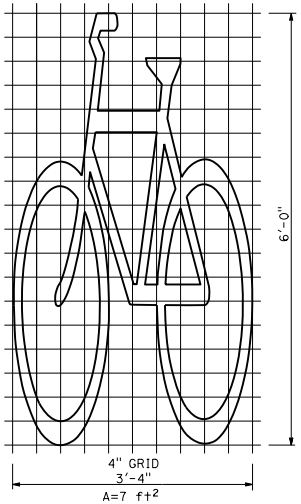
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

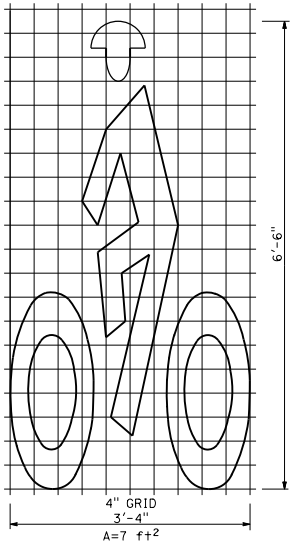
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

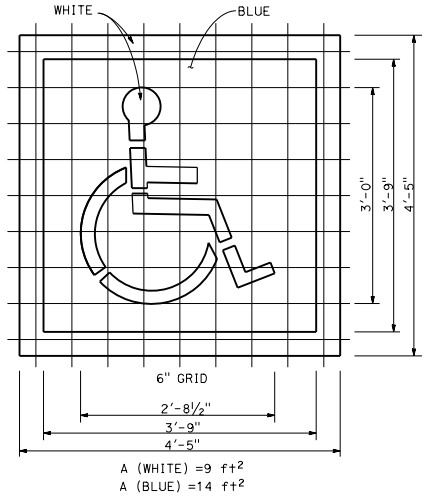
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



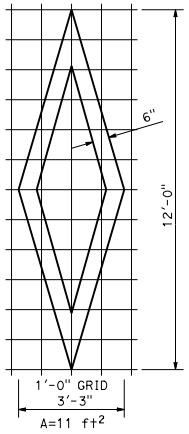
BIKE LANE SYMBOL WITHOUT PERSON



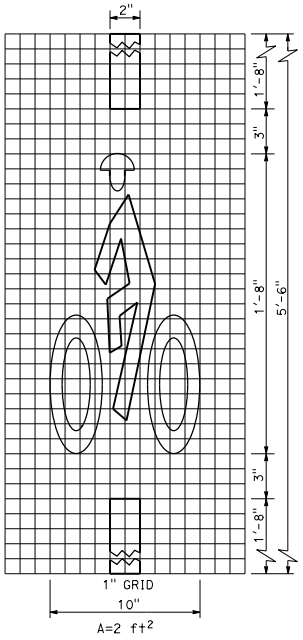
BIKE LANE SYMBOL WITH PERSON



INTERNATIONAL SYMBOL OF ACCESSIBILITY (ISA) MARKING



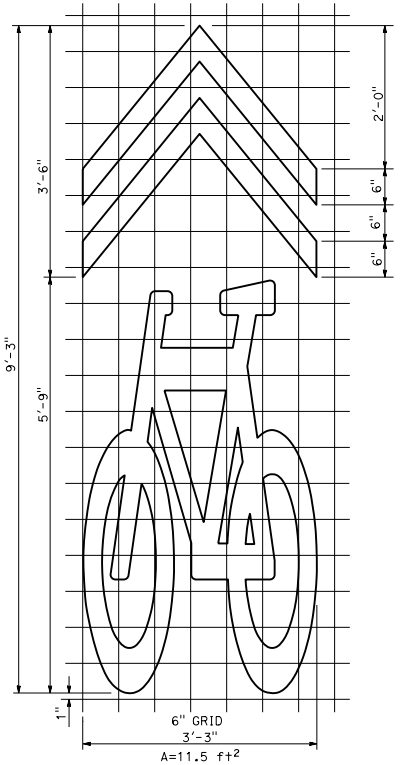
DIAMOND SYMBOL



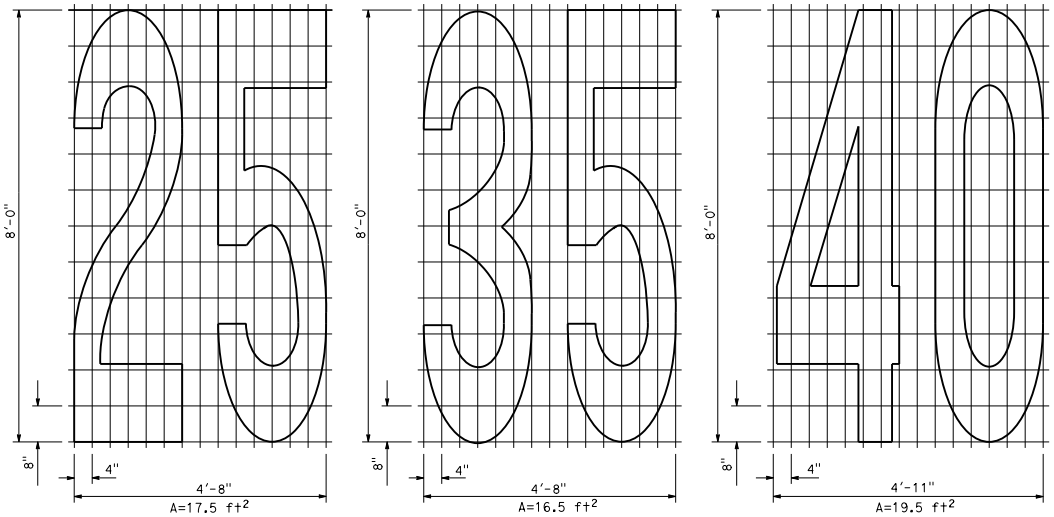
BICYCLE LOOP DETECTOR SYMBOL

NOTE:

Minor variations in dimensions may be accepted by the Engineer.



SHARED ROADWAY BICYCLE MARKING



NUMERALS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS SYMBOLS AND NUMERALS

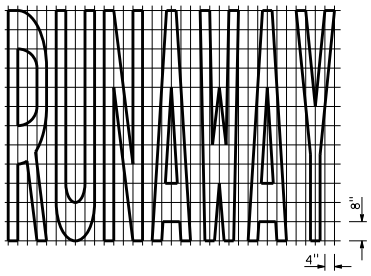
NO SCALE

A24C

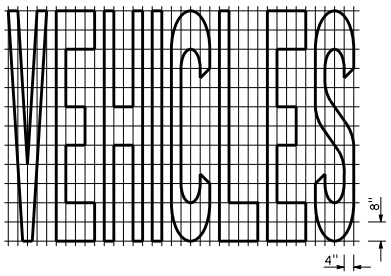
2018 STANDARD PLAN A24C

1-26-18

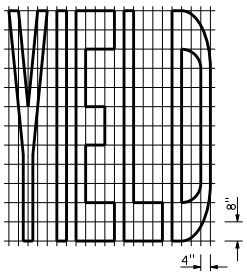
Return to Table of Contents



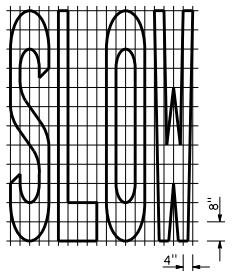
A=43 ft²



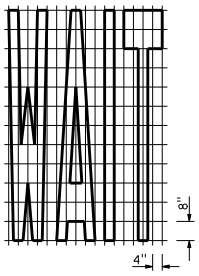
A=42 ft²



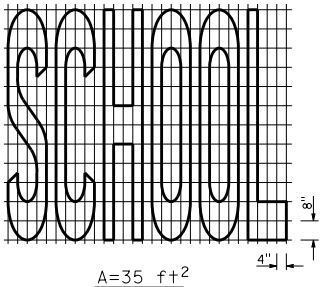
A=24 ft²



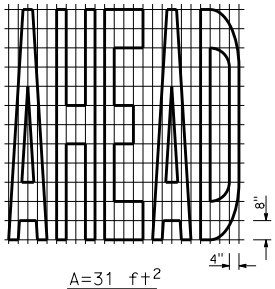
A=23 ft²



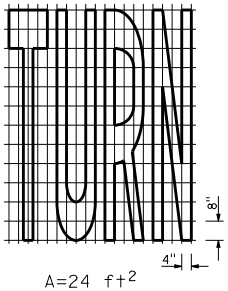
A=19 ft²



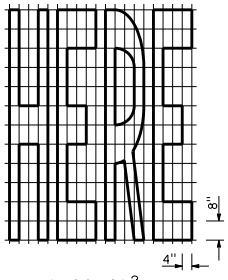
A=35 ft²



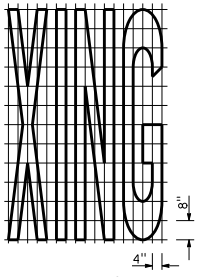
A=31 ft²



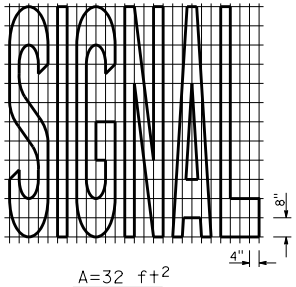
A=24 ft²



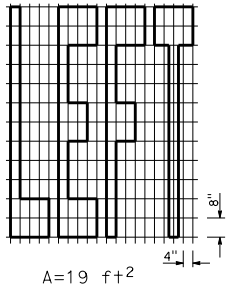
A=26 ft²



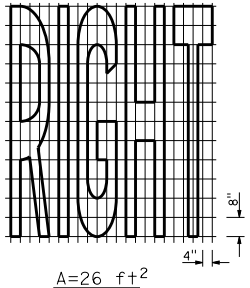
A=21 ft²



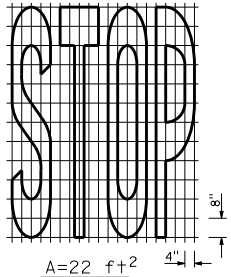
A=32 ft²



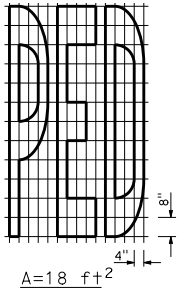
A=19 ft²



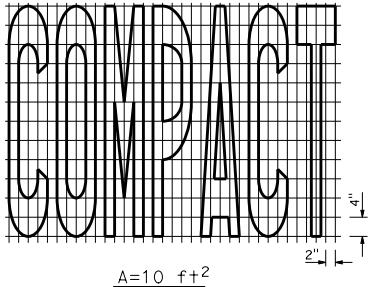
A=26 ft²



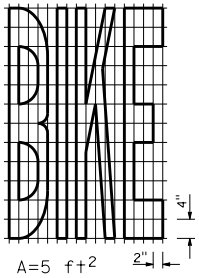
A=22 ft²



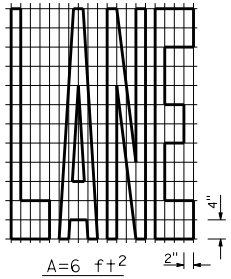
A=18 ft²



A=10 ft²



A=5 ft²



A=6 ft²

NOTES:

1. If a message consists of more than one word, it must read "UP", i.e., the first word must be nearest the driver.
2. The space between words must be at least four times the height of the characters for low speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions.
3. Minor variations in dimensions may be accepted by the Engineer.
4. Portions of a letter, number or symbol may be separated by connecting segments not to exceed 2" in width.

WORD MARKINGS

ITEM	ft²	ITEM	ft²	ITEM	ft²	ITEM	ft²
XING	21	YIELD	24	BIKE	5	PED	18
AHEAD	31	SCHOOL	35	SLOW	23	COMPACT	10
WAIT	19	SIGNAL	32	STOP	22	RUNAWAY	43
LANE	6	TURN	24	LEFT	19	VEHICLES	42
RIGHT	26	HERE	26				

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS WORDS

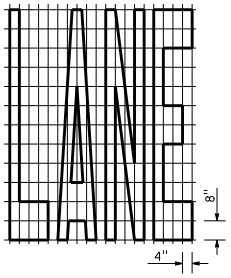
NO SCALE

A24D

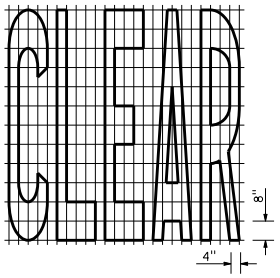
2018 STANDARD PLAN A24D

1-26-18

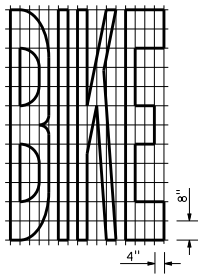
Return to Table of Contents



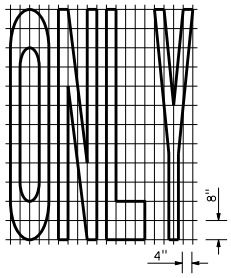
A=24 ft²



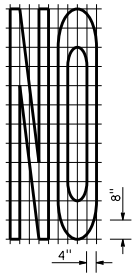
A=27 ft²



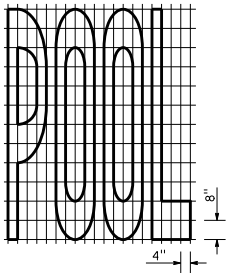
A=21 ft²



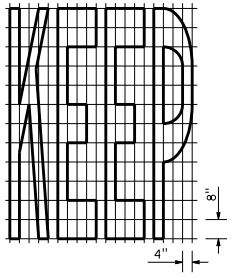
A=22 ft²



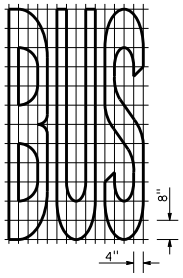
A=14 ft²



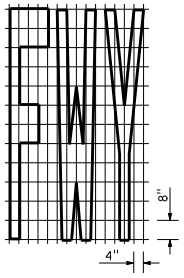
A=23 ft²



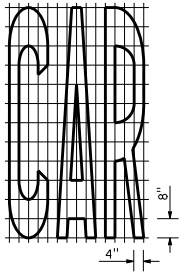
A=24 ft²



A=20 ft²

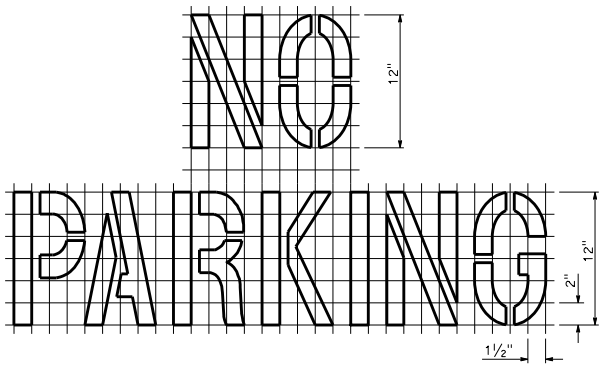


A=16 ft²



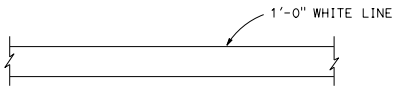
A=17 ft²

WORD MARKINGS			
ITEM	ft²	ITEM	ft²
LANE	24	NO	14
POOL	23	BIKE	21
CAR	17	BUS	20
CLEAR	27	ONLY	22
KEEP	24	FWY	16

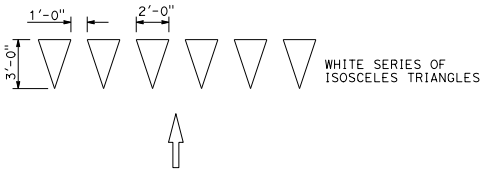


A=2 ft²

See Notes 6 and 7



LIMIT LINE (STOP LINE)



YIELD LINE

NOTES:

1. If a message consists of more than one word, it must read "UP", i.e., the first word must be nearest the driver.
2. The space between words must be at least four times the height of the characters for low speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions.
3. Minor variations in dimensions may be accepted by the Engineer.
4. Portions of a letter, number or symbol may be separated by connecting segments not to exceed 2" in width.
5. The words "NO PARKING" pavement marking is to be used for parking facilities. For typical locations of markings, see Standard Plans A90A and A90B.
6. The words "NO PARKING", shall be painted in white letters no less than 1'-0" high on a contrasting background and located so that it is visible to traffic enforcement officials.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS
WORDS, LIMIT AND YIELD LINES

NO SCALE

A24E

1-26-18

2018 STANDARD PLAN A24E

Return to Table of Contents

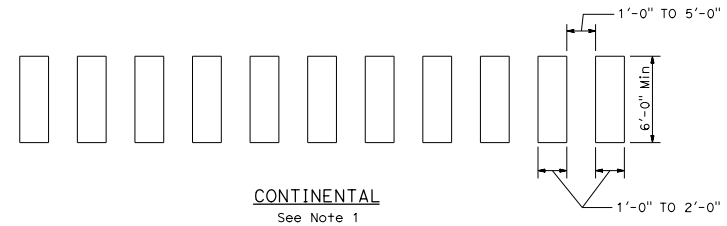
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

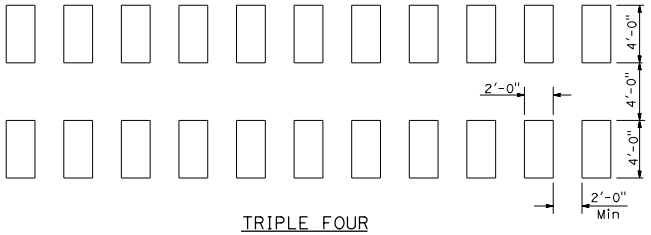
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

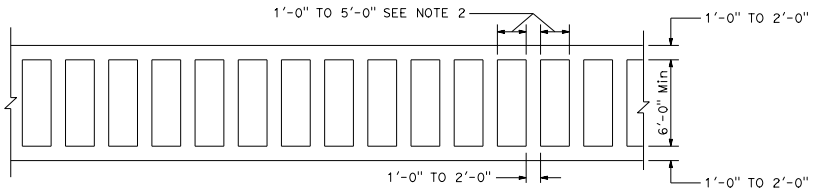
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



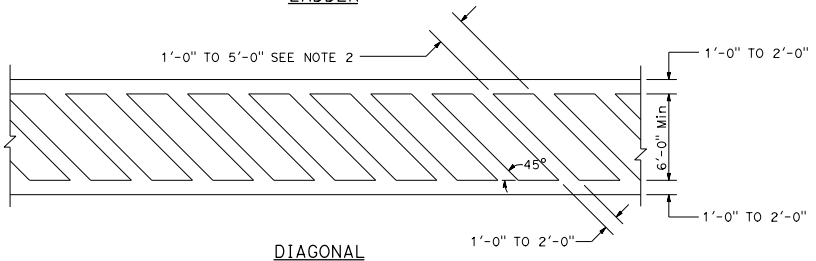
CONTINENTAL
See Note 1



TRIPLE FOUR
See Note 1



LADDER

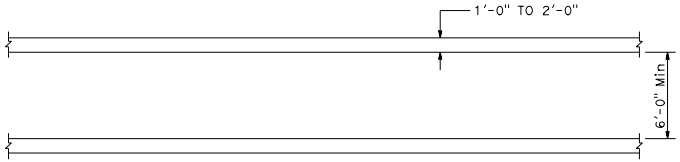


DIAGONAL

HIGHER VISIBILITY CROSSWALKS

NOTES:

1. Spaces between markings must be placed in wheel tracks of each lane.
2. Spacings not to exceed 2.5 times width of longitudinal line.
3. All crosswalk markings must be white except those near schools must be yellow.



BASIC

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKINGS
CROSSWALKS

NO SCALE

A24F

1-26-18

2018 STANDARD PLAN A24F

Return to Table of Contents

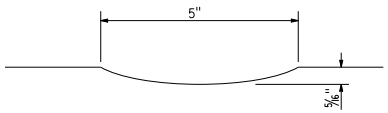
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

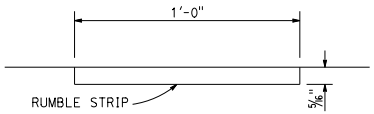
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

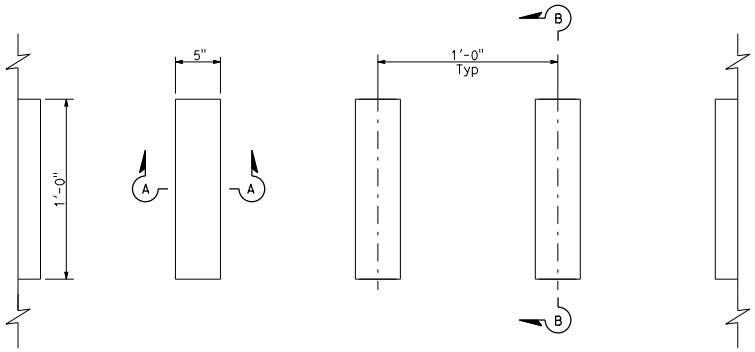
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



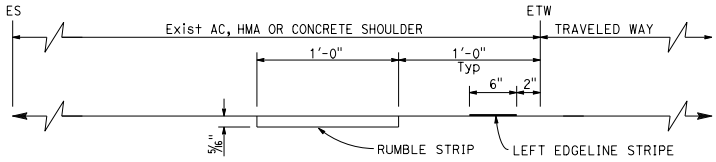
SECTION A-A



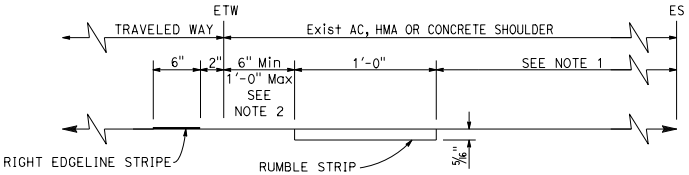
SECTION B-B



PLAN
GROUND-IN INDENTATIONS



RUMBLE STRIP PLACEMENT
LEFT OF DIRECTION OF TRAVEL



RUMBLE STRIP PLACEMENT
RIGHT OF DIRECTION OF TRAVEL

TYPICAL GROUND-IN RUMBLE STRIP SHOULDER PLACEMENT

NOTES:

1. Where bicycles are permitted, shoulder rumble strips should not be used right of direction of travel unless a minimum of 5'-0" of clear shoulder width for bicycle use is available between the rumble strip and the outer edge of the shoulder. Where bicycles are not permitted, a minimum of 4'-0" of distance is required between the rumble strip and the outer edge of the shoulder.
2. Unless otherwise shown on the plans or specified in the special provisions, the 6" offset from the edge of traveled way to the edge of the rumble strip shall be used for rumble strip placement right of the direction of travel.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SHOULDER RUMBLE STRIP DETAILS GROUND-IN INDENTATIONS

NO SCALE

A40B

1-26-18

Return to Table of Contents

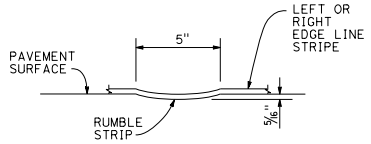
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

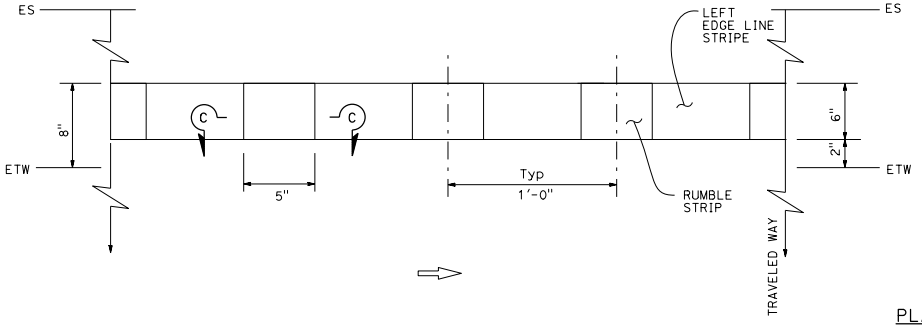
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

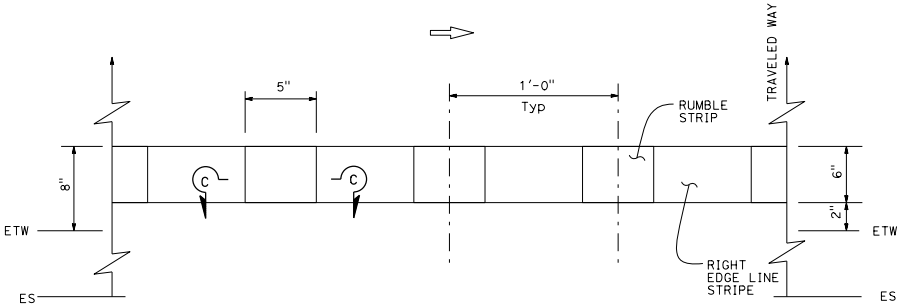


SECTION C-C



PLAN

EDGE LINE RUMBLE STRIP PLACEMENT
LEFT OF DIRECTION OF TRAVEL



EDGE LINE RUMBLE STRIP PLACEMENT
RIGHT OF DIRECTION OF TRAVEL

TYPICAL EDGE LINE RUMBLE STRIP PLACEMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EDGE LINE RUMBLE STRIP DETAILS GROUND-IN INDENTATIONS

NO SCALE

A40C

1-26-18

Return to Table of Contents

NOTE:

Detail 21 and Detail 5 traffic stripes shown, see project plans for traffic stripe details.

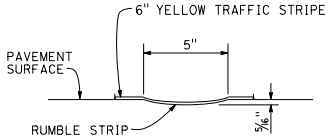
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

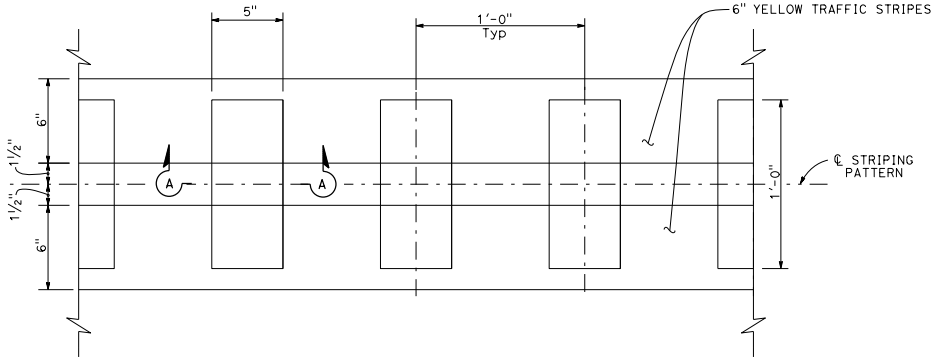
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

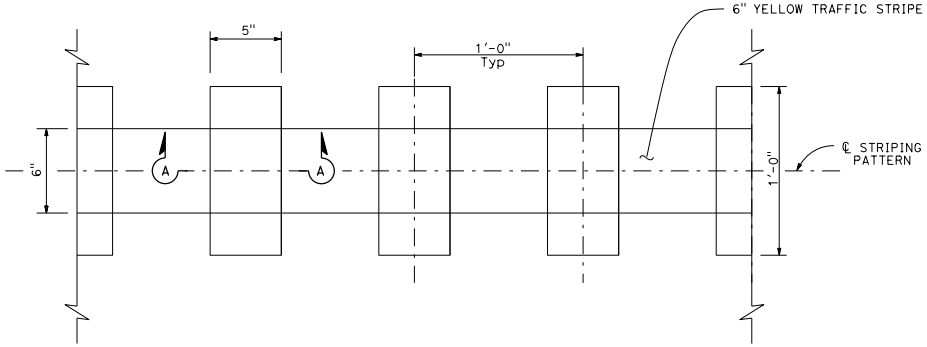


SECTION A-A



PLAN

RUMBLE STRIP PLACEMENT IN NO PASSING ZONE



RUMBLE STRIP PLACEMENT IN PASSING ZONE

TYPICAL CENTERLINE RUMBLE STRIP PLACEMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CENTERLINE RUMBLE STRIP DETAILS GROUND-IN INDENTATIONS

NO SCALE

A40D

1-26-18

2018 STANDARD PLAN A40D

Return to Table of Contents

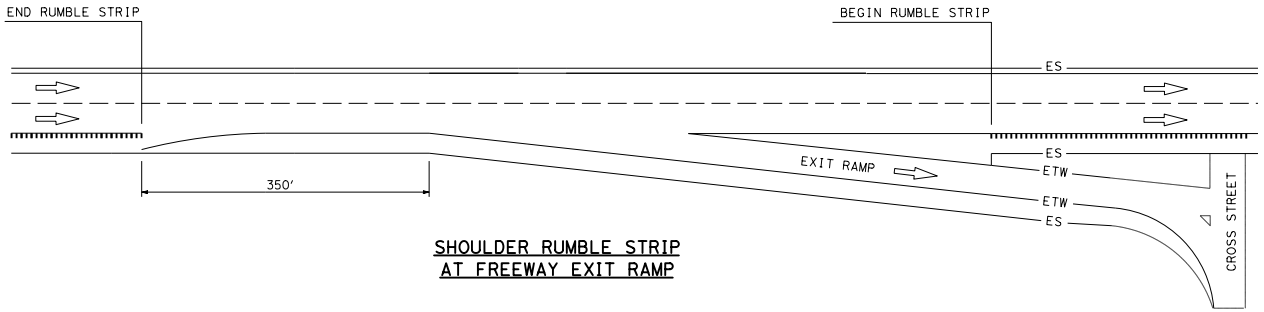
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

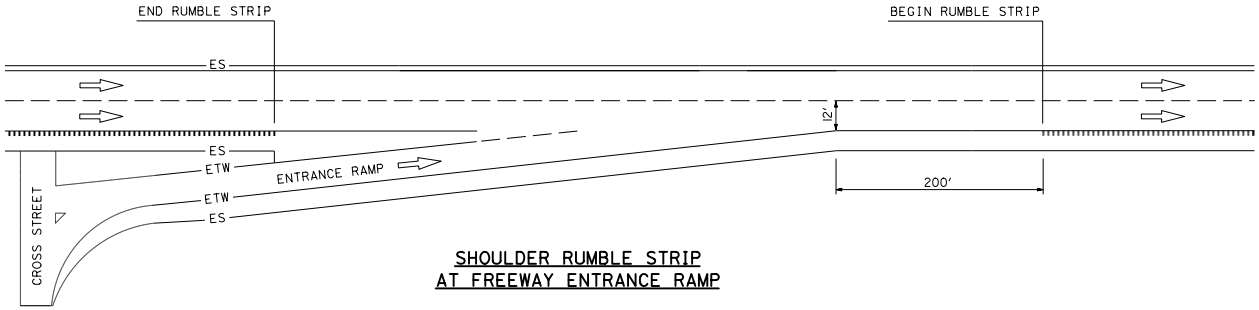
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

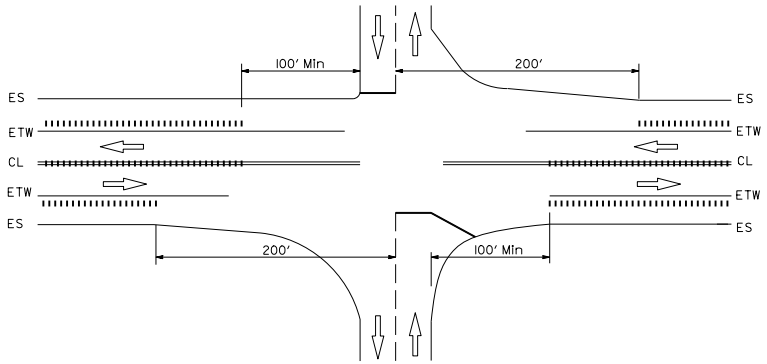
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SHOULDER RUMBLE STRIP
AT FREEWAY EXIT RAMP



SHOULDER RUMBLE STRIP
AT FREEWAY ENTRANCE RAMP



CENTERLINE AND SHOULDER RUMBLE STRIP
AT GRADE INTERSECTION

LEGEND

RUMBLE STRIP (GROUND-IN)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RUMBLE STRIP PLACEMENT AT FREEWAY EXIT RAMPS, FREEWAY ENTRANCE RAMPS, AND INTERSECTIONS

NO SCALE

A40E

2018 STANDARD PLAN A40E

1-26-18

Return to Table of Contents

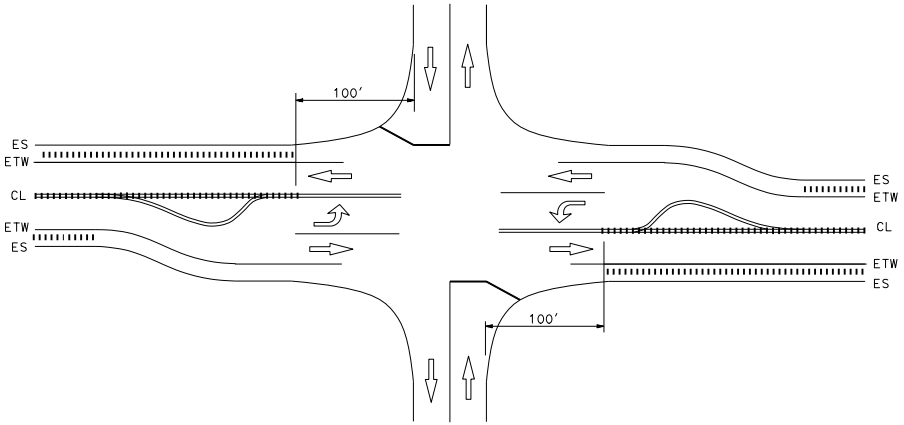
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

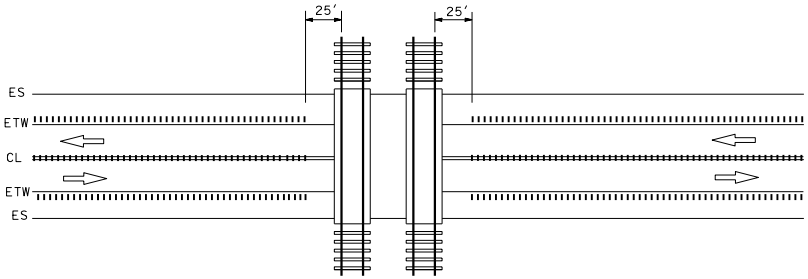


CENTERLINE AND SHOULDER RUMBLE STRIPS
AT INTERSECTION WITH LEFT TURN POCKETS

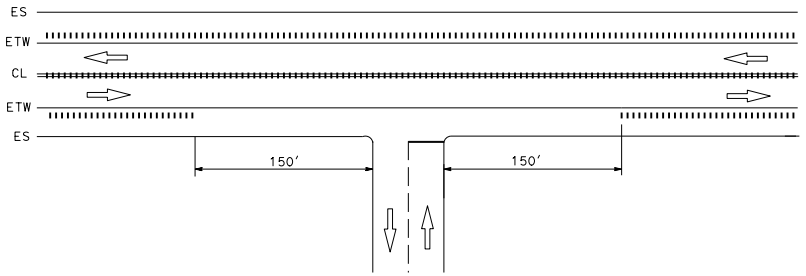
LEGEND

RUMBLE STRIPS (GROUND-IN)

RAILROAD TRACKS



CENTERLINE AND SHOULDER RUMBLE STRIPS
AT RAILROAD CROSSING



CENTERLINE AND SHOULDER RUMBLE STRIPS
AT DRIVEWAY/PRIVATE ROAD APPROACH

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RUMBLE STRIP PLACEMENT AT INTERSECTIONS WITH LEFT TURN POCKETS, RAILROAD CROSSINGS, PRIVATE ROADS, AND MAJOR DRIVEWAYS

NO SCALE

A40F

2018 STANDARD PLAN A40F

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

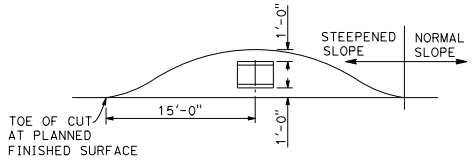
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

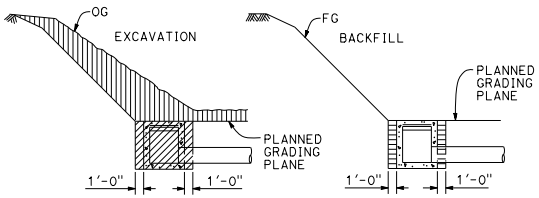
Carl M. Dugan
No. C59976
Exp. 6-30-18
CIVIL

REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

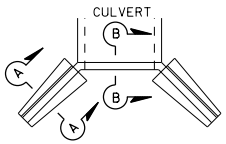
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



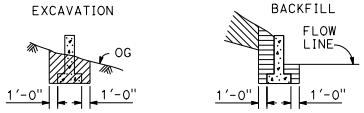
PLAN
See Note 2



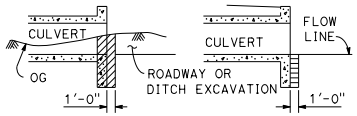
SECTION
RECESSES AT DRAINAGE INLETS



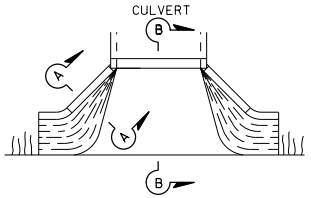
PLAN OF WING WALL



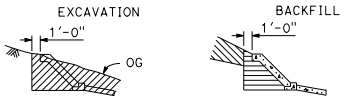
SECTION A-A



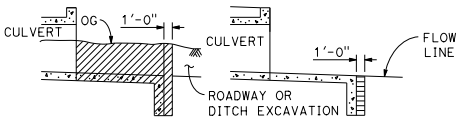
SECTION B-B
WING WALLS



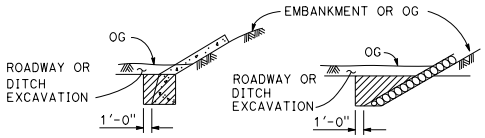
PLAN OF WARPED WING WALL



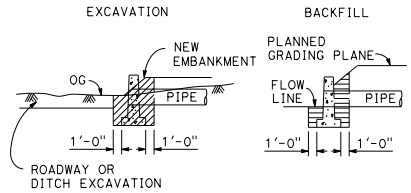
SECTION A-A



SECTION B-B
WARPED WING WALLS

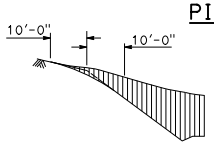


SLOPE PROTECTION
See Note 3

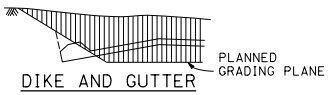


PIPE HEADWALLS

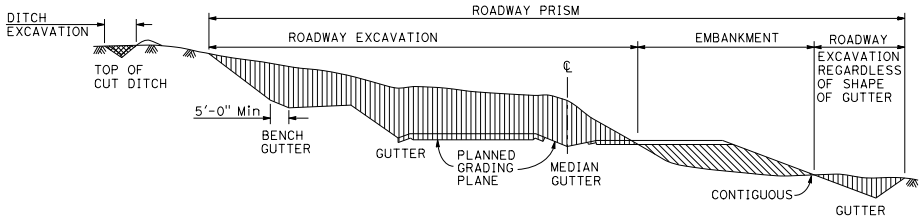
PAVED OR LINED DITCH



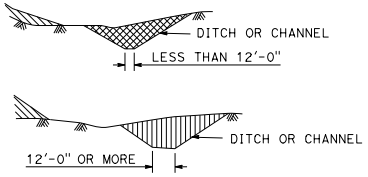
SLOPE ROUNDING



DIKE AND GUTTER



ROADWAY EXCAVATION - DITCH EXCAVATION



NOTES:

1. This drawing indicates the work to be done and limits of payment for:
   Roadway Excavation
   Ditch Excavation
   Structure Excavation for Slope Protection
2. Slopes and dimensions may vary to fit field conditions.
3. Top limit of structure excavation is original ground if ditch is not excavated.

LEGEND

- STRUCTURE EXCAVATION
- STRUCTURE BACKFILL
- DITCH EXCAVATION
- SLOPE PROTECTION
- ROADWAY EXCAVATION
- ROADWAY EMBANKMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL MISCELLANEOUS DETAILS

NO SCALE

A62A

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

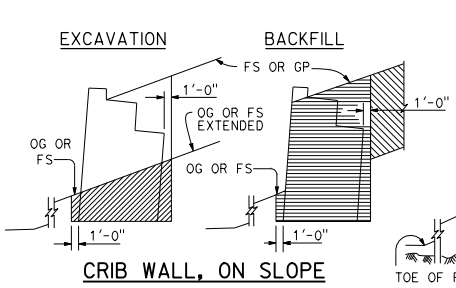
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

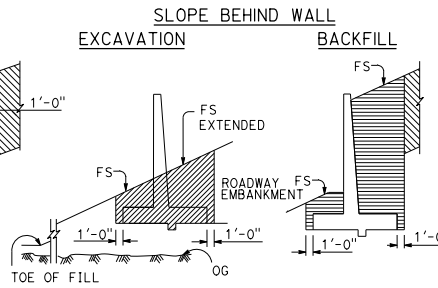
REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

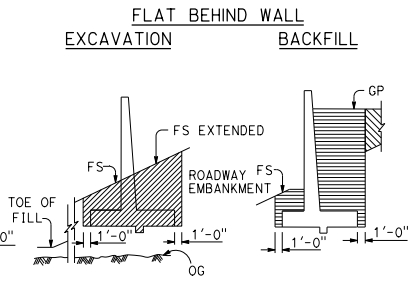


CRIB WALL, ON SLOPE

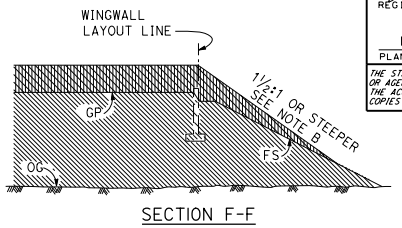
SLOPE BEHIND WALL



FLAT BEHIND WALL



RETAINING WALL IN FILL, ON SLOPE

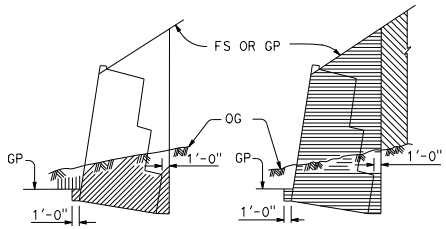


SECTION F-F

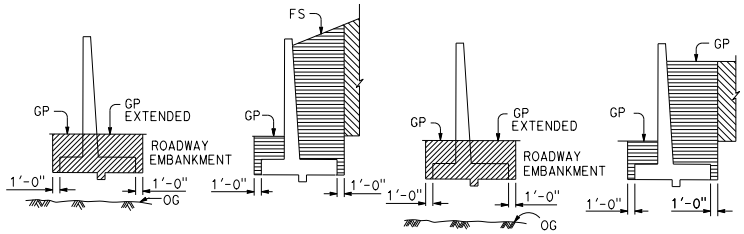
SURCHARGE NOTES:

A. Bridge embankment surcharges to be placed at locations and to the heights listed in the special provisions.

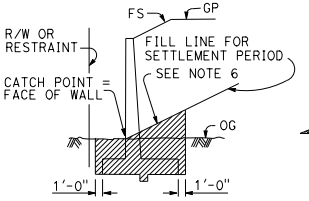
B. Surcharge slopes to be as steep as stability of material permits.



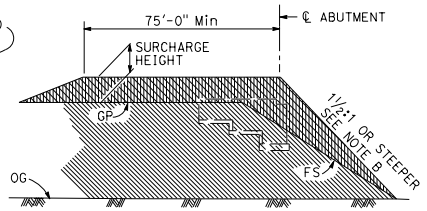
REINFORCED CONCRETE CRIB WALL



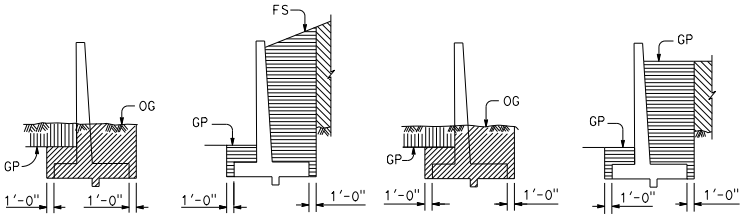
RETAINING WALL IN FILL



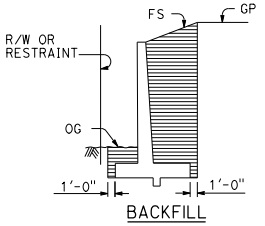
EXCAVATION



ELEVATION

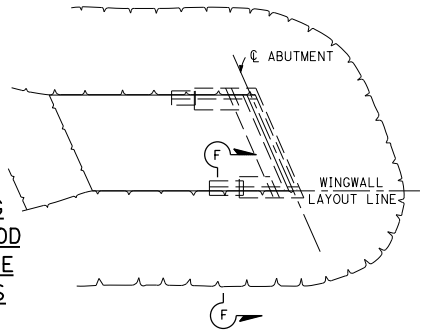


RETAINING WALL IN FILL AND CUT



BACKFILL

RETAINING WALL IN OG WITH SETTLEMENT PERIOD AND NEXT TO R/W LINE OR OTHER RESTRAINTS

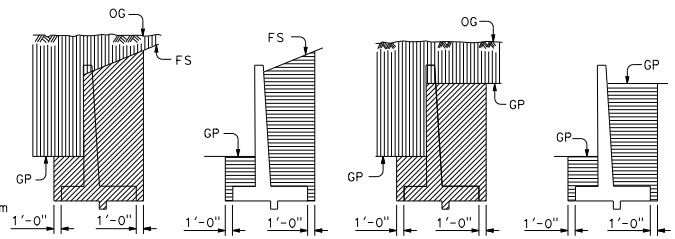


PLAN

BRIDGE EMBANKMENT SURCHARGE

NOTES:

1. Roadway embankment is not delineated on excavation drawings for clarity.
2. Embankment, if any, must be in place before structure excavation is made.
3. If no roadway or ditch excavation or embankment is involved at the wall, structure excavation will be measured from the original ground.
4. No deduction for crib wall member volumes is made from structure backfill quantities.
5. When an embankment settlement period is required, the upper limits of structure excavation are raised to conform to the elevation of the embankment after the settlement period or, when an embankment surcharge is used to the finished surface and grading plane elevations.
6. Embankment slopes to be as steep as material permits. Slope assumed to be 1:1 for purposes of quantity calculations.



RETAINING WALL IN CUT

LEGEND

- STRUCTURE EXCAVATION
- STRUCTURE BACKFILL
- ROADWAY EXCAVATION
- ROADWAY EMBANKMENT
- BRIDGE EMBANKMENT SURCHARGE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

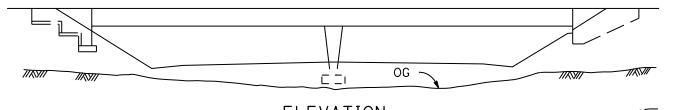
LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE SURCHARGE AND WALL

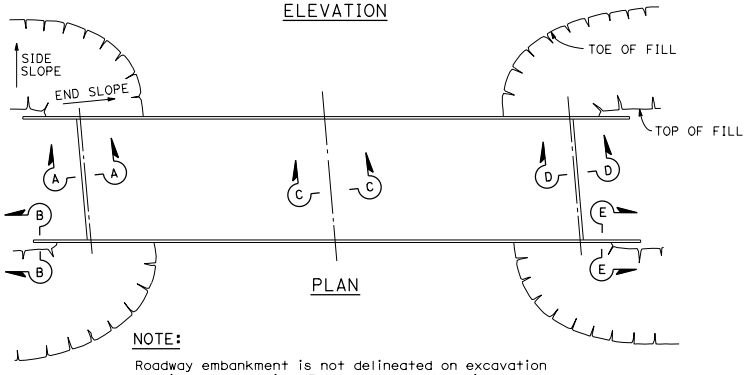
NO SCALE

A62B

1-26-18

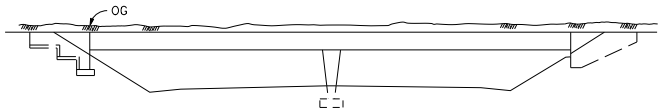
Return to Table of Contents

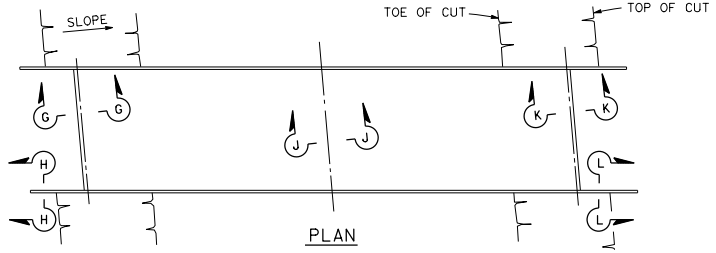




NOTE:
Roadway embankment is not delineated on excavation drawings for clarity. Embankment must be in place before structure excavation is made.

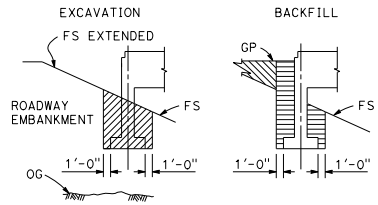
IN FILL



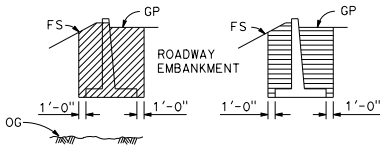


NOTE:
If no roadway excavation is involved at bridge, structure excavation is measured from original ground.

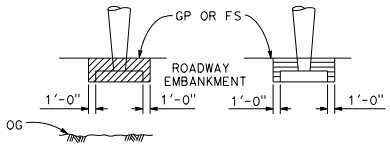
IN CUT



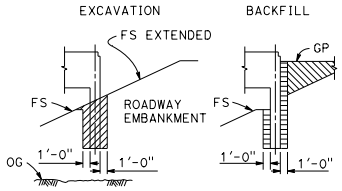
SECTION A-A



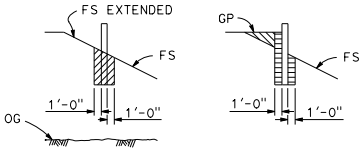
SECTION B-B



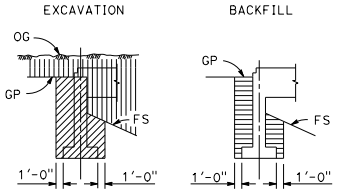
SECTION C-C



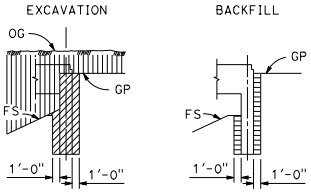
SECTION D-D



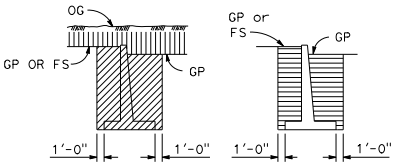
SECTION E-E



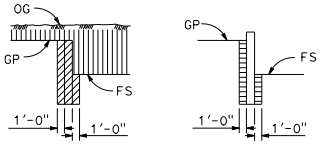
SECTION G-G



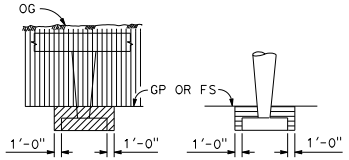
SECTION K-K



SECTION H-H



SECTION L-L



SECTION J-J

LEGEND

- STRUCTURE EXCAVATION
- STRUCTURE BACKFILL
- ROADWAY EXCAVATION
- ROADWAY EMBANKMENT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE

NO SCALE

A62C

1-26-18

2018 STANDARD PLAN A62C

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

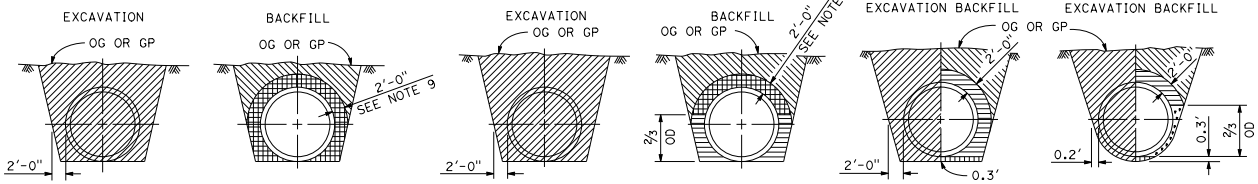
REGISTERED CIVIL ENGINEER

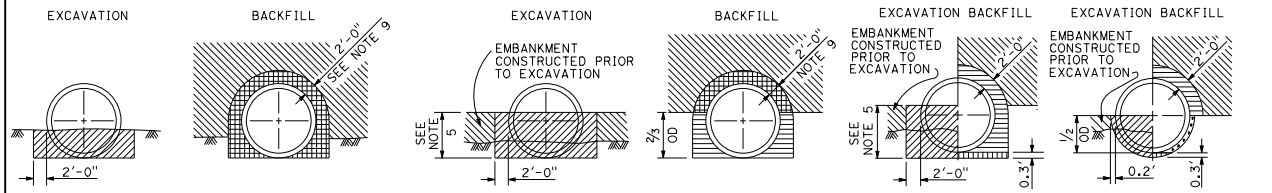
May 31, 2018

PLANS APPROVAL DATE

Carl W. Duch No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 1

COVER	MINIMUM CLASS AND D-LOAD
5.9'	CLASS II 1000D
6.0' - 7.9'	CLASS III 1350D
8.0' - 9.9'	CLASS III SPECIAL 1700D
10.0' - 11.9'	CLASS IV 2000D
12.0' - 13.9'	CLASS IV SPECIAL 2500D
14.0' - 16.9'	CLASS V 3000D
17.0' - 20.0'	CLASS V SPECIAL 3600D

See Notes 6 and 9

METHOD 1

MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 2

COVER	MINIMUM CLASS AND D-LOAD
15.9'	CLASS II 1000D
16.0' - 19.9'	CLASS III 1350D
20.0' - 24.9'	CLASS III SPECIAL 1700D
25.0' - 27.9'	CLASS IV 2000D
28.0' - 34.9'	CLASS IV SPECIAL 2500D
35.0' - 41.9'	CLASS V 3000D
42.0' - 50.0'	CLASS V SPECIAL 3600D

See Notes 8 and 9

METHOD 2

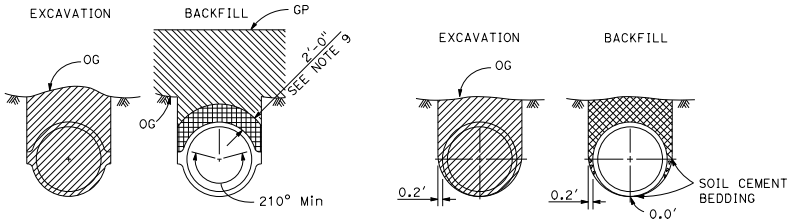
MINIMUM ALLOWABLE CLASSES OF RCP FOR METHOD 3

COVER	MINIMUM CLASS AND D-LOAD
25.9'	Class II 1000D
26.0' - 31.9'	Class III 1350D
32.0' - 37.9'	Class III Special 1700D
38.0' - 44.9'	Class IV 2000D
45.0' - 55.9'	Class IV Special 2500D
56.0' - 67.9'	Class V 3000D
68.0' - 80.0'	Class V Special 3600D

METHOD 3

REINFORCED CONCRETE PIPE

See Notes 1, 2, 7 and 10



See Notes 7 and 11

NON-REINFORCED CONCRETE PIPE

LEGEND

- STRUCTURE EXCAVATION (CULVERT)
- STRUCTURE BACKFILL (CULVERT) 95% RELATIVE COMPACTION
- STRUCTURE BACKFILL (CULVERT) 90% RELATIVE COMPACTION
- LOOSE BACKFILL
- SAND BEDDING
- SOIL CEMENT BEDDING
- ROADWAY EMBANKMENT

OD = OUTSIDE DIAMETER FOR CIRCULAR PIPES AND MAXIMUM VERTICAL DIMENSION FOR OTHER SHAPES

ID = INSIDE DIAMETER FOR CIRCULAR PIPES AND MINIMUM VERTICAL DIMENSION FOR OTHER SHAPES

NOTES:

1. Unless otherwise shown on the plans or specified in the special provisions, the Contractor shall have the option of selecting the class of RCP and the method of backfill to be used, provided the height of cover does not exceed the value shown for the RCP selected.
   Example:
   2'-0" RCP culvert with maximum cover of 19'-0" the options are:
   a) Class V Special or stronger with Method 1.
   b) Class III or stronger with Method 2.
   c) Class II or stronger with Method 3.
   Cover is defined as the maximum vertical distance from top of pipe to finished grade within the length of any given culvert.
2. The class of RCP, method of backfill and bedding selected shall be the same throughout the length of any given culvert.
3. The "length of any culvert" is defined as the culvert between:
   a) Successive drainage structures (inlets, junction boxes, headwalls, etc.).
   b) A drainage structure and the inlet or outlet end of the culvert.
   c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
4. Slope or shore excavation sides as necessary.
5. Embankment height prior to excavation for installation of all classes of RCP under Methods 2 and 3A shall be as follows:
   Pipe sizes 1'-0" to 3'-6", I D = 2'-6"
   Pipe sizes 4'-0" to 7'-0", I D = 2/3 OD
   Pipe sizes larger than 7'-0", I D = 5'-0"
6. The maximum size for all classes of RCP placed under Method 1 is 6'-6" ID.
7. Non-reinforced precast pipe sizes 3'-0" or smaller may also be placed under Methods 1, 2 or 3.
8. Oval or arch shaped RCP shall be placed under Method 2 only.
9. Embankment compaction requirements govern over the 90% relative compaction backfill requirement within 2'-6" of finished grade.
10. Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimums.
11. Where the precast non-reinforced concrete pipe is used as a substitute for the cast-in-place pipe, both the wall thickness and the concrete strength shall be at least as great as that specified for the cast-in-place pipe. The fill height allowed shall not exceed that shown for the cast-in-place pipe.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS

NO SCALE

A62D

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

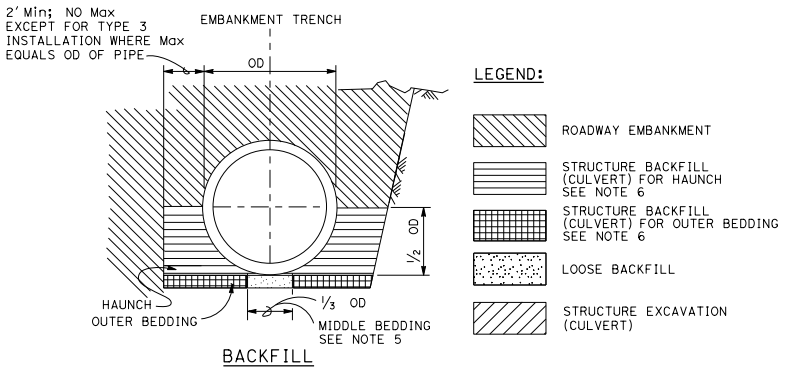
REGISTERED PROFESSIONAL ENGINEER
Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

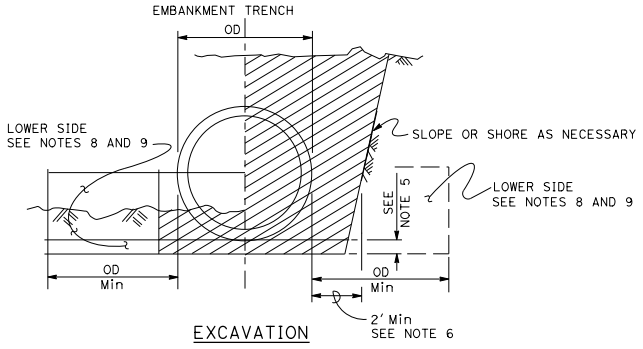
DESIGN NOTES:

Design: AASHTO LRFD Bridge Design Specifications, 4th edition with California Amendments. ACPA DESIGN DATA 1, October 2007. INDIRECT DESIGN METHOD

Soil: w Fe = 162 pcf Installation Type 1
w Fe = 168 pcf Installation Types 2 & 3
w = Unit weight of soil (pcf)
Fe = Soil-structure interaction factor



BACKFILL



EXCAVATION

INSTALLATION TYPE 1:

The haunch and outer bedding shall be compacted to a minimum 90 percent relative compaction. In addition, the minimum sand equivalent in these areas shall be 30 and the maximum percentage passing the No. 200 sieve size shall be 12.

INSTALLATION TYPE 2:

The haunch and outer bedding shall be compacted to a minimum 90 percent relative compaction. In addition, the minimum sand equivalent in these areas shall be 25.

INSTALLATION TYPE 3:

The haunch and outer bedding shall be compacted to a minimum 85 percent relative compaction. 90 percent relative compaction will be required where the fill over the pipe is less than 4′-0" or ½ OD. In addition, the minimum sand equivalent in these areas shall be 25 and the material shall not contain rocks, broken concrete, or other solid material exceeding 3" in greatest dimension.

INSTALLATION TYPE 1

MINIMUM CLASS AND D-LOAD	COVER	
	60" Dia AND SMALLER	OVER 60" Dia TO 120" Dia Max
CLASS II 1000D	14.9′	12.9′
CLASS III 1350D	15.0′ - 21.9′	13.0′ - 18.9′
CLASS III SPECIAL 1700D	22.0′ - 27.9′	19.0′ - 24.9′
CLASS IV 2000D	28.0′ - 32.9′	25.0′ - 29.9′
CLASS IV SPECIAL 2500D	33.0′ - 41.9′	30.0′ - 38.9′
CLASS V 3000D	42.0′ - 49.9′	39.0′ - 46.9′
CLASS V SPECIAL 3600D	50.0′ - 60.0′	47.0′ - 58.0′

INSTALLATION TYPE 2

MINIMUM CLASS AND D-LOAD	COVER	
	60" Dia AND SMALLER	OVER 60" Dia TO 120" Dia Max
CLASS II 1000D	11.9′	9.9′
CLASS III 1350D	12.0′ - 15.9′	10.0′ - 14.9′
CLASS III SPECIAL 1700D	16.0′ - 20.9′	15.0′ - 19.9′
CLASS IV 2000D	21.0′ - 24.9′	20.0′ - 23.9′
CLASS IV SPECIAL 2500D	25.0′ - 31.9′	24.0′ - 30.9′
CLASS V 3000D	32.0′ - 37.9′	31.0′ - 37.9′
CLASS V SPECIAL 3600D	38.0′ - 46.0′	38.0′ - 46.0′

INSTALLATION TYPE 3

MINIMUM CLASS AND D-LOAD	COVER	
	60" Dia AND SMALLER	OVER 60" Dia TO 120" Dia Max
CLASS II 1000D	8.9′	5.9′
CLASS III 1350D	9.0′ - 11.9′	6.0′ - 10.9′
CLASS III SPECIAL 1700D	12.0′ - 15.9′	11.0′ - 13.9′
CLASS IV 2000D	16.0′ - 18.9′	14.0′ - 17.9′
CLASS IV SPECIAL 2500D	19.0′ - 24.9′	18.0′ - 22.9′
CLASS V 3000D	25.0′ - 29.9′	23.0′ - 28.9′
CLASS V SPECIAL 3600D	30.0′ - 36.0′	29.0′ - 35.0′

NOTES:

1. Unless otherwise shown on the plans or specified in the special provisions, the Contractor shall have the option of selecting the class of RCP and the type of installation to be used, provided the height of cover does not exceed the value shown for the RCP selected.
   Example: 24" RCP culvert with maximum cover of 24′-0" the options are:
   a) Class III Special or stronger with Installation Type 1.
   b) Class IV or stronger with Installation Type 2.
   c) Class IV Special or stronger with Installation Type 3.
   Cover is defined as the maximum vertical distance from top of the pipe to finished grade within the length of any given culvert.
2. The class of RCP and Installation Type selected shall be the same throughout the length of any given culvert.
3. The "length of any culvert" is defined as the culvert between:
   a) Successive drainage structure (inlets, junction boxes, headwalls, etc.).
   b) A drainage structure and the inlet or outlet end of the culvert.
   c) The inlet and outlet end of the culvert when there are no intervening drainage structures.
4. Oval and arch shaped RCP shall not be used.
5. Bedding depth: 1/25 OD Min, not less than 3".
6. Slurry cement backfill may be substituted for backfill in the outer bedding and haunch areas. If slurry is used, the outer and middle beddings shall be omitted. Prior to installation, the soil under the middle ⅓ of the outside diameter of the pipe shall be softened by scarifying or other means to a minimum depth of 1/25 OD, but not less than 3". Where slurry cement backfill is used, clear distance to trench wall may be reduced as set forth in the Standard Specifications.
7. Backfill shall be placed full width of excavation except where dimensions are shown for backfill width or thickness. Dimensions shown are minimum.
8. Lower side shall be suitable material as determined by the Engineer. Otherwise it shall be considered unsuitable as set forth in of the Standard Specifications. See Note 9.
9. Where the pipe is placed in a trench, if the trench walls are sloped at 5 vertical to 1 horizontal or steeper for at least 90 percent of the trench height or up to not less than 12" from the grading plane, the firmness of the soil in the lower side need not be considered.
10. Non-reinforced precast concrete pipe sizes 3′-0" or smaller may be placed under installation Types 1, 2 or 3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL CONCRETE PIPE CULVERTS INDIRECT DESIGN METHOD

NO SCALE

A62DA

1-29-18

2018 STANDARD PLAN A62DA

Return to Table of Contents

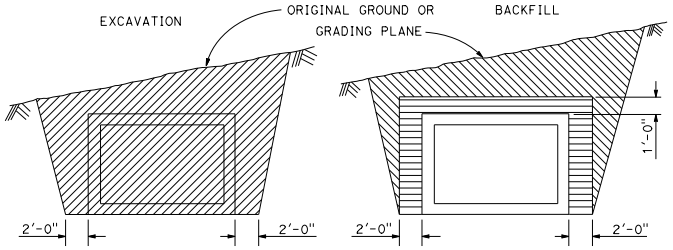
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

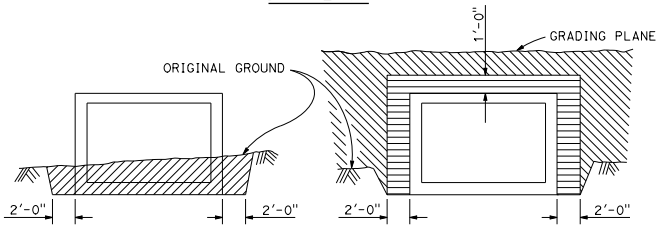
May 31, 2018
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

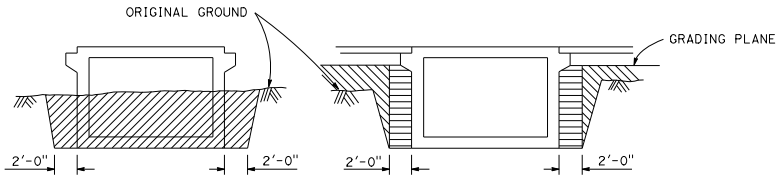
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



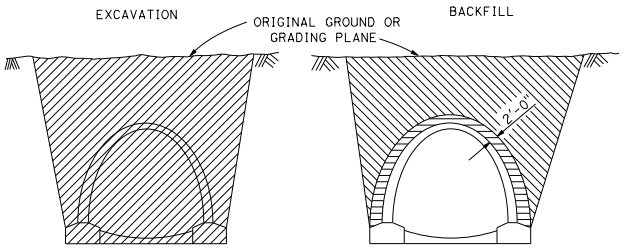
IN TRENCH



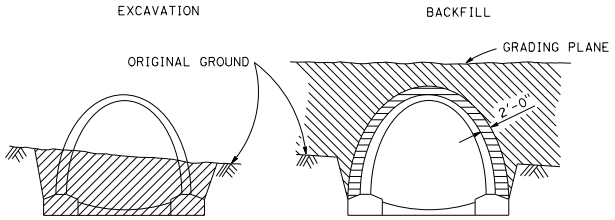
IN EMBANKMENT



EXPOSED TOP
REINFORCED CONCRETE BOX CULVERT



IN TRENCH



IN EMBANKMENT
REINFORCED CONCRETE ARCH CULVERT

NOTES:

1. Slope or shore excavation sides as necessary.
2. Dimensions shown are minimum.

LEGEND

- STRUCTURE EXCAVATION (CULVERT)
- STRUCTURE BACKFILL (CULVERT) 95% RELATIVE COMPACTION
- ROADWAY EMBANKMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL CAST-IN-PLACE REINFORCED CONCRETE BOX AND ARCH CULVERTS

NO SCALE

A62E

1-29-18

Return to Table of Contents

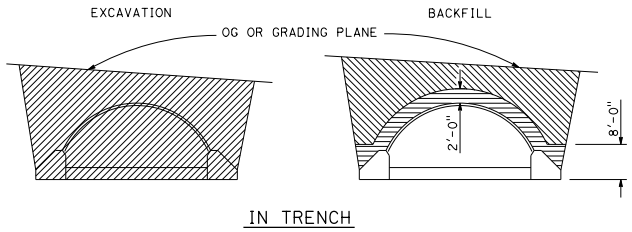
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

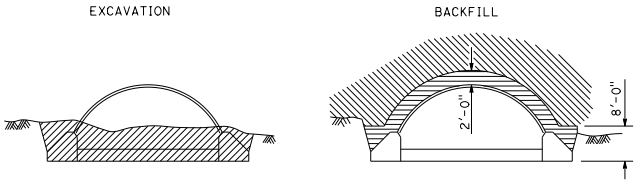
May 31, 2018
PLANS APPROVAL DATE

Carl W. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

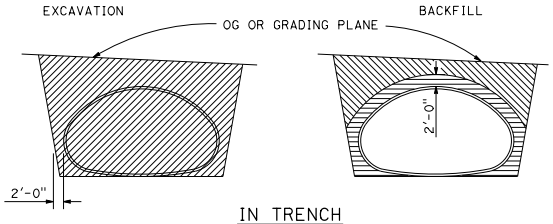


IN TRENCH

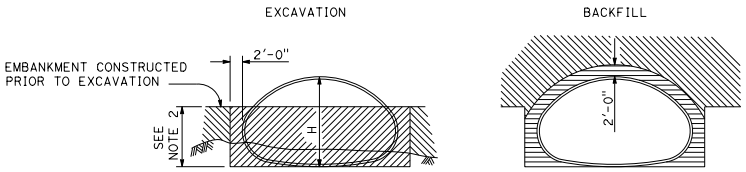


IN EMBANKMENT

STRUCTURAL STEEL PLATE ARCHES

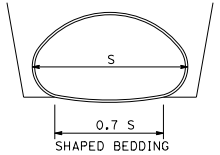


IN TRENCH

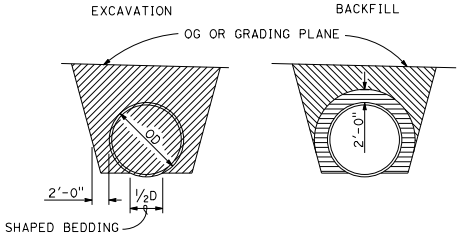


IN EMBANKMENT

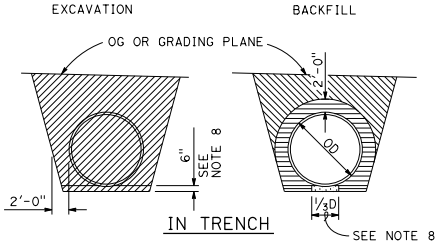
STRUCTURAL STEEL PLATE PIPE ARCHES AND VEHICULAR UNDERCROSSING



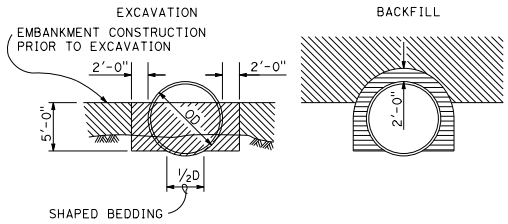
SHAPED BEDDING
S = Larger than 84"



IN TRENCH



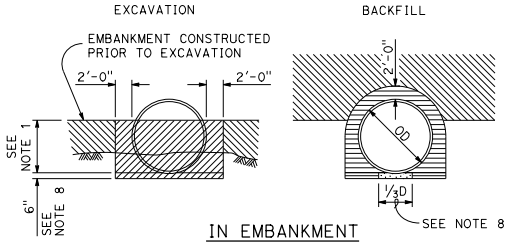
IN TRENCH



IN EMBANKMENT

PIPES

Larger than 84"



IN EMBANKMENT

METAL AND PLASTIC PIPES AND CORRUGATED METAL PIPE ARCHES

84" or Smaller

NOTES:

1. PIPES: 30" minimum for diameters up to and including 42" then 2/3 diameter but no more than 60" required. CORRUGATED METAL PIPE ARCHES: 30" maximum.
2. 2/3 H up to 60" maximum.
3. Slope or shore excavation sides as necessary.
4. Backfill shall be placed full width of excavation except as noted.
5. Diagrams do not apply to overside drains.
6. Dimensions shown are minimum.
7. Construction strutting of structural steel plate pipe, arches and vehicular undercrossing to be used when shown on the project plans. When shown, see Standard Plan D88A for strutting requirements.
8. Excavation below pipe and 80% relative compaction requirements for plastic pipes only.
9. D is the inside diameter (ID) of the pipe.

LEGEND

- STRUCTURE EXCAVATION (CULVERT)
- ROADWAY EMBANKMENT
- STRUCTURE BACKFILL (CULVERT) 95% RELATIVE COMPACTION
- STRUCTURE BACKFILL (CULVERT) 80% RELATIVE COMPACTION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL METAL AND PLASTIC CULVERTS

NO SCALE

A62F

1-29-18

Return to Table of Contents

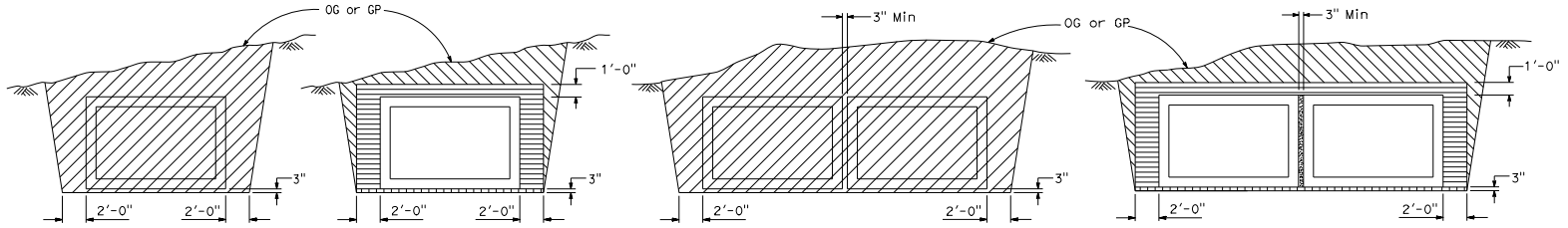
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

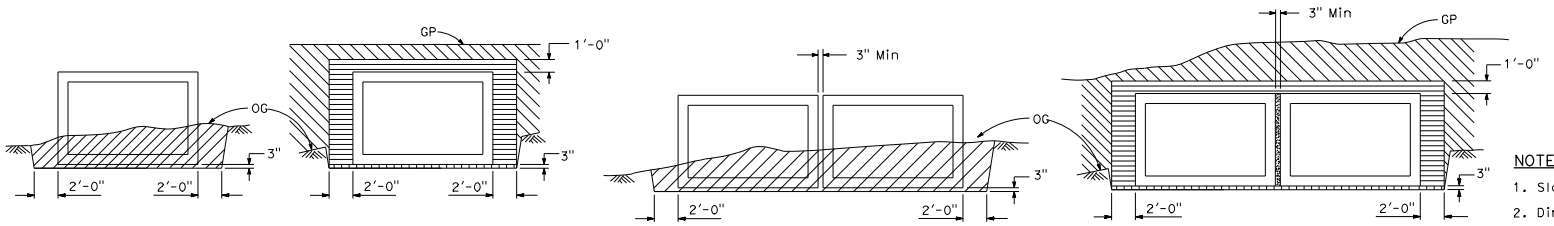
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Carl W. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





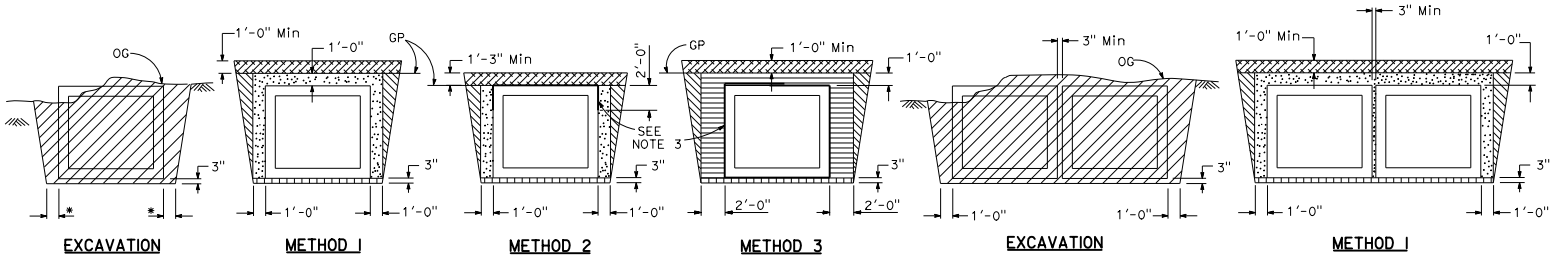
FILL HEIGHT GREATER THAN 2'-0"

LEGEND:

- STRUCTURE EXCAVATION (CULVERT)
- STRUCTURE BACKFILL (CULVERT) 95% RELATIVE COMPACTION
- ROADWAY EMBANKMENT
- SLURRY CEMENT BACKFILL
- SAND BEDDING (CULVERT)
- ROADWAY PAVEMENT STRUCTURE

NOTES:

1. Slope or shore excavation sides as necessary.
2. Dimensions shown are minimum.
3. Method 2 and 3 for single or multiple boxes requires an approved external sealing band. See Standard Plan D83A.
4. Construction of Roadway Pavement Structure in Method 2 or Method 3 shall not disturb the external sealing band installation.



* 1'-0" Where Method 1 or 2 Backfill is used.
2'-0" Where Method 3 Backfill is used.

FILL HEIGHT 2'-0" OR LESS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EXCAVATION AND BACKFILL PRECAST REINFORCED CONCRETE BOX CULVERT

NO SCALE

A62G

1-29-18

2018 STANDARD PLAN A62G

Return to Table of Contents

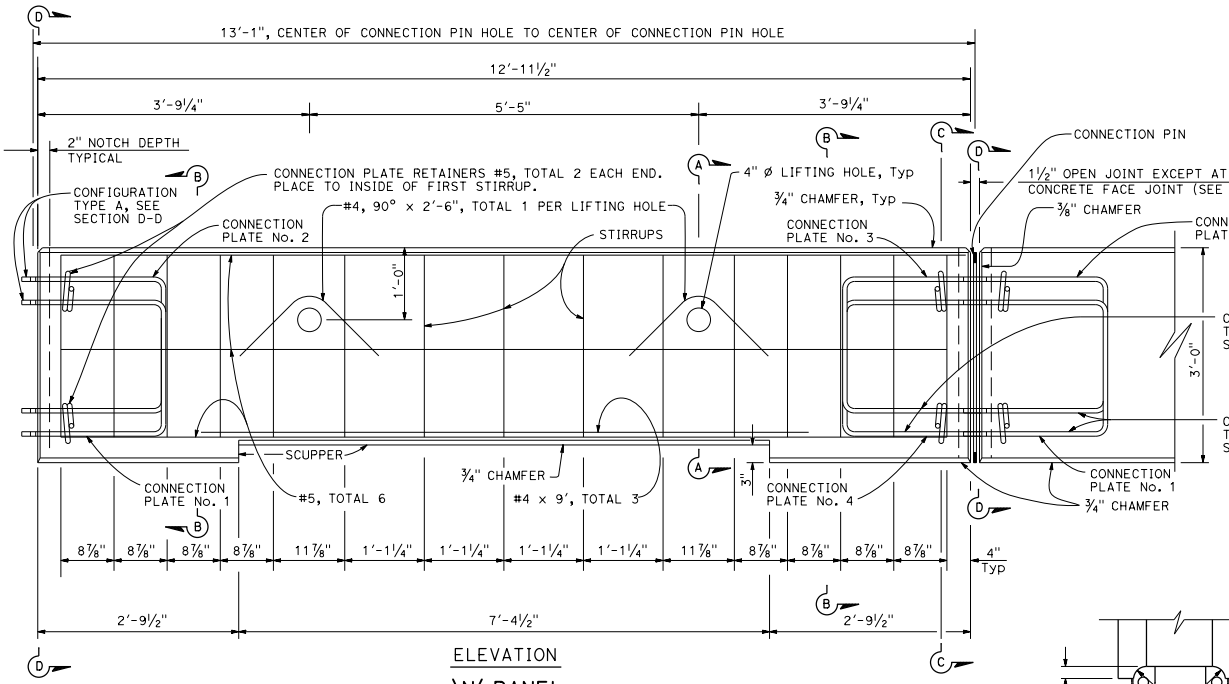
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

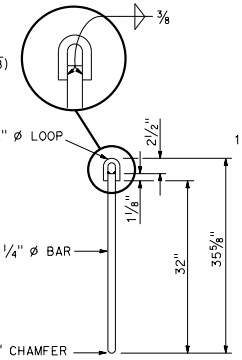
May 31, 2018
PLANS APPROVAL DATE

Randall D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

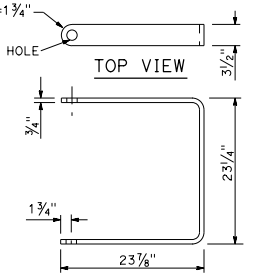
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION
'N' PANEL
See Note 1



ELEVATION
CONNECTION PIN



SIDE VIEW
CONNECTION PLATE

NOTES:

1. Portable concrete barrier (Type 60K) consists of a layout of interconnected precast panels of the following types:

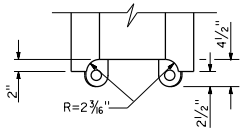
   "N" Panels - Notched concrete end at both ends of panel. Majority of panels used for portable (Type 60K) barrier are "N" Panels.

   "T" Panels - Notched concrete end at one end of the panel and a vertical concrete face at the other end of the panel. Used to connect "N" Panels to the "R" Panels.

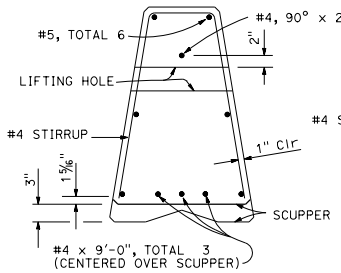
   "R" Panels - Vertical concrete face at both ends of the panel. Used between "T" Panels. Also connects to vertical concrete end of "T" Panels and vertical concrete end of the connection to permanent concrete barrier.

   For Details of "T" and "R" Panels and Typical layouts of portable concrete barrier (Type 60K), see Standard Plan A63B.

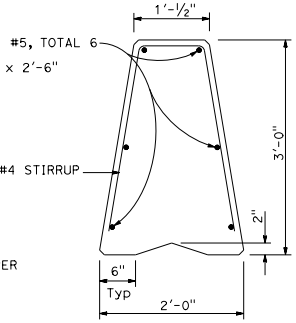
2. Connection Plate Configurations Type A and Type B apply to "N", "T" and "R" Panels. The ends of Connection Plate No. 3 overlap the ends of Connection Plate No. 1. The ends of Connection Plate No. 4 overlap the ends of Connection Plate No. 2. One connection pin inserted through the holes in Connection Plates No. 3 and No. 1 and the other connection pin inserted through the holes in Connection Plates No. 4 and No. 2.



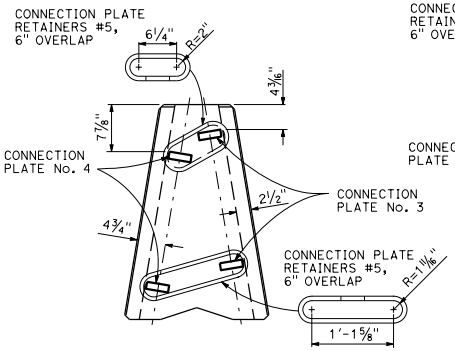
SECTION E-E
Notched Concrete Panel End



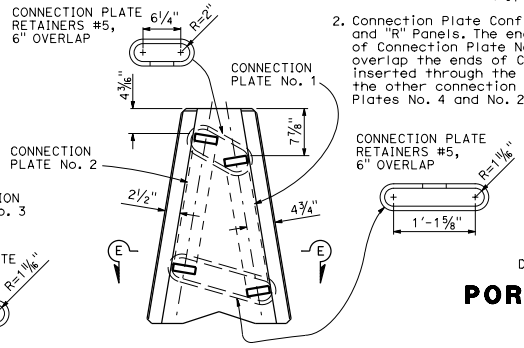
SECTION A-A



SECTION B-B



SECTION C-C
Connection Plate Configuration Type B
See Note 2



SECTION D-D
Connection Plate Configuration Type A
See Note 2

DEPARTMENT OF TRANSPORTATION

PORTABLE CONCRETE BARRIER (TYPE 60K)

NO SCALE

A63A

1-29-18

Return to Table of Contents

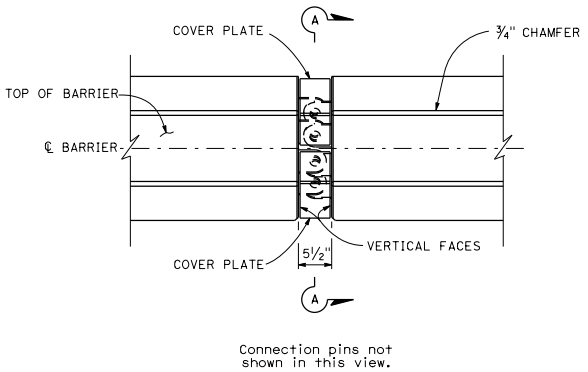
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

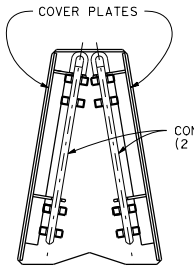
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



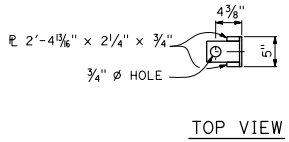
Connection pins not shown in this view.

TOP VIEW

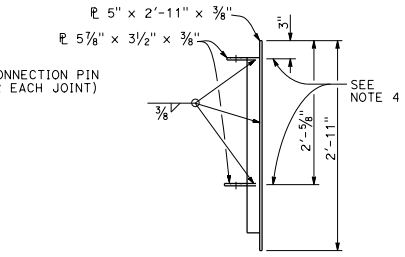
VERTICAL CONCRETE FACE JOINTS



SECTION A-A



TOP VIEW

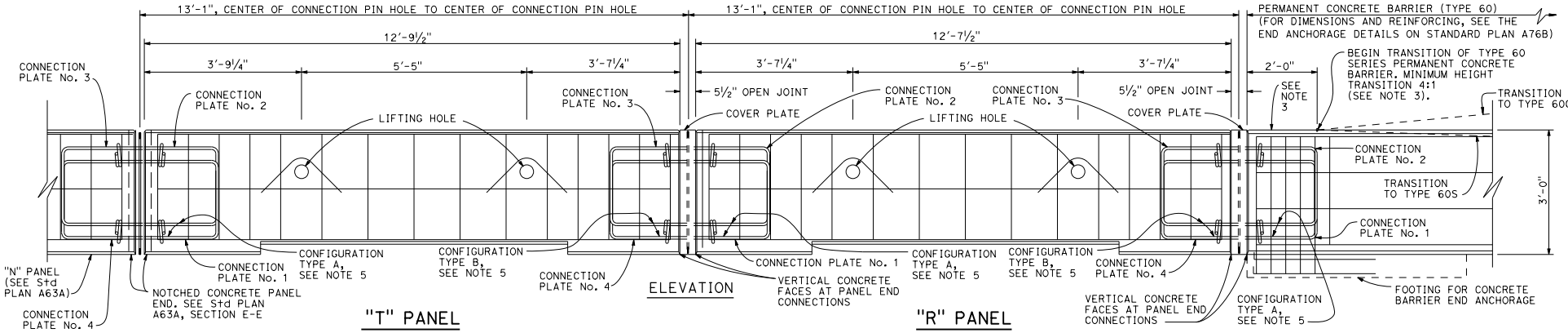


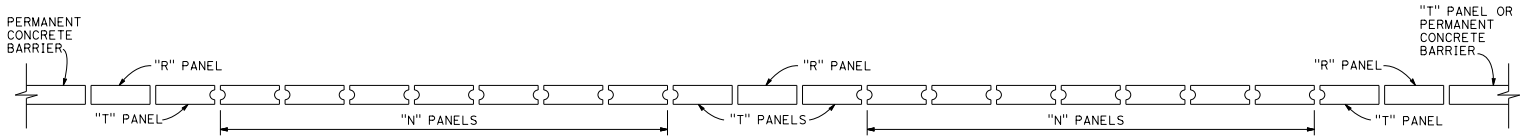
SIDE VIEW

COVER PLATE

NOTES:

1. "R" Panels are to be placed at a maximum of 10 panel segment intervals and at connections to permanent concrete barrier. "R" panels provide for quick and easy placement and removal by lateral movement of panel (NO Notched Ends). "N" Panels have concrete notches at each end of the panel. "T" panels have a concrete notch at one end of the panel and a vertical face at the other end of the panel. Notched end connections plus overlapping connection plates require longitudinal movement of the panels during placement or removal. If portable concrete barrier (Type 60K) is to be removed after installation, "R" panels are to be removed first to facilitate removal of the remaining panels.
2. Reinforcement and dimensioning details for "R" and "T" Panels are similar to the "N" Panel details shown on Standard Plan A63A.
3. Modify end of permanent concrete barrier with the installation of connection plates for connection pins and cover plates. Remove 2' of existing Type 60 permanent concrete barrier to install connection plates for "R" Panel connection. Where the connection to existing barrier requires a height transition, remove existing barrier to end of the height transition.
4. Dimension to bottom of the 5⅞" x 3½" x ⅜" plate.
5. For additional details of connection plate configurations, see Sections C-C and D-D of Standard Plan A63A.





PLAN

TYPICAL PORTABLE CONCRETE BARRIER (TYPE 60K) LAYOUT

See Note 1

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PORTABLE CONCRETE BARRIER (TYPE 60K)

NO SCALE

A63B

1-29-18

Return to Table of Contents

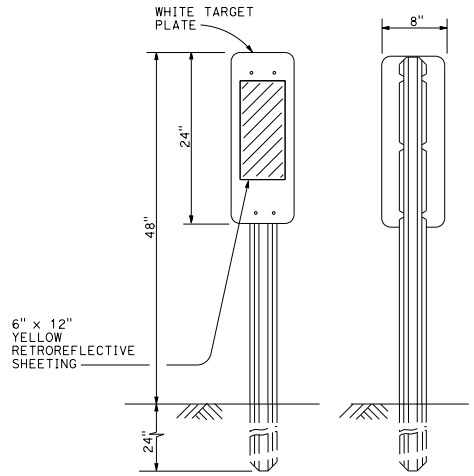
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

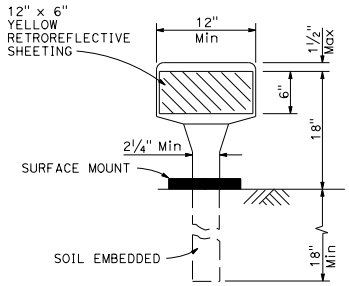
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FRONT BACK

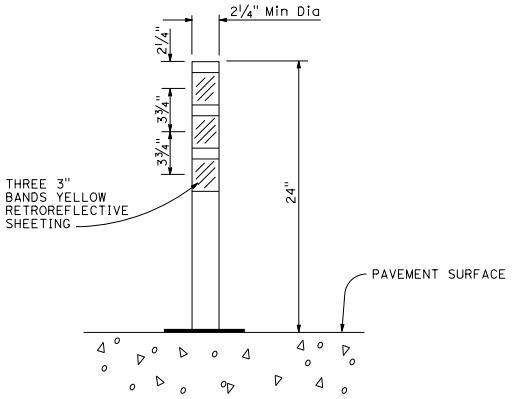
TYPE L-1 (CA)

See Note 1



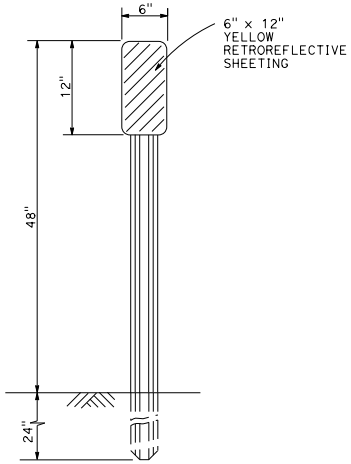
TYPE K-1 (CA)

(Flexible post with horizonal orientation of sheeting)



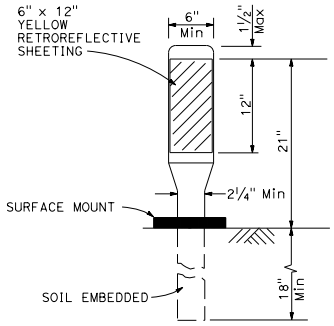
TYPE Q (CA)

(Tubular flexible post surface mount)



TYPE L-2 (CA)

See Note 1



TYPE K-2 (CA)

(Flexible post with vertical orientation of sheeting)

NOTE:

1. See Standard Plan A73B for metal post details and additional markers.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OBJECT MARKERS

NO SCALE

A73A

2018 STANDARD PLAN A73A

1-29-18

Return to Table of Contents

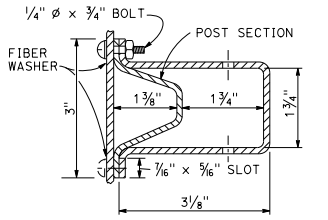
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

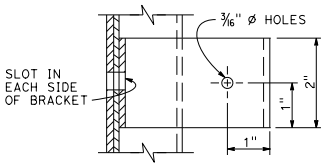
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



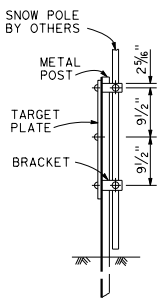
TOP VIEW



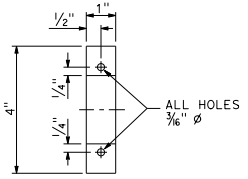
Bracket to be 1/8" x 2" mild steel galvanized after fabrication

SIDE VIEW

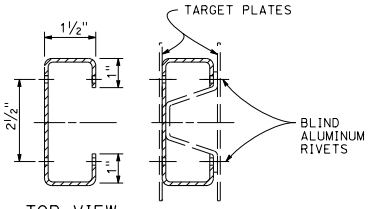
SNOW POLE BRACKET



POST SIDE VIEW



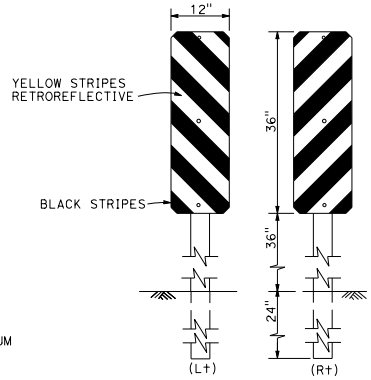
SIDE VIEW



TOP VIEW

Material: Aluminum 0.050" thick (3003-H14 Alloy)

TWO PLATE POST MOUNT



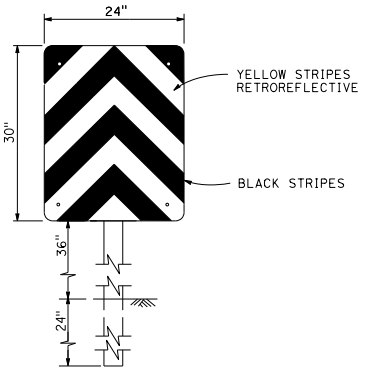
TYPE P (CA)

NOTES:

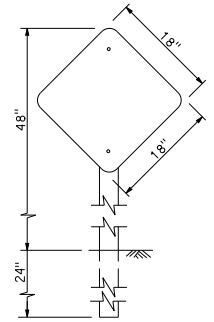
A. See Std Plan A73A for additional object markers.

B. Type P(CA) and R(CA) markers shall have orange and white retroreflective stripes in work zones.

C. Diagonal stripes on Type P(CA) markers shall be sloped down in the direction of travel.



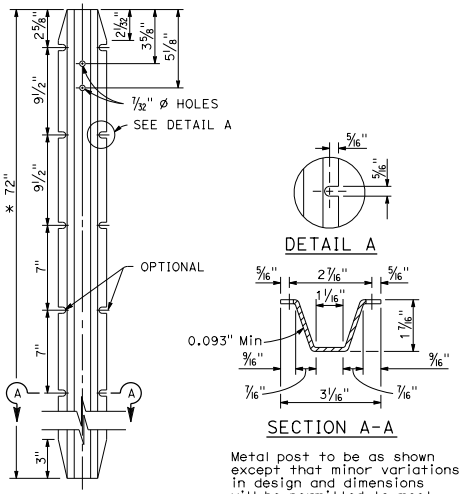
TYPE R (CA)



TYPE N-1 (CA), N-2 (CA), N-3 (CA)

N-1(CA). Yellow retroreflective.
N-2(CA). Red retroreflective.
N-3(CA). Orange retroreflective.

OBJECT MARKERS



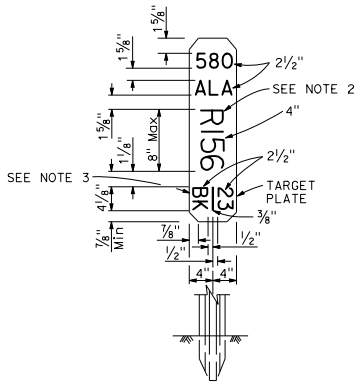
DETAIL A

SECTION A-A

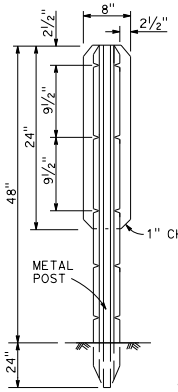
Metal post to be as shown except that minor variations in design and dimensions will be permitted to meet manufacturer's standards.

* 8'-0" for Type P object marker

METAL POST DETAIL



FRONT



BACK

HIGHWAY POST MARKER

HIGHWAY POST MARKER NOTES:

1. The marker shall be white (non-reflective) target plate with black Series D numerals and letters.
2. A post mile prefix, such as "R", shall apply only when directed by the Engineer.
3. "BK"(Back), "AH" (Ahead), or a blank space shall apply as directed by the Engineer.
4. All information shall be in U.S. Customary units (miles).

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MARKERS

NO SCALE

A73B

1-29-18

Return to Table of Contents

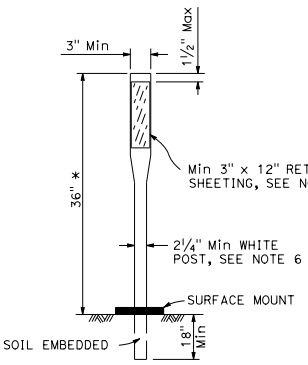
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

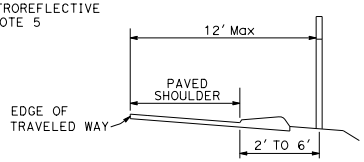
REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

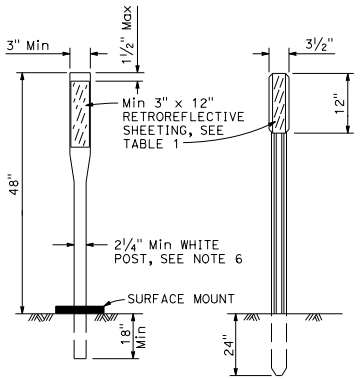


* 36" Min where speeds are 40 miles/h or less.

CHANNELIZERS



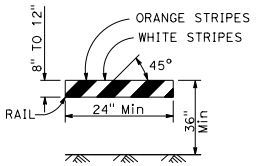
DELINEATOR POSITIONING



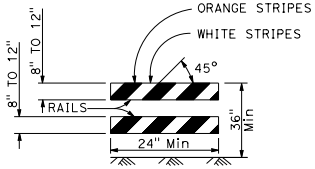
CLASS 1 FLEXIBLE POST

CLASS 2 METAL POST
See Note 4

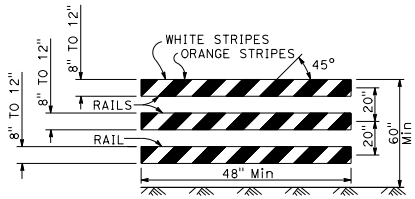
DELINEATORS



TYPE I BARRICADE
See Note A



TYPE II BARRICADE



TYPE III BARRICADE

BARRICADES (See Note 3)

Only face of rails shown. Barricade construction materials and supports as specified in the specifications.

TABLE 2 - BARRICADES			
BARRICADE	TYPE I	TYPE II	TYPE III
WIDTH OF RAIL	8" Min - 12" Max *	8" Min - 12" Max *	8" Min - 12" Max *
LENGTH OF RAIL	24" Min	24" Min	48" Min
WIDTH OF STRIPES * *	6"	6"	6"
HEIGHT	36" Min	36" Min	60" Min
NUMBER OF RETROREFLECTIVE RAIL FACES	2 (ONE EACH DIRECTION)	4 (TWO EACH DIRECTION)	3 IF FACING TRAFFIC IN ONE DIRECTION 6 IF FACING TRAFFIC IN TWO DIRECTION

* For the wooden option dimensions are nominal lumber dimensions.

* * For rails less than 36" long, 4" wide stripes shall be used.

NOTE A:

Barricades to have a minimum of 270 square inches of retroreflective area facing traffic when used on freeways, expressways, and other high speed highways.

TABLE 1- DELINEATORS		
TYPE	RETROREFLECTIVE SHEETING	
	FRONT	BACK
E	WHITE	WHITE (SEE NOTE 1)
F	WHITE	NONE
G	YELLOW	NONE
J	RED	NONE

NOTES:

1. The retroreflective sheeting used on the back of delineator shall be a minimum size of 3" x 3".
2. The type of delineator to be installed will be designated on the plans.
3. All barricade stripes shall be retroreflective and sloped downward in the direction of the opened traffic lane.
4. See Standard Plan A73B for Metal Post Details.
5. Unless shown otherwise on the plans, or as directed by the Engineer, the color of the retroreflective sheeting for permanent channelizers shall conform to the color of the pavement markings it supplements.
6. Except, Class 1 (Flexible Post) temporary delineators and temporary channelizers in work zones shall be orange post with white retroreflective sheeting.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DELINEATORS, CHANNELIZERS AND BARRICADES

NO SCALE

A73C

1-29-18

Return to Table of Contents

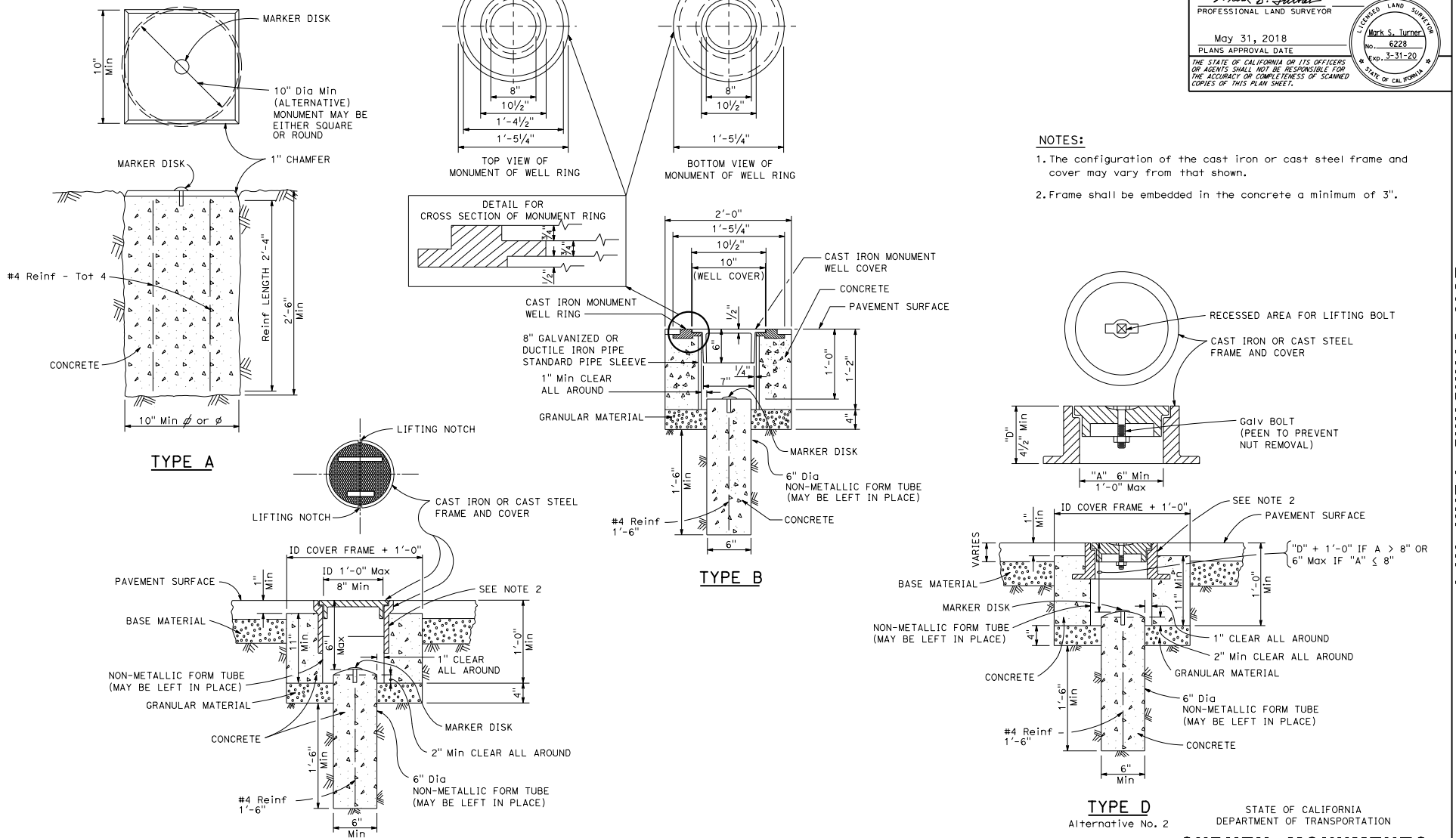
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Mark S. Turner
PROFESSIONAL LAND SURVEYOR

May 31, 2018
PLANS APPROVAL DATE

LICENSED LAND SURVEYOR — Mark S. Turner — No. 6228 — Exp. 3-31-20 — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



NOTES:

1. The configuration of the cast iron or cast steel frame and cover may vary from that shown.
2. Frame shall be embedded in the concrete a minimum of 3".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SURVEY MONUMENTS

NO SCALE

A74

1-29-18

Return to Table of Contents

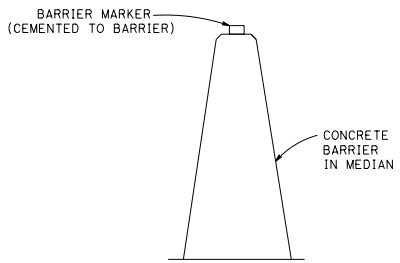
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

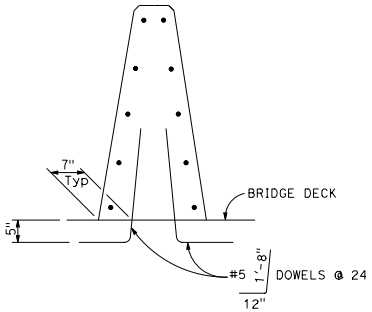
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



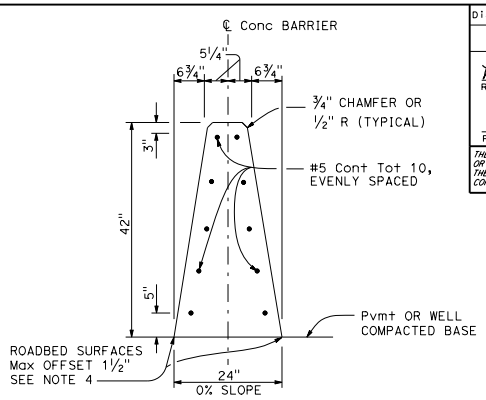
CONCRETE BARRIER TYPE 60M DELINEATION

See Note 5



CONCRETE BARRIER TYPE 60MA

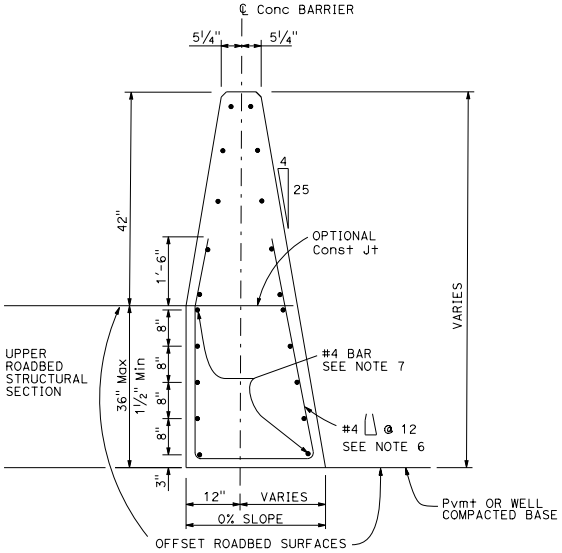
Details similar to Type 60M except as noted.



CONCRETE BARRIER TYPE 60M

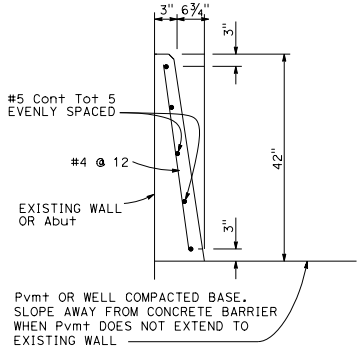
NOTES:

1. See Standard Plan A76B for details of Concrete Barrier Type 60M end anchors, connection to structures and transitions to Concrete Barrier Type 50 and Concrete Barrier Type 60MS.
2. See Standard Plan A76C for Concrete Barrier Type 60M transitions at bridge column and sign pedestals.
3. Where glare screen is required on Concrete Barrier Type 60M, use Concrete Barrier Type 60MG.
4. Where roadbed offset is greater than 1½", see Concrete Barrier Type 60MC.
5. See Project Plans for barrier delineation locations.
6. Reinforcing stirrup not required for roadbed offsets less than 1'-0".
7. For roadbed surfaces offset greater than 1½" and less than or equal to 3", no reinforcement required. For roadbed surfaces offset greater than 3" and less than or equal to 8", use two #4 Reinf at 3" above the lower roadbed surface. For roadbed surfaces offset greater than 8" and less than or equal to 12", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at 8" above the lower roadbed surface. For roadbed surfaces offset greater than 12" and less than or equal to 36", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at every 8" increment vertical spacing above the first two #4 Reinf.



CONCRETE BARRIER TYPE 60MC

Details similar to Type 60M except as noted.
Use concrete barrier end anchor when necessary.
36" roadbed surfaces offset shown.



CONCRETE BARRIER TYPE 60MD

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

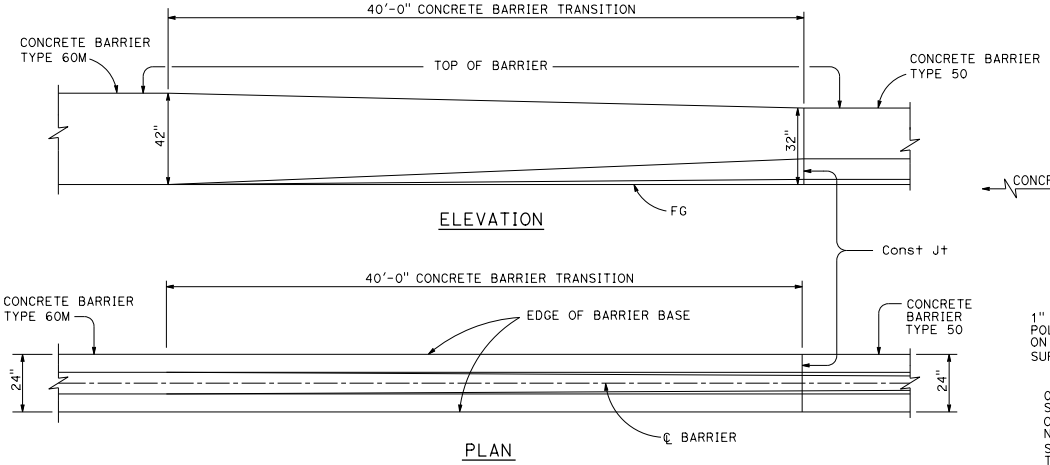
CONCRETE BARRIER TYPE 60M

NO SCALE

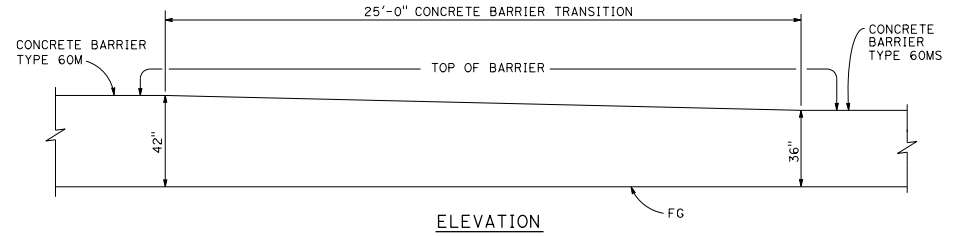
A76A

1-29-18

Return to Table of Contents



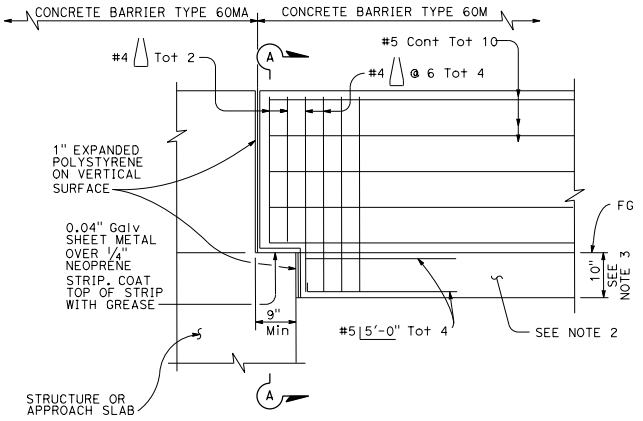
TRANSITION CONCRETE BARRIER TYPE 60M TO CONCRETE BARRIER TYPE 50



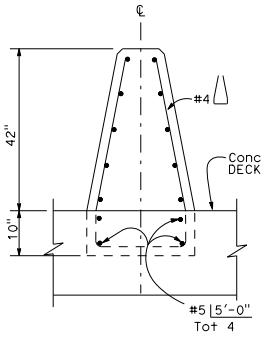
TRANSITION CONCRETE BARRIER TYPE 60M TO CONCRETE BARRIER TYPE 60MS

NOTES:

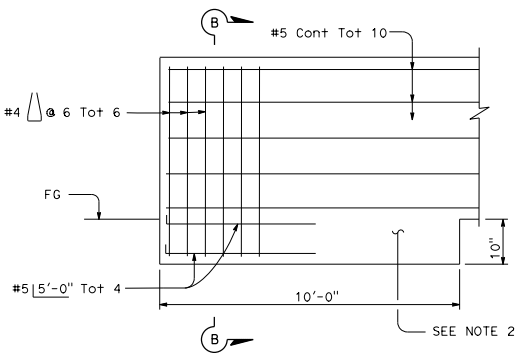
1. See Standard Plan A76A for Concrete Barrier Type 60M and Type 60MA.
2. Footing monolithic or doweled with 2-#8 x 8" @ 2'-0". The footing is required at concrete barrier ends and at interruptions in concrete barrier.
3. 10" concrete barrier footing extends 10' back from structure.
4. See Standard Plan A78I for transition to Thrie Beam Barrier.



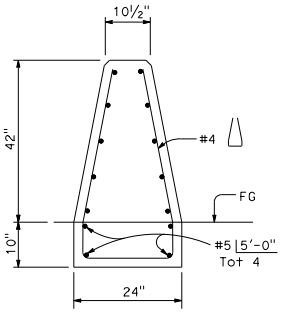
CONCRETE BARRIER TYPE 60M CONNECTION TO STRUCTURE



SECTION A-A



CONCRETE BARRIER TYPE 60M END ANCHORAGE



SECTION B-B

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60M

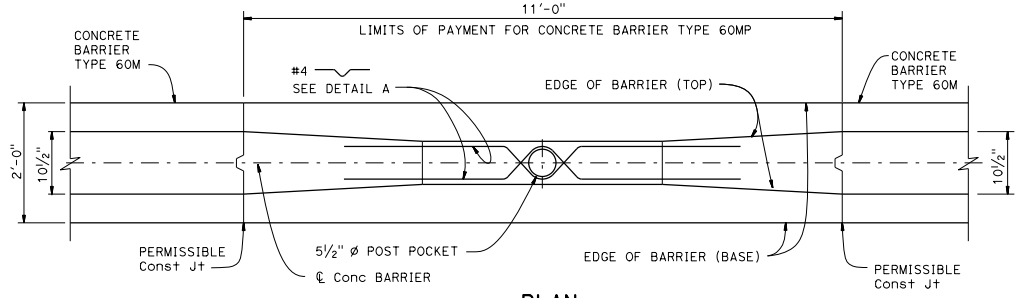
NO SCALE

A76B

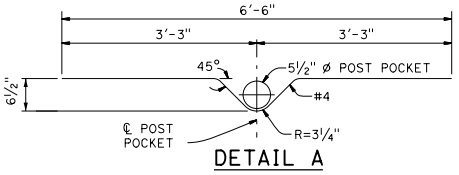
2018 STANDARD PLAN A76B

1-29-18

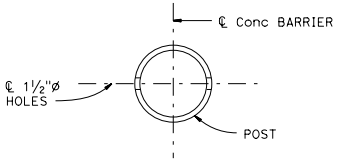
Return to Table of Contents



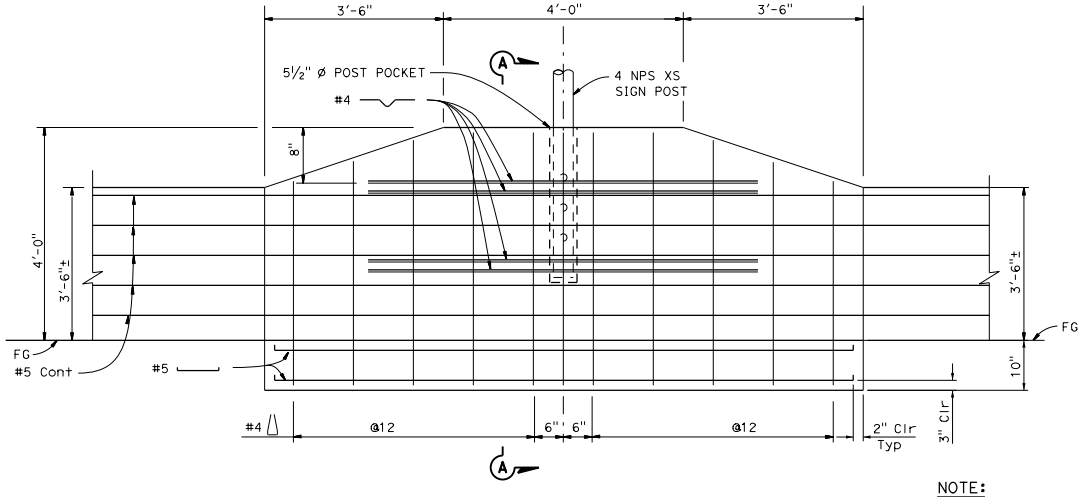
PLAN



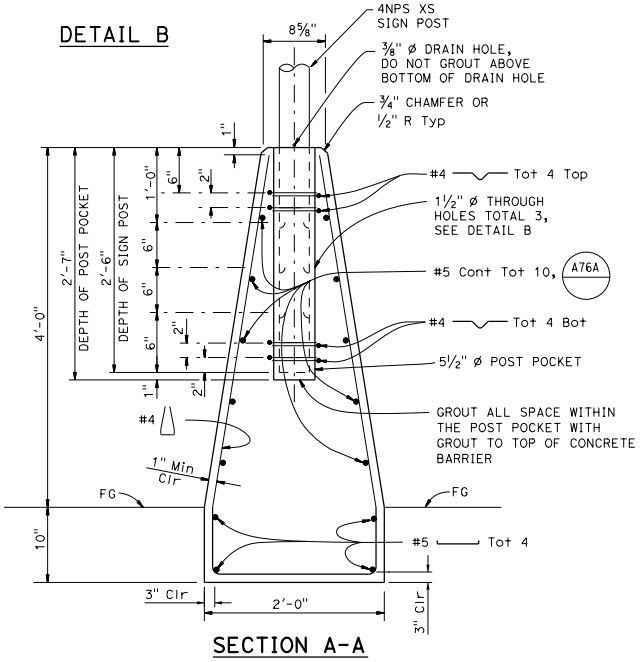
DETAIL A



DETAIL B



ELEVATION



SECTION A-A

NOTE:
For Type 60M Barrier cross section, see Standard Plan A76A.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MP

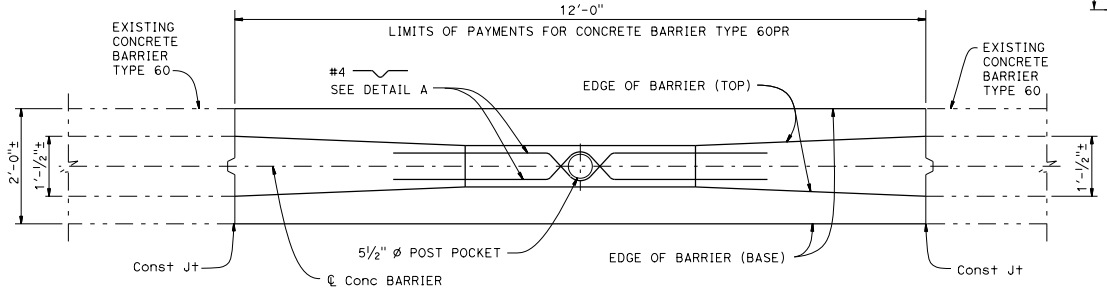
NO SCALE

A76BA

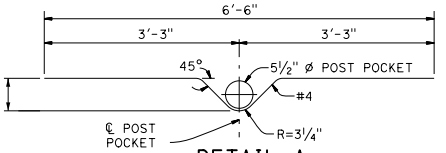
1-29-18

2018 STANDARD PLAN A76BA

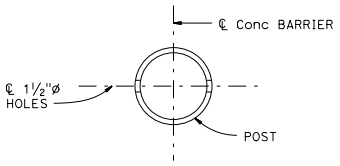
Return to Table of Contents



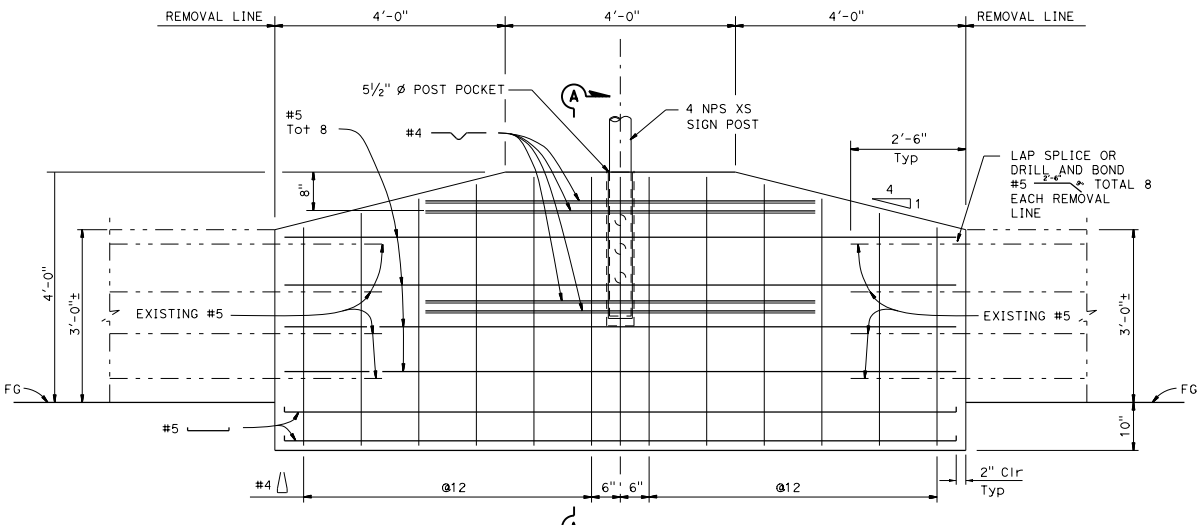
PLAN



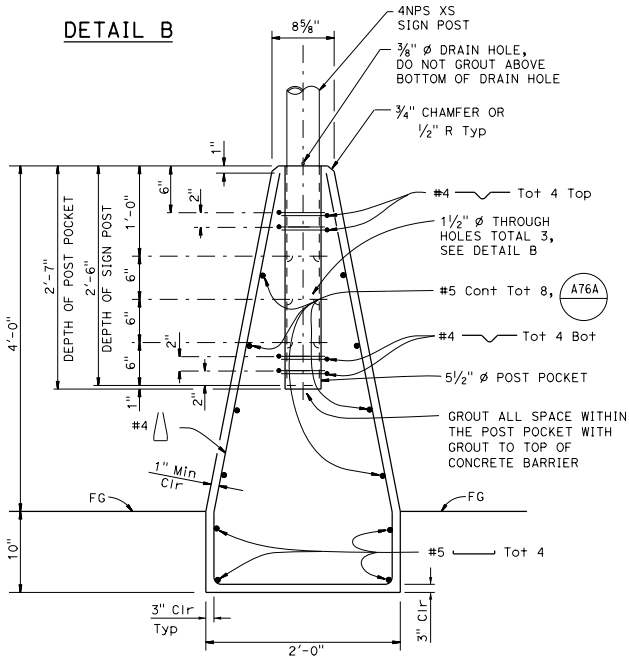
DETAIL A



DETAIL B



ELEVATION



SECTION A-A

NOTE:

THE CONTRACTOR MUST VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60PR

NO SCALE

A76BB

1-29-18

2018 STANDARD PLAN A76BB

Return to Table of Contents

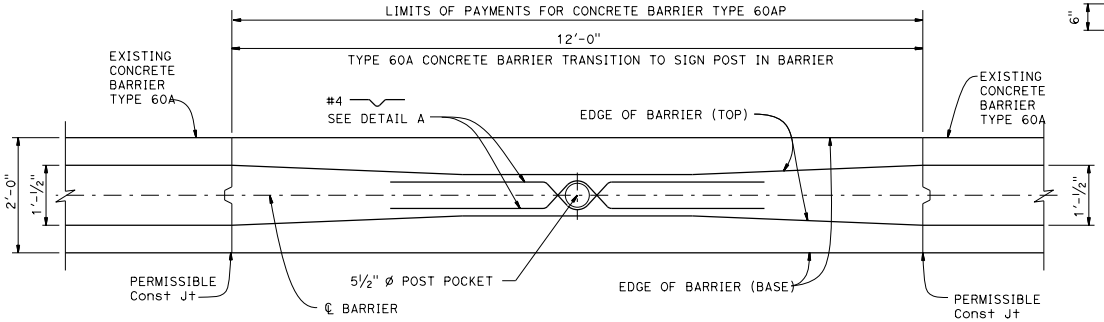
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

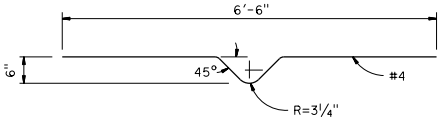
May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

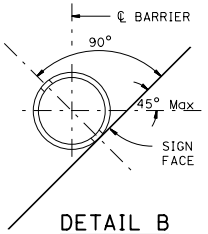
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



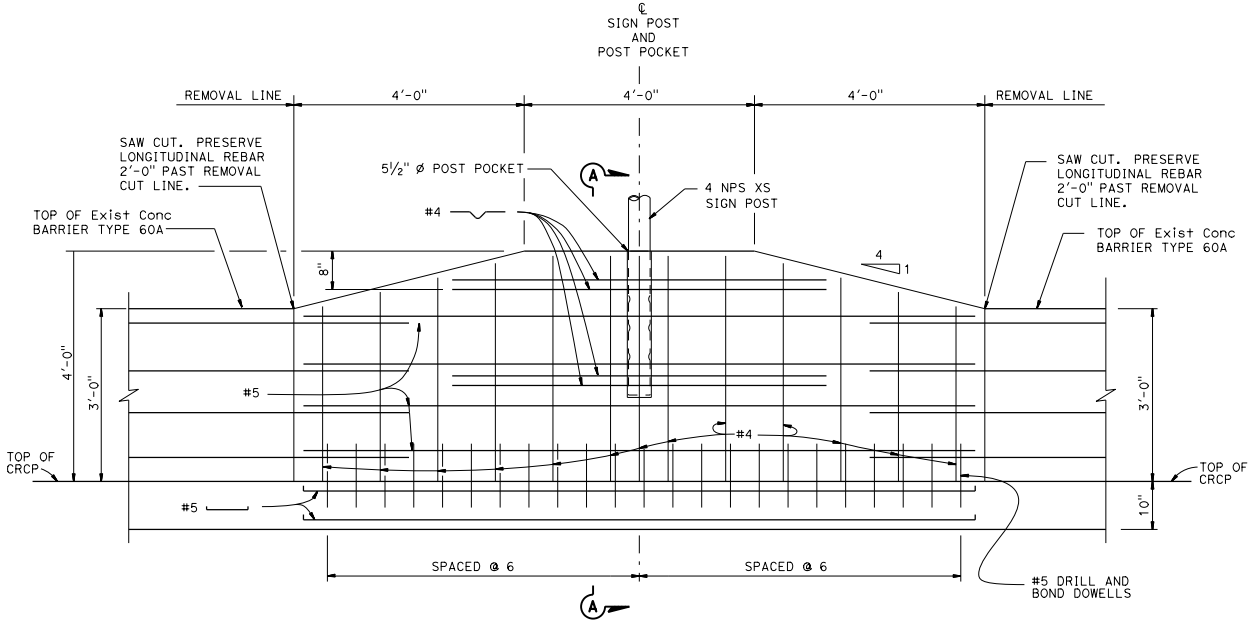
PLAN



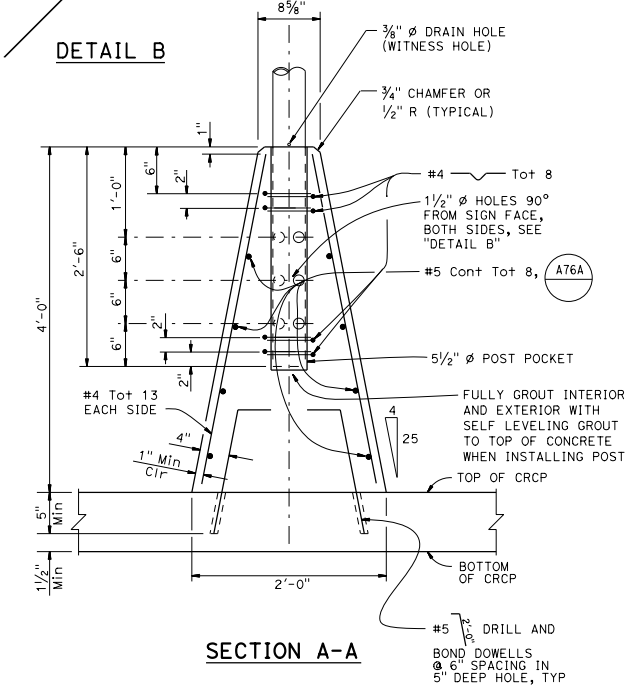
DETAIL A



DETAIL B



ELEVATION



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60AP

NO SCALE

A76BC

1-29-18

2018 STANDARD PLAN A76BC

Return to Table of Contents

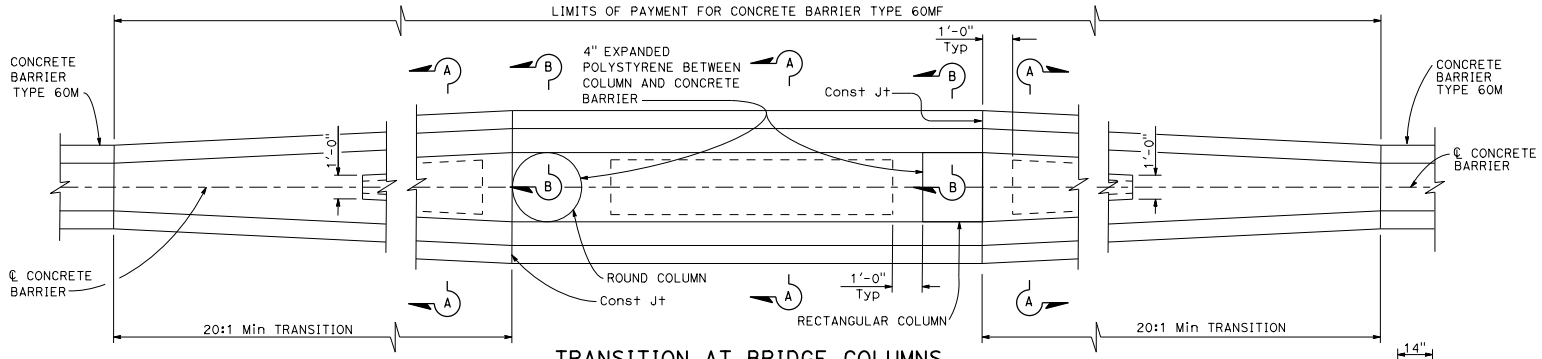
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

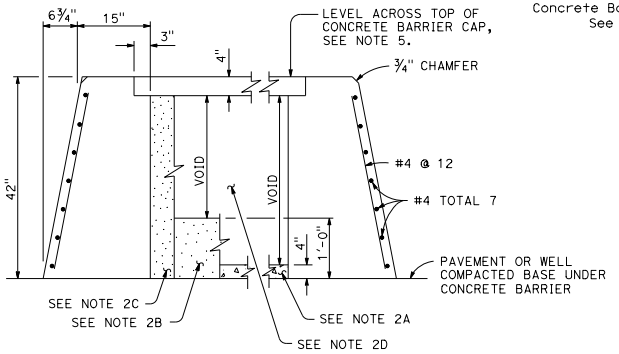
May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

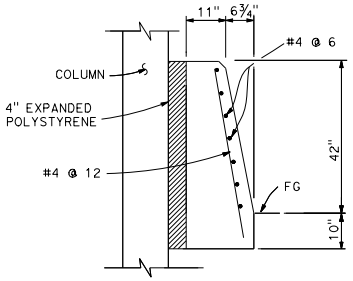


TRANSITION AT BRIDGE COLUMNS

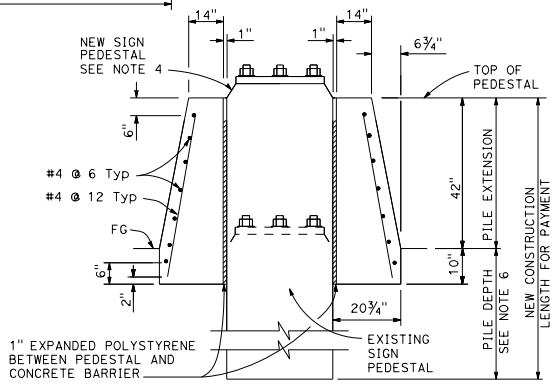


SECTION A-A

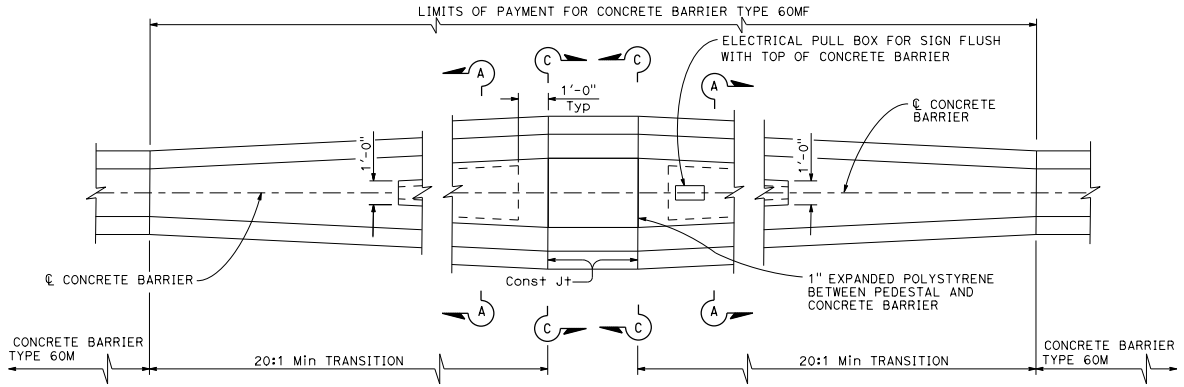
Concrete Barrier Type 60MF
See Note 7



SECTION B-B



SECTION C-C



TRANSITION AT SIGN PEDESTAL

Concrete Barrier Type 60MF
See Note 7

NOTES:

1. See Standard Plan A76A for Concrete Barrier Type 60M.
2. Contractor options for fill between concrete barrier walls:
   A. Place 4" PCC at base between concrete barrier walls.
   B. Place 1'-0" of granular material at base between walls.
   C. Place granular material from base to bottom of 4" cap.
   D. Monolithic concrete with foam blockouts is not permitted.
3. Reinforcing steel shall extend continuous through construction joints.
4. See Overhead Sign plans for sign pedestal elevations on new construction.
5. Adjust height of concrete barrier wall on low side of offset or superelevated roadways to provide level grade across top of concrete barrier cap.
6. See Overhead Signs Standard Plan Pile Foundation Tables.
7. All locations with limited shoulder width available for barrier, see Standard Plan A76F for use of Concrete Barrier Type 60MGF.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MF

NO SCALE

A76C

1-29-18

2018 STANDARD PLAN A76C

Return to Table of Contents

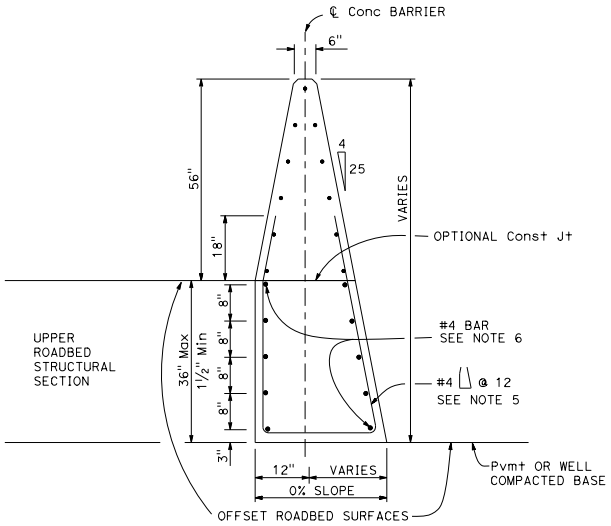
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

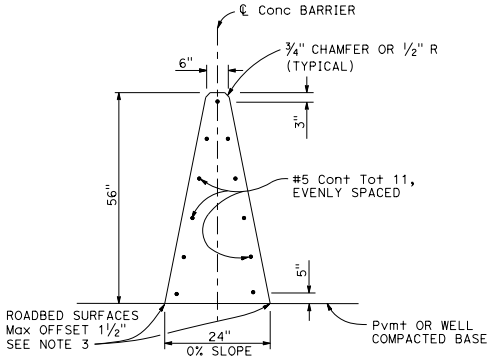
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



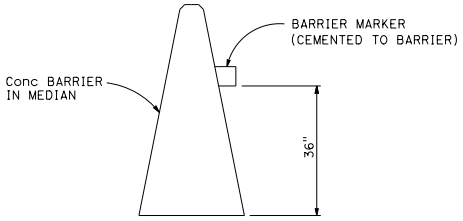
CONCRETE BARRIER TYPE 60MGC

Details similar to Type 60MG except as noted.
36" roadbed surfaces offset shown.



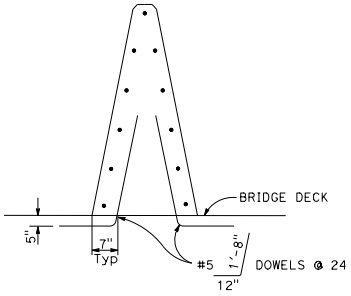
CONCRETE BARRIER TYPE 60MG

(Monolithic concrete
glare screen/barrier)



CONCRETE BARRIER TYPE 60MG DELINEATION

See Note 4



CONCRETE BARRIER TYPE 60MGA

Details similar to Type
60MG except as noted.

NOTES:

1. See Standard Plan A76E for details of Concrete Barrier Type 60MG end anchors, connection to structures and transitions to Concrete Barrier Type 60M.
2. See Standard Plan A76F for Concrete Barrier Type 60MG transitions at bridge column and sign pedestals.
3. Where roadbed offset is greater than 1½", see Concrete Barrier Type 60MGC.
4. Barrier delineation to be used when required by the Special Provisions.
5. Reinforcing stirrup not required for offsets less than 1'-0".
6. For roadbed surfaces offset greater than 1½" and less than or equal to 3", no reinforcement required. For roadbed surfaces offset greater than 3" and less than or equal to 8", use two #4 Reinf at 3" above the lower roadbed surface. For roadbed surfaces offset greater than 8" and less than or equal to 12", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at 8" above the lower roadbed surface. For roadbed surfaces offset greater than 12" and less than or equal to 36", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at every 8" increment vertical spacing above the first two #4 Reinf.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MG

NO SCALE

A76D

1-29-18

Return to Table of Contents

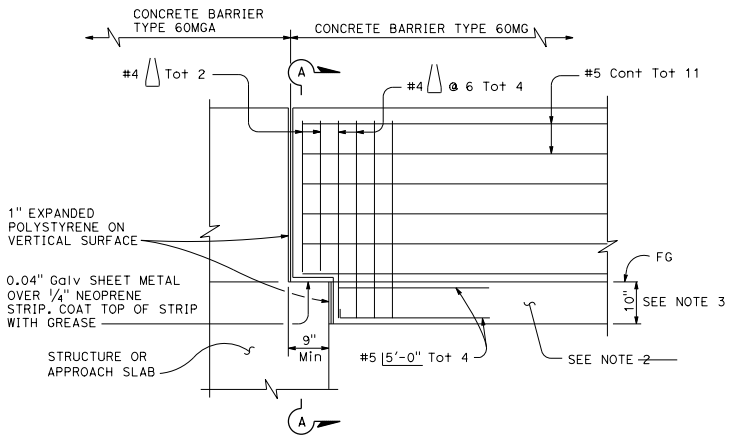
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

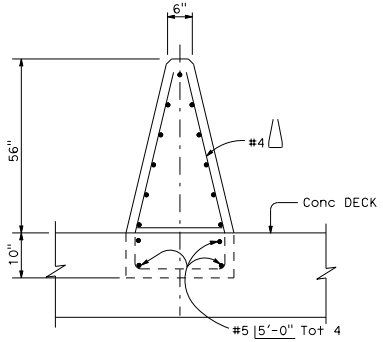
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



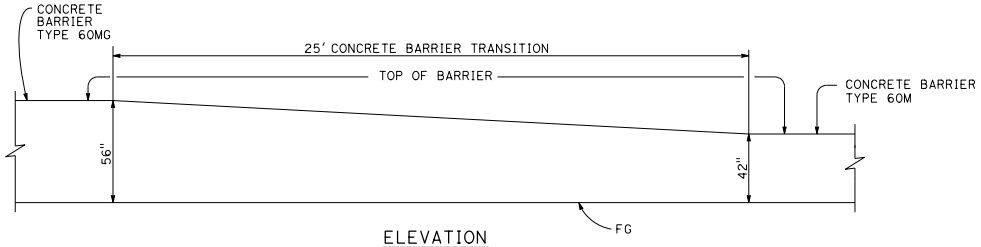
CONCRETE BARRIER TYPE 60MG CONNECTION TO STRUCTURE



SECTION A-A

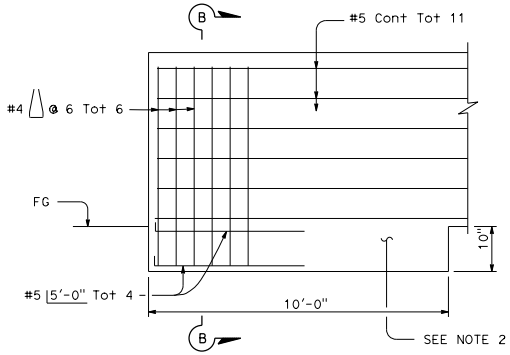
NOTES:

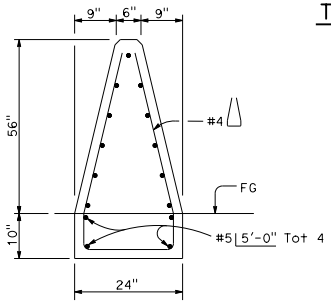
1. See Standard Plan A76D for Concrete Barrier Type 60MG and Type 60MGA.
2. Footing monolithic or doweled with 2-#8 x 8" @ 2'-0". The footing is required at concrete barrier ends and at interruptions in concrete barrier.
3. 10" concrete barrier footing extends 10' back from structure.
4. See Standard Plan A78I for transition to Thrie Beam Barrier.



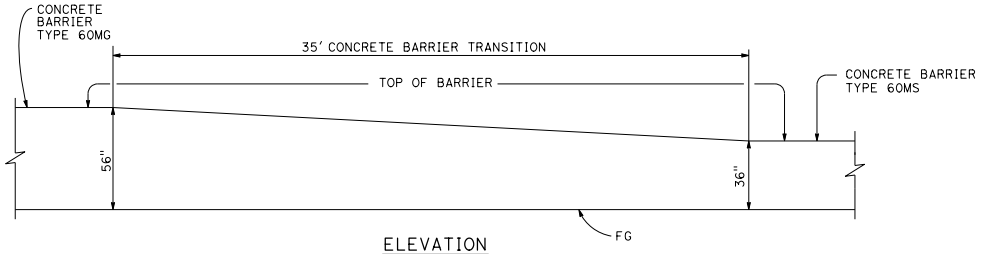
ELEVATION

TRANSITION CONCRETE BARRIER TYPE 60MG TO CONCRETE BARRIER TYPE 60M





SECTION B-B



ELEVATION

TRANSITION CONCRETE BARRIER TYPE 60MG TO CONCRETE BARRIER TYPE 60MS

CONCRETE BARRIER TYPE 60MG END ANCHORAGE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

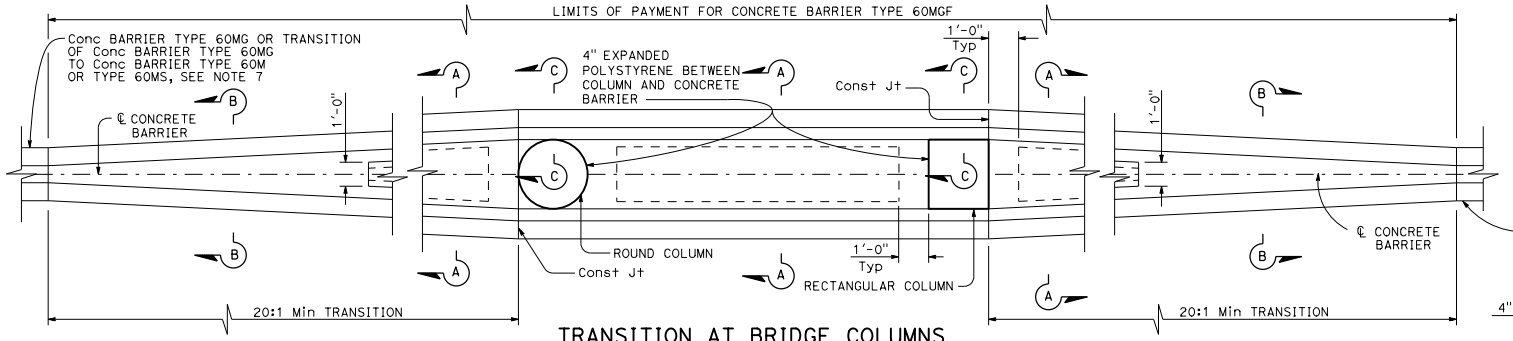
CONCRETE BARRIER TYPE 60MG

NO SCALE

A76E

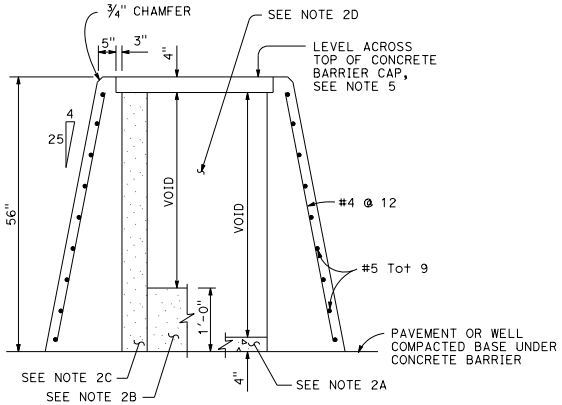
1-29-18

Return to Table of Contents

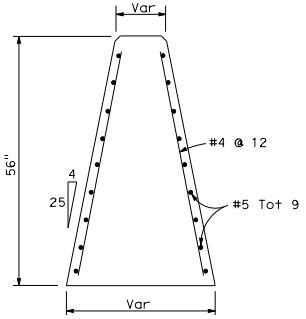


TRANSITION AT BRIDGE COLUMNS

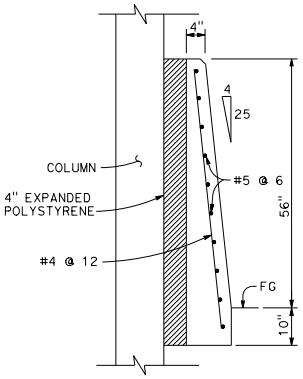
Concrete Barrier Type 60MGF



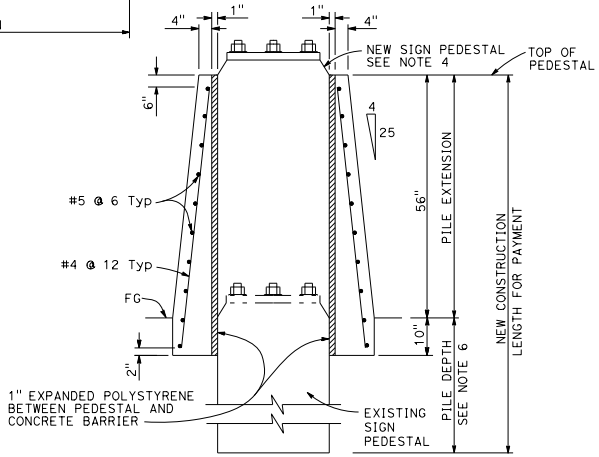
SECTION A-A



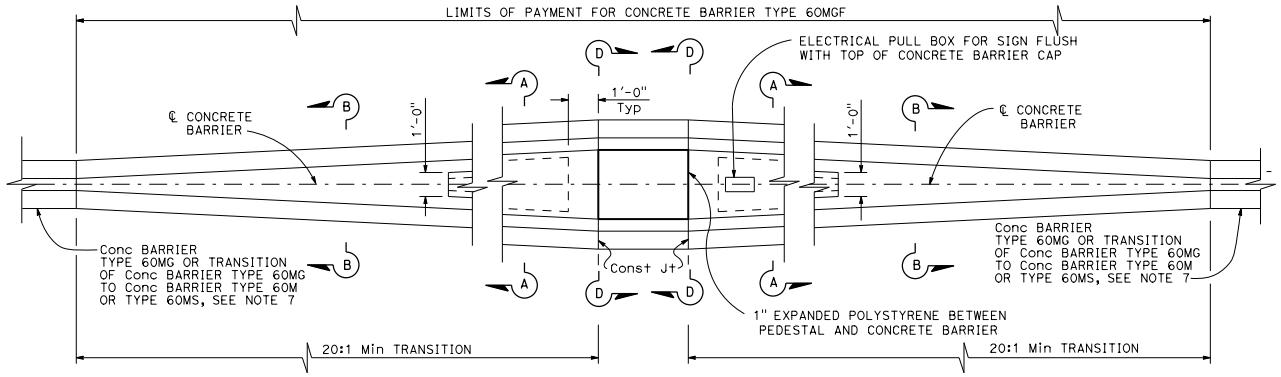
SECTION B-B



SECTION C-C



SECTION D-D



TRANSITION AT SIGN PEDESTAL

Concrete Barrier Type 60MGF

NOTES:

1. See Standard Plan A76D for Concrete Barrier Type 60MG.
2. Contractor options for fill between concrete barrier walls:
   A. Place 4" PCC at base between concrete barrier walls.
   B. Place 1'-0" of granular material at base between walls.
   C. Place granular material from base to bottom of 4" cap.
   D. Monolithic concrete with foam blockouts is not permitted.
3. Reinforcing steel shall extend continuous through construction joints.
4. See Overhead Sign plans for sign pedestal elevations on new construction.
5. Adjust height of concrete barrier wall on low side of offset or superelevated roadways to provide level grade across top of concrete barrier cap.
6. See Overhead Signs Standard Plan Pile Foundation Tables.
7. See Standard Plan A76E for concrete barrier transitions.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MGF

NO SCALE

A76F

2018 STANDARD PLAN A76F

1-29-18

Return to Table of Contents

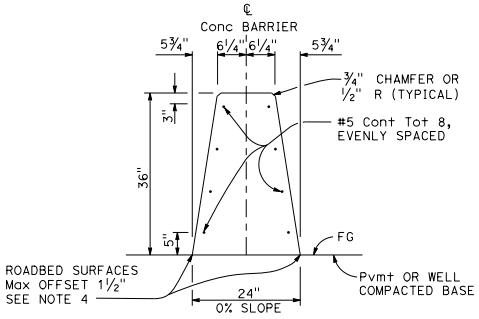
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

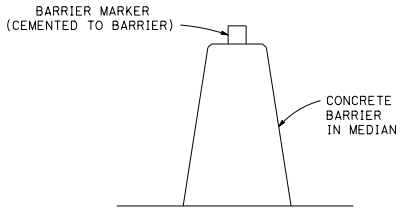
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

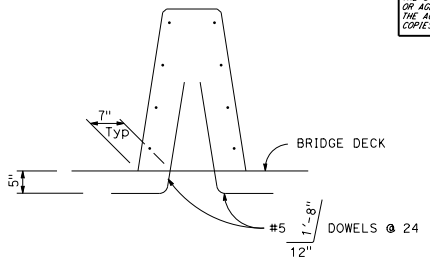


CONCRETE BARRIER TYPE 60MS



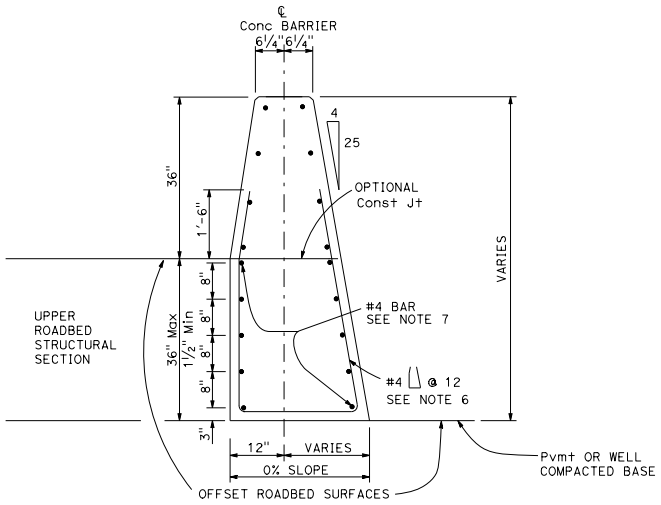
CONCRETE BARRIER TYPE 60MS DELINEATION

See Note 5



CONCRETE BARRIER TYPE 60MSA

Details similar to Type 60MS except as noted.



CONCRETE BARRIER TYPE 60MSC

Details similar to Type 60MS except as noted.
Use concrete barrier end anchor when necessary.
36" roadbed surfaces offset shown.

NOTES:

1. See Standard Plan A76H for details of Concrete Barrier Type 60MS end anchors, connection to structures and transitions to Concrete Barrier Type 50.
2. See Standard Plan A76I for Concrete Barrier Type 60MS transitions at bridge column and sign pedestals.
3. Where glare screen is required on top of concrete barrier, use Concrete Barrier Type 60MG.
4. Where roadbed offset is greater than 1½" see Concrete Barrier Type 60MSC.
5. Barrier delineation to be used when required by the Special Provisions.
6. Reinforcing stirrup not required for roadbed offsets less than 1'-0".
7. For roadbed surfaces offset greater than 1½" and less than or equal to 3", no reinforcement required. For roadbed surfaces offset greater than 3" and less than or equal to 8", use two #4 Reinf at 3" above the lower roadbed surface. For roadbed surfaces offset greater than 8" and less than or equal to 12", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at 8" above the lower roadbed surface. For roadbed surfaces offset greater than 12" and less than or equal to 36", use two #4 Reinf at 3" above the lower roadbed surface and two #4 Reinf at every 8" increment vertical spacing above the first two #4 Reinf.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MS

NO SCALE

A76G

1-29-18

Return to Table of Contents

NOTES:

1. See Standard Plan A76G for Concrete Barrier Type 60MS and Type 60MSA.
2. Footing monolithic or doweled with 2-#8 x 8" @ 2'-0". The footing is
3. 10" concrete barrier footing extends 10' back from structure.
4. See Standard Plan A78I for transition to Thrie Beam Barrier.

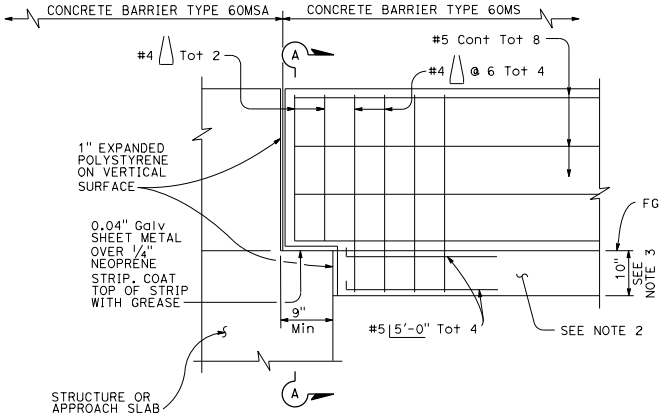
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

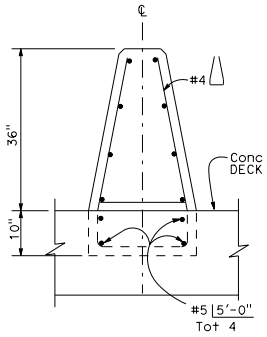
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randall D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

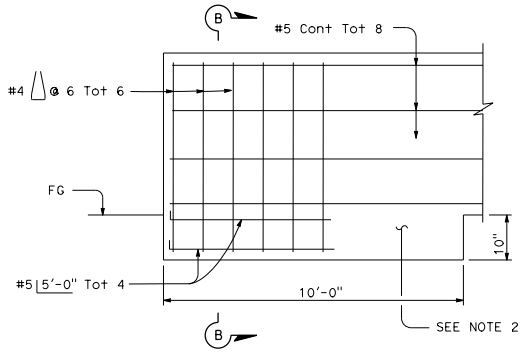
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



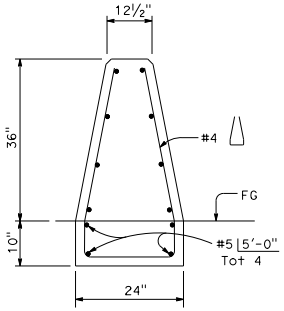
CONCRETE BARRIER TYPE 60MS
CONNECTION TO STRUCTURE



SECTION A-A



CONCRETE BARRIER TYPE 60MS
END ANCHORAGE



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MS

NO SCALE

A76H

1-29-18

2018 STANDARD PLAN A76H

Return to Table of Contents

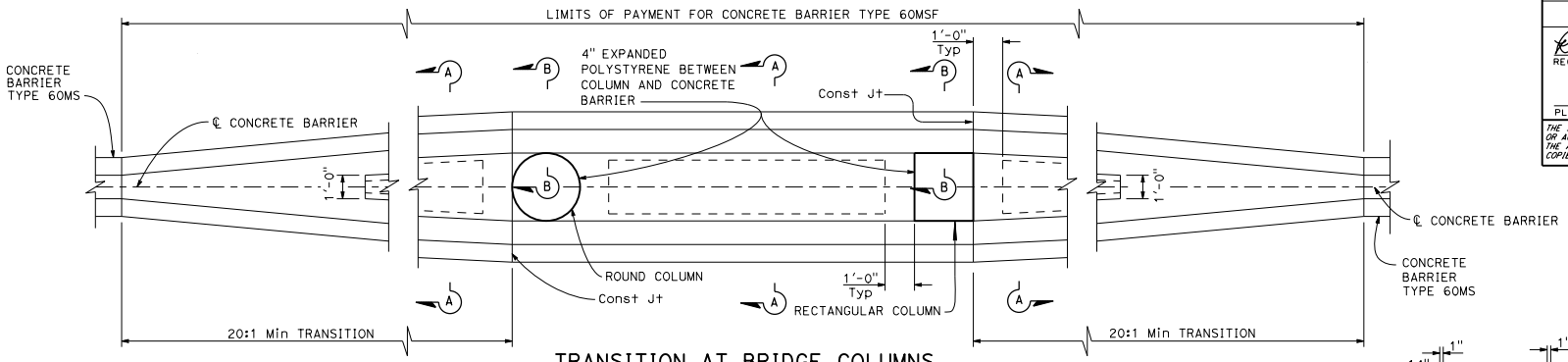
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

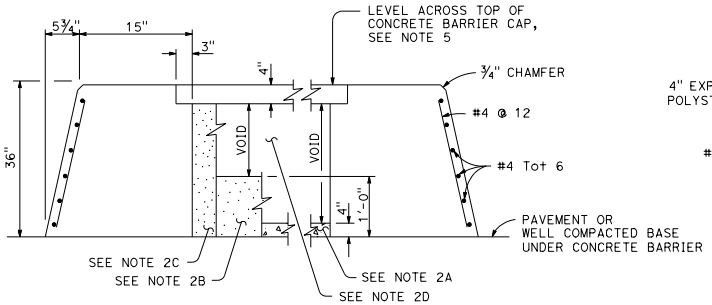
REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

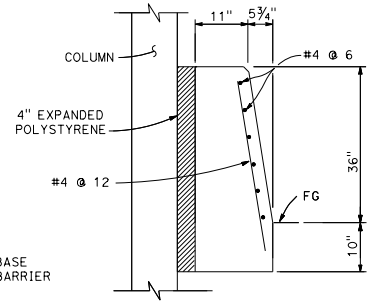


TRANSITION AT BRIDGE COLUMNS

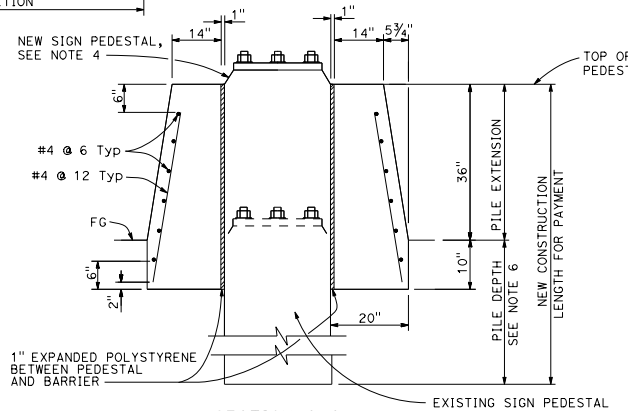
Concrete Barrier Type 60MSF
See Note 7



SECTION A-A



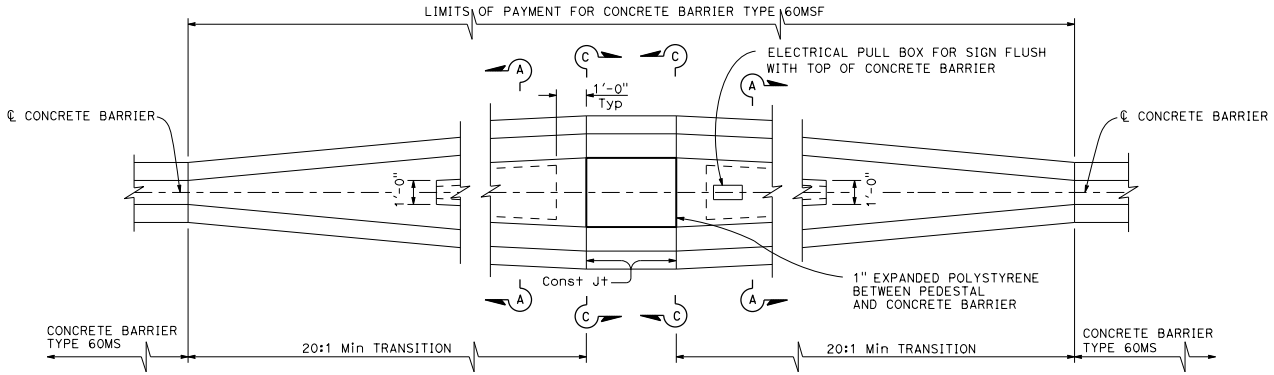
SECTION B-B



SECTION C-C

NOTES:

1. See Standard Plan A76G for Concrete Barrier Type 60MS.
2. Contractor options for fill between concrete barrier walls:
   A. Place 4" PCC at base between concrete barrier walls.
   B. Place 1'-0" of granular material at base between walls.
   C. Place granular material from base to bottom of 4" cap.
   D. Monolithic concrete with foam blockouts is not permitted.
3. Reinforcing steel shall extend continuous through construction joints.
4. See Overhead Sign plans for sign pedestal elevations on new construction.
5. Adjust height of concrete barrier wall on low side of offset or superelevated roadways to provide level grade across top of concrete barrier cap.
6. See Overhead Signs Standard Plan Pile Foundation Tables.
7. All locations with limited shoulder width available for barrier, see Standard Plan A76F for use of Concrete Barrier Type 60MGF.



TRANSITION AT SIGN PEDESTAL

Concrete Barrier Type 60MSF
See Note 7

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 60MSF

NO SCALE

A76I

1-29-18

2018 STANDARD PLAN A76I

Return to Table of Contents

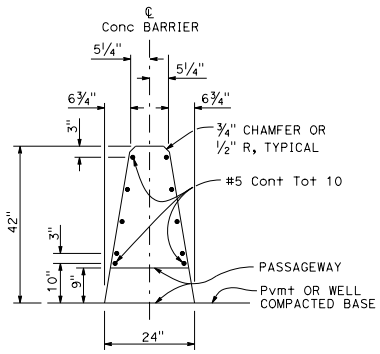
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

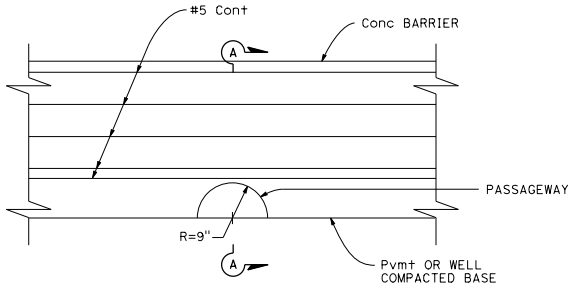
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A
(Concrete Barrier Type 60M shown)



ELEVATION
See Notes 1 and 2

NOTES:

1. Type MS Passageway typically used for crossing of small size animals.
2. See Standard Plan A76A for typical details of Concrete Barrier Type 60M.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

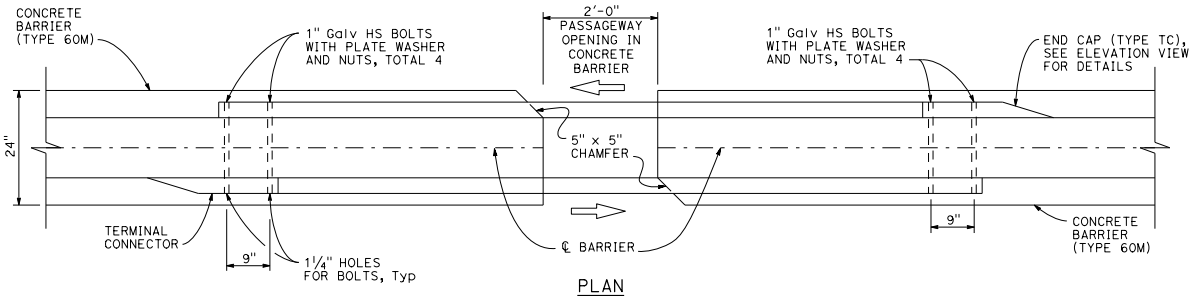
CONCRETE BARRIER WILDLIFE PASSAGEWAY (TYPE MS)

NO SCALE

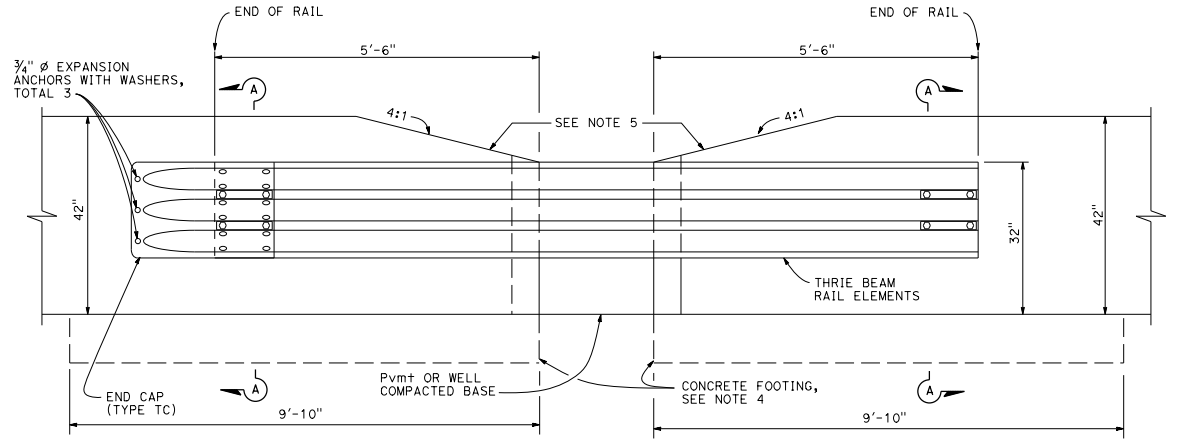
A76J

1-29-18

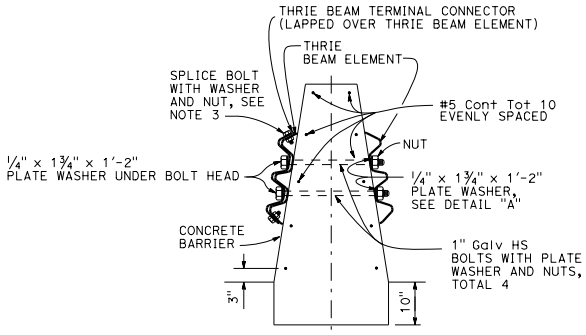
Return to Table of Contents



PLAN

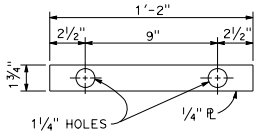


ELEVATION



SECTION A-A

See Notes 4 and 6



DETAIL "A"

¼" PLATE WASHER

NOTES:

1. Type MM Passageway typically used for crossing of medium size animals.
2. For details of the thrie beam element and hardware, see the A78 series of the Standard Plans. For details of Concrete Barrier Type 60, see the A76 series of the Standard Plans.
3. The end cap, and the thrie beam element, may be spliced together prior to bolting the elements to the concrete barrier. All 8 splice bolts to connect the end cap to the rail element are not required. The 2 top and the 2 bottom splice bolts with washers and nuts shall be used.
4. Barrier end anchorage shall be constructed as shown in Section A-A of this plan or as shown on Standard Plan A76B.
5. Taper the top of the end of the concrete barrier at 4:1 to match the top elevation of the thrie beam rail element.
6. For details not shown, see Standard Plan A76A.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER WILDLIFE PASSAGEWAY (TYPE MM)

NO SCALE

A76K

2018 STANDARD PLAN A76K

1-29-18

Return to Table of Contents

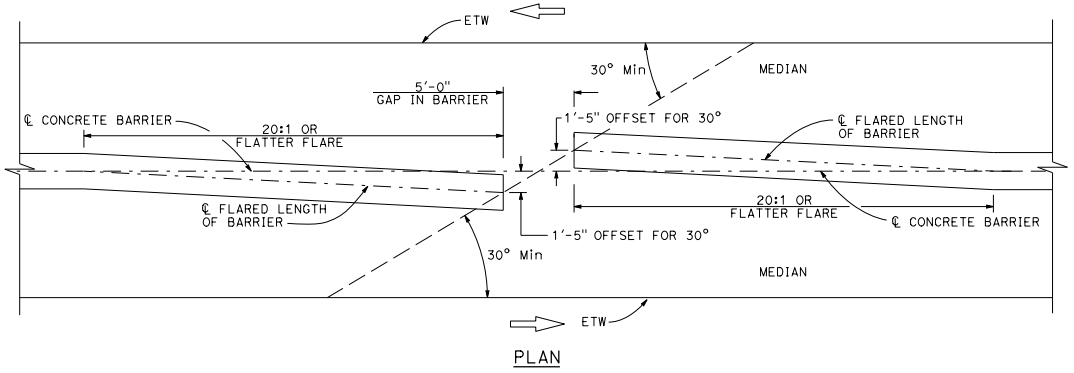
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

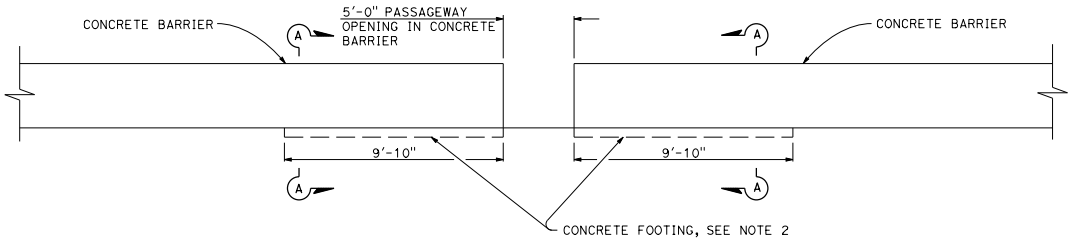
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



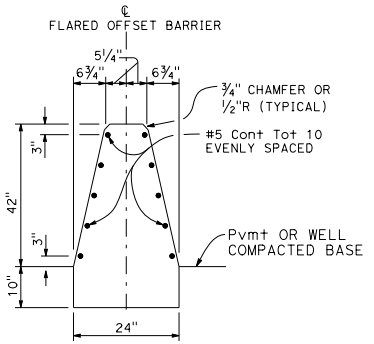
PLAN



ELEVATION

NOTES:

1. Type ML Passageway typically used for crossing of large size animals.
2. Barrier end anchorage shall be constructed as shown in Section A-A of this plan or as shown on Standard Plan A76B.



SECTION A-A
See Note 2

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER WILDLIFE PASSAGEWAY (TYPE ML)

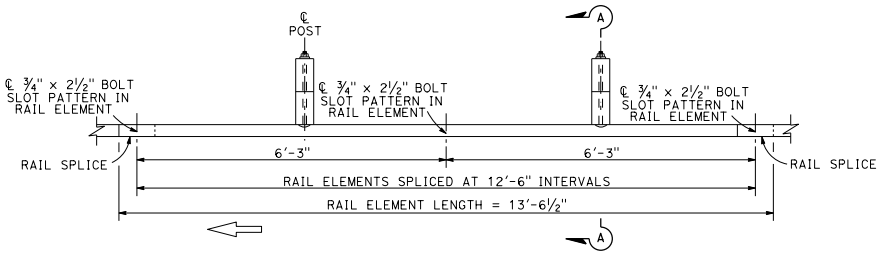
NO SCALE

A76L

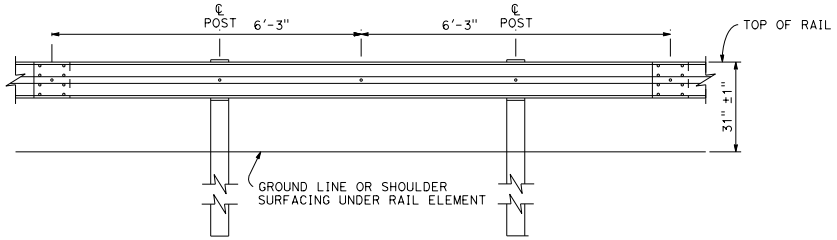
1-29-18

2018 STANDARD PLAN A76L

Return to Table of Contents

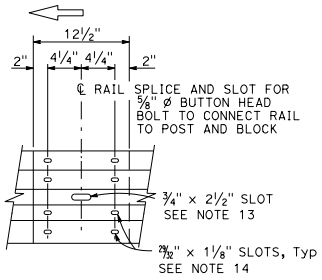


PLAN



ELEVATION

MIDWEST GUARDRAIL SYSTEM WITH WOOD POST AND BLOCKS



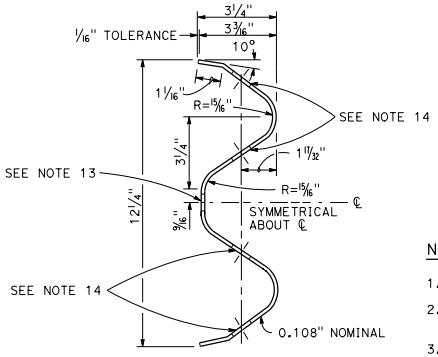
ELEVATION

RAIL ELEMENT SPLICE DETAIL

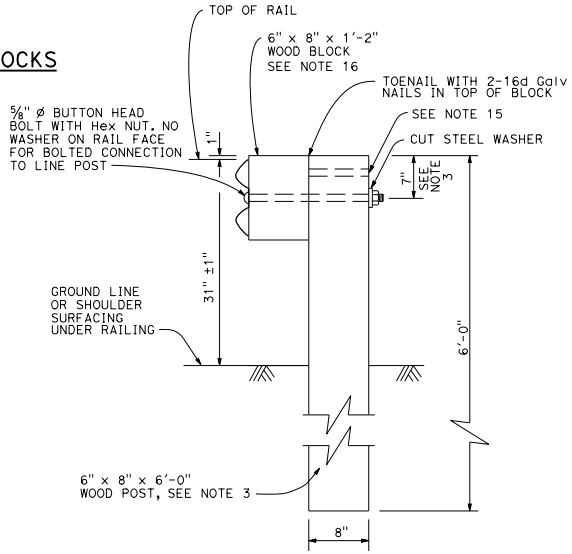
a) Connect the overlapped end of the rail elements with ⅝" ø x 1⅜" button head oval shoulder splice bolts inserted into the 29/32" x 1⅛" slots and bolted together with ⅝" ø recessed hex nuts. Recess of hex nut points toward rail element. A total of 8 bolts and nuts are to be used at each rail splice connection.

b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).

c) Where end cap is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used.



SECTION THRU RAIL ELEMENT



SECTION A-A

TYPICAL WOOD LINE POST INSTALLATION

See Note 4

NOTES:

1. For details of steel post installations, see Standard Plan A77L2.
2. For details of standard hardware used to construct MGS, see Standard Plan A77M1.
3. For details of wood posts and wood blocks used to construct MGS, see Standard Plan A77N1.
4. For additional installation details, see Standard Plan A77N3.
5. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
6. For MGS typical layouts, see the A77P, A77Q and A77R Series of Standard Plans.
7. If railing is connected to terminal system end treatment, use 31" height terminal system end treatment.
8. For MGS end anchor details, see Standard Plans A77S1 and A77T2.
9. For details of MGS transition to bridge railing, see Standard Plan A77U4.
10. For additional details of MSG connection to bridge railing, see Standard Plans A77U1, A77U2 and A77V1.
11. For MGS connection details to abutments and walls, see Standard Plan A77U3.
12. For typical MGS delineation and dike positioning details, see Standard Plan A77N4.
13. Slotted hole for bolted connection of rail element to block and post.
14. Slotted holes for splice bolts to overlap ends of rail element.
15. Additional hole in uppermost portion of line post is for potential future adjustments of railing height. See Standard Plan A77N1.
16. 6" x 12" x 1'-2" block must be used with 6" dike.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION (WOOD POST WITH WOOD BLOCK)

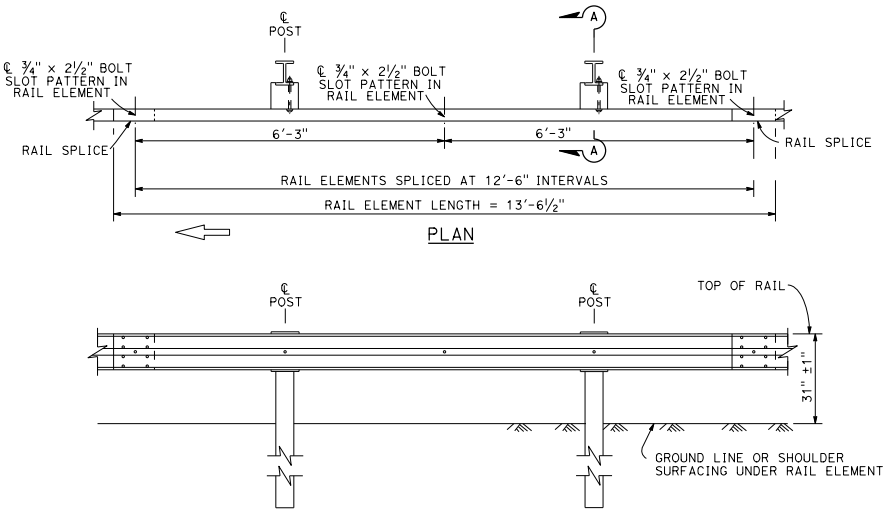
NO SCALE

A77L1

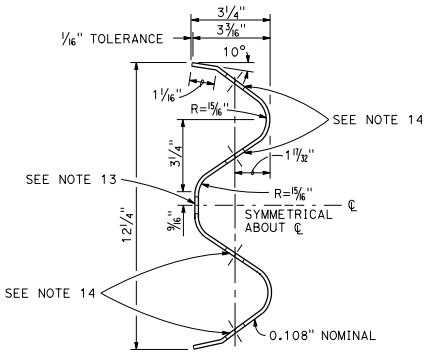
2018 STANDARD PLAN A77L1

1-29-18

Return to Table of Contents



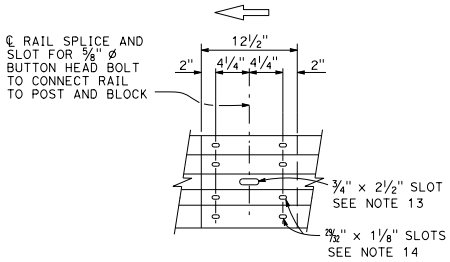
MIDWEST GUARDRAIL SYSTEM WITH STEEL POSTS AND NOTCHED WOOD OR NOTCHED RECYCLED PLASTIC BLOCKS



SECTION THRU RAIL ELEMENT

NOTES:

1. For details of wood post installations, see Standard Plan A77L1.
2. For details of standard hardware used to construct MGS, see Standard Plan A77M1.
3. For details of steel posts and notched wood blocks used to construct MGS, see Standard Plan A77N2.
4. For additional installation details, see Standard Plan A77N3.
5. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
6. For MGS typical layouts, see the A77P, A77Q and A77R Series of Standard Plans.
7. If railing is connected to terminal system end treatment, use 31" height terminal system end treatment.
8. For MGS end anchor details, see Standard Plans A77S1 and A77T2.
9. For details of MGS transition to bridge railing, see Standard Plan A77U4.
10. For additional details of MGS connection to bridge railings, see Standard Plans A77U1, A77U2 and A77V1.
11. For dike positioning and MGS delineation details, see Standard Plan A77N4.
12. Notched face of block faces steel post.
13. Slotted hole for bolted connection of rail element to block and post.
14. Slotted holes for splice bolts to overlap ends of rail element.
15. 6" x 12" x 1'-2" block must be used with 6" dike.



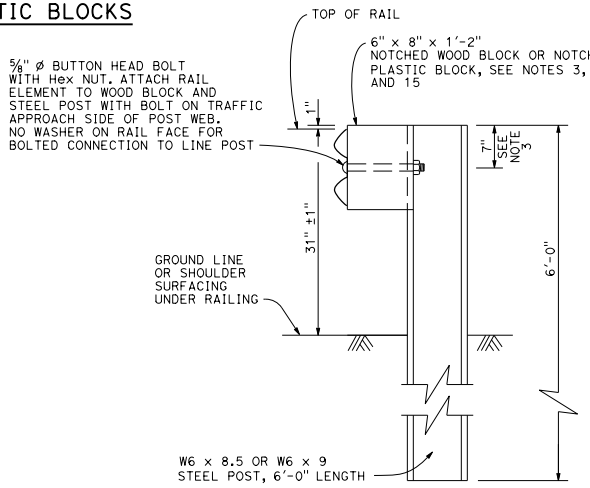
ELEVATION

RAIL ELEMENT SPLICE DETAIL

a) Connect the overlapped end of the rail elements with ⅝" ø x 1⅜" button head oval shoulder splice bolts inserted into the 29/32" x 1⅛" slots and bolted together with ⅝" ø recessed hex nuts. Recess of hex nut points toward rail element. A total of 8 bolts and nuts are to be used at each rail splice connection.

b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).

c) Where end cap is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used.



SECTION A-A

TYPICAL STEEL LINE POST INSTALLATION

See Note 4

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION (STEEL POST WITH NOTCHED WOOD OR NOTCHED RECYCLED PLASTIC BLOCK)

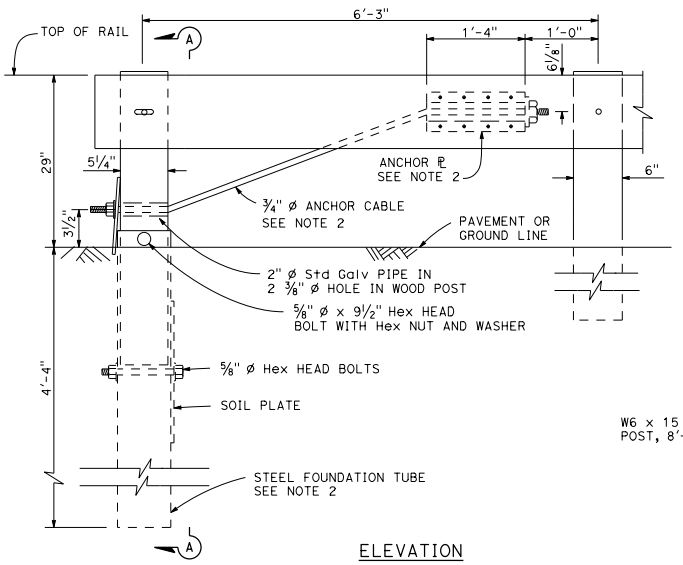
NO SCALE

A77L2

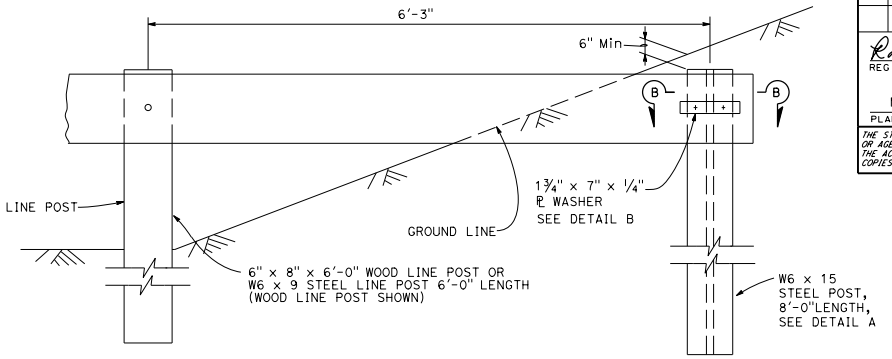
2018 STANDARD PLAN A77L2

1-29-18

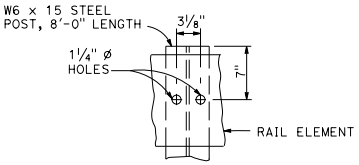
Return to Table of Contents



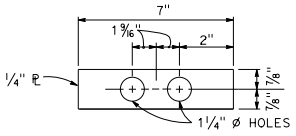
ELEVATION
END ANCHOR
ASSEMBLY (TYPE SFT)



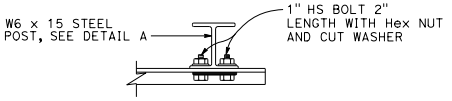
BURIED POST END ANCHOR



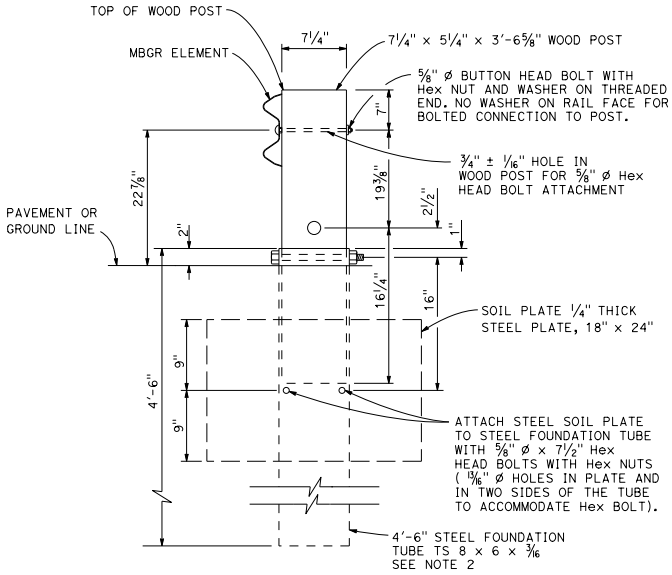
DETAIL A



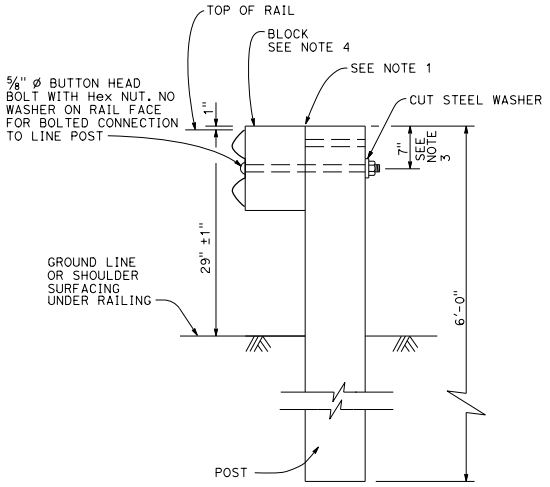
DETAIL B



SECTION B-B



SECTION A-A



TYPICAL LINE
POST INSTALLATION

NOTES:

1. For wood post and wood block, toenail with 2-16d Galv nails in top of block. For steel post and notched wood or plastic block, notched face of block faces steel post.
2. A 6'-0" Length steel foundation tube, TS 8 x 6 x 3/16, without a soil plate, may be furnished and installed in place of the 4'-6" length steel foundation tube and soil plate shown, Minimum embedment of the 6'-0" length tube shall be 5'-9". A 5/8" ø Hex head bolt and nut shall be installed in the hole in the 6'-0" length tube to keep the wood post from dropping into the tube.
3. To connect railing to 27" terminal system end treatment, transition the top of railing height at a ratio of 120:1 to terminal system end treatment height plus one 12'-6" standard railing section at the transitioned height for a horizontal connection to the end treatment.
4. See Standard Plans A77N1 and A77N2 for details.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randall D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

METAL BEAM GUARD RAILING
RECONSTRUCT INSTALLATION

NO SCALE

A77L3

1-29-18

Return to Table of Contents

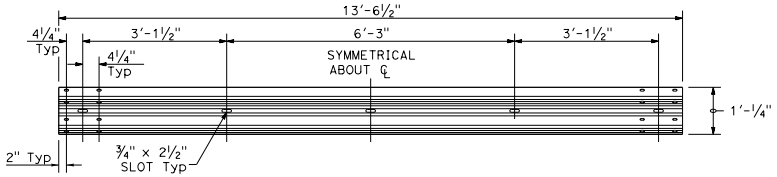
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

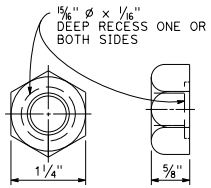
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



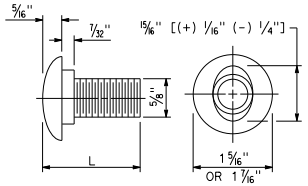
TYPICAL RAIL ELEMENT

NOTE:

1. Slotted holes for splice bolts to overlap ends of rail element.



⅝" ø RECESS NUT

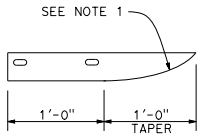


⅝" ø BUTTON HEAD BOLT

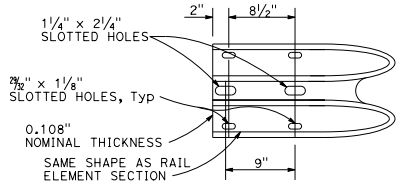
BUTTON HEAD BOLT

L	THREAD LENGTH
1⅜"	FULL THREAD LENGTH
2"	FULL THREAD LENGTH
10"	4" Min THREAD LENGTH
18"	4" Min THREAD LENGTH
20"	4" Min THREAD LENGTH
22"	4" Min THREAD LENGTH
26"	4" Min THREAD LENGTH
36"	4" Min THREAD LENGTH
** 2¾"	2" Min THREAD LENGTH
** 19"	4" Min THREAD LENGTH

** For nested rail applications.



PLAN



ELEVATION

END CAP
(TYPE A)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM
STANDARD HARDWARE

NO SCALE

A77M1

1-29-18

2018 STANDARD PLAN A77M1

Return to Table of Contents

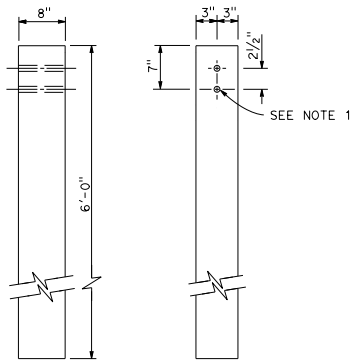
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

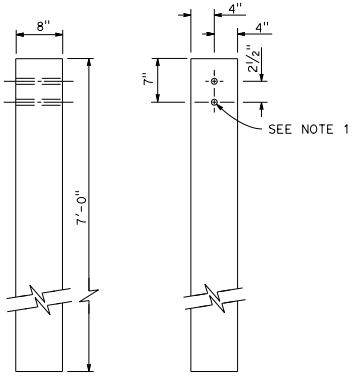
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

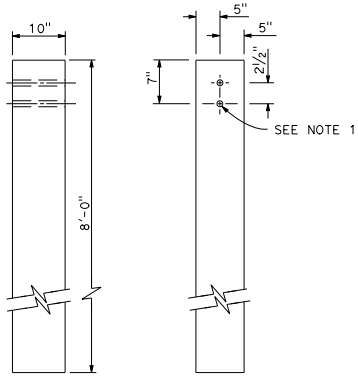
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



6" x 8" WOOD POST
See Note 3



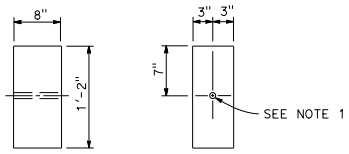
8" x 8" WOOD POST
See Note 4



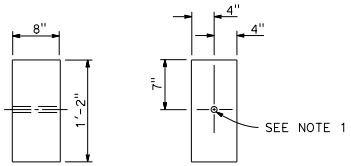
10" x 10" WOOD POST
See Note 5

NOTES:

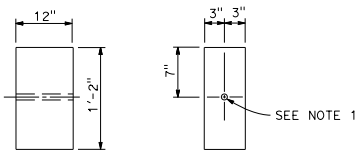
1. All holes in wood posts and blocks shall be ¾" Dia ± 1/16".
2. Dimensions shown for wood post are nominal.
3. This post and block combination used for standard line post sections of MGS.
4. This post and 8" x 12" block combination used for line post sections of MGS on narrow roadways.
5. This post and 8" x 12" block combination is typically used where strengthened line post sections of MGS are warranted to shield fixed objects.
6. See Standard Plan A77L3 for use of 6" x 8" and 8" x 8" wood blocks.
7. To be used with 8" x 8" x 7'-0" wood post if installed with 6" height dike.
8. To be used with 6" x 8" x 6'-0" wood post if installed with 6" height dike.



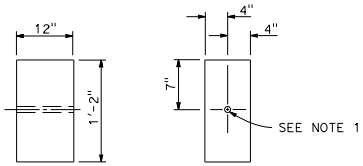
6" x 8" WOOD BLOCK
See Note 6 and Note 3



8" x 8" WOOD BLOCK
See Note 6 and Note 4



6" x 12" WOOD BLOCK
See Note 8



8" x 12" WOOD BLOCK
See Note 7

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM WOOD POST AND WOOD BLOCK DETAILS

NO SCALE

A77N1

1-29-18

2018 STANDARD PLAN A77N1

Return to Table of Contents

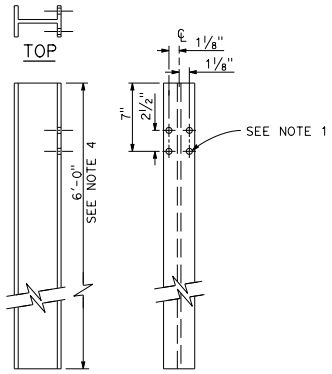
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

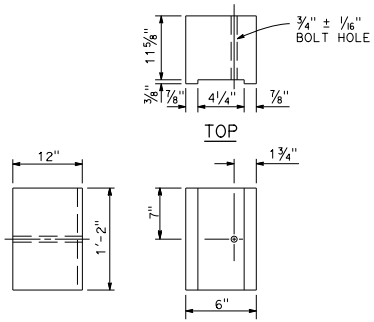
May 31, 2018
PLANS APPROVAL DATE

Randall D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

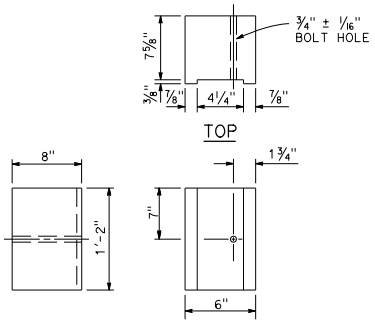
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



W6 x 9 OR W6 x 8.5 STEEL POST
See Note 4



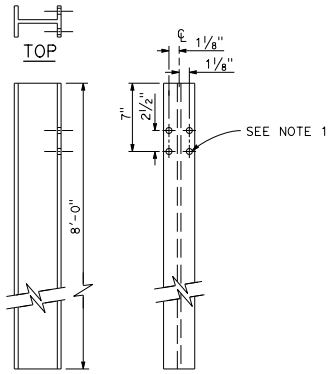
6" x 12" NOTCHED WOOD BLOCK
See Notes 2, 3 and 7



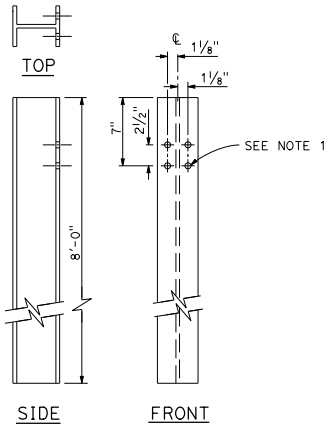
6" x 8" NOTCHED WOOD BLOCK
Only for use with metal beam guard railing. See Note 5

NOTES:

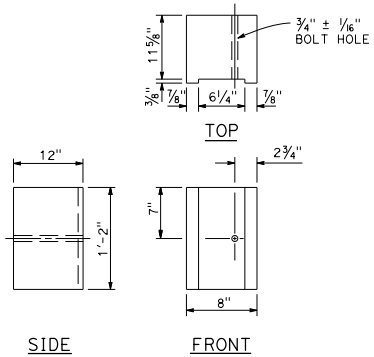
1. All holes in steel post shall be 13/16" Dia maximum.
2. Dimensions shown for wood block are nominal.
3. Notched face of block faces steel post.
4. 6'-0" length posts to be used for typical roadway installation. See Standard Plan A77N3.
5. See Standard Plan A77L3 for use of 6" x 8" and 8" x 8" notched wood blocks.
6. This post and 8" x 12" block combination to be used for line post sections of MGS on narrow roadways and where strengthened line post sections of MGS are warranted to shield fixed objects.
7. 6" x 12" notched wood block and 8" x 12" notched wood block must be used with 6" dike.



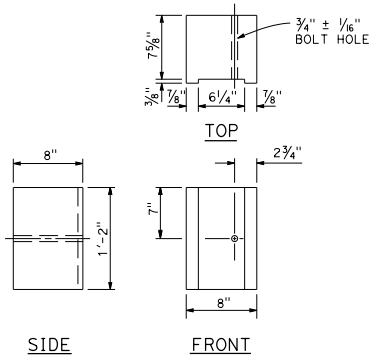
W6 x 9 OR W6 x 8.5 STEEL POST
See Note 6



W6 x 15 STEEL POST



8" x 12" NOTCHED WOOD BLOCK
See Notes 2, 3 and 7



8" x 8" NOTCHED WOOD BLOCK
Only for use with metal beam guard railing. See Note 5

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM STEEL POST AND NOTCHED WOOD BLOCK DETAILS

NO SCALE

A77N2

1-29-18

Return to Table of Contents

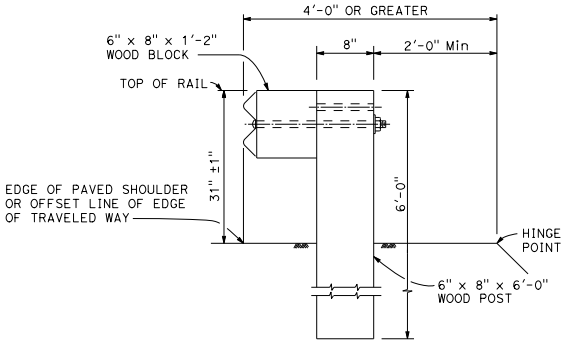
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

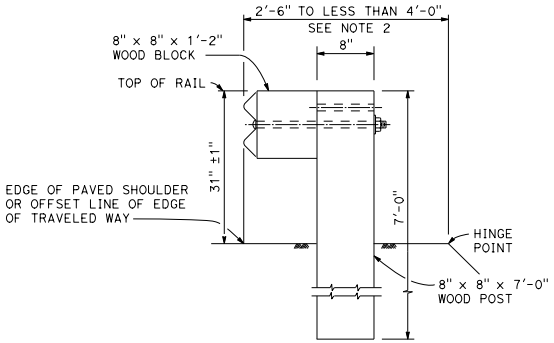
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



DETAIL A

TYPICAL ROADWAY INSTALLATION

See Note 1

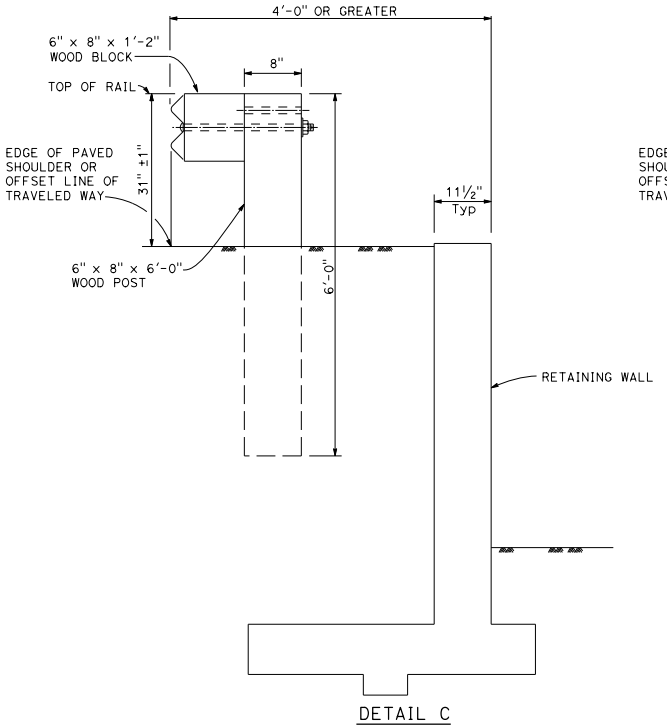


DETAIL B

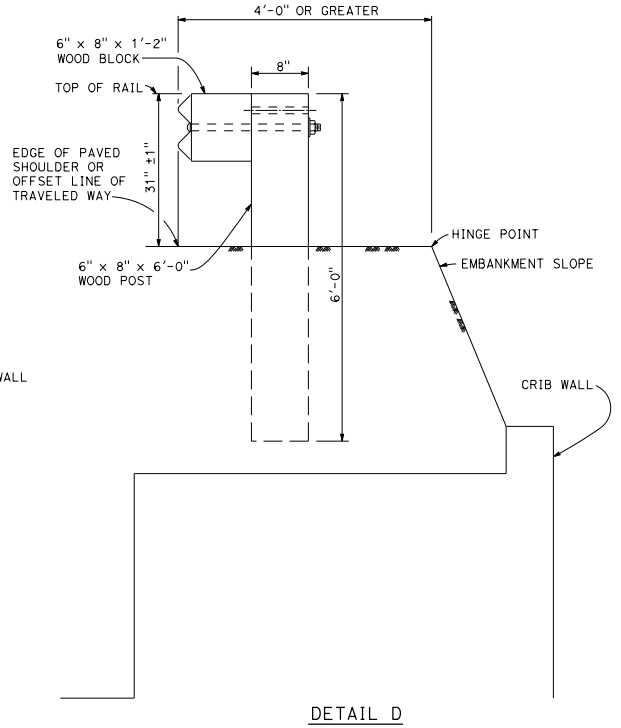
NARROW ROADWAY INSTALLATION

See Note 1

POST EMBEDMENT



DETAIL C



DETAIL D

INSTALLATION AT EARTH RETAINING WALLS

NOTES:

1. These installation details also applicable to steel line post installations. For Detail A, C, and D, where steel line post installations are constructed, W6 x 8.5 or W6 x 9 steel post, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks are to be used in place of the size of wood post and wood block shown. For Detail B, where steel line post installations are constructed, W6 x 8.5 or W6 x 9 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks are to be used in place of the size of wood post and wood block shown. For additional installation details, see Standard Plans A77L1 and A77L2.
2. Where the distance between the face of the rail and the hinge point is less than 2'-6", see the Project Plans for special details.
3. For dike positioning with MGS installations, see Standard Plan A77N4.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LINE POST EMBEDMENT AND HINGE POINT OFFSET DETAILS

NO SCALE

A77N3

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

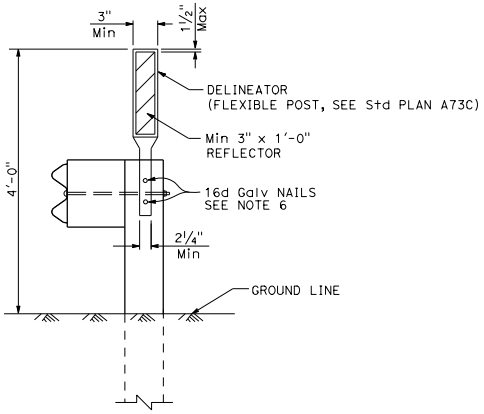
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

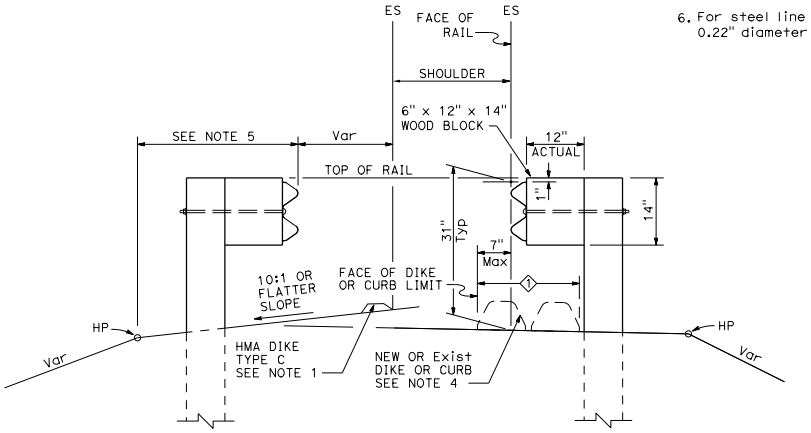
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. When necessary to place dike more than 7" in front of face of MGS, only Type C dike may be used. For dike details, see Standard Plan A87B.
2. For standard railing post embedment, see Standard Plan A77N3.
3. MGS delineation to be used where shown on the Project Plans.
4. When dike or curb is placed under MGS, the maximum height of the dike or curb shall be 6". Mountable dike should not be used. For dike and curb details, see Standard Plans A87A and A87B.
5. For details of typical distance between the face of rail and hinge point, see Standard Plan A77N3.
6. For steel line posts, use 1/4 - 20 self-tapping screws in 0.22" diameter holes or 1/4" bolts in 9/32" diameter holes.



MGS DELINEATION
See Note 3



DIKE POSITIONING
See Note 1

1 PERMISSIBLE DIKE OR CURB PLACEMENT AREA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL RAILING DELINEATION AND DIKE POSITIONING DETAILS

NO SCALE

A77N4

2018 STANDARD PLAN A77N4

1-29-18

Return to Table of Contents

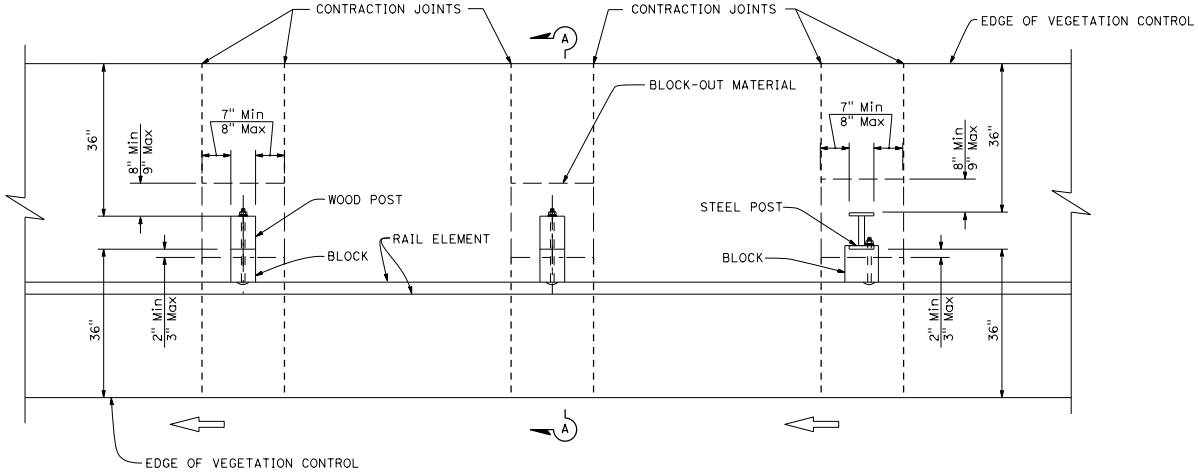
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

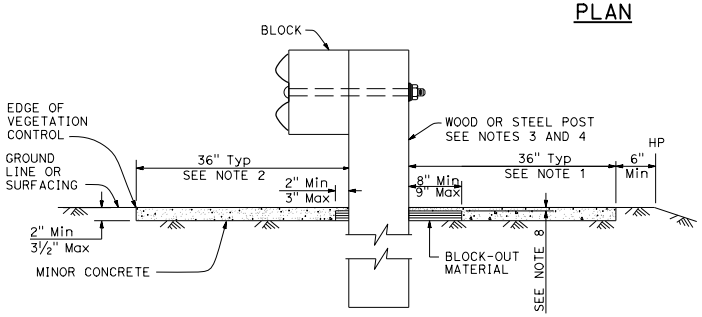
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



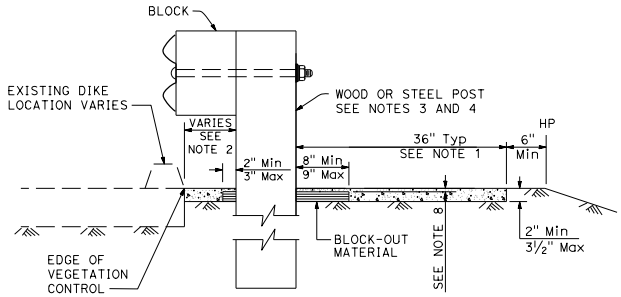
PLAN

NOTES:

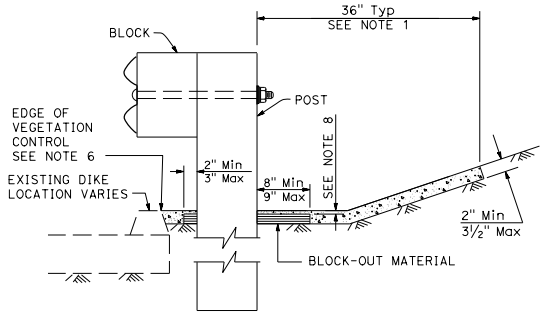
1. Where the distance between back of post and hinge point is less than 42", construct vegetation control to 6" from hinge point while maintaining the 8" block-out at back of post.
2. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. For wood post sizes, see Standard Plan A77N1.
4. For steel post sizes, see Standard Plan A77N2.
5. For details not shown, see Standard Plans A77L1 and A77L2.
6. Where vegetation control is adjacent to a dike on a cut slope, construct vegetation control flush with the top edge of dike.
7. Vegetation control must slope to drain water.
8. Concrete over block-out material depth, construct ⅜" Min to ⅝" Max.
9. This plan for vegetation control installation only.



SECTION A-A
Without Existing Dike



SECTION A-A
With Existing Dike



SECTION A-A
With Existing Dike on cut slope

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM

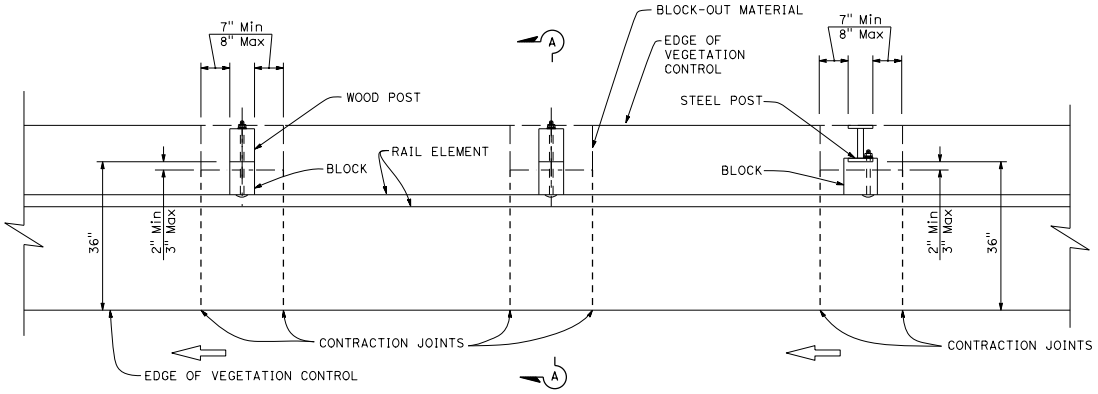
NO SCALE

A77N5

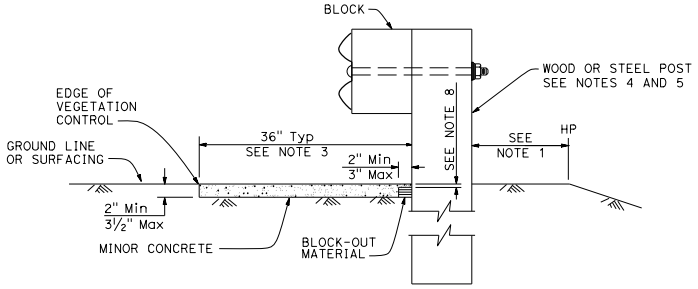
1-29-18

2018 STANDARD PLAN A77N5

Return to Table of Contents



PLAN



SECTION A-A

Without Existing Dike

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Use the details on this sheet when the length from the back of post to the hinge point is less than 18". Use the details on Standard Plan A77N5 when the length from the back of the post to the hinge point is greater than 18".
2. Construct vegetation control flush with the back edge of post.
3. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
4. For wood post sizes, see Standard Plan A77N1.
5. For steel post sizes, see Standard Plan A77N2.
6. For details not shown, see Standard Plans A77L1 and A77L2.
7. Vegetation control must slope to drain water.
8. Concrete over block-out material depth, construct ⅜" Min to ⅝" Max.
9. This plan for vegetation control installation only.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM NARROW VEGETATION CONTROL INSTALLATION

NO SCALE

A77N5A

2018 STANDARD PLAN A77N5A

1-29-18

Return to Table of Contents

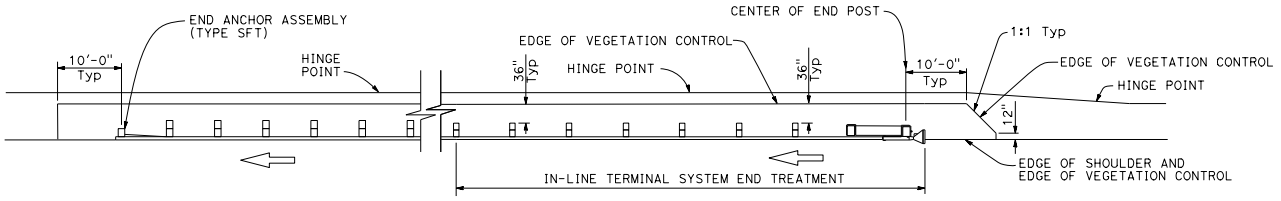
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

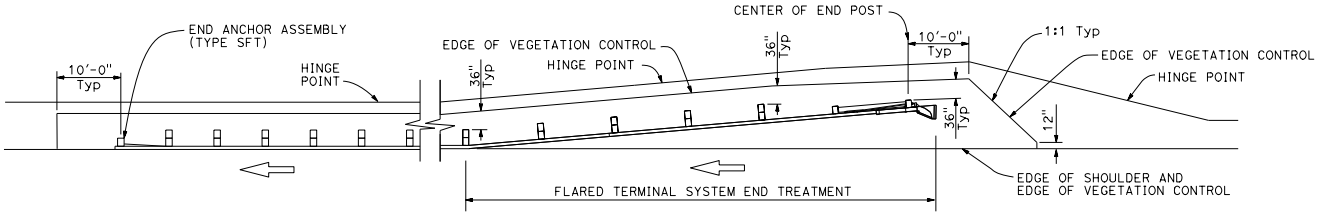
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



PLAN

NOTES:

1. See Standard Plan A77N5 for additional vegetation control details.
2. Where the distance between back of post and hinge point is less than 42", construct vegetation control to 6" from hinge point while maintaining the 8" block-out at back of post.
3. Vegetation control must slope to drain water.
4. This plan for vegetation control installation only.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM FOR TERMINAL SYSTEM END TREATMENTS

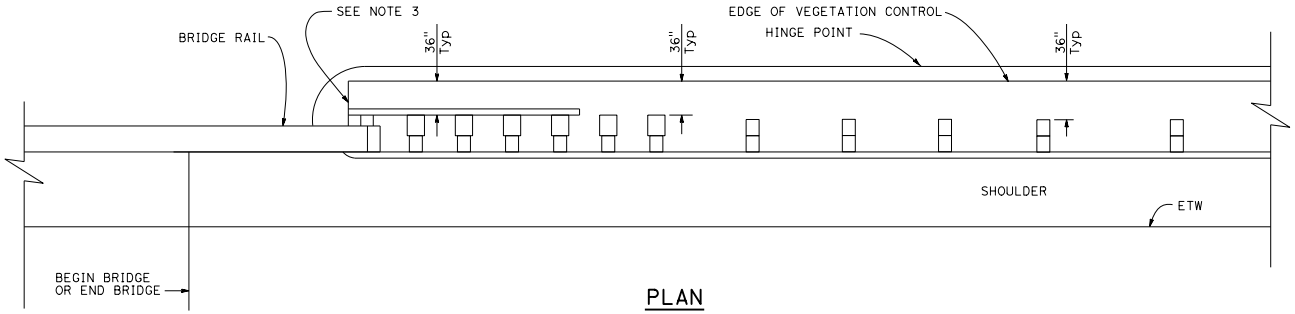
NO SCALE

A77N6

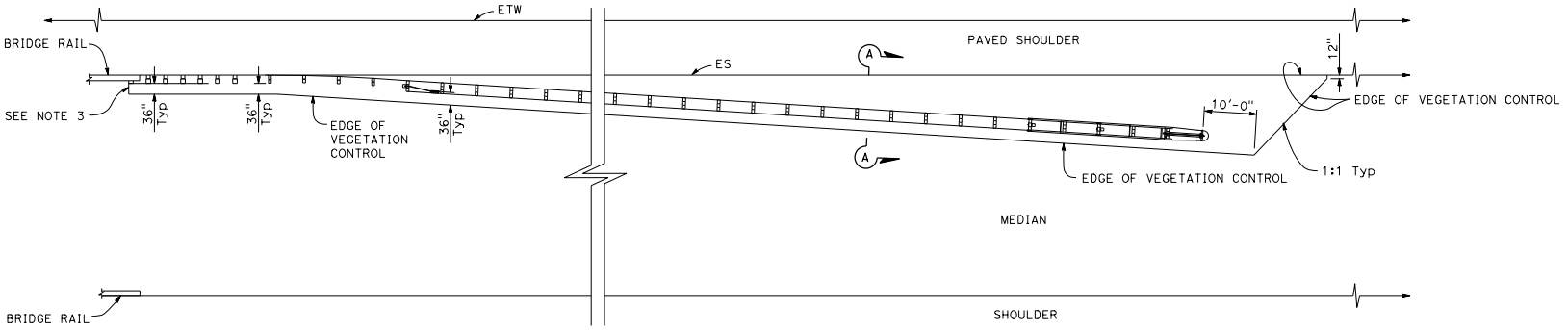
1-29-18

2018 STANDARD PLAN A77N6

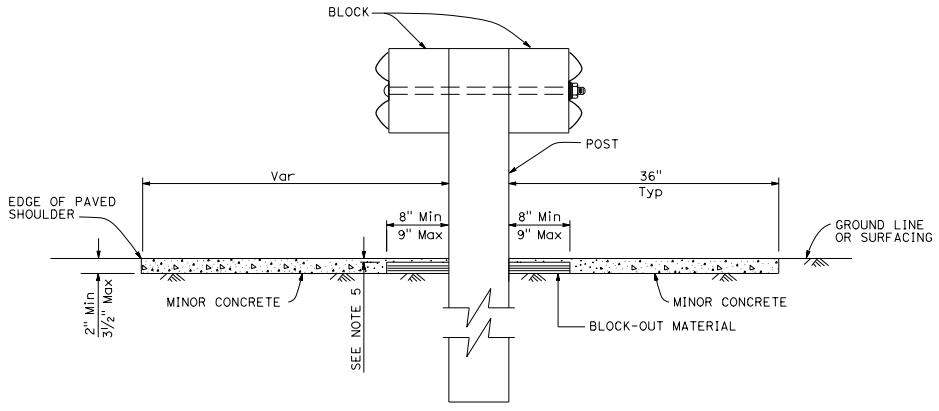
Return to Table of Contents



PLAN



PLAN



SECTION A-A

NOTES:

1. See Standard Plan A77N5 for additional vegetation control details.
2. Where the distance between back of post and hinge point is less than 42", construct vegetation control to 6" from hinge point while maintaining the 8" block-out at back of post.
3. End vegetation control at end of backside rail element.
4. Vegetation control must slope to drain water.
5. Concrete over block-out material depth, construct ⅜" Min to ⅝" Max.
6. This plan for vegetation control installation only.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM AT STRUCTURE APPROACH

NO SCALE

A77N7

1-29-18

2018 STANDARD PLAN A77N7

Return to Table of Contents

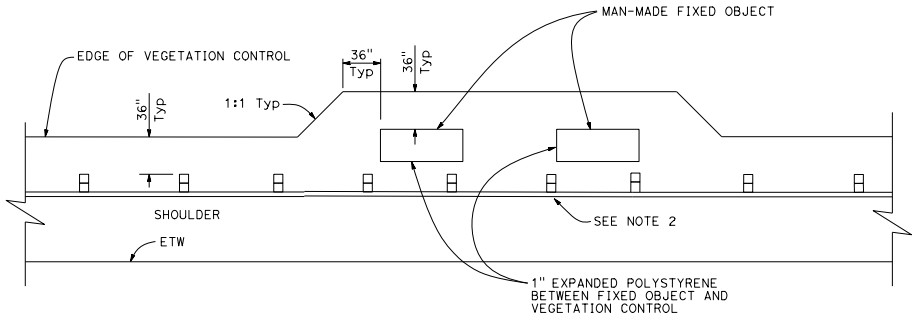
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

Fixed object(s) on shoulder

NOTES:

1. See Standard Plan A77N5 for additional vegetation control details.
2. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. Vegetation control must slope to drain water.
4. This plan for vegetation control installation only.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

NO SCALE

A77N8

1-29-18

2018 STANDARD PLAN A77N8

Return to Table of Contents

NOTES:

1. See Standard Plan A77N5 for additional vegetation control details.
2. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. Vegetation control must slope to drain water.
4. Concrete over block-out material depth, construct 3/8" Min to 5/8" Max.
5. This plan for vegetation control installation only.

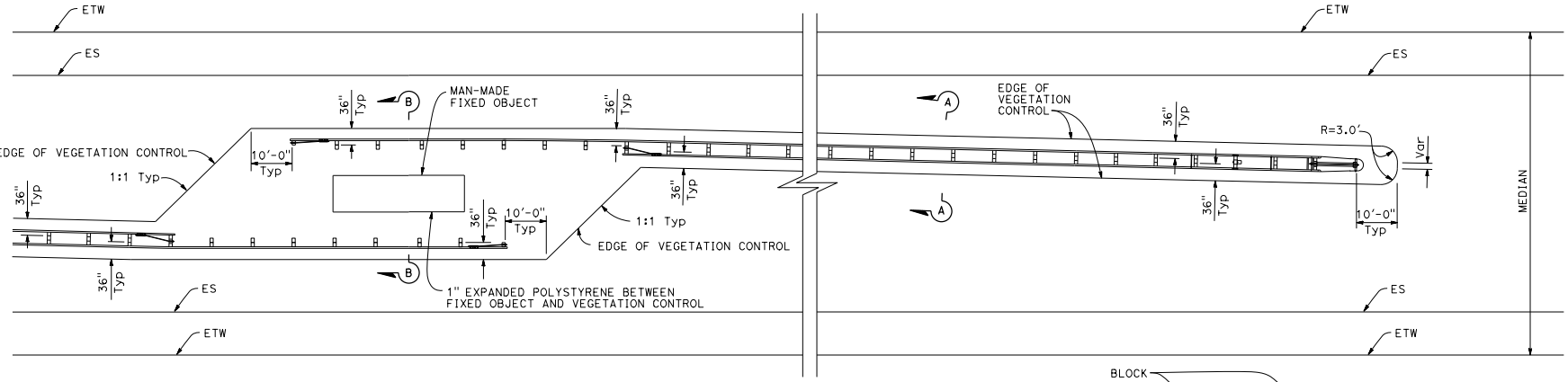
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

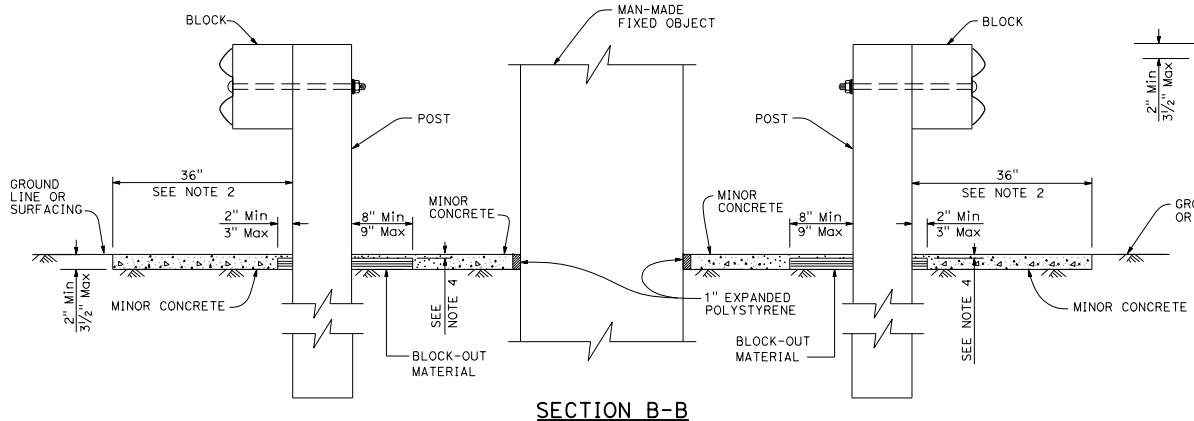
REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

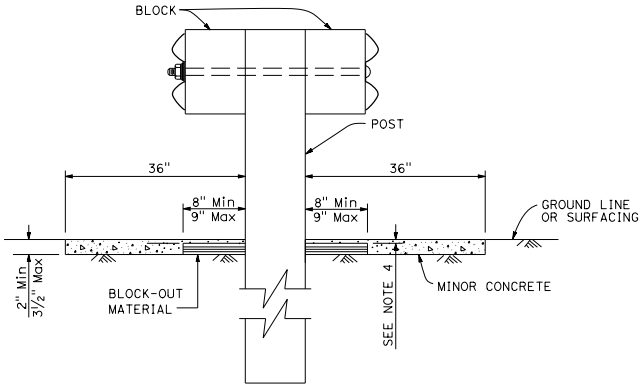


PLAN

Fixed object(s) in median



SECTION B-B



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

NO SCALE

A77N9

1-29-18

2018 STANDARD PLAN A77N9

Return to Table of Contents

NOTES:

1. See Standard Plan A77N5 for additional vegetation control details.
2. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. Vegetation control must slope to drain water.
4. Concrete over block-out material depth, construct ⅜" Min to ⅝" Max.
5. This plan for vegetation control installation only.

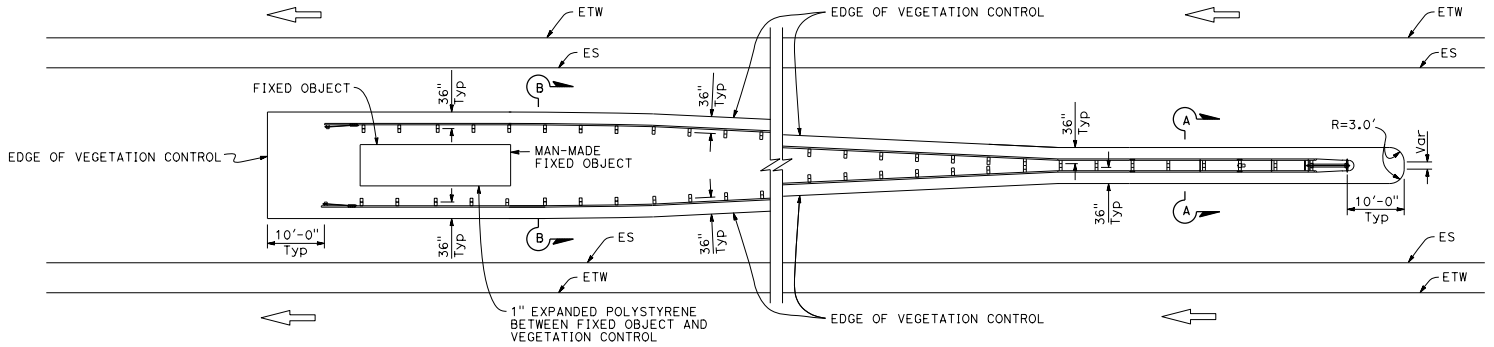
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

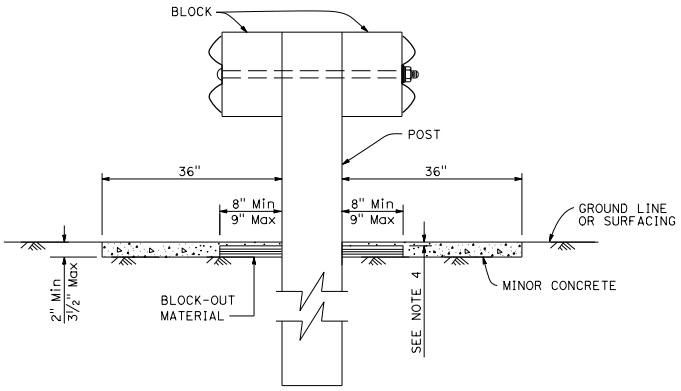
REGISTERED PROFESSIONAL ENGINEER — Chi H. Wong — No. C54738 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

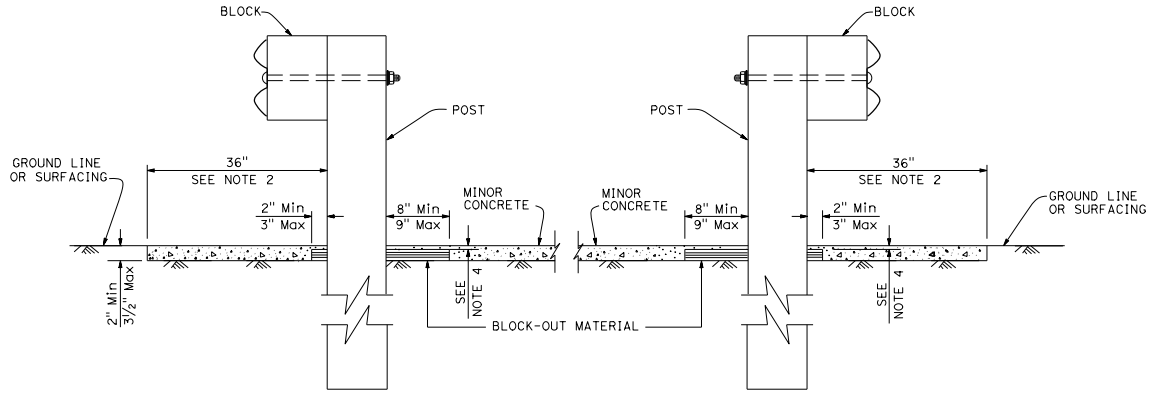


PLAN

Fixed object(s) between separate roadbeds
(One-Way Traffic)



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

NO SCALE

A77N10

1-29-18

2018 STANDARD PLAN A77N10

Return to Table of Contents

NOTES:

1. Minor concrete must be placed below anchor cable, bolt with nut and washer, or anchor plate.
2. Vegetation control must slope to drain water.
3. Concrete over block-out material depth, construct ⅜" Min to ⅝" Max.
4. This plan for vegetation control installation only.
5. For buried post end anchor, refer to Standard Plan A77T2.
6. For end anchor assembly, refer to Standard Plan A77S1.

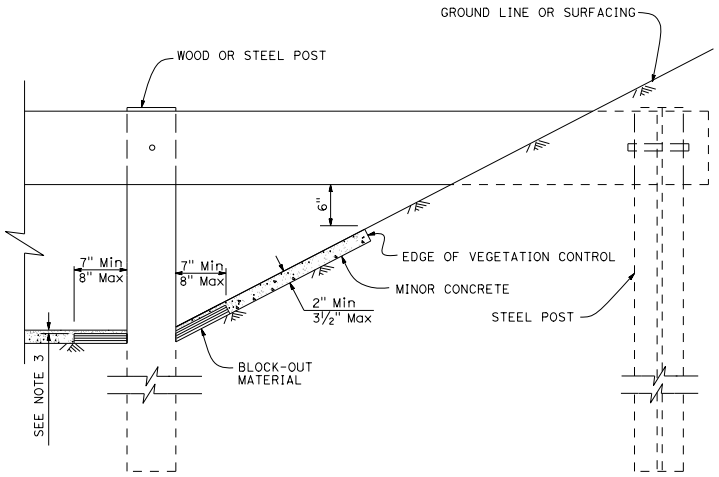
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

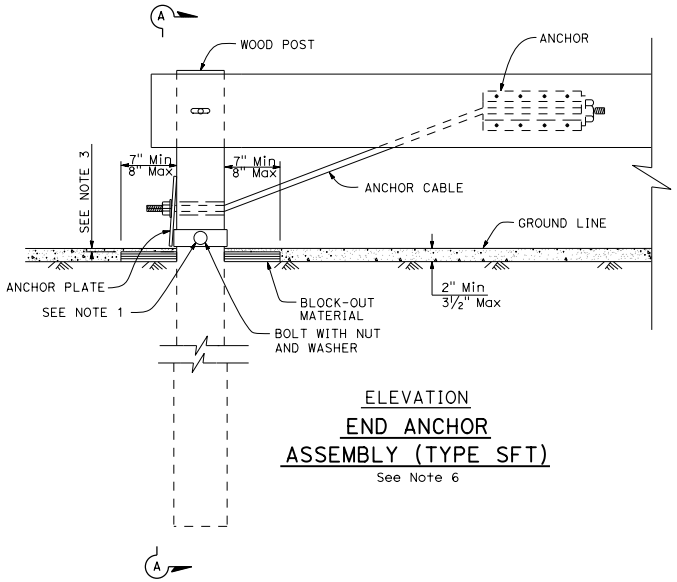
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

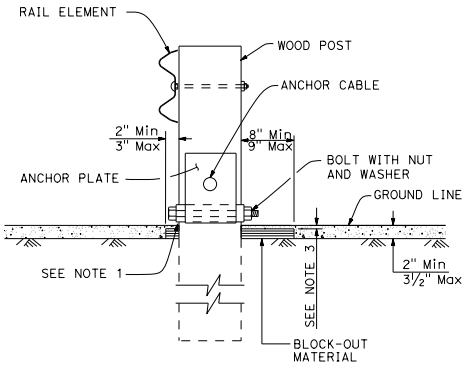
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



BURIED POST END ANCHOR
See Note 5



ELEVATION
END ANCHOR
ASSEMBLY (TYPE SFT)
See Note 6



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL GUARDRAIL SYSTEM MISCELLANEOUS DETAILS

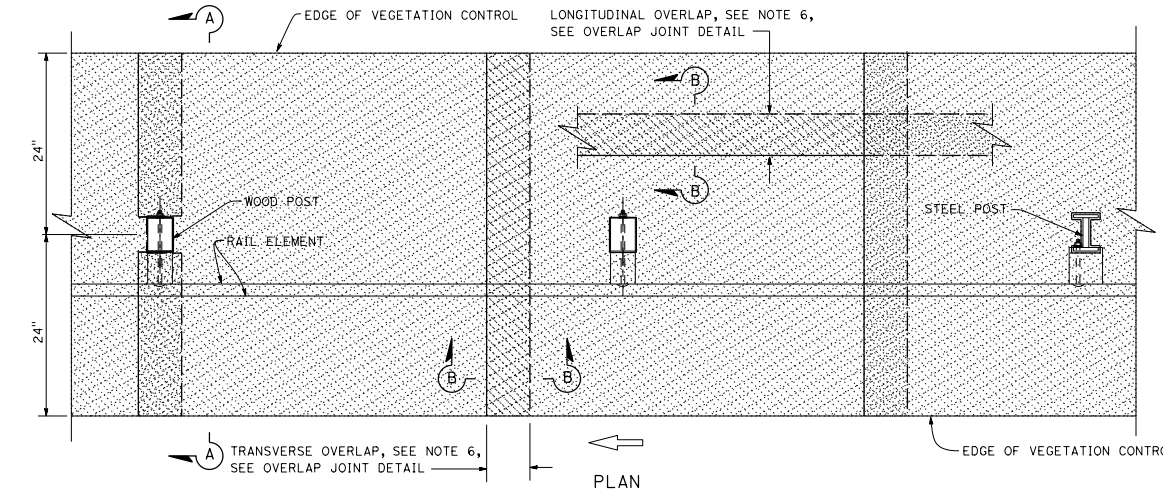
NO SCALE

A77N11

1-29-18

2018 STANDARD PLAN A77N11

Return to Table of Contents



PLAN

NOTES:

1. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
2. For wood and steel post sizes, see Standard Plans A77N1 and A77N2.
3. For details not shown, see Standard Plans A77L1 and A77L2.
4. This plan for vegetation control installation only.
5. Vegetation control must slope in direction of water flow.
6. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable. No longitudinal overlap allowed in front of rail element on traffic side.
7. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
8. Where vegetation control is adjacent to a dike on a cut slope, construct vegetation control flush with the top edge of dike, and caulk.
9. For fiber mat, install post collar at all posts and caulk all edges.
10. Where the distance between center of post and hinge point is less than 30", construct vegetation control to 6" from the hinge point.

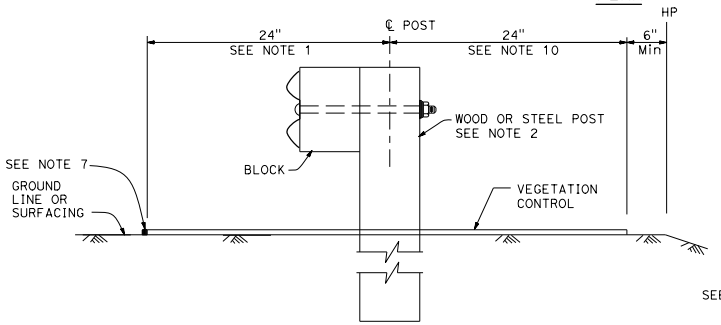
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

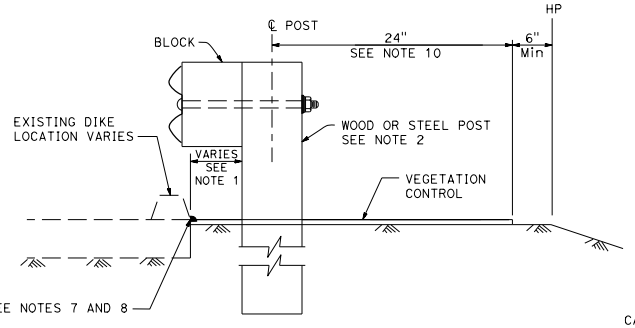
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

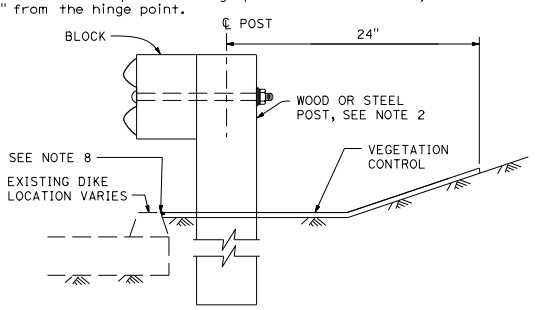
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



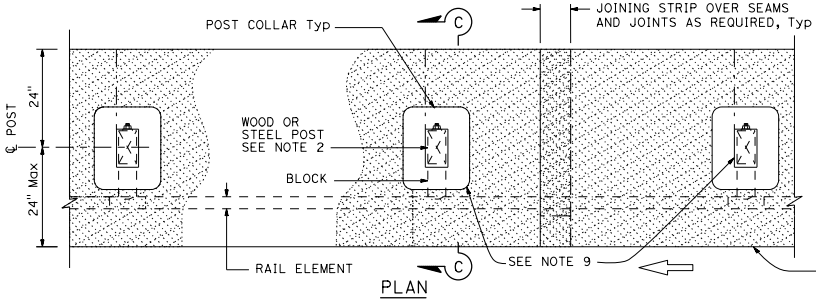
SECTION A-A
Without Existing Dike



SECTION A-A
With Existing Dike

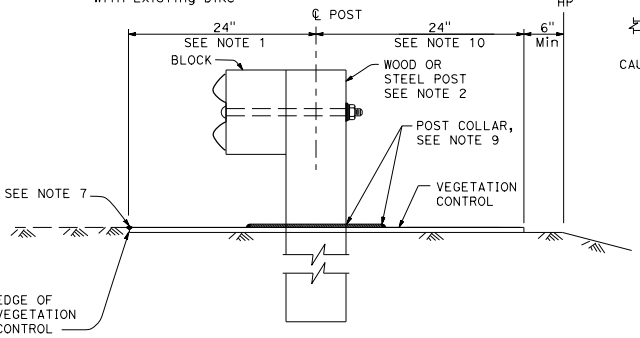


SECTION A-A
With Existing Dike on Cut Slope

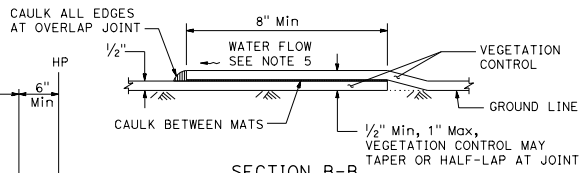


PLAN

FIBER VEGETATION CONTROL POST COLLAR DETAIL



SECTION C-C



SECTION B-B

OVERLAP JOINT DETAIL
See Note 6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM

NO SCALE

A77N12

2018 STANDARD PLAN A77N12

1-29-18

Return to Table of Contents

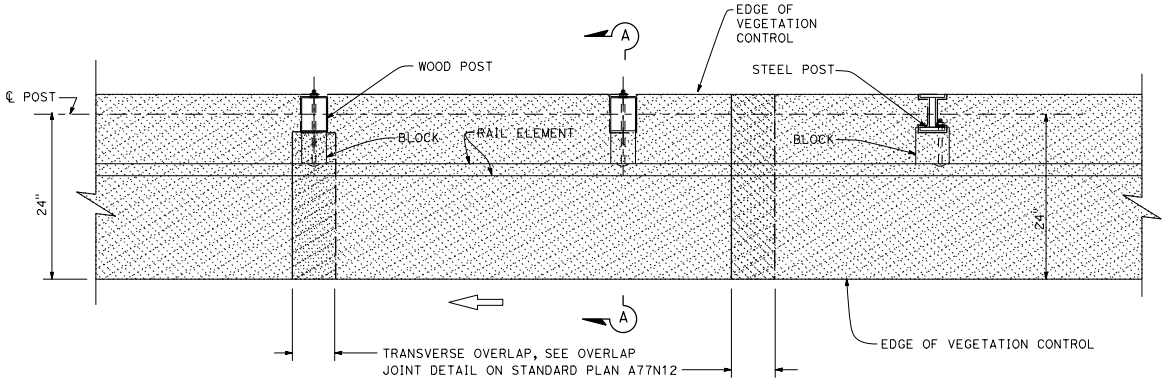
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

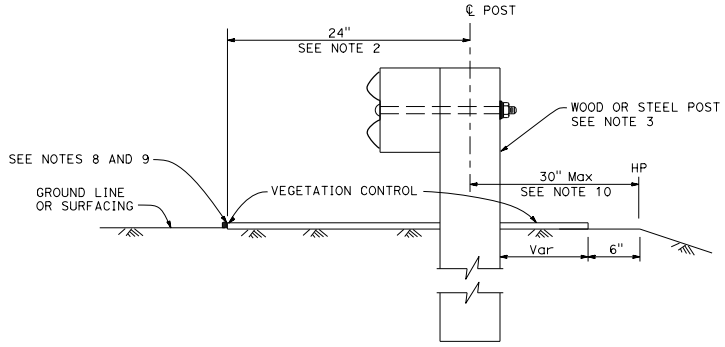
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

Without Existing Dike

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plans A77N1 and A77N2.
4. For details not shown, see Standard Plans A77L1 and A77L2.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike on a cut slope, construct vegetation control flush with the top edge of dike, and caulk. See Standard Plan A77N12.
10. Where the distance between center of post and hinge point is less than 30", construct vegetation control to 6" from the hinge point.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM NARROW VEGETATION CONTROL INSTALLATION

NO SCALE

A77N13

1-29-18

2018 STANDARD PLAN A77N13

Return to Table of Contents

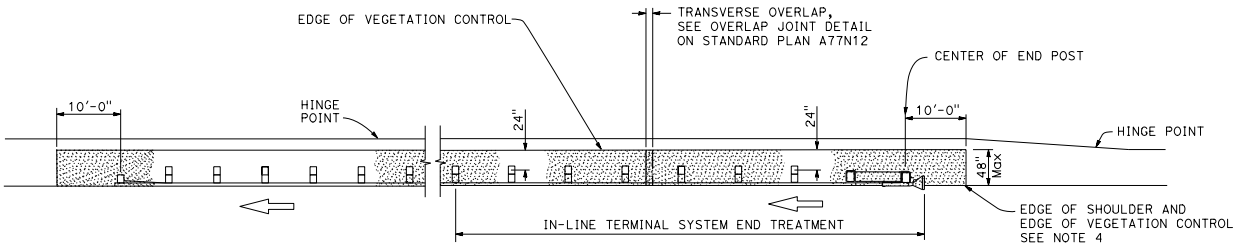
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

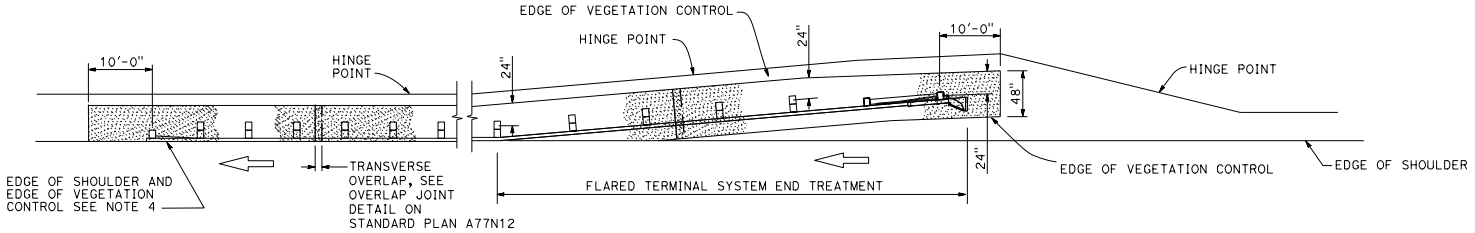
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



PLAN

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Vegetation control must slope in direction of water flow.
3. This plan for vegetation control installation only.
4. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM FOR TERMINAL SYSTEM END TREATMENTS

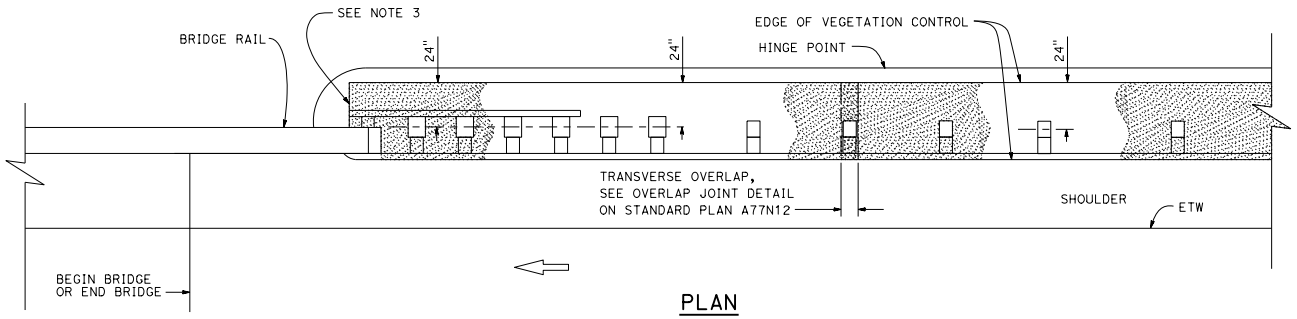
NO SCALE

A77N14

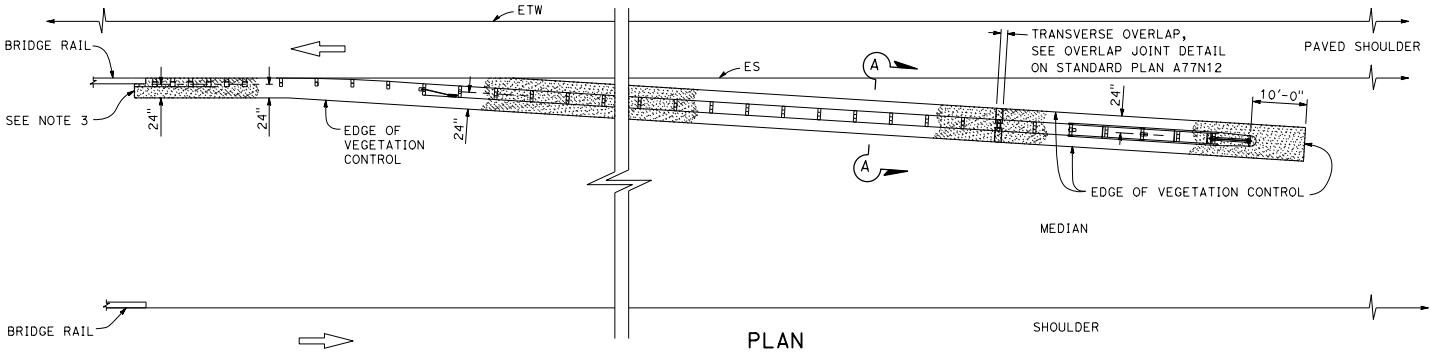
1-29-18

2018 STANDARD PLAN A77N14

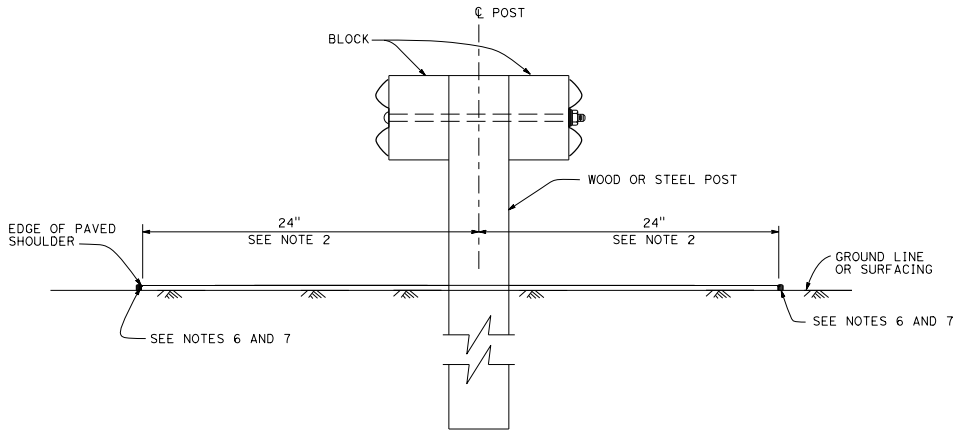
Return to Table of Contents



PLAN



PLAN



SECTION A-A

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. End vegetation control at end of backside rail element.
4. Vegetation control must slope in direction of water flow.
5. This plan for vegetation control installation only.
6. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
7. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM AT STRUCTURE APPROACH

NO SCALE

A77N15

2018 STANDARD PLAN A77N15

1-29-18

Return to Table of Contents

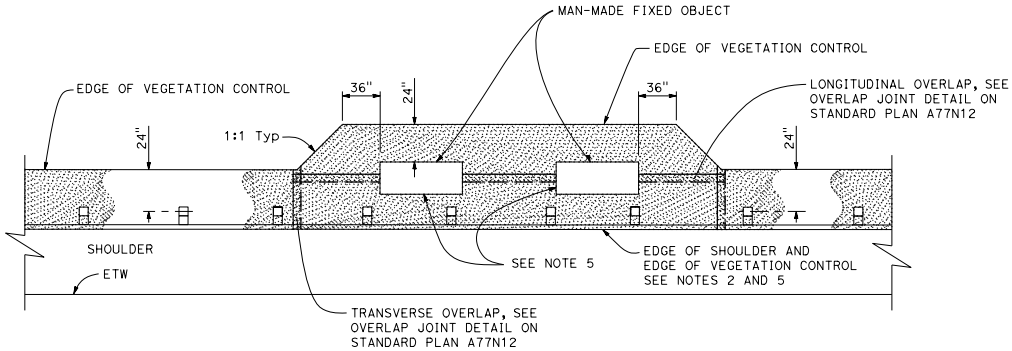
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

Fixed object(s) on shoulder

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. Vegetation control must slope in direction of water flow.
4. This plan for vegetation control installation only.
5. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

NO SCALE

A77N16

1-29-18

Return to Table of Contents

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plans A77N1 and A77N2.
4. For details not shown, see Standard Plans A77L1 and A77L2.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.

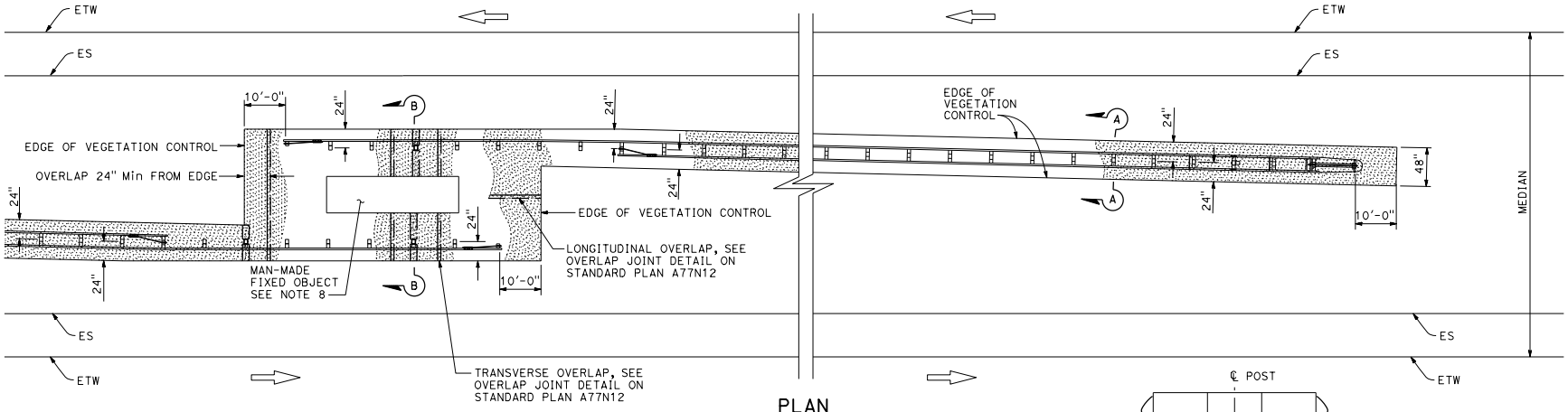
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

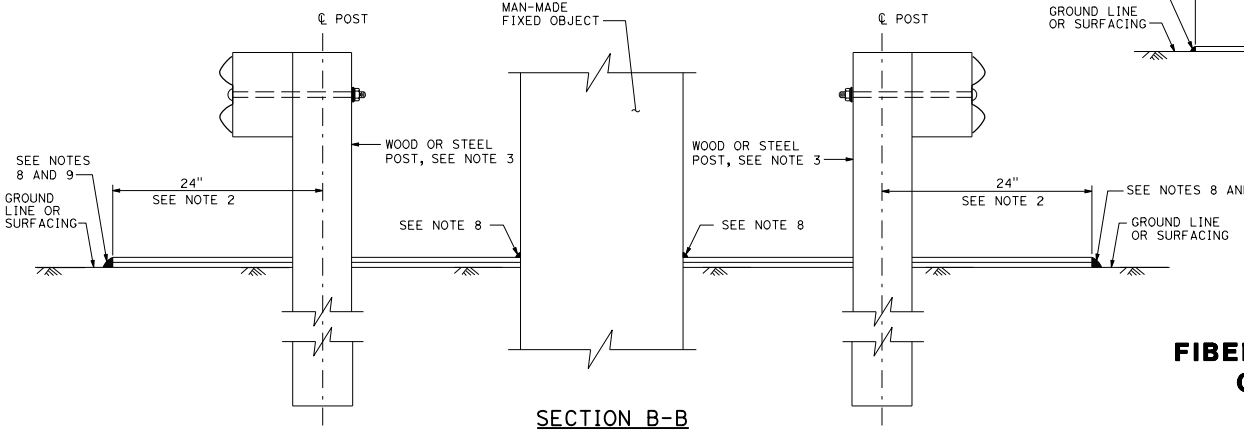
REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

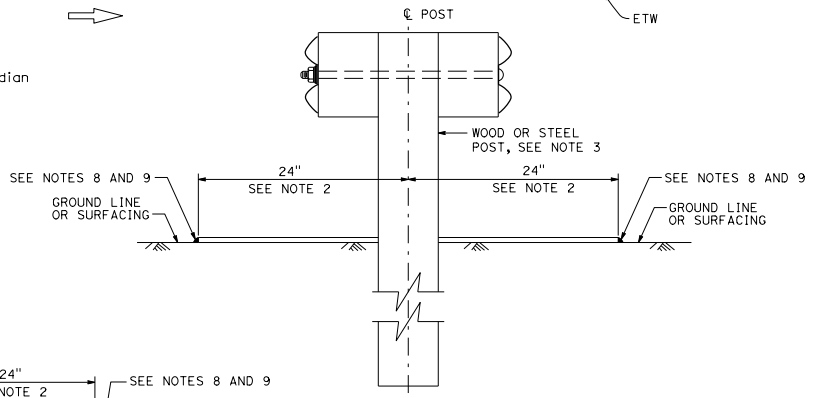


PLAN

Fixed object(s) in median



SECTION B-B



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

NO SCALE

A77N17

1-29-18

2018 STANDARD PLAN A77N17

Return to Table of Contents

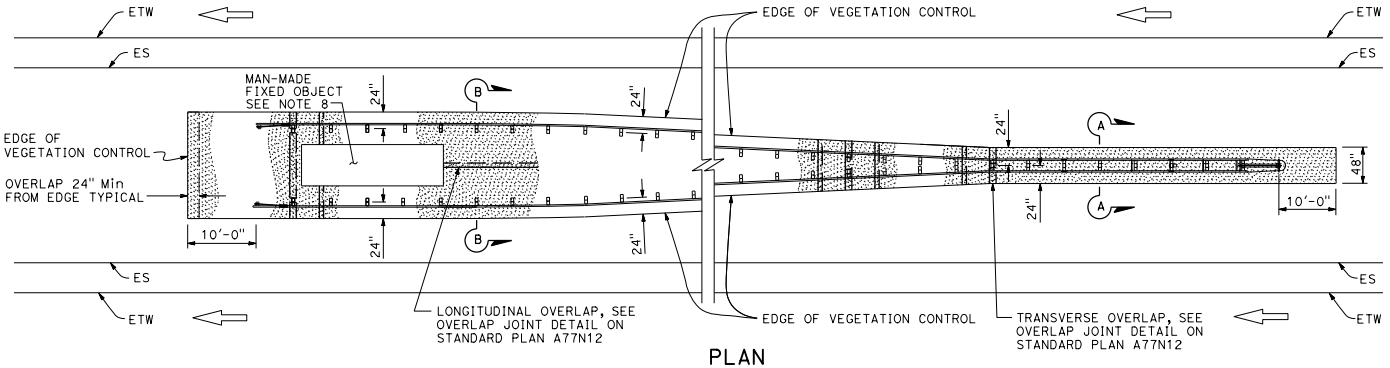
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

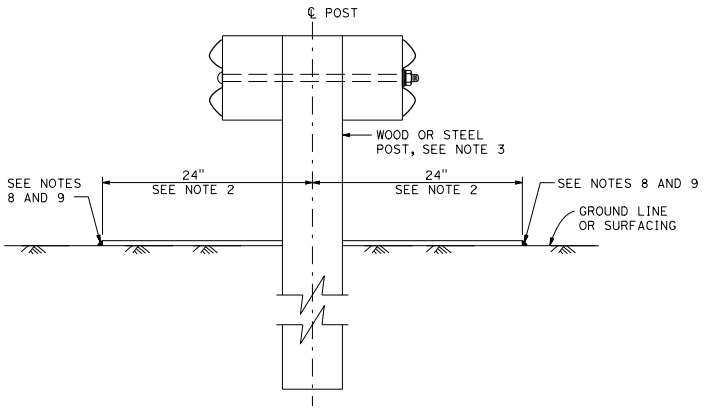


PLAN

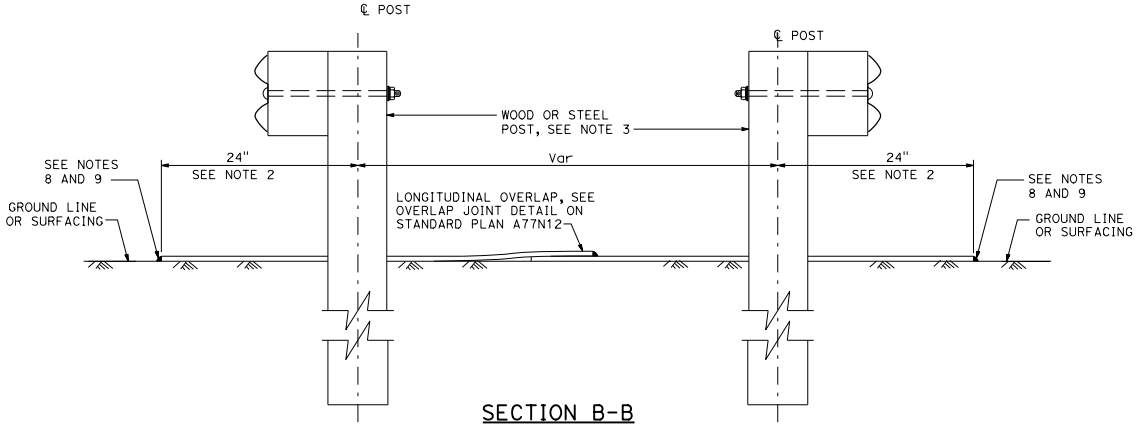
Fixed object(s) between separate roadbeds
(One-Way Traffic)

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plans A77N1 and A77N2.
4. For details not shown, see Standard Plans A77L1 and A77L2.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see Standard Plan A77N12.



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL GUARDRAIL SYSTEM AT FIXED OBJECT

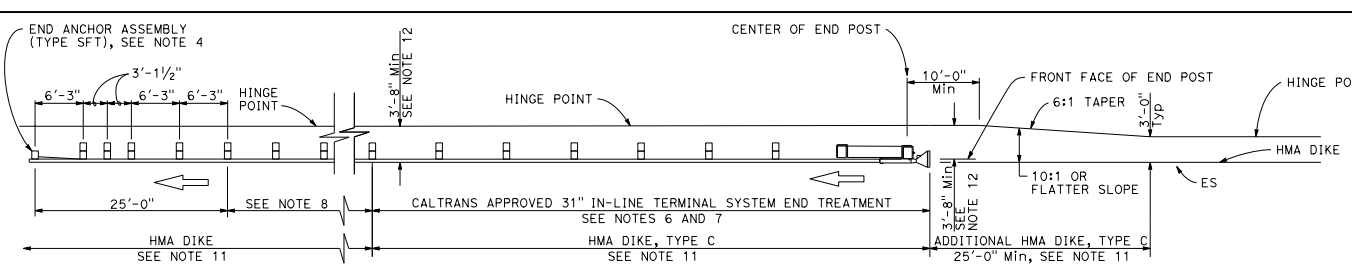
NO SCALE

A77N18

1-29-18

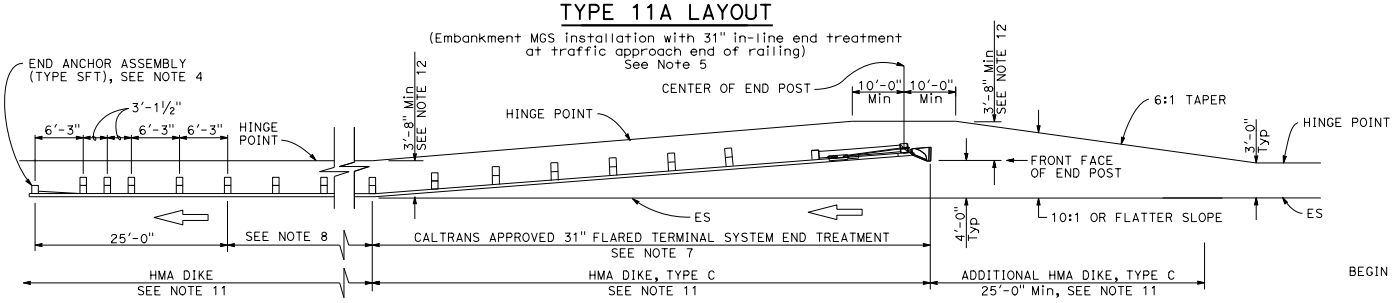
2018 STANDARD PLAN A77N18

Return to Table of Contents



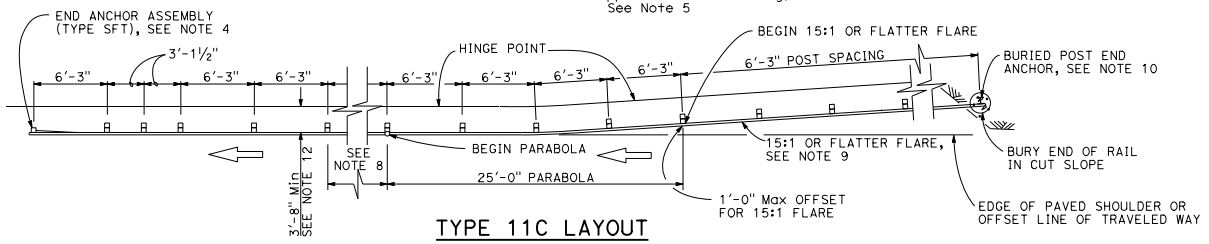
TYPE 11A LAYOUT

(Embankment MGS installation with 31" in-line end treatment at traffic approach end of railing)
See Note 5



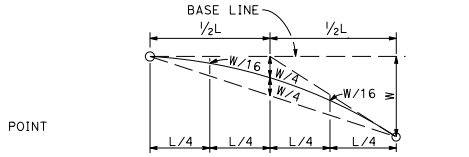
TYPE 11B LAYOUT

(Embankment MGS installation with 31" flared end treatment at traffic approach end of railing)
See Note 5

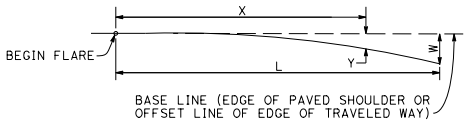


TYPE 11C LAYOUT

(Embankment MGS installation with buried end anchor treatment at traffic approach end of railing)
See Notes 5 and 11



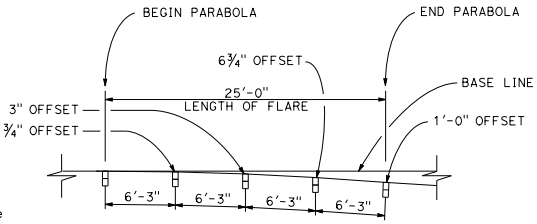
TYPICAL PARABOLIC LAYOUT



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL FLARE OFFSETS FOR 1 FOOT Max END OFFSET

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or recycled plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. For End Anchor Assembly (Type SFT) details, see Standard Plan A77S1.
5. Layout Types 11A, 11B or 11C are typically used where MGS is recommended to shield embankment slopes and a crashworthy end treatment is required for only one direction of traffic.
6. 31" in-line terminal system end treatments are used where site conditions will not accommodate a flared end treatment.
7. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
8. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
9. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
10. For details of the buried post end anchor used with Type 11C Layout, see Standard Plan A77T2.
11. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
12. Use this offset for 8-inch block. For 12-inch block, use 4'-0" Min offset.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P1

1-29-18

2018 STANDARD PLAN A77P1

Return to Table of Contents

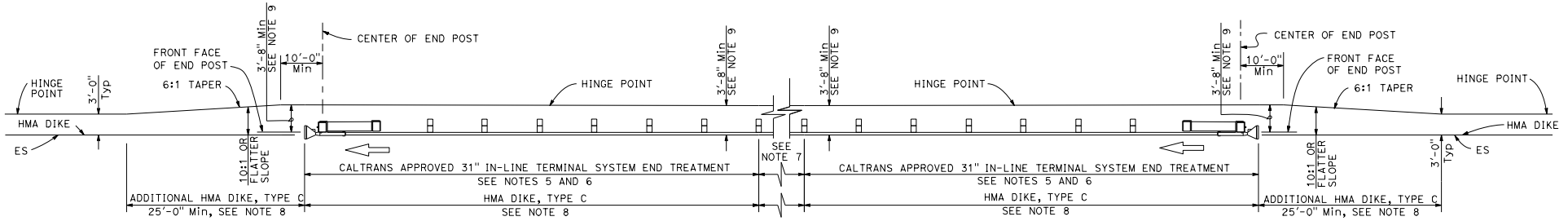
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

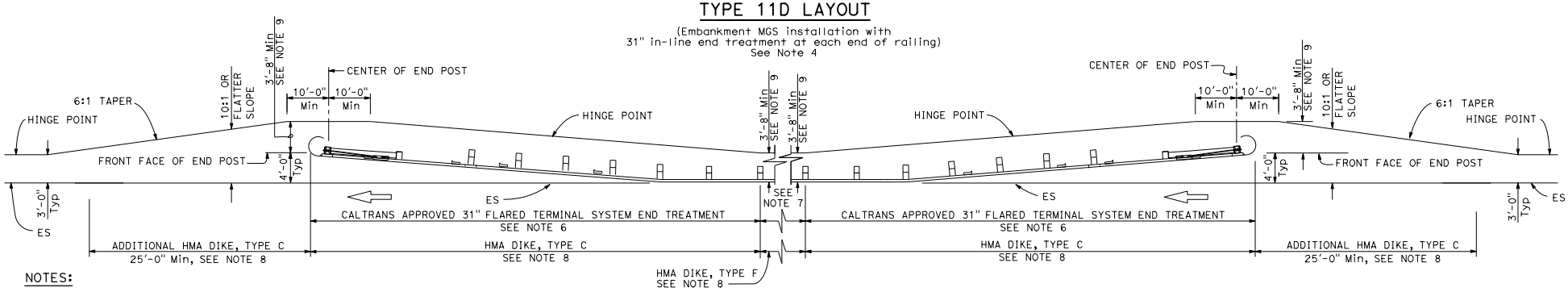
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA



TYPE 11D LAYOUT

(Embankment MGS installation with
31" in-line end treatment at each end of railing)
See Note 4



TYPE 11E LAYOUT

(Embankment MGS installation with
31" flared end treatment at each end of railing)
See Note 4

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. Layout Types 11D through 11L, shown on the A77P Series of Standard Plans, are typically used where MGS is recommended to shield embankment slopes and a crashworthy 31" end treatment is required for both directions of traffic.
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a flared end treatment.
6. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
7. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
8. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
9. Use this offset for 8-inch block. For 12-inch block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P2

1-29-18

2018 STANDARD PLAN A77P2

Return to Table of Contents

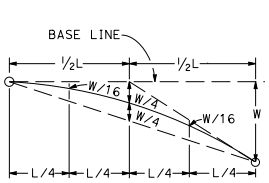
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

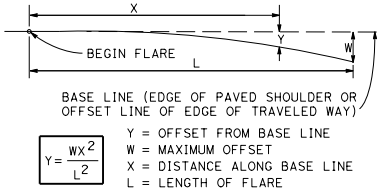
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



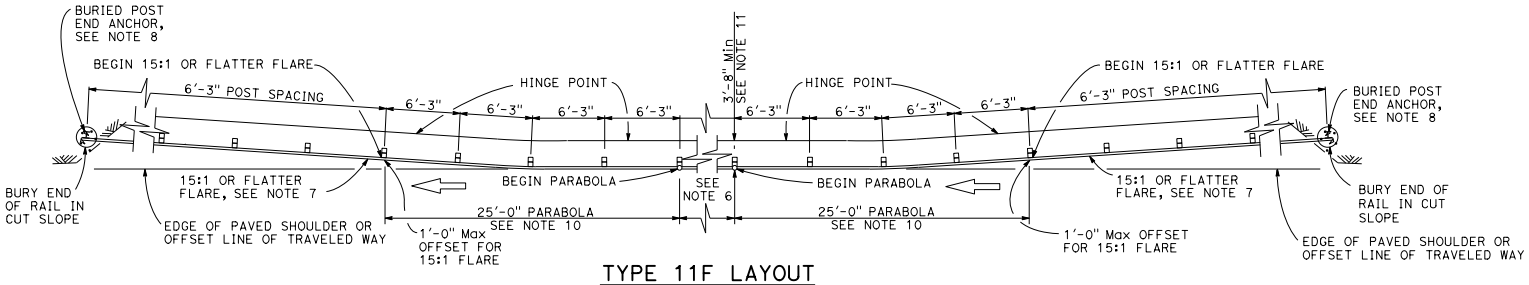
TYPICAL PARABOLIC LAYOUT



$Y = \frac{WX^2}{L^2}$

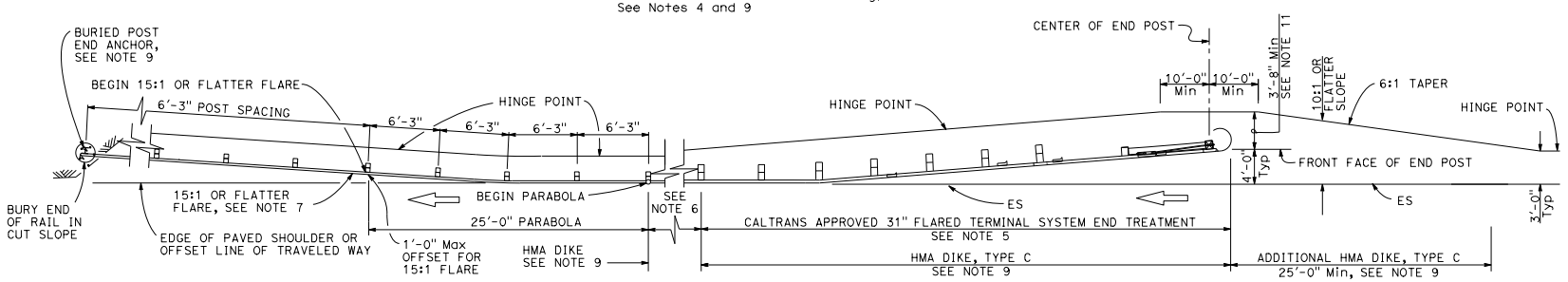
Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPE 11F LAYOUT

(Embankment MGS installation with a buried end anchor treatment at each end of railing)
See Notes 4 and 9



TYPE 11G LAYOUT

(Embankment MGS installation with 31" flared end treatment and a buried end anchor treatment at the ends of railing)
See Notes 4 and 9

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. Layout Types 11D through 11L, shown on the A77P Series of Standard Plans, are typically used where MGS is recommended to shield embankment slopes and a crashworthy 31" end treatment is required for both directions of traffic.
5. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
6. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
7. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
8. For details of the buried post end anchor used with Type 11F and 11G Layouts, see Standard Plan A77T2.
9. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
10. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
11. Use this offset for 8-inch block. For 12-inch block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P3

1-29-18

Return to Table of Contents

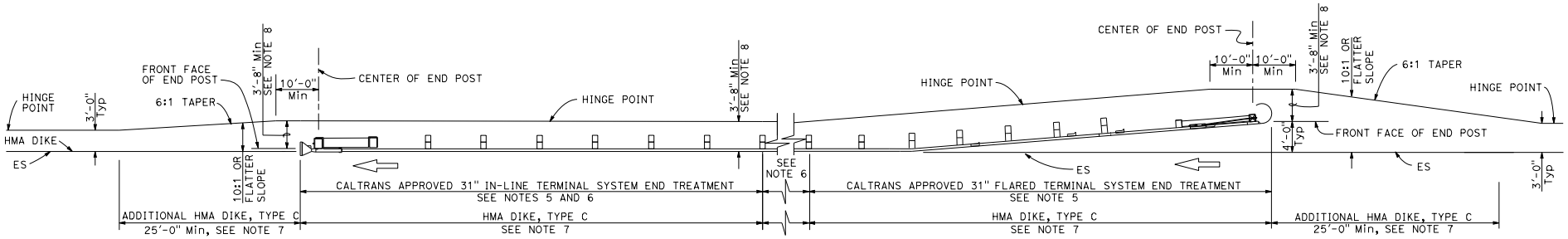
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA



TYPE 11H LAYOUT

(Embankment MGS installation with 31" flared end treatment
and 31" in-line end treatment at the ends of railing)
See Notes 4 and 7

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. Layout Types 11D through 11L, shown on the A77P Series of Standard Plans, are typically used where MGS is recommended to shield embankment slopes and a crashworthy 31" end treatment is required for both directions of traffic.
5. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
6. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
7. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
8. Use this offset for 8-inch block. For 12-inch block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P4

1-29-18

Return to Table of Contents

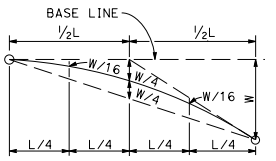
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

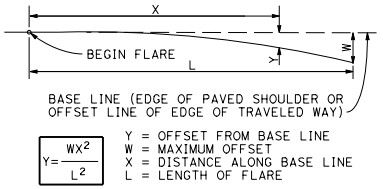
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



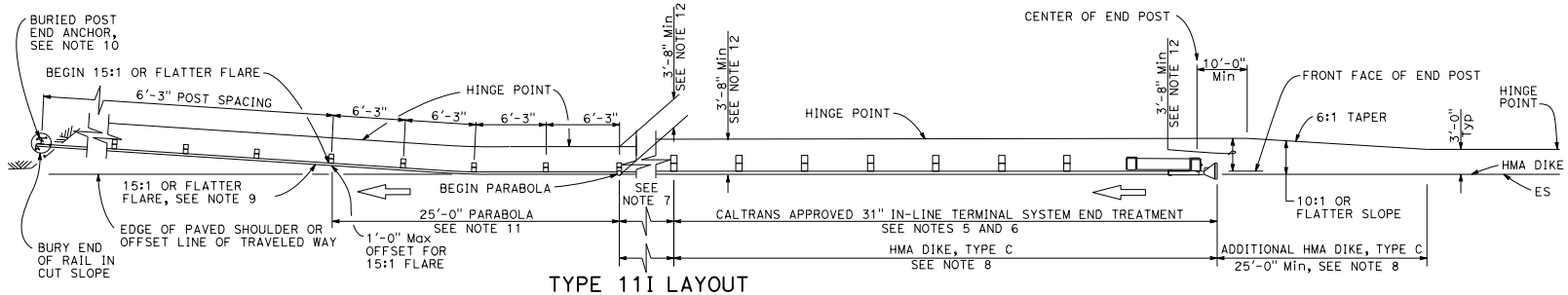
TYPICAL PARABOLIC LAYOUT



$Y = \frac{WX^2}{L^2}$

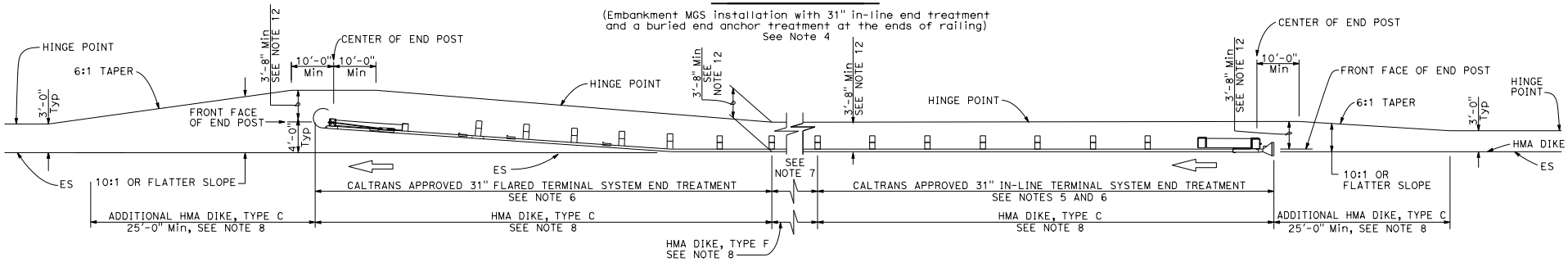
Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPE 11I LAYOUT

(Embankment MGS installation with 31" in-line end treatment and a buried end anchor treatment at the ends of railing)
See Note 4



TYPE 11J LAYOUT

(Embankment MGS installation with 31" in-line end treatment and 31" flared end treatment at the ends of railing)
See Note 4

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. Layout Types 11D through 11L, shown on the A77P Series of Standard Plans, are typically used where MGS is recommended to shield embamkment slopes and a crashworthy 31" end treatment is required for both directions of traffic.
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
7. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
8. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
9. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
10. For details of the buried post end anchor used with Type 11I Layout, see Standard Plan A77T2.
11. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
12. Use this offset for 8-inch block. For 12-inch block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P5

1-29-18

Return to Table of Contents

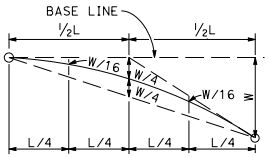
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

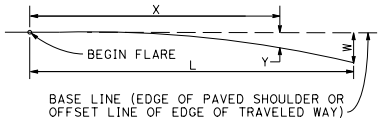
May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — State of California

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



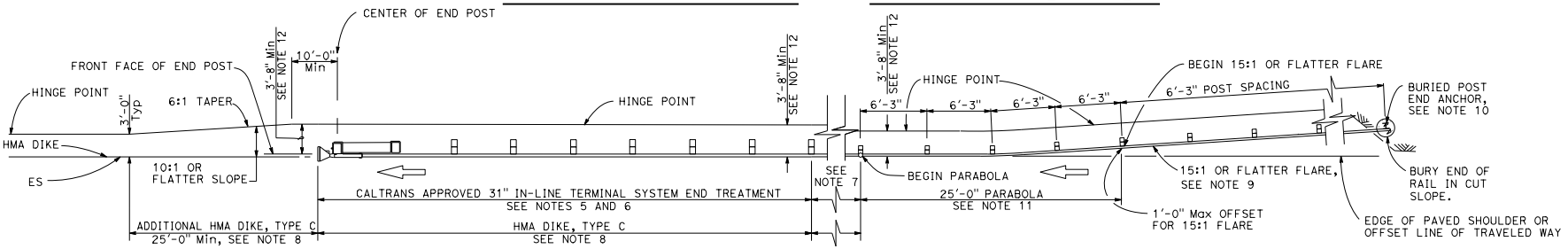
TYPICAL PARABOLIC LAYOUT



$Y = \frac{WX^2}{L^2}$

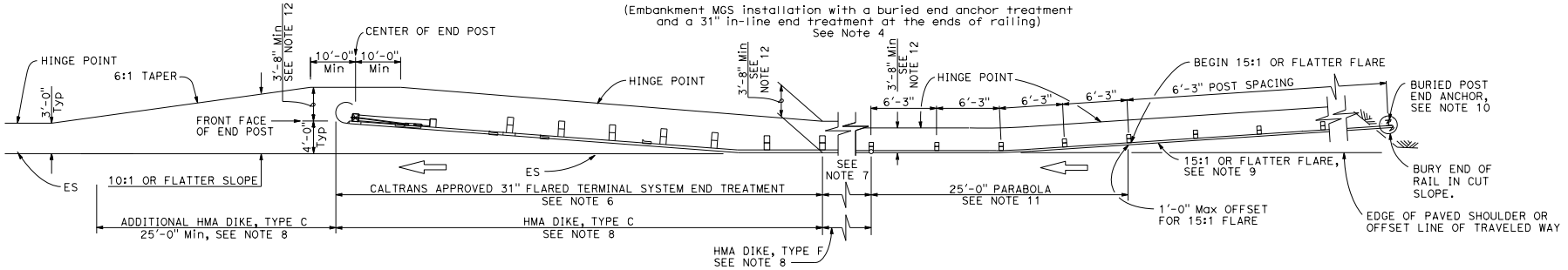
Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPE 11K LAYOUT

(Embankment MGS installation with a buried end anchor treatment and a 31" in-line end treatment at the ends of railing)
See Note 4



TYPE 11L LAYOUT

(Embankment MGS installation with a buried end anchor treatment and a 31" flared end treatment at the ends of railing)
See Note 4

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. Layout Types 11D through 11L, shown on the A77P Series of Standard Plans, are typically used where MGS is recommended to shield embamkment slopes and a crashworthy 31" end treatment is required for both directions of traffic.
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
7. Dependent on site conditions (embankment height and side slope), construction of additional MGS (length equal to multiples of 12'-6" with 6'-3" post spacing) may be advisable.
8. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
9. The 15:1 or flatter flare used with buried end anchors is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
10. For details of the buried post end anchor used with Type 11K and 11L Layouts, see Standard Plan A77T2.
11. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
12. Use this offset for 8" block. For 12" block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS

NO SCALE

A77P6

1-29-18

Return to Table of Contents

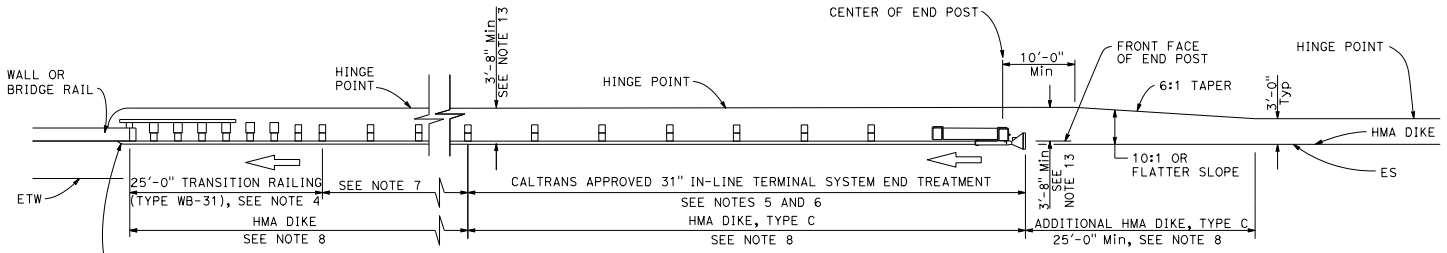
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

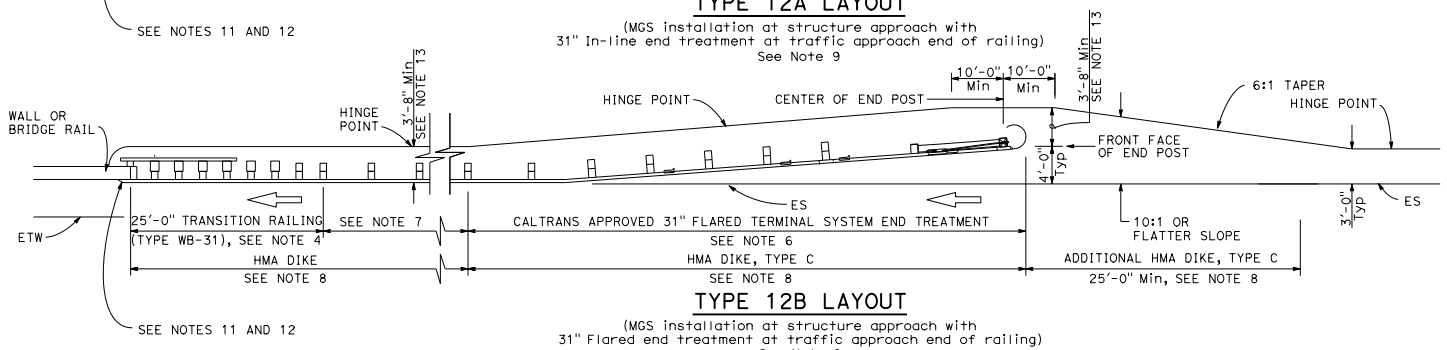
REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPE 12A LAYOUT

(MGS installation at structure approach with 31" In-line end treatment at traffic approach end of railing)
See Note 9



TYPE 12B LAYOUT

(MGS installation at structure approach with 31" Flared end treatment at traffic approach end of railing)
See Note 9

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. For Transition Railing (Type WB-31) details for Types 12A and 12B Layouts, see Standard Plan A77U4.
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system end treatment to be used will be shown on the Project Plans.
7. Dependent on site conditions (embankment height, side slopes, or other fixed objects), it may be advisable to construct additional guard railing (a length equal to multiples of 12'-6" with 6'-3" post spacing) between the transition railing and end treatment. A 12.5 degree angle of departure can be drawn on the Project Plans from the edge of traveled way through the outer most point of the fixed object to determine the additional length of railing needed.
8. Where placement of dike is required with guard railing installations, see Standard Plan A77N4 for dike positioning details.
9. Type 12A or Type 12B Layouts are typically used:
   a. To the right of approaching traffic, at the end of a structure, on two-lane conventional highway where the roadbed width across the structure is less than 40 feet.
   b. To the left of approaching traffic, at the end of a structure, on two-lane conventional highway where the roadbed width across the structure is less than 40 feet.
   c. To the right of approaching traffic at the end of each structure on multilane freeways or expressways with separate adjacent or parallel bridges.
   d. To the right of approaching traffic at the end of the structure on multilane freeways or expressways with decked median on the bridge.
10. See Standard Plan A77O3 for typical layout used left of approaching traffic at the ends of each structure on multilane freeways or expressways with separate adjacent or parallel bridges.
11. For additional details of typical connections to bridge rail, see Connection Detail AA on Standard Plans A77U1 and A77U2 and Connection Detail FF on Standard Plans A77V1 and A77V2.
12. For additional details of a typical connection to walls or abutments, see Standard Plan A77U3.
13. Use this offset for 8" block. For 12" block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURE APPROACH

NO SCALE

A77Q1

1-29-18

2018 STANDARD PLAN A77Q1

Return to Table of Contents

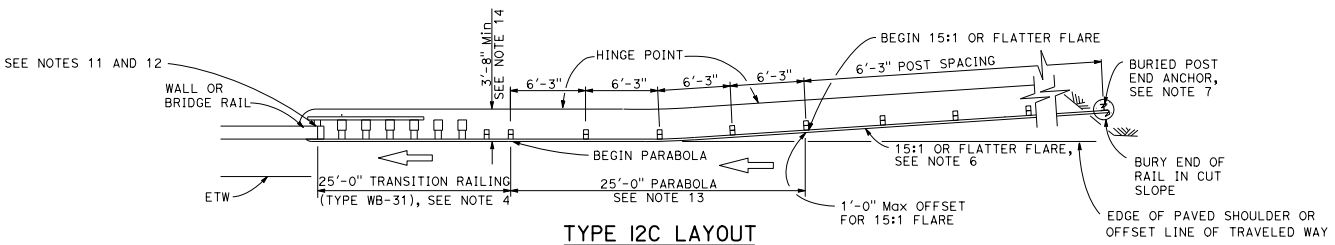
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

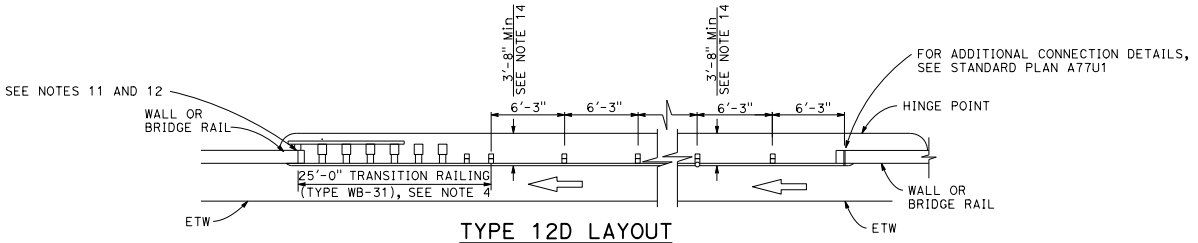
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



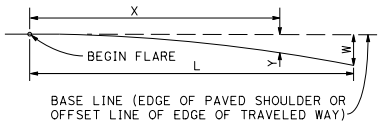
TYPE 12C LAYOUT

(MGS installation at structure approach with a
Buried end anchor treatment at traffic approach end of railing)
See Notes 8 and 9



TYPE 12D LAYOUT

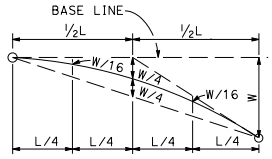
(Continuous MGS installation between structures)
See Notes 5 and 9



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" m wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. For Transition Railing (Type WB-31) details for Types 12C and 12D Layouts, see Standard Plan A77U4.
5. Type 12D layout is typically used where continous MGS is recommended between structures.
6. The 15:1 or flatter flare for Type 12C Layout is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS with the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
7. For details of the buried post end anchor used with Type 12C Layout, see Standard Plan A77T2.
8. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
9. Type 12C Layout is typically used:
   a. To the right of approaching traffic, at the end of the structure, on two-lane conventional highway where the roadbed width across the structure is less than 40 feet.
   b. To the left of approaching traffic, at each of a structure, on two-lane conventional highway where the roadbed width across the structure is less than 40 feet.
   c. To the right of approaching traffic at the end of each structure on multilane freeways or expressways with separate adjacent or parallel bridges.
   d. To the right of approaching traffic at the end of the structure on multilane freeways or expressways with decked median on the bridge.
10. See Standard Plan A77Q3 for typical layout used left of approaching traffic at the ends of each structure on multilane freeways or expressways with separate adjacent or parallel bridges.
11. For additional details of typical connections to bridge rail, see Connection Detail AA on Standard Plans A77U1 and A77U2 and Connection Detail FF on Standard Plans A77V1 and A77V2.
12. For additional details of a typical connection to walls or abutments, see Standard Plan A77U3.
13. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
14. Use this offset for 8" block. For 12" block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURE APPROACH AND BETWEEN STRUCTURES

NO SCALE

A77Q2

1-29-18

Return to Table of Contents

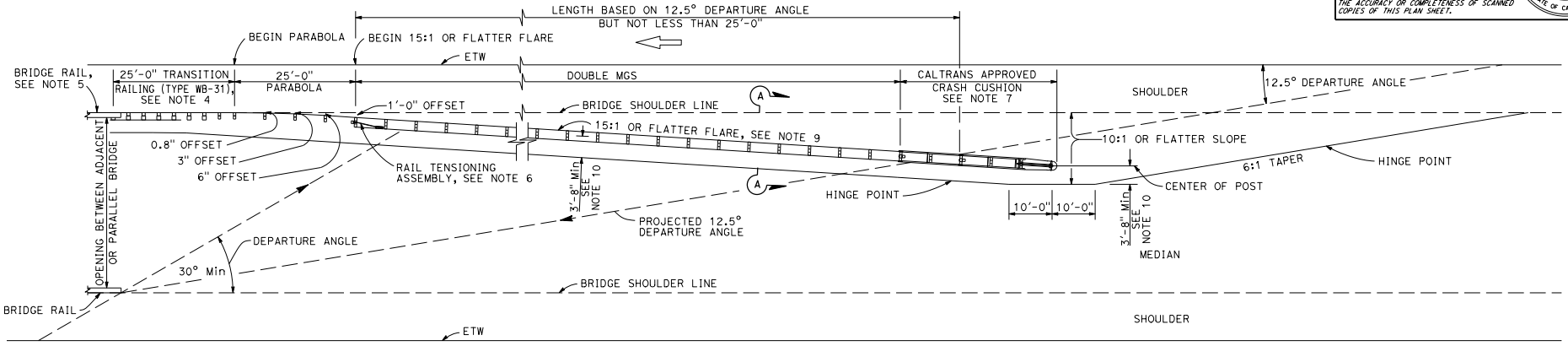
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

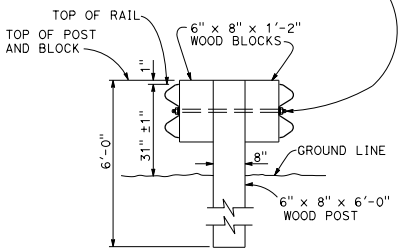
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPE 12E LAYOUT

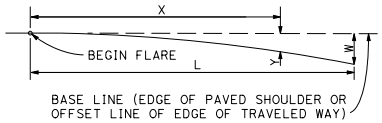
See Note 9

5/8" ø BUTTON HEAD BOLT WITH Hex NUT OR 5/8" ø ROD, THREADED BOTH ENDS, WITH Hex NUTS. 1/2" Max EXPOSED THREADS AFTER Hex NUT(S) TIGHTENED. NO WASHER ON RAIL FACES FOR BOLTED CONNECTION TO LINE POST



SECTION A-A

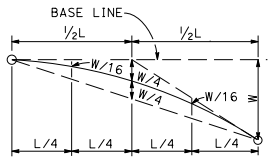
TYPICAL DOUBLE MIDWEST GUARDRAIL SYSTEM



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2, and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. For Transition Railing (Type WB-31) details, see Standard Plan A77U4.
5. For additional details of a typical connection to bridge rail, see Connection Detail AA on Standard Plan A77U1.
6. For Rail Tensioning Assembly details, see Standard Plan A77S2.
7. The type of Crash Cushion to be used will be shown on the Project Plans.
8. Type 12E Layout is typically used left of approaching traffic at the end of each structure on multilane freeways or expressways where a median type barrier is not constructed between separated roadbeds.
9. The 15:1 or flatter flare is measured off of the edge of traveled way.
10. Use this offset for 8" block. For 12" block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURE APPROACH

NO SCALE

A77Q3

1-29-18

2018 STANDARD PLAN A77Q3

Return to Table of Contents

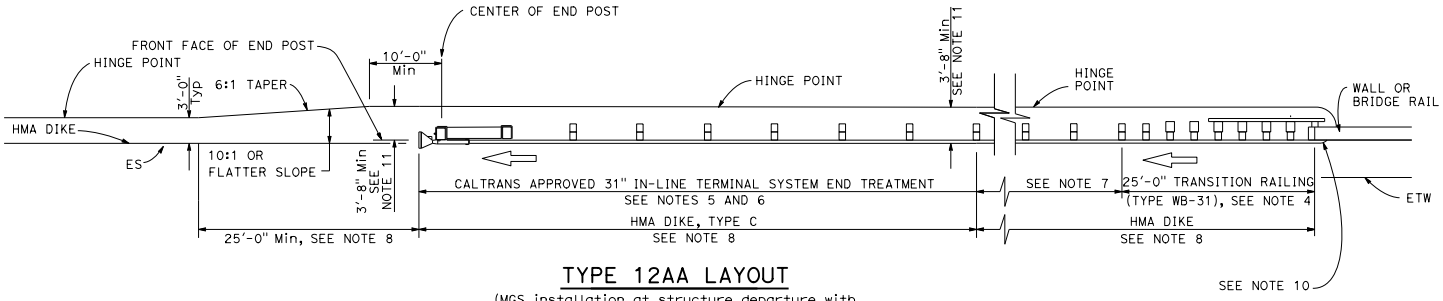
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

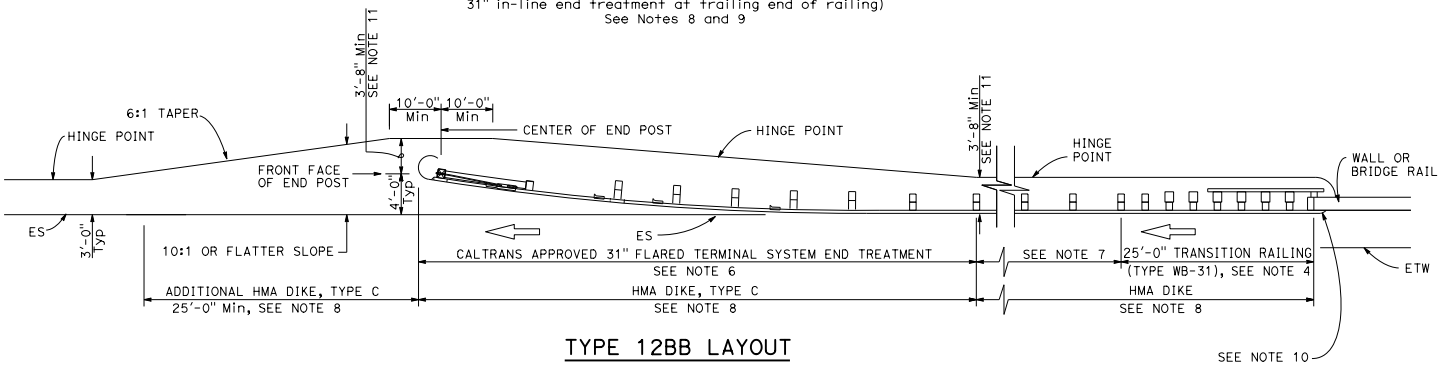
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPE 12AA LAYOUT

(MGS installation at structure departure with
31" in-line end treatment at trailing end of railing)
See Notes 8 and 9



TYPE 12BB LAYOUT

(MGS installation at structure departure with
31" flared end treatment at trailing end of railing)
See Notes 8 and 9

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. For Transition Railing (Type WB-31) details for Types 12AA and 12BB Layouts, see Standard Plan A77U4.
5. 31" in-line terminal system treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system to be used will be shown on the Project Plans.
7. Dependent on site conditions (embankment height, side slopes, other fixed objects), it may be advisable to construct additional MGS (a length equal to multiples of 12'-6" with 6'-3" post spacing) between the transition railing and 31" end treatments.
8. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
9. Type 12AA or Type 12BB Layouts are typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is less than 40 feet.
10. For additional details of typical connections to bridge rail, see Connection Detail CC on Standard Plan A77U2 and Connection Detail HH on Standard Plan A77V2.
11. Use this offset for 8" block. For 12" block, use 4'-0" Min offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE

NO SCALE

A77Q4

1-29-18

Return to Table of Contents

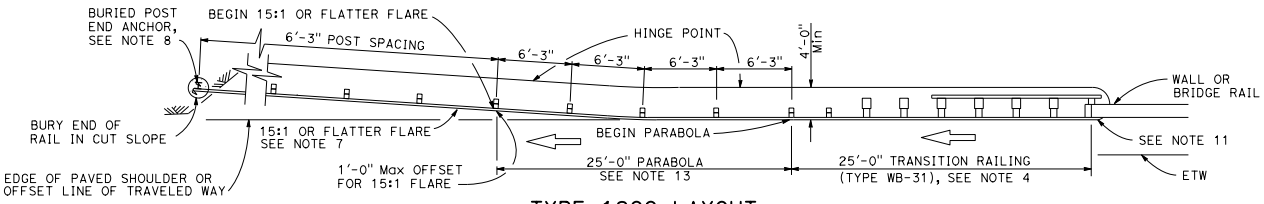
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

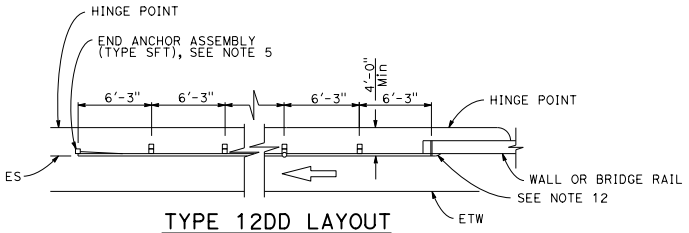
Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



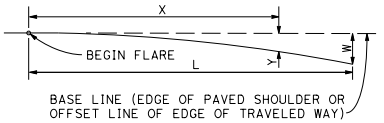
TYPE 12CC LAYOUT

(MGS installation at structure departure with a Buried end anchor treatment at trailing end of railing)
See Notes 9 and 10



TYPE 12DD LAYOUT

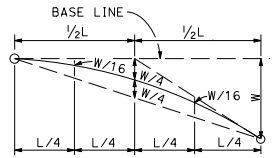
(MGS installation at structure departure
With end anchor assembly at trailing end of railing)
See Notes 6 and 9



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77M1, A77N1 and A77N2.
2. MSG post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 12" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 12" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 12" x 1'-2" wood blocks where applicable and when specified.
4. For Transition Railing (Type WB-31) details for Type 12CC Layout, see Standard Plan A77U4.
5. For details of End Anchor Assembly (Type SFT) used with Type 12DD Layout, see Standard Plan A77S1.
6. Type 12DD layout is typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is equal to or greater than 40 feet and MGS is recommended (embankment height, side slopes, other fixed objects). Length of railing to be equal to multiples of 12'-6". For MGS connection details to bridge rail, see Standard Plans A77U1 and A77V1. For MGS connection details to wall, see Standard Plan A77U3.
7. The 15:1 or flatter flare for Type 12CC Layout is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
8. For details of the buried post end anchor used with Type 12CC Layout, see Standard Plan A77T2.
9. Where placement of dike is required with MGS installations, see Standard Plan A77N4 for dike positioning details.
10. Type 12CC Layout is typically used to the right of traffic departing a structure on two-way conventional highways where the roadbed width across the structure is less than 40 feet.
11. For additional details of a typical connection to bridge rail for Layout Type 12CC, see Connection Detail CC on Standard Plan A77U2 and Connection Detail HH on Standard Plan A77V2.
12. For additional details of a typical connection to bridge rail for Layout Type 12DD, see Connection Detail BB on Standard Plan A77U1 and Connection Detail GG on Standard Plan A77V1.
13. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURE DEPARTURE

NO SCALE

A77Q5

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

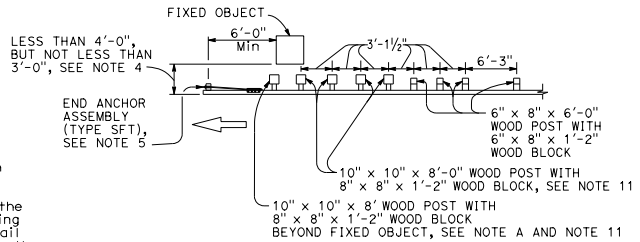
May 31, 2018
PLANS APPROVAL DATE

Randall D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

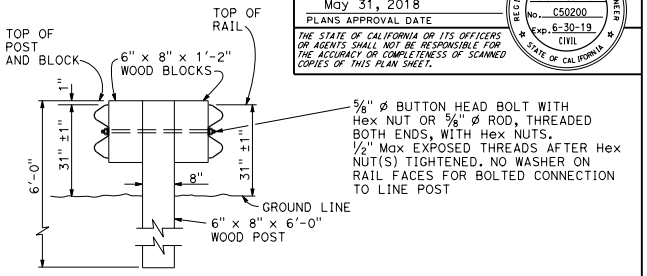
1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing of 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. For End Anchor Assembly (Type SFT) details, see Standard Plan A77S1.
6. For details of Rail Tensioning Assembly, see Standard Plan A77S2.
7. The type of crash cushion to be used will be shown on the Project Plans.
8. Type 14A layout is typically used on multilane freeways or expressways to shield fixed objects where a median type barrier is not constructed between the separated roadbeds.
9. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
10. The 15:1 or flatter flare is measured off of the edge of traveled way.
11. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic block may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
12. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed objects.

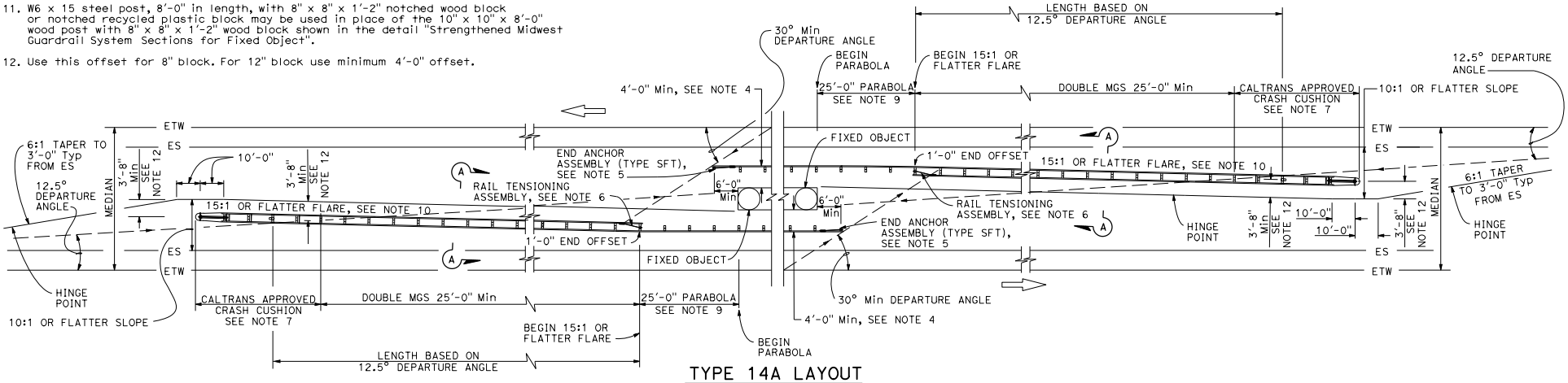
STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

Use strengthened MGS sections with Type 14A layout where minimum clearance between the face of the railing and fixed object(s) is less than 4'-0", but not less than 3'-0", See Note 4.



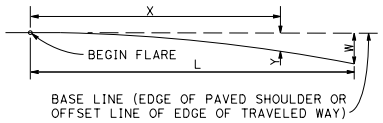
SECTION A-A

TYPICAL DOUBLE MIDWEST GUARDRAIL SYSTEM



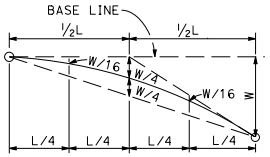
TYPE 14A LAYOUT

See Note 8



$Y = \frac{WX^2}{L^2}$

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR FIXED OBJECTS BETWEEN SEPARATE ROADBEDS (TWO-WAY TRAFFIC)

NO SCALE

A77R1

1-29-18

2018 STANDARD PLAN A77R1

Return to Table of Contents

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS section with post spacing of 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. For End Anchor Assembly (Type SFT) details, see Standard Plan A77S1.
6. Type of crash cushion to be used will be shown on the Project Plans.
7. Type 15A layout is typically used on multilane freeways or expressways to shield fixed objects in the area between separated one-way roadbeds.
8. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
9. The 15:1 or flatter flare is measured off of the edge of the traveled way.
10. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".

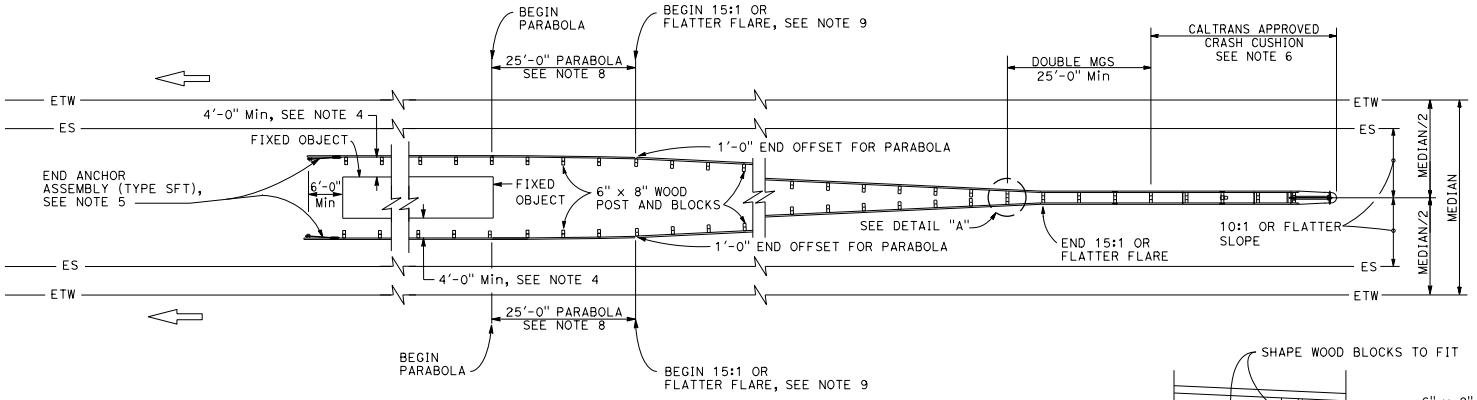
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

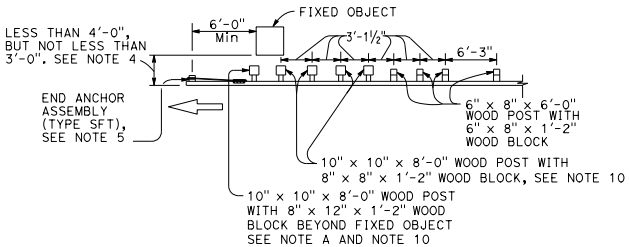
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA



TYPE 15A LAYOUT

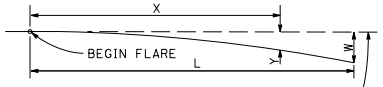
See Note 7



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed objects.

STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

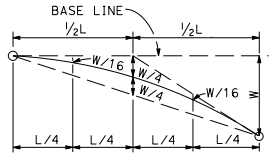
Use strengthened MGS sections with Type 15A layout where minimum clearance between the face of the MGS and the fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



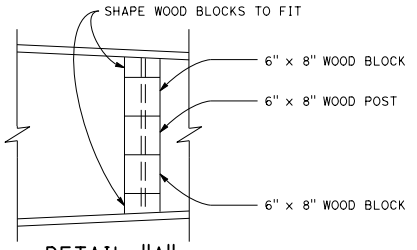
$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT



DETAIL "A"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR FIXED OBJECTS BETWEEN SEPARATE ROADBEDS (ONE-WAY TRAFFIC)

NO SCALE

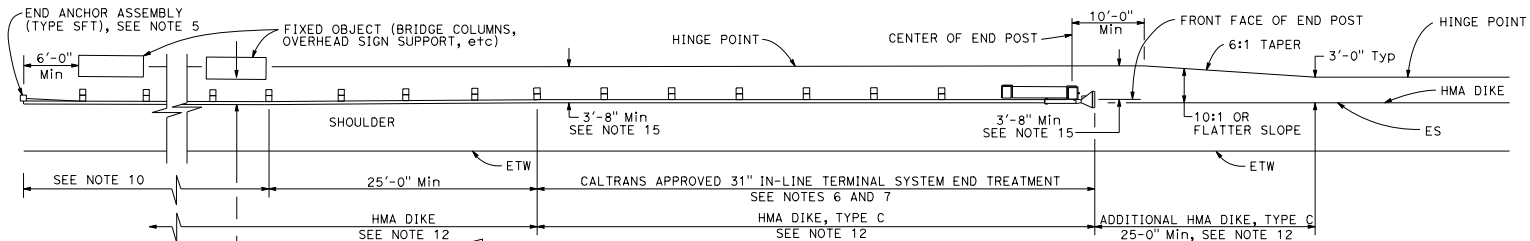
A77R2

1-29-18

2018 STANDARD PLAN A77R2

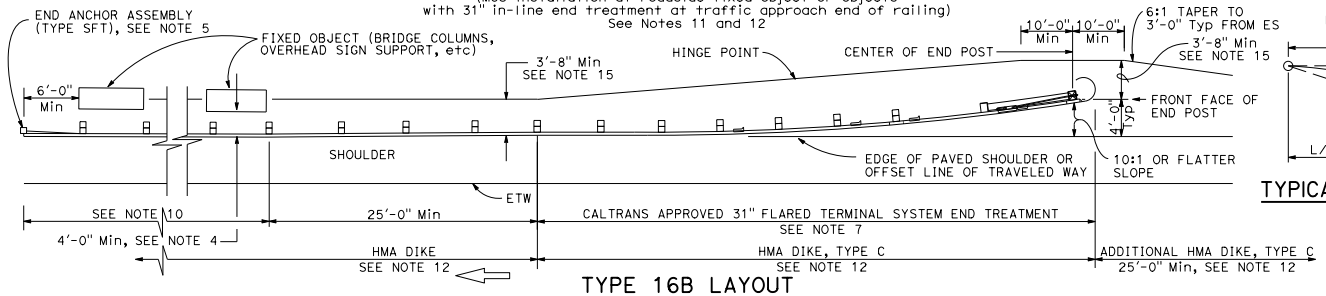
92

Return to Table of Contents



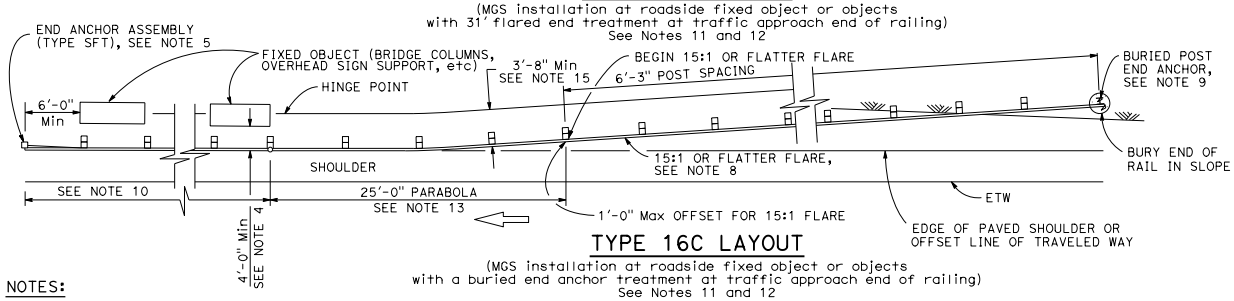
TYPE 16A LAYOUT

(MGS installation at roadside fixed object or objects with 31" in-line end treatment at traffic approach end of railing)
See Notes 11 and 12



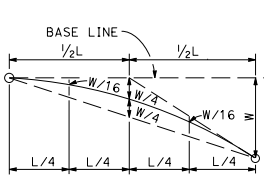
TYPE 16B LAYOUT

(MGS installation at roadside fixed object or objects with 31' flared end treatment at traffic approach end of railing)
See Notes 11 and 12

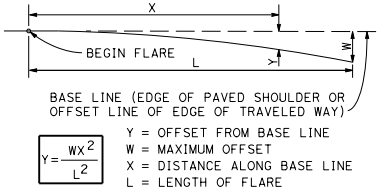


TYPE 16C LAYOUT

(MGS installation at roadside fixed object or objects with a buried end anchor treatment at traffic approach end of railing)
See Notes 11 and 12



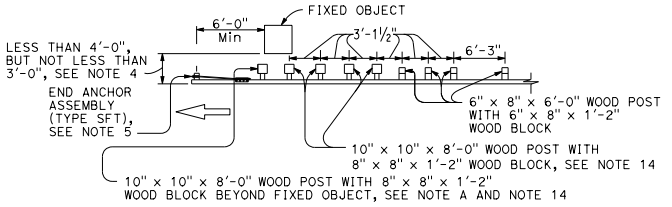
TYPICAL PARABOLIC LAYOUT



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed objects.

STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

Use strengthened MGS sections with Types 16A, 16B or 16C layouts where minimum clearance between the face of the railing and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing of 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. For End Anchor Assembly (Type SFT) details, see Standard Plan A77S1.
6. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
7. The type of 31" terminal system to be used will be shown on the Project Plans.
8. The 15:1 or flatter flare used with Type 16C Layout is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
9. For details of the Buried Post End Anchor used with Type 16C Layout, see Standard Plan A77T2.
10. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3" except as specified in Note 4.
11. Layout Types 16A, 16B or 16C are typically used where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for only one direction of traffic.
12. Where placement of dike is required with MGS, see Standard Plan A77N4 for dike positioning details.
13. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
14. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
15. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R3

2018 STANDARD PLAN A77R3

1-29-18

Return to Table of Contents

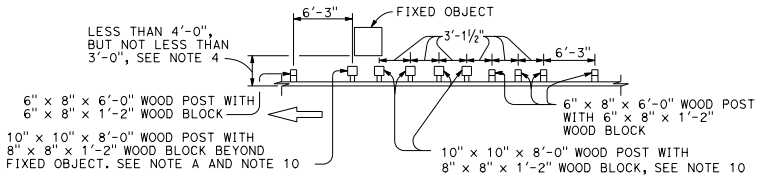
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

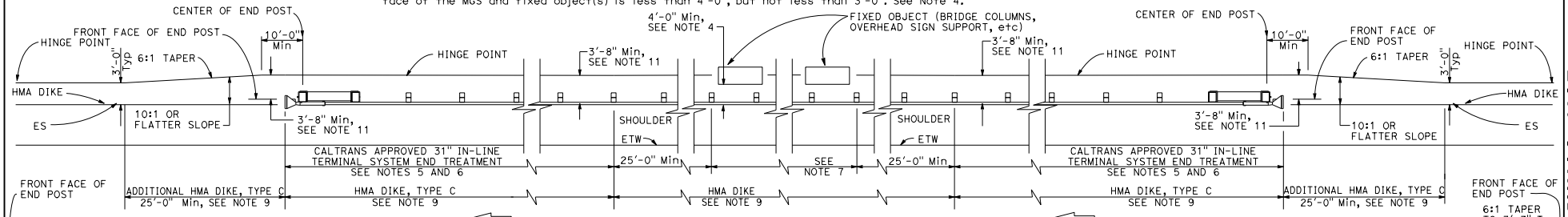
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed object(s).

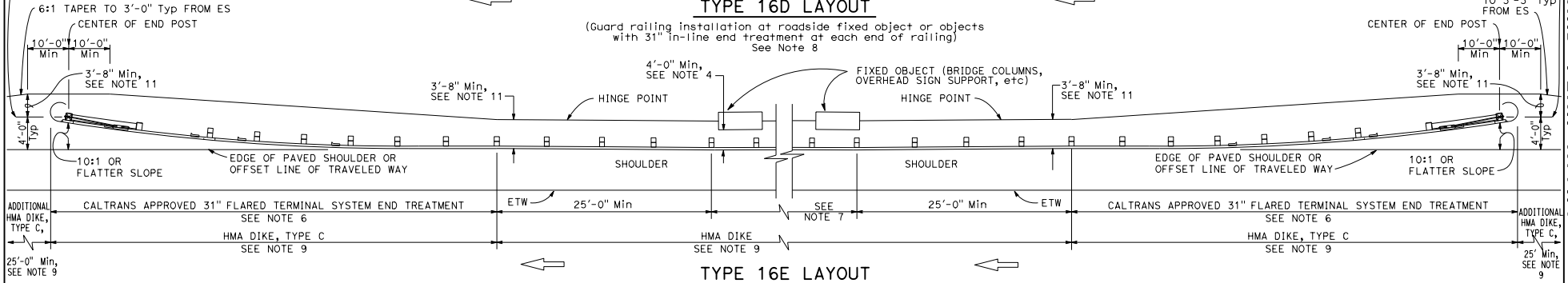
STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

Use strengthened MGS sections with layout Types 16D or 16E where minimum clearance between the face of the MGS and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



TYPE 16D LAYOUT

(Guard railing installation at roadside fixed object or objects with 31" in-line end treatment at each end of railing) See Note 8



TYPE 16E LAYOUT

(MGS installation at roadside fixed object or objects with 31" flared end treatment at each end of railing) See Note 8

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood line posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing at 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object". on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system to be used will be shown on the Project Plans.
7. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3", except as specified in Note 4.
8. Layout Types 16D through 16L, shown on the A77R Series of Standard Plans, are typically used where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for both directions of traffic.
9. Where placement of dike is required with MGS, see Standard Plan A77N4 for dike positioning details.
10. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic block may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
11. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

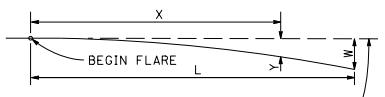
MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R4

1-29-18

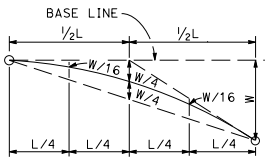
Return to Table of Contents



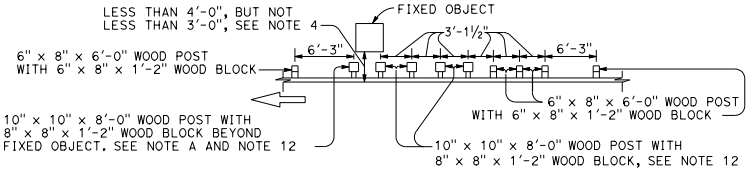
$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



TYPICAL PARABOLIC LAYOUT



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed object(s).

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

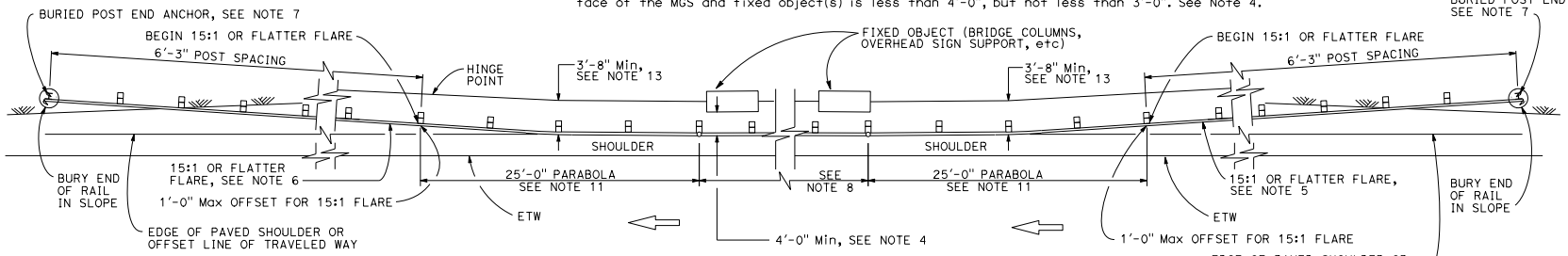
Randell D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

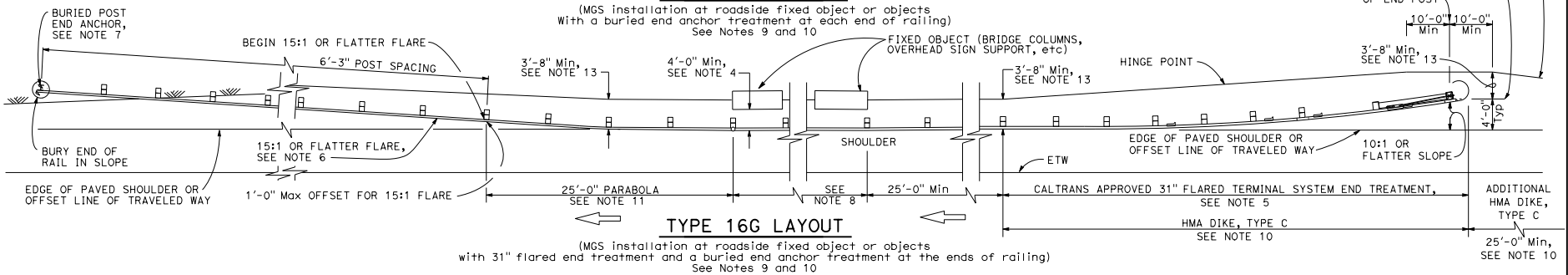
STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

Use strengthened MGS sections with layout Types 16F or 16G where minimum clearance between the face of the MGS and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



TYPE 16F LAYOUT

(MGS installation at roadside fixed object or objects With a buried end anchor treatment at each end of railing) See Notes 9 and 10



TYPE 16G LAYOUT

(MGS installation at roadside fixed object or objects with 31" flared end treatment and a buried end anchor treatment at the ends of railing) See Notes 9 and 10

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 8" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing at 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. The type of 31" terminal system to be used will be shown on the Project Plans.
6. The 15:1 or flatter flare for the buried post anchor is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
7. For details of the Buried Post End Anchor, see Standard Plan A77T2.
8. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3", except as specified in Note 4.
9. Layout Types 16D through 16L, shown on the A77R Series of Standard Plans, are typically used on highways where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for both directions of traffic.
10. Where placement of dike is required with MGS, see Standard Plan A77N4 for dike positioning details.
11. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
12. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
13. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R5

1-29-18

2018 STANDARD PLAN A77R5

Return to Table of Contents

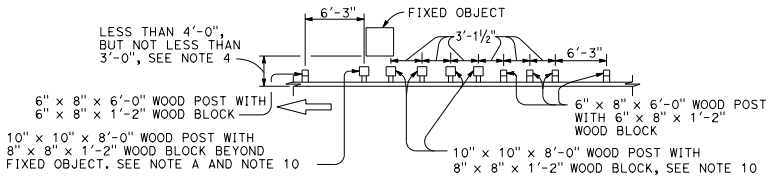
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

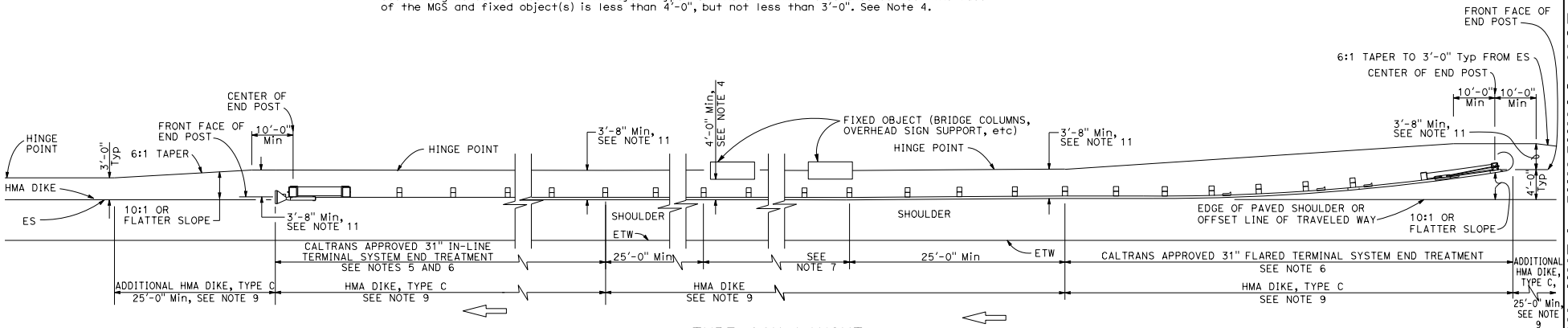
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed object(s).

STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

Use strengthened MGS sections with layout Type 16H where minimum clearance between the face of the MGS and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



TYPE 16H LAYOUT

(MGS installation at roadside fixed object or objects with 31" flared end treatment and 31" in-line end treatment at the ends of railing) See Note 8

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing at 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system to be used will be shown on the Project Plans.
7. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3", except as specified in Note 4.
8. Layout Types 16D through 16L, shown on the A77R Series of Standard PLans, typically used where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for both directions of traffic.
9. Where placement of dike is required with MGS, see Standard Plan A77N4 for dike positioning details.
10. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
11. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

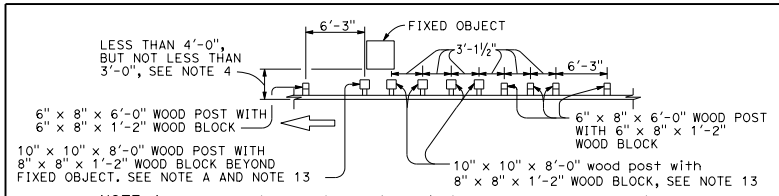
MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R6

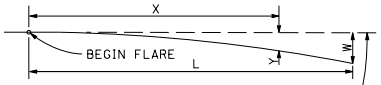
1-29-18

Return to Table of Contents



NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed object(s).

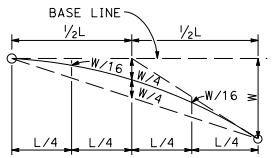
STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT



$Y = \frac{WX^2}{L^2}$

Y = OFFSET FROM BASE LINE
W = MAXIMUM OFFSET
X = DISTANCE ALONG BASE LINE
L = LENGTH OF FLARE

PARABOLIC FLARE OFFSETS



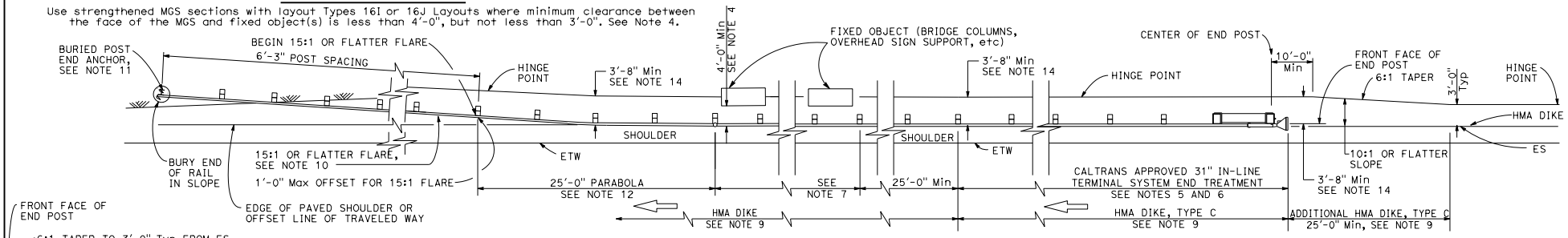
TYPICAL PARABOLIC LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Randall D. Hiatt No. C50200 Exp. 6-30-19 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

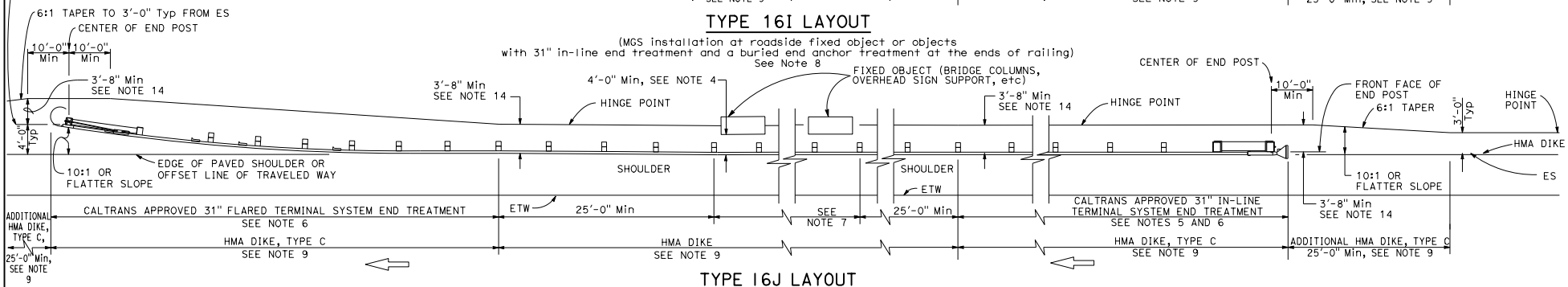
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

Use strengthened MGS sections with layout Types 16I or 16J Layouts where minimum clearance between the face of the MGS and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



TYPE 16I LAYOUT

(MGS installation at roadside fixed object or objects with 31" in-line end treatment and a buried end anchor treatment at the ends of railing) See Note 8



TYPE 16J LAYOUT

(MGS installation at roadside fixed object or objects with a 31" in-line end treatment and a 31" flared end treatment at the ends of railing) See Note 8

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing at 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system to be used will be shown on the Project Plans.
7. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3", except as specified in Note 4.
8. Layout Types 16D through 16L, shown on the A77R Series of Standard Plans, are typically used where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for both directions of traffic.
9. Where placement of dike is required with guard railing, see Standard Plan A77N4 for dike positioning details.
10. The 15:1 or flatter flare for the buried post anchor is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
11. For details of Buried Post End Anchor, see Standard Plan A77T2.
12. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
13. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
14. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R7

1-29-18

2018 STANDARD PLAN A77R7

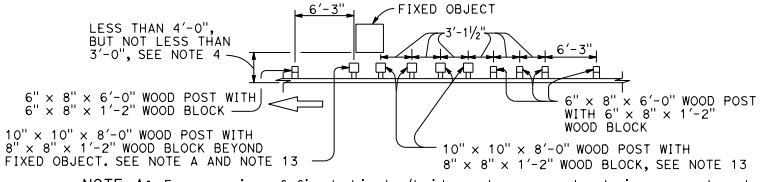
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

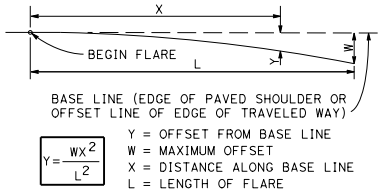
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



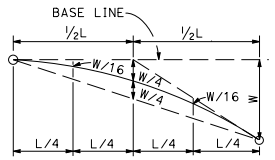
NOTE A: For a series of fixed objects (bridge columns, overhead sign supports, etc.) additional 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood blocks at 3'-1½" center to center spacing are to be used between fixed object(s).

STRENGTHENED MIDWEST GUARDRAIL SYSTEM SECTIONS FOR FIXED OBJECT

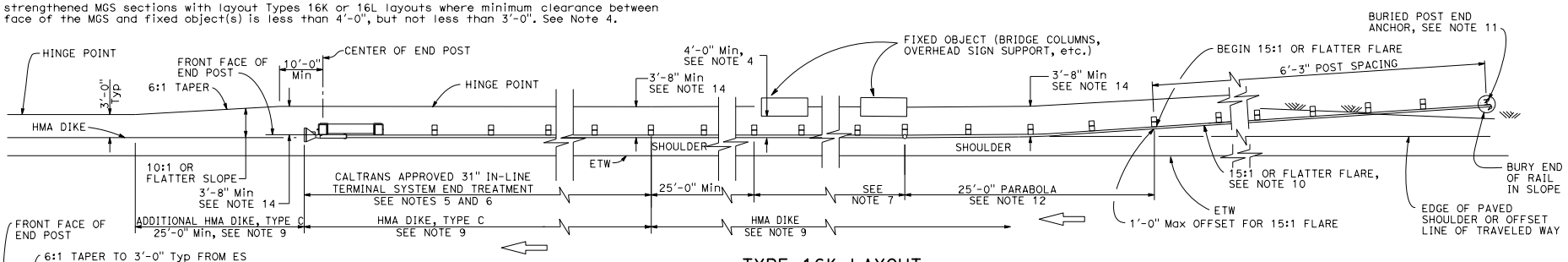
Use strengthened MGS sections with layout Types 16K or 16L layouts where minimum clearance between the face of the MGS and fixed object(s) is less than 4'-0", but not less than 3'-0". See Note 4.



PARABOLIC FLARE OFFSETS

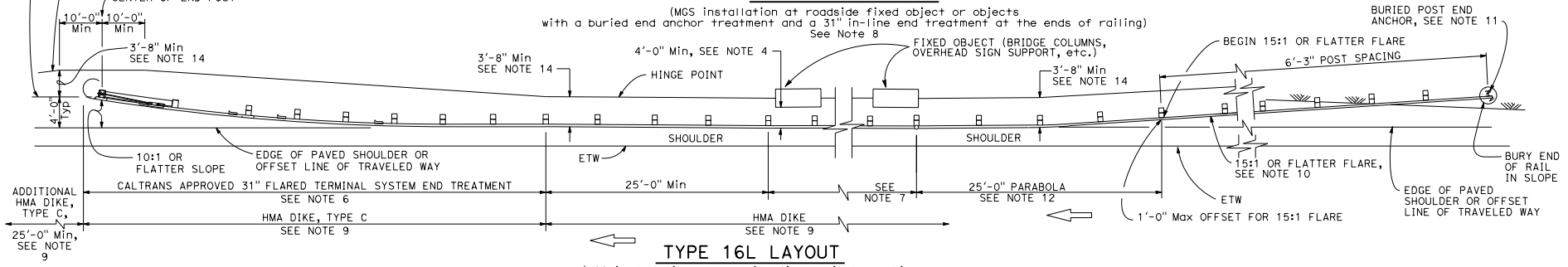


TYPICAL PARABOLIC LAYOUT



TYPE 16K LAYOUT

(MGS installation at roadside fixed object or objects with a buried end anchor treatment and a 31" in-line end treatment at the ends of railing) See Note 8



TYPE 16L LAYOUT

(MGS installation at roadside fixed object or objects with a buried end anchor treatment and a 31" flared end treatment at the ends of railing) See Note 8

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A77L1, A77L2, A77N1, A77N2 and A77M1.
2. MGS post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-2" wood blocks. W6 x 8.5 or W6 x 9 steel posts, 6'-0" in length, with 6" x 8" x 1'-2" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-2" wood blocks where applicable and when specified.
4. A 4'-0" minimum clearance is required between the face of the railing and the face of a fixed object located directly behind MGS sections with post spacing at 6'-3". Construct MGS as shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Objects" on this plan, where the clearance between the face of the railing and the face of a fixed object is less than 4'-0", but not less than 3'-0". Where the clearance is less than 3'-0", a concrete wall or barrier should be constructed to shield the fixed object(s).
5. 31" in-line terminal system end treatments are used where site conditions will not accommodate a 31" flared end treatment.
6. The type of 31" terminal system to be used will be shown on the Project Plans.
7. As site conditions dictate, construct additional MGS to shield fixed object(s). Additional MGS length equal to multiples of 12'-6". Post spacing at 6'-3", except as specified in Note 4.
8. Layout Types 16D through 16L, shown on the A77R Series of Standard Plans are typically used where MGS is recommended to shield roadside fixed object(s) and a crashworthy 31" end treatment is required for both directions of traffic.
9. Where placement of dike is required with MGS, see Standard Plan A77N4 for dike positioning details.
10. The 15:1 or flatter flare for the buried post anchor is based on the edge of the paved shoulder or offset line of edge of the traveled way. The length of MGS within the 15:1 or flatter flare is based on site conditions and should be a length equal to multiples of 12'-6".
11. For details of Buried Post End Anchor, see Standard Plan A77T2.
12. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.
13. W6 x 15 steel post, 8'-0" in length, with 8" x 8" x 1'-2" notched wood block or notched recycled plastic blocks may be used in place of the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-2" wood block shown in the detail "Strengthened Midwest Guardrail System Sections for Fixed Object".
14. Use this offset for 8" block. For 12" block use minimum 4'-0" offset.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR ROADSIDE FIXED OBJECTS

NO SCALE

A77R8

1-29-18

Return to Table of Contents

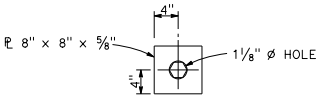
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

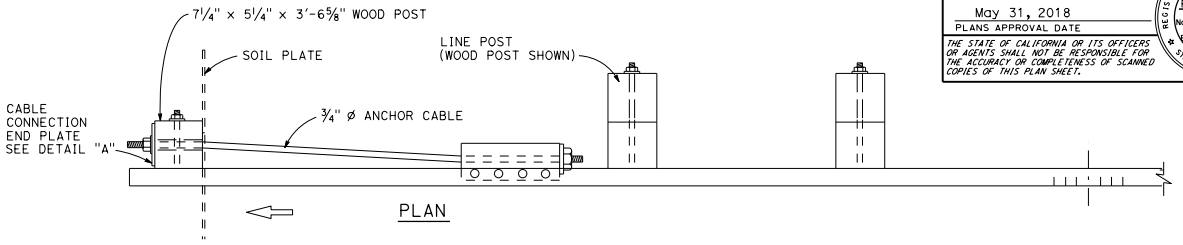
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

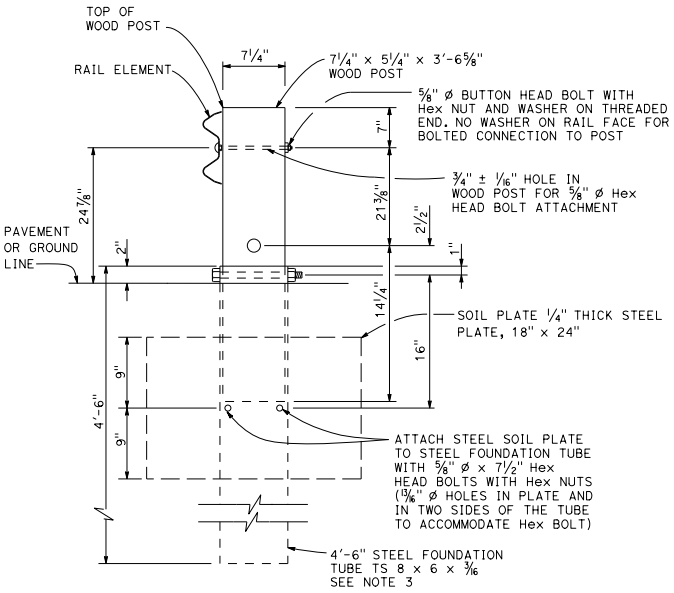
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



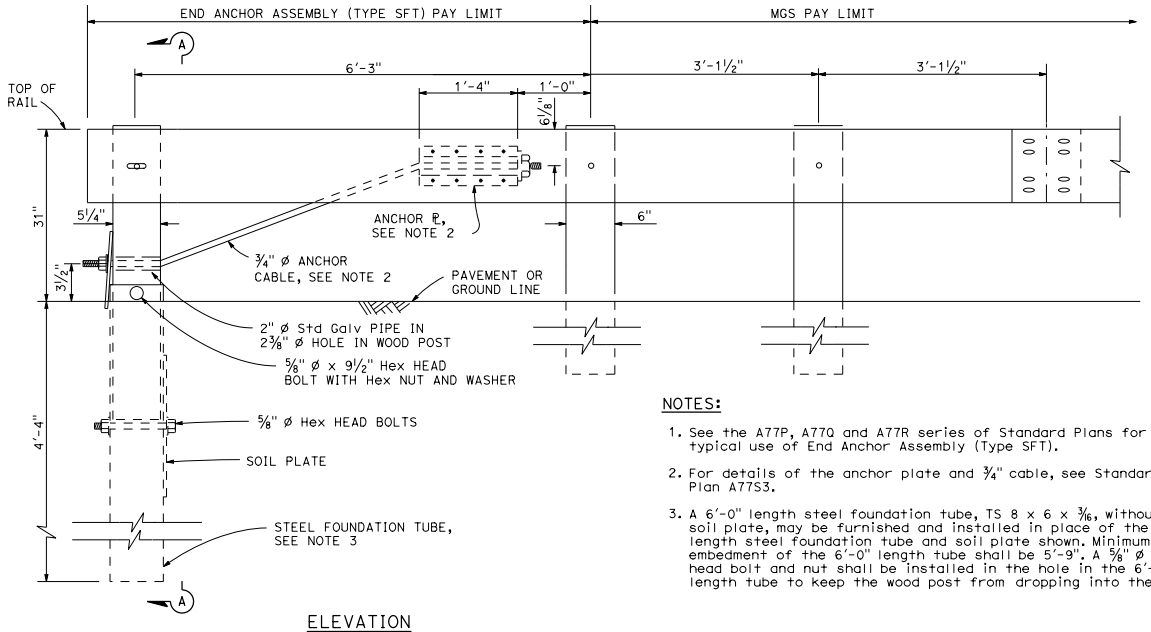
DETAIL "A"
CABLE CONNECTION
END PLATE



PLAN



SECTION A-A



ELEVATION

END ANCHOR
ASSEMBLY (TYPE SFT)
See Note 1

NOTES:

1. See the A77P, A77Q and A77R series of Standard Plans for typical use of End Anchor Assembly (Type SFT).
2. For details of the anchor plate and 3/4" cable, see Standard Plan A77S3.
3. A 6'-0" length steel foundation tube, TS 8 x 6 x 5/16, without a soil plate, may be furnished and installed in place of the 4'-6" length steel foundation tube and soil plate shown. Minimum embedment of the 6'-0" length tube shall be 5'-9". A 5/8" ø Hex head bolt and nut shall be installed in the hole in the 6'-0" length tube to keep the wood post from dropping into the tube.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM
END ANCHOR ASSEMBLY
(TYPE SFT)

NO SCALE

A77S1

1-29-18

2018 STANDARD PLAN A77S1

Return to Table of Contents

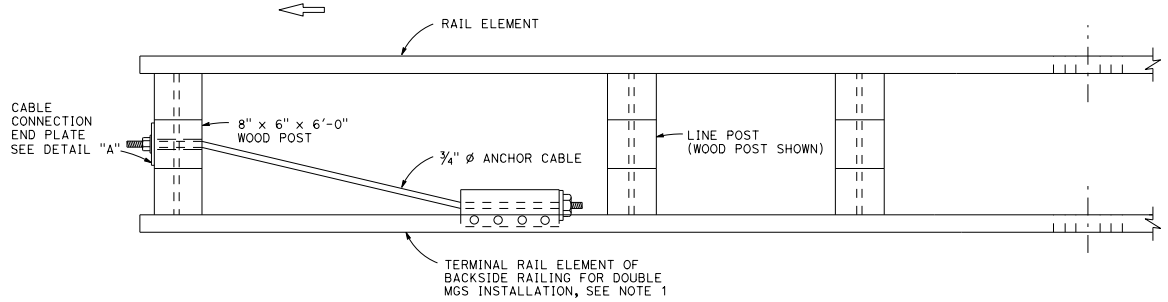
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

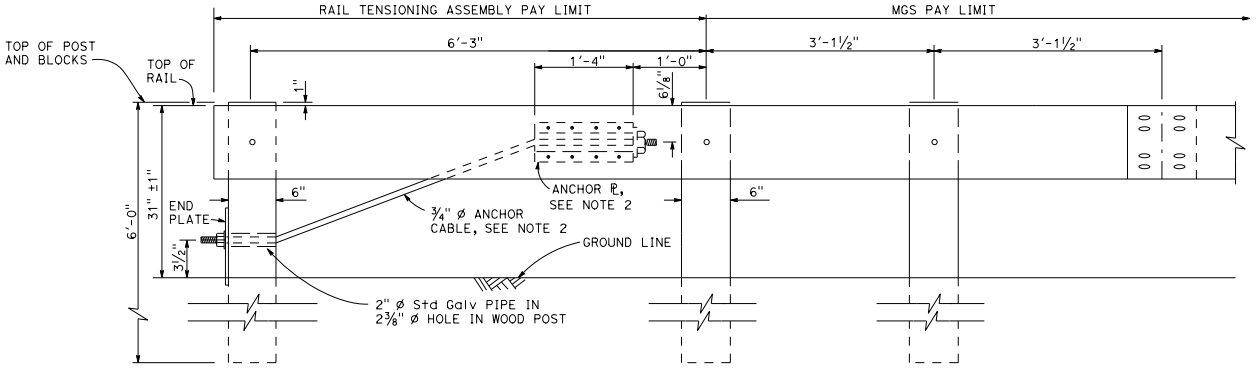
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



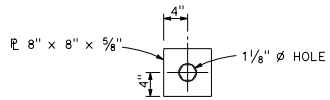
PLAN



ELEVATION
RAIL TENSIONING ASSEMBLY
See Note 1

NOTES:

1. See Standard Plans A77Q3 and A77R1 for typical use of rail tensioning assembly.
2. For details of the anchor plate and ¾" cable, see Standard Plan A77S3.



DETAIL "A"
CABLE CONNECTION END PLATE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM
RAIL TENSIONING ASSEMBLY

NO SCALE

A77S2

1-29-18

2018 STANDARD PLAN A77S2

100

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

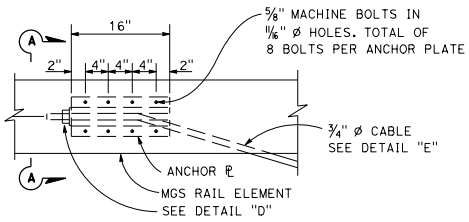
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

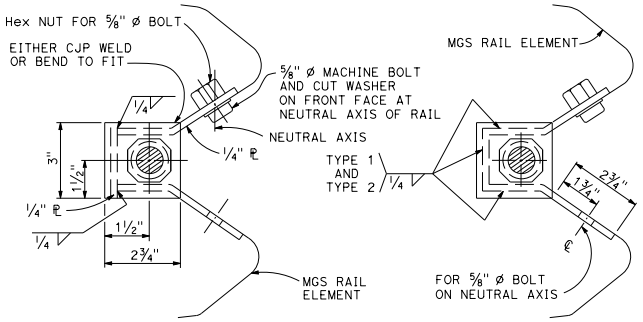
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

See Standard Plans A77S1, A77S2 and A77T1 for typical use of anchor cable and anchor plate.



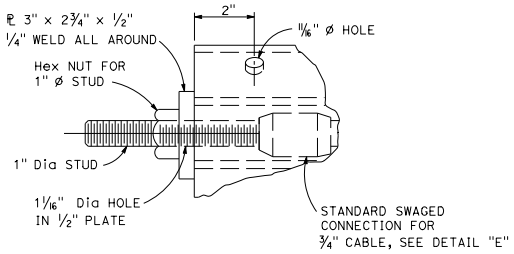
ANCHOR PLATE DETAIL
(MGS shown, TBB similar)



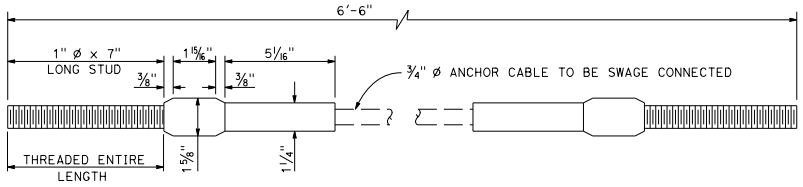
NOTE:
Dimensioning applies to both types.

SECTION A-A
(ALTERNATIVE TYPE 1)

SECTION A-A
(ALTERNATIVE TYPE 2)



DETAIL "D"



ANCHOR CABLE WITH SWAGED FITTING AND STUD
DETAIL "E"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

METAL RAILING ANCHOR CABLE AND ANCHOR PLATE DETAILS

NO SCALE

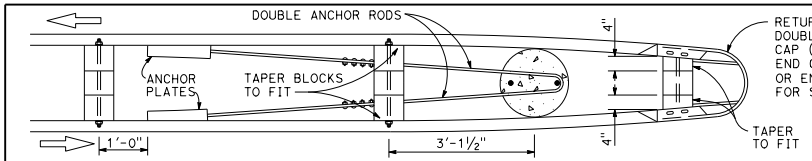
A77S3

1-29-18

2018 STANDARD PLAN A77S3

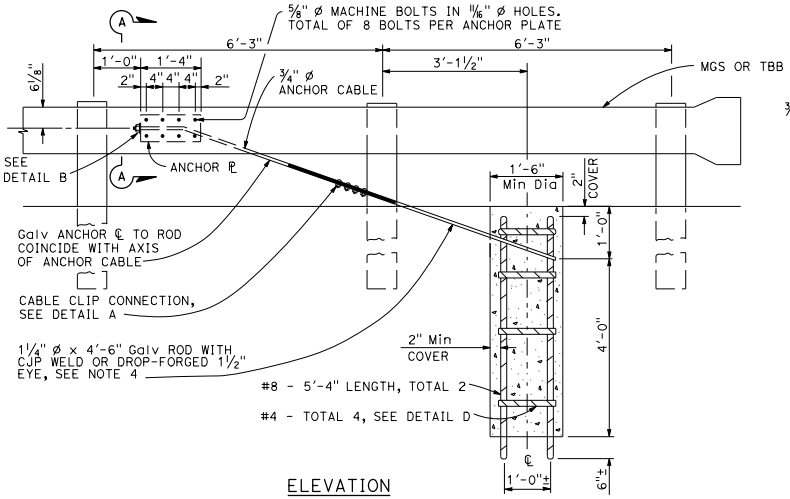
101

Return to Table of Contents



PLAN

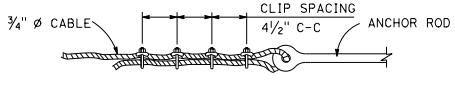
See Note 4



ELEVATION

END ANCHOR ASSEMBLY (TYPE CA)

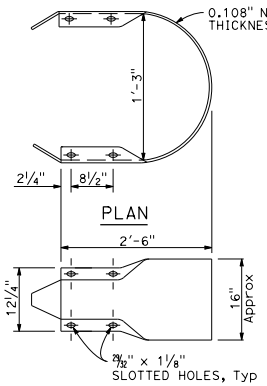
(Wood post, MGS shown, details similar for Thrie Beam Barrier.)



"U" bolts of clip on short end of cable only
"U" bolts tightened to 50 ft/lb torque

DETAIL A

CABLE CLIP CONNECTION



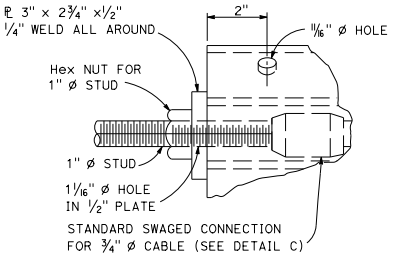
PLAN

ELEVATION

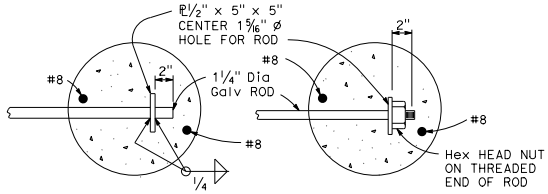
RETURN CAP (TYPE A)

NOTES:

1. For typical use of this type of end anchor, see Standard Plan A78E2.
2. Anchor cable to be parallel to railing for straight runs of rail. Anchor cable may have angle point at anchor plate if railing is curved.
3. Anchor rod hooks to be in contact with anchor reinforcement when concrete is placed. Wire ties may be used to position anchor rods.
4. Single sided railing installations require only one anchor plate, anchor rod and anchor cable. Single sided railing will not have a rail element or blockouts on backside of line posts as shown in the plan view.

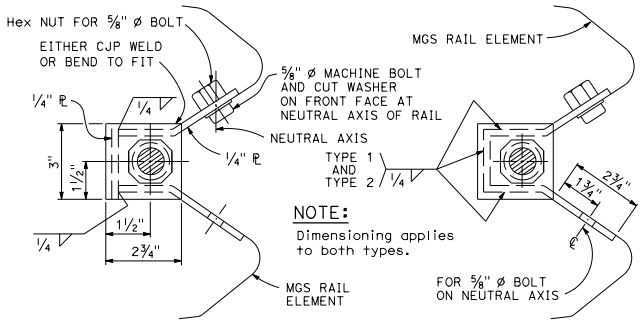


DETAIL B



OPTIONAL ENDS ON SINGLE ANCHOR ROD

(Not to be used for double anchors)



NOTE:

Dimensioning applies to both types.

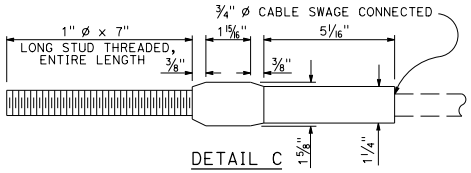
SECTION A-A

(Alternative Type 1)

SECTION A-A

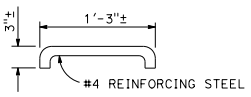
(Alternative Type 2)

ANCHOR PLATE DETAILS



DETAIL C

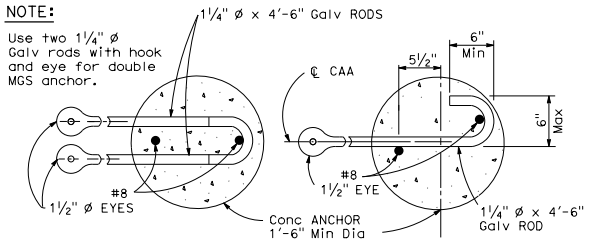
ANCHOR CABLE WITH SWAGED FITTING AND STUD



DETAIL D

NOTE:

Use two 1¼" ø Galv rods with hook and eye for double MGS anchor.



DOUBLE ANCHOR SINGLE ANCHOR

ANCHOR RODS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

METAL RAILING END ANCHOR ASSEMBLY (TYPE CA)

NO SCALE

A77T1

1-29-18

2018 STANDARD PLAN A77T1

Return to Table of Contents

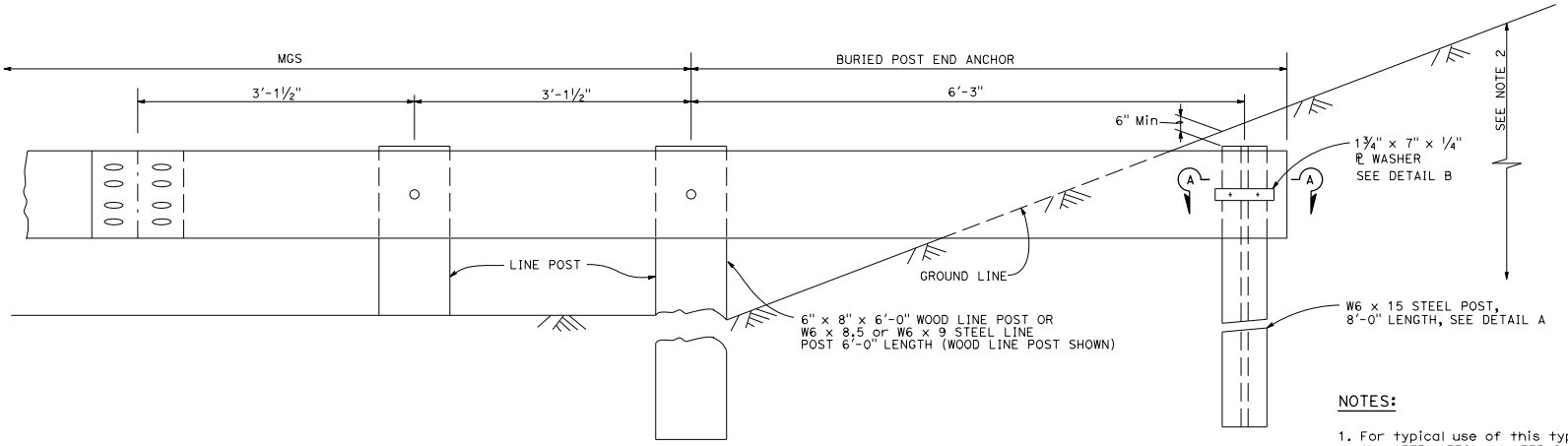
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

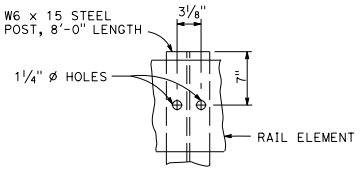


BURIED POST END ANCHOR

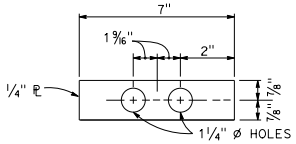
See Note 2

NOTES:

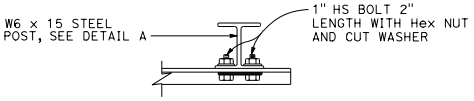
1. For typical use of this type of end anchor with MGS see the A77P, A77Q and A77R Series of the Standard Plans.
2. The buried post end anchor shall only be constructed at those locations where the slope perpendicular to the roadway is non-traversable.



DETAIL A



DETAIL B



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM
BURIED POST END ANCHOR

NO SCALE

A77T2

1-29-18

2018 STANDARD PLAN A77T2

Return to Table of Contents

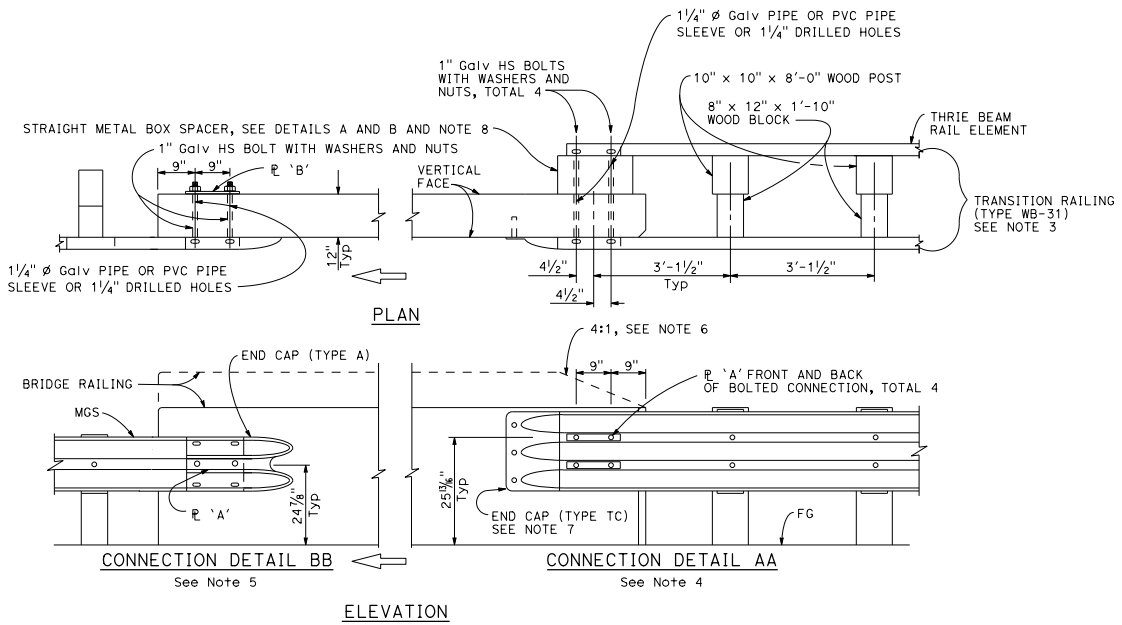
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

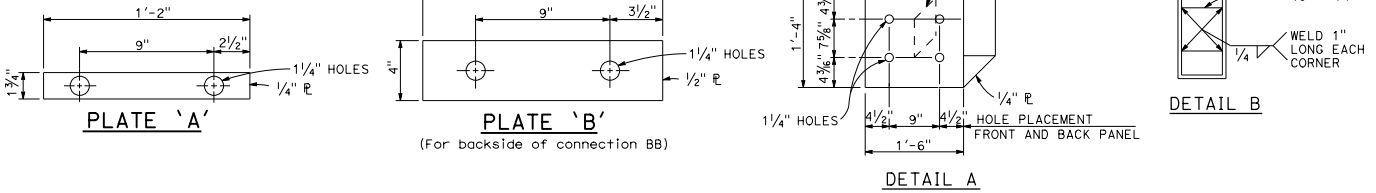
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

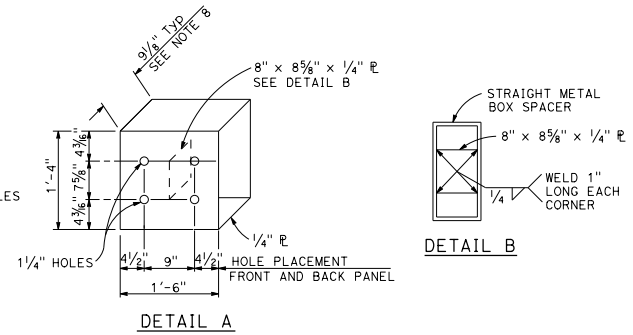


MIDWEST GUARDRAIL SYSTEM CONNECTION TO BRIDGE RAILING WITHOUT SIDEWALK

NOTES:

1. See Standard Plan A77U2 for additional connection details to bridges without sidewalks.
2. Additional details of posts, blocks and hardware are shown on Standard Plans A77M1, A77N1 and A77N2.
3. For additional details of Transition Railing (Type WB-31), see Standard Plan A77U4. Transition Railing (Type WB-31) transitions the 12 gauge MGS railing section to a heavier gauge nested thrie beam railing section which is connected to the concrete bridge railing.
4. For typical use of Connection Detail AA, see Layout Types 12A and 12B on Standard Plan A77Q1, Layout Types 12C and 12D on Standard Plan A77Q2, and Layout Type 12E on Standard Plan A77Q3.
5. For typical use of Connection Detail BB, see Layout Type 12D (structure departure railing connection) on Standard Plan A77Q2 and Layout Type 12DD on Standard Plan A77Q5.
6. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 1" at Connection Detail AA, taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam rail.
7. For details of End Cap (Type TC), see Standard Plan A77U4.
8. See Standard Plan A77U4 for additional details regarding depth dimension for straight metal box spacer.





STRAIGHT METAL BOX SPACER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS DETAILS No. 1

NO SCALE

A77U1

2018 STANDARD PLAN A77U1

1-29-18

Return to Table of Contents

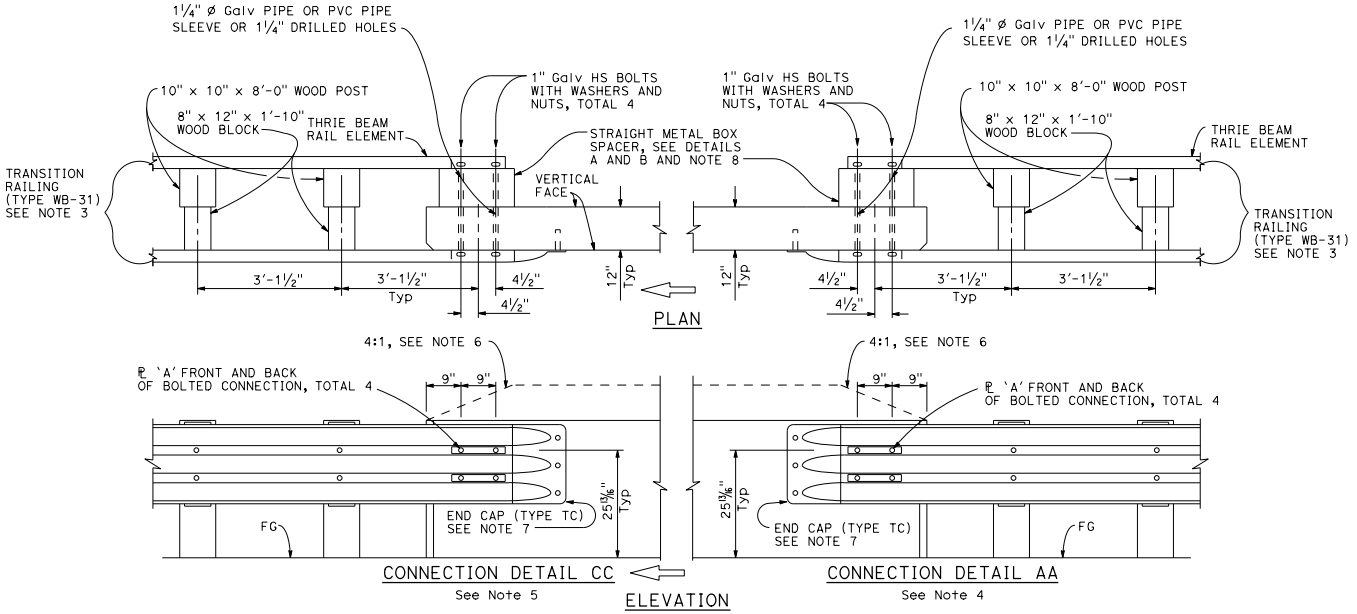
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — State of California

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



MIDWEST GUARDRAIL SYSTEM CONNECTION TO BRIDGE RAILING WITHOUT SIDEWALK

NOTES:

1. See Standard Plan A77U1 for additional connection details to bridges without sidewalks.
2. Additional details of posts, blocks and hardware are shown on Standard Plans A77M1, A77N1 and A77N2.
3. For additional details of Transition Railing (Type WB-31), see Standard Plan A77U4. Transition Railing (Type WB-31) transitions the 12 gauge MGS railing section to a heavier gauge nested thrie beam railing section which is connected to the concrete bridge railing.
4. For typical use of Connection Detail AA, see Layout Types 12A and 12B on Standard Plan A77Q1, Layout Types 12C and 12D on Standard Plan A77Q2, and Layout Type 12E on Standard Plan A77Q3.
5. For typical use of Connection Detail CC, see Layout Types 12AA and 12BB on Standard Plan A77Q4 and Layout Type 12CC on Standard Plan A77Q5.
6. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 1" at Connection Detail AA and connection Detail CC, taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam railing.
7. For details of End Cap (Type TC), see Standard Plan A77U4.
8. See Standard Plan A77U4 for additional details regarding depth dimension for straight metal box spacer.

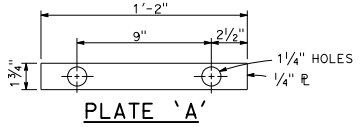


PLATE 'A'

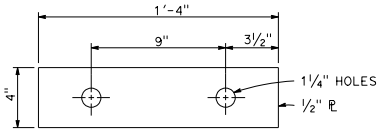
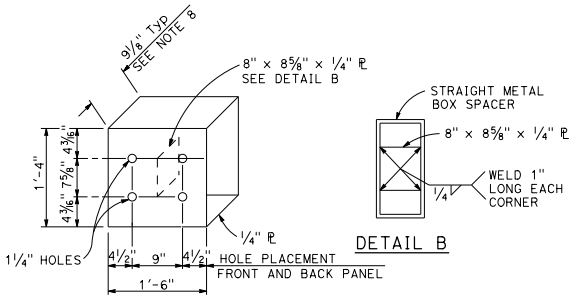


PLATE 'B'
(For backside of connection BB)



DETAIL A

STRAIGHT METAL BOX SPACER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS DETAILS No. 2

NO SCALE

A77U2

2018 STANDARD PLAN A77U2

1-29-18

Return to Table of Contents

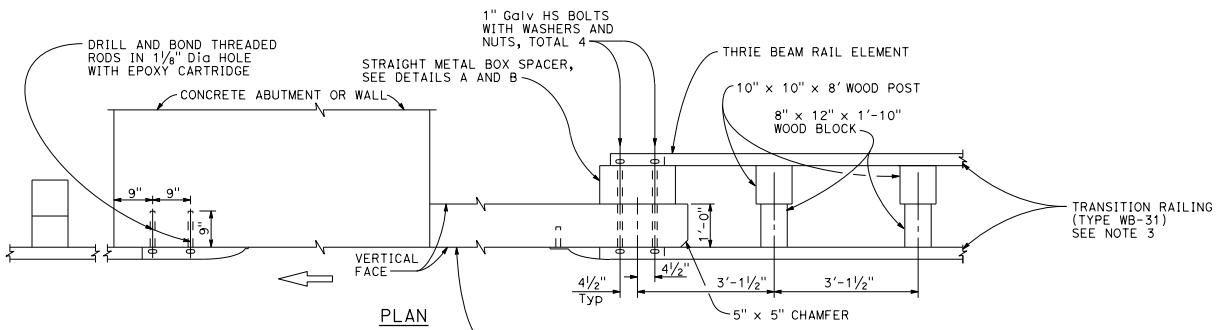
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

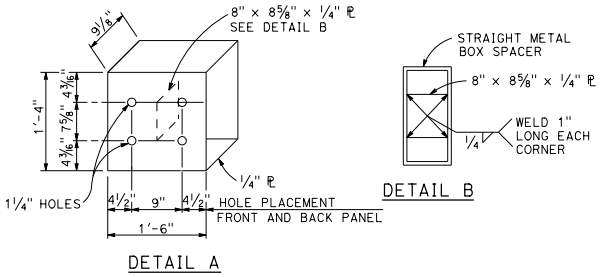
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



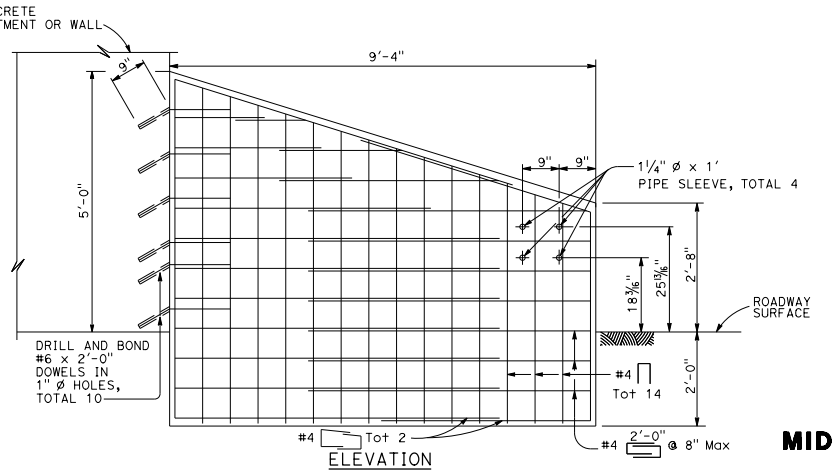
MIDWEST GUARDRAIL SYSTEM CONNECTION TO ABUTMENT OR WALL

NOTES:

1. These connection details apply to abutments and walls.
2. Additional details of posts, blocks and hardware are shown on Standard Plans A77M1, A77N1 and A77N2.
3. For additional details of Transition Railing (Type WB-31), see Standard Plan A77U4. Transition Railing (Type WB-31) transitions the 12 gauge MGS railing section to a heavier gauge nested thrie beam railingsection which is connected to the concrete anchor block.
4. For typical use of Connection Details DD, see Layout Types 12A and 12B on Standard Plan A77Q1 and Layout Types 12C and 12D on Standard Plan A77Q2.
5. For typical use of Connection Detail EE, see Layout Type 12D on Standard Plan A77Q2 and Layout Type 12DD on Standard Plan A77Q5.

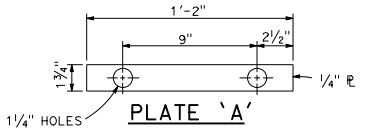


STRAIGHT METAL BOX SPACER



ANCHOR BLOCK FOR TRANSITION RAILING CONNECTION

DETAIL C



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM CONNECTIONS TO ABUTMENTS AND WALLS

NO SCALE

A77U3

2018 STANDARD PLAN A77U3

1-29-18

Return to Table of Contents

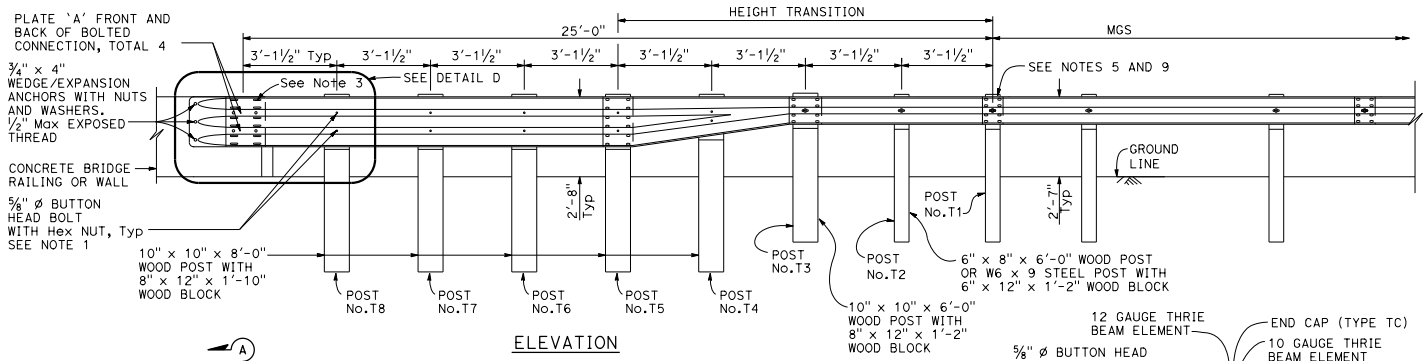
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

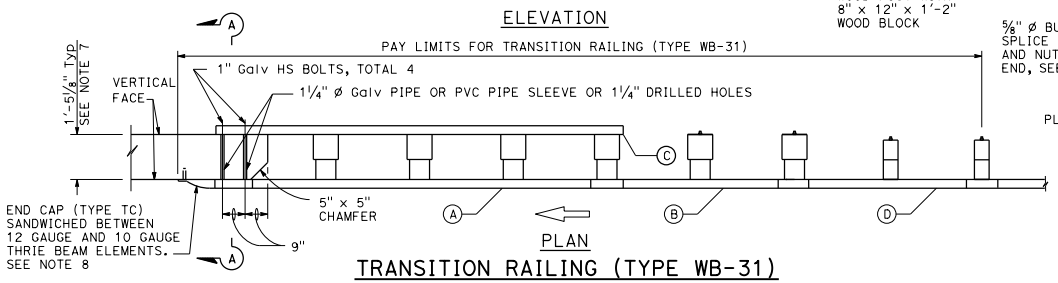
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



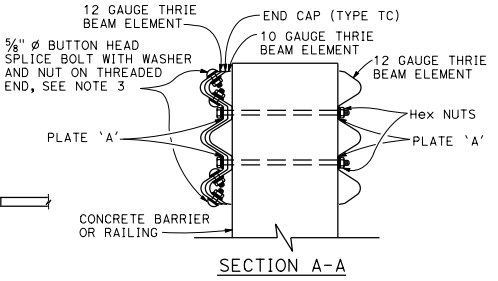
ELEVATION



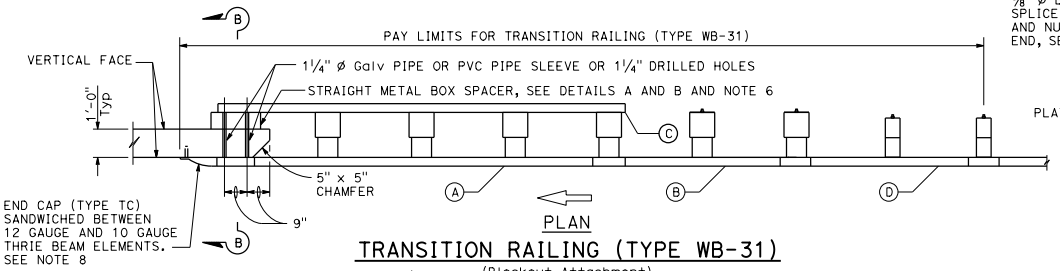
PLAN

TRANSITION RAILING (TYPE WB-31)

(No Blockout Attachment)



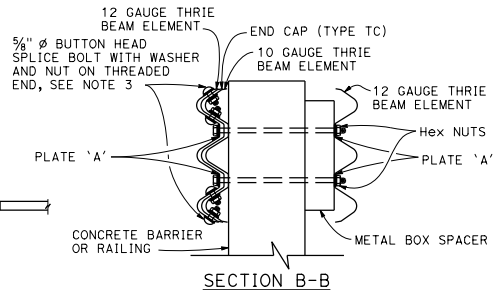
SECTION A-A



PLAN

TRANSITION RAILING (TYPE WB-31)

(Blockout Attachment)

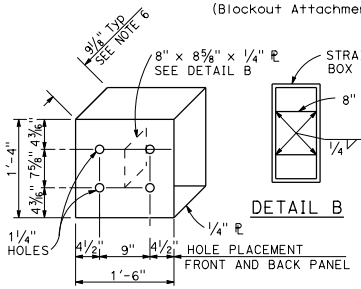


SECTION B-B

LEGEND:

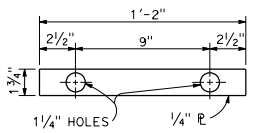
- (A) NESTED THRIE BEAM ELEMENTS (ONE 12 GAUGE ELEMENT NESTED OVER ONE 10 GAUGE ELEMENT).
- (B) ONE ASYMMETRICAL 10 GAUGE "W" BEAM TO THRIE BEAM ELEMENT.
- (C) ONE 12 GAUGE THRIE BEAM ELEMENT.
- (D) ONE 10 GAUGE "W" BEAM RAIL ELEMENT (7'-3½"LENGTH)

10 GAUGE = 0.138" THICK
12 GAUGE = 0.108" THICK

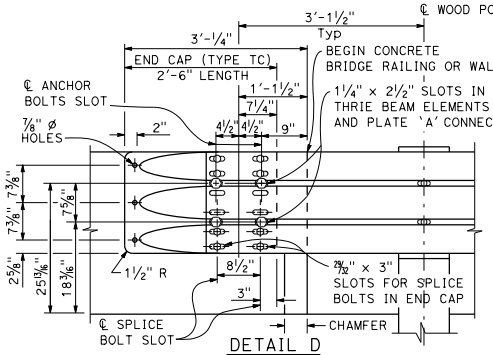


DETAIL A

DETAIL B



DETAIL C



DETAIL D

STRAIGHT METAL BOX SPACER

PLATE 'A'

NOTES:

1. Use ⅝" ø Button head bolts and hex nuts for connections to posts. No washer on rail face for bolted connections to post.
2. The nested rail elements, end cap, and 'W' beam to thrie beam element may be spliced together prior to bolting the elements to the wood post and concrete barrier or railing.
3. Exterior splice bolt holes for rail element splices at Post No. T5 and the connection to the concrete barrier or railing shall be the standard $^{29}/_{32}$" x 1⅛" slot size. Interior splice bolt holes at these locations may be increased up to 1¼" ø. Only the top 4 and the bottom 4 splice bolts with washers and nuts are required for rail splices at Post No. T5 and the connection to the concrete barrier or railing.
4. The top elevation of Posts No. T2 through No. T7 shall not project more than 1" above the top elevation of the rail element.
5. Typically, the railing connected to Transition Railing (Type WB-31) will be either standard railing section of MGS with height transition ratio of 150:1 or a Caltrans approved 31" end treatment attached to Post No. T1.
6. The depth of the metal box spacer varies from the 9⅛" to 1½" and is dependent on the width of the concrete railing or wall. The combined dimension for the depth of the metal box spacer plus the width of railing or wall is typically 21⅛". Where the space between the backside of the concrete railing or wall and the rear thrie beam element is less than 1½", metal plates similar to Plate 'A' are to be used as spacers.
7. Where the width of the concrete railing or wall is greater than 17⅛", wood blocks are to be used to fill the space created between the backside of Posts No. T5 through No. T8 and the rear thrie beam element. These wood blocks shall be 8" in width and 1'-2" in length. The dimension between the front thrie beam element and the rear thrie beam element is to match the width of the concrete railing or wall.
8. End cap may be installed over 12 gauge and 10 gauge thrie beam elements where transition railing is installed on the departure end of bridge railing.
9. Conform standard railing section height to 31" at Post No. T1 using height transition ratio of 150:1.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM TRANSITION RAILING (TYPE WB-31)

NO SCALE

A77U4

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

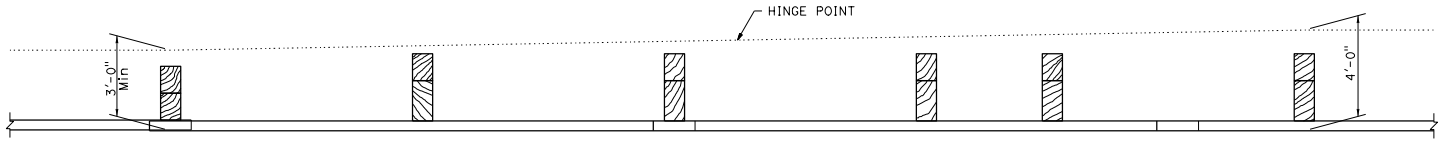
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

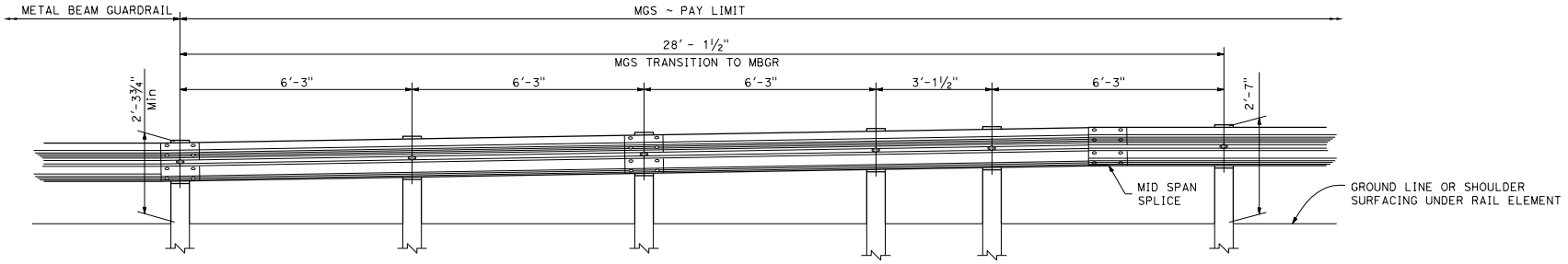
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

1. Refer to Standard Plans A77L1 and A77L2 for component details for MGS not shown on this plan.



PLAN



ELEVATION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM
TRANSITION TO METAL BEAM GUARDRAIL

NO SCALE

A77U5

1-29-18

2018 STANDARD PLAN A77U5

Return to Table of Contents

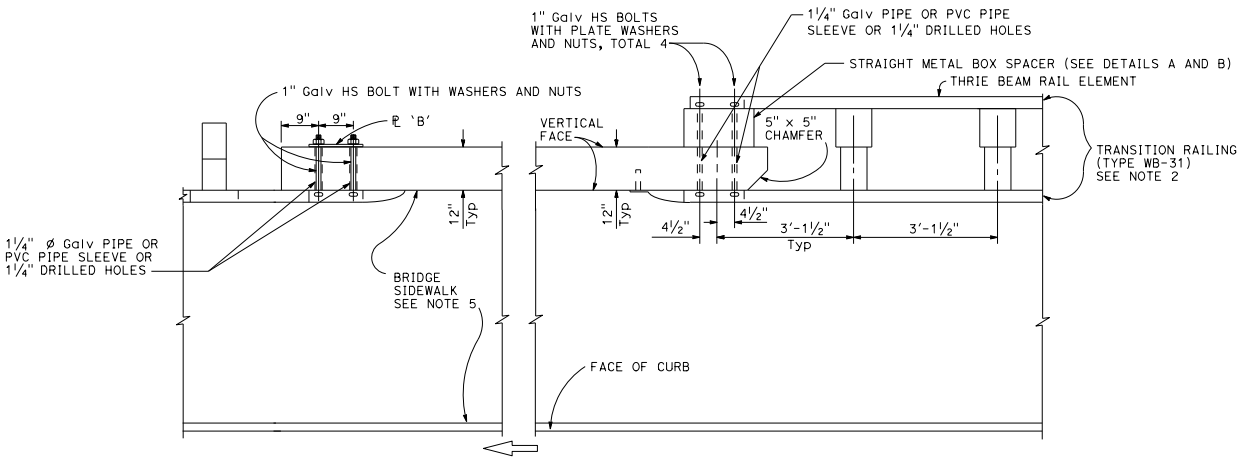
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

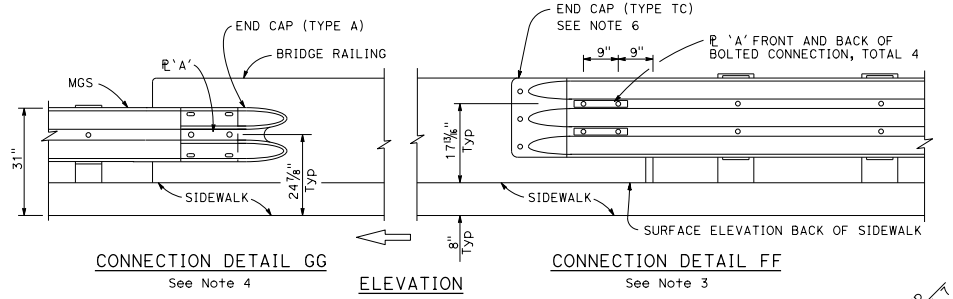
Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





MIDWEST GUARDRAIL SYSTEM CONNECTION TO BRIDGE RAILING WITH SIDEWALKS

NOTES:

1. See Standard Plan A77V2 for additional connection details to bridges with sidewalks.
2. For additional details of Transition Railing (Type WB-31), see Standard Plan A77U4. Transition Railing (Type WB-31) transitions the 12 gauge MGS railing section to a heavier gauge nested thrie beam railing section which is connected to the concrete bridge railing.
3. For typical use of Connection Detail FF, see Layout Types 12A and 12B on Standard Plan A77Q1.
4. For typical use of Connection Detail GG, see Layout Type 12D on Standard Plan A77Q2 and Layout Type 12DD on Standard Plan A77Q5.
5. Where the bridge sidewalk is not continued beyond the end of the bridge railing, the portion of the sidewalk beyond each end of the bridge railing shall be transitioned down from the top elevation of the sidewalk, for its entire width, to the finished grade of the adjacent roadbed. The longitudinal slope of each sidewalk elevation transition shall not exceed 8.33 percent.
6. For details of End Cap (Type TC), see Standard Plan A77U4.
7. See Standard Plan A77U4 for additional details regarding depth dimension for straight metal box spacer.

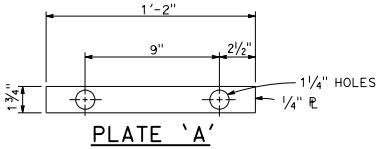


PLATE 'A'

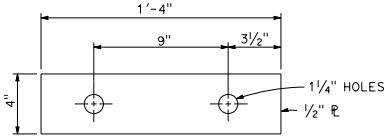
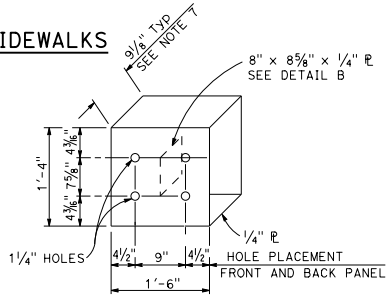
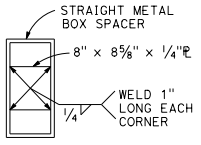


PLATE 'B'
(For backside of connection SB)



DETAIL A



DETAIL B

STRAIGHT METAL BOX SPACER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MIDWEST GUARDRAIL SYSTEM CONNECTIONS TO BRIDGE RAILINGS WITH SIDEWALKS DETAILS No. 1

NO SCALE

A77V1

2018 STANDARD PLAN A77V1

1-29-18

Return to Table of Contents

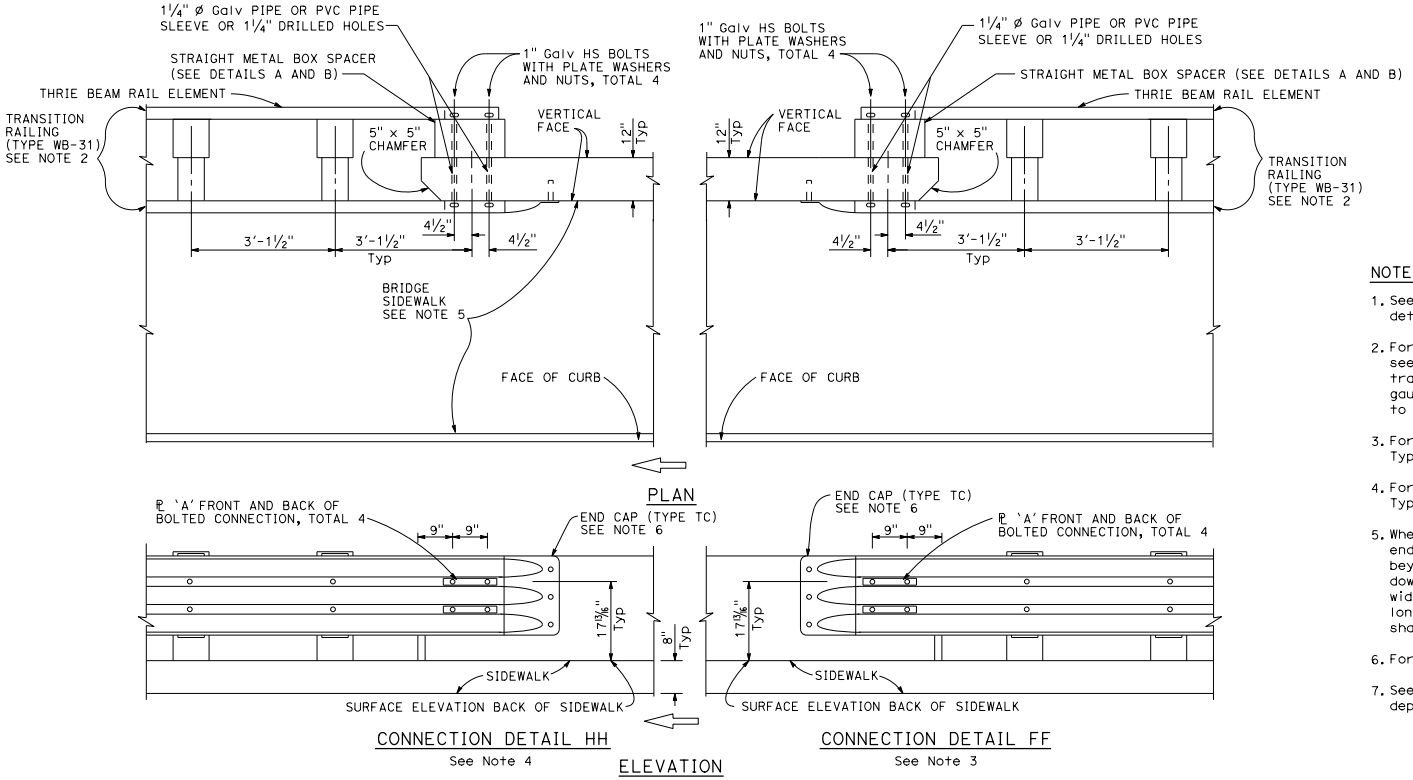
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

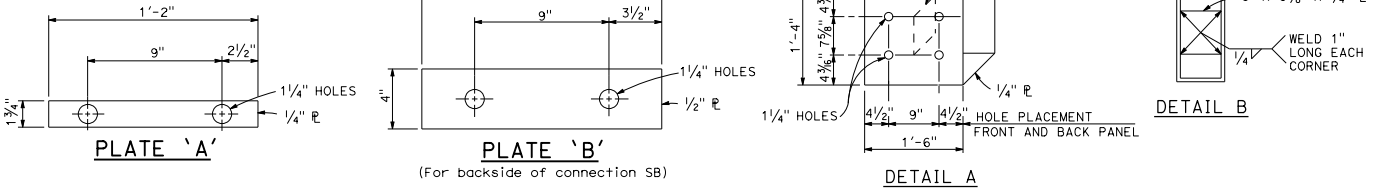
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



MIDWEST GUARDRAIL SYSTEM CONNECTION TO BRIDGE RAILING WITH SIDEWALKS

NOTES:

1. See Standard Plan A77V1 for additional connection details to bridges with sidewalks.
2. For additional details of Transition Railing (Type WB-31), see Standard Plan A77U4. Transition Railing (Type WB-31) transitions the 12 gauge MGS railing section to a heavier gauge nested thrie beam railing section which is connected to the concrete bridge railing.
3. For typical use of Connection Detail FF, see Layout Types 12A and 12B on Standard Plan A77Q1.
4. For typical use of Connection Detail HH, see Layout Types 12AA and 12BB on Standard Plan A77Q4.
5. Where the bridge sidewalk is not continued beyond the end of the bridge railing, the portion of the sidewalk beyond each end of the bridge railing shall be transitioned down from the top elevation of the sidewalk, for its entire width, to the finished grade of the adjacent roadbed. The longitudinal slope of each sidewalk elevation transition shall not exceed 8.33 percent.
6. For details of End Cap (Type TC), see Standard Plan A77U4.
7. See Standard Plan A77U4 for additional details regarding depth dimension for straight metal box spacer.



STRAIGHT METAL BOX SPACER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

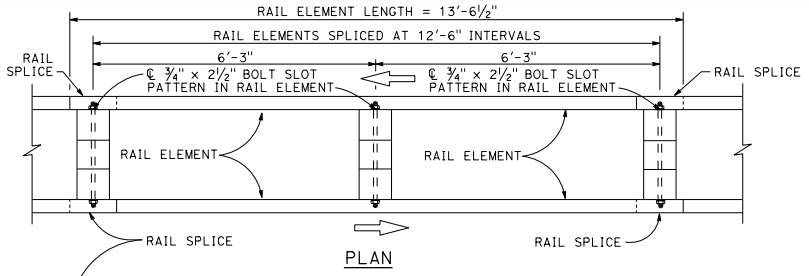
MIDWEST GUARDRAIL SYSTEM CONNECTIONS TO BRIDGE RAILINGS WITH SIDEWALKS DETAILS No. 2

NO SCALE

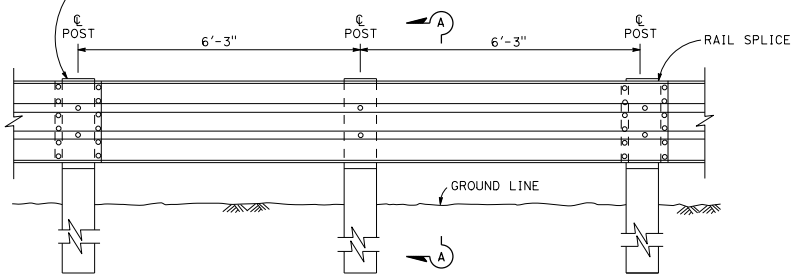
A77V2

1-29-18

Return to Table of Contents



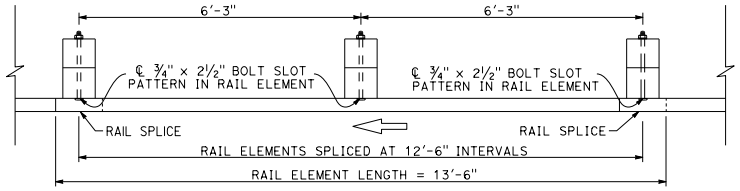
PLAN



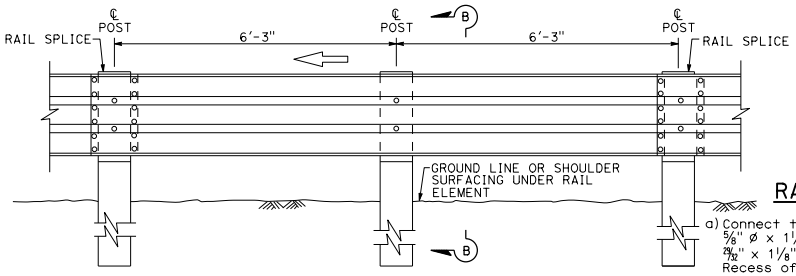
ELEVATION

DOUBLE THRIE BEAM BARRIER

(Wood post and blocks)
See Note 1



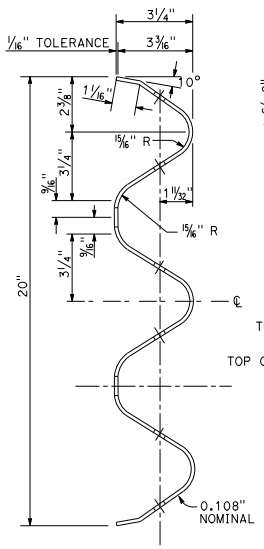
PLAN



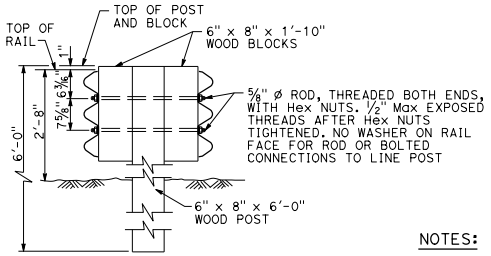
ELEVATION

SINGLE THRIE BEAM BARRIER

(Wood post and blocks)
See Note 1

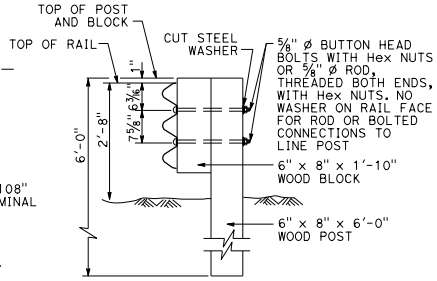


SECTION THRU RAIL ELEMENT



SECTION A-A

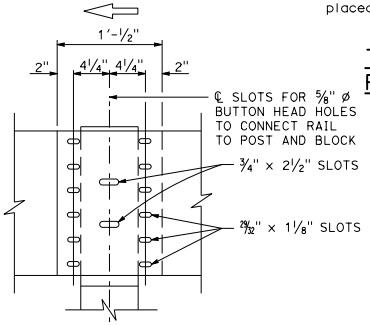
TYPICAL WOOD LINE POST INSTALLATION



Where bolts are used, install so that the threaded end of the bolts and nuts are placed away from traffic side of rail.

SECTION B-B

TYPICAL WOOD LINE POST INSTALLATION



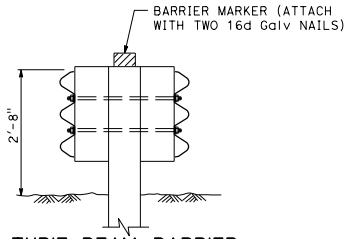
ELEVATION

RAIL ELEMENT SPLICE DETAIL

a) Connect the overlapped ends of the thrie beam rail elements with ⅝" ø x 1¼" button head oval shoulder bolts inserted into the 29/32" x 1⅛" slots and bolted together with ⅝" ø recessed hex nuts. Recess of hex nut points toward rail element. A total of 12 bolts and nuts are to be used at each rail splice connection.

b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).

c) Where end cap is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used. Where a return cap is to be attached to the ends of rail elements, a total of 8 of the above described splice bolts and nuts are to be used.



THRIE BEAM BARRIER DELINEATION

See Note 8

NOTES:

1. For details of steel post thrie beam barrier, see Standard Plan A78B.
2. For details of standard hardware, posts and blocks used to construct thrie beam barrier, see Standard Plan A78C1 and A78C2.
3. Thrie beam barrier post spacing to be 6'-3" center to center, except as otherwise noted.
4. Top of barrier rail to be 2'-8" above ground line or shoulder surfacing under the rail element.
5. For barrier end treatments and barrier connections, see Standard Plans A78E3 and A78G, and Standard Plans A78E1, A78E2, A77Q1, A77Q2 and A78H.
6. For connection to Concrete Barrier (Type 60M), see Standard Plans A78I.
7. For details of thrie beam barrier on bridge see Standard Plan A78D2. For details of thrie beam barrier at fixed object, see Standard Plan A78D1.
8. See Project Plans for barrier delineation locations.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER STANDARD BARRIER RAILING SECTION (WOOD POST WITH WOOD BLOCK)

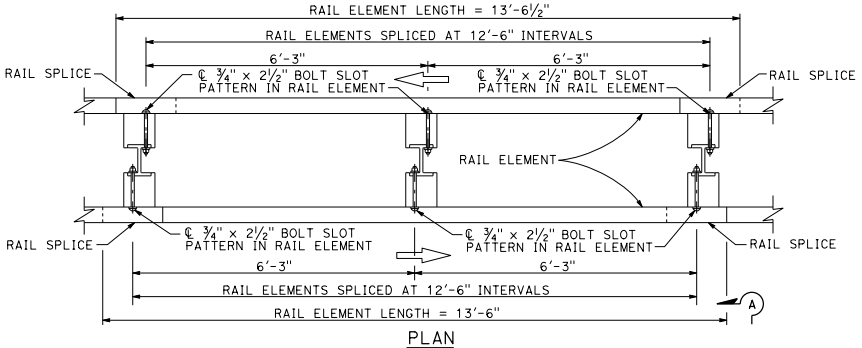
NO SCALE

A78A

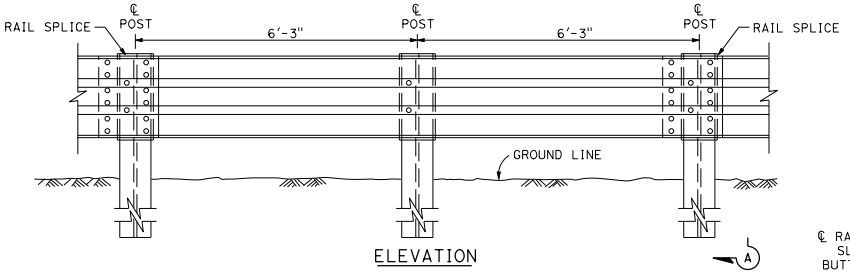
2018 STANDARD PLAN A78A

1-29-18

Return to Table of Contents



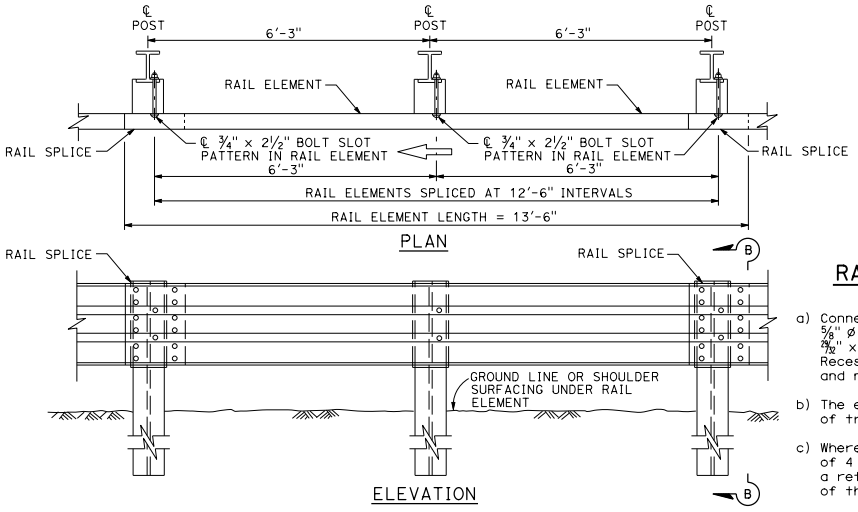
PLAN



ELEVATION

DOUBLE THRIE BEAM BARRIER

(Steel post with notched wood or notched plastic blocks)
See Note 1

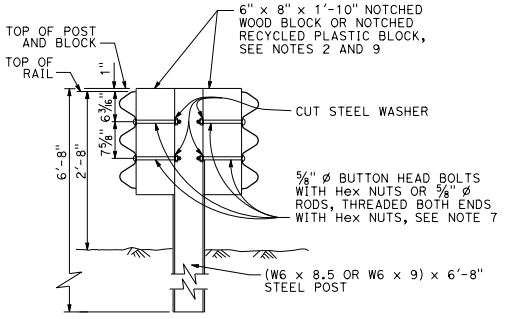


PLAN

ELEVATION

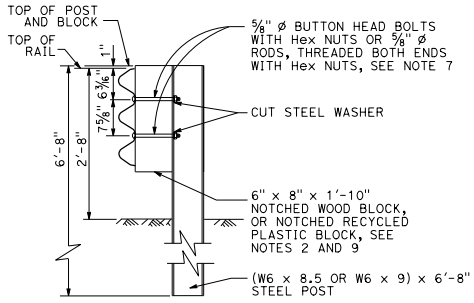
SINGLE THRIE BEAM BARRIER

(Steel post with notched wood or notched plastic blocks)
See Note 1



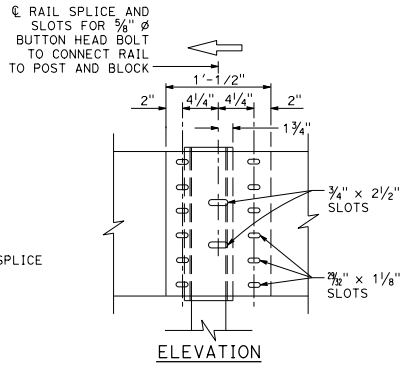
SECTION A-A

TYPICAL STEEL LINE POST INSTALLATION



SECTION B-B

TYPICAL STEEL LINE POST INSTALLATION



ELEVATION

RAIL ELEMENT SPLICE DETAIL

a) Connect the overlapped ends of the thrie beam rail elements with ⅝" ø x 1¼" button head oval shoulder bolts inserted into the 29/32" x 1⅛" slots and bolted together with ⅝" ø recessed hex nuts. Recess of hex nut points toward rail element. A total of 12 bolts and nuts are to be used at each rail splice connection.

b) The ends of the rail elements are to be overlapped in the direction of traffic (see details).

c) Where end cap is to be attached to the end of a rail element, a total of 4 of the above described splice bolts and nuts are to be used. Where a return cap is to be attached to the ends of rail elements, a total of 8 of the above described splice bolts and nuts are to be used.

NOTES:

1. For details of the cross section of the thrie beam rail element and details for wood post with wood block installations, see Standard Plan A78A.
2. For details of standard hardware, posts and blocks used to construct thrie beam barrier, see Standard Plans A78C1 and A78C2.
3. Thrie beam barrier post spacing to be 6'-3" center to center, except as otherwise noted.
4. Top of barrier rail to be 2'-8" above ground line or shoulder surfacing under the rail element.
5. For barrier end treatments and barrier connections, see Standard Plans A78E1, A78E2, A78E3, A78F1, A78F2, A78G and A78H.
6. For connection to Concrete Barrier, see Standard Plan A78I.
7. Attach rail element to block and steel post with 2 bolts or rods on approaching traffic side of block and post web. No washer on rail face for rod or bolted connections to line post.
8. For details of thrie beam barrier on bridges, see Standard Plan A78D2. For details of thrie beam barrier at fixed objects, see Standard Plan A78D1.
9. Notched face of block faces steel post.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER STANDARD BARRIER RAILING SECTION (STEEL POST WITH NOTCHED WOOD BLOCK OR NOTCHED RECYCLED PLASTIC BLOCK)

NO SCALE

A78B

1-29-18

Return to Table of Contents

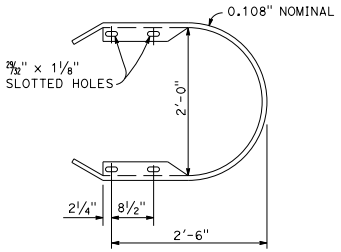
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

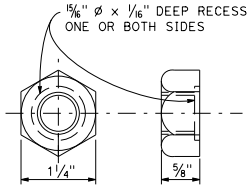
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

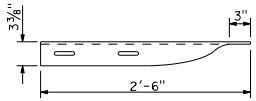
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

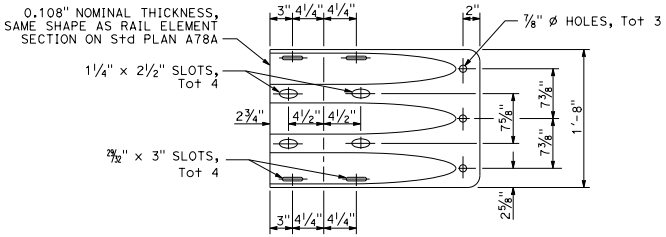


RETURN CAP
(TYPE TA)

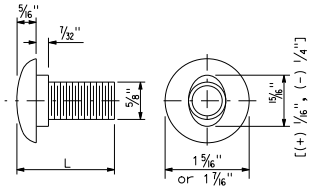


5/8" ø RECESS NUT





END CAP
(TYPE TC)



5/8" ø BUTTON HEAD BOLT

L	THREAD LENGTH
1 1/4"	FULL THREAD LENGTH
2"	FULL THREAD LENGTH
9 1/2"	4" Min THREAD LENGTH
18"	4" Min THREAD LENGTH
27"	4" Min THREAD LENGTH

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER
STANDARD HARDWARE DETAILS

NO SCALE

A78C1

1-29-18

2018 STANDARD PLAN A78C1

Return to Table of Contents

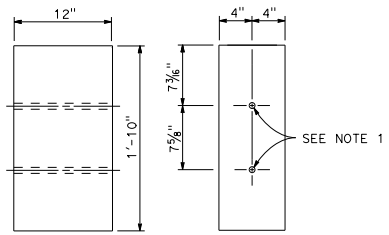
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

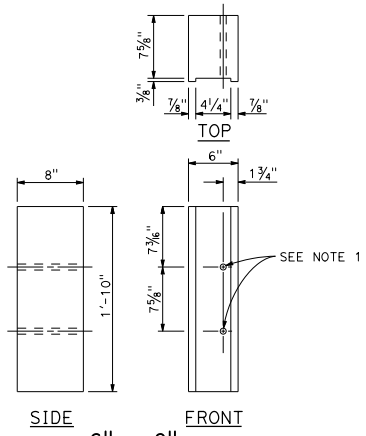
May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

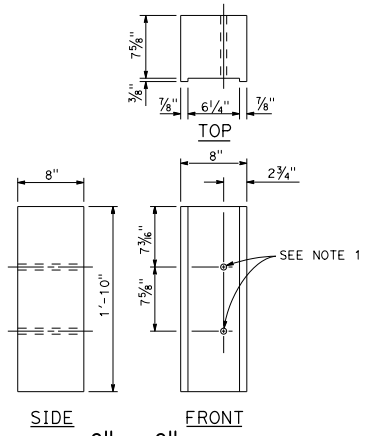
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



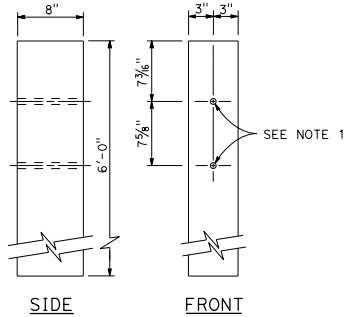
8" x 12"
WOOD BLOCK



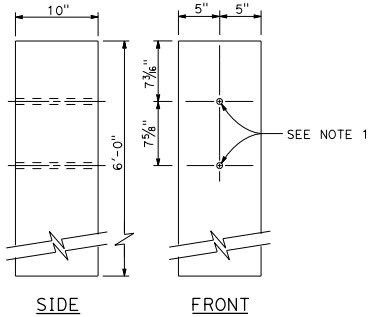
6" x 8"
NOTCHED WOOD BLOCK
See Notes 3 and 5



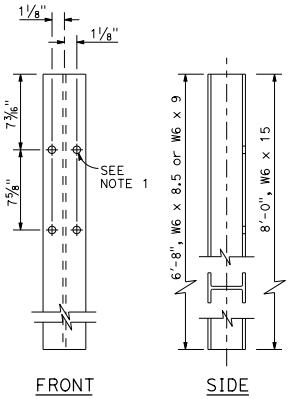
8" x 8"
NOTCHED WOOD BLOCK
See Notes 4 and 5



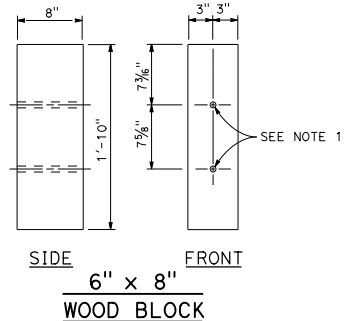
6" x 8"
WOOD POST



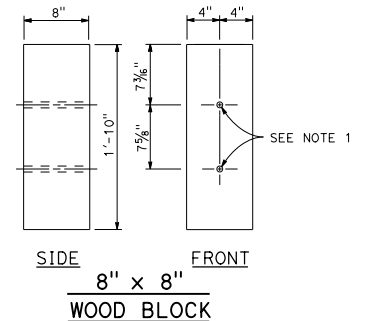
10" x 10"
WOOD POST



STEEL POST
W6 x 9 or W6 x 8.5 and
W6 x 15



6" x 8"
WOOD BLOCK



8" x 8"
WOOD BLOCK

NOTES:

1. All holes in steel post to be 13/16" Dia maximum. Holes in wood posts and wood blocks to be ¾" Dia ±1/16".
2. Dimensions shown for wood post are nominal.
3. For use with W6 x 8.5 or W6 x 9 steel post.
4. For use with W6 x 15 steel post.
5. Notched face of block faces steel post.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER POST AND BLOCK DETAILS

NO SCALE

A78C2

2018 STANDARD PLAN A78C2

1-29-18

Return to Table of Contents

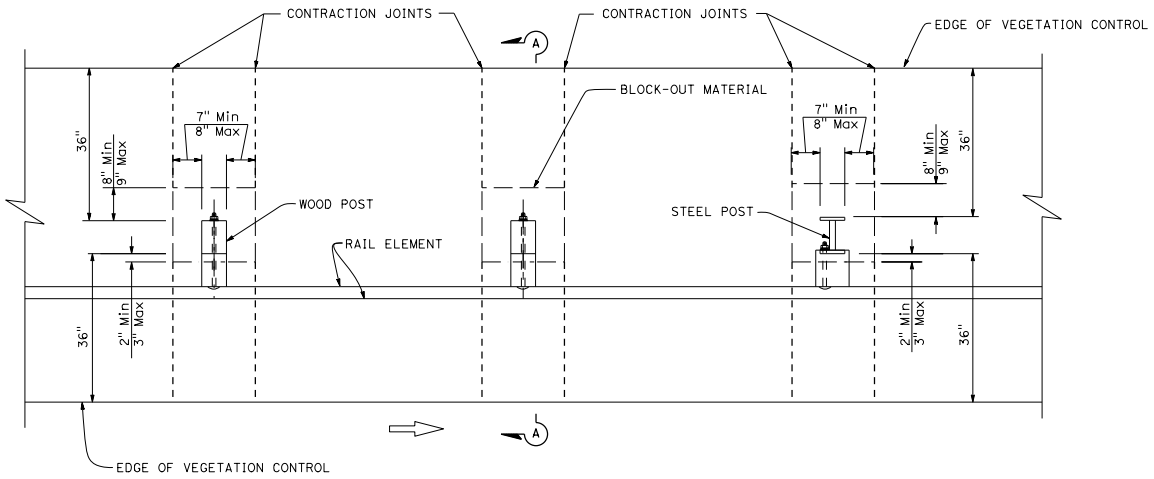
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

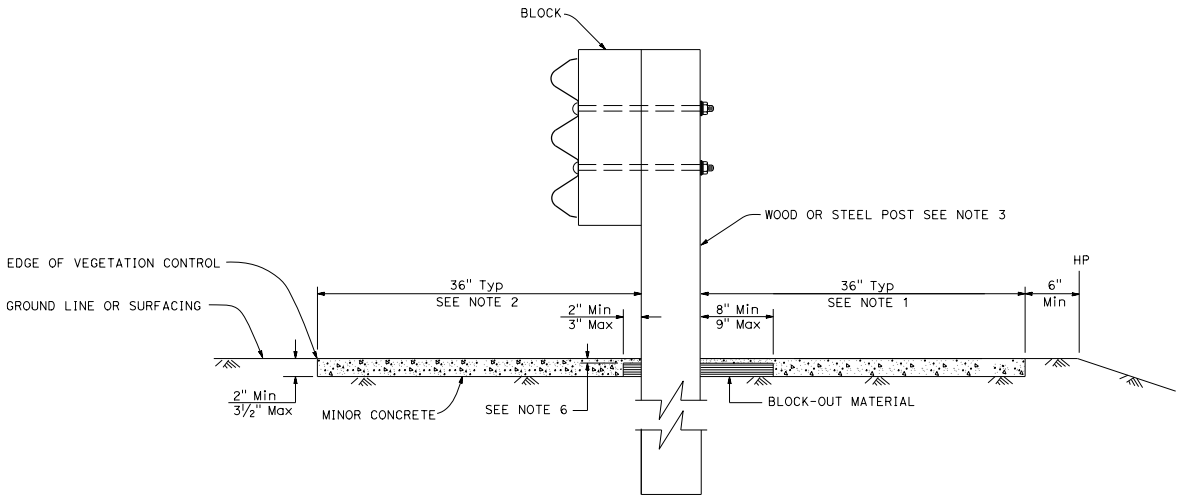
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

NOTES:

1. Where the distance between back of post and hinge point is less than 42", construct vegetation control to 6" from hinge point while maintaining the 8" block-out at back of post.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plan A78C2.
4. For details not shown, see Standard Plans A78A and A78B.
5. This plan for vegetation control installation only.
6. Concrete over block-out material depth, ⅜" Min to ⅝" Max.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL SINGLE THRIE BEAM BARRIER

NO SCALE

A78C3

1-29-18

2018 STANDARD PLAN A78C3

Return to Table of Contents

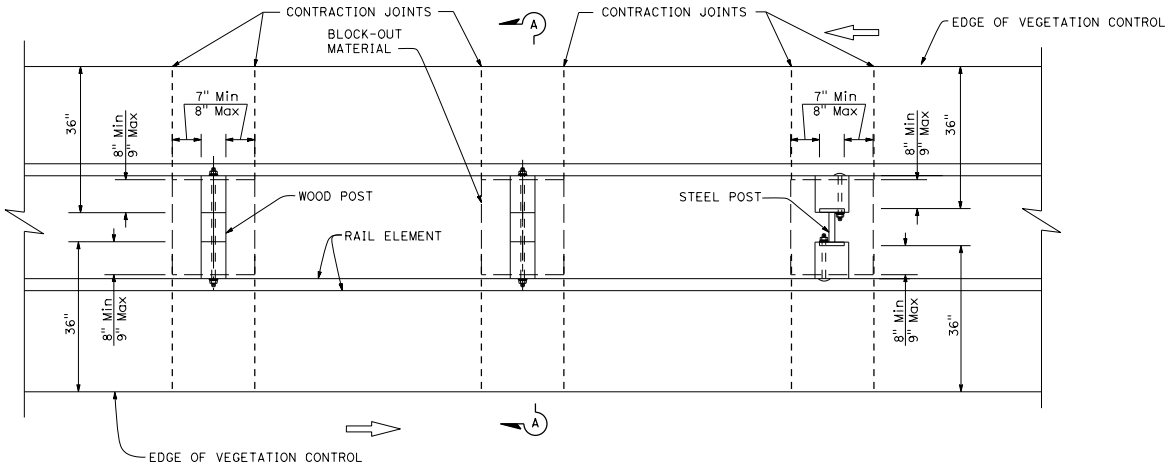
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

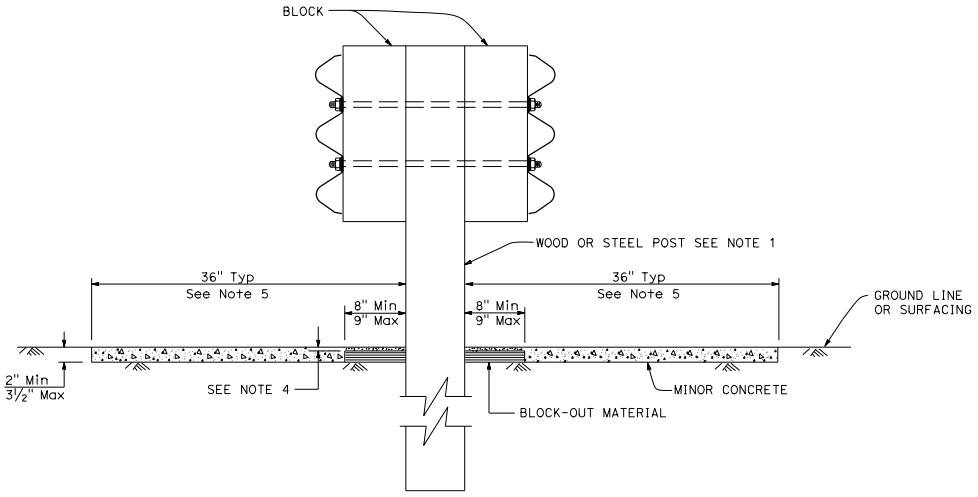
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

NOTES:

1. For wood and steel post sizes, see Standard Plan A78C2.
2. For details not shown, see Standard Plans A78A and A78B.
3. This plan for vegetation control installation only.
4. Concrete over block-out material depth, ⅜" Min to ⅝" Max.
5. Vegetation control must not conflict with drainage facilities.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL DOUBLE THRIE BEAM BARRIER

NO SCALE

A78C4

1-29-18

Return to Table of Contents

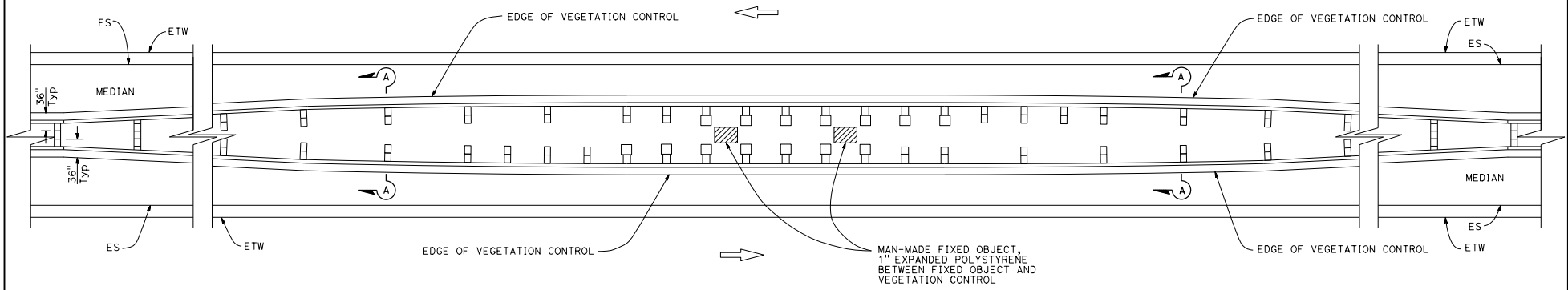
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

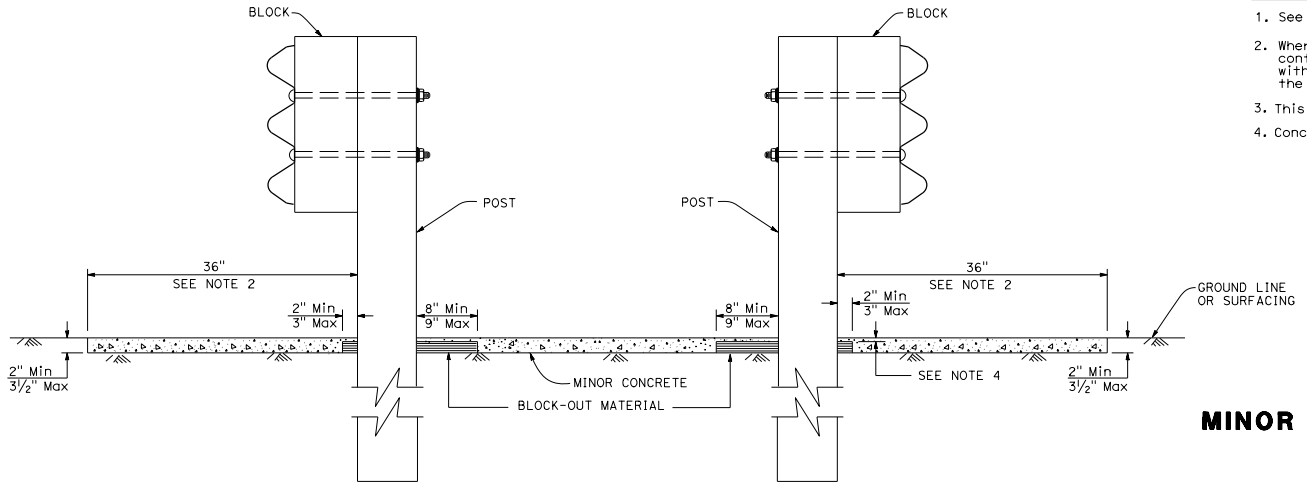
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

NOTES:

1. See Standard Plan A78C3 for additional vegetation control.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 36" in front of the post, construct vegetation control to the edge of paved shoulder.
3. This plan for vegetation control installation only.
4. Concrete over block-out material depth, ⅜" Min to ⅝" Max.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL THRIE BEAM BARRIER AT FIXED OBJECTS IN MEDIAN

NO SCALE

A78C5

1-29-18

2018 STANDARD PLAN A78C5

Return to Table of Contents

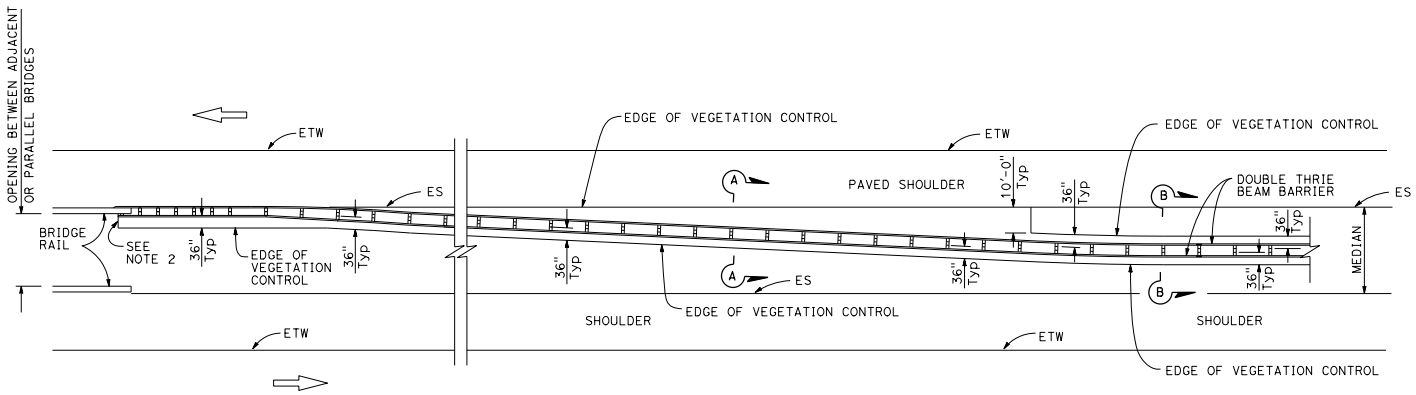
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

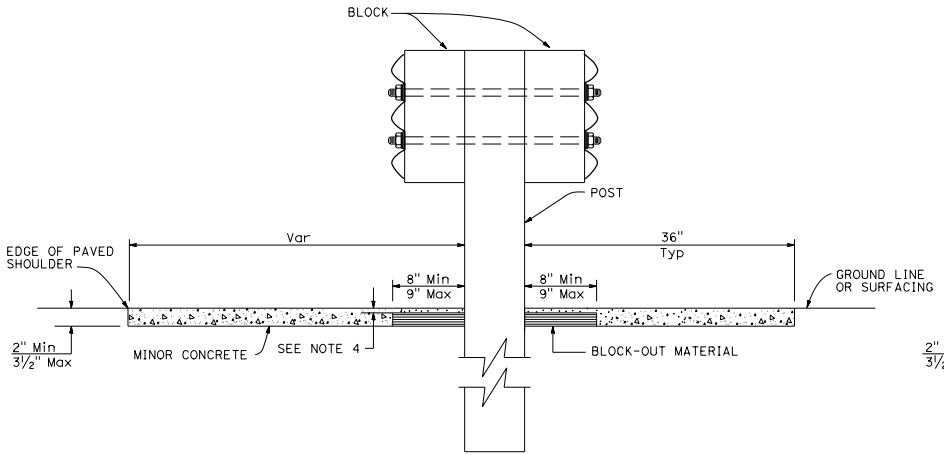
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



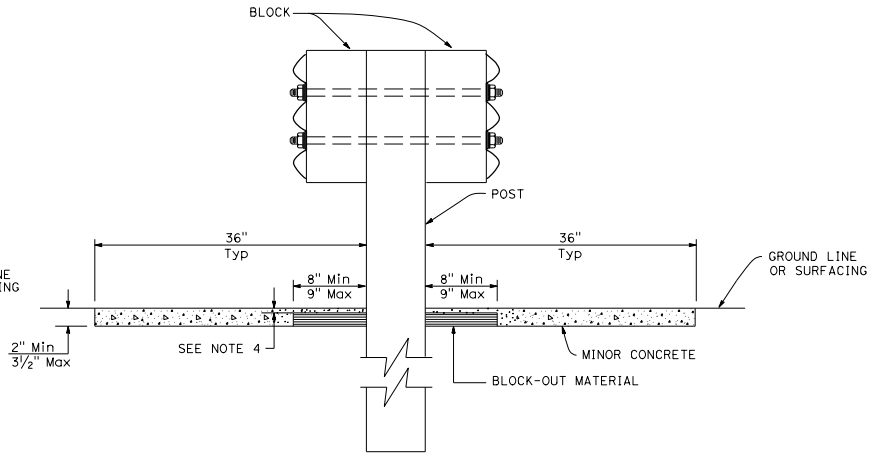
PLAN

NOTES:

1. See Standard Plan A78C4 for additional vegetation control details.
2. End vegetation control at end of backside rail element attached to bridge railing.
3. This plan for vegetation control installation only.
4. Concrete over block-out material depth, 3/8" Min to 5/8" Max.



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MINOR CONCRETE VEGETATION CONTROL THRIE BEAM BARRIER AT STRUCTURE APPROACH

NO SCALE

A78C6

1-29-18

Return to Table of Contents

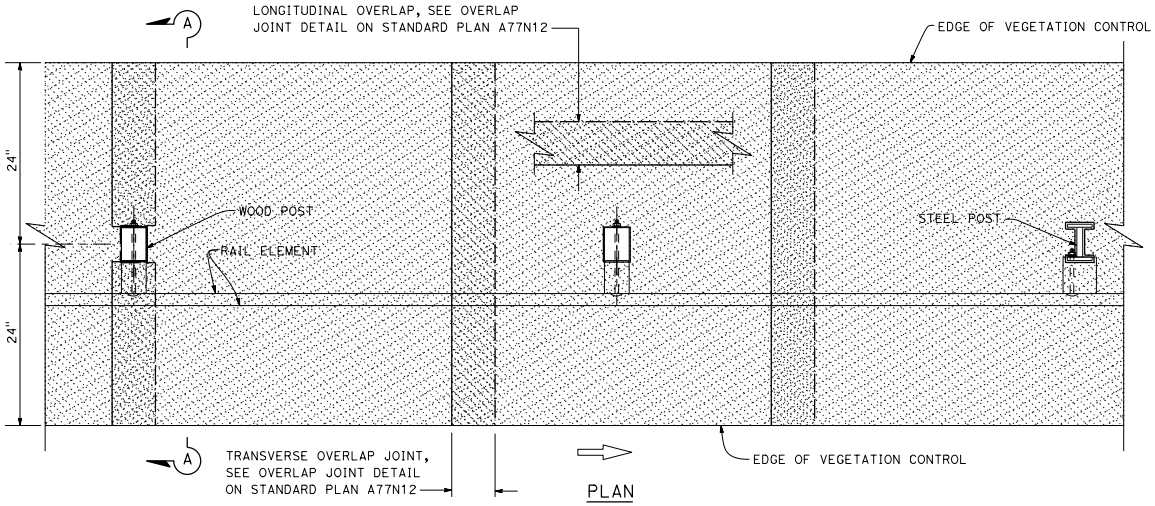
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

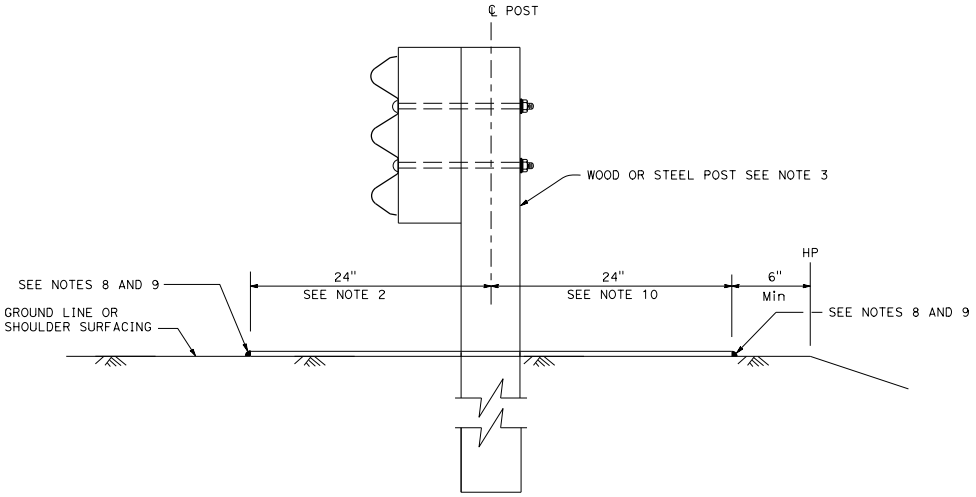
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plan A78C2.
4. For details not shown, see Standard Plans A78A and A78B.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.
10. Where the distance between center of post and hinge point is less than 30", construct vegetation control to 6" from the hinge point. For narrow installation, see Standard Plan A77N13.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL SINGLE THRIE BEAM BARRIER

NO SCALE

A78C7

1-29-18

2018 STANDARD PLAN A78C7

Return to Table of Contents

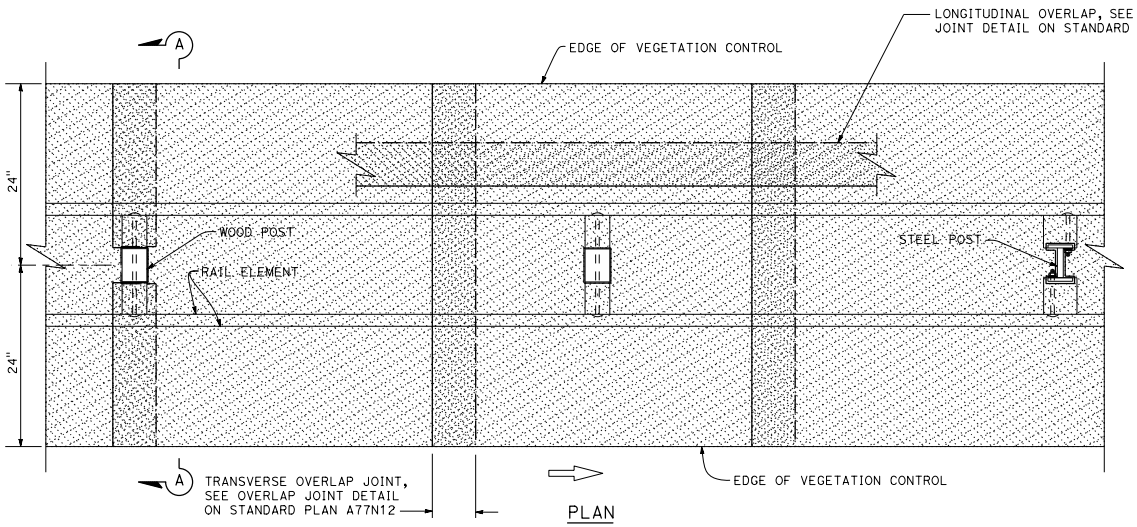
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

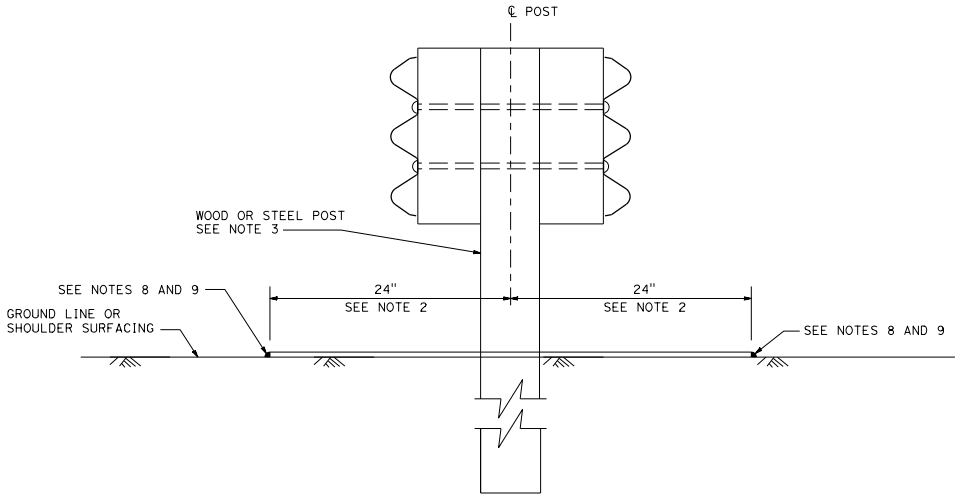
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plan A78C2.
4. For details not shown, see Standard Plans A78A and A78B.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL DOUBLE THRIE BEAM BARRIER

NO SCALE

A78C8

2018 STANDARD PLAN A78C8

1-29-18

Return to Table of Contents

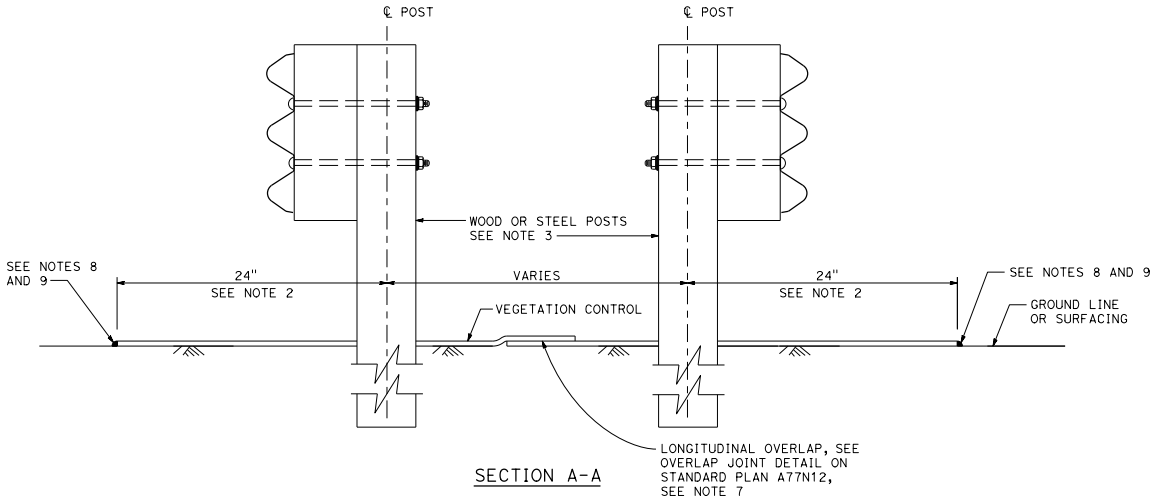
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

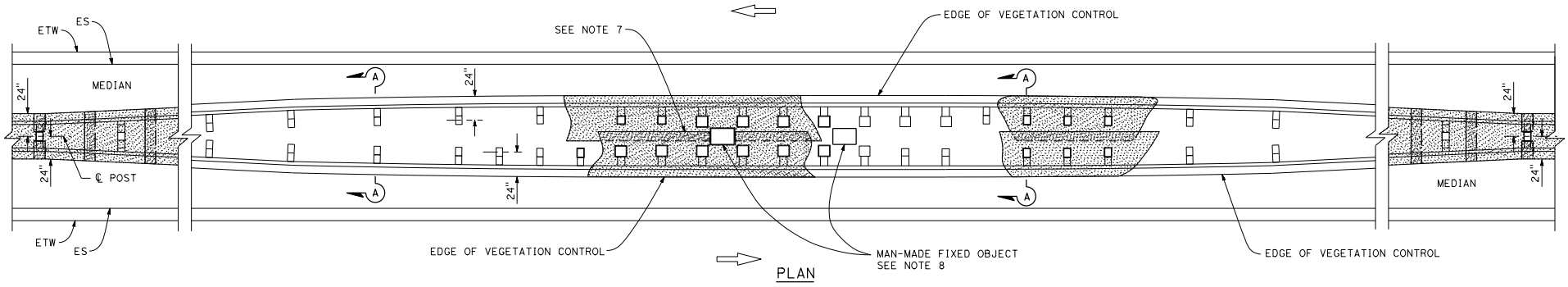
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plan A78C2.
4. For details not shown, see Standard Plans A78A and A78B.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place transverse and longitudinal overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.



PLAN

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL THRIE BEAM BARRIER AT FIXED OBJECTS IN MEDIAN

NO SCALE

A78C9

1-29-18

Return to Table of Contents

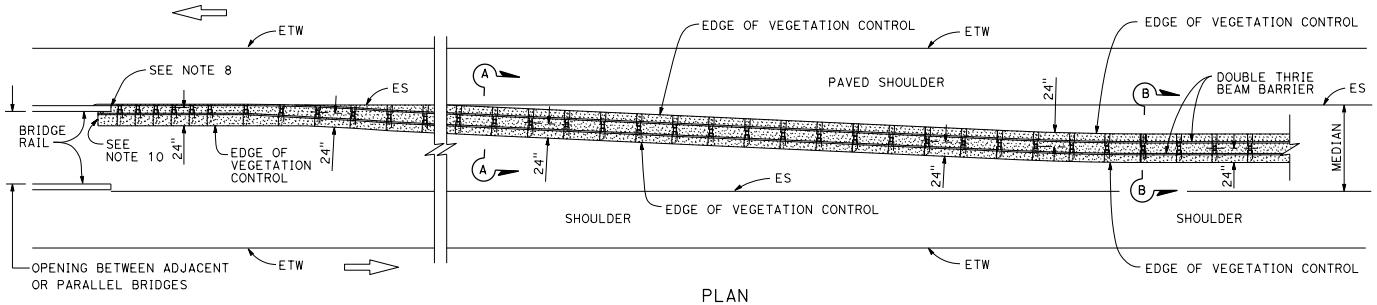
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Chi H. Wong
REGISTERED CIVIL ENGINEER

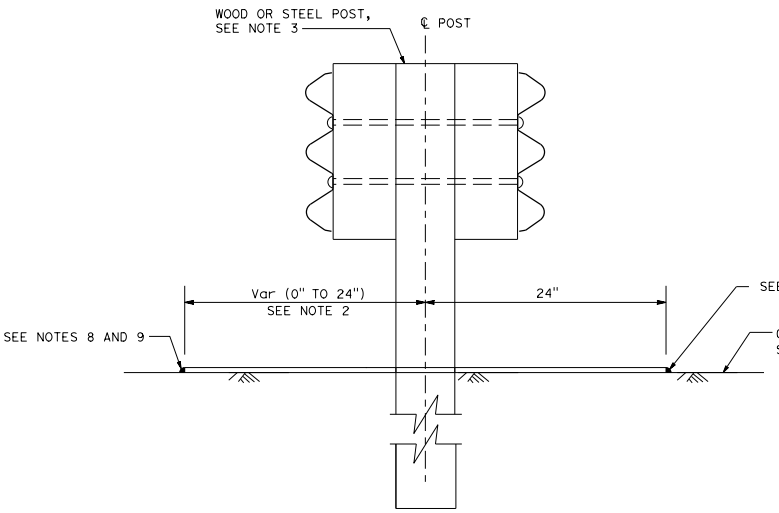
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Chi H. Wong
No. C54738
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

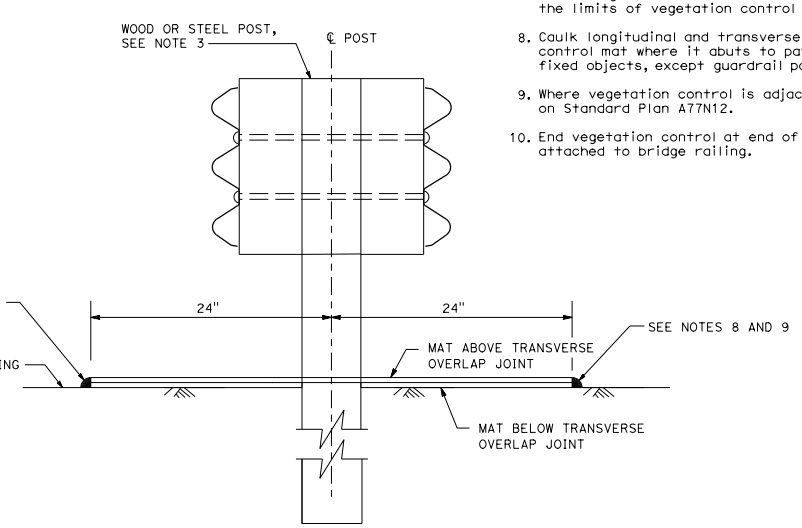
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. For additional vegetation control details, see Standard Plan A77N12.
2. Where dike is constructed under barrier, construct vegetation control to back edge of dike. Where paved shoulder is constructed within 24" of the post center, construct vegetation control to the edge of paved shoulder.
3. For wood and steel post sizes, see Standard Plan A78C2.
4. For details not shown, see Standard Plans A78A and A78B.
5. This plan for vegetation control installation only.
6. Vegetation control must slope in direction of water flow.
7. Place longitudinal and transverse overlap joint within the limits of vegetation control where applicable.
8. Caulk longitudinal and transverse edges of vegetation control mat where it abuts to paved surface or man-made fixed objects, except guardrail posts.
9. Where vegetation control is adjacent to a dike, see details on Standard Plan A77N12.
10. End vegetation control at end of backside rail element attached to bridge railing.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FIBER OR RUBBER MAT VEGETATION CONTROL THRIE BEAM BARRIER AT STRUCTURE APPROACH

NO SCALE

A78C10

1-29-18

Return to Table of Contents

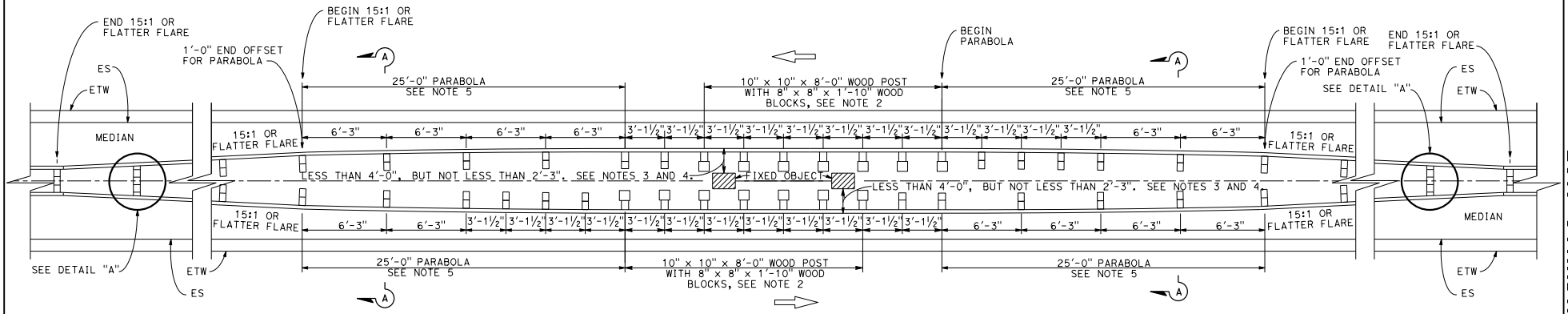
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

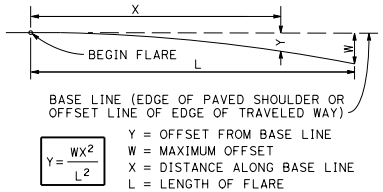
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



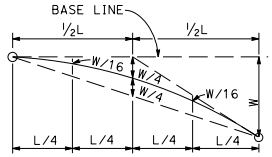
PLAN

THRIE BEAM BARRIER AT FIXED OBJECTS

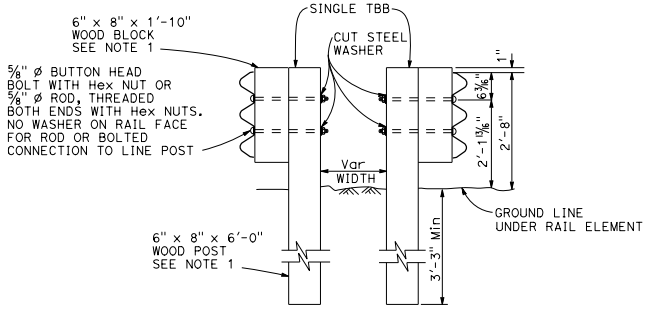
(Wood post and block shown)
See Notes 1, 2 and 3.



PARABOLIC FLARE OFFSETS

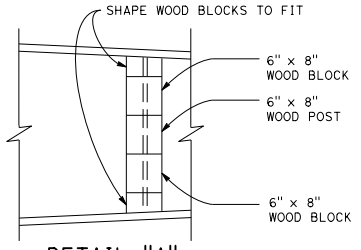


TYPICAL PARABOLIC LAYOUT



SECTION A-A

Wood post with wood block shown
See Note 1



DETAIL "A"

NOTES:

1. Where applicable and when specified, (W6 x 8.5 or W6 x 9) x 6'-8" steel post with 6" x 8" x 1'-10" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood post with 6" x 8" x 1'-10" wood block.
2. Where applicable and when specified, (W6 x 15) x 8'-0" steel post with 8" x 8" x 1'-10" notched wood blocks or notched recycled plastic blocks may be used for the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-10" wood blocks shown at 3'-1½" center to center spacing.
3. Where a minimum clearance of 4'-0" or more can be obtained between the face of the thrie beam rail and the face of the fixed object(s), the following substitutions may be made:
   a) 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-10" wood blocks for the 10" x 10" x 8'-0" wood post with 8" x 8" x 1'-10" wood blocks shown.
   b) 6'-3" post spacing for the 3'-1½" spacing shown.
4. Where the clearance between the face of the railing and the face of a fixed object is less than 2'-3", a concrete barrier should be constructed to shield the fixed object(s).
5. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER AT FIXED OBJECTS IN MEDIAN

NO SCALE

A78D1

1-29-18

2018 STANDARD PLAN A78D1

Return to Table of Contents

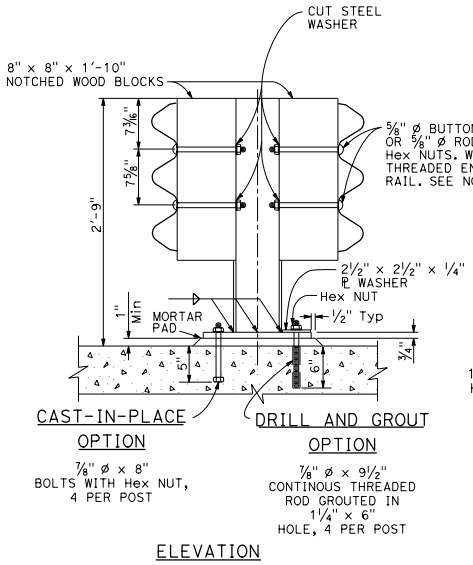
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

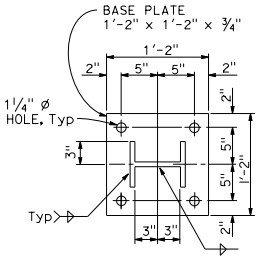
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

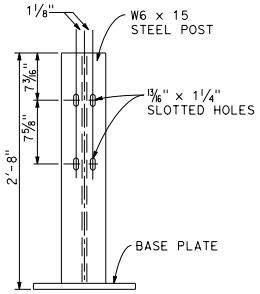
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION



BRIDGE POST BASE PLATE PLAN



BRIDGE POST DETAILS

DOUBLE THRIE BEAM BARRIER ON BRIDGE

NOTES:

1. See Standard Plan A78B for steel post with notched wood block construction details.
2. Attach rail element to wood block and steel post with 2 bolts or rods on approaching traffic side of block and post web. No washer on rail faces for rods or bolted connections to post.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER ON BRIDGE

NO SCALE

A78D2

1-29-18

Return to Table of Contents

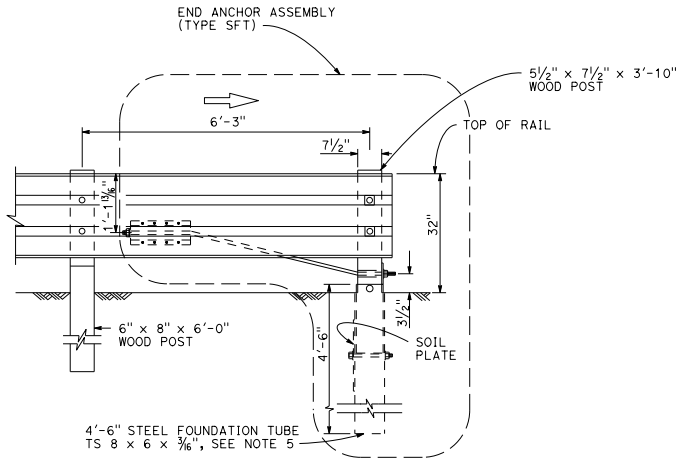
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

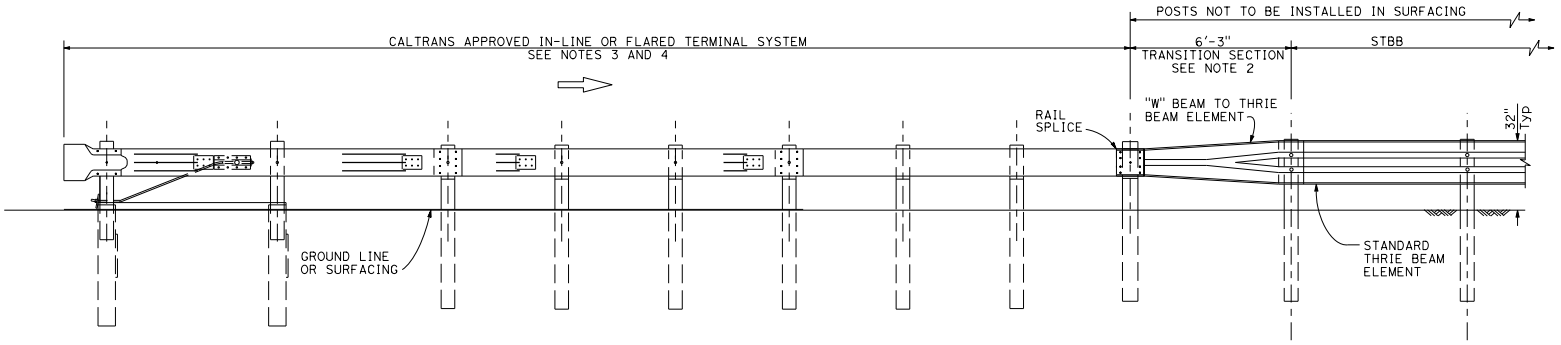


END ANCHOR FOR TRAFFIC DEPARTURE END OF SINGLE THRIE BEAM BARRIER

(For one-way roadways)
See Note 1

NOTES:

1. For additional details of End Anchor Assembly (Type SFT), see Standard Plan A77S1.
2. The "W" beam to thrie beam section is only required where the terminal system connection to the thrie beam barrier is a "W" beam rail.
3. In-line Terminal System End Treatments are used where site conditions will not accommodate a flared end treatment. The type of terminal system to be used will be shown on the Project Plans. Do not use a Caltrans approved 31" end treatment.
4. A Caltrans approved crash cushion should be used in place of a terminal system end treatment where the backside of the railing would be exposed to traffic.
5. A 6'-0" length steel foundation tube, TS 8 x 6 x ⅜, without a soil plate, may be furnished and installed in place of the 4'-6" length steel foundation tube and soil plate shown. Minimum embedment of the 6'-0" length tube shall be 5'-9". A ⅝" Ø hex head bolt and nut shall be installed in the hole in the 6'-0" length tube to keep the wood postfrom dropping into the tube.



ELEVATION

END TREATMENT FOR TRAFFIC APPROACH END OF SINGLE THRIE BEAM BARRIER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SINGLE THRIE BEAM BARRIER END ANCHOR ASSEMBLY AND TERMINAL SYSTEM END TREATMENT

NO SCALE

A78E1

1-29-18

2018 STANDARD PLAN A78E1

Return to Table of Contents

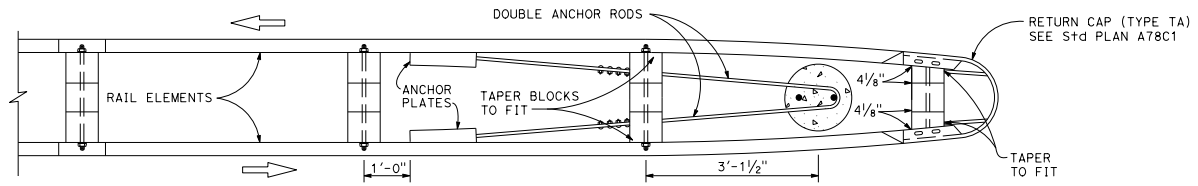
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

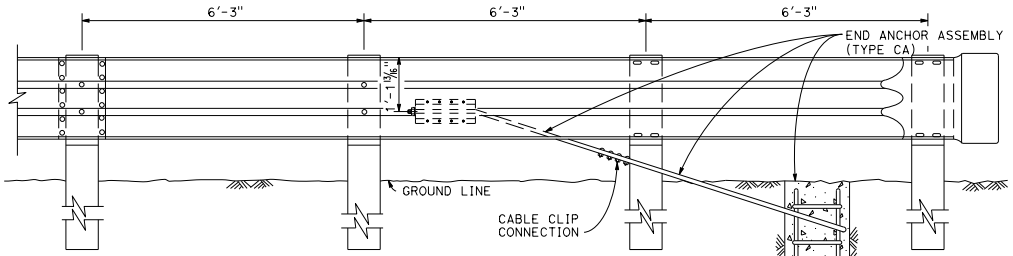
May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



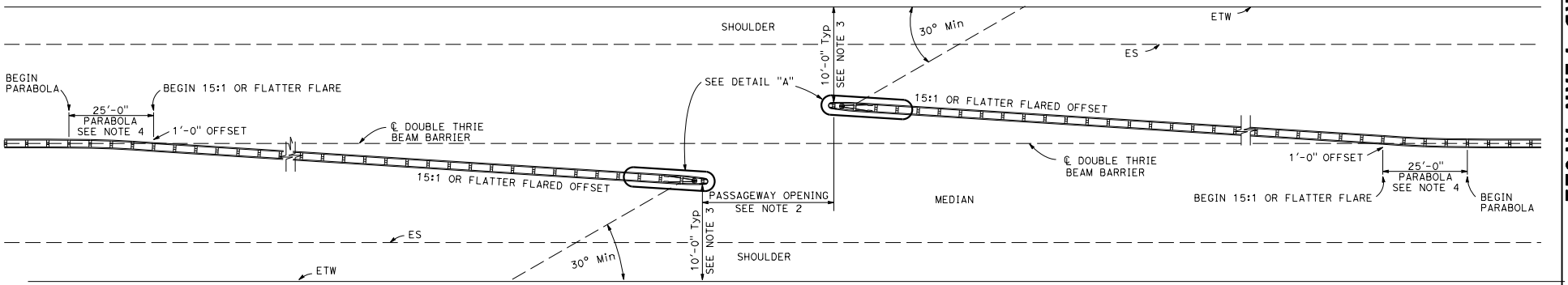
ELEVATION

END ANCHOR FOR DOUBLE THRIE BEAM BARRIER

DETAIL "A"

NOTES:

1. For End Anchor Assembly (Type CA) details, see Standard Plan A77T1.
2. The typical passageway opening for motorcycles is 6'-0" to 8'-0". Generally, motorcycle passageways are not used where median width is less than 22'-0". The typical passageway opening for motor vehicles is 12'-0" to 16'-0". Generally, motor vehicle passageways are not used where median width is 32'-0" or less. See Project Plans for width of passageway opening.
3. Barrier end offsets from edge of traveled way vary depending on type of highway facility involved. End offsets other than 10'-0" will be shown on the Project Plans.
4. For typical flare offsets for 25'-0" length parabola with maximum offset of 1'-0", see Standard Plan A77P1.



PLAN

EMERGENCY PASSAGEWAY IN THRIE BEAM BARRIER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER EMERGENCY PASSAGEWAY AND END ANCHOR ASSEMBLY DETAILS

NO SCALE

A78E2

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

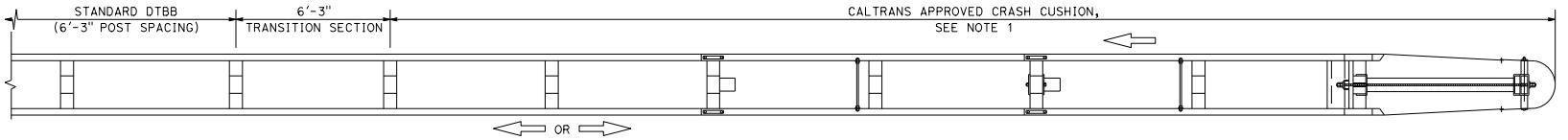
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

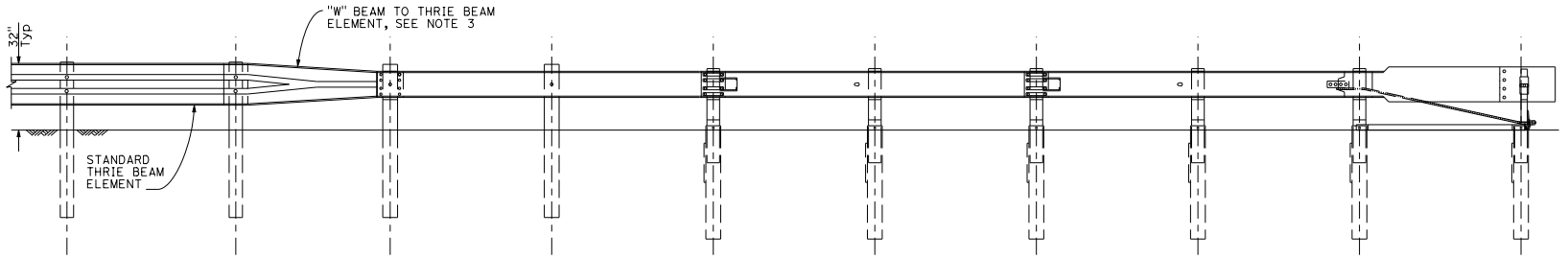
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. For the type of Crash Cushion to be used, see Project Plans and Special Provisions.
2. For details of standard double thrie beam barrier, see Standard Plans A78A, A78B, A78C1, and A78C2.
3. The 'W' beam to thrie beam sections are only required where the crash cushion connection to the thrie beam barrier assembly is a 'W' beam rail.



PLAN



ELEVATION

END TREATMENT FOR DOUBLE THRIE BEAM BARRIER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER CRASH CUSHION END TREATMENT

NO SCALE

A78E3

1-29-18

2018 STANDARD PLAN A78E3

Return to Table of Contents

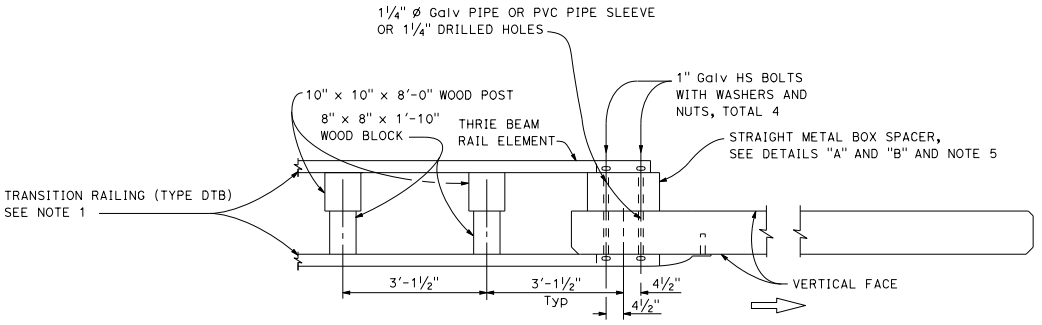
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

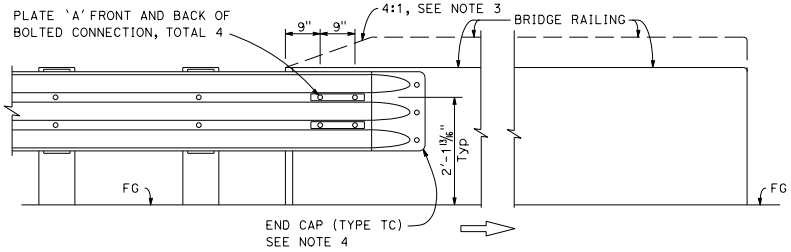
May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



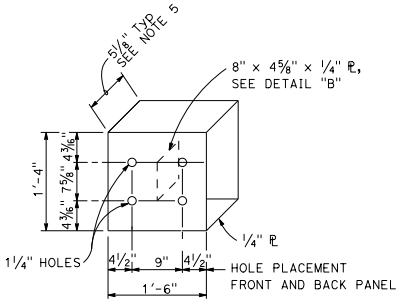
ELEVATION

CONNECTION DETAIL 1A
See Note 2

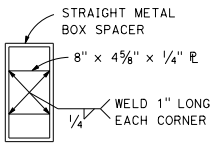
DOUBLE THRIE BEAM BARRIER CONNECTION TO BRIDGE RAILING WITHOUT SIDEWALK

NOTES:

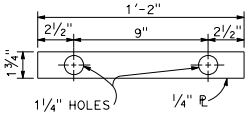
1. For additional details of Transition Railing (Type DTB), see Standard Plans A78K. Transition Railing (Type DTB) transitions the standard 12 gauge double thrie beam barrier to a heavier gauge double thrie beam railing section then to a heavier gauge nested double thrie beam barrier section which then is connected to the concrete bridge railing.
2. For typical use of Connection Detail 1A, see Type 25A Connection Layout on Standard Plan A78H.
3. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 1" at Connection Detail 1A, taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam railing.
4. For details of End Cap (Type TC), see Standard Plan A78C1.
5. See Standard Plan A78K for additional details regarding depth dimension for straight metal box spacer.



DETAIL "A"



DETAIL "B"



DETAIL "C"

STRAIGHT METAL BOX SPACER

PLATE 'A'

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS

NO SCALE

A78F1

1-29-18

2018 STANDARD PLAN A78F1

Return to Table of Contents

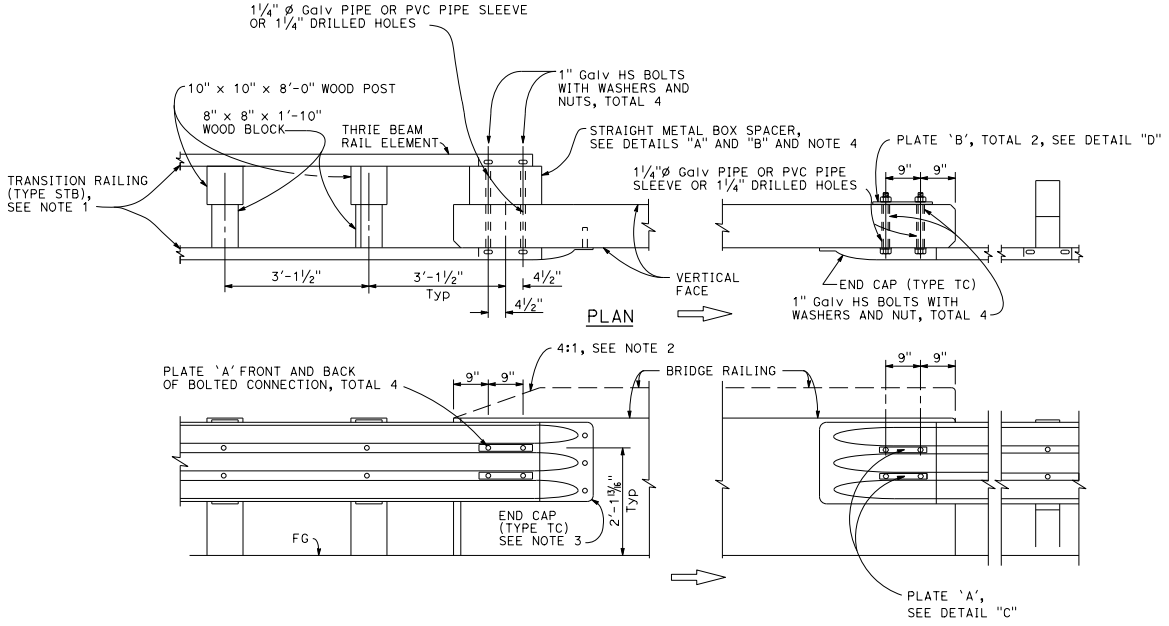
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

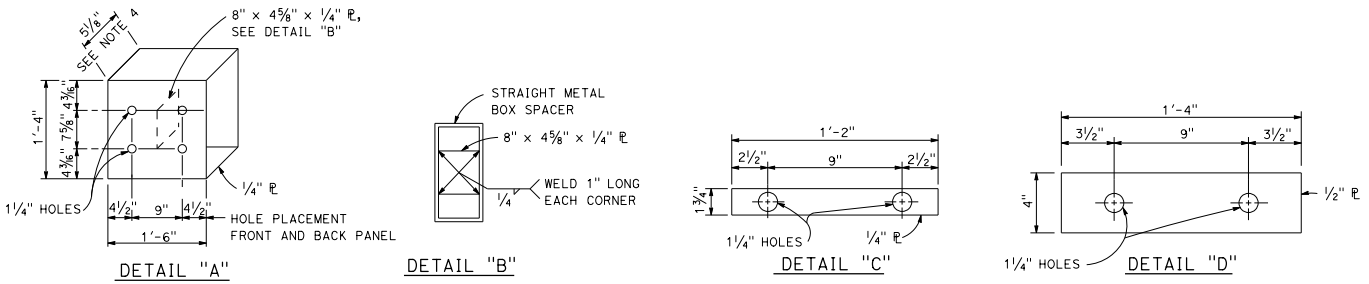
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SINGLE THRIE BEAM BARRIER CONNECTION TO BRIDGE RAILING WITHOUT SIDEWALK

NOTES:

1. For additional details of Transition Railing (Type STB), see Standard Plans A78J. Transition Railing (Type STB) transitions the standard 12 gauge single thrie beam barrier to a heavier gauge single thrie beam railing section then to a heavier gauge nested double thrie beam barrier section which then is connected to the concrete bridge railing.
2. Where the height of the bridge railing exceeds the height of the thrie beam railing by more than 1" at Connection Detail 2A, taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam railing.
3. For details of End Cap (Type TC), see Standard Plan A78C1.
4. See Standard Plan A78J for additional details regarding depth dimension for straight metal box spacer.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SINGLE THRIE BEAM BARRIER CONNECTIONS TO BRIDGE RAILINGS WITHOUT SIDEWALKS

NO SCALE

A78F2

2018 STANDARD PLAN A78F2

1-29-18

Return to Table of Contents

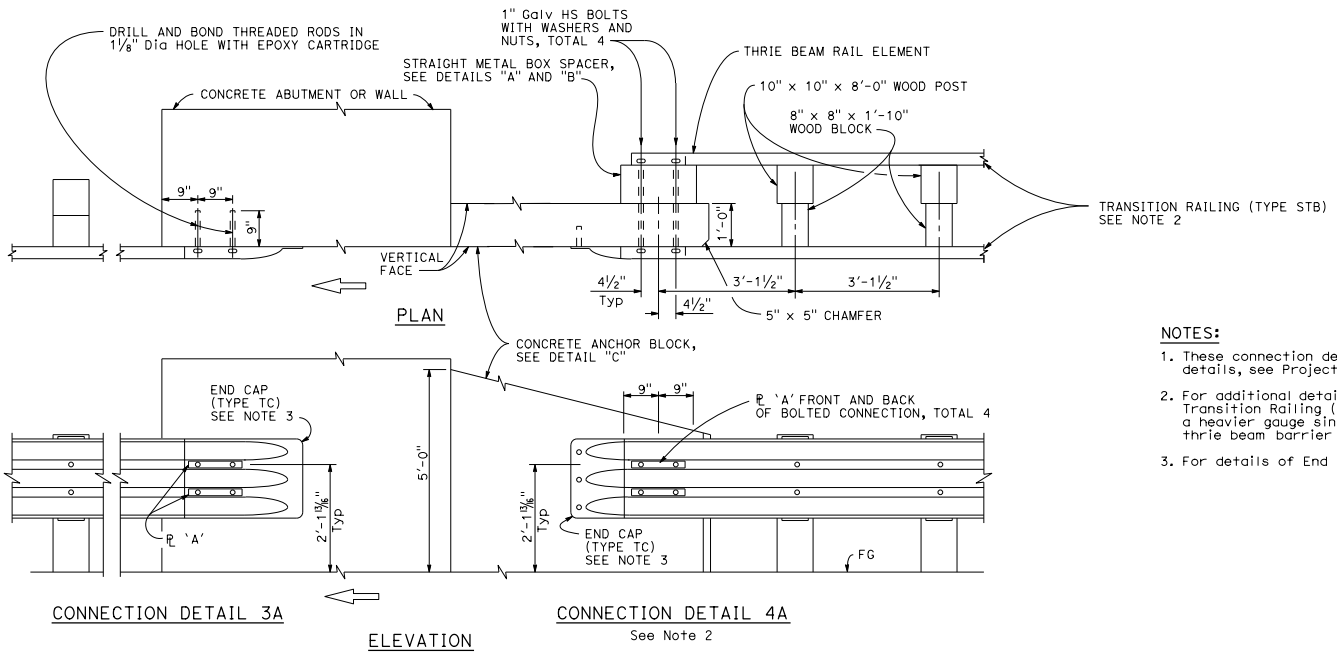
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

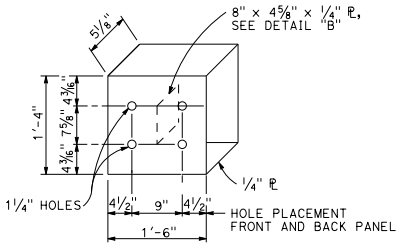
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

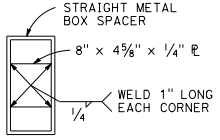


SINGLE THRIE BEAM BARRIER CONNECTION TO ABUTMENT OR WALL

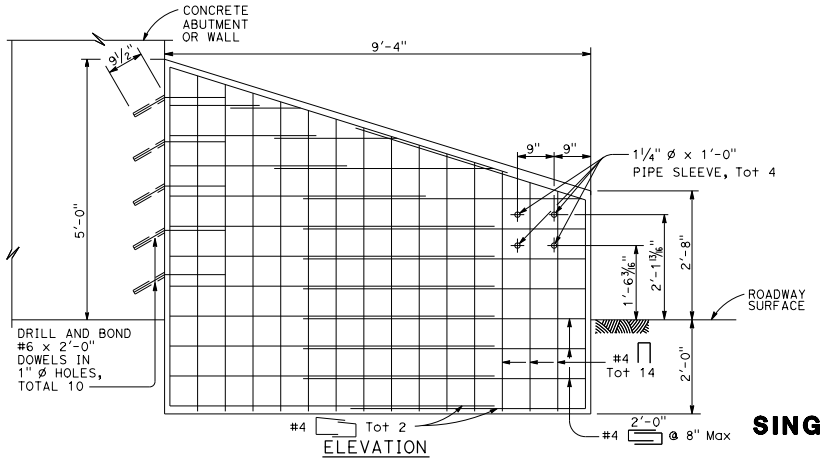
NOTES:

1. These connection details apply to concrete abutments and walls. For additional connections details, see Project Plans.
2. For additional details of Transition Railing (Type STB), see Standard Plan A78J. Transition Railing (Type STB) transitions the standard 12 gauge single thrie beam barrier to a heavier gauge single thrie beam railing section then to a heavier gauge nested double thrie beam barrier section which then is connected to the concrete anchor block.
3. For details of End Cap (Type TC), see Standard Plan A78C1.





STRAIGHT METAL BOX SPACER



ANCHOR BLOCK FOR TRANSITION RAILING CONNECTION
DETAIL "C"

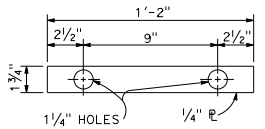


PLATE 'A'

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SINGLE THRIE BEAM BARRIER CONNECTIONS TO ABUTMENTS AND WALLS

NO SCALE

A78G

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

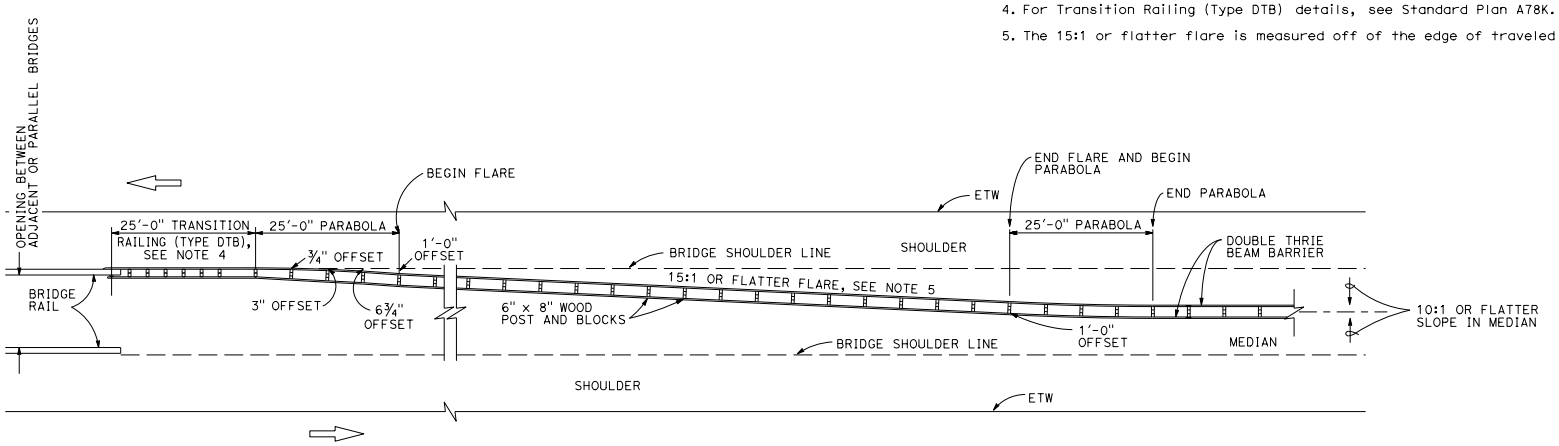
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Line post, blocks and hardware to be used are shown on Standard Plans A78A, A78B, A78C1 and A78C2.
2. Post spacing to be 6'-3" center to center, except as otherwise noted.
3. Except as noted, line posts are 6" x 8" x 6'-0" wood with 6" x 8" x 1'-10" wood blocks. (W6 x 8.5 or W6 x 9) steel posts, 6'-8" in length, with 6" x 8" x 1'-10" notched wood blocks or notched recycled plastic blocks may be used for 6" x 8" x 6'-0" wood posts with 6" x 8" x 1'-10" wood blocks where applicable and when specified.
4. For Transition Railing (Type DTB) details, see Standard Plan A78K.
5. The 15:1 or flatter flare is measured off of the edge of traveled way.



TYPE 25A CONNECTION LAYOUT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

THRIE BEAM BARRIER TYPICAL LAYOUT FOR CONNECTION TO BRIDGE RAILING

NO SCALE

A78H

1-29-18

2018 STANDARD PLAN A78H

Return to Table of Contents

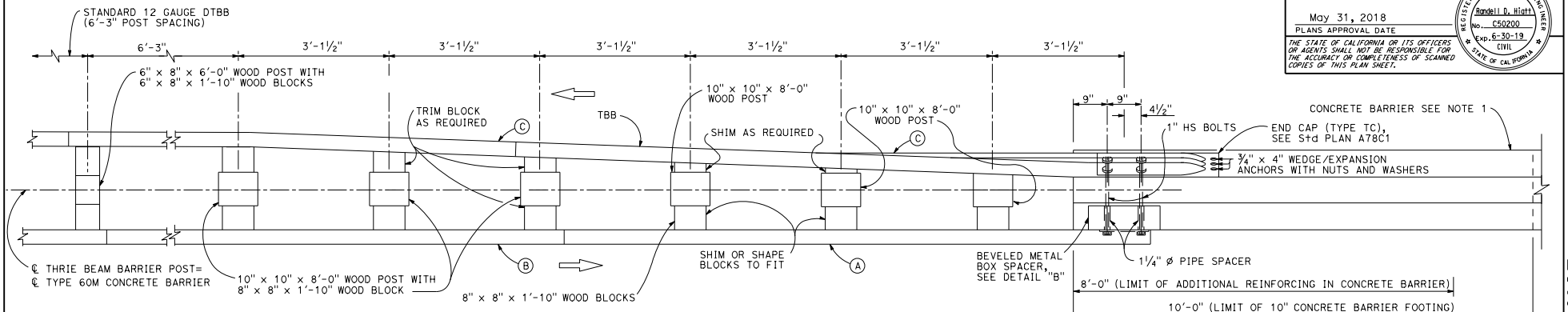
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

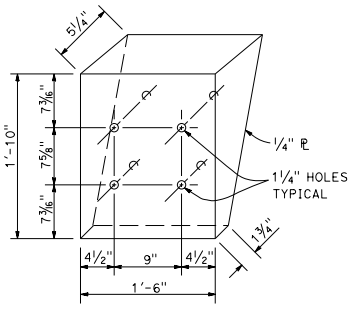
May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

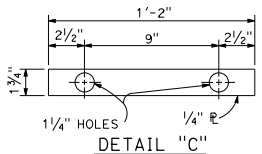
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



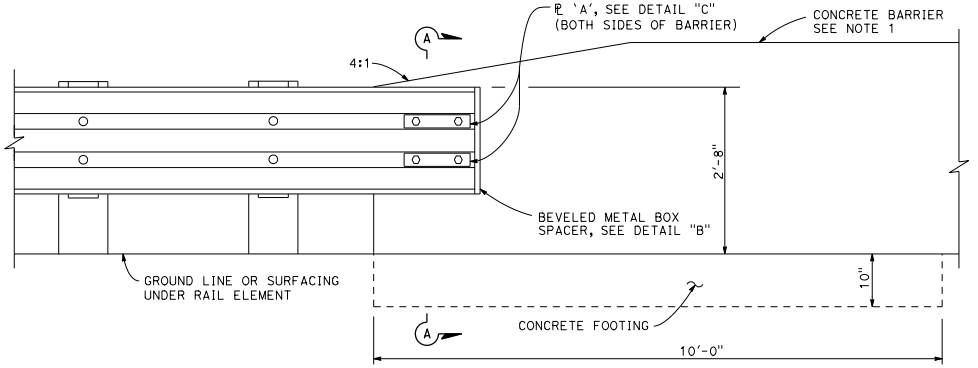
PLAN



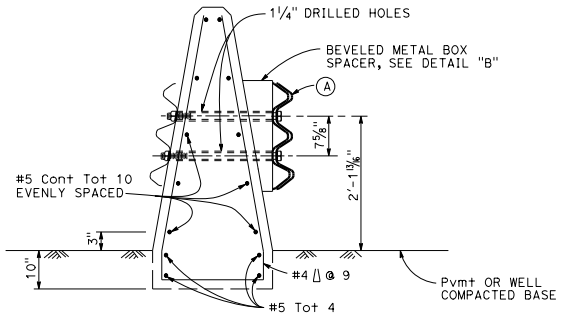
DETAIL "B"
Beveled metal box spacer
See Note 3



DETAIL "C"
PLATE 'A'



ELEVATION



SECTION A-A
(Type 60M Concrete Barrier shown)

LEGEND

(A) NESTED THRIE BEAM ELEMENTS (ONE 12 GAUGE ELEMENT NESTED OVER ONE 10 GAUGE ELEMENT).

(B) ONE 10 GAUGE THRIE BEAM ELEMENT.

(C) ONE 12 GAUGE THRIE BEAM ELEMENT.

10 GAUGE = 0.135" THICK

12 GAUGE = 0.108" THICK

NOTES:

1. For details of Concrete Barrier Type 60M, see Standard Plan A76A. Thrie beam barrier connections to Concrete Barrier Type 60MS and Type 60MG are similar to details shown on this plan.
2. For additional thrie beam barrier details, see Standard Plans A78A, A78B, A78C1, and A78C2.
3. Where beveled metal box spacer is installed, place 1¼" ø x 3¼" and 1¼" ø x 2" pipe spacers on 1" HS bolts passing through interior of box.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER CONNECTION TO CONCRETE BARRIER

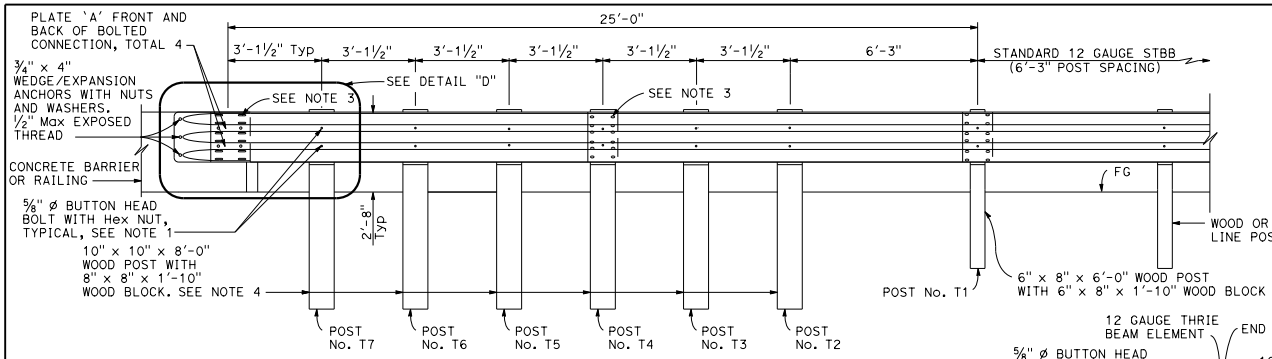
NO SCALE

A78I

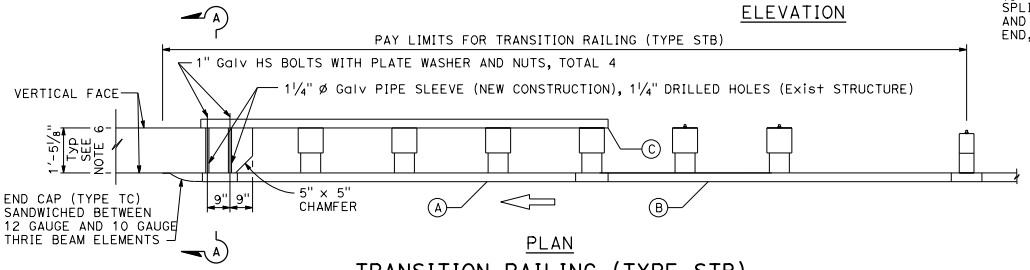
1-29-18

2018 STANDARD PLAN A78I

Return to Table of Contents



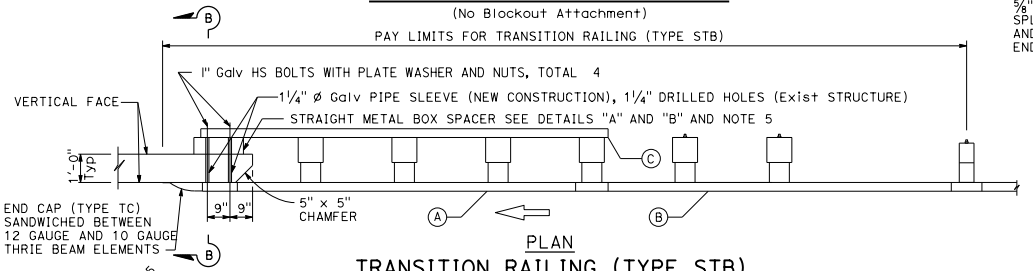
ELEVATION



PLAN

TRANSITION RAILING (TYPE STB)

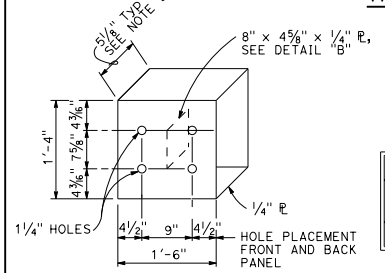
(No Blockout Attachment)



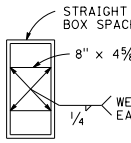
PLAN

TRANSITION RAILING (TYPE STB)

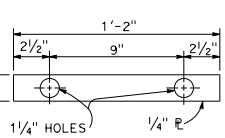
(Blockout Attachment)



DETAIL "A"



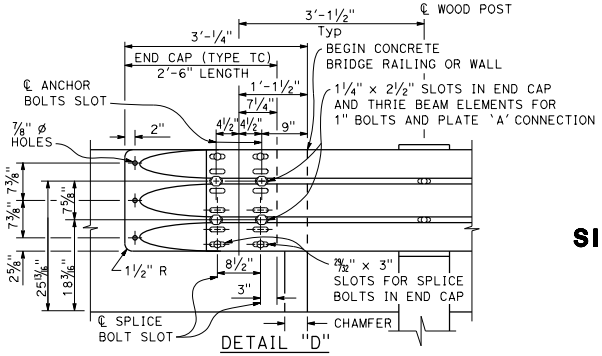
DETAIL "B"



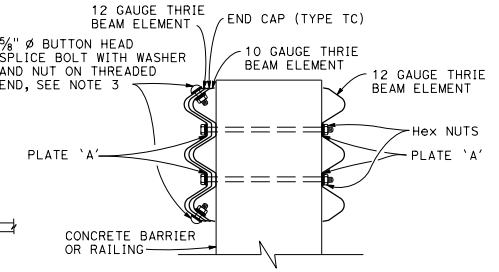
DETAIL "C"

STRAIGHT METAL BOX SPACER

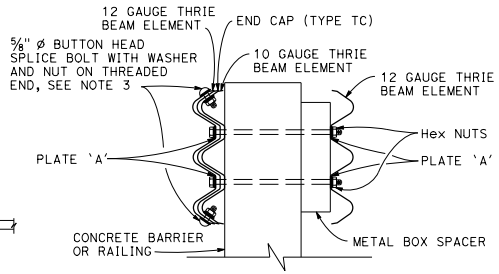
PLATE 'A'



DETAIL "D"



SECTION A-A



SECTION B-B

LEGEND

Ⓐ NESTED THRIE BEAM ELEMENTS (ONE 12 GAUGE ELEMENT NESTED OVER ONE 10 GAUGE ELEMENT)

Ⓑ ONE 10 GAUGE THRIE BEAM ELEMENT

Ⓒ ONE 12 GAUGE THRIE BEAM ELEMENT

10 GAUGE = 0.135" THICK

12 GAUGE = 0.108" THICK

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Use ⅝" ø Button head bolts and hex nuts for connection to posts. No washer on rail face for bolted connections to post.
2. The nested rail elements, end cap and single 10 gauge thrie beam element, may be spliced together prior to bolting the elements to the wood post and concrete barrier or railing.
3. Exterior splice bolt holes for rail element splices at Post No. T4 and the connection to the concrete barrier or railing shall be the standard 29/32" x 1⅛" slot size. Interior splice bolt holes at these locations may be increased up to 1¼" ø. Only the top 2 and the bottom 2 splice bolts with washers and nuts are required for rail splices at Post No. T4 and the connection to the concrete barrier or railing.
4. The top elevation of Post Nos. T2 through T7 shall not project more than 1" above the top elevation of the rail element.
5. The depth of the metal box spacer varies from the 5⅛" to 1½" and is dependent on the width of the concrete railing or wall. The combined dimension for the depth of the metal box spacer plus the width of railing or wall is typically 17⅛". Where the space between the backside of the concrete railing or wall and the rear thrie beam element is less than 1½", metal plates similar to Plate 'A' are to be used as spacers.
6. Where the width of the concrete railing or wall is greater than 17⅛", wood blocks are to be used to fill the space created between the backside of Post No.4 through No. 7 and the rear thrie beam element. These wood blocks shall be 8" in width and 1'-2" in length. The dimension between the front thrie beam element and the rear thrie beam element is to match the width of the concrete railing or wall.
7. For details of End Cap (Type TC), see Standard Plan A78C1.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SINGLE THRIE BEAM BARRIER TRANSITION RAILING (TYPE STB)

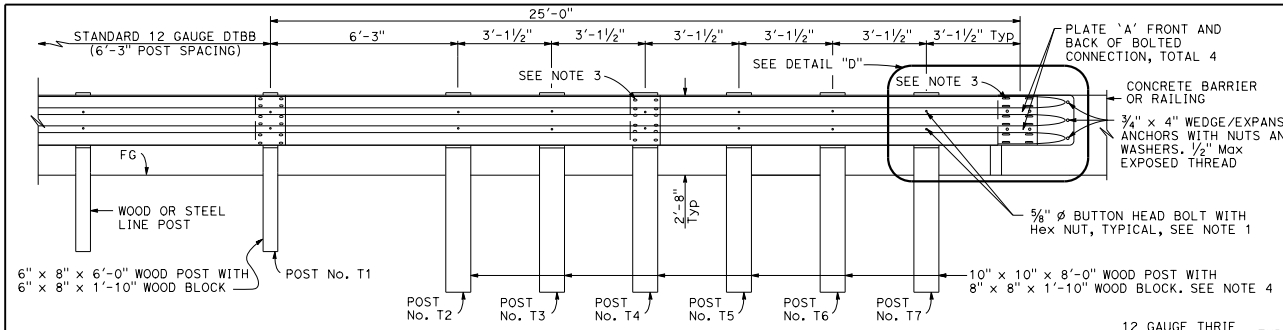
NO SCALE

A78J

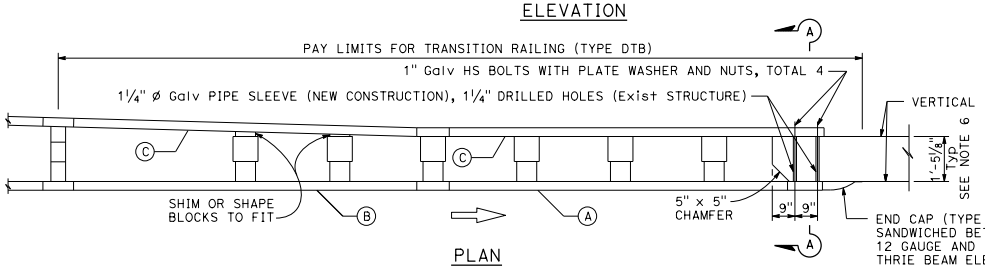
2018 STANDARD PLAN A78J

1-29-18

Return to Table of Contents



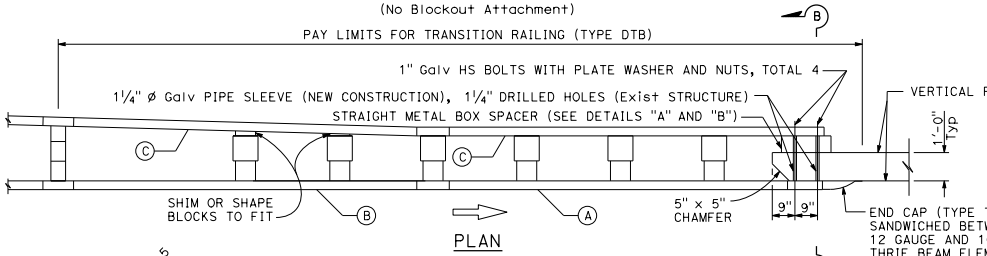
ELEVATION



PLAN

TRANSTION RAILING (TYPE DTB)

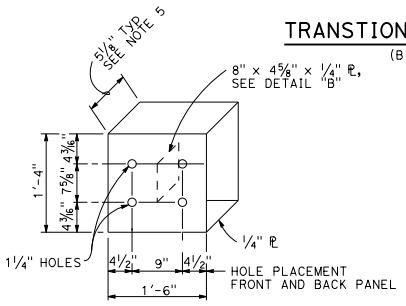
(No Blockout Attachment)



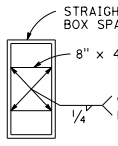
PLAN

TRANSTION RAILING (TYPE DTB)

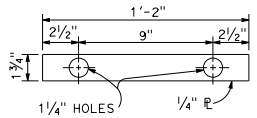
(Blockout Attachment)



DETAIL "A"



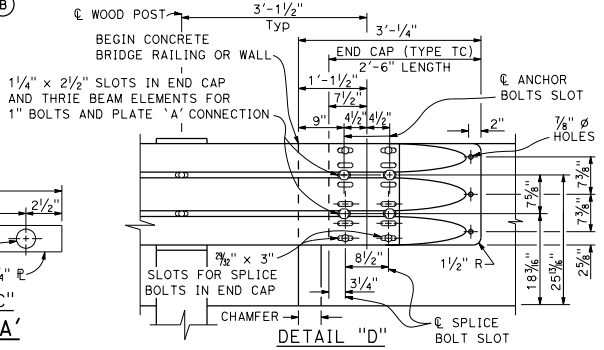
DETAIL "B"



DETAIL "C"

STRAIGHT METAL BOX SPACER

PLATE 'A'



DETAIL "D"

LEGEND

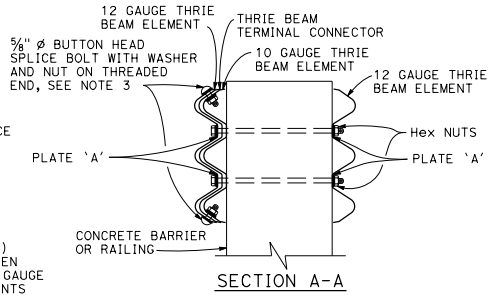
Ⓐ NESTED THRIE BEAM ELEMENTS (ONE 12 GAUGE ELEMENT NESTED OVER ONE 10 GAUGE ELEMENT)

Ⓑ ONE 10 GAUGE THRIE BEAM ELEMENT

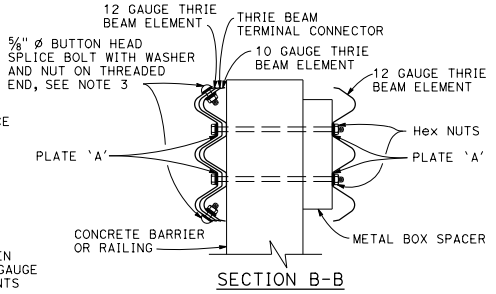
Ⓒ ONE 12 GAUGE THRIE BEAM ELEMENT

10 GAUGE = 0.135" THICK

12 GAUGE = 0.108" THICK



SECTION A-A



SECTION B-B

NOTES:

1. Use ⅝" Ø Button head bolts and hex nuts for connections to posts. No washer on rail face for bolted connections to post.
2. The nested rail elements, end cap and single 10 gauge thrie beam element, may be spliced together prior to bolting the elements to the wood post and concrete barrier or railing.
3. Exterior splice bolt holes for rail element splices at Post No. T4 and the connection to the concrete barrier or railing shall be the standard $^{29}/_{32}$" x 1⅛" slot size. Interior splice bolt holes at these locations may be increased up to 1¼" Ø. Only the top 2 and the bottom 2 splice bolts with washers and nuts are required for rail splices at Post No. T4 and the connection to the concrete barrier or railing.
4. The top elevation of Post Nos. T1 through T7 shall not project more than 1" above the top elevation of the rail element.
5. The depth of the metal box spacer varies from the 5⅛" to 1½" and is dependent on the width of the concrete railing or wall. The combined dimension for the depth of the metal box spacer plus the width of railing or wall is typically 17⅛". Where the space between the backside of the concrete railing or wall and the rear thrie beam element is less than 1½", metal plates similar to Plate 'A' are be used as spacers.
6. Where the width of the concrete railing or wall is greater than 17⅛", wood blocks are to be used to fill the space created between the backside of Post No.4 through No.7 and the rear thrie beam element. These wood blocks shall be 8" in width and 1'-2" in length. The dimension between the front thrie beam element and the rear thrie beam element is to match the width of the concrete railing or wall.
7. For details of End Cap (Type TC), see Standard Plan A78C1.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOUBLE THRIE BEAM BARRIER TRANSITION RAILING (TYPE DTB)

NO SCALE

A78K

1-29-18

2018 STANDARD PLAN A78K

Return to Table of Contents

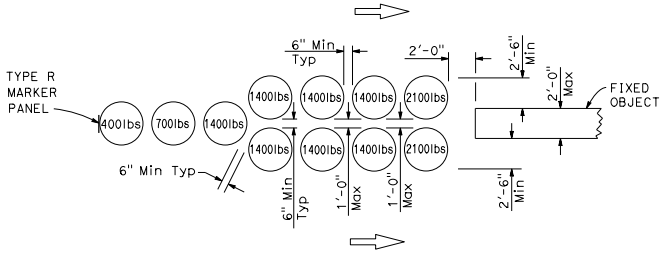
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

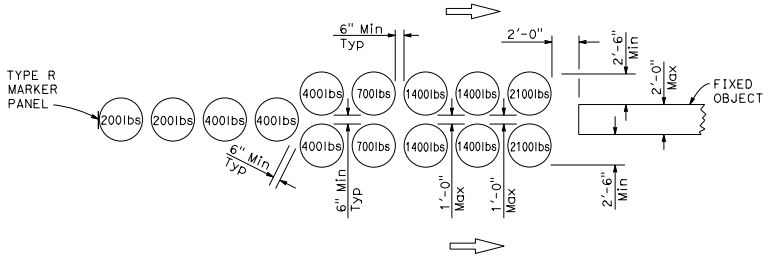
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



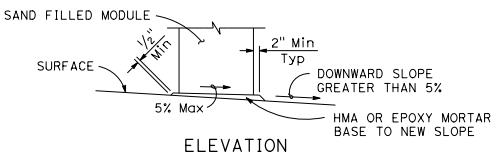
ARRAY 'U11'

Approach speed less than 45 mph



ARRAY 'U14'

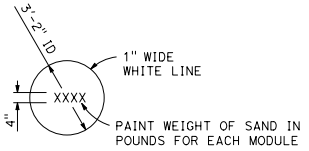
Approach speed 45 mph or more



ELEVATION

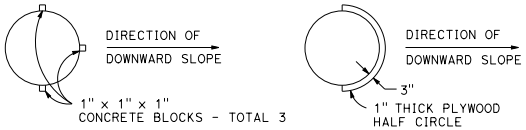
SLOPED SEAT DETAIL

See Note 3

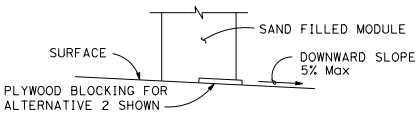


PAINTING DETAIL

See Note 4



PLAN



ELEVATION

BRIDGE DECK MODULE BLOCKING DETAILS

See Note 5

NOTES:

1. (XXX) Indicates module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the modules.
2. All sand weights are nominal.
3. Modules shall be placed on hot mix asphalt, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
4. Weight of sand and outline of each module shall be painted on the surface at each module location.
5. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
6. Approach speeds indicated conform to NCHRP Report criteria.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL)

NO SCALE

A81A

1-29-18

2018 STANDARD PLAN A81A

Return to Table of Contents

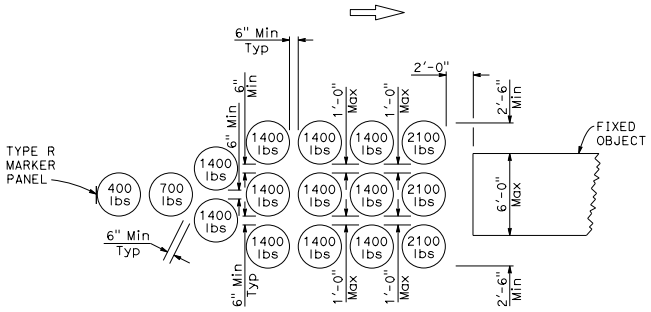
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randall D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

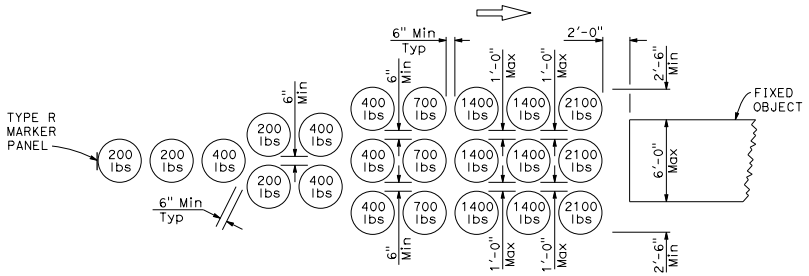
REGISTERED PROFESSIONAL ENGINEER — Randall D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ARRAY 'U16'

Approach speed less than 45 mph

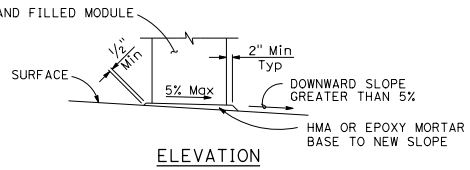


ARRAY 'U21'

Approach speed 45 mph or more

NOTES:

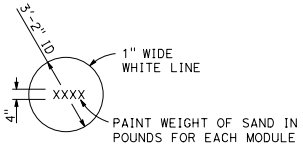
1. (XXX) Indicates module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the modules.
2. All sand weights are nominal.
3. Modules shall be placed on hot mix asphalt, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
4. Weight of sand and outline of each module shall be painted on the surface at each module location.
5. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
6. Approach speeds indicated conform to NCHRP Report criteria.



ELEVATION

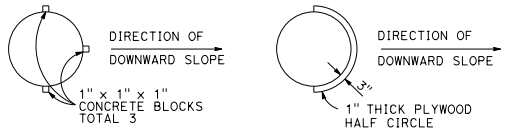
SLOPED SEAT DETAIL

See Note 3

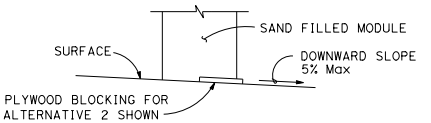


PAINTING DETAIL

See Note 4



ALTERNATIVE 1 — PLAN — ALTERNATIVE 2



ELEVATION

BRIDGE DECK MODULE BLOCKING DETAILS

See Note 5

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL)

NO SCALE

A81B

2018 STANDARD PLAN A81B

1-29-18

Return to Table of Contents

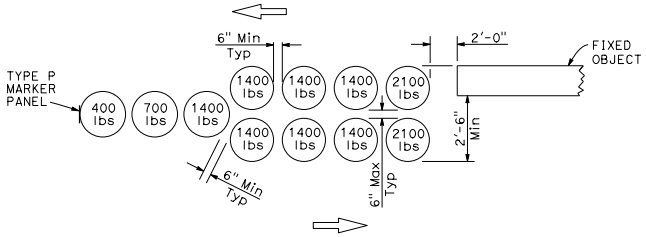
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

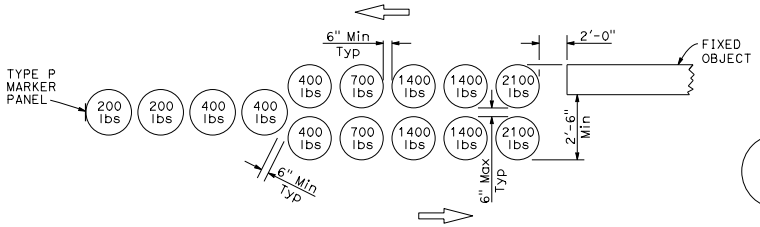
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



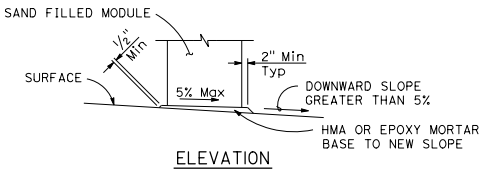
ARRAY 'B11'

Approach speed less than 45 mph



ARRAY 'B14'

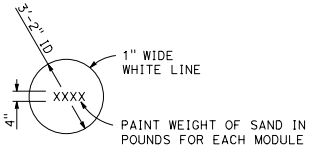
Approach speed 45 mph or more



ELEVATION

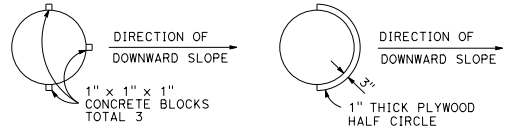
SLOPED SEAT DETAIL

See Note 4

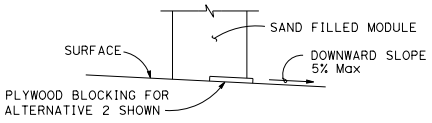


PAINTING DETAIL

See Note 5



PLAN



ELEVATION

BRIDGE DECK MODULE BLOCKING DETAILS

See Note 6

NOTES:

1. (XXX) Indicates module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the module.
2. All sand weights are nominal.
3. Bidirectional crash cushion arrays may be angled toward approaching traffic. Amount of angle not to exceed 10 degrees.
4. Modules shall be placed on hot mix asphalt, epoxy mortar or concrete surface. Modules to be placed on surfacing with greater than 5% downward slope shall be seated as shown.
5. Weight of sand and outline of each module shall be painted on the surface at each module location.
6. Module blocking, epoxied to the deck surface, is required for all modules placed on bridge decks. Two acceptable alternatives are shown. Other alternatives recommended by the manufacturer and approved by the Engineer will be accepted.
7. Approach speeds indicated conform to NCHRP Report criteria.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CRASH CUSHION, SAND FILLED (BIDIRECTIONAL)

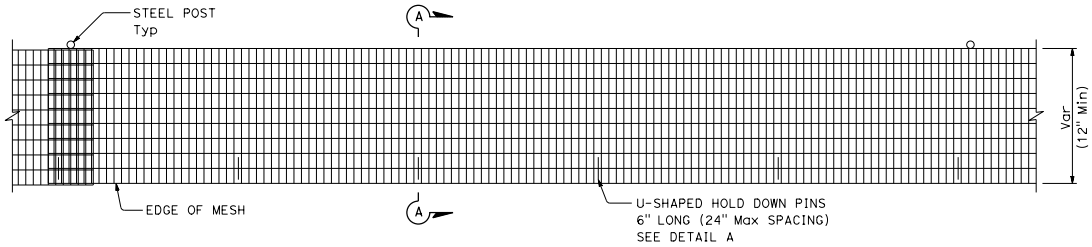
NO SCALE

A81C

2018 STANDARD PLAN A81C

1-29-18

Return to Table of Contents



PLAN VIEW

LEGEND:

Desert Tortoise Habitat

NOTES:

1. Exact locations for temporary desert tortoise fence are shown on the plans.
2. Horizontal portion of hardware cloth must be on habitat side of posts.

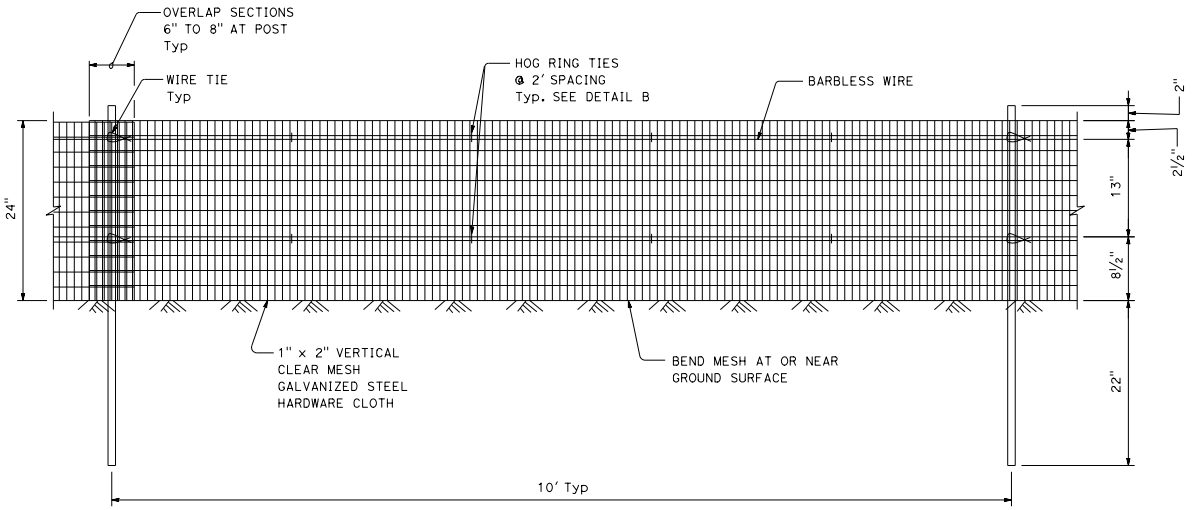
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

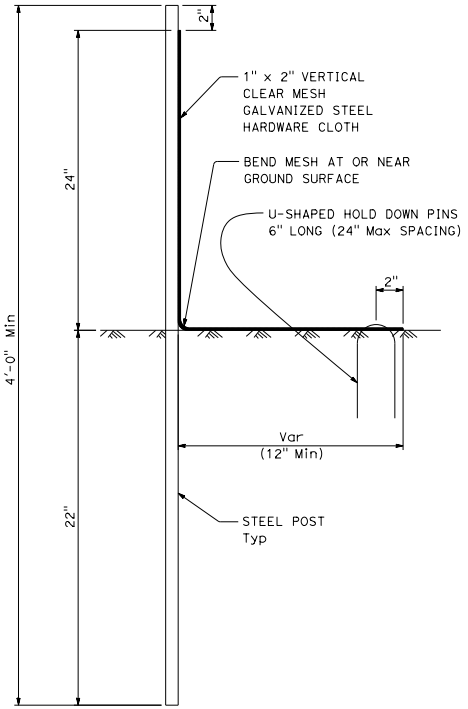
May 31, 2018
PLANS APPROVAL DATE

M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

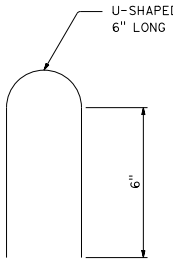
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



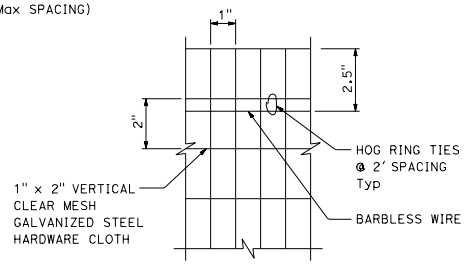
FRONT VIEW



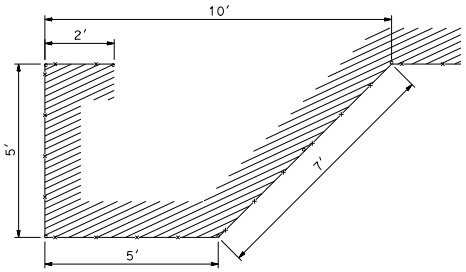
SECTION A-A



DETAIL A



DETAIL B



REDIRECTIONAL CONFIGURATION PLAN VIEW

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY DESERT TORTOISE FENCE

NO SCALE

A84A

2018 STANDARD PLAN A84A

1-29-18

Return to Table of Contents

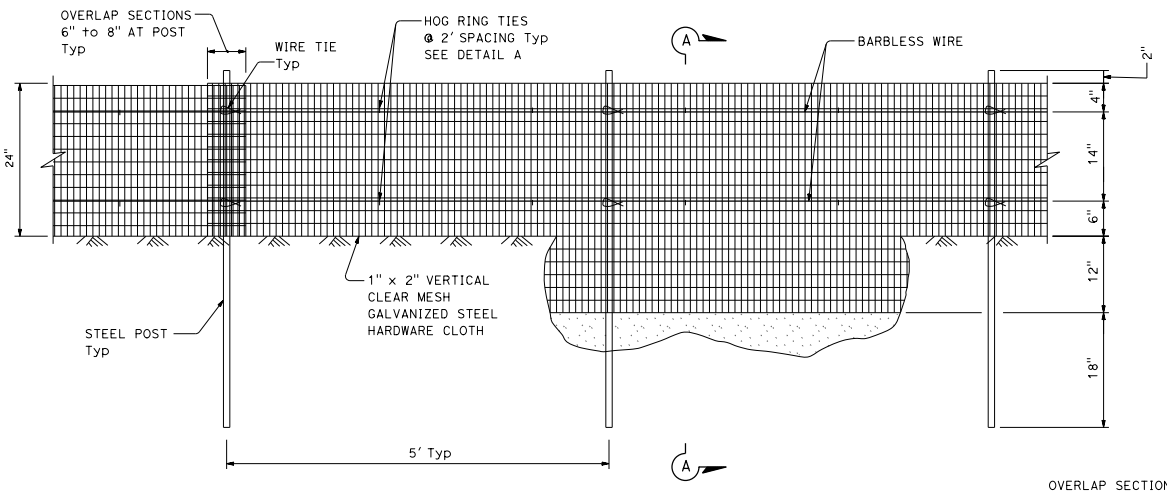
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA



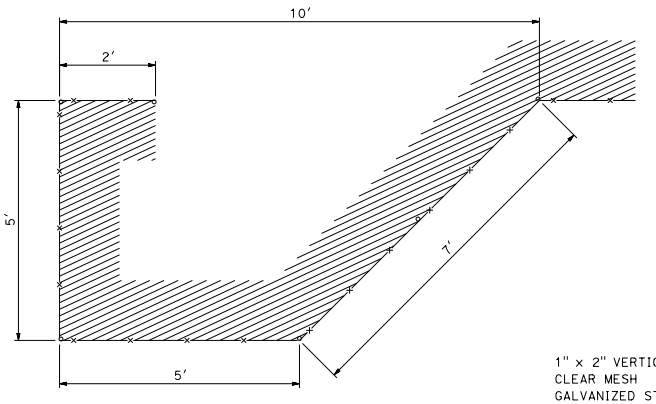
FRONT VIEW

LEGEND:

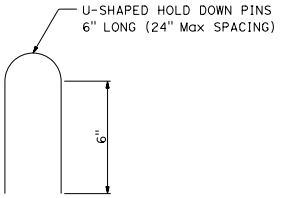
Desert Tortoise Habitat

NOTE:

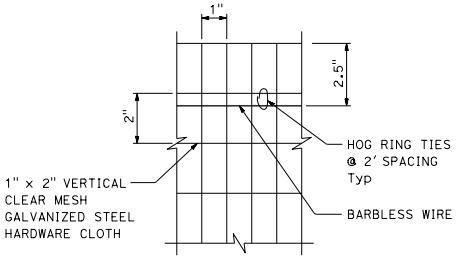
1. Exact locations for desert tortoise fence are shown on the plans.



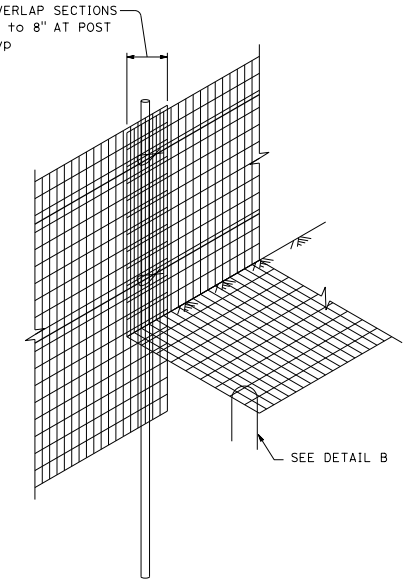
REDIRECTIONAL CONFIGURATION PLAN VIEW



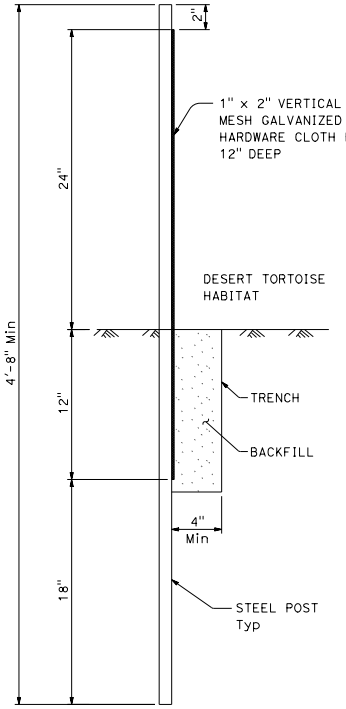
DETAIL B



DETAIL A



FENCE TRANSITION FOR
BEDROCK OR CALICHE SUBSTRATE



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DESERT TORTOISE FENCE

NO SCALE

A84B

2018 STANDARD PLAN A84B

1-29-18

Return to Table of Contents

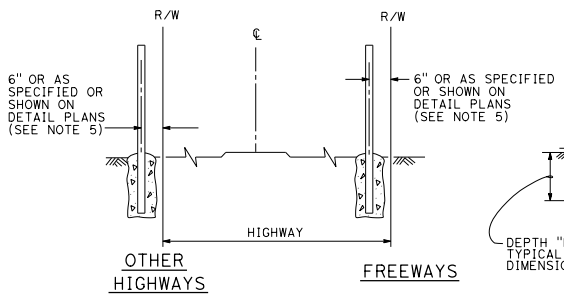
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

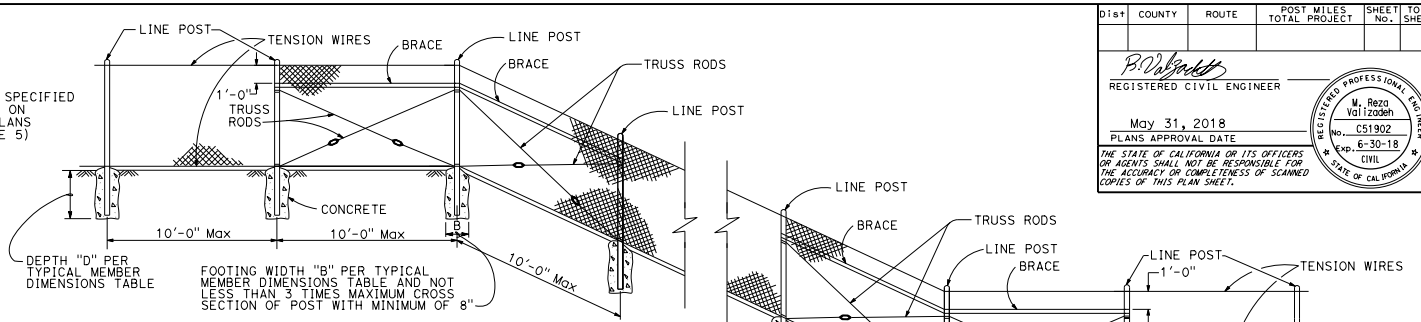
May 31, 2018
PLANS APPROVAL DATE

W. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

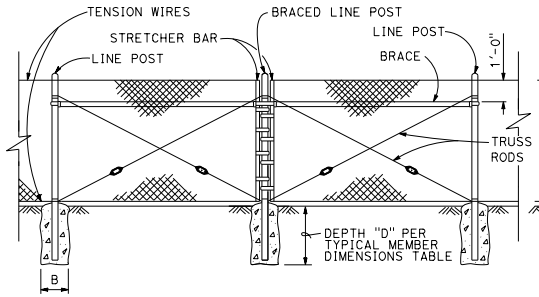
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FENCE LOCATION

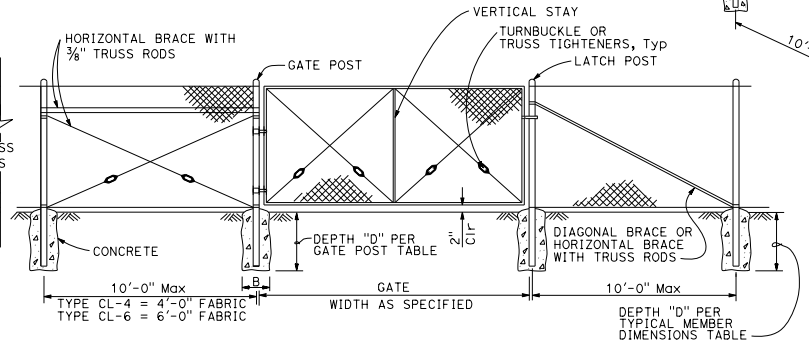


CHAIN LINK FENCE ON SHARP BREAK IN GRADE



BRACED LINE POST INSTALLATION

Braced line post at intervals not exceeding 1000'



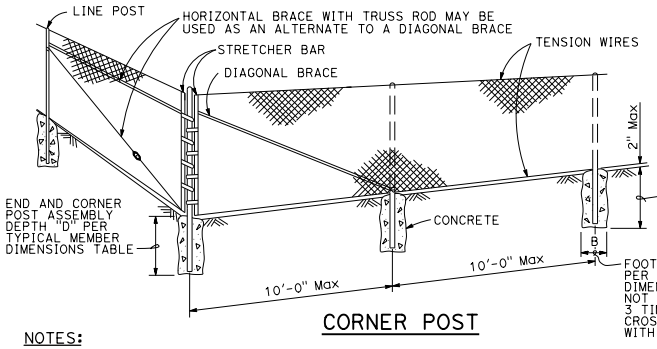
CHAIN LINK GATE INSTALLATION

Maximum Gate Width is 12'-0"
Vertical Stay is required in middle of gate greater than 8'-0" in width.

GATE POST

FENCE HEIGHT (Max)	SLATTED	B (in)	D (ft)	ROUND PIPE		
				SECTION	ROUND OD PIPE	WEIGHT (lb/ft)
5'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
6'-0"	NO	12"	2'-6"	3 Std	3.50"	7.58
8'-0"	NO	12"	3'-0"	3 Std	3.50"	7.58
10'-0"	NO	14"	3'-6"	3 Std	3.50"	7.58
5'-0"	YES	12"	3'-0"	3½ Std	4.00"	9.12
6'-0"	YES	14"	3'-6"	4 Std	4.50"	10.80
8'-0"	YES	18"	3'-6"	5 Std	5.56"	14.60
10'-0"	YES	20"	4'-0"	6 Std	6.63"	19.00

Above post dimensions and weights are minimums.
Larger sizes may be used upon approval.



CORNER POST

TYPICAL MEMBER DIMENSIONS (See Notes)

FENCE HEIGHT (Max)	SLATTED	B (in)	D (ft)	LINE POSTS					BRACES				
				ROUND PIPE			ROLL FORMED		ROUND PIPE			ROLL FORMED	
				SECTION	ROUND OD PIPE	WEIGHT (lb/ft)	SECTION	WEIGHT (lb/ft)	SECTION	ROUND OD PIPE	WEIGHT (lb/ft)	SECTION	WEIGHT (lb/ft)
5'-0"	NO	8"	2'-6"	1½ Std	1.90"	2.72	1.875" x 1.625"	1.85	1½" Std	1.90"	2.72	1.625" x 1.250"	1.35
6'-0"	NO	10"	2'-6"	2 Std	2.38"	3.66	1.875" x 1.625"	2.40	2 Std	2.38"	3.66	1.625" x 1.250"	1.35
8'-0"	NO	12"	3'-0"	2½ Std	2.88"	5.80	3.250" x 2.500"	4.50	2 Std	2.38"	3.66	1.625" x 1.250"	1.35
10'-0"	NO	14"	3'-6"	3 Std	3.50"	7.58	3.250" x 2.500"	4.50	2½ Std	2.88"	5.80	1.625" x 1.250"	1.35
5'-0"	YES	12"	3'-0"	3½ Std	4.00"	9.12	N/A	-	2 Std	2.38"	3.66	N/A	-
6'-0"	YES	14"	3'-0"	4 Std	4.50"	10.80	N/A	-	2 Std	2.38"	3.66	N/A	-
8'-0"	YES	18"	3'-6"	5 Std	5.56"	14.60	N/A	-	2 Std	2.38"	3.66	N/A	-
10'-0"	YES	20"	4'-0"	6 Std	6.63"	19.00	N/A	-	2½ Std	2.88"	5.80	N/A	-

NOTES:

1. The table to the right shows minimum sized posts and braces complying with the specifications. Larger or heavier post and brace sizes may be used upon approval.
2. Sections shown in the tables must also comply with the strength requirements and other provisions of the Specifications.
3. Other sections which comply with the strength requirements and other provisions of the Specifications may be used upon approval.
4. Options exercised shall be uniform on any one project.
5. Offset to be 2'-0" at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 20'-0" long.
6. See Standard Plan A85B for Brace, Stretcher Bar, and Truss Tightener Details.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CHAIN LINK FENCE

NO SCALE

A85

2-1-18

2018 STANDARD PLAN A85

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

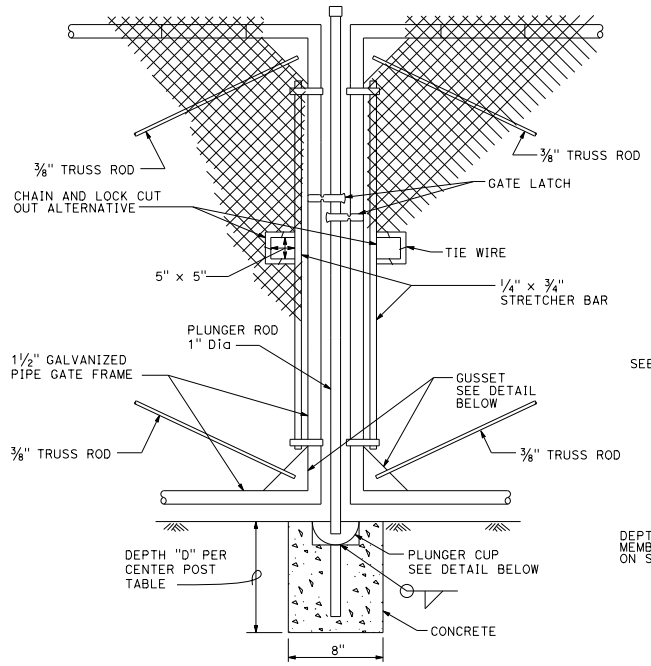
REGISTERED PROFESSIONAL ENGINEER
W. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

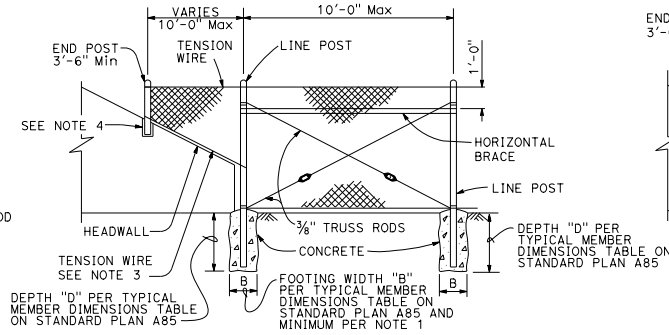
1. B is not less than 3 times maximum cross section of post with minimum of 8".
2. See Standard Plan A85 for Chain Link Fencing dimensions.
3. See Detail A on Standard Plan A86B for connection at headwall.
4. See Detail D on Standard Plan A86B for connection at headwall.

CENTER POST		
FENCE HEIGHT (Max)	SLATTED	D
ALL HEIGHTS	NO	1'-6"
5'-0"	YES	3'-0"
6'-0"	YES	3'-0"
8'-0"	YES	3'-6"
10'-0"	YES	4'-0"

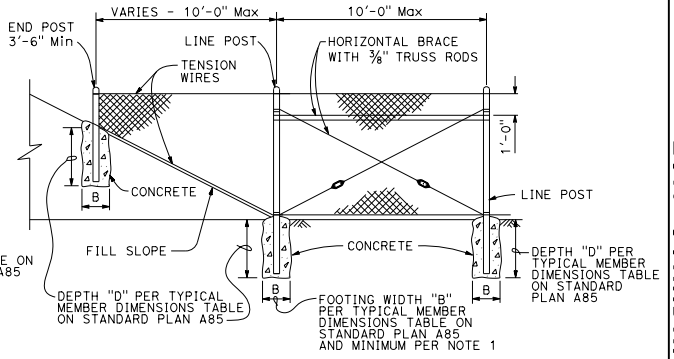


DOUBLE GATE REMOVABLE CENTER POST

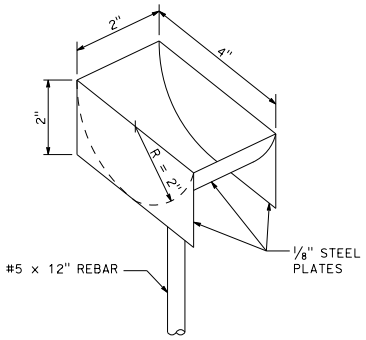
Each gate maximum width is 12'-0"



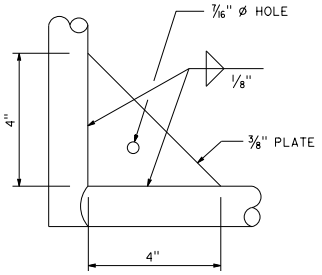
METHOD OF TYING FENCE TO HEADWALL



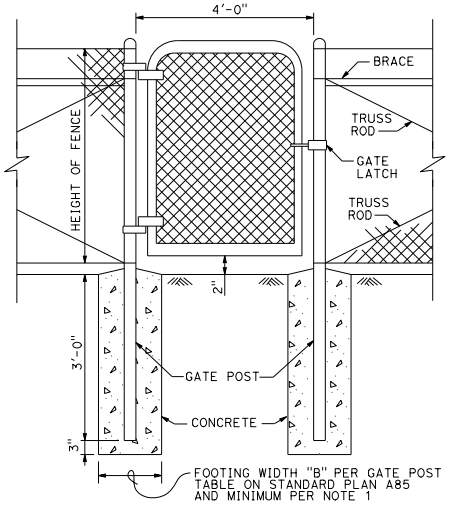
METHOD OF ERECTING FENCE FOR FILL SLOPE



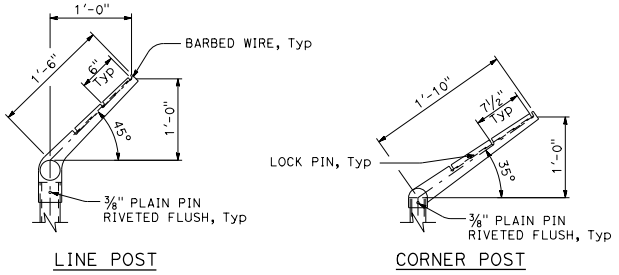
PLUNGER CUP DETAIL



GUSSET DETAIL



WALK GATE



BARBED WIRE POST TOP

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CHAIN LINK FENCE DETAILS

NO SCALE

A85A

2018 STANDARD PLAN A85A

1-29-18

Return to Table of Contents

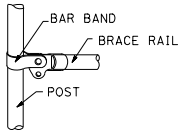
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

P. Valizadeh
REGISTERED CIVIL ENGINEER

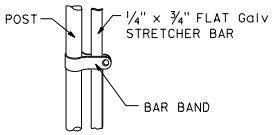
May 31, 2018
PLANS APPROVAL DATE

M. Reza Valizadeh No. C51902 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

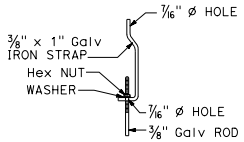
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



BRACE RAIL



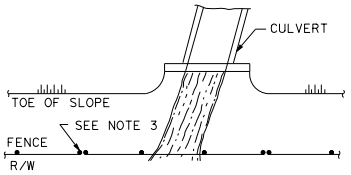
STRETCHER BAR



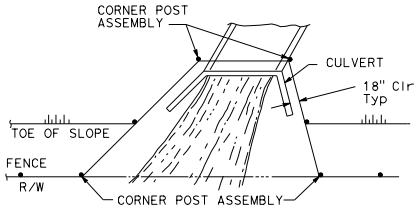
TRUSS TIGHTENER

NOTES:

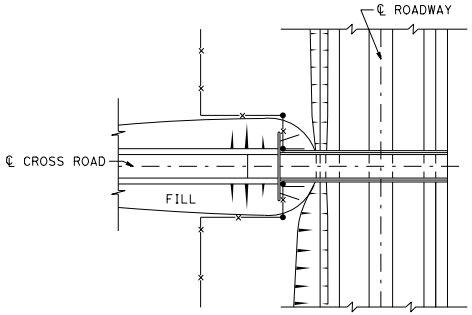
1. All material for abutment connection to be galvanized.
2. The chain link fabric shall be replaced by barbed wire strands at 12" maximum centers between the double posts.
3. When the width of the culvert makes it necessary to anchor a post to the top of the culvert, a cast iron shoe or other device approved by the Engineer shall be used.
4. Fencing over stream and around headwall may also use Barbed Wire or Wire Mesh fencing with either wood post or steel post installation.
5. See Standard Plan A85 for Chain Link fence dimensions. See Standard Plan A86 for Barbed Wire and Wire Mesh fence dimensions and for wood post and steel post installation.



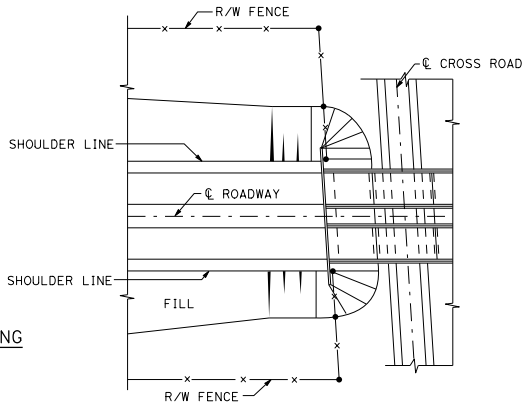
PLAN



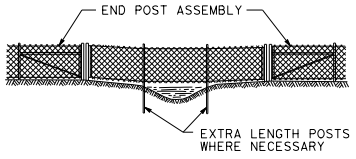
PLAN



PLAN OF ROADWAY - OVERCROSSING

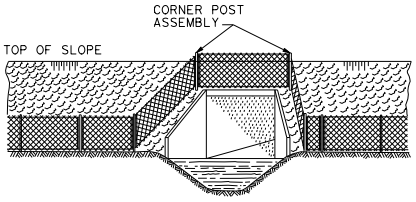


PLAN OF ROADWAY - UNDERCROSSING



ELEVATION

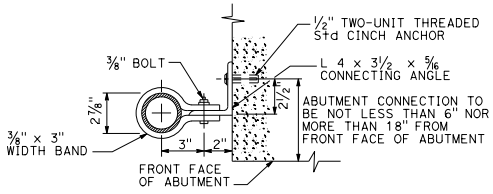
INSTALLATION OVER STREAM



ELEVATION

INSTALLATION AROUND HEADWALL

See Note 4



ABUTMENT CONNECTION

TYPICAL INSTALLATION AT BRIDGES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CHAIN LINK FENCE DETAILS

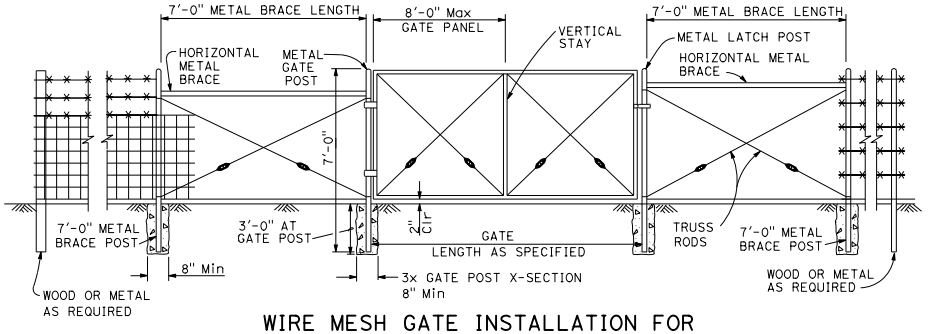
NO SCALE

A85B

2018 STANDARD PLAN A85B

1-29-18

Return to Table of Contents



WIRE MESH GATE INSTALLATION FOR EITHER WOOD OR METAL POST FENCES

WIRE MESH GATE POST (SEE NOTE 3)		
GATE WIDTHS	NOMINAL Dia	WEIGHT PER FOOT
UP THRU 6'-0"	2½"	5.79 LB
OVER 6'-0" THRU 12'-0"	3½"	9.11 LB
OVER 12'-0" THRU 18'-0"	5"	14.62 LB
OVER 18'-0" TO 24'-0" Max	6"	18.97 LB

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

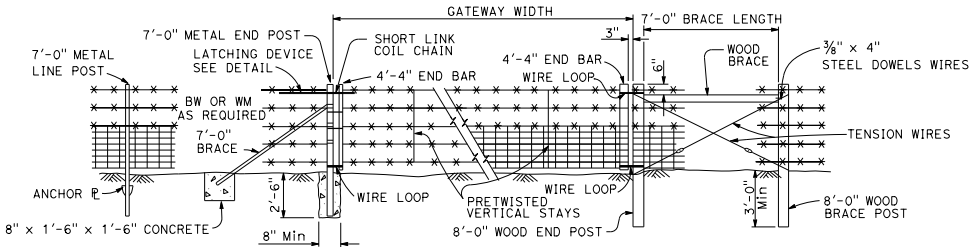
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — M. Reza Valizadeh — No. C51902 — Exp. 6-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

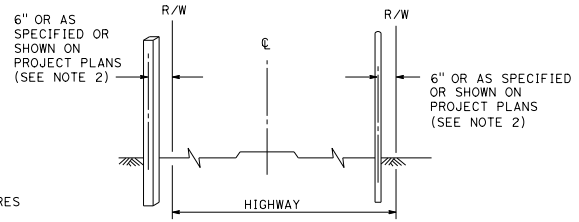
NOTES:

1. Metal end post and end bar shown. Use wood end post and end bar for wood post installation.
2. Offset to be 2'-0" at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 20'-0" long.
3. Post dimensions and weights are minimums. Larger sizes may be used on approval of the Engineer.

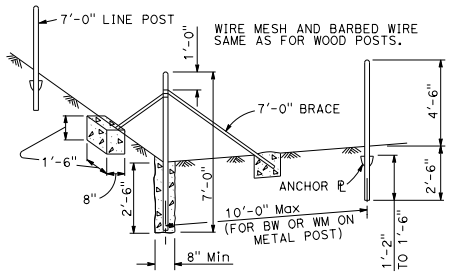


METAL POST INSTALLATION — WOOD POST INSTALLATION

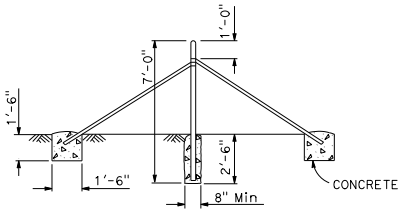
GATEWAY



FENCE LOCATION

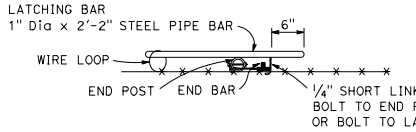


END AND CORNER POST ASSEMBLY



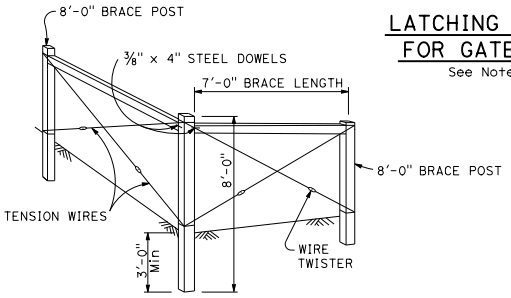
PULL POST ASSEMBLY

At 660'-0" maximum intervals for WM fence.
At 1320'-0" maximum intervals for BW fence.



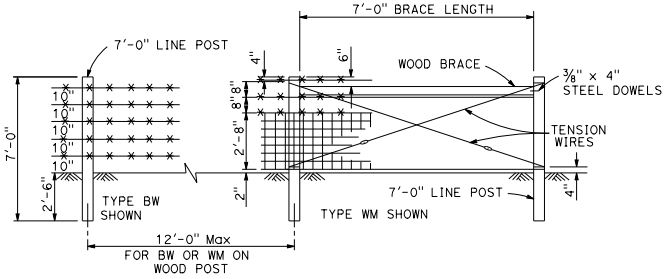
LATCHING DEVICE FOR GATEWAYS

See Note 1



END AND CORNER POST ASSEMBLY

METAL POST INSTALLATION



PULL POST ASSEMBLY

At 660'-0" maximum intervals for WM fence.
At 1320'-0" maximum intervals for BW fence.

WOOD POST INSTALLATION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BARBED WIRE AND WIRE MESH FENCES

NO SCALE

A86

2018 STANDARD PLAN A86

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

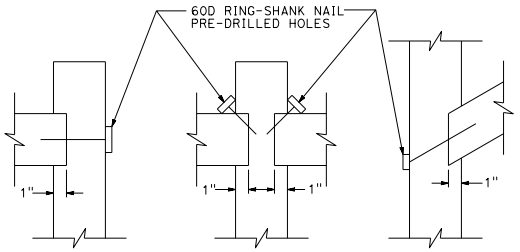
May 31, 2018
PLANS APPROVAL DATE

M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

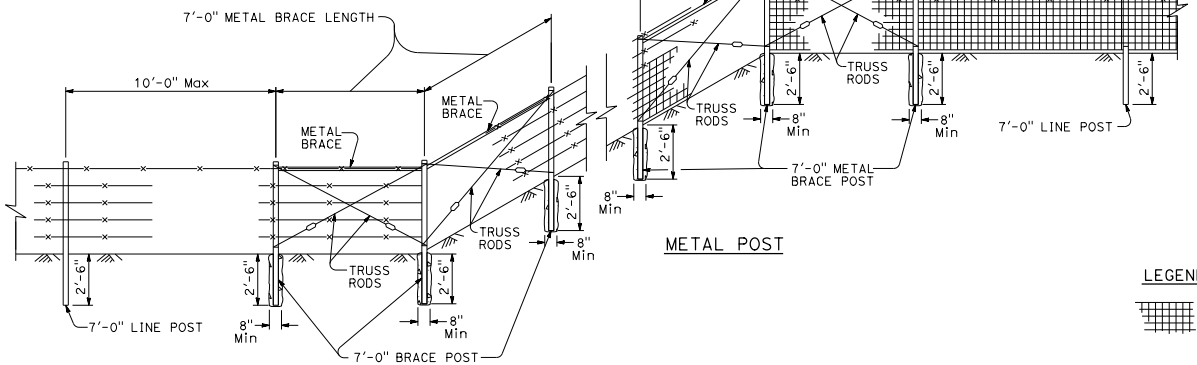
NOTES:

1. Offset to be 2'-0" at monument locations, measured at right angles to R/W lines. Taper to achieve offset to be at least 20'-0" long.
2. See Standard Plan A86 for Barbed Wire and Wire Mesh dimensions and for steel post and wood post dimensions and weight.
3. Use wood posts when specified in the Special Provisions or shown on the Project Plans.



WOOD MORTISE DETAIL

See Note 3

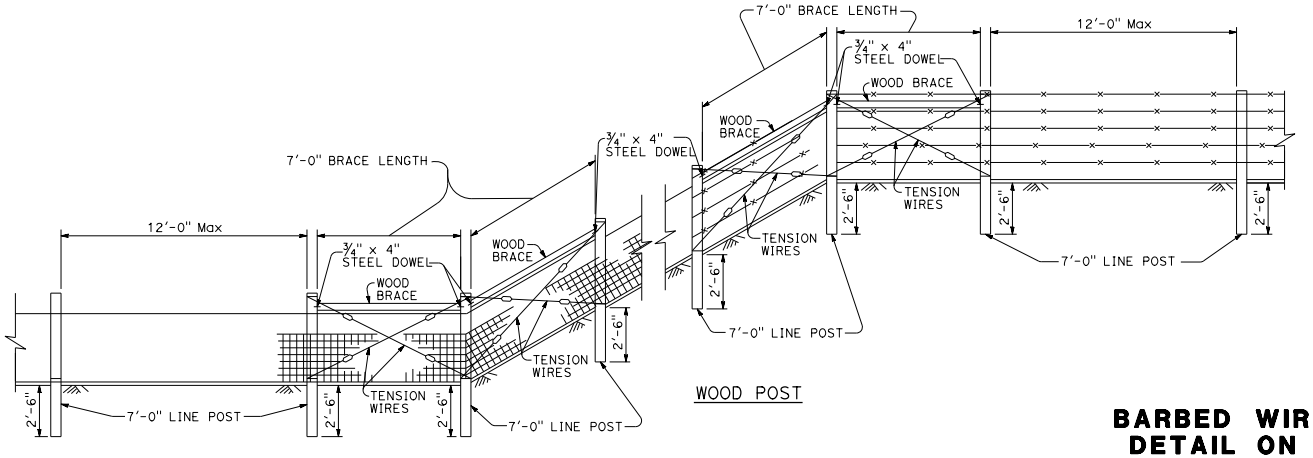


METAL POST

LEGEND:

WIRE MESH FENCING

BARBED WIRE FENCING



WOOD POST

FENCE ON SHARP BREAK IN GRADE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BARBED WIRE AND WIRE MESH FENCE DETAIL ON SHARP BREAK IN GRADE

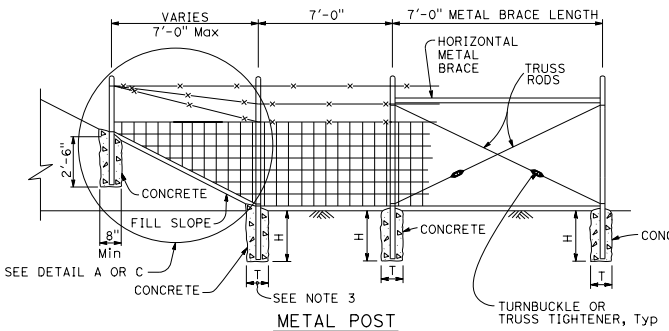
NO SCALE

A86A

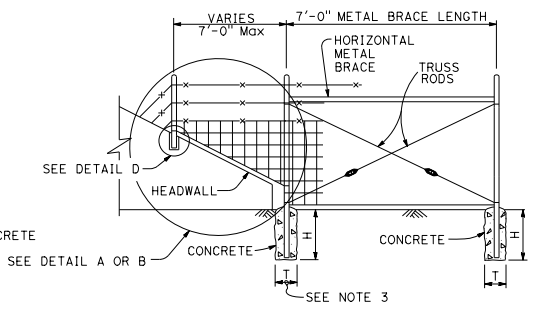
1-29-18

2018 STANDARD PLAN A86A

Return to Table of Contents



METAL POST



METAL POST

NOTES:

1. Wire Mesh fencing shown, can also use Barbed Wire fencing.
2. See Standard Plan A86 for Wire Mesh and Barbed Wire fence dimensions.
3. T is not less than 3 times maximum cross section of post with minimum of 8".
4. H is 2'-6" for fabric less than 5'-0" high. H is 3'-0" for fabric 5'-0" and over.
5. May be used when thickness of concrete is 1'-0" or more.
6. May be used when thickness of concrete is 10" or more.

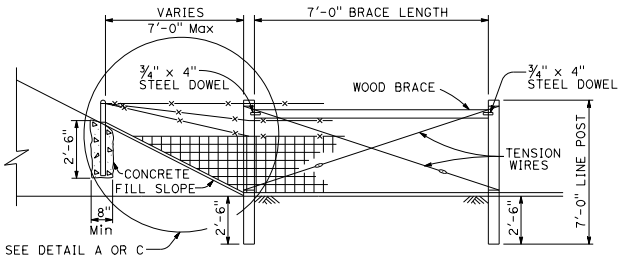
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

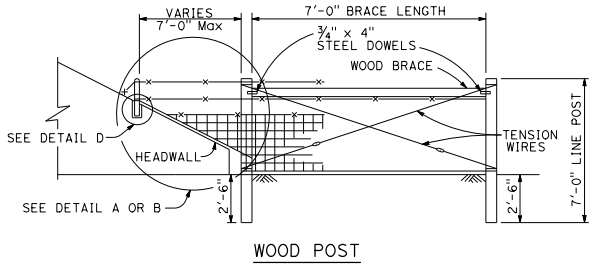
REGISTERED PROFESSIONAL ENGINEER
M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



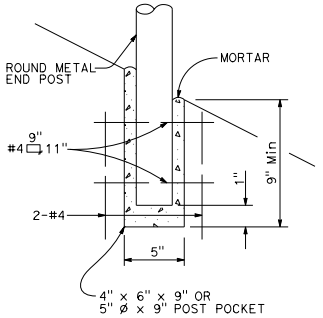
WOOD POST

METHOD OF ERECTING FENCE FOR FILL SLOPE

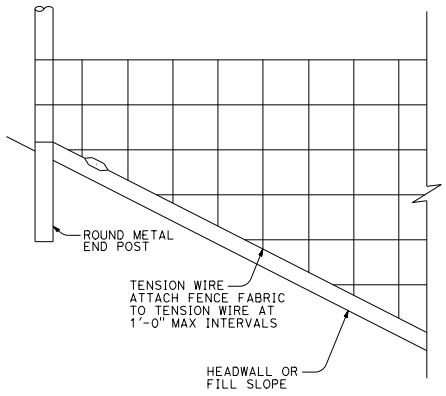


WOOD POST

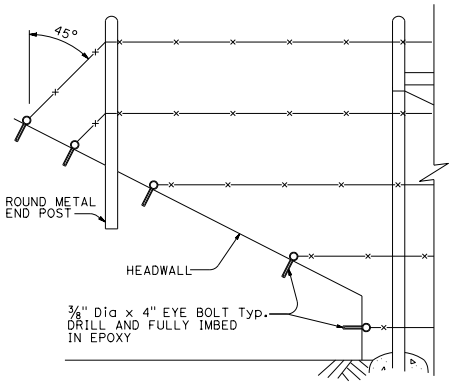
METHOD OF TYING FENCE TO HEADWALL



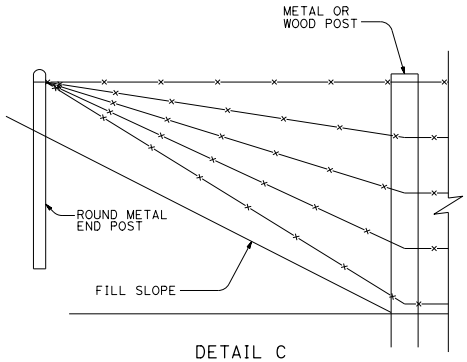
DETAIL D
See Note 5



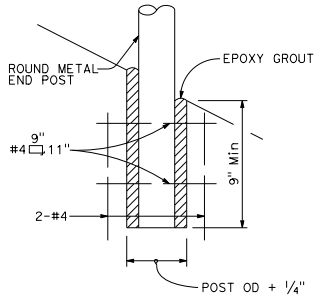
DETAIL A



DETAIL B



DETAIL C



ALTERNATIVE DETAIL D
See Note 6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BARBED WIRE AND WIRE MESH FENCE DETAILS

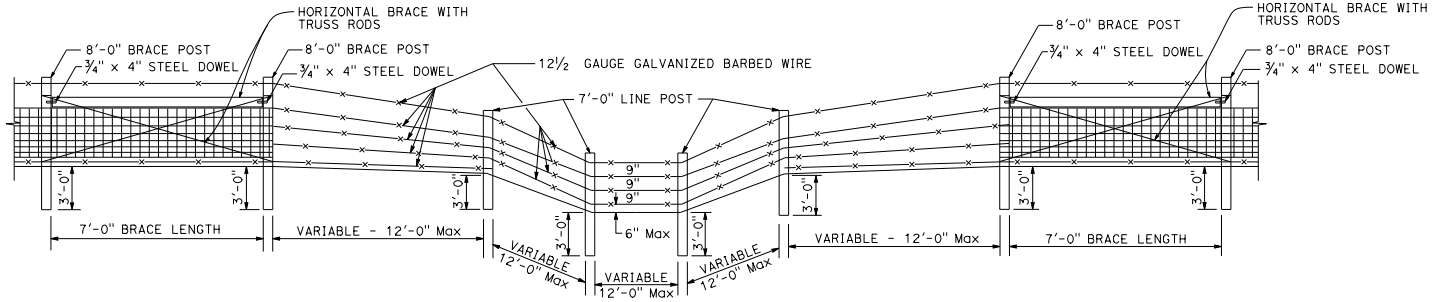
NO SCALE

A86B

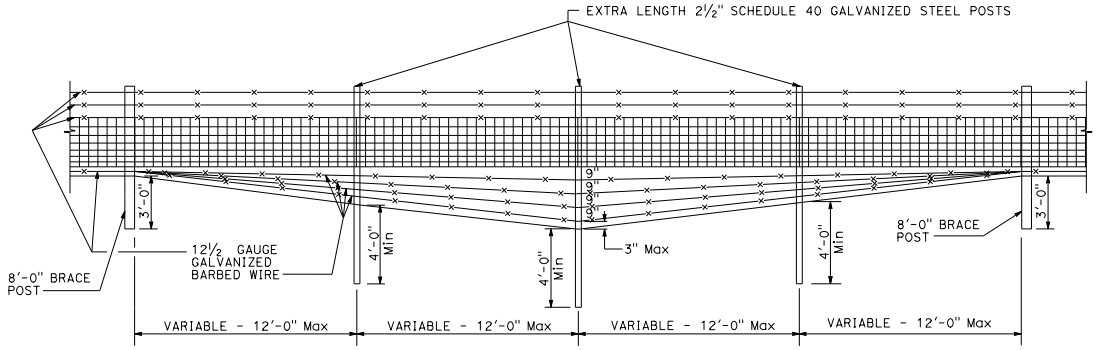
1-29-18

2018 STANDARD PLAN A86B

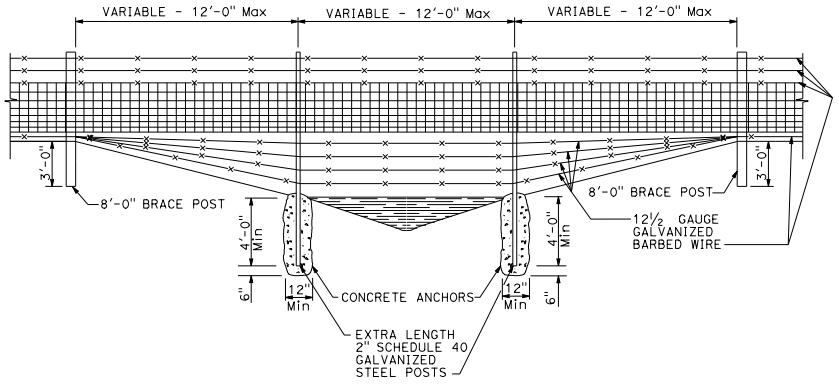
Return to Table of Contents



TYPE I



TYPE II



TYPE III

DITCH CROSSINGS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

NOTES:

1. Type I Ditch Crossing shows wood posts. Steel posts may be used in place of wood.
2. Ditch crossings show Wire Mesh fencing. Barbed Wire fencing may be used in place of Wire Mesh.
3. See Standard Plan A86 for Wire Mesh and Barbed Wire fence dimensions.
4. See Standard Plan A86 for steel post installation.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BARBED WIRE AND WIRE MESH FENCE DETAILS AT DITCH CROSSING

NO SCALE

A86C

1-29-18

2018 STANDARD PLAN A86C

Return to Table of Contents

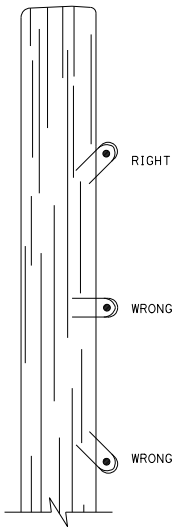
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

R. Valizadeh
REGISTERED CIVIL ENGINEER

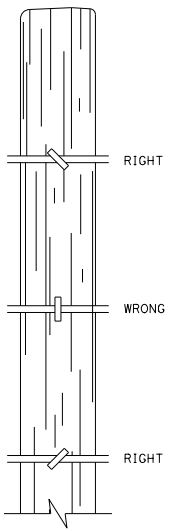
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M. Reza Valizadeh
No. C51902
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

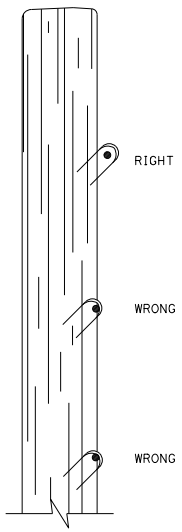
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



DRIVE STAPLES AT ANGLE



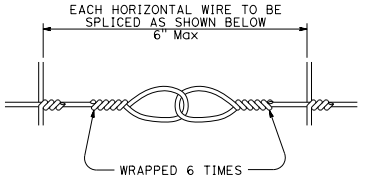
DO NOT DRIVE STAPLES PARALLEL TO SIDE OF POST



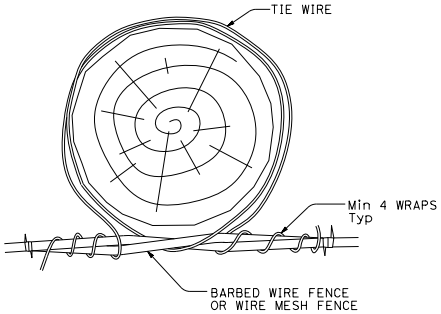
LEAVE WIRE LOOSE IN STAPLE

LINE POST STAPLING DETAILS

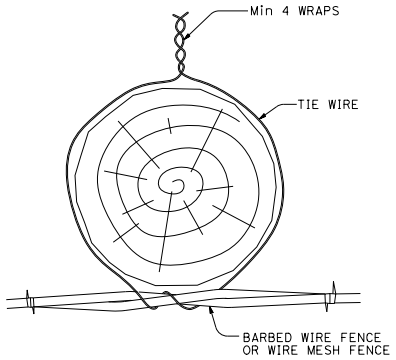
(Apply to rectangular/square and round posts)
Do not staple vertical wire in wire mesh.



SPLICE DETAIL FOR BARBED WIRE/WIRE MESH FENCE



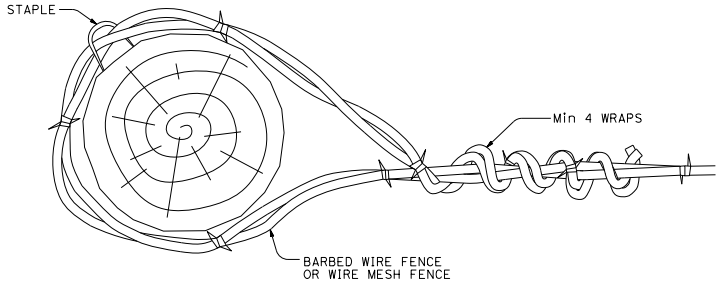
OPTION A



OPTION B

LINE POST WIRE TIE OPTION DETAILS

(Option details also apply to rectangular/square posts)



END, LATCH, PULL, AND CORNER POST DETAIL

(Also applies to rectangular/square posts)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BARBED WIRE AND WIRE MESH FENCE - MISCELLANEOUS DETAILS

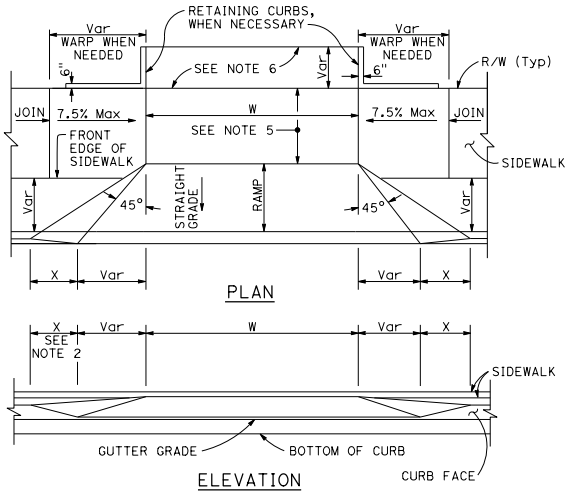
NO SCALE

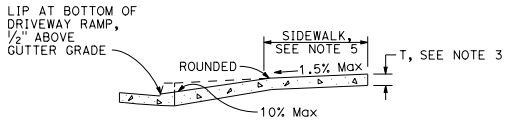
A86D

1-29-18

2018 STANDARD PLAN A86D

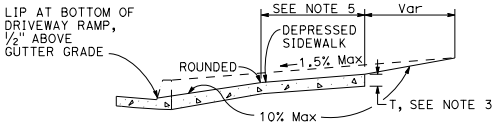
Return to Table of Contents





CASE A

Typical driveway, sidewalk not depressed



CASE B

Driveway with depressed sidewalk

SECTIONS

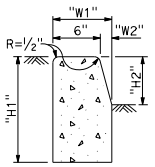
TABLE A

CURB TYPE	DIMENSIONS			
	"H1"	"H2"	"W1"	"W2"
A1-6	1'-2"	6"	7½"	1½"
A1-8	1'-4"	8"	8"	2"
A2-6	1'-0"	6"	2'-7½"	1½"
A2-8	1'-2"	8"	2'-8"	2"
A3-6	6"	5"	7¼"	1¼"
A3-8	8"	7"	7¾"	1¾"
B1-4	1'-0"	4"	7½"	2½"
B1-6	1'-2"	6"	9"	4"
B2-4	10"	4"	2'-7½"	2½"
B2-6	1'-0"	6"	2'-9"	4"
B3-4	4"	3"	7"	2"
B3-6	6"	5"	8½"	3½"
D-4	10"	4"	1'-6"	1'-1"
D-6	1'-0"	6"	2'-2"	1'-9"

CURB QUANTITIES

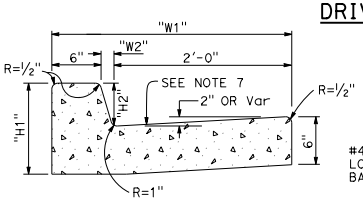
TYPE	CUBIC YARDS PER LINEAR FOOT
A1-6	0.02585
A1-8	0.03084
A2-6	0.05903
A2-8	0.06379
A3-6	0.01036
A3-8	0.01435
B1-4	0.02185
B1-6	0.02930
B2-4	0.05515
B2-6	0.06171
B3-4	0.00641
B3-6	0.01074
B4	0.05709
D-4	0.04083
D-6	0.06804
E	0.06661

DRIVEWAYS



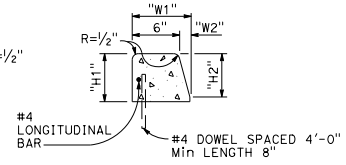
TYPE A1 CURBS

See Table A



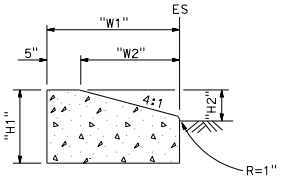
TYPE A2 CURBS

See Table A



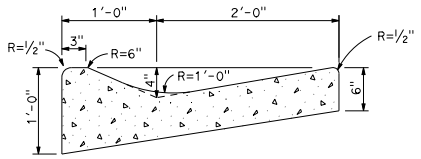
TYPE A3 CURBS

Superimposed on existing pavement
See Table A

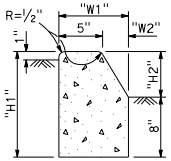


TYPE D CURBS

See Table A

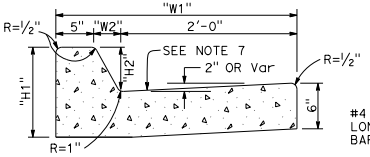


TYPE E CURB



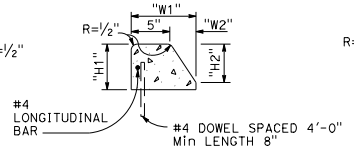
TYPE B1 CURBS

See Table A



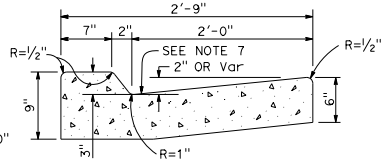
TYPE B2 CURBS

See Table A

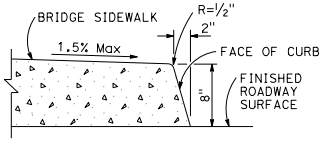


TYPE B3 CURBS

Superimposed on existing pavement
See Table A



TYPE B4 CURBS



TYPE H CURB

On Bridges

CURBS

NOTES:

1. Case A driveway section typically applies.
2. X=3'-0" except for curb heights over 10" where 4:1 slopes shall be used on curb slope.
3. Sidewalk and ramp thickness "T" at driveway shall be 4" for residental and 6" for commercial.
4. Difference in slope of the driveway ramp and the slope of a line between the gutter and a point on the roadway 5'-0" from gutter line shall not exceed 15%. Reduce driveway ramp slope, not gutter slope, where required.
5. Minimum width of clear passageway for sidewalk shall be 4'-2".
6. Retaining curbs and acquisition of construction easement may be necessary for narrow sidewalks or curb heights in excess of 6".
7. Across the pedestrian route at curb ramp locations, the gutter pan slope shall not exceed 1" of depth for each 2'-0" of width.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Hector David Cordova — No. C41957 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURBS AND DRIVEWAYS

NO SCALE

A87A

1-29-18

Return to Table of Contents

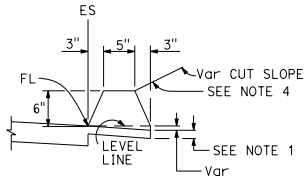
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H. David Cordova
REGISTERED CIVIL ENGINEER

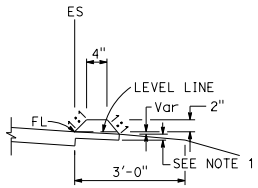
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hector David Cordova
No. C41957
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

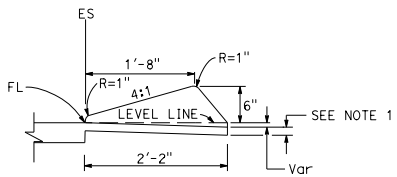
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



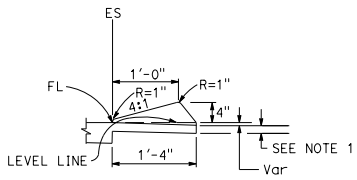
TYPE A
See Notes 3 and 5



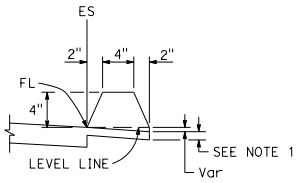
TYPE C



TYPE D

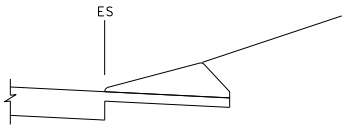


TYPE E

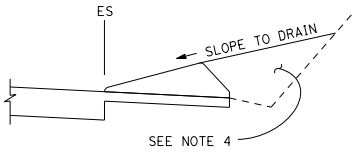


TYPE F
See Note 5

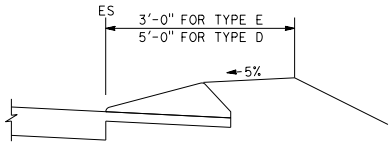
DIKES



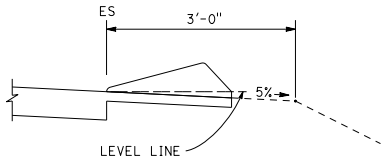
CASE C-1
Cut Slope



CASE C-2
Cut Slope



CASE F



CASE R
See Note 2

TYPE D AND E BACKFILL DETAILS

NOTES:

1. For HMA shoulders only, extend top layer of HMA placed on the shoulder under dike with no joint at the ES. For projects with OGFC shoulders, do not extend OGFC under dike. See project plans for modified dike detail.
2. Case R applies to retrofit only projects where restrictive conditions do not provide enough width for Case F backfill.
3. Type A dike only to be used where restrictive slope conditions do not provide enough width to use Type D or Type E dike.
4. Fill and compact with excavated material to top of dike.
5. Use Type A or F dike, where dike is required with guardrail installations. See Standard Plan A77N4 for dike positioning details. See Standard Plan A77N3 for hinge point offsets with guardrail.

DIKE QUANTITIES

TYPE	CUBIC YARDS PER LINEAR FOOT
A	0.0135
C	0.0038
D	0.0293
E	0.0130
F	0.0066

Quantities based on 5% cross slope.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

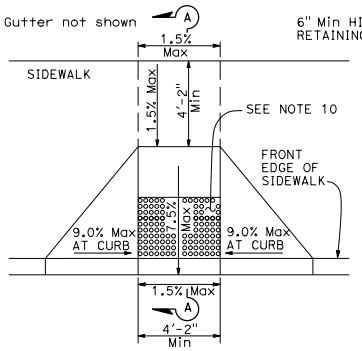
HOT MIX ASPHALT DIKES

NO SCALE

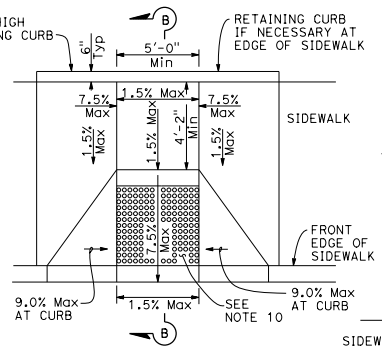
A87B

1-29-18

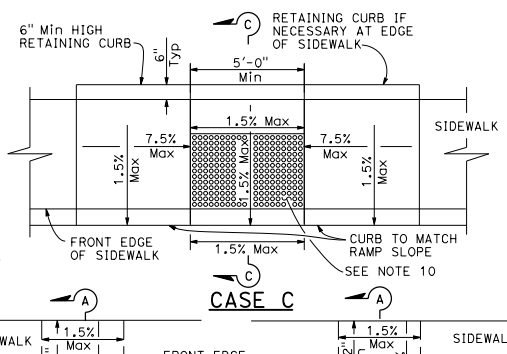
Return to Table of Contents



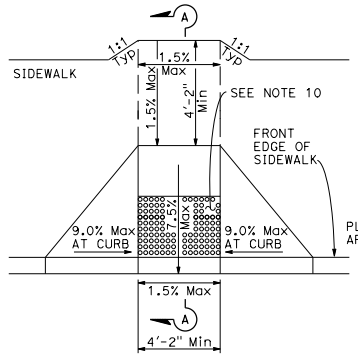
CASE A



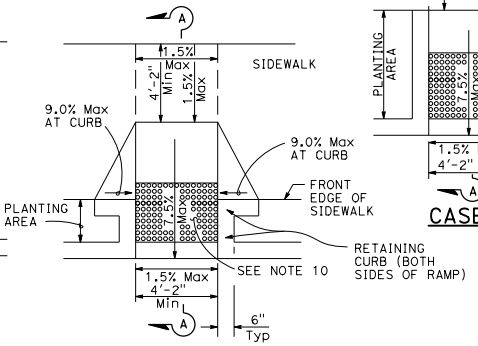
CASE B



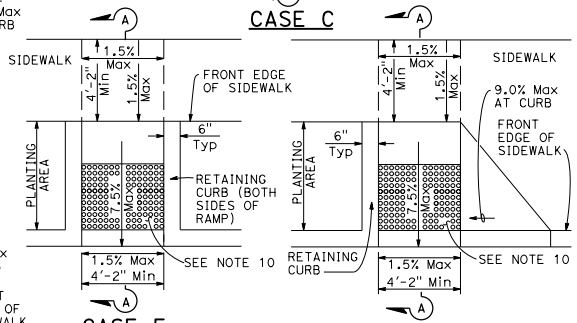
CASE C



CASE D

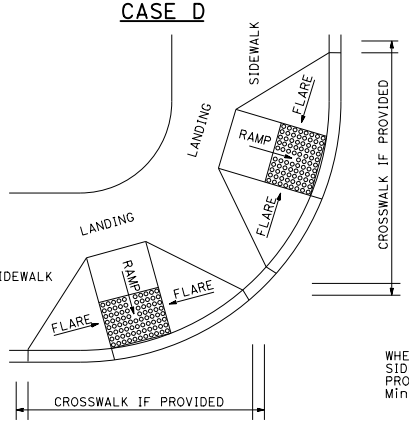


CASE E

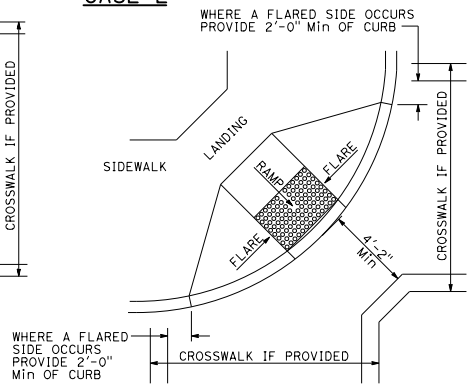


CASE F

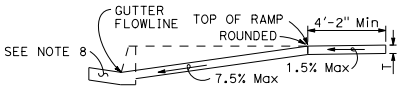
CASE G
See Note 4



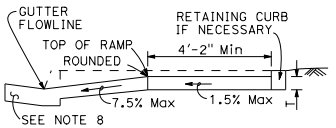
DETAIL A
TYPICAL TWO-RAMP CORNER INSTALLATION
See Note 1



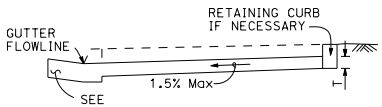
DETAIL B
TYPICAL ONE-RAMP CORNER INSTALLATION
See Notes 1 and 3



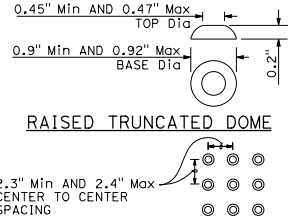
SECTION A-A



SECTION B-B
Depress entire sidewalk as required



SECTION C-C



RAISED TRUNCATED DOME PATTERN (IN-LINE)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

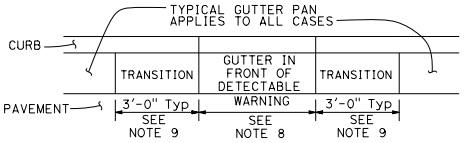
Rebecca Lynn Mowry No. C54415 Exp. 12-31-19 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DETECTABLE WARNING SURFACE

NOTES: See Note 10

1. As site conditions dictate, Case A through Case G curb ramps may be used for corner installations similar to those shown in Detail A and Detail B. The case of curb ramps used in Detail A do not have to be the same. Case A through Case G curb ramps also may be used at mid block locations, as site conditions dictate. For specific site condition configuration, including the conform to existing sidewalk, see Project Plans.
2. If distance from curb to back of sidewalk is too short to accommodate ramp and 4'-2" platform (landing) as shown in Case A, the sidewalk may be depressed longitudinally as in Case B or C or may be widened as in Case D.
3. When ramp is located in center of curb return, crosswalk configuration must be similar to that shown for Detail B.
4. As site conditions dictate, the retaining curb side and the flared side of the Case G ramp shall be constructed in reversed position.
5. The ramp portion of the curb ramp is a typical rectangle, unless modified in the Project Plans.
6. Side slope of ramp flares vary uniformly from a maximum of 9.0% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp, except in Case C and Case F.
7. The adjacent surfaces at transitions at curb ramps to walks, gutters, and streets shall be at the same level.
8. Counter slopes of adjoining gutters and road surfaces immediately adjacent to and within 24 inches of the curb ramp shall not be steeper than 1V:20H (5.0%). Gutter pan slope shall not exceed 1" of depth for each 2'-0" of width.
9. Transition gutter pan slope from 1" of depth for each 2'-0" of width to match typical gutter pan slope per Standard Plan A87A.
10. The detectable warning surface will be a rectangle as shown at back of curb, unless modified in the Project Plans. Curb ramps shall have a detectable warning surface that extends the full width and 3'-0" depth of the ramp. Detectable warning surfaces shall extend the full width of the ramp except a maximum gap of 1 inch is allowed on each side of the ramp. Detectable warning surfaces shall conform to the requirements in the Standard Specifications.
11. Sidewalk and ramp thickness, "T", shall be 3½" minimum.
12. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
13. Detectable warning surface may have to be cut to allow removal of utility covers while maintaining detectable warning width and depth.



GUTTER PAN TRANSITION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURB RAMP DETAILS

NO SCALE

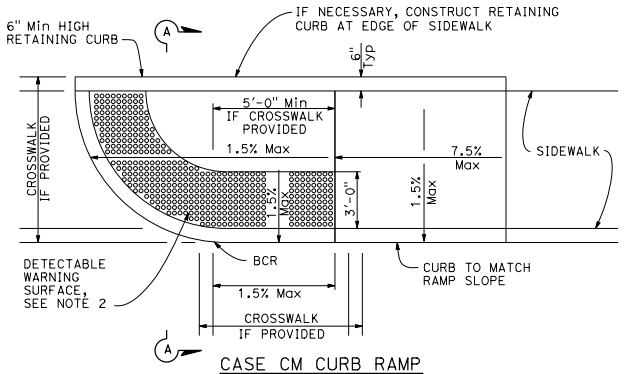
A88A

2018 STANDARD PLAN A88A

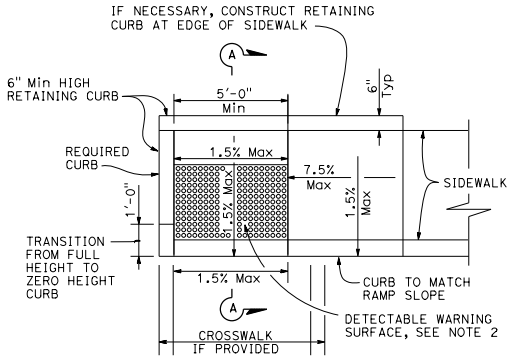
1-29-18

Return to Table of Contents

Gutter not shown



CASE CM CURB RAMP



CASE CH CURB RAMP

NOTES:

1. Sidewalk, ramp and passageway thickness, "T", shall be 3½" minimum.
2. For details of detectable warning surfaces, see Standard Plan A88A.
3. Where an island passageway length is greater than or equal to 6'-0", but less than 8'-0", each detectable warning surface shall extend the full width and 2'-0" depth of the passageway length. Where an island passageway length is greater than or equal to 8'-0", each detectable warning surface shall extend the full width and 3'-0" depth of the passageway length. Detectable warning surfaces shall extend the full width of the island passageway except a maximum gap of 1 inch is allowed on each side of the passageway.
4. The adjacent surfaces at transitions at curb ramps to walks, gutters, and streets shall be at the same level.
5. Utility pull boxes, manholes, vaults and all other utility facilities within the boundaries of the curb ramp will be relocated or adjusted to grade by the owner prior to, or in conjunction with, curb ramp construction.
6. Detectable warning surface may have to be cut to allow removal of utility covers while maintaining detectable warning width and depth.
7. For additional curb ramp details, see Standard Plan A88A.
8. The detectable warning surface will be a rectangle as shown at the face of curb, unless modified in the Project Plans.

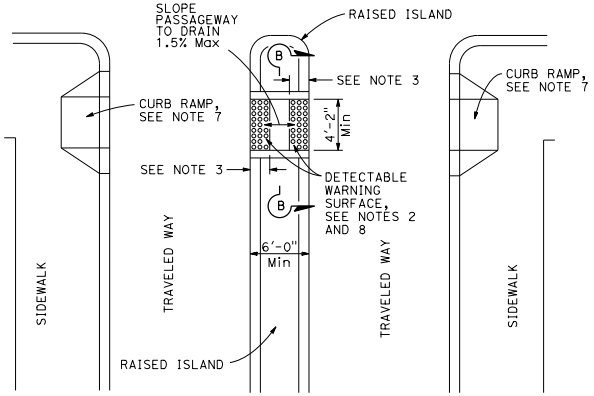
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

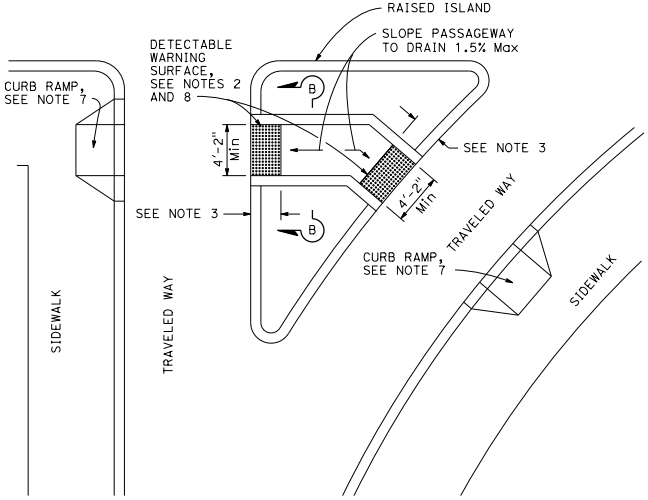
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

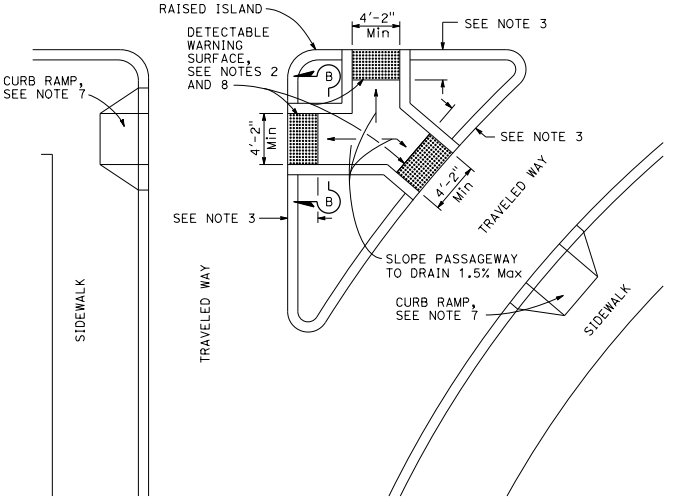
REGISTERED PROFESSIONAL ENGINEER
Rebecca Lynn Mowry
No. C54415
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA



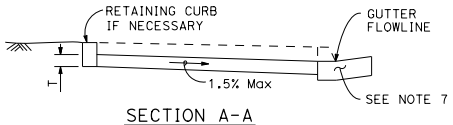
TYPE A PASSAGEWAY



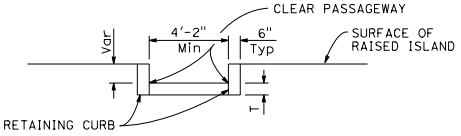
TYPE B PASSAGEWAY



TYPE C PASSAGEWAY



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CURB RAMP AND ISLAND PASSAGEWAY DETAILS

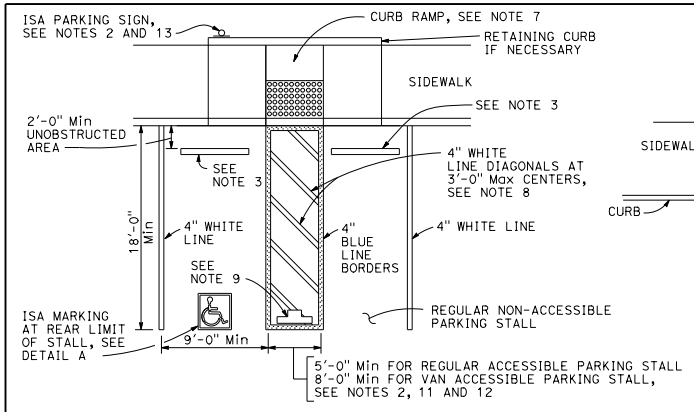
NO SCALE

A88B

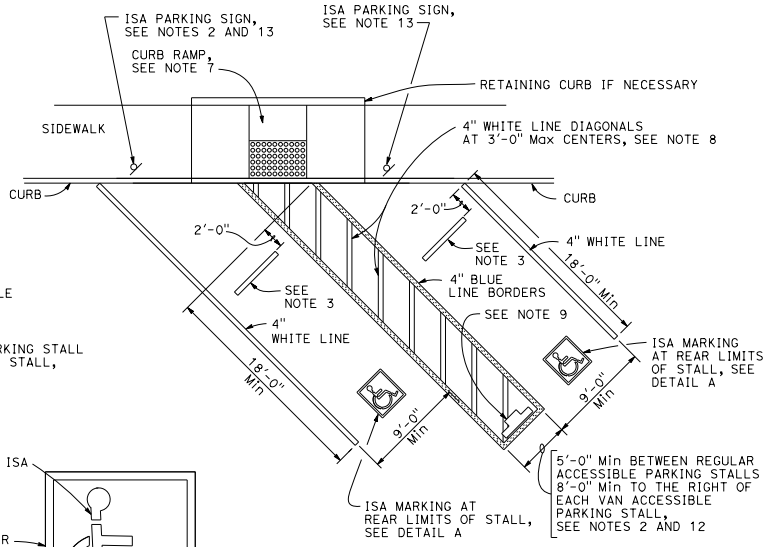
2018 STANDARD PLAN A88B

1-29-18

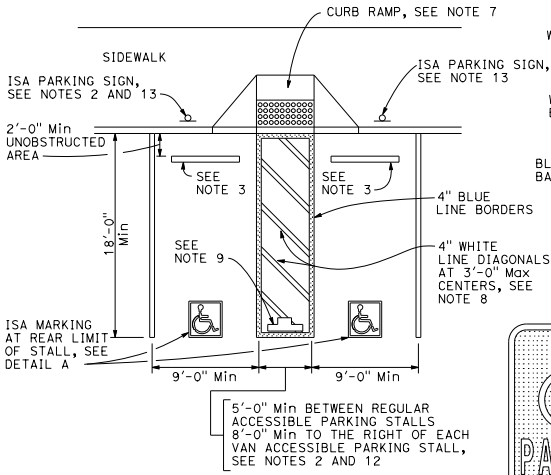
Return to Table of Contents



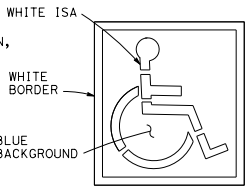
SINGLE PARKING STALL



DIAGONAL DOUBLE PARKING STALLS



DOUBLE PARKING STALL



ISA MARKING
See Standard Plan A24C

DETAIL A

TABLE A

TOTAL NUMBER OF PARKING SPACES PROVIDED IN PARKING FACILITY	MINIMUM NUMBER OF REQUIRED ACCESSIBLE PARKING SPACES
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2 PERCENT OF TOTAL
1001 AND OVER	20 PLUS 1 FOR EACH 100 OR FRACTION THEREOF OVER 1000

SIGN R99 (CA)

PLAQUE R99B (CA)

SIGN R99 (CA) with PLAQUE R99B (CA)
See Note 6

SIGN R99C (CA)
See Note 6

SIGN R100B (CA)
See Note 10

SIGN R7-8b
See Notes 2 and 6

OFF-STREET PARKING SIGNS
(Parking lot or garage)
See Note 6

NOTES:

1. Accessible parking spaces serving a particular building shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance. In parking facilities that do not serve a particular building, accessible parking shall be located on the shortest accessible route of travel to an accessible pedestrian entrance of the parking facility.
2. One in every six accessible off-street parking stalls, but not less than one, shall be served by an accessible aisle of 8'-0" minimum width and shall be signed van accessible. The R7-8b sign shall be mounted below the R99B (CA) plaque or the R99C (CA) sign.
3. In each parking stall, a curb or parking bumper shall be provided if required to prevent encroachment of vehicles over the required width of walkways. Parking stalls shall be so located that persons with disabilities are not compelled to wheel or walk behind parked vehicles other than their own. For more parking bumper requirements, see the Standard Specifications.
4. Parking spaces and access aisles shall be level with surface slopes not exceeding 1.5% in all directions.
5. Table A shall be used to determine the required number of accessible parking stalls in each parking lot or garage.
6. Where Plaque R99B (CA), Sign R99C (CA) or Sign R7-8b are installed, the bottom of the sign or plaque panel shall be a minimum of 7'-0" above the surrounding surface.
7. Curb ramps shall conform to the details shown on Standard Plan A88A.
8. Blue paint, instead of white may be used for marking accessibility aisles in areas where snow may cause white markings to not be visible.
9. The words "NO PARKING", shall be painted in white letters no less than 1'-0" high and located so that it is visible to traffic enforcement officials. See Standard Plan A90B for details of the "NO PARKING" pavement marking.
10. A R100B (CA) sign shall be posted in a conspicuous place at each entrance to off-street parking facilities or immediately adjacent to and visible from each stall. The sign shall include the address where the towed vehicle may be reclaimed and the telephone number of the local traffic law enforcement agency.
11. Where a single (non-van) accessible parking space is provided, the loading and unloading access aisle shall be on the passenger side of the vehicle as the vehicle is going forward into the parking space.
12. Where a van accessible parking space is provided, the loading and unloading access aisle shall be 8'-0" wide minimum, and shall be on the passenger side of the vehicle as the vehicle is going forward into the parking space.
13. Accessible Parking Only Sign shall be Sign R99C (CA) or Sign R99 (CA) with Plaque R99B (CA).

LEGEND

ISA = International Symbol of Accessibility

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Rebecca Lynn Mowry
No. C54415
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ACCESSIBLE PARKING OFF-STREET

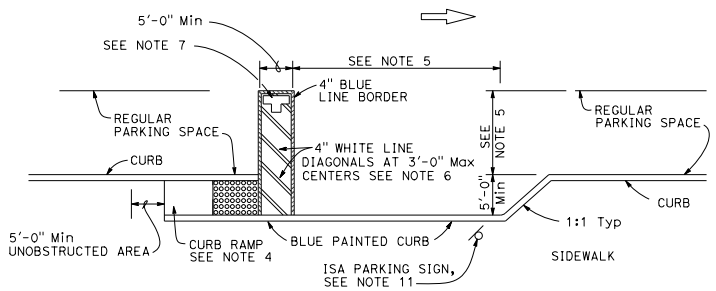
NO SCALE

A90A

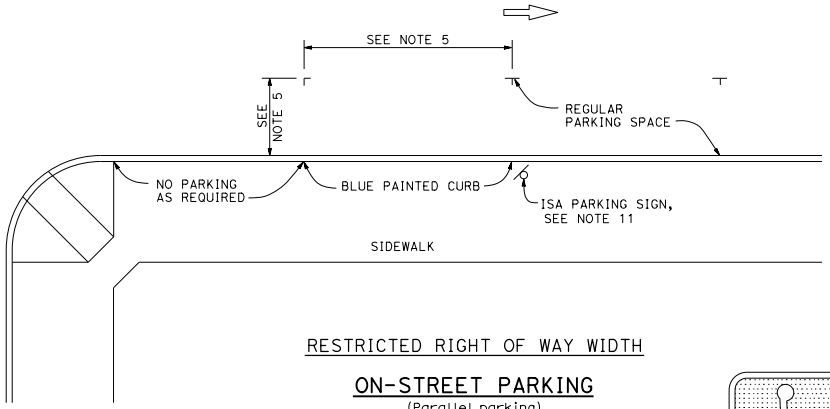
1-29-18

2018 STANDARD PLAN A90A

Return to Table of Contents



CONVENTIONAL
(See Note 9)



RESTRICTED RIGHT OF WAY WIDTH

ON-STREET PARKING
(Parallel parking)
(See Note 10)

PAVEMENT MARKING
See Note 7

SIGN R99 (CA)

PLAQUE R99B (CA)

SIGN R99 (CA) with PLAQUE R99B (CA)
See Note 3

SIGN R99C (CA)
See Note 3

NOTES:

1. Parking spaces shall be so located that persons with disabilities are not compelled to wheel or walk behind parked vehicles other than their own.
2. Surface slopes of accessible on-street parking spaces shall be the minimum feasible.
3. Where Plaque R99B (CA) or Sign R99C (CA) are installed, the bottom of the sign or plaque panel shall be a minimum of 7'-0" above the surrounding surface.
4. Curb ramps shall conform to the details shown on Standard Plan A88A.
5. Accessible on-street parking spaces shall not be smaller in length or width than that specified by the local jurisdiction for other parking spaces, but not less than 20'-0" in length and not less than 8'-0" in width.
6. Blue paint, instead of white may be used for marking accessibility aisles in areas where snow may cause white markings to not be visible.
7. The words "NO PARKING", shall be painted in white letters no less than 1'-0" high on a contrasting background and located so that it is visible to traffic enforcement officials. See Standard Plan A24E for square foot area for painting the words "NO PARKING".
8. There shall be no obstructions on the sidewalk adjacent to and for the full length of the parking space, except for the ISA parking sign shown.
9. The Conventional detail should be the primary choice of accessible on-street parking. However, if the sidewalk lacks adequate space to construct a standard curb ramp, the Restricted Right of Way detail should be used.
10. If the Restricted Right of Way width detail is selected and it conflicts with a bus stop or other uses, this detail may apply to the other end of the block.
11. Accessible Parking Only Sign shall be Sign R99C (CA) or Sign R99 (CA) with Plaque R99B (CA).

LEGEND

ISA = International Symbol of Accessibility

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Rebecca Lynn Mowry
No. C54415
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ACCESSIBLE PARKING ON-STREET

NO SCALE

A90B

2018 STANDARD PLAN A90B

1-29-18

Return to Table of Contents

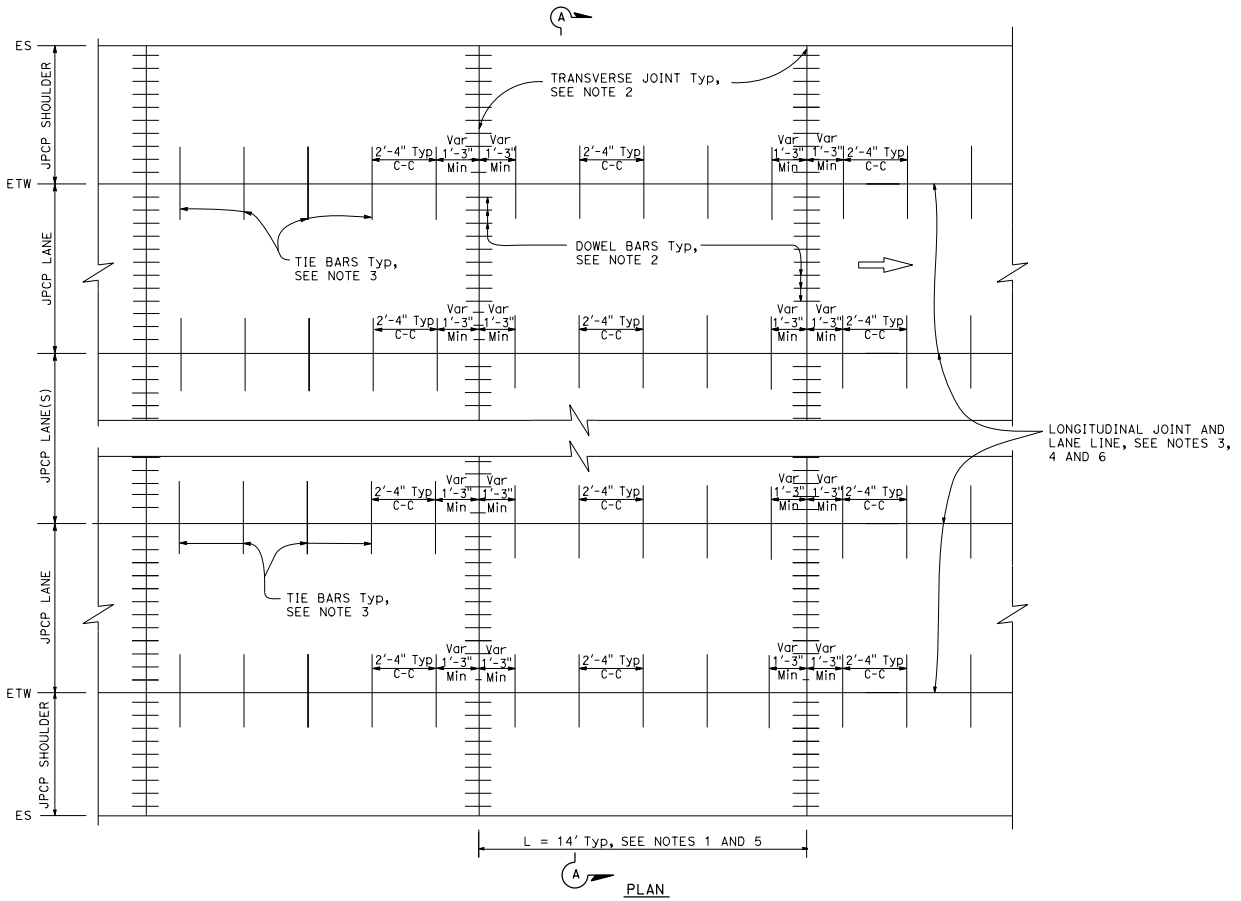
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

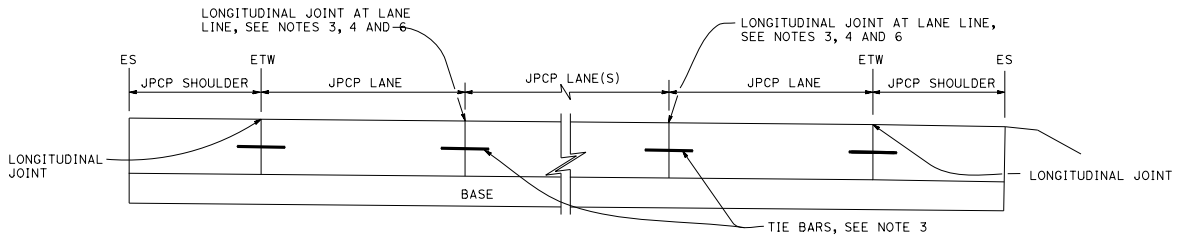
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



SECTION A-A

NOTES:

1. Transverse joint spacing may be adjusted to no less than 10' and no more than 14' to conform to bridges, change in pavement type, and hardened concrete pavement.
2. For transverse joint and dowel bar details not shown, see Standard Plan P10.
3. For longitudinal joint and tie bar details not shown, see Standard Plan P15.
4. For additional longitudinal joint layout details, see Standard Plan P18.
5. For joint layout at intersections, see Project Plans.
6. For dowel bars at longitudinal joint. see Standard Plan P18.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOINTED PLAIN CONCRETE PAVEMENT NEW CONSTRUCTION

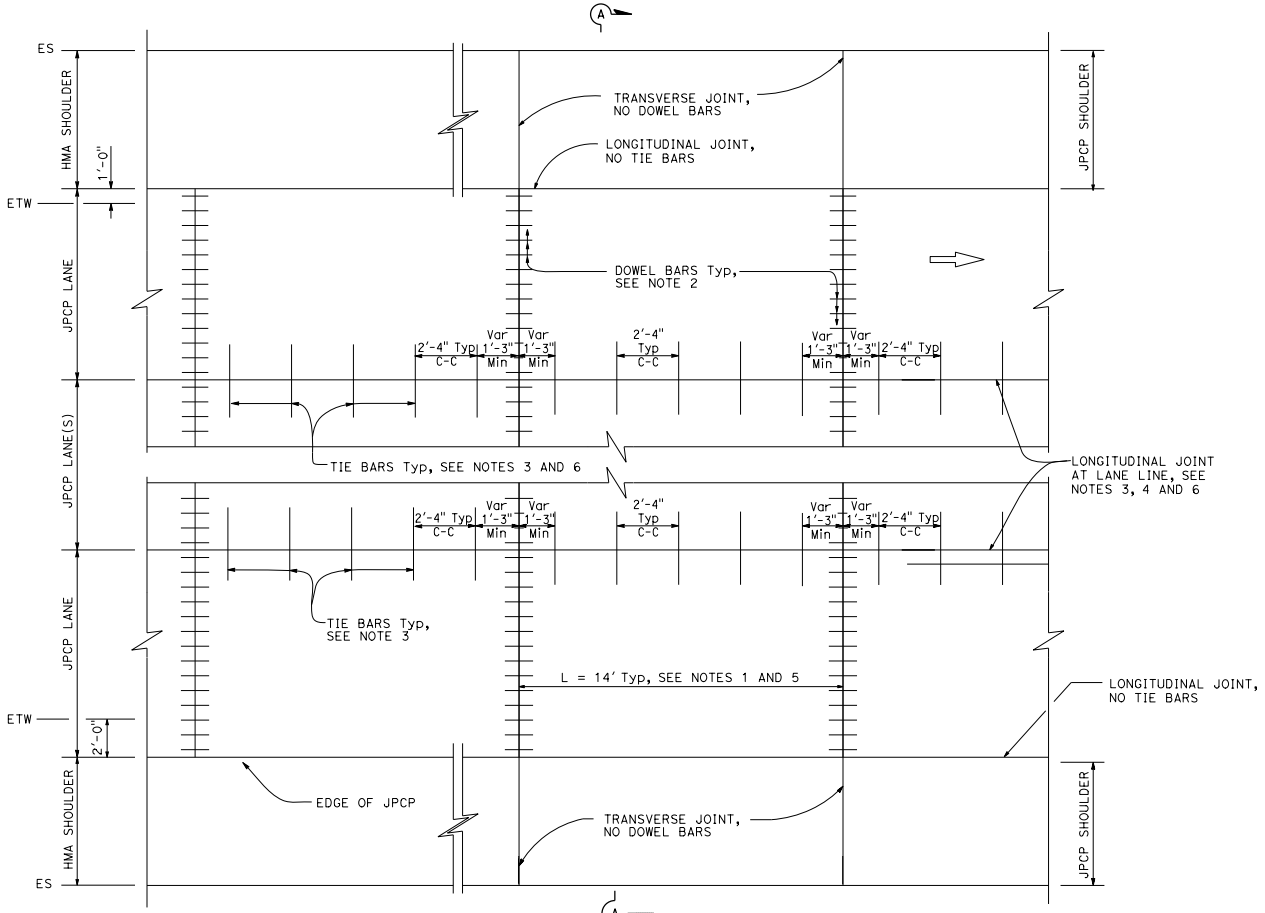
NO SCALE

P1

2018 STANDARD PLAN P1

1-26-18

Return to Table of Contents



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

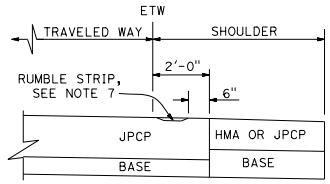
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

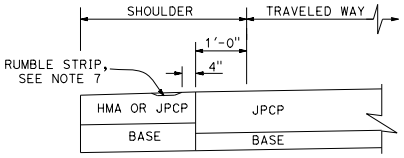
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Transverse joint spacing may be adjusted to no less than 10' and no more than 14' to conform to bridges, change in pavement type, and hardened concrete pavement.
2. For transverse joint and dowel bar details not shown, see Standard Plan P10.
3. For longitudinal joint and tie bar details not shown, see Standard Plan P15.
4. For additional longitudinal joint layout details, see Standard Plan P18.
5. For joint layout at intersections, see Project Plans.
6. For dowel bars at longitudinal joint. see Standard Plan P18.
7. For limits of rumble strips, see Projects Plans.



DETAIL A



DETAIL B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOINTED PLAIN CONCRETE PAVEMENT (WIDENED LANE) NEW CONSTRUCTION

NO SCALE

P2

2018 STANDARD PLAN P2

1-26-18

Return to Table of Contents

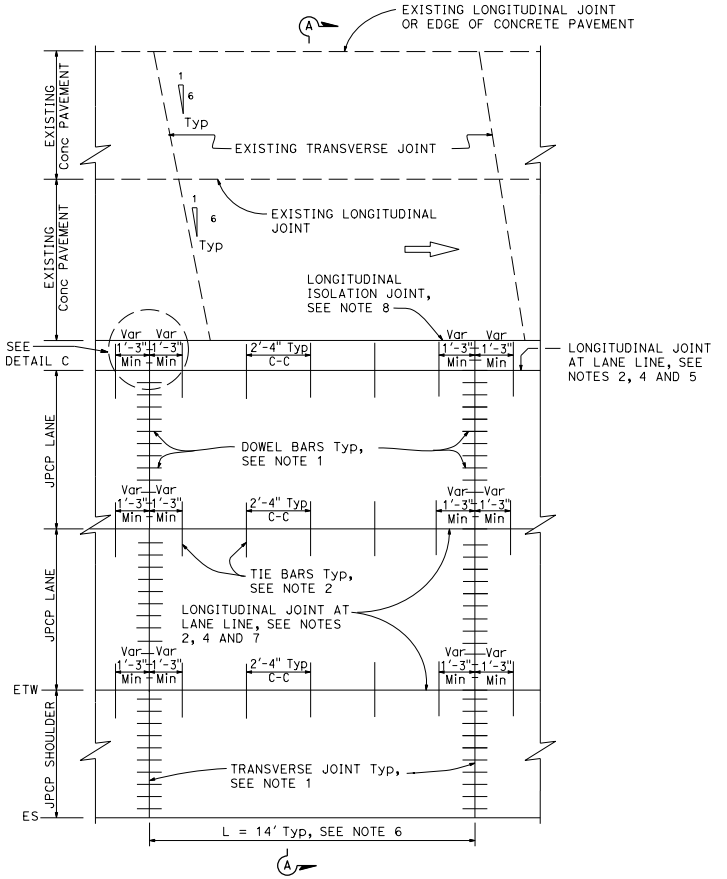
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

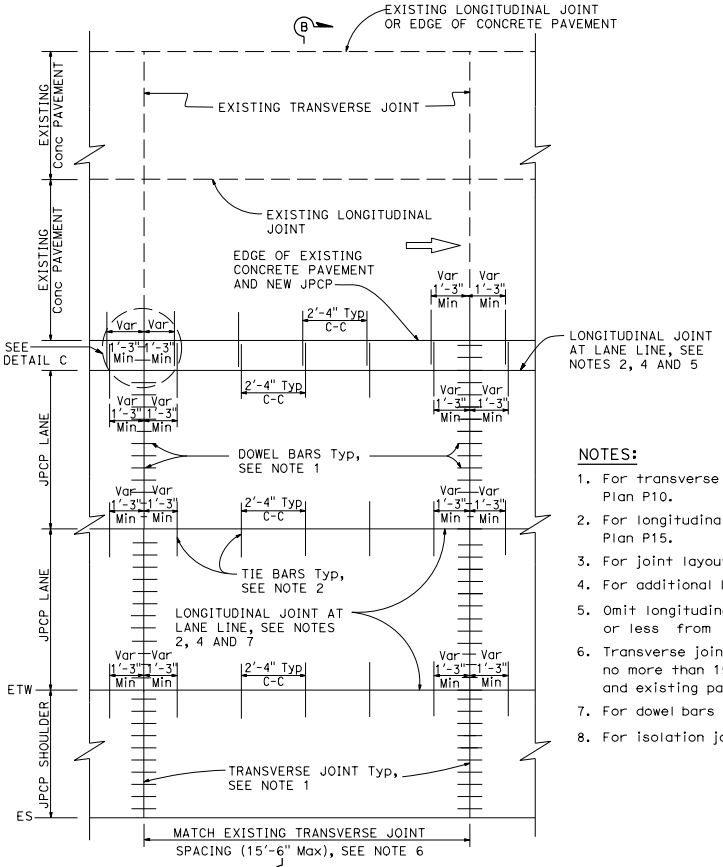
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

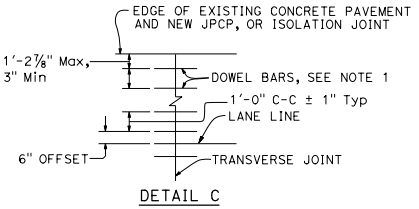
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN
ISOLATED
See Note 3



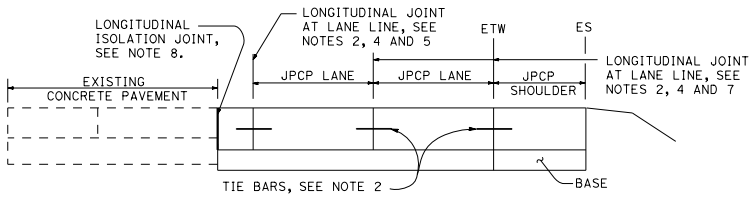
PLAN
TIED
See Note 3



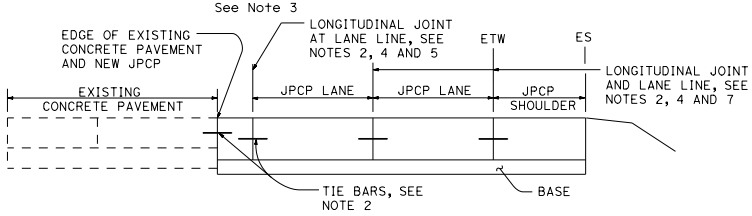
DETAIL C

NOTES:

1. For transverse joint and dowel bar details not shown, see Standard Plan P10.
2. For longitudinal joint and tie bar details not shown, see Standard Plan P15.
3. For joint layout at intersections, see Project Plans.
4. For additional longitudinal joint details, see Standard Plan P18.
5. Omit longitudinal joint when edge of new concrete pavement is 3'-3" or less from JPCP lane line.
6. Transverse joint spacing may be adjusted to no less than 10' and no more than 15'-6" to conform to bridges, change in pavement type and existing pavement.
7. For dowel bars at longitudinal joint. see Standard Plan P18.
8. For isolation joints, see Detail A on Standard Plan P18.



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOINTED PLAIN CONCRETE PAVEMENT LANE AND SHOULDER ADDITION OR REPLACEMENT

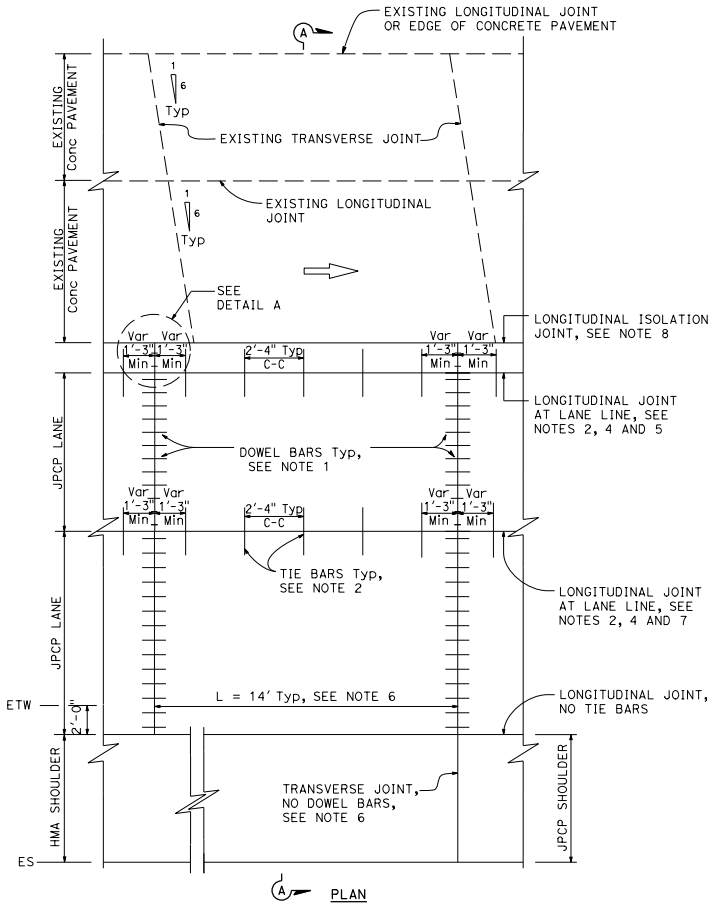
NO SCALE

P3A

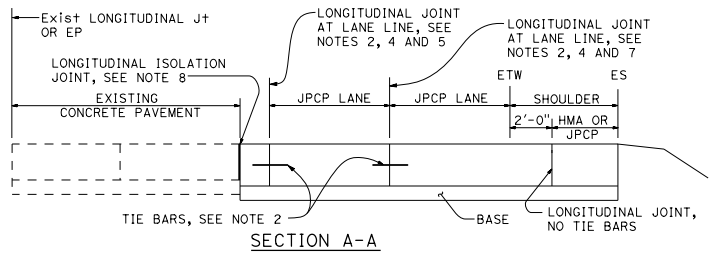
2018 STANDARD PLAN P3A

1-29-18

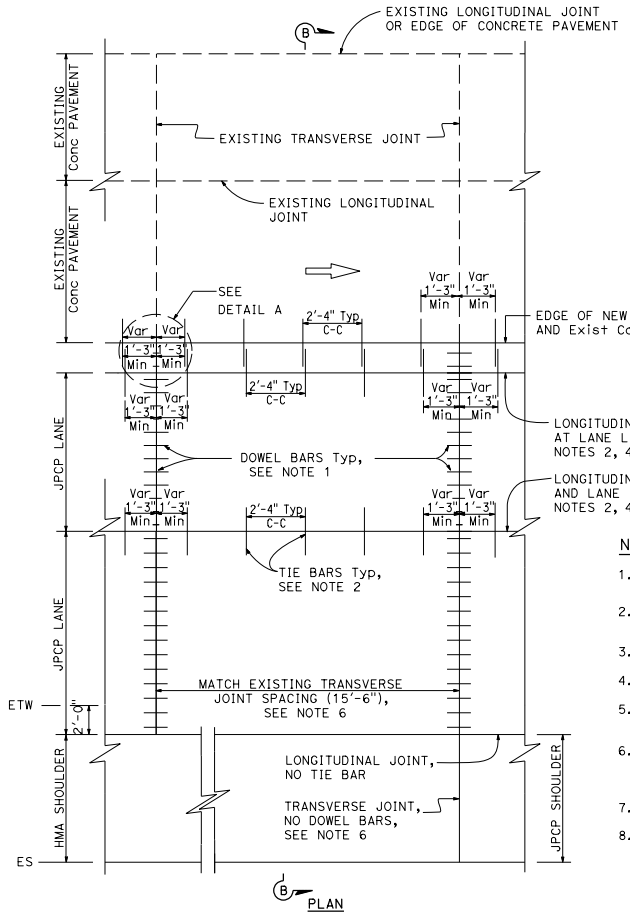
Return to Table of Contents



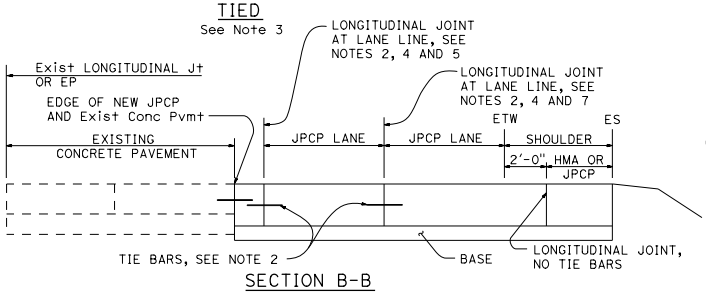
A PLAN
ISOLATED
See Note 3



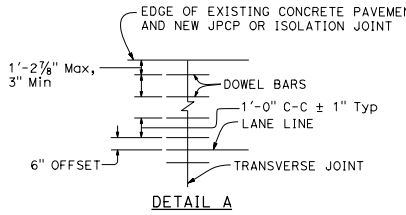
SECTION A-A



B PLAN
TIED
See Note 3



SECTION B-B



DETAIL A

NOTES:

1. For transverse joint and dowel bar details not shown, see Standard Plan P10.
2. For longitudinal joint and tie bar details not shown, see Standard Plan P15.
3. For joint layout at intersections, see Project Plans.
4. For additional longitudinal joint details, see Standard Plan P18.
5. Omit longitudinal joint when edge of new concrete pavement is 3'-3" or less from JPCP lane line.
6. Transverse joint spacing may be adjusted to no less than 10' and no more than 15'-6" to conform to bridges, change in pavement type and existing pavement.
7. For dowel bars at longitudinal joint, see Standard Plan P18.
8. For isolation joints, see Detail A on Standard Plan P18.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOINTED PLAIN CONCRETE PAVEMENT (WIDENED LANE) LANE AND SHOULDER ADDITION OR REPLACEMENT

NO SCALE

P3B

1-26-18

2018 STANDARD PLAN P3B

Return to Table of Contents

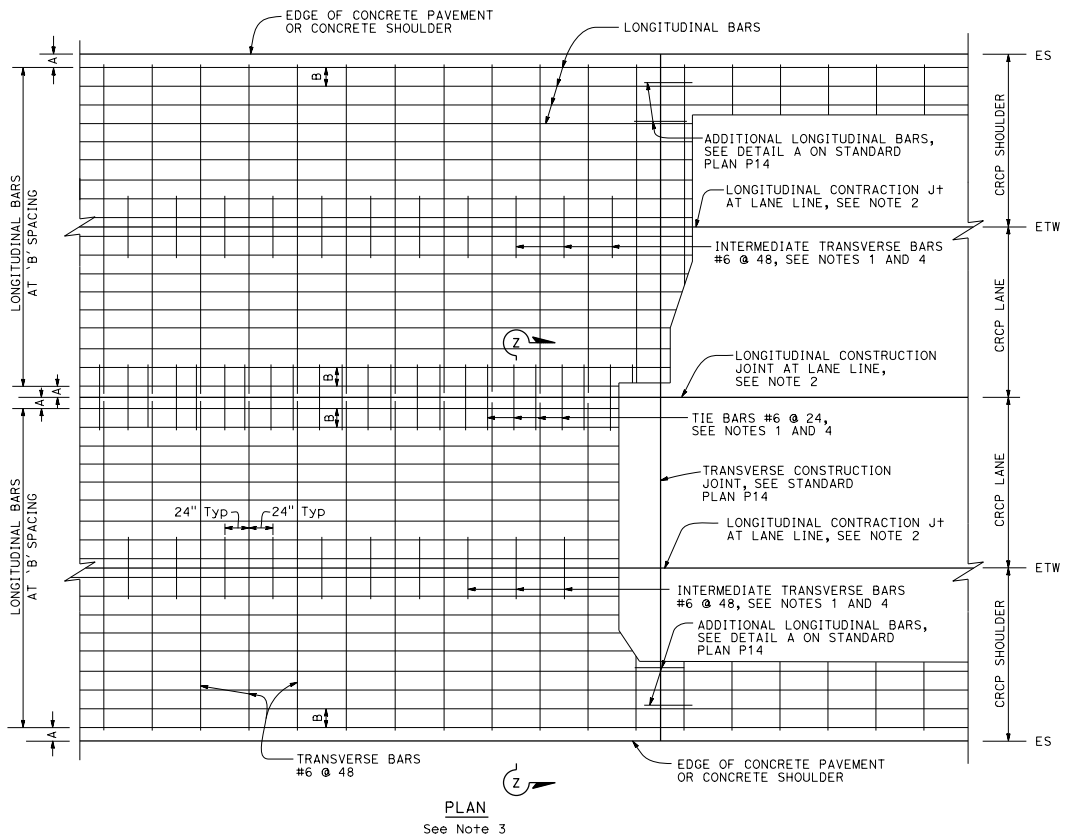
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

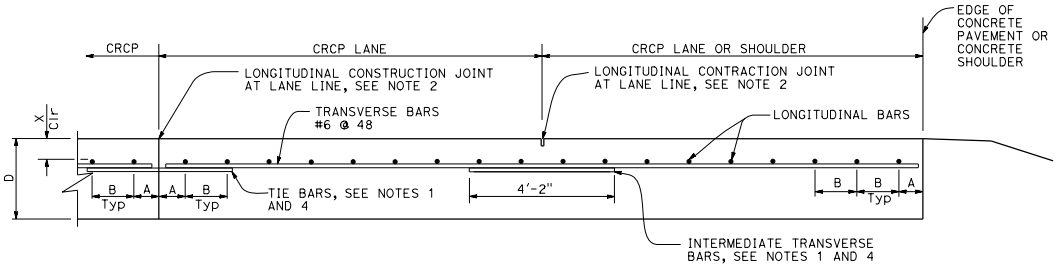
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN
See Note 3



SECTION Z-Z

TABLE No. 1 LONGITUDINAL BAR REINFORCEMENT					
SLAB THICKNESS AND BAR SIZE		FIRST SPACING AT EDGE OR JOINT	REGULAR BARS	ADDITIONAL BARS AT TRANSVERSE CONSTRUCTION JOINT	Clr
D	BAR SIZE	SPACING A	SPACING B	SPACING 2 x B	X
.75′	#6	3" TO 4"	8.0"	16"	4"
.80′	#6	3" TO 4"	7.5"	15"	4"
.85′	#6	3" TO 4"	7.0"	14"	4"
.90′	#6	3" TO 4"	6.5"	13"	4"
.95′	#6	3" TO 4"	6.25"	12.5"	4"
1.00′	#6	3" TO 4"	6.0"	12"	5"
1.05′	#6	3" TO 4"	5.75"	11.5"	5"
1.10′	#6	3" TO 4"	5.5"	11"	5.5"

NOTES:

1. Place tie bars and intermediate transvese bars parallel to and in the same plane as transverse bars.
2. For longitudinal contraction and construction joint details, see Standard Plan P16.
3. For curved lane layout see Standard Plan P16.
4. For tie bar and intermediate transverse bar details, see Standard Plan P16.

ABBREVIATION:

D = Thickness of CRCP

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

NO SCALE

P4

1-26-18

Return to Table of Contents

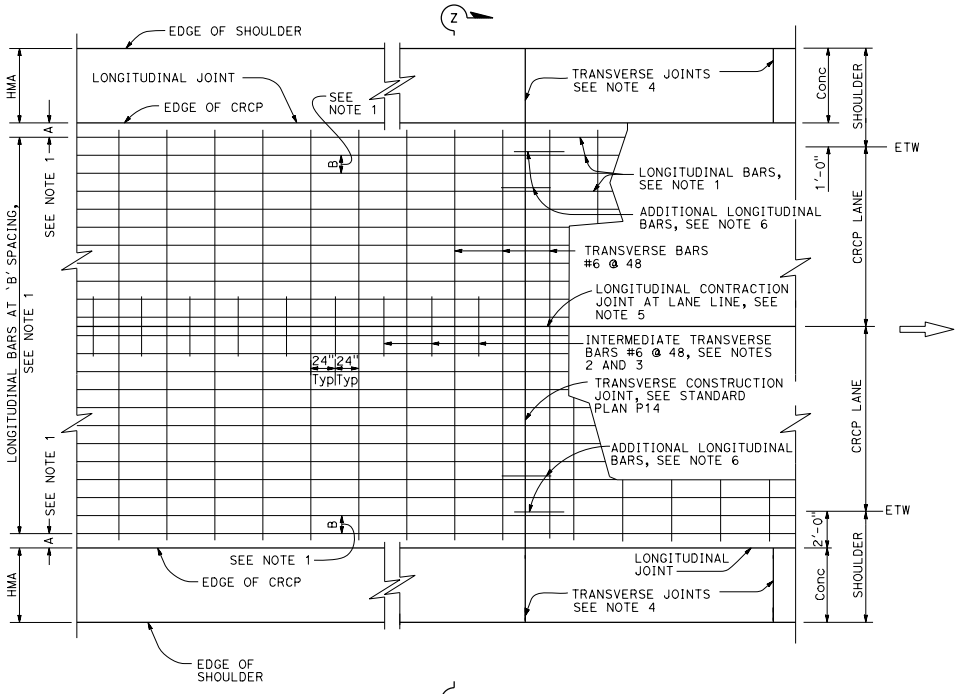
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

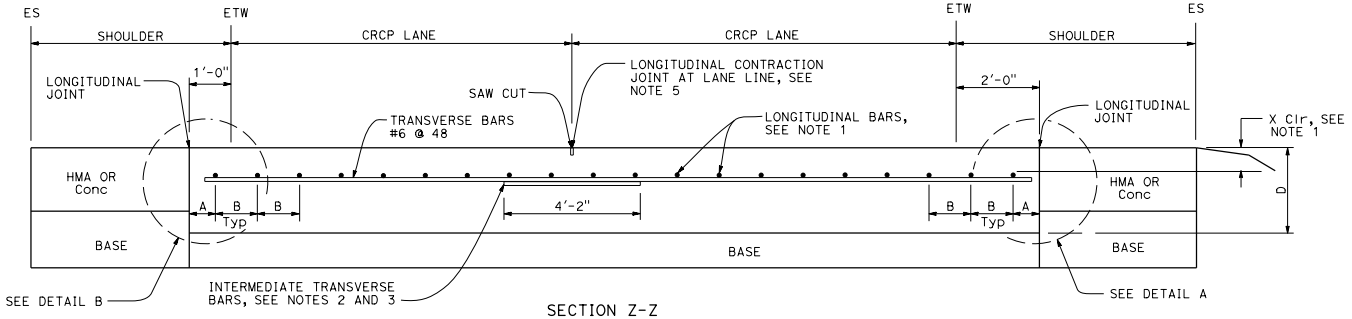
May 31, 2018
PLANS APPROVAL DATE

Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN
See Note 7



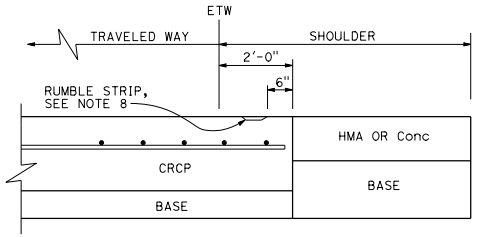
SECTION Z-Z

NOTES:

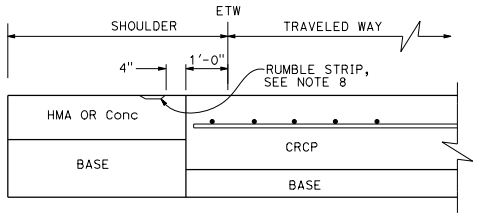
1. For longitudinal bar size, spacing and clearances, see Standard Plan P4.
2. For tie bar and intermediate transverse bar details, see Standard Plan P16.
3. Place Intermediate transverse bars parallel to and in the same plane as transverse bars.
4. Construct transverse joints at right angle to the longitudinal joints in adjacent CRCP. Space joints at no less than 10' intervals and no more than 14' intervals. Match location of JPCP transverse joint with CRCP transverse construction joint, expansion joint or wide flange beam. Omit dowel bars.
5. For longitudinal contraction joint details, see Standard Plan P16.
6. For additional longitudinal bars detail, see Detail A on Standard Plan P14.
7. For longitudinal construction joint plan layout not shown, see Standard Plan P4. For tie bar details at longitudinal construction joint, see Standard Plan P16.
8. For limits of rumble strips, see Project Plans.

ABBREVIATION:

D = Thickness of CRCP



DETAIL A



DETAIL B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT (WIDENED LANE)

NO SCALE

P5A

1-26-18

2018 STANDARD PLAN P5A

Return to Table of Contents

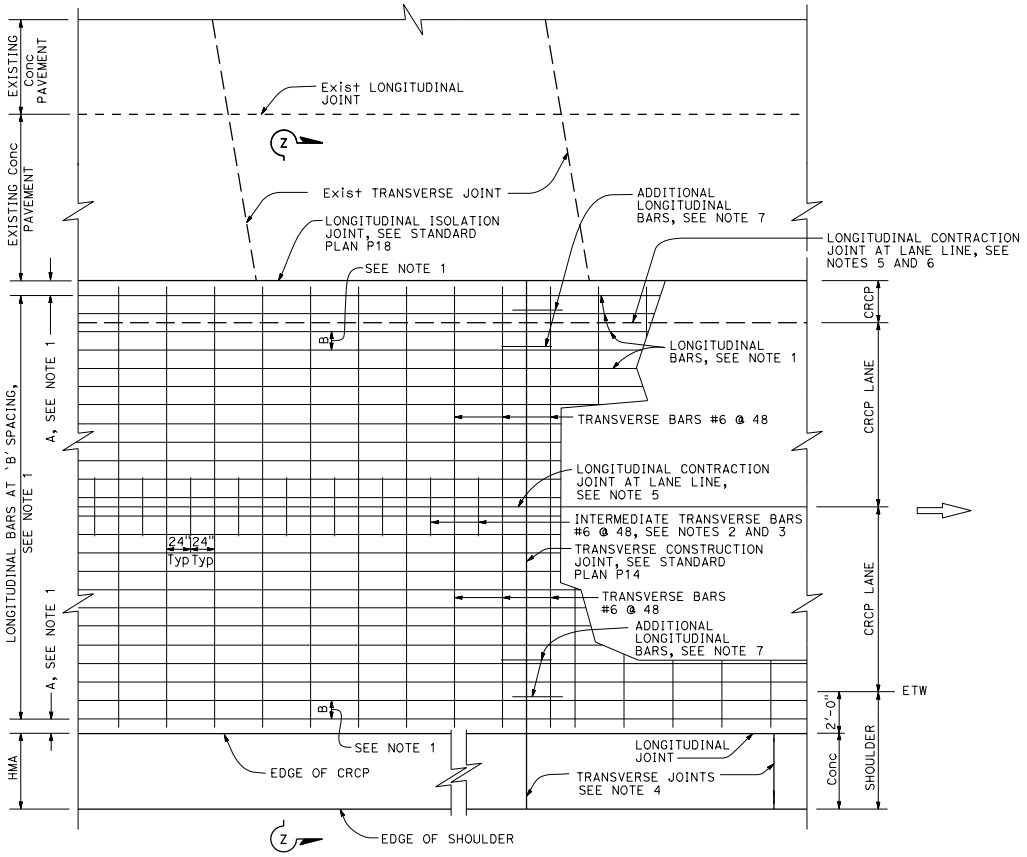
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

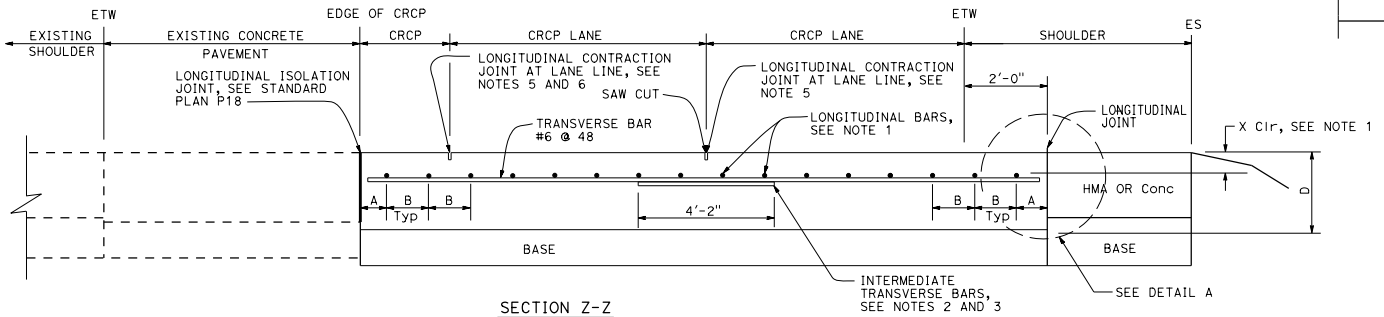
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN
See Note 8



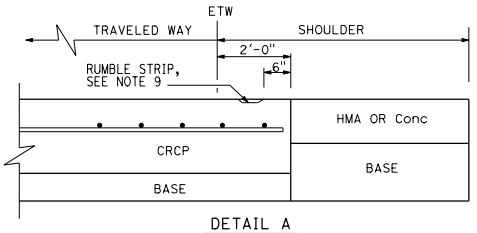
SECTION Z-Z

NOTES:

1. For longitudinal bar size, spacing and clearances, see Standard Plan P4.
2. For tie bar and intermediate transverse bar details, see Standard Plan P16.
3. Place Intermediate transverse bars parallel to and in the same plane as transverse bars.
4. Construct transverse joints at right angle to the longitudinal joints in adjacent CRCP. Space joints at no less than 10' intervals and no more than 14' intervals. Match location of JPCP transverse joint with CRCP transverse construction joint, expansion joint or wide flange beam. Omit dowel bars.
5. For longitudinal contraction joint details, see Standard Plan P16.
6. Do not construct longitudinal contraction joint when edge of new CRCP is less than 3'-3" from lane line.
7. For additional longitudinal bars detail, see Detail A on Standard Plan P14.
8. For longitudinal construction joint plan layout not shown, see Standard Plan P4. For tie bar details at longitudinal construction joint, see Standard Plan P16.
9. For limits of rumble strips, see Project Plans.

ABBREVIATION:

D = Thickness of CRCP



DETAIL A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT (WIDENED LANE) LANE AND SHOULDER ADDITION OR REPLACEMENT

NO SCALE

2018 STANDARD PLAN P5B

P5B

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ron Jones
REGISTERED CIVIL ENGINEER

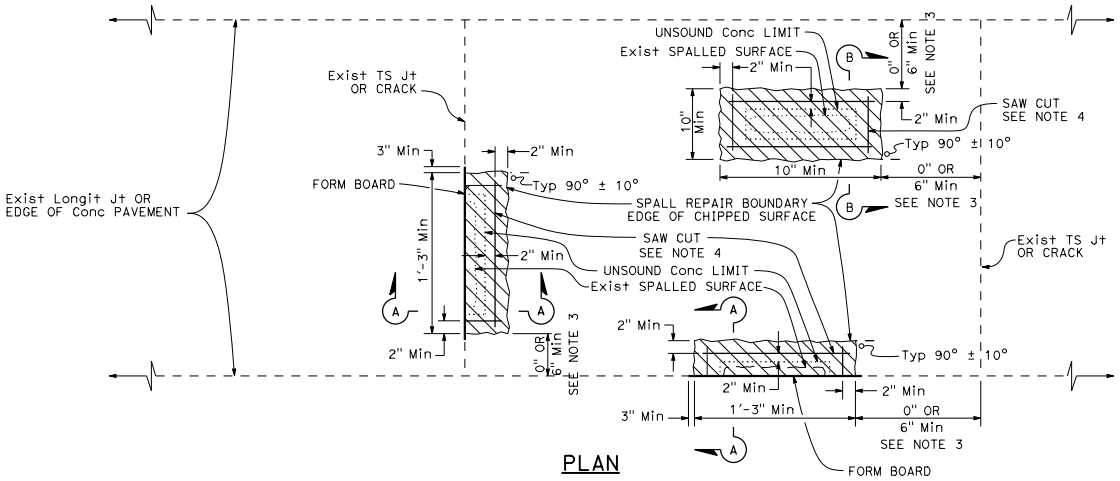
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Myron Duane Jones
No. C52419
Exp. 12-31-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND

SPALL REPAIR

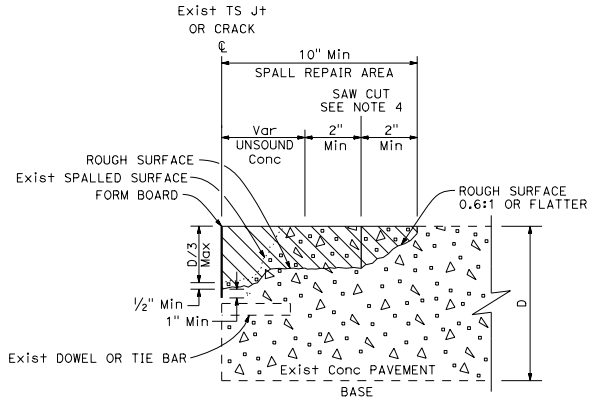


PLAN

NOTES:

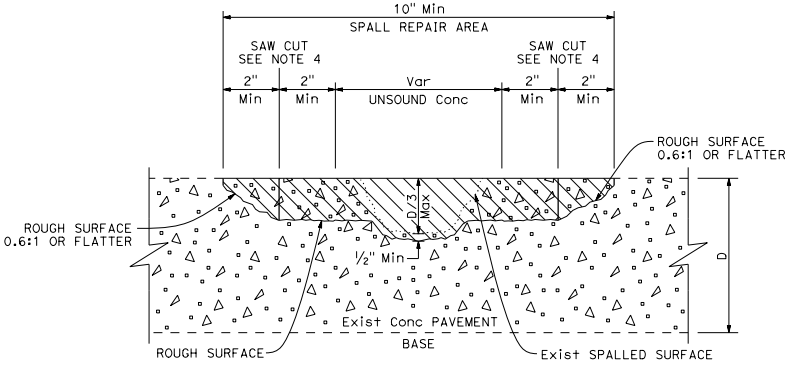
1. See Project Plans for spall repair locations.
2. Combine spall repair areas closer than 2' apart.
3. If the spall repair area is less than 6" from a joint, extend the repair to the joint.
4. Cut at least 2" beyond the rectangular limits of unsound concrete determined by the Engineer. Determine the saw cut depth using the following table:

Conc MATERIAL	SAW CUT DEPTH	
	Min	Max
FAST-SETTING	2"	3½"
POLYESTER	1½"	3½"



SECTION A-A

JOINT, CRACK, OR EDGE OF CONCRETE PAVEMENT REPAIR



SECTION B-B

MISCELLANEOUS SPALL REPAIR

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPALL REPAIR

NO SCALE

P6

1-26-18

2018 STANDARD PLAN P6

Return to Table of Contents

NOTES:

1. Details for skewed joints also apply to perpendicular joints.
2. Use 1'-6" ± ¼" long dowel bars with a 1¼" diameter except 1" diameter dowel bars may be used if D < 0.70'.
3. Caulk existing transverse joint at bottom and sides of the dowel bar slot prior to placing dowel bar and foam insert.
4. Foam insert thickness must match width of existing transverse joint or crack.

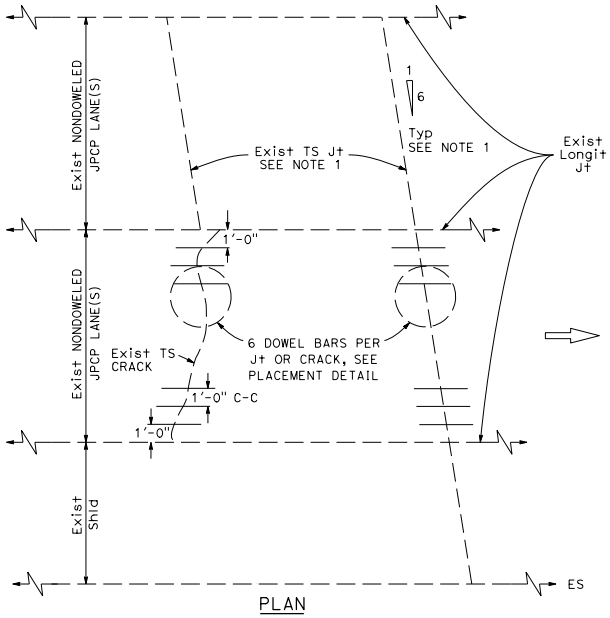
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ron Jones
REGISTERED CIVIL ENGINEER

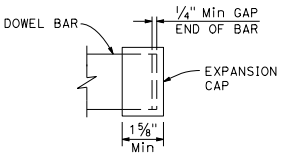
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Myron Duane Jones — No. C52419 — Exp. 12-31-18 — CIVIL — STATE OF CALIFORNIA

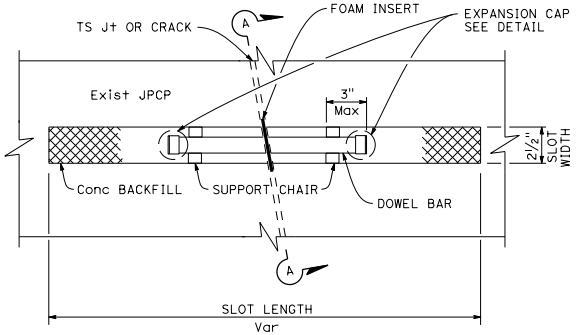
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



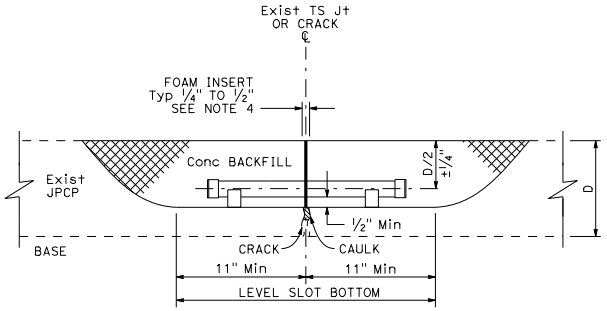
PLAN



EXPANSION CAP DETAIL

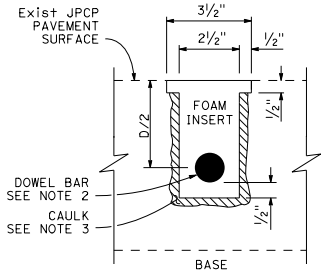


PLAN



ELEVATION

DOWEL BAR PLACEMENT DETAIL



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DOWEL BAR RETROFIT

NO SCALE

P7

1-26-18

Return to Table of Contents

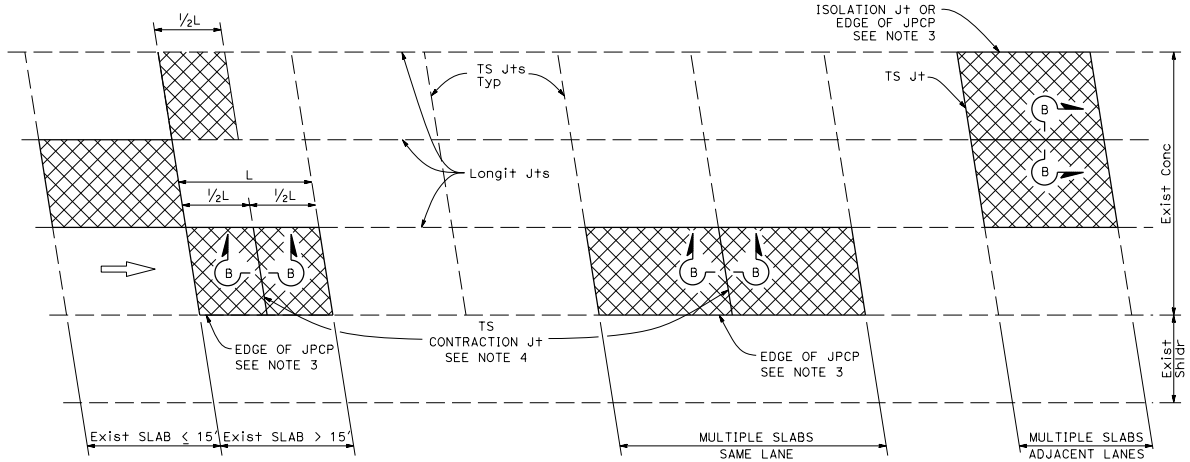
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ron Jones
REGISTERED CIVIL ENGINEER

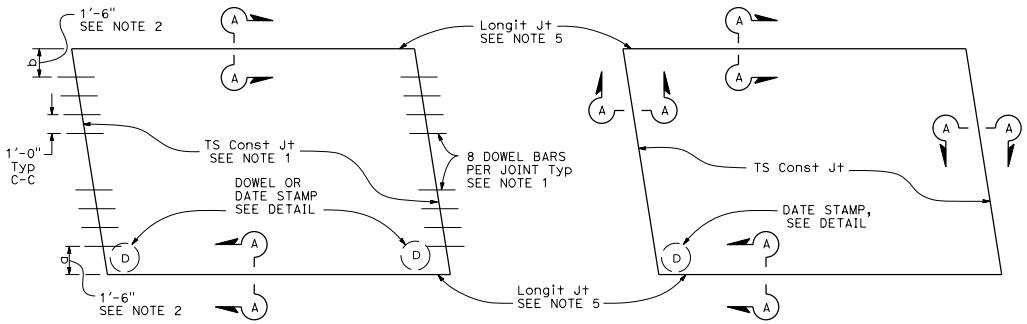
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Myron Duane Jones — No. C52419 — Exp. 12-31-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



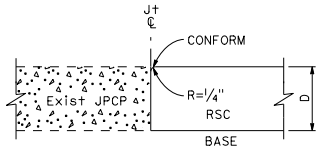
PLAN



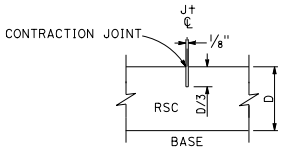
TYPE I
See Design Note 1

TYPE II
See Design Note 2

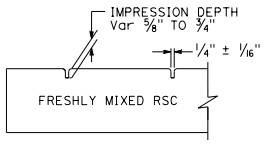
SLAB LAYOUT



SECTION A-A



SECTION B-B



SECTION C-C

LEGEND:

RSC RAPID STRENGTH CONCRETE

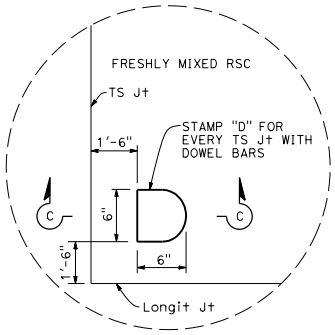
INDIVIDUAL SLAB REPLACEMENT WITH RSC

NOTES:

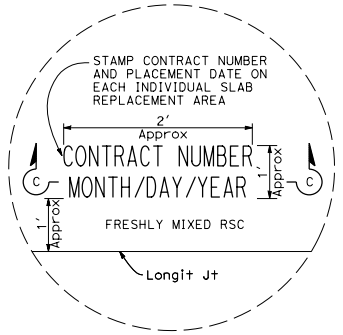
1. For details not shown, see Standard Plan P10.
2. Where the existing outside shoulder is asphalt concrete pavement, "a" = 1'-0" and "b" = 2'-0".
3. Use side forms where edge of RSC pavement is adjacent to asphalt concrete.
4. Transverse contraction joint to match skew of existing joint. Omit dowel bars.
5. Do not place tie bars at longitudinal joints.

DESIGN NOTES:

1. For concrete slab repair with > 5 years design life.
2. For short term repairs with 5 yrs or less design life or for slab replacements with cracking and seating.



DOWEL STAMP DETAIL



DATE STAMP DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE

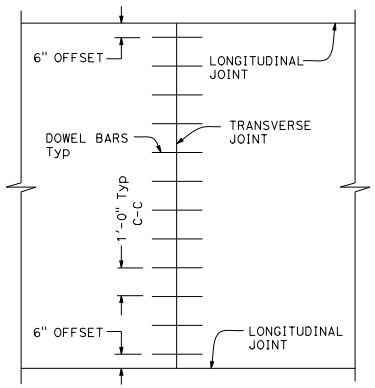
NO SCALE

P8

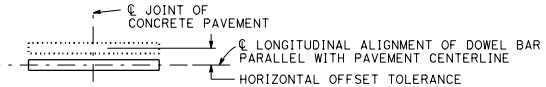
1-26-18

2018 STANDARD PLAN P8

Return to Table of Contents

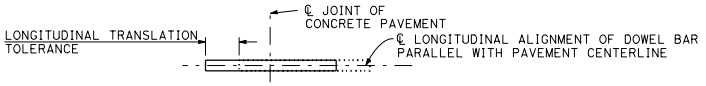


TRANSVERSE JOINT
DOWEL BAR LAYOUT



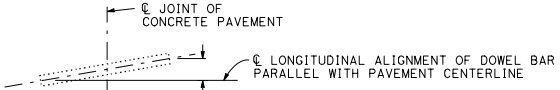
PLAN

HORIZONTAL OFFSET TOLERANCE



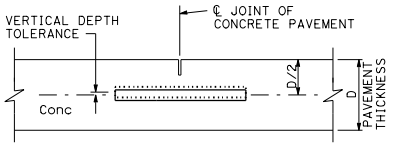
PLAN

LONGITUDINAL TRANSLATION TOLERANCE



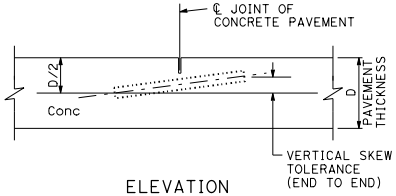
PLAN

HORIZONTAL SKEW TOLERANCE



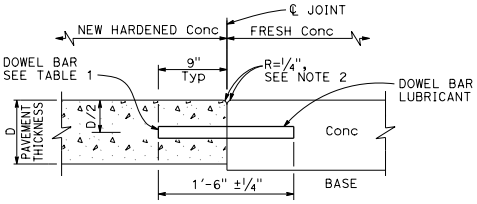
ELEVATION

VERTICAL DEPTH TOLERANCE

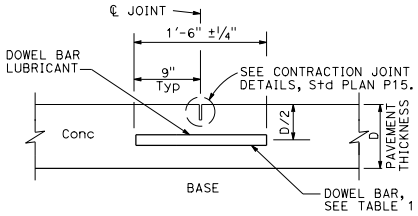


ELEVATION

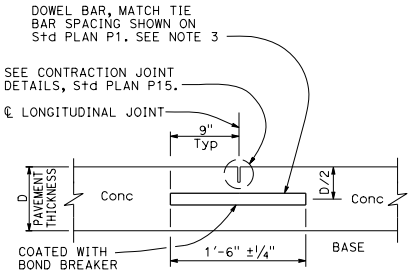
VERTICAL SKEW TOLERANCE



TRANSVERSE CONSTRUCTION JOINT DETAIL

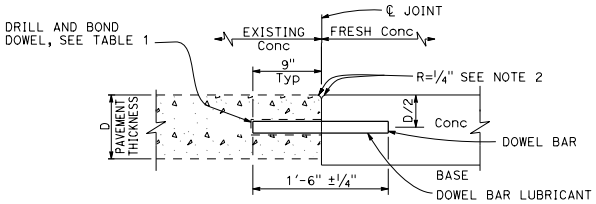


TRANSVERSE CONTRACTION JOINT

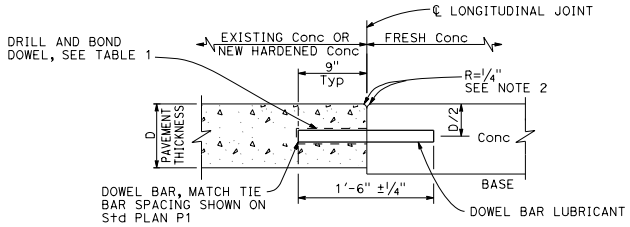


LONGITUDINAL CONTRACTION JOINT WITH DOWEL BARS

See Std Plan P18



TRANSVERSE CONSTRUCTION JOINT FOR EXISTING CONCRETE PAVEMENT



LONGITUDINAL CONSTRUCTION JOINT WITH DOWEL BARS

See Std Plan P18

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. See Standard Plan P1 for typical dowel bar placement and locations.
2. Where fresh concrete pavement is placed against new concrete or existing concrete pavement, rounding the corner of the existing concrete pavement is not required.
3. May also use 3/4" Dia dowel bars 2'-4" ± 1/4" in length. Center the length of dowel bars at the centerline of longitudinal joint.

TABLE 1

DOWEL BAR DIAMETER TABLE			
PAVEMENT THICKNESS	0.65'	> 0.65' - 0.85'	> 0.85'
MINIMUM DOWEL * BAR DIAMETER	1"	1 1/4"	1 1/2"

* The drilled hole diameter must be 1/8" to 3/16" larger than the bar diameter.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT DOWEL BAR DETAILS

NO SCALE

P10

1-26-18

Return to Table of Contents

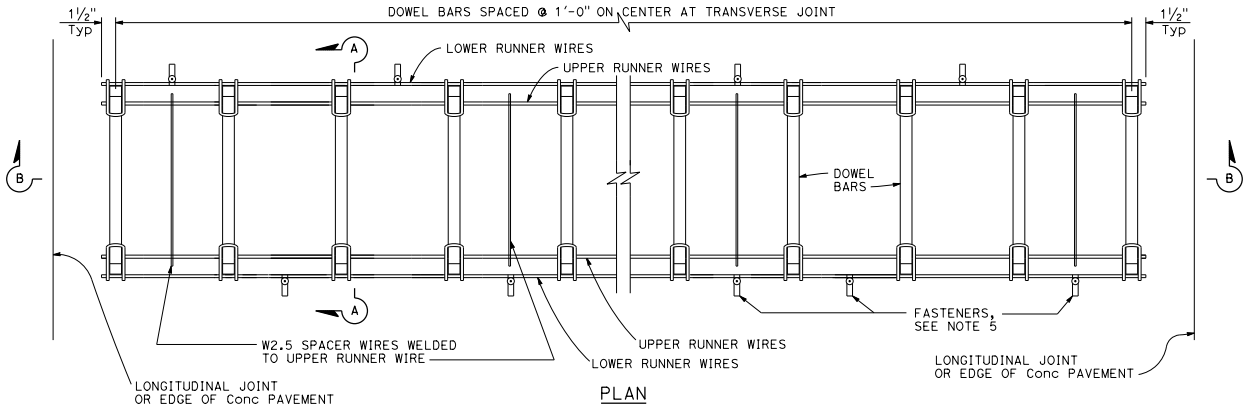
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

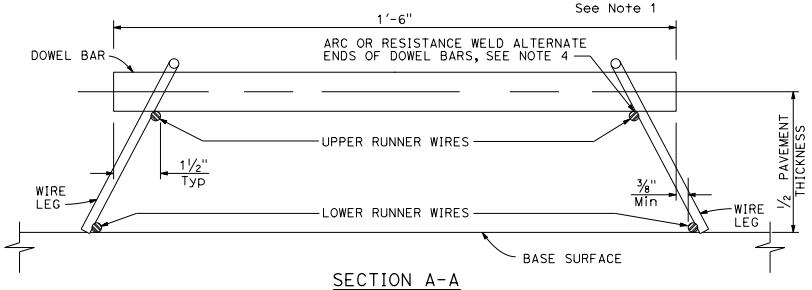
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



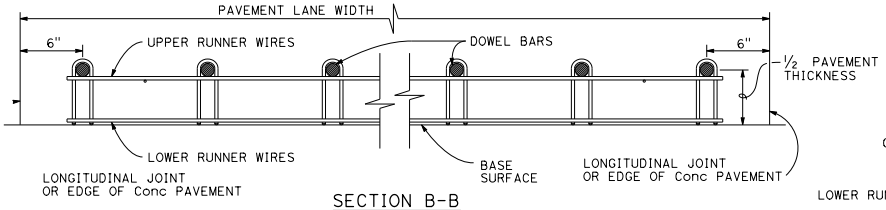
PLAN

DOWEL BAR BASKET (TRANSVERSE JOINT)

See Note 1

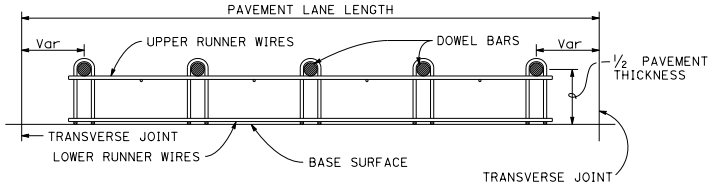


SECTION A-A

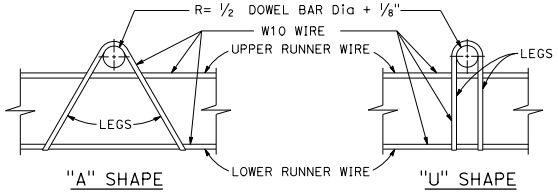


SECTION B-B

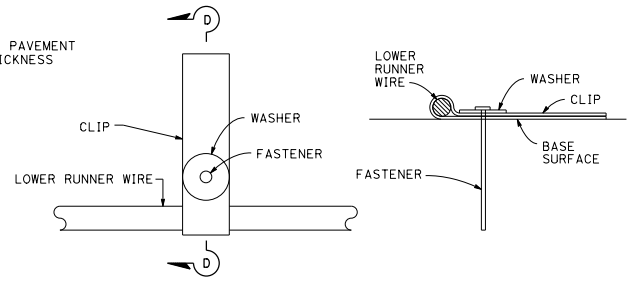
See Note 1



SECTION C-C



ASSEMBLY FRAME DETAILS

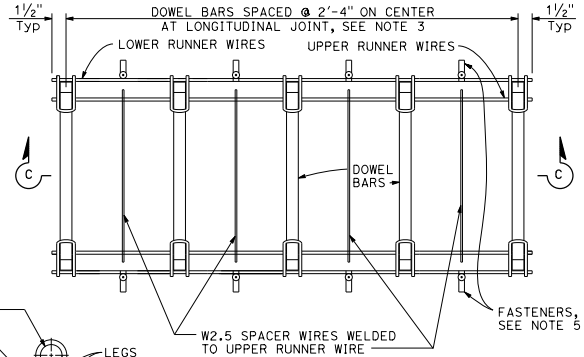


PLAN

SECTION D-D

FASTENER DETAIL

See Note 5



PLAN

DOWEL BAR BASKET (LONGITUDINAL JOINT)

See Note 1

NOTES:

1. "U" frame shape assembly shown. Use either "U" frame shape or "A" frame shape.
2. Wire sizes shown are the minimum required.
3. Use tie bar spacing for longitudinal dowel bar locations. See Standard Plans P1, P2, P3A, and P3B for tie bar requirements.
4. Weld may be at the top or bottom of the dowel bar.
5. Use anchor pins where soil or granular base is used. See Standard Plan P17 for Anchor Pin Detail.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT DOWEL BAR BASKET DETAILS

NO SCALE

P12

1-26-18

Return to Table of Contents

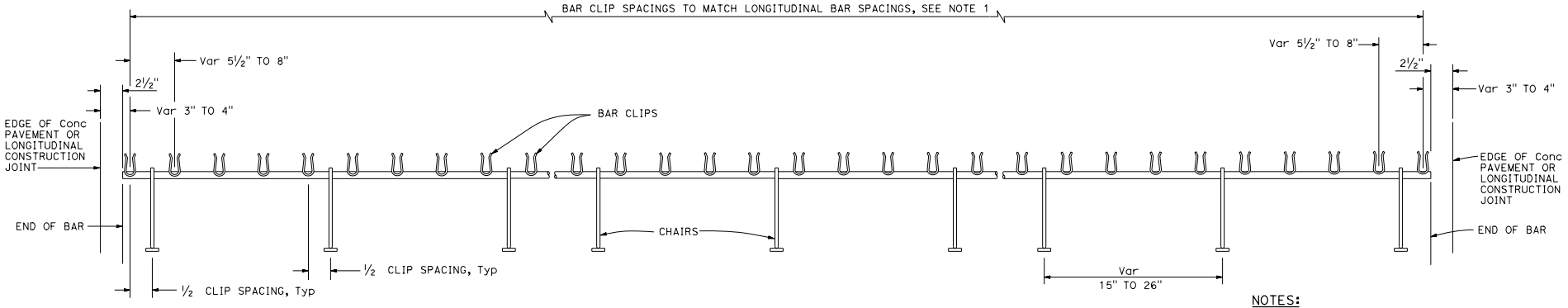
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

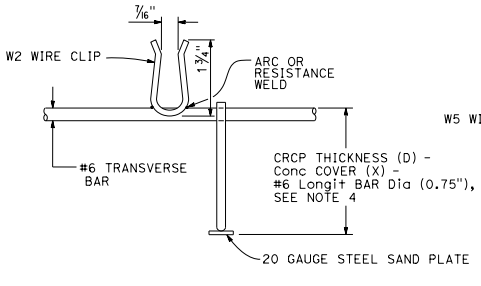
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



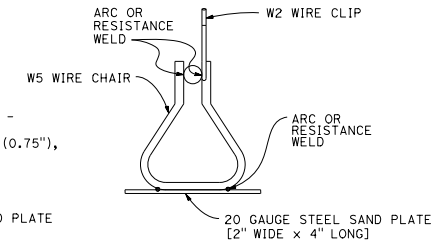
TRANSVERSE BAR ASSEMBLY

NOTES:

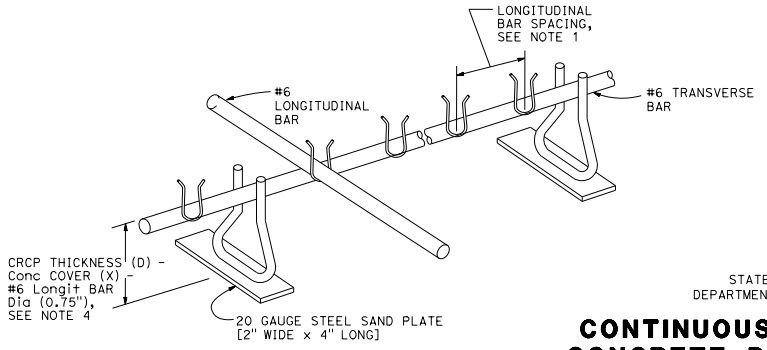
1. See Standard Plan P4 for spacing of longitudinal bars.
2. Tensile strength of chair shall be at least 50,000 psi.
3. Wire sizes shown are minimum required.
4. For concrete cover (X), see Table 1 in Standard Plan P4.



#6 BAR CLIP DETAIL



CHAIR DETAIL



ISOMETRIC VIEW OF CHAIR ASSEMBLY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT-SINGLE PIECE TRANSVERSE BAR ASSEMBLY

NO SCALE

P13

1-26-18

2018 STANDARD PLAN P13

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

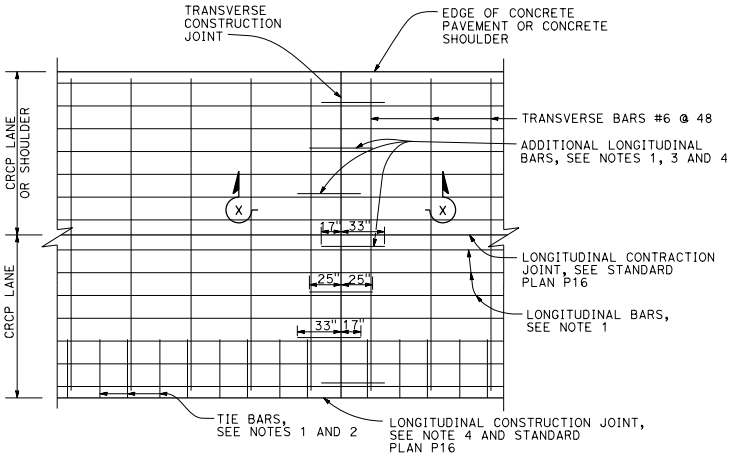
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. For longitudinal bar size, spacing and clearances, see Table 1 on Standard Plan P4.
2. For tie bars in longitudinal construction joint, see Standard Plan P16.
3. Place additional longitudinal bars parallel to and in the same plane as the longitudinal bars.
4. Place additional longitudinal bars symmetrically about longitudinal construction joint.

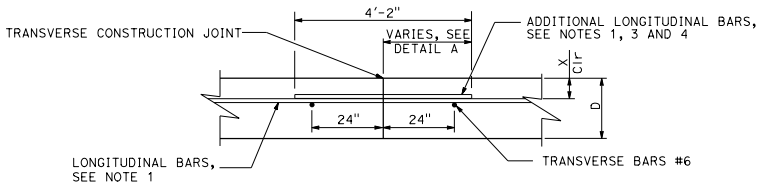
ABBREVIATION

D = Thickness of CRCP



DETAIL A

Additional longitudinal bars at transverse construction joint



SECTION X-X

TRANSVERSE CONSTRUCTION JOINT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

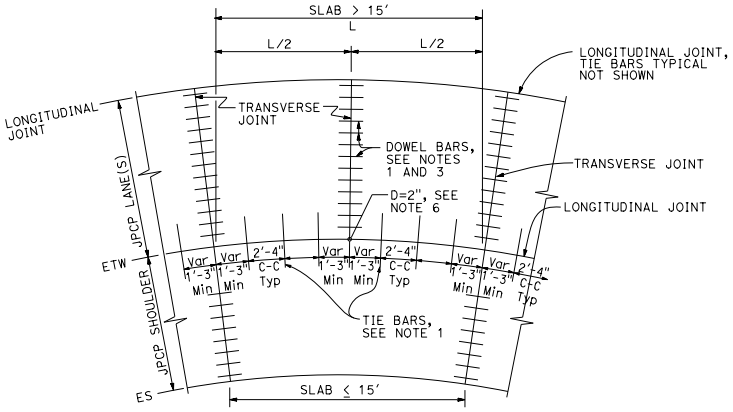
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT TRANSVERSE CONSTRUCTION JOINT

NO SCALE

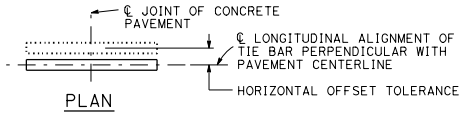
P14

1-26-18

Return to Table of Contents

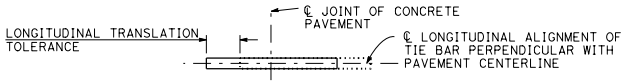


TIE BAR LAYOUT IN CURVED LANES



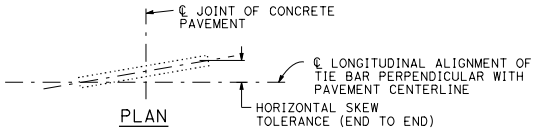
PLAN

HORIZONTAL OFFSET TOLERANCE



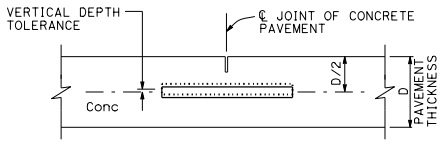
PLAN

LONGITUDINAL TRANSLATION TOLERANCE



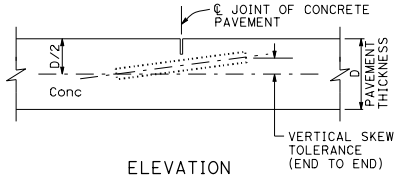
PLAN

HORIZONTAL SKEW TOLERANCE



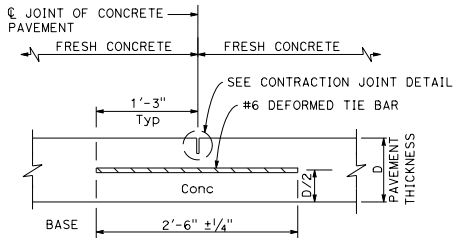
ELEVATION

VERTICAL DEPTH TOLERANCE

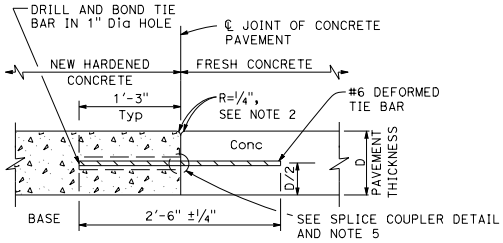


ELEVATION

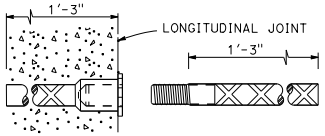
VERTICAL SKEW TOLERANCE



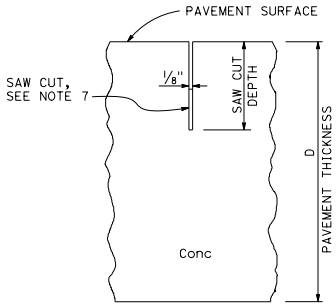
LONGITUDINAL CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



ALTERNATIVE SPLICE COUPLER



CONTRACTION JOINT DETAIL

NOTES:

1. See Standard Plan P1 for typical dowel bar and tie bar placement and locations.
2. Where new pavement is placed against existing concrete pavement, rounding the corner is not required.
3. For dowel bar sizes, See Standard Plan P10.
4. Tie bar details apply to inside widenings.
5. Use either drill and bond or splice couplers.
6. Full depth drilled hole. Fill hole with filler material.
7. The bottom of the saw cut must be at least 0.5" clear of any dowel bar, tie bar and bar reinforcement.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Dulce Rufino Feldman No. C81459 Exp. 9-30-19 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT-TIE BAR DETAILS

NO SCALE

P15

1-26-18

Return to Table of Contents

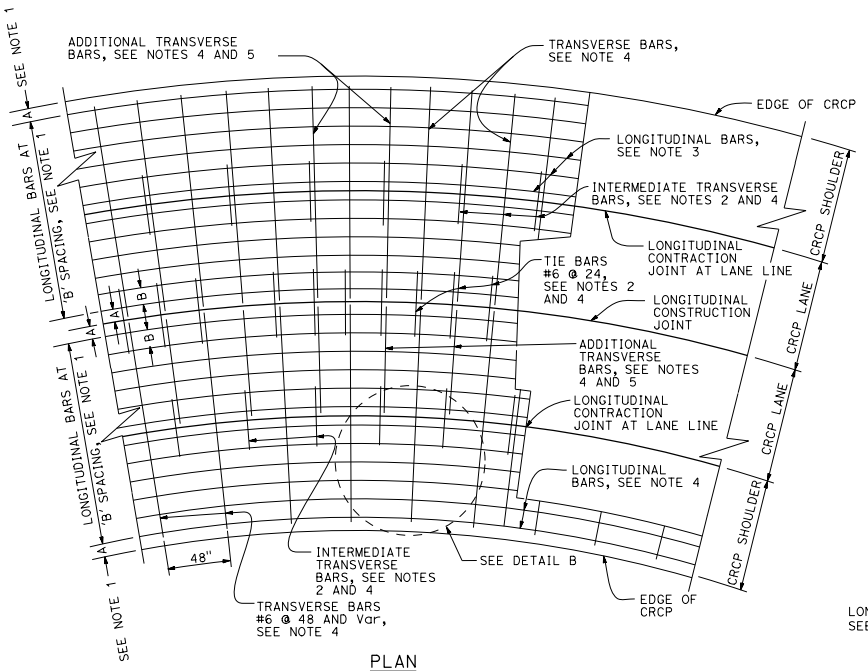
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

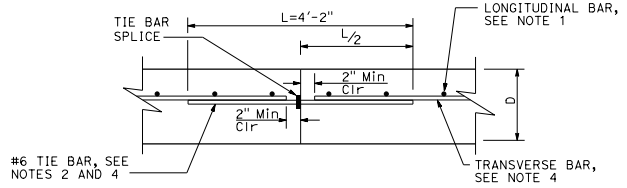
May 31, 2018
PLANS APPROVAL DATE

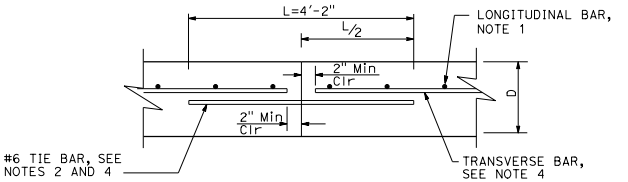
REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



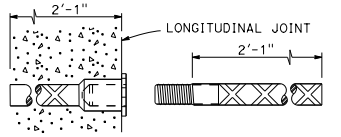
PLAN
CURVED LANES



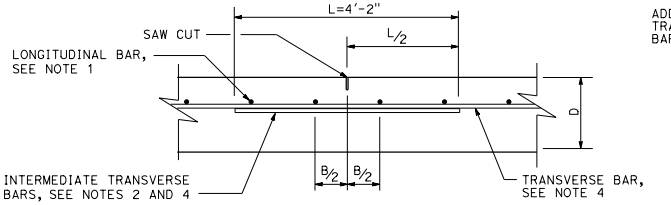


ALTERNATE

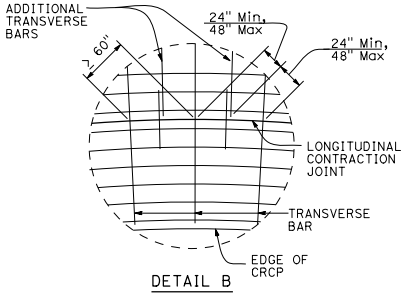
LONGITUDINAL CONSTRUCTION JOINT



TIE BAR SPLICE COUPLER DETAIL



LONGITUDINAL CONTRACTION JOINT



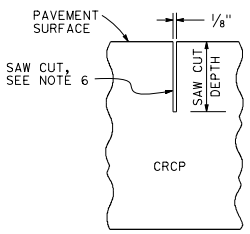
DETAIL B

NOTES:

1. For longitudinal bar spacing and clearances, see Table 1 on Standard Plan P4.
2. Place tie bars and intermediate transverse bars parallel to and in the same plane as the transverse bars.
3. Place longitudinal bars parallel to roadway curvature.
4. Place transverse bars, additional transverse bars, tie bars and intermediate transverse bars perpendicular to the pavement curvature.
5. Place additional transverse bars where required, see Detail B.
6. The bottom of the saw cut must be at least 0.5" clear of any dowel bar, tie bar and bar reinforcement.

ABBREVIATION:

D = Thickness of CRCP



CONTRACTION JOINT SAW CUT DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT TIE BARS AND JOINT DETAILS

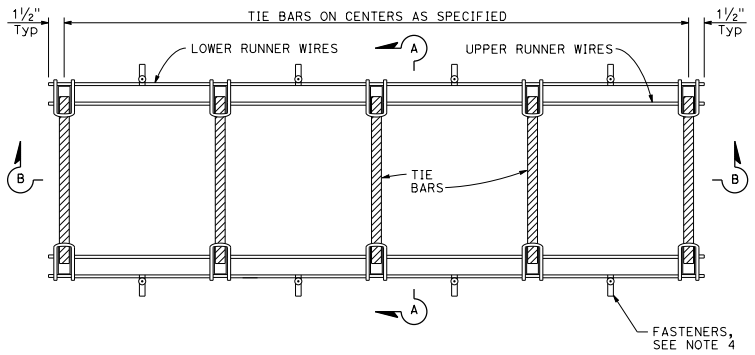
NO SCALE

P16

1-29-18

2018 STANDARD PLAN P16

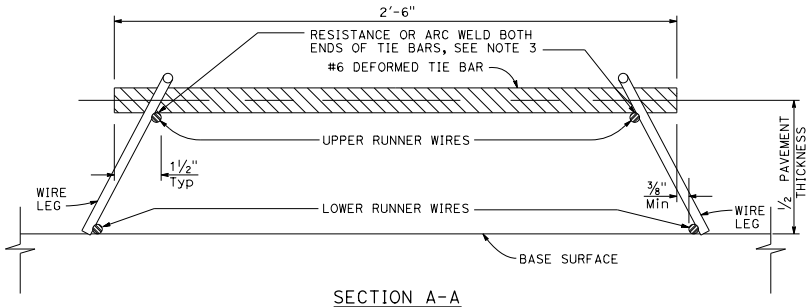
Return to Table of Contents



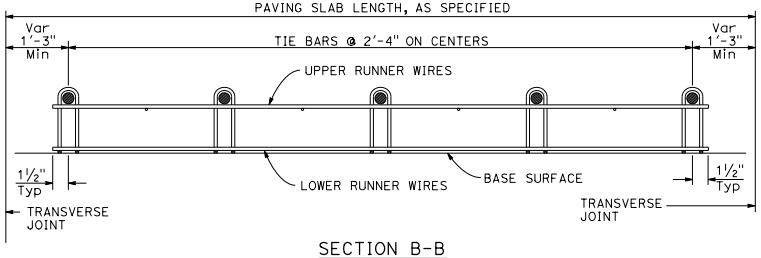
PLAN

TIE BAR BASKET

(Tie bars at longitudinal joint)
See Note 1

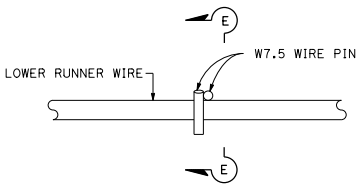


SECTION A-A

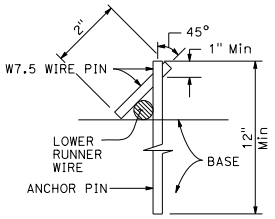


SECTION B-B

See Note 1



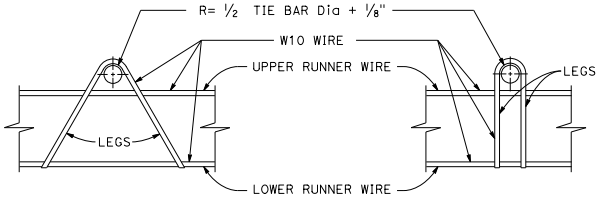
PLAN



SECTION E-E

ANCHOR PIN DETAIL

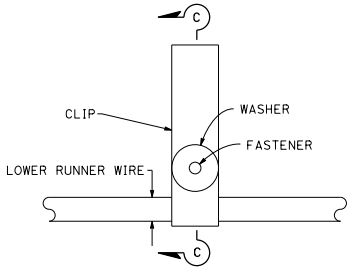
See Note 4



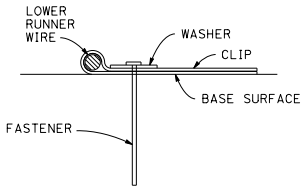
"A" SHAPE "U" SHAPE

ASSEMBLY FRAME DETAILS

See Note 1



PLAN



SECTION C-C

FASTENER DETAIL

NOTES:

1. "U" frame shape assembly shown. Use either "U" frame shape or "A" frame shape.
2. Wire sizes shown are the minimum required.
3. Weld may be at top or bottom of tie bars.
4. Use anchor pins where soil or granular base is used.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT TIE BAR BASKET DETAILS

NO SCALE

P17

1-29-18

Return to Table of Contents

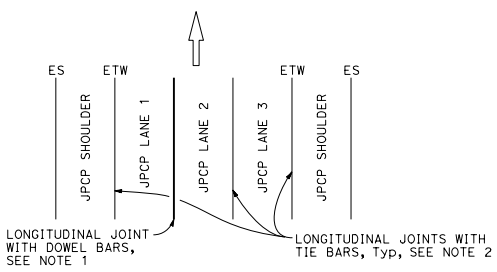
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

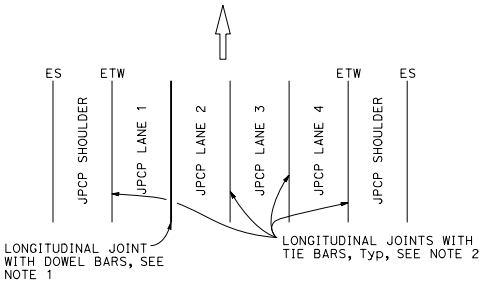
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

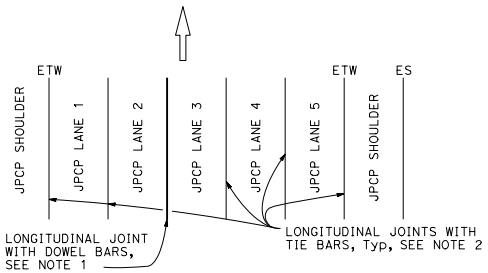
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



3 LANES WITH CONCRETE SHOULDERS
PLAN



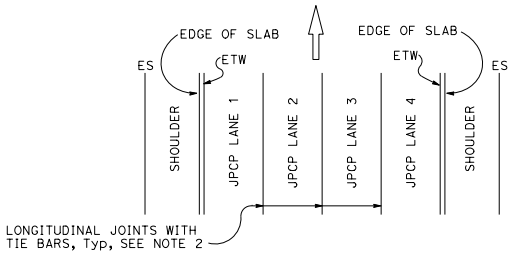
4 LANES WITH CONCRETE SHOULDERS
PLAN



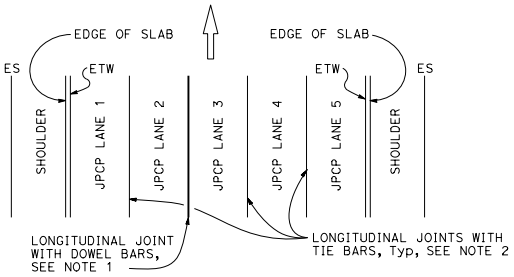
5 LANES WITH CONCRETE SHOULDERS
PLAN

NOTES:

1. See Standard Plan P10 for longitudinal joint with dowel bars.
2. See Standard Plan P15 for longitudinal joint with tie bars.
3. S= Reservoir depth.
   S= 7/8" ± 1/16" for asphalt rubber seals
   S= 3/4" ± 1/16" for silicone seals
   Preformed compression seals must be 13/16" wide and S= 1 11/16" ± 1/16"



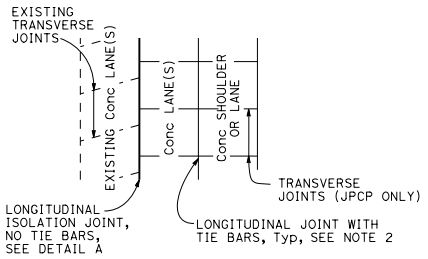
4 LANES OR LESS WITH AC SHOULDERS
PLAN



5 LANES WITH AC SHOULDERS
PLAN

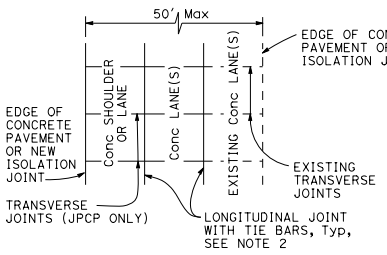
NEW CONSTRUCTION

Location of Longitudinal Joints
For JPCP



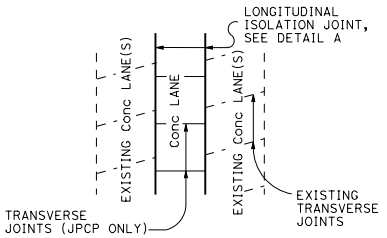
CASE 1
PLAN

Transverse Joints do not align between new and existing.



CASE 2
PLAN

Transverse Joints align between new and existing.
(For JPCP only)

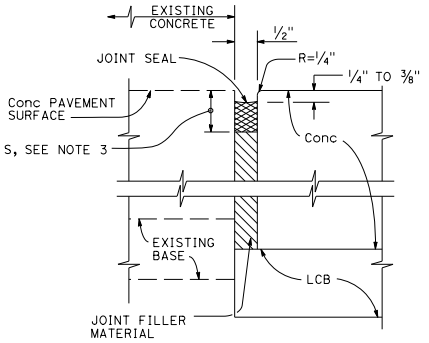


CASE 3 (INTERIOR LANE REPLACEMENT)
PLAN

Transverse Joints do not align between new and existing.

LANE/SHOULDER ADDITION OR RECONSTRUCTION

For JPCP and CRCP



DETAIL "A"

ISOLATION JOINT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT LANE SCHEMATICS AND ISOLATION JOINT DETAIL

NO SCALE

P18

1-29-18

2018 STANDARD PLAN P18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Ron Jones
REGISTERED CIVIL ENGINEER

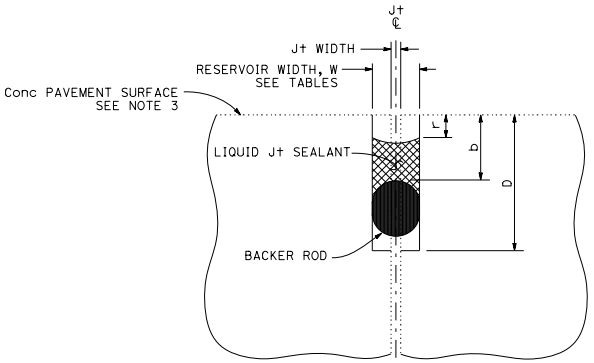
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Myron Duane Jones — No. C52419 — Exp. 12-31-18 — CIVIL — STATE OF CALIFORNIA

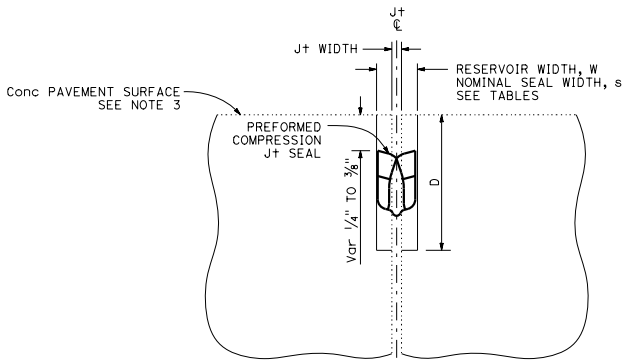
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Details do not apply to isolation joints and longitudinal construction joints.
2. Tie bars, dowel bars, and bar reinforcement are not shown.
3. Depths are measured from the final concrete pavement surface elevation after any grinding.



LIQUID JOINT SEALANT



PREFORMED COMPRESSION JOINT SEAL

RESERVOIR WIDTH W ±1/16"	LIQUID JOINT SEALANT DIMENSIONS					
	BACKER ROD NOMINAL Dia *	DEPTHS (ASPHALT RUBBER) **		DEPTHS (SILICONE)		
		RESERVOIR D ± 1/4"	BACKER ROD b ± 1/16"	RESERVOIR D ± 1/4"	BACKER ROD b ± 1/16"	RECESS r ± 1/16"
1/4"	3/8"	1 3/4"	7/8"	1 3/8"	1/2"	1/4"
3/8"	1/2"	1 7/8"	7/8"	1 1/2"	1/2"	1/4"
1/2"	3/4"	2"	7/8"	1 3/4"	9/16"	5/16"
5/8"	7/8"	2 1/4"	1"	2"	5/8"	5/16"
3/4"	1"	2 3/4"	1 1/8"	2 1/4"	3/4"	3/8"
7/8"	1 1/4"	3"	1 1/4"	2 1/2"	13/16"	3/8"
1"	1 1/2"	3 1/4"	1 3/8"	2 5/8"	7/8"	3/8"
1 1/8"	1 1/2"	3 1/2"	1 1/2"	2 13/16"	1"	1/2"

* Larger diameter backer rods may be substituted according to manufacturer recommendations if reservoir depth is increased equivalently.

** Asphalt rubber sealant recess depth "r" varies from 1/4" to 3/8"

RESERVOIR WIDTH W ±1/16"	PREFORMED COMPRESSION JOINT SEAL DIMENSIONS	
	NOMINAL SEAL WIDTH s	RESERVOIR DEPTH D ± 1/4"
1/4"	7/16"	1 1/4"
3/8"	11/16"	1 7/16"
1/2"	15/16"	1 11/16"
5/8"	1"	1 7/8"
3/4"	1 1/4"	2 1/8"
7/8"	1 5/8"	2 5/8"
1"	1 5/8"	2 5/8"
1 1/8"	2"	2 7/8"

Const SEASON	Min RESERVOIR WIDTH * W ± 1/16"
WINTER	1/4"
SPRING	3/8"
SUMMER	
FALL	

* Minimum reservoir width for replace joint seal = existing joint width + 1/8"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOINT SEALS

NO SCALE

P20

1-29-18

Return to Table of Contents

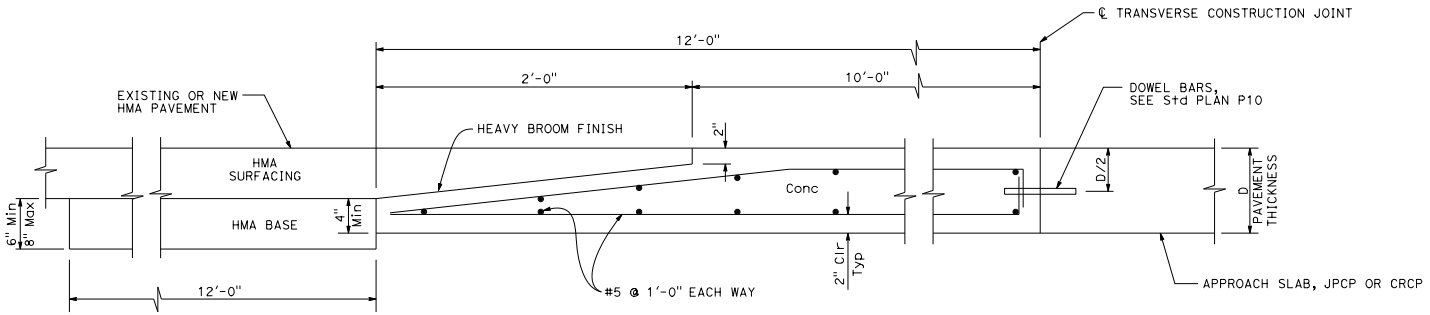
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

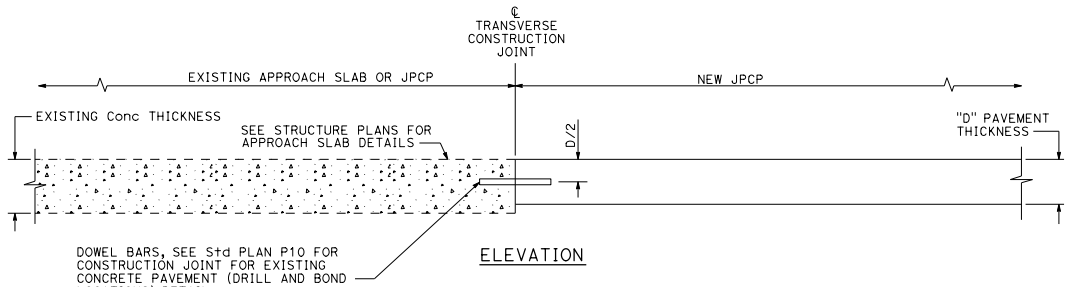
REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION

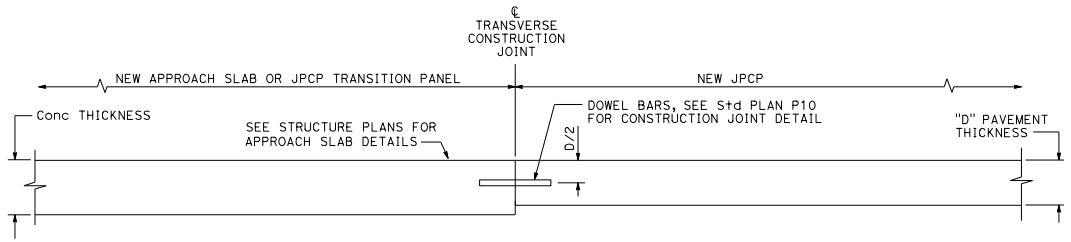
CONCRETE PAVEMENT TRANSITION PANEL



ELEVATION

TERMINAL JOINT TYPE 1

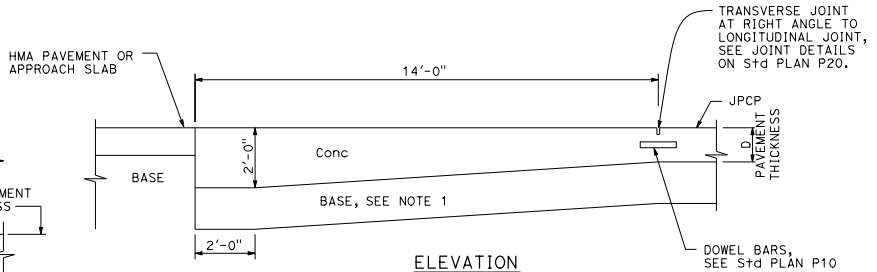
For Exist JPCP or Approach Slab



ELEVATION

TERMINAL JOINT TYPE 2

For JPCP Transition Panel or Approach Slab



ELEVATION

PAVEMENT END ANCHOR

For HMA Pvmt or Approach Slab

NOTE:

1. Maintain same base thickness as JPCP.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT-END PANEL PAVEMENT TRANSITIONS

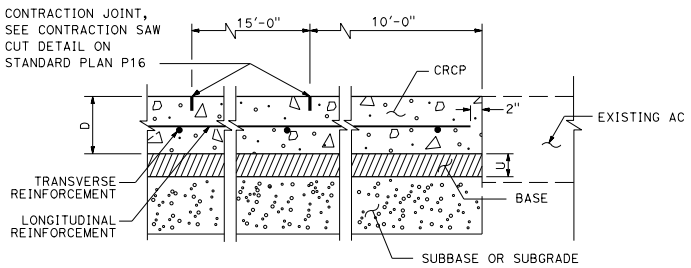
NO SCALE

P30

1-29-18

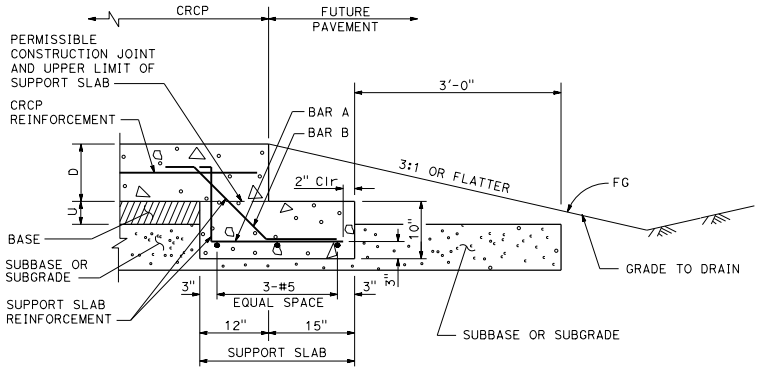
2018 STANDARD PLAN P30

Return to Table of Contents



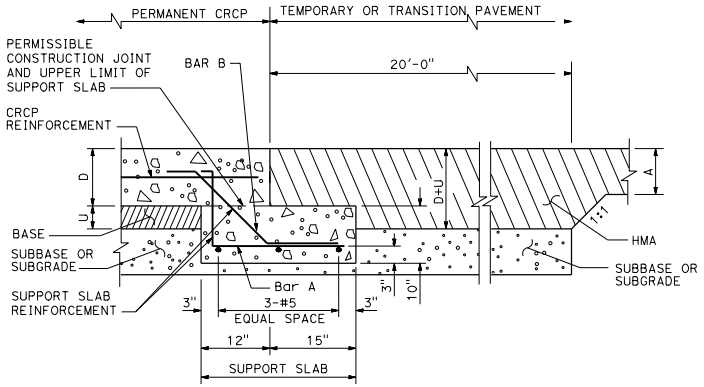
TERMINAL JOINT TYPE A

(For Existing AC)



TERMINAL JOINT TYPE B

(For Future Pavement)



TERMINAL JOINT TYPE C

(For Temporary HMA Pavement)

NOTES:

1. For the locations of wide flange beam terminal, pavement anchors and expansion joints, see Projects Plans.
2. See Standard Plans P31B and P32A.

ABBREVIATIONS

D = Thickness of CRCP

A = Depth of HMA as shown on Project Plans

U = Thickness of Base

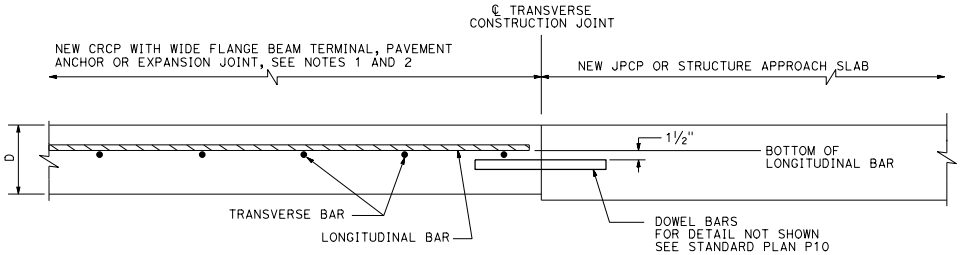
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

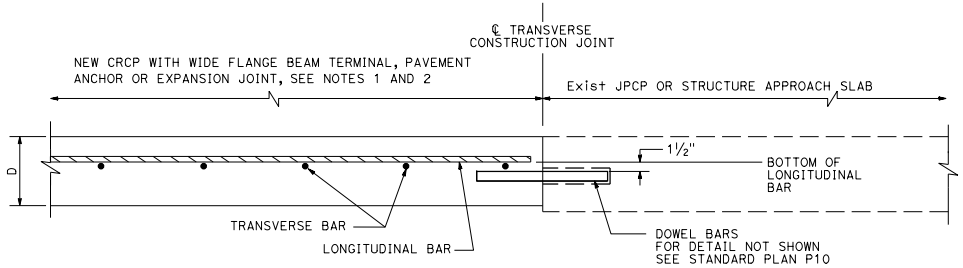
REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



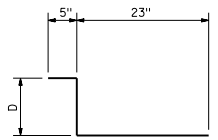
TERMINAL JOINT TYPE E

(For New JPCP or Structure Appproach Slabs)

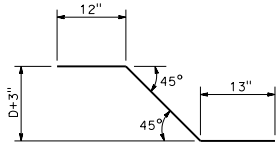


TERMINAL JOINT TYPE D

(For Existing JPCP or Structure Appproach Slabs)



BAR "A" (#5)
AT 12" C-C



BAR "B" (#5)
AT 12" C-C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT TERMINAL JOINT DETAILS

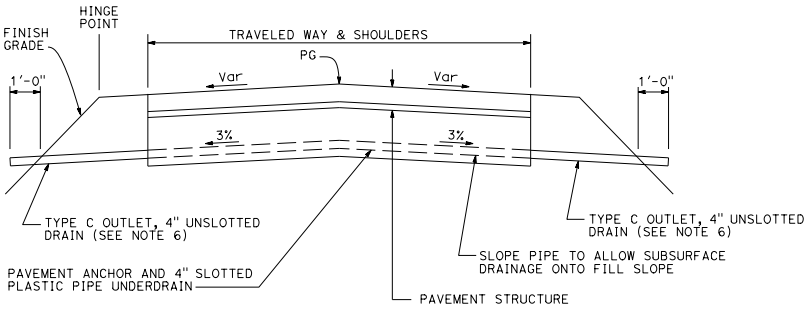
NO SCALE

P31A

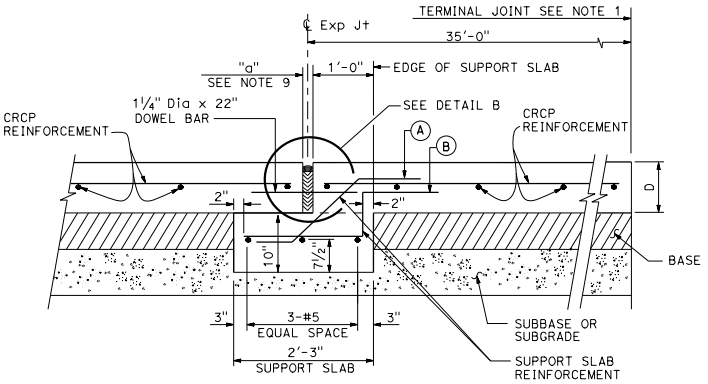
1-29-18

2018 STANDARD PLAN P31A

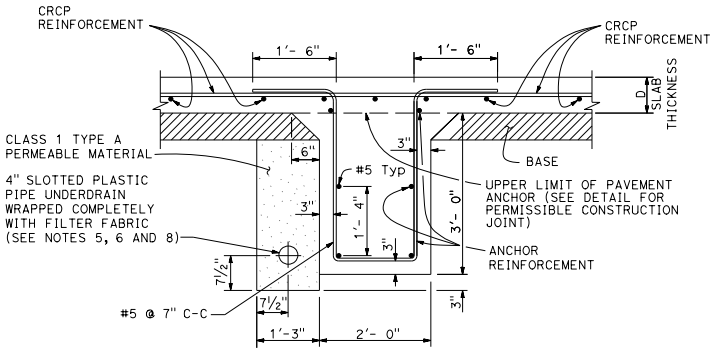
Return to Table of Contents



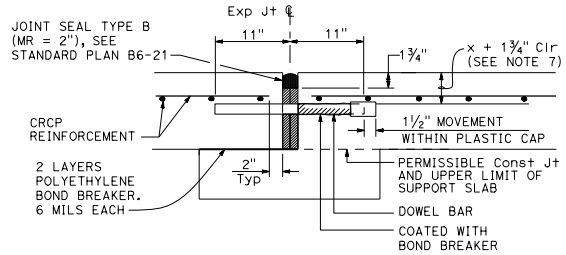
PAVEMENT ANCHOR PROFILE



EXPANSION JOINT TYPE AN

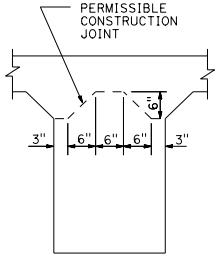


PAVEMENT ANCHOR

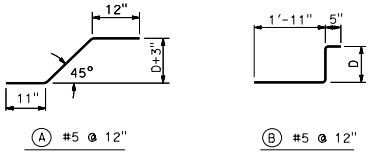


DETAIL B

(For layout, tolerances, and other details not shown, see Standard Plan P10.)



PAVEMENT ANCHOR DETAIL SHOWING PERMISSIBLE CONSTRUCTION JOINT



REINFORCEMENT DETAIL

NOTES:

1. For the locations of the terminal joints, expansion joints and pavement anchors, see project plans.
2. The CRCP shall continue across the pavement anchor and expansion joints as shown.
3. Details of reinforcement, tie bars, and longitudinal joints (and if necessary, transverse construction joints) are shown on Standard Plans P4 and P16.
4. Transverse construction joints are not allowed within 20'-0" of the pavement anchor.
5. When placing pipe through concrete barrier, use 4" unslotted plastic pipe wrapped completely with ⅜" polystyrene.
6. See Standard Plan P51 for details not shown.
7. See Standard Plan P4 for "x".
8. Place the 4" Slotted Plastic Pipe on the high side of the longitudinal grade.
9. See Standard Plan B6-21 for "a".

ABBREVIATION:

D = Thickness of CRCP

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT- EXPANSION JOINT AND ANCHOR DETAILS

NO SCALE

P31B

2018 STANDARD PLAN P31B

1-29-18

Return to Table of Contents

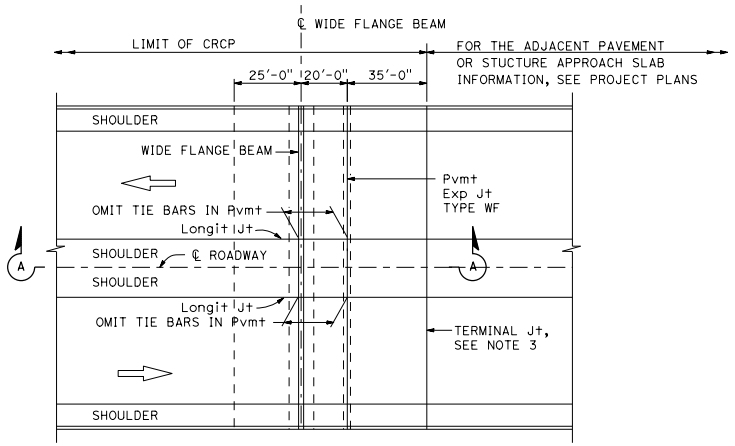
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

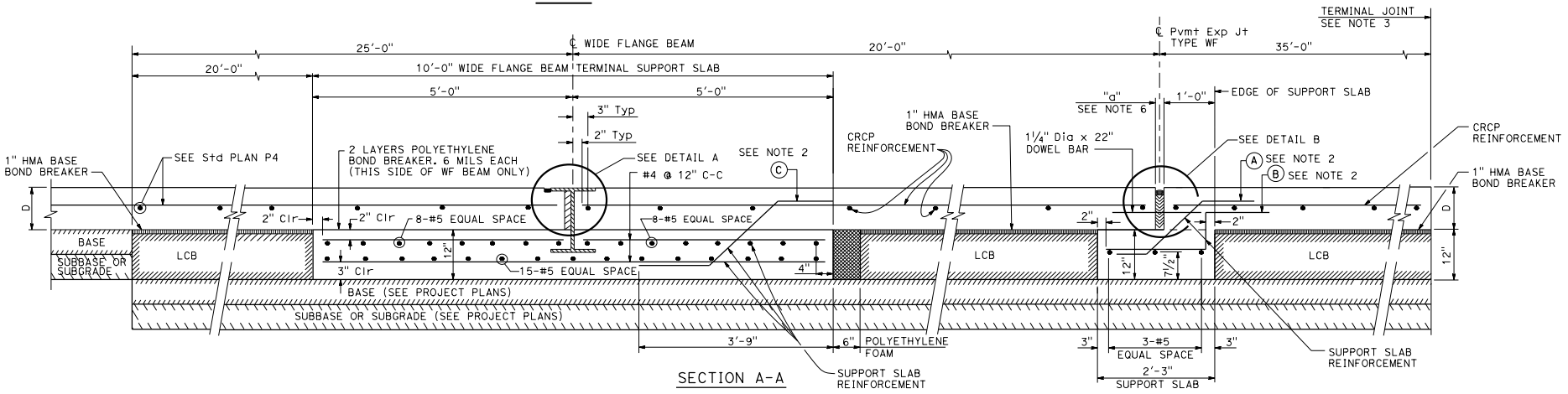
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



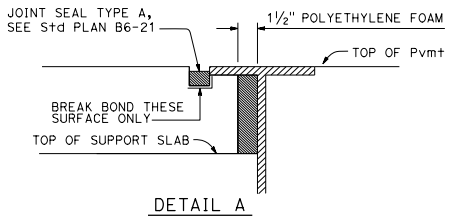
PLAN

NOTES:

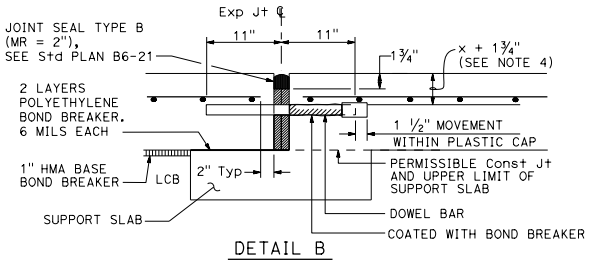
1. For additional details on reinforcement member quantities of the wide flange beam terminal and Pavement Expansion Joint Type WF, see Standard Plan P32B.
2. For reinforcement (A), (B), and (C) Details, see Standard Plan P32B.
3. For the Pavement Terminal Joint Details, see Standard Plan P31A. For Pavement Terminal Joint Type, see Project Plans.
4. See Standard Plan P4 for "x".
5. D = Thickness of CRCP
6. See Standard Plan B6-21 for "a".



SECTION A-A



DETAIL A



DETAIL B

For layout, tolerances, and other details not shown see Std Plan P10.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

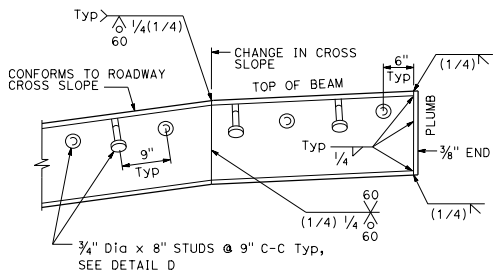
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT - WIDE FLANGE BEAM TERMINALS

NO SCALE

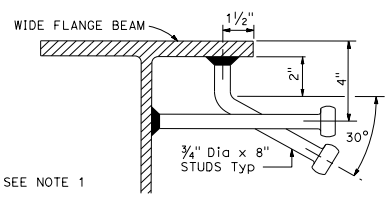
P32A

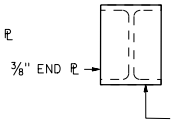
1-29-18

Return to Table of Contents

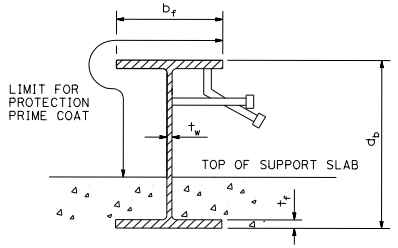


WIDE FLANGE DETAIL





DETAIL D



WIDE FLANGE PAINTING DETAIL

See "TABLE OF BEAM SIZES"

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

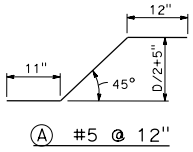
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

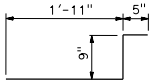
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND:

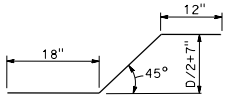
b_f - FLANGE WIDTH
t_f - FLANGE THICKNESS
t_w - WEB THICKNESS
d_b - BEAM DEPTH
D1, D2 - PAVEMENT THICKNESSES



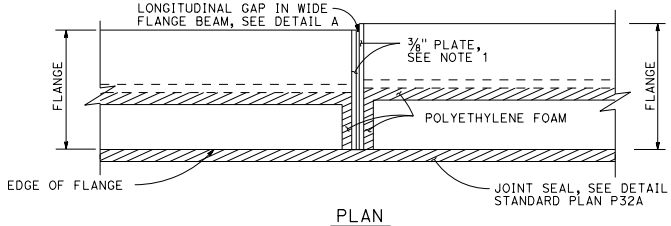
Ⓐ #5 @ 12"



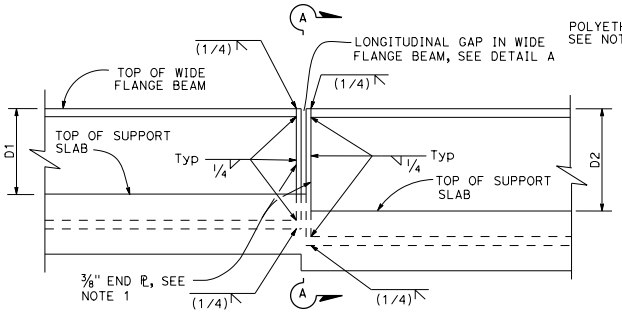
Ⓑ #5 @ 12"



Ⓒ #4 @ 12"



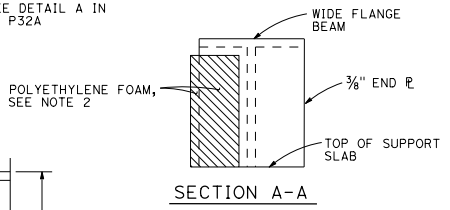
PLAN



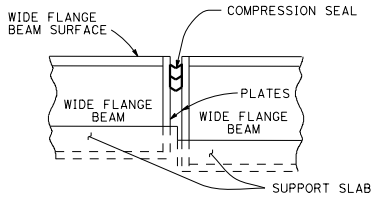
ELEVATION

NOTES:

1. Weld 3/8" plate to each end of wide flange beam at pavement edges only. End plate covers the entire wide flange beam.
2. Extend polyethylene foam to the sides and edges of the front part of the plate.



SECTION A-A



DETAIL A

TABLE OF BEAM SIZES					
PAVEMENT THICKNESS	WIDE FLANGE BEAM DESIGNATION	d_b	b_f	t_f	t_w
.75′	W14 x 43	13.70"	8.00"	0.53"	0.31"
.80′	W14 x 68	14.04"	10.04"	0.72"	0.42"
.85′	W16 x 89	16.75"	10.37"	0.88"	0.53"
.90′	W16 x 89	16.75"	10.37"	0.88"	0.53"
.95′	W18 x 97	18.59"	11.15"	0.87"	0.54"
1.00′	W18 x 97	18.59"	11.15"	0.87"	0.54"
1.05′	W18 x 97	18.59"	11.15"	0.87"	0.54"
1.10′	W18 x 97	18.59"	11.15"	0.87"	0.54"

CONCRETE AND STEEL QUANTITIES								
	ITEM	PAVEMENT THICKNESS							
		.75′	.80′	.85′	.90′	.95′	1.00′	1.05′	1.10′
WIDE FLANGE BEAM TERMINAL SLAB	CONCRETE	4.8 CY	4.8 CY	4.8 CY	4.8 CY	4.8 CY	4.8 CY	4.8 CY	4.8 CY
	REINFORCING STEEL	552.0 LBS	552.2 LBS	552.4 LBS	552.6 LBS	552.8 LBS	553.0 LBS	553.1 LBS	553.3 LBS
Exp JOINT TYPE WIDE FLANGE SUPPORT SLAB	CONCRETE	1.1 CY	1.1 CY	1.1 CY	1.1 CY	1.1 CY	1.1 CY	1.1 CY	1.1 CY
	REINFORCING STEEL	99.9 LBS	99.9 LBS	100.2 LBS	100.5 LBS	100.8 LBS	101.1 LBS	101.1 LBS	101.6 LBS
	STEEL BEAM (WEIGHT OF WIDE FLANGE BEAM AND STUDS)	43.0 LBS/LF +2 PLATES @ 14.9 LBS EA	69.51 LBS/LF +2 PLATES @ 14.9 LBS EA	90.51 LBS/LF +2 PLATES @ 18.5 LBS EA	90.51 LBS/LF +2 PLATES @ 18.5 LBS EA	98.51 LBS/LF +2 PLATES @ 22.0 LBS EA	98.51 LBS/LF +2 PLATES @ 22.0 LBS EA	98.51 LBS/LF +2 PLATES @ 22.0 LBS EA	98.51 LBS/LF +2 PLATES @ 22.0 LBS EA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT WIDE FLANGE BEAM TERMINALS

NO SCALE

P32B

1-29-18

2018 STANDARD PLAN P32B

Return to Table of Contents

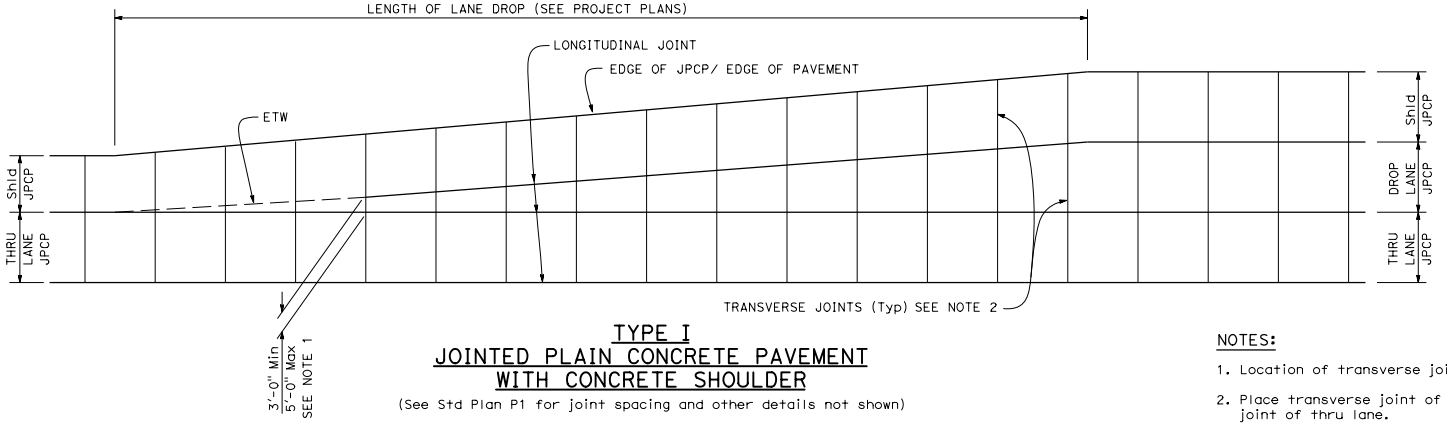
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

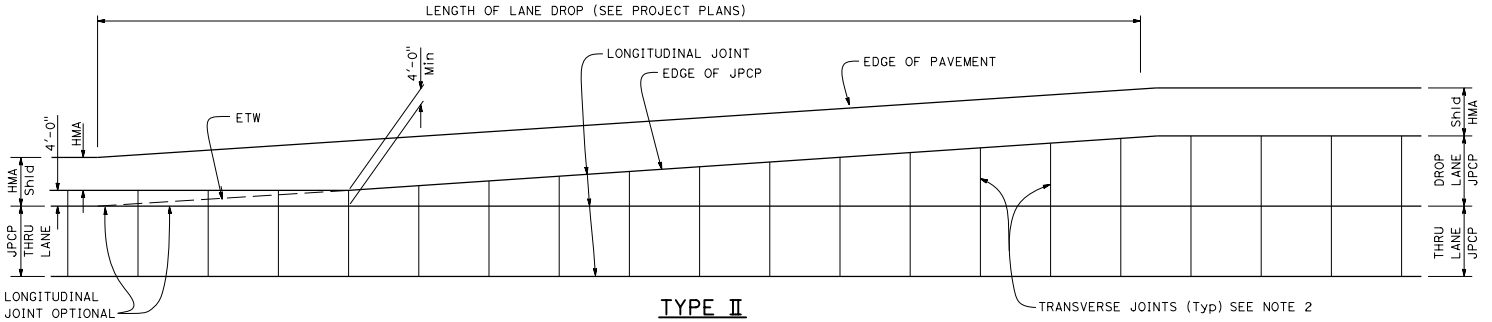


TYPE I
JOINTED PLAIN CONCRETE PAVEMENT WITH CONCRETE SHOULDER

(See Std Plan P1 for joint spacing and other details not shown)

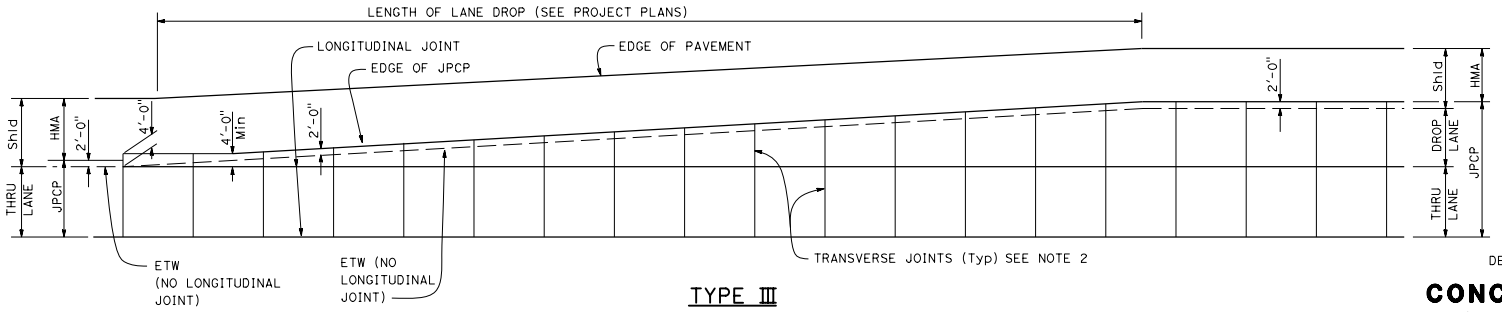
NOTES:

1. Location of transverse joint to match transverse joint of adjacent lane.
2. Place transverse joint of lane and shoulder perpendicular to longitudinal joint of thru lane.



TYPE II
JOINTED PLAIN CONCRETE PAVEMENT WITH ASPHALT SHOULDER

(See Std Plan P2 for joint spacing and other details not shown)



TYPE III
JOINTED PLAIN CONCRETE PAVEMENT WITH WIDENED SLAB AND ASPHALT SHOULDER

(See Std Plan P2 for joint spacing and other details not shown)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

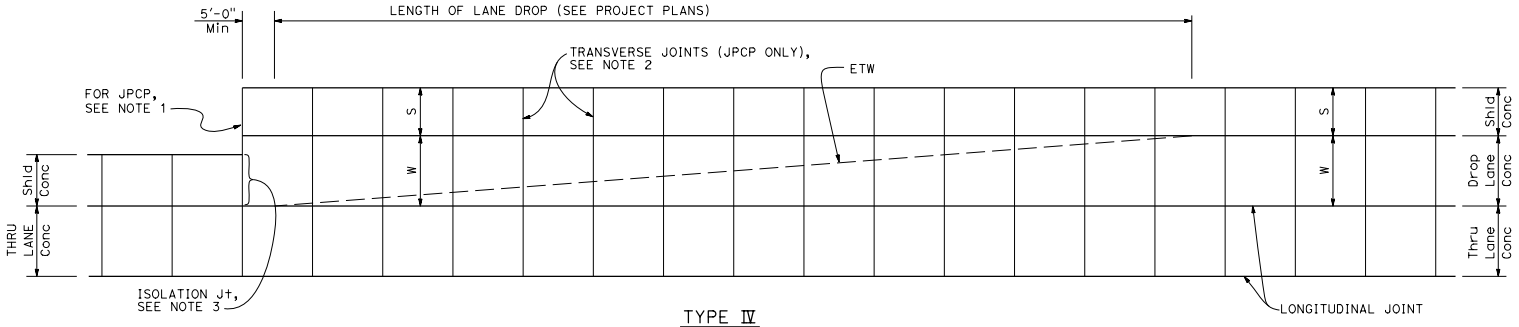
CONCRETE PAVEMENT- LANE DROP PAVING DETAILS No. 1

NO SCALE

P33

1-29-18

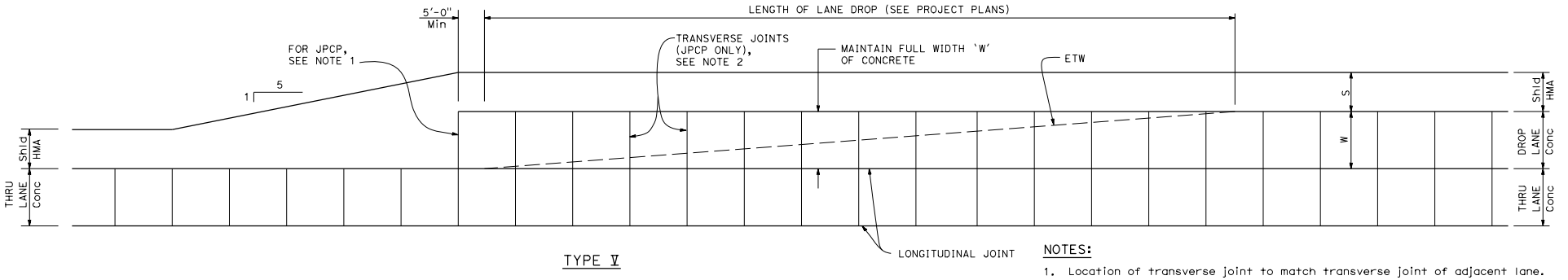
Return to Table of Contents



TYPE IV

JOINTED PLAIN AND CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

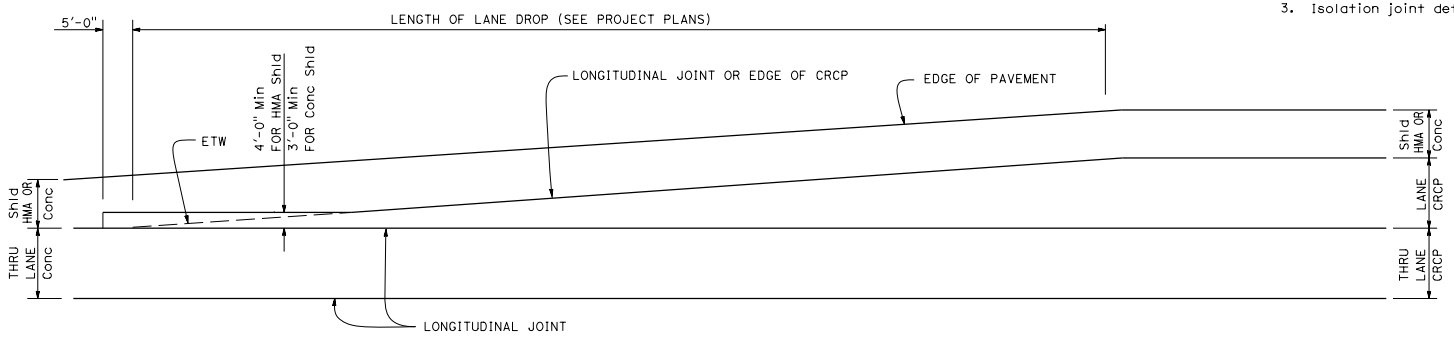
(See Std Plans P1, P2, or P4 for details not shown)



TYPE V

JOINTED PLAIN AND CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

(See Std Plans P1, P2, or P4 for details not shown)



TYPE VI

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

(See Std Plan P4 for details not shown)

NOTES:

1. Location of transverse joint to match transverse joint of adjacent lane.
2. Place transverse joint of lane and shoulder perpendicular to longitudinal joint of through lane.
3. Isolation joint detail shown on Standard Plan P18.

LEGEND

S - SHOULDER WIDTH
W - LANE WIDTH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT- LANE DROP PAVING DETAILS No. 2

NO SCALE

P34

1-29-18

2018 STANDARD PLAN P34

Return to Table of Contents

NOTES:

1. Details for gore area paving are applicable to both exit and entrance ramps.
2. Transverse Joint Layouts are not shown. Refer to Standard Plan P1 or Project Plans for details regarding joint layouts, tie bars, and dowel bars not shown.
3. WWF 4 x 4 - W4.0 x W4.0 can be used in place of steel reinforcement for gore area paving only.
4. Omit longitudinal joint when concrete on ramp shoulder is less than 3'-0".
5. Place joint perpendicular to ramp longitudinal joints. Match location of joint with ramp transverse joints.
6. Place joint perpendicular to ramp longitudinal joints. Match location of joint with mainline transverse joints.
7. Isolation joint detail shown on Standard Plan P18.
8. For jointed plain concrete pavement, transverse joints to be spaced from fixed transverse joint and shall follow spacing pattern on Standard Plan P1. Minimum spacing shall be 6 feet.

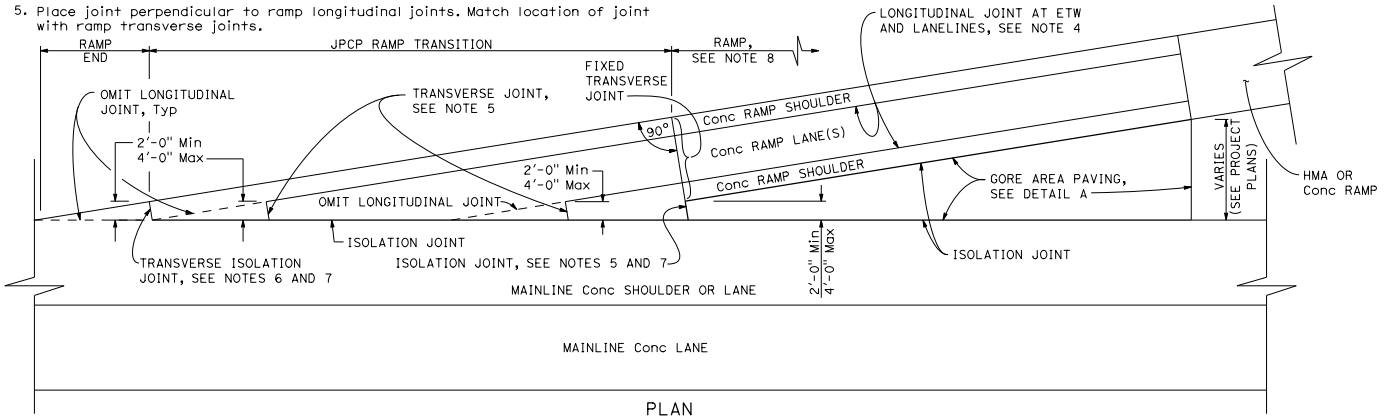
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Dulce Rufino Feldman
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

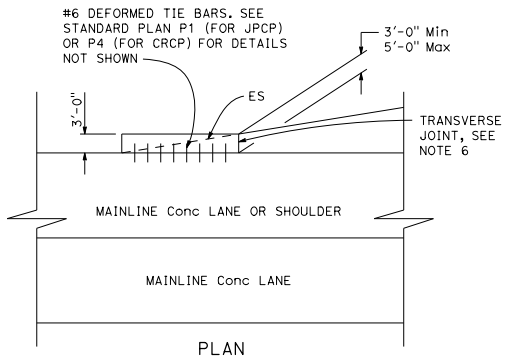
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Dulce Rufino Feldman
No. C81459
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA



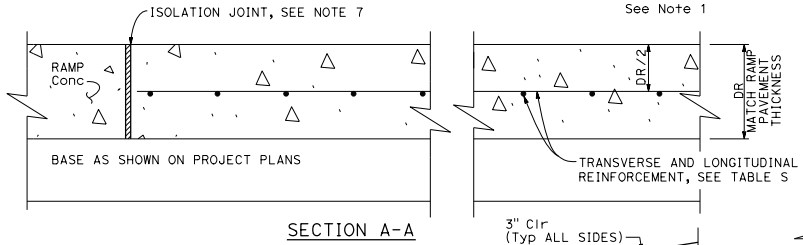
PLAN

RAMP TRANSITION DETAIL

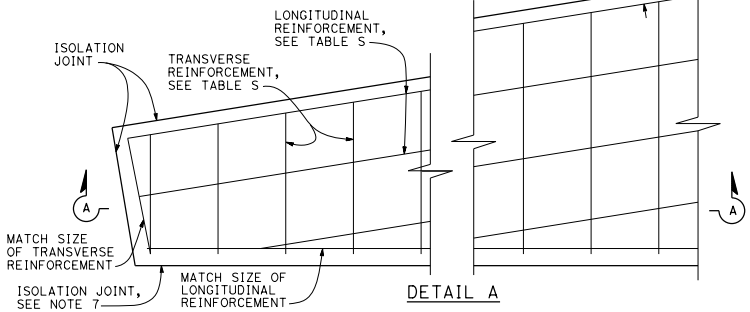


PLAN

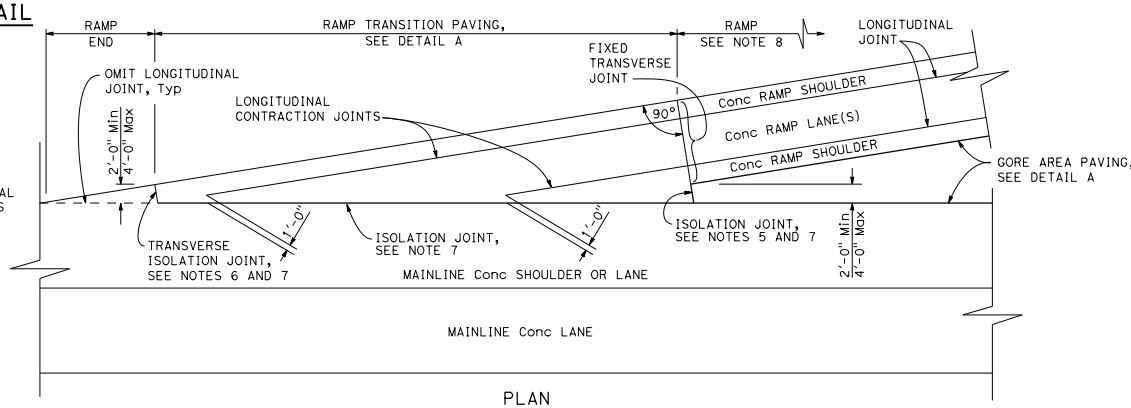
ALTERNATE RAMP END DETAIL



SECTION A-A



DETAIL A



PLAN

ALTERNATE RAMP TRANSITION DETAIL

(For JPCP and CRCP)

TABLE S

LOCATION	TRANSVERSE BAR	LONGITUDINAL BAR
GORE AREA PAVING	#4 @ 1'-0" *	#4 @ 1'-0" *
RAMP TRANSITION (JPCP)	#6 @ 1'-6"	#6 @ 9"
RAMP TRANSITION (CRCP)	SEE Std PLAN P4, TABLE No. 2	SEE Std PLAN P4, TABLE No. 1

* See Note 3

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT-RAMP TRANSITION PAVING DETAILS

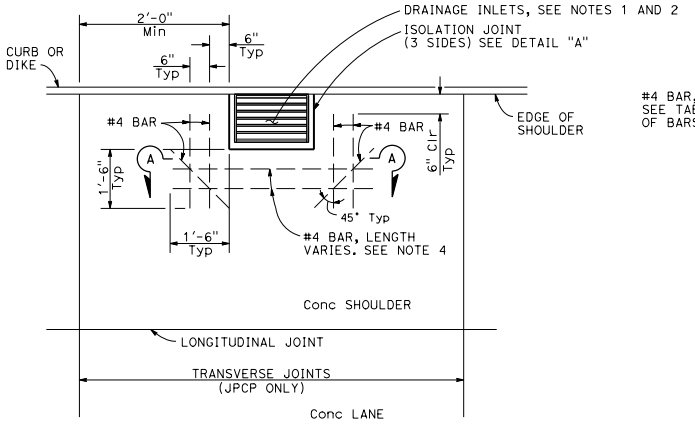
NO SCALE

P35

1-29-18

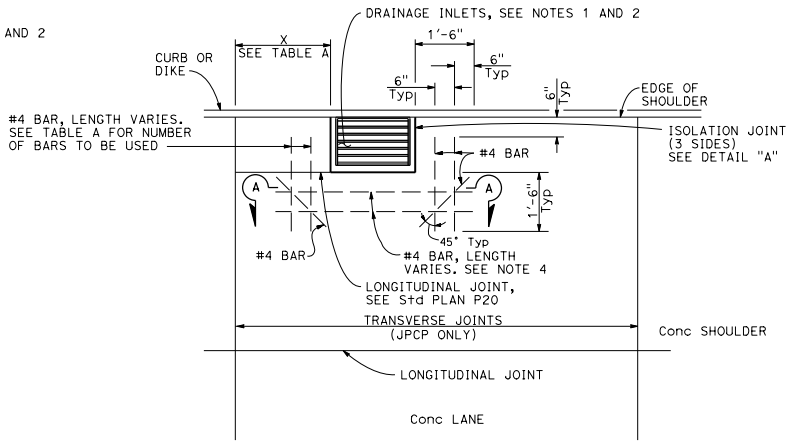
2018 STANDARD PLAN P35

Return to Table of Contents



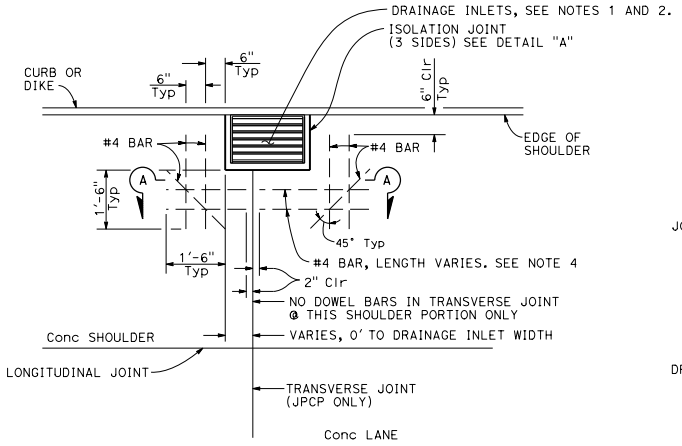
CASE 1

Transverse joint more than 2'-0" clear of drainage inlet wall or no transverse joint



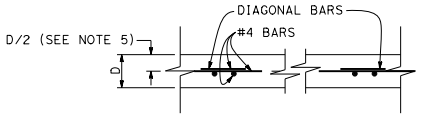
CASE 3

Transverse joint within 2'-0" of drainage inlet wall, or matches drainage inlet wall.



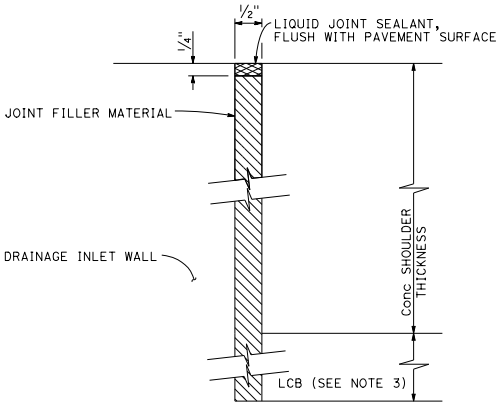
CASE 2

Transverse joint intersects drainage inlet, or matches drainage inlet wall.



SECTION A-A

D = Pavement Thickness



DETAIL "A"

ISOLATION JOINT AROUND DRAINAGE INLET

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Deepak R. Maskey — No. C70117 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Refer to Project Plans for location and Type of drainage inlets.
2. Top of inlet shall be flush with shoulder surface.
3. Extend joint filler material to bottom of Lean Concrete Base. Where Lean Concrete Base is not used as base material, the joint filler material shall only extend to the bottom of the new concrete pavement.
4. For Jointed Plain Concrete Pavement only. For Continuously Reinforced Concrete Pavement, terminate pavement steel reinforcement 2" clear from all outside edges of isolation joint.
5. For Jointed Plain Concrete Pavement only. For Continuously Reinforced Concrete Pavement, see Standard Plan P4.
6. Dowel and tie bars not shown, see Standard Plan P1.

TABLE A

DISTANCE X	BARS REQUIRED
2'-0" TO 1'-6"	2
1'-6" TO 9"	1 @ X/2
9" OR LESS	NONE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT-DRAINAGE INLET DETAILS No. 1

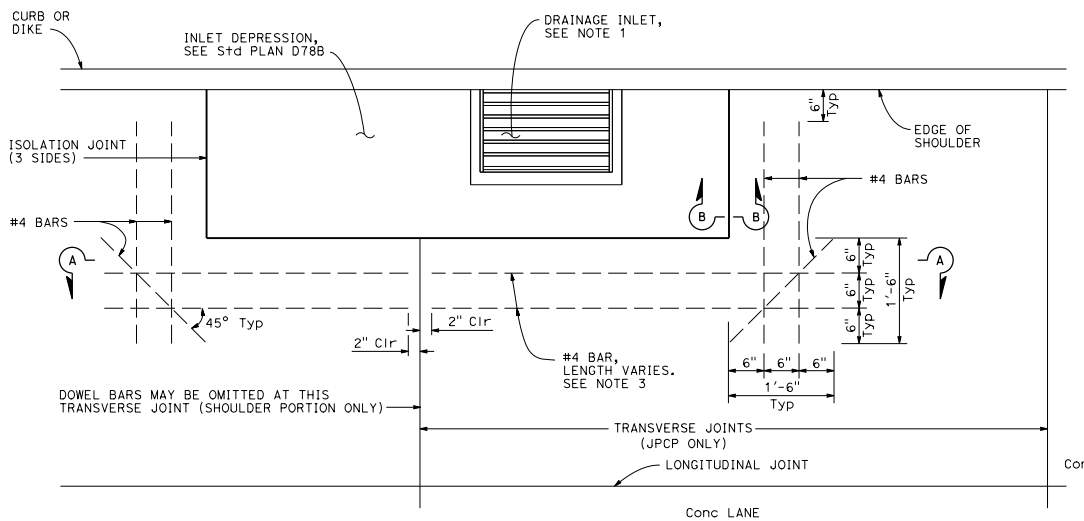
NO SCALE

P45

1-29-18

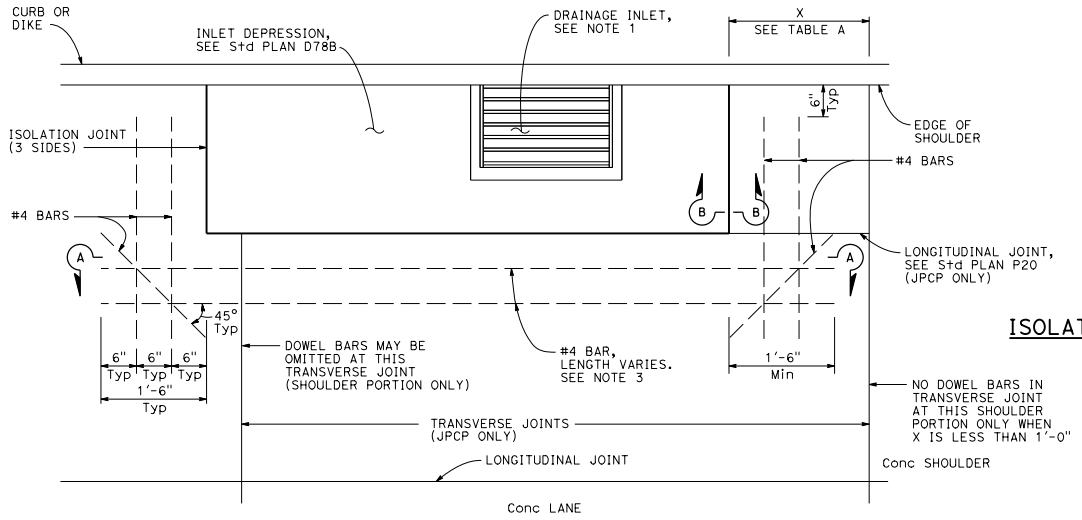
2018 STANDARD PLAN P45

Return to Table of Contents



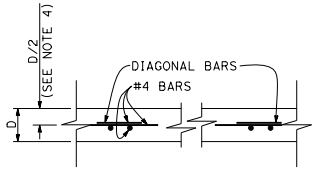
CASE A

Transverse Joint intersects inlet depression or no transverse joints.



CASE B

Transverse Joint within 2'-0" of edge of inlet depression.

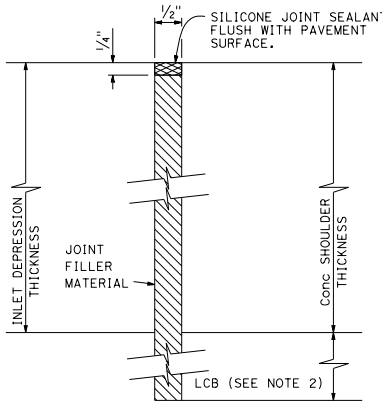


SECTION A-A

D = Pavement Thickness

TABLE A

DISTANCE X	BARS REQUIRED
2'-0" TO 1'-6"	2
1'-6" TO 1'-0"	1
1'-0" OR LESS	NONE



SECTION B-B

NOTES:

1. Refer to Project Plans for location and type of drainage inlets.
2. Extend joint filler material to bottom of Lean Concrete Base. Where Lean Concrete Base is not used as base material, the joint filler material shall only extend to the bottom of the new concrete pavement.
3. For Jointed Plain Concrete Pavement only. For Continuously Reinforced Concrete Pavement, terminate pavement steel reinforcement 2" clear from all outside edges of isolation joint.
4. For Jointed Plain Concrete Pavement only. For Continuously Reinforced Concrete Pavement, see Standard Plan P4.

ISOLATION JOINT AROUND INLET DEPRESSION

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Deepak R. Maskey — No. C70117 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT-DRAINAGE INLET DETAILS No. 2

NO SCALE

P46

1-29-18

2018 STANDARD PLAN P46

Return to Table of Contents

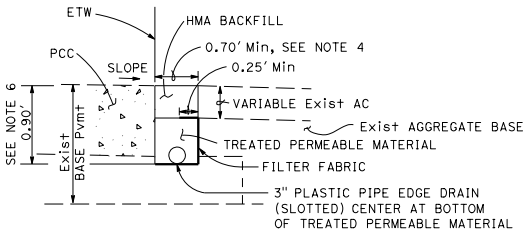
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

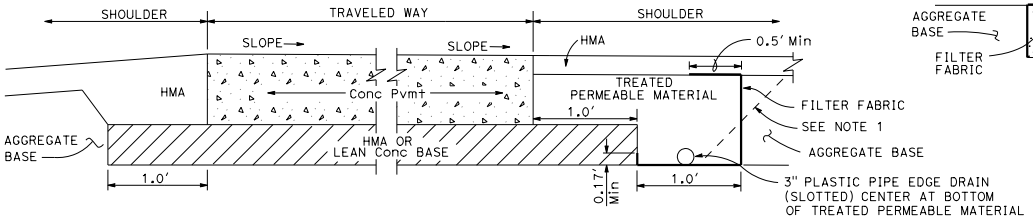
Deepak R. Maskey
No. C70117
Exp. 9-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



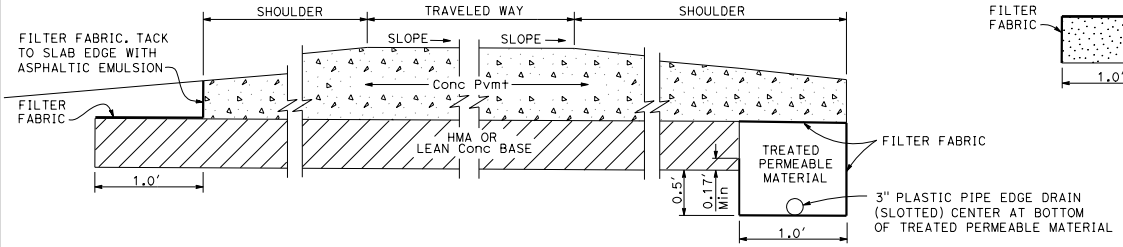
TYPE 1 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(For existing highway facility)



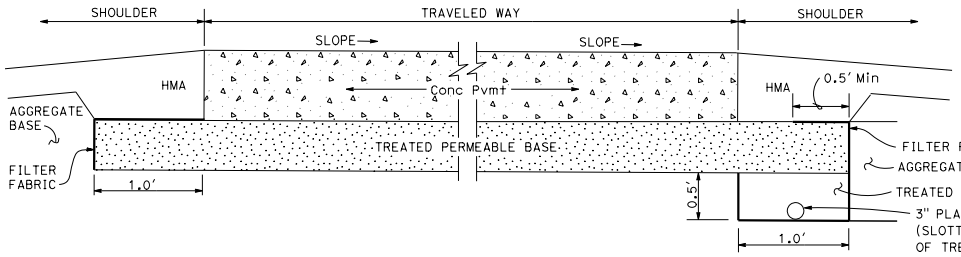
TYPE 2 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(New construction)



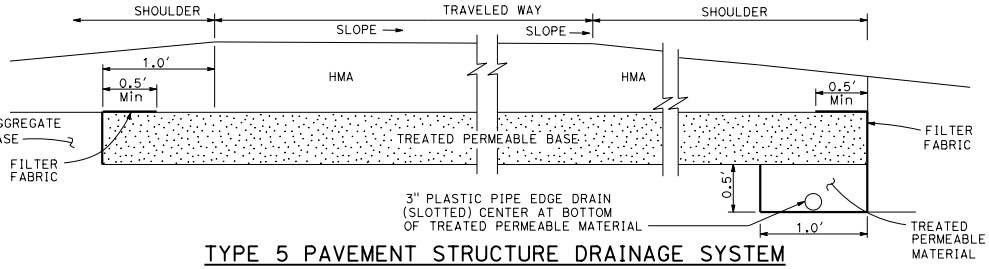
TYPE 3 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(New construction)



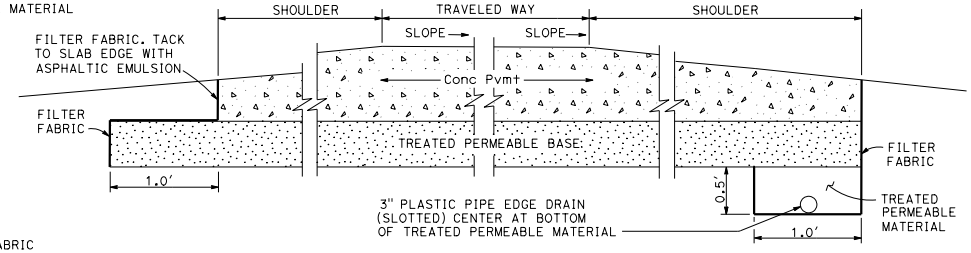
TYPE 4 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(New construction)



TYPE 5 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(New construction)



TYPE 6 PAVEMENT STRUCTURE DRAINAGE SYSTEM

(New construction)

NOTES:

1. At the Contractor's option, on new construction, the vertical jointline (including the filter fabric) between the treated permeable material and the shoulder base/subgrade material may be rotated about its midpoint to a slope not flatter than 1:1 as shown by the dashed lines.
2. See the project plans and typical cross sections for pavement structure details.
3. The plan layout for pavement structure drainage collector and outlet systems for new concrete pavement and new hot mix asphalt pavement is the same as that shown on Standard Plan P51.
4. For plastic pipe edge drain diameter larger than 3", the minimum trench width shall be equal to the outside diameter of the plastic pipe plus 4".
5. For plastic pipe edge drain diameters larger than 3", all details for 3" plastic pipe edge drain shall apply.
6. For pavements thicker than 0.75', the minimum trench depth is 1.0'.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT STRUCTURE DRAINAGE SYSTEM DETAILS

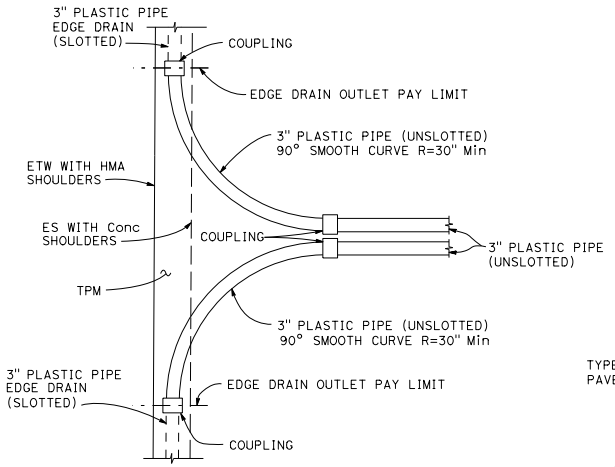
NO SCALE

P50

1-29-18

2018 STANDARD PLAN P50

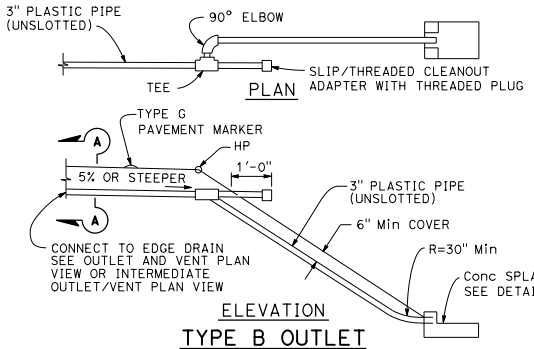
Return to Table of Contents



PLAN

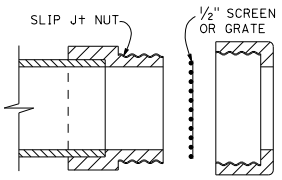
DUAL OUTLET AND/OR VENT

See Note 2

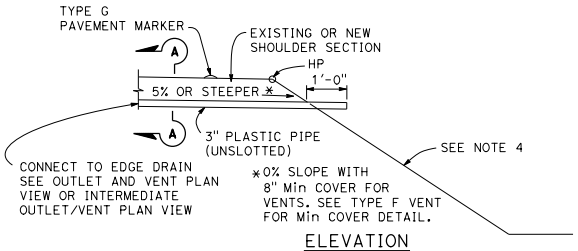


ELEVATION

TYPE B OUTLET

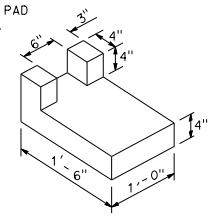


EDGE DRAIN OUTLET AND VENT COVER



ELEVATION

TYPE C OUTLET AND/OR VENT

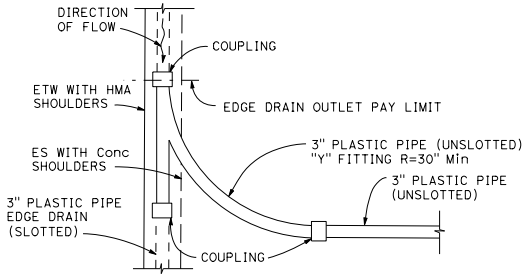


DETAIL A

CONCRETE SPLASH PAD

NOTES:

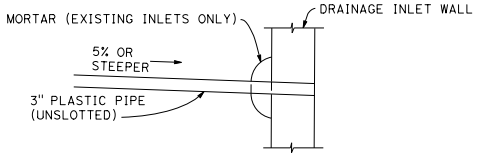
1. See project plans for location and type of outlet and/or vent installations.
2. The position of slotted plastic pipe and limits of treated permeable material shown are for the Type 1 structural section drainage system shown on Standard Plan P50.
3. The maximum length of plastic pipe outlet shall be 50'-0" measured from the longitudinal centerline of the collector trench to the pipe outlet. For pipe lengths greater than 50'-0" use Type B outlets.
4. See project plans for slope protection details at Type C pipe outlets.
5. Backfill with aggregate base from outside edge paved shoulder to hinge point and backfill with native material in slope area.
6. See Standard Plan P52 for Type G vent detail used with concrete shoulders.



PLAN

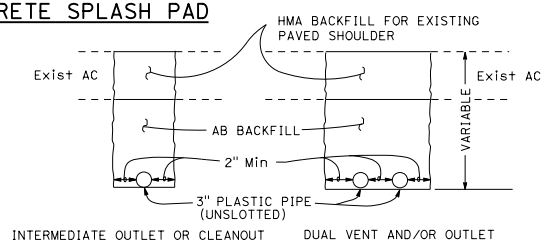
INTERMEDIATE OUTLET

See Note 2



ELEVATION

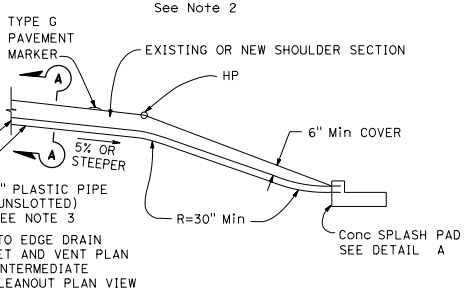
TYPE D OUTLET CONNECTION TO DRAINAGE INLET



SECTION A-A

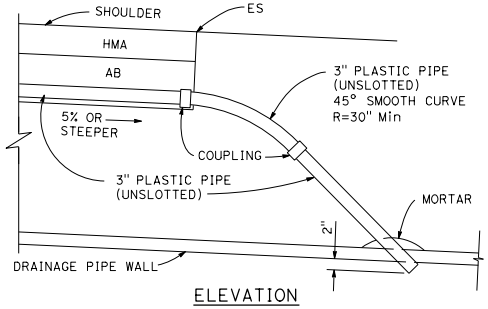
OUTLET EXCAVATION AND BACKFILL IN PAVED SHOULDERS

See Note 5



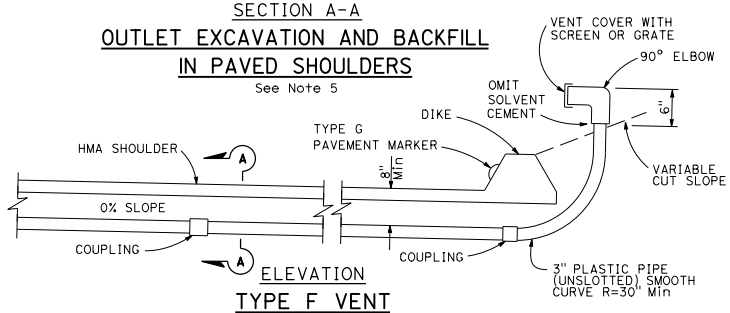
ELEVATION

TYPE A OUTLET



ELEVATION

TYPE E OUTLET CONNECTION TO DRAINAGE PIPE



ELEVATION

TYPE F VENT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Deepak R. Maskey No. C70117 Exp. 9-30-18 CIVIL

REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EDGE DRAIN OUTLET AND VENT DETAILS

NO SCALE

P51

1-29-18

2018 STANDARD PLAN P51

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

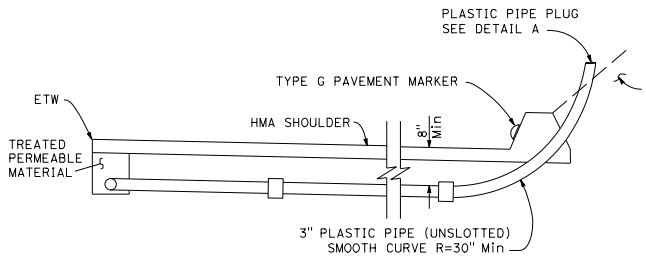
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

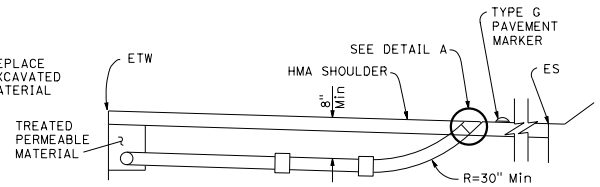
Deepak R. Maskey
No. C70117
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

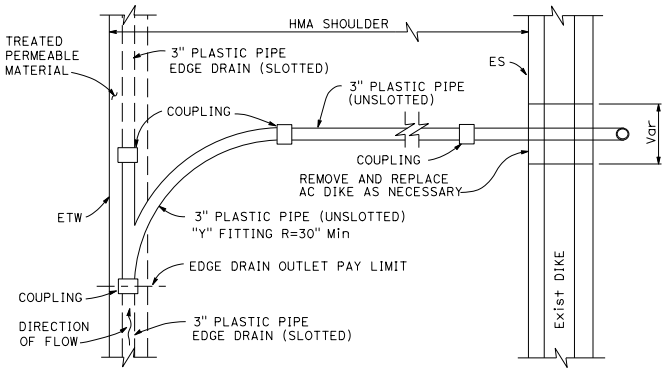
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION



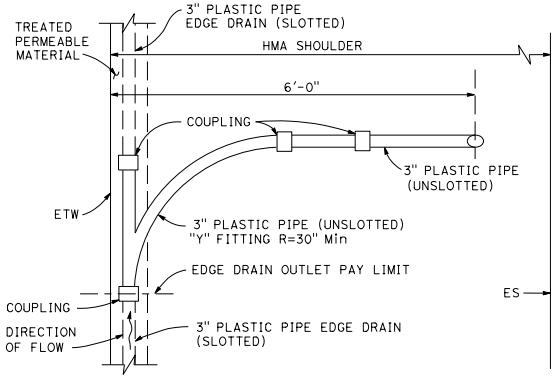
ELEVATION



PLAN

TYPE 1 CLEANOUT

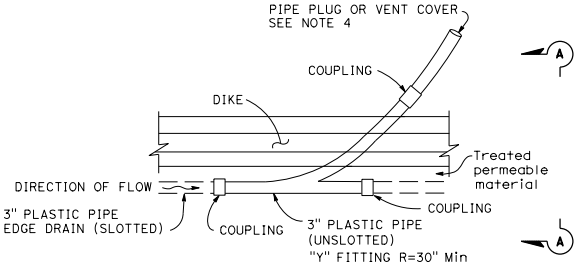
See Note 2



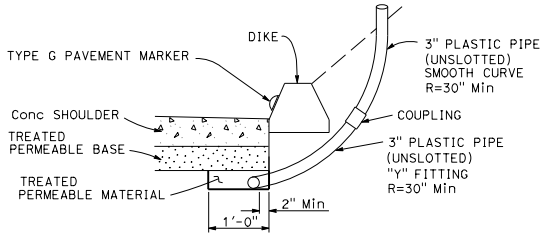
PLAN

TYPE 2 CLEANOUT

See Note 2



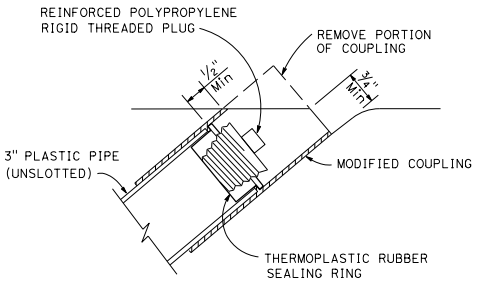
PLAN



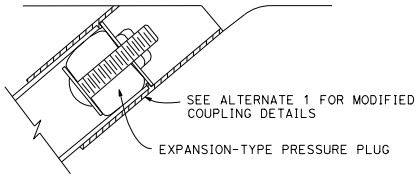
SECTION A-A

TYPE 3 CLEANOUT/TYPE G VENT

See Note 4



ALTERNATIVE 1



ALTERNATIVE 2

DETAIL A

PLASTIC PIPE PLUG

See Note 3

NOTES:

1. See project plans for location and type of cleanout or vent installations.
2. The position of slotted plastic pipe and limits of treated permeable material shown are for the Type 1 structural section drainage system shown on Standard Plan P50.
3. Other types of plugs may be substituted with the Engineer's approval.
4. The Type 3 cleanout and Type G vent is for use with concrete shoulders. The Type 6 structural section drainage system from Standard Plan P50 is shown. Use plastic pipe plug shown in Detail A with Type 3 cleanouts. Use vent cover shown on Standard Plan P51 with Type G vents.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

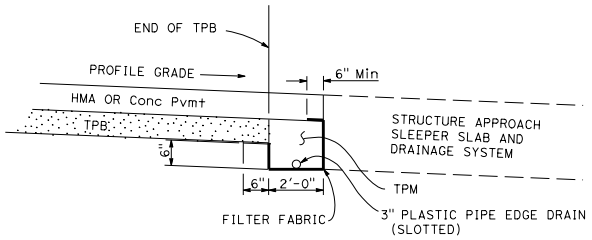
EDGE DRAIN CLEANOUT AND VENT DETAILS

NO SCALE

P52

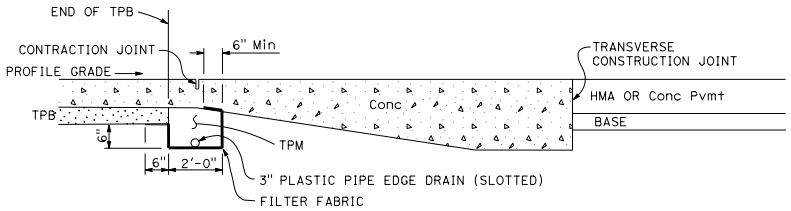
1-29-18

Return to Table of Contents



LONGITUDINAL SECTION

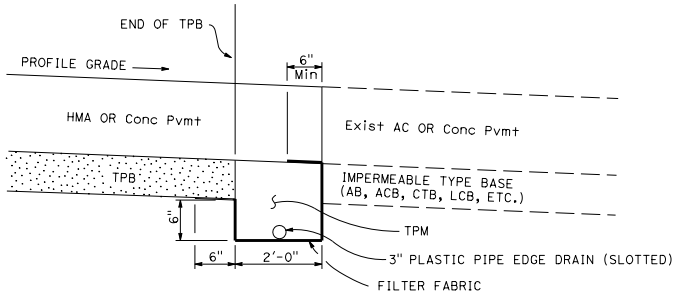
CROSS DRAIN INTERCEPTOR AT STRUCTURE APPROACH



LONGITUDINAL SECTION

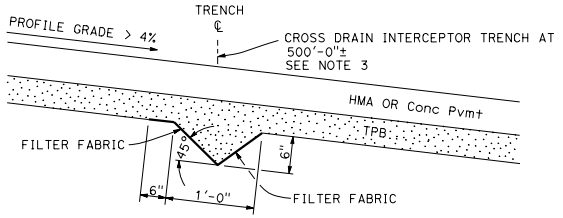
CROSS DRAIN INTERCEPTOR AT END ANCHOR

See Note 2



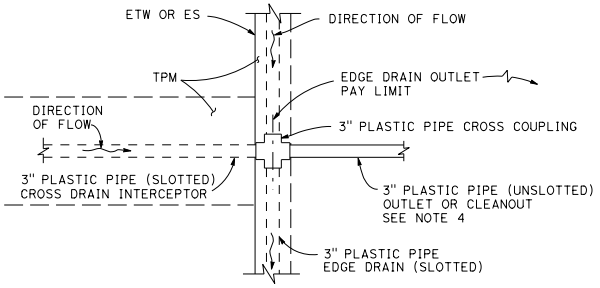
LONGITUDINAL SECTION

TERMINAL CROSS DRAIN INTERCEPTOR



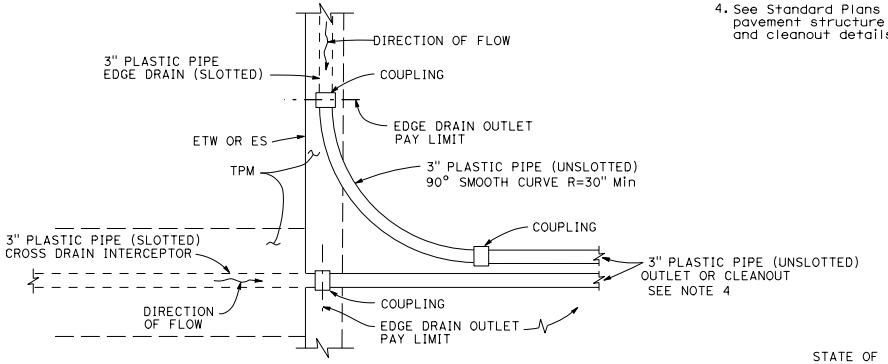
LONGITUDINAL SECTION

INTERMEDIATE CROSS DRAIN INTERCEPTOR



PLAN

CROSS DRAIN INTERCEPTOR OUTLET CONNECTION DETAILS



PLAN

COMBINED CROSS DRAIN INTERCEPTOR/EDGE DRAIN OUTLET DETAILS

NOTES:

1. Cross drain interceptors are for use with treated permeable bases.
2. See Standard Plan P30 for Pavement End Anchor details. A typical pavement end anchor is shown.
3. The cross drain interceptor trench shall slope to drain. See project plans for location and skew of cross drains.
4. See Standard Plans P51 and P52 for pavement structure drainage system outlet and cleanout details, respectively.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Deepak R. Maskey — No. C70117 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CROSS DRAIN INTERCEPTOR DETAILS

NO SCALE

P53

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

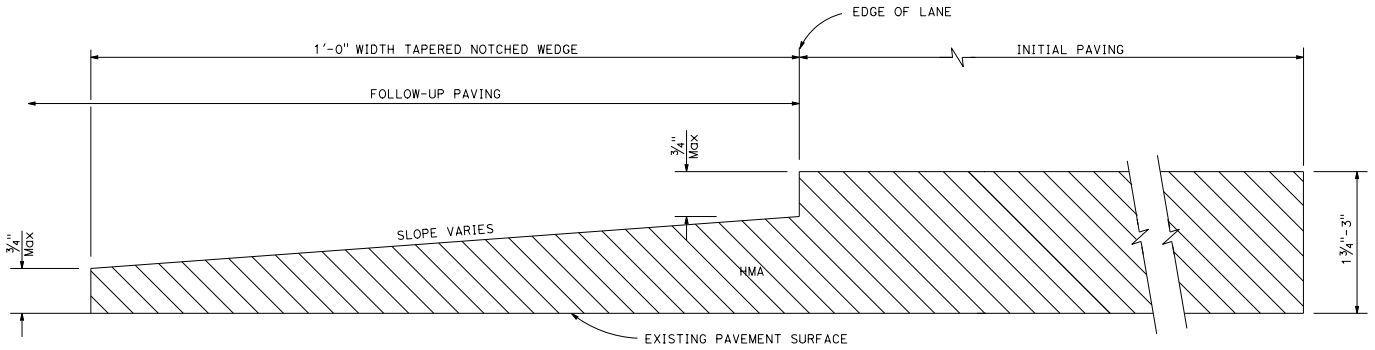
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

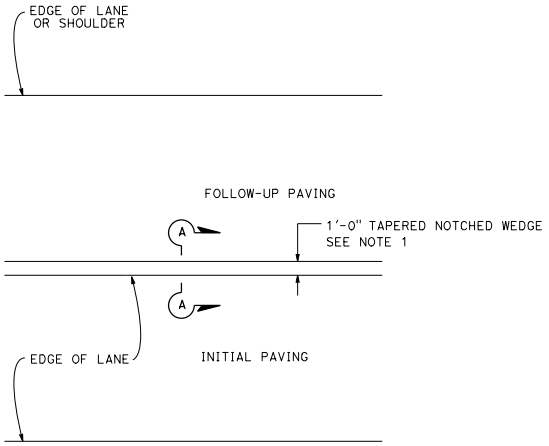
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Dulce Rufino Feldman — No. C81459 — Exp. 9-30-19 — CIVIL — STATE OF CALIFORNIA



SECTION A-A

LONGITUDINAL TAPERED NOTCHED WEDGE JOINT



PLAN

DIVIDED MULTILANE HIGHWAY

NOTE:

1. Tapered notch wedge shall extend 1'-0" into adjacent lane or shoulder to receive follow-up paving.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

HOT MIX ASPHALT PAVING (LONGITUDINAL TAPERED NOTCHED WEDGE JOINT)

NO SCALE

P70

1-29-18

2018 STANDARD PLAN P70

Return to Table of Contents

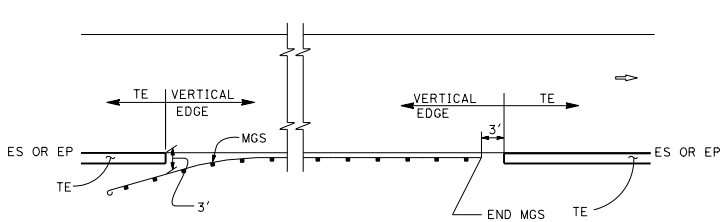
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Srikanth Balasubramanian
REGISTERED CIVIL ENGINEER

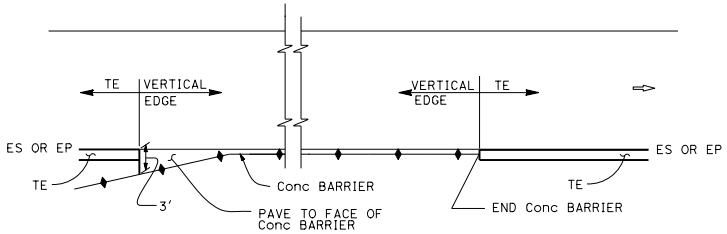
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Srikanth N. Balasubramanian
No. C56426
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA



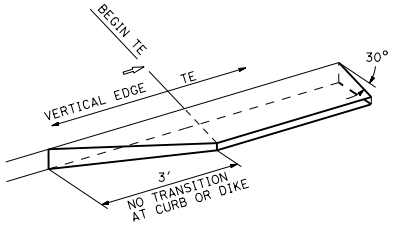
MGS



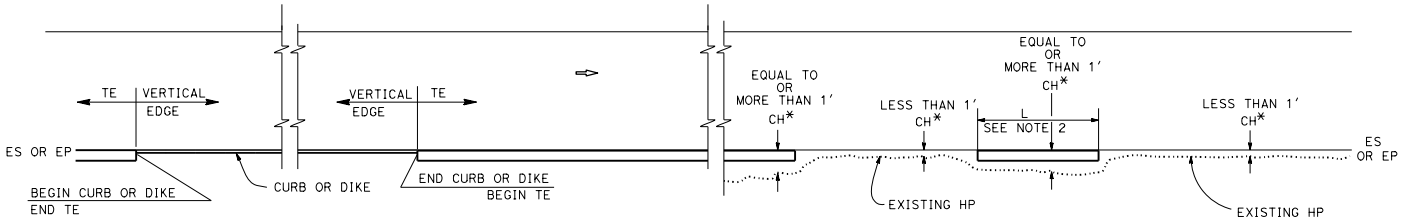
CONCRETE BARRIER

ABBREVIATIONS:

TE TAPERED EDGE



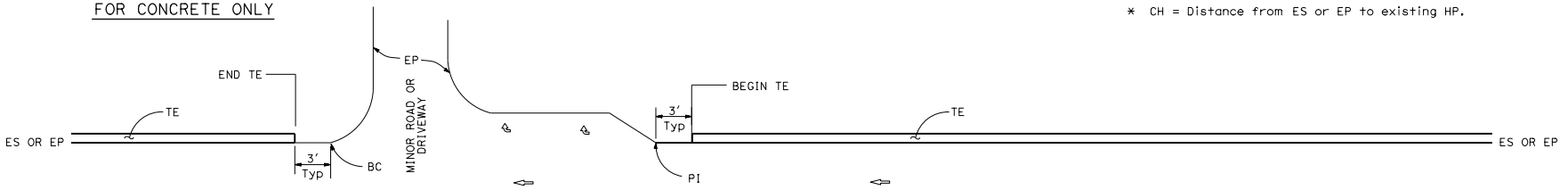
TRANSITION DETAIL FOR CONCRETE ONLY

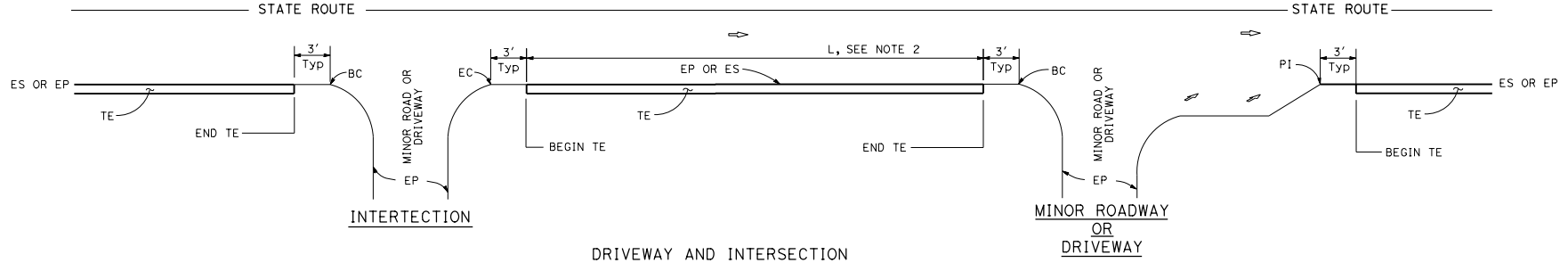


CURB OR DIKE

NARROW SIDE SLOPE

* CH = Distance from ES or EP to existing HP.





DRIVEWAY AND INTERSECTION

NOTES:

1. For details not shown, see Standard Plans P75 and P76.
2. Tapered edge is optional when L is less than 30′.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT EDGE TREATMENTS

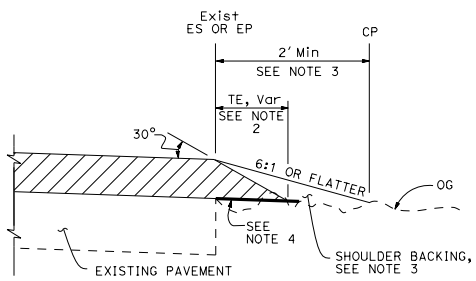
NO SCALE

P74

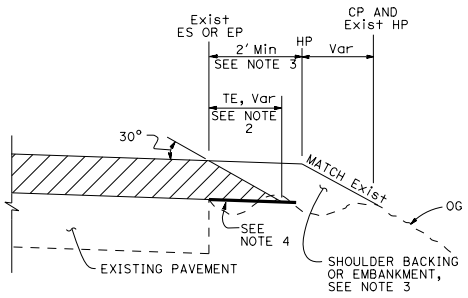
1-29-18

2018 STANDARD PLAN P74

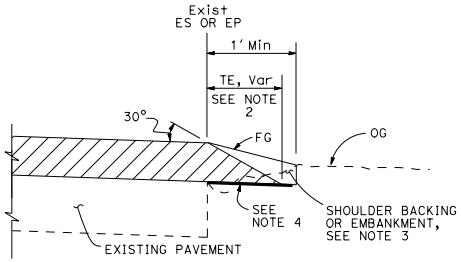
Return to Table of Contents



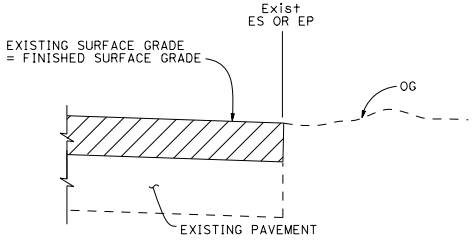
CASE A
Tapered Edge



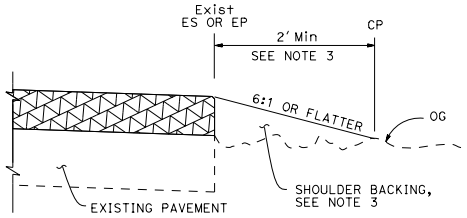
CASE B
Tapered Edge



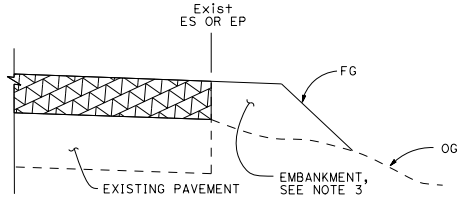
CASE C
Tapered Edge



CASE D
Vertical Edge



CASE E
Vertical Edge



CASE F
Vertical Edge
* See Table A and Standard Plan P74

LEGEND:

HMA OVERLAY

HMA OR CONCRETE OVERLAY

CONCRETE OVERLAY

ABBREVIATIONS:

TE TAPERED EDGE
TT TOTAL THICKNESS OF TE

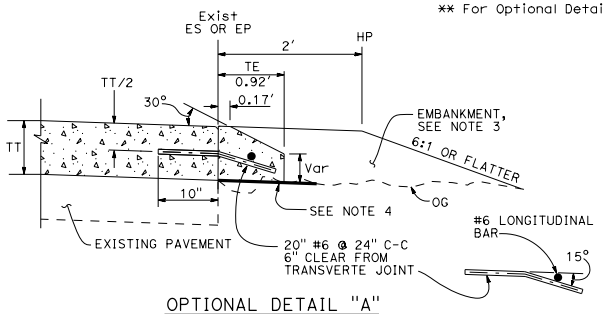
TABLE A
EDGE TREATMENT FOR VARIOUS OVERLAY THICKNESS AND CONDITIONS

	OVERLAY THICKNESS	
FIELD CONDITION	LESS THAN 0.15'	0.15' OR MORE
Exist SLOPE 6:1 OR FLATTER	CASE E	CASE A
Exist SLOPE 3:1 TO 6:1	CASE E	CASE B
Exist SLOPE STEEPER THAN 3:1	CASE F	CASE F
CUT SECTION (REPLACE, COLD PLANE, MILL PAVEMENT)	CASE D	CASE C

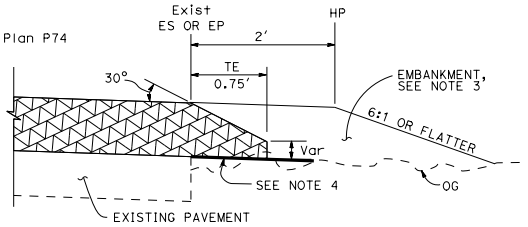
ADDITIONAL HMA OR CONCRETE QUANTITIES FOR TE/SIDE/MILE

TYPICAL CROSS SECTION	TT	TOTAL ADDITIONAL MATERIAL FOR TE/SIDE/MILE		
		HMA (TON)	CONCRETE (CY)*	CONCRETE (CY)**
TT	0.15'	7.7	NA	NA
	0.20'	13.7	NA	NA
	0.30'	30.9	NA	NA
	0.40'	54.9	NA	NA
	0.45'	69.4	NA	NA
TT 0.43'	0.50'	84.2	NA	NA
	0.60'	113.9	NA	NA
	0.70'	143.6	70.9	94.2
	0.80'	173.3	85.6	112.2
	0.90'	203.0	100.3	130.2
	1.00'	232.7	114.9	148.2
	1.10'	262.4	129.6	166.2
	1.20'	292.1	144.3	184.2

* For Detail "A"
** For Optional Detail "A"



OPTIONAL DETAIL "A"
For concrete overlay
See Note 5



DETAIL "A"
For HMA overlay thickness more than 0.43' or concrete overlay

NOTES:

1. For limits of tapered edge and vertical edge treatments, see Standard Plan P74.
2. Details shown for HMA overlay thickness less than 0.43'. See Detail "A" for HMA overlay thickness more than 0.43' or concrete overlay.
3. For locations and limits of shoulder backing or embankment see project plans.
4. Grade existing ground to place tapered edge. 1' minimum width
5. Tapered edge transverse joint must match overlay transverse joint. End of #6 longitudinal bar must be 2" ±½" clear from transverse joint.
6. Tapered edge is not needed in the area of MGS, barrier, right turn lane and acceleration lane. See Standard Plan P74.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Srikanth Balasubramanian
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER Srikanth N. Balasubramanian No. C56426 Exp. 6-30-19 CIVIL STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT EDGE TREATMENTS-OVERLAYS

NO SCALE

P75

1-29-18

Return to Table of Contents

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Srikanth Balasubramanian
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Srikanth N. Balasubramanian — No. C56426 — Exp. 6-30-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND:

HMA PAVEMENT

HMA OR CONCRETE PAVEMENT

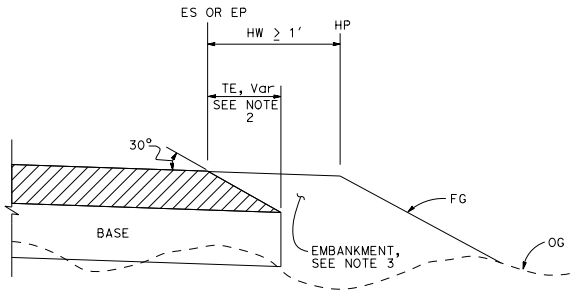
CONCRETE PAVEMENT

ABBREVIATIONS:

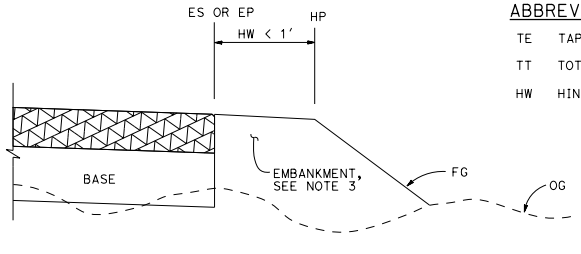
TE TAPERED EDGE

TT TOTAL THICKNESS OF TE

HW HINGE WIDTH, DISTANCE FROM ES OR EP TO HP

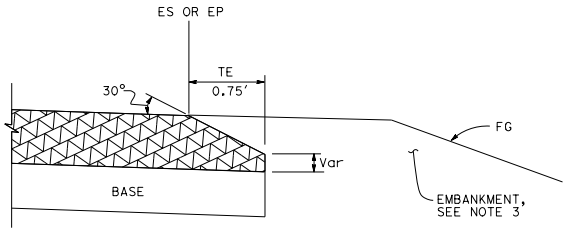


CASE K
Tapered Edge - Fill Section, HW ≥ 1'

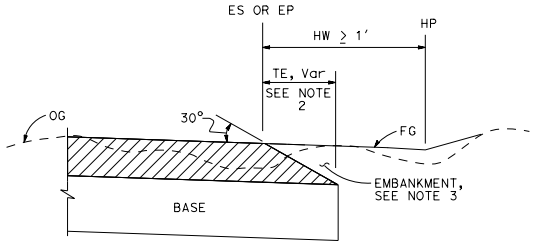


CASE L
Vertical Edge - Fill Section, HW < 1'

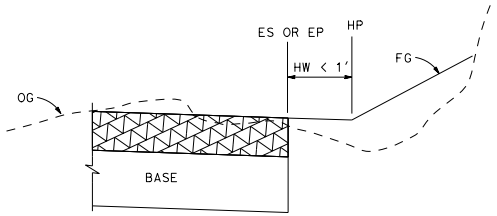
FILL SECTION



DETAIL "B"
For HMA pavement thickness
more than 0.43' or concrete pavement

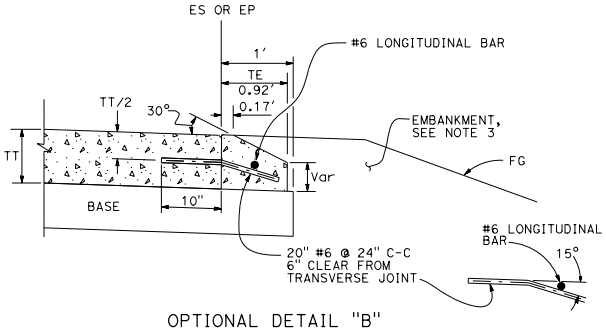


CASE M
Tapered Edge - Cut Section, HW ≥ 1'



CASE N
Vertical Edge - Cut Section, HW < 1'

CUT SECTION



OPTIONAL DETAIL "B"
For concrete pavement
See Note 4

NOTES:

1. For limits of tapered edge and vertical edge treatments, see Standard Plan P74
2. Details shown for HMA pavement thickness less than 0.43'. See Detail "B" for HMA pavement thickness more than 0.43' or concrete pavement.
3. For locations and limits of embankment see project plans.
4. Tapered edge transverse joint must match pavement transverse joint. End of #6 longitudinal bar must be 2" ±½" clear from transverse joint.
5. Tapered edge is not needed in the area of MGS, barrier, right turn lane and acceleration lane. See Standard Plan P74.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAVEMENT EDGE TREATMENTS- NEW CONSTRUCTION

NO SCALE

P76

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Kathryn Griswell
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Kathryn Griswell
No. C55599
Exp. 12-31-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND:

10" x 6" x 1'-0" FILLER BLOCK ALIGNED AGAINST HEADER.

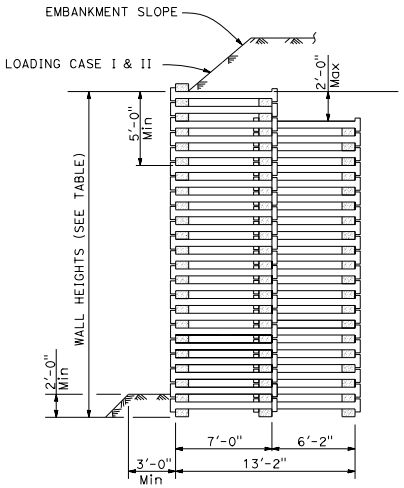
10" x 6" STRETCHERS

LC1 = LOADING CASE I
LC2 = LOADING CASE II

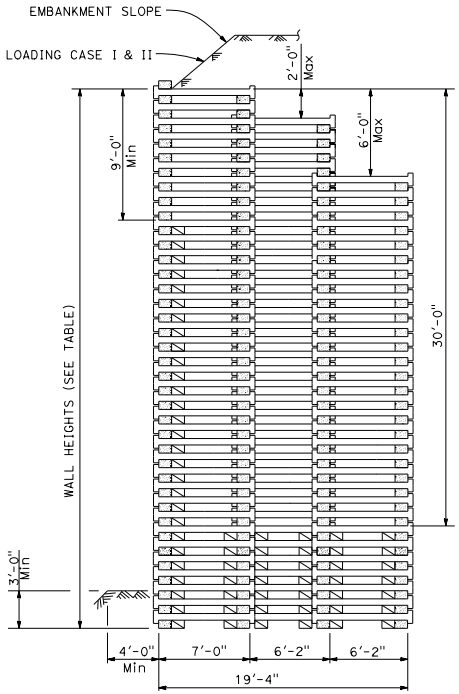
y = 4 AND 6 FOR BATTERED FOR TYPES A, B, AND C

MAXIMUM WALL HEIGHTS

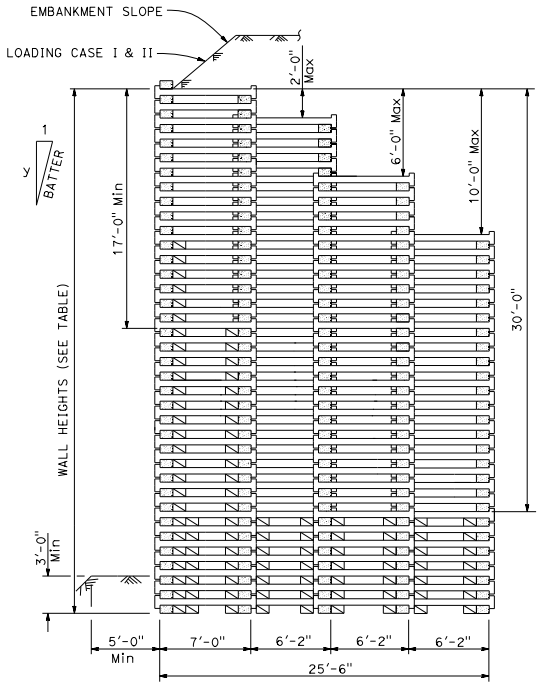
BATTER	TYPE A		TYPE B		TYPE C	
	LC1	LC2	LC1	LC2	LC1	LC2
VERTICAL	24'-0"	11'-0"	27'-0"	20'-0"	31'-0"	27'-0"
1:6	31'-0"	13'-0"	36'-0"	23'-0"	36'-0"	33'-0"
1:4	33'-0"	15'-0"	36'-0"	25'-0"	36'-0"	36'-0"



TYPE A



TYPE B



TYPE C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE CRIB WALL TYPES A, B AND C

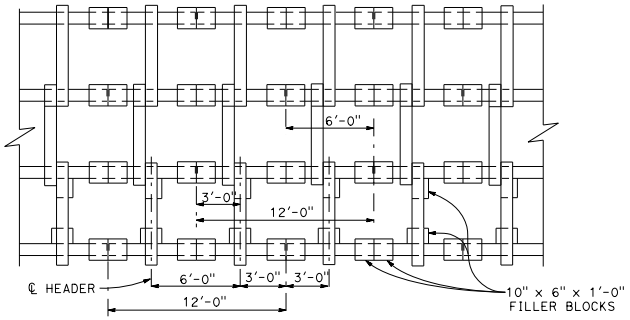
NO SCALE

C7A

2018 STANDARD PLAN C7A

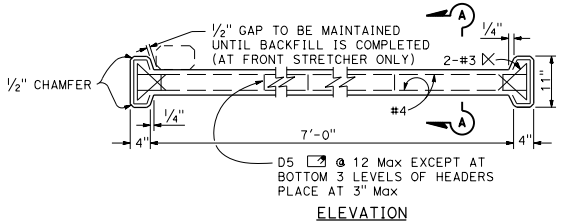
1-29-18

Return to Table of Contents

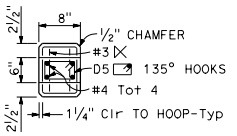


PARTIAL PLAN AT BASE

Type "B" shown, others similar

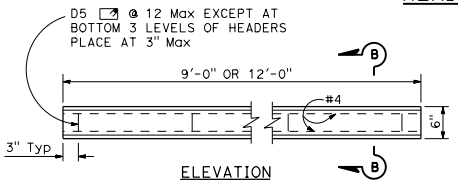


ELEVATION

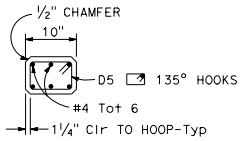


SECTION A-A

HEADER DETAIL

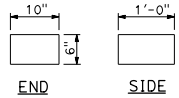


ELEVATION



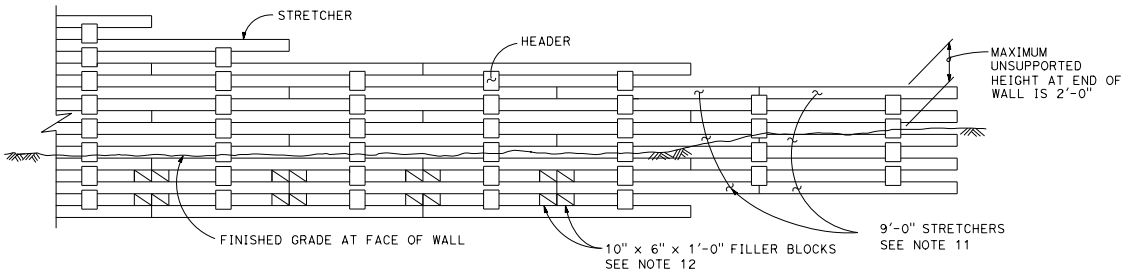
SECTION B-B

STRETCHER DETAIL

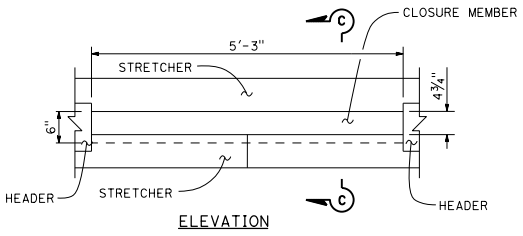


END SIDE

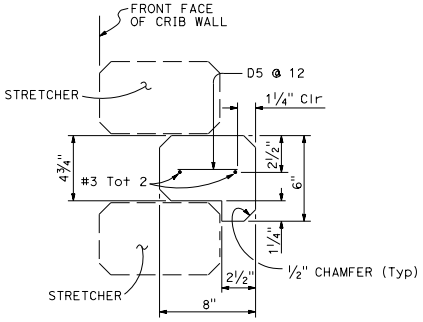
FILLER BLOCK DETAIL



PARTIAL ELEVATION



ELEVATION



SECTION C-C

FRONT FACE CLOSURE MEMBER

NOTES:

1. Design: AASHTO LRFD Bridge Design Specifications, 4th edition with the California Amendments.
2. Reinforced Concrete: f_y = 60 ksi, f'_c = 3.6 ksi, n = 8
3. Soil Parameters: Φ = 34°, δ = 25.5°, ɣ = 120 pcf, A = 0.2g

   Lateral earth pressure determined by Coulomb's theory.
4. Concrete to concrete bearing surfaces shall be finished to a smooth plane. The gap between bearing surfaces shall not exceed ⅛ inch. Where a gap of 1/16 inch to ⅛ inch exists, a 1/16 inch pad of asphalt felt or sheet neoprene shall be placed between the bearing surfaces. For wall Types B and C, a 1/16 inch asphalt felt pad or sheet neoprene shall be placed between all concrete bearing surfaces below the 29'-10" level.
5. All members may be manufactured to dimensions ⅛ inch greater in thickness and stretchers ½ inch less in length.
6. Where an opening is specified in the face of a wall, special length stretchers and additional headers may be required.
7. For non-tangent wall alignment, special length stretchers may be required.
8. For non-tangent wall alignment and at locations where filler blocks are required, special length front face closure members may be required.
9. The thickness of the lowest step for each wall type shall not be less than the dimension shown on these plans.
10. Use "Front Face Closure Member" only when specified on project plans or in the Special Provisions.
11. All stretchers are 12'-0" except as noted.
12. Place 2 filler blocks midspan between stretchers in the bottom 2 levels of walls 9' high and higher.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Kathryn Griswell
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Kathryn Griswell
No. C55599
Exp. 12-31-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE CRIB WALL TYPES A, B, AND C HEADER AND STRETCHER DETAILS

NO SCALE

C7B

2018 STANDARD PLAN C7B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Kathryn Grisewell No. C55599 Exp. 12-31-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

VERTICAL WALL HEIGHT

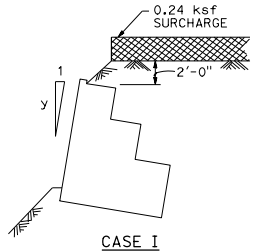
TYPE	CASE	BEARING (ksf) AND B' (ft)	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'
A	I	qu	1.4	1.6	1.8	2.0	2.1	2.4	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.8	5.2	5.6	6.1	6.6	7.1	7.7]												
		B'	13.2	13.2	13.2	13.2	13.1	12.9	12.7	12.4	12.1	11.9	11.6	11.4	11.1	10.8	10.5	10.2	9.9	9.6	9.3	9.0												
	II	qu	1.8	1.9	2.1	2.3	2.5	2.7	2.9]																									
		B'	13.2	13.2	13.2	13.2	13.2	13.2	13.1																									
B	I	qu					2.2	2.4	2.5	2.7	2.9	3.2	3.4	3.6	3.9	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.3	6.6	7.0]									
		B'					19.3	19.3	19.3	19.3	19.2	19.0	18.8	18.6	18.4	18.2	18.0	17.8	17.6	17.4	17.2	16.9	16.7	16.5	16.2									
	II	qu					3.0	3.1	3.3	3.5	3.6	3.9	4.1	4.3	4.5	4.8	5.1	5.5]																
		B'					19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.1	18.8	18.4																
C	I	qu													3.7	3.9	4.1	4.4	4.6	4.9	5.2	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5]					
		B'													25.2	25.1	25.0	24.8	24.7	24.5	24.4	24.2	24.0	23.9	23.7	23.5	23.3	23.1	22.9					
	II	qu													5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.5	6.8	7.2	7.5]									
		B'													25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	25.1	24.8	24.5									

1:6 BATTERED WALL HEIGHT

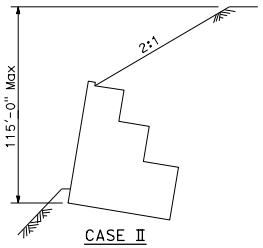
TYPE	CASE	BEARING (ksf) AND B' (ft)	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'
A	I	qu	1.4	1.5	1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.1	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.8	7.1	7.6	8.2]					
		B'	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.0	12.9	12.8	12.6	12.5	12.3	12.1	11.9	11.8	11.6	11.4	11.2	8.2	7.8					
	II	qu	1.8	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.2]																							
		B'	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2																							
B	I	qu					2.0	2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.2	5.4	5.6	5.8	6.0	6.2	6.5	6.8	7.0	7.3	7.6	7.8]
		B'					19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.2	19.0	18.9	18.8	18.7	18.5
	II	qu					2.9	3.0	3.2	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.2	5.4	5.6]													
		B'					19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3													
C	I	qu													3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.1	5.3	5.5	5.7	5.9	6.2	6.4	6.6	6.9	7.1	7.3	7.5]
		B'													25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
	II	qu													4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.6	6.8	7.0	7.3	7.5	7.7	8.0	8.3]			
		B'													25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	25.3		

1:4 BATTERED WALL HEIGHT

TYPE	CASE	BEARING (ksf) AND B' (ft)	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'
A	I	qu	1.3	1.5	1.6	1.9	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.2	6.5	6.7	7.0]			
		B'	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.1	13.0	12.9	12.8	12.7				
	II	qu	1.9	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6]																					
		B'	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2																					
B	I	qu					2.0	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.9	7.1	7.3]
		B'					19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
	II	qu					2.8	2.9	3.1	3.3	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.9]											
		B'					19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3											
C	I	qu													3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.6	5.8	6.0	6.2	6.4	6.6	6.9	7.1	7.3]
		B'													25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
	II	qu													4.5	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.8	7.0	7.2	7.4	7.7	7.9	8.1	8.4	8.6]
		B'													25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5



CASE I



CASE II

DETAIL OF DESIGN LOADING CASES

DESIGN FOOTNOTE:

1. Nominal soil bearing resistance, design lateral loads, settlement and overall slope stability shall be determined by analysis based on a foundation site investigation. Walls shall not be founded on unimproved original ground with nominal bearing resistance less than 3 ksf.

LEGEND:

B' - EFFECTIVE FOOTING WIDTH (ft)
qu - GROSS FACTORED BEARING STRESS (ksf)
] - INDICATES MAXIMUM ALLOWABLE WALL HEIGHT FOR PARTICULAR WALL TYPE AND PARTICULAR LOADING CASE.
y = 4 AND 6 FOR BATTERED

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE CRIB WALL FOUNDATION PRESSURE

NO SCALE

C7C

2018 STANDARD PLAN C7C

1-29-18

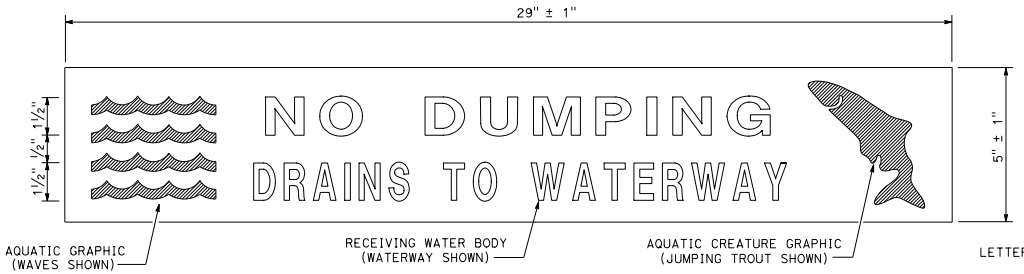
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

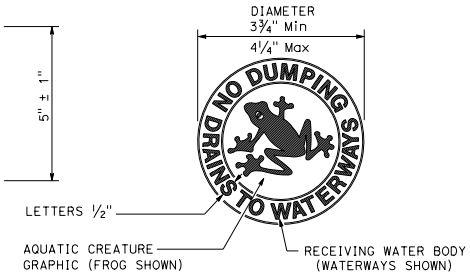
Robert B. Schott
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT Robert B. Schott Signature 11-30-18 Renewal Date STATE OF CALIFORNIA

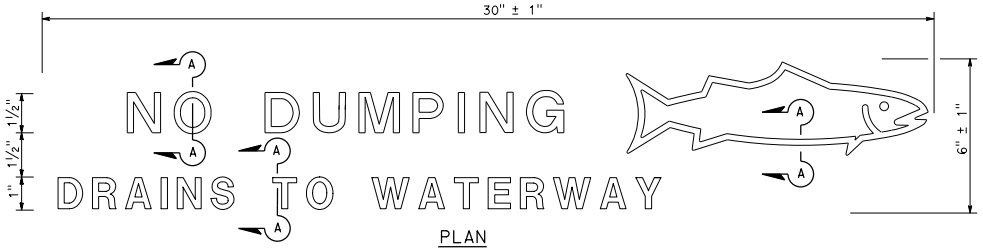
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



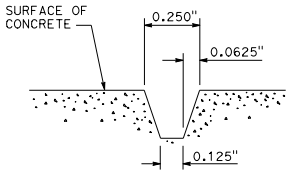
PLAN
DRAINAGE INLET MARKER
(PREFABRICATED THERMOPLASTIC)



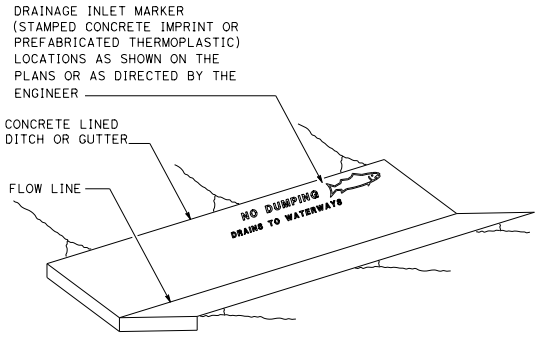
PLAN
DRAINAGE INLET MARKER
(MEDALLION)



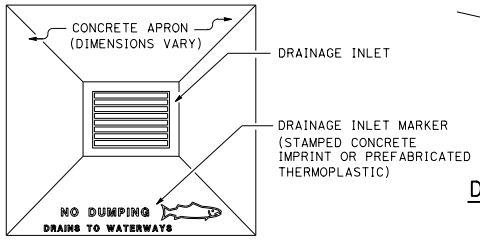
PLAN
DRAINAGE INLET MARKER
(STAMPED CONCRETE IMPRINT)



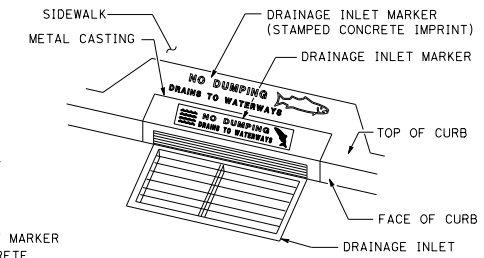
SECTION A-A
STAMPED CONCRETE
IMPRINT DETAIL



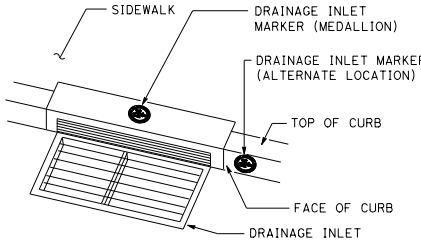
PERSPECTIVE
DRAINAGE INLET MARKER ON
CONCRETE LINED DITCH



PLAN
DRAINAGE INLET MARKER ON
DRAINAGE INLET APRON



PERSPECTIVE
DRAINAGE INLET MARKER ON
DRAINAGE INLET



PERSPECTIVE
DRAINAGE INLET MARKER (MEDALLION)
ON DRAINAGE INLET

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

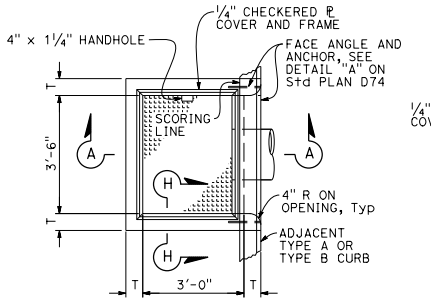
DRAINAGE INLET MARKERS

NO SCALE

D71

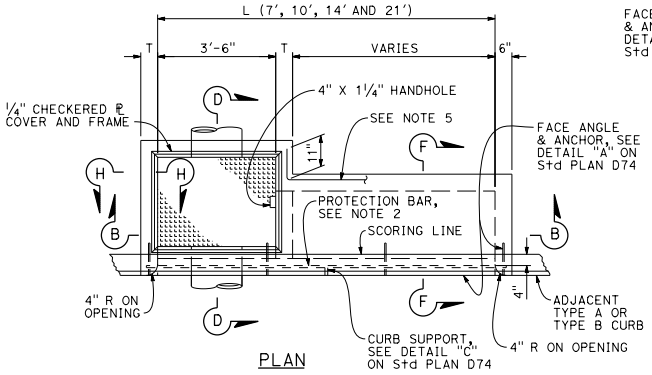
1-29-18

Return to Table of Contents



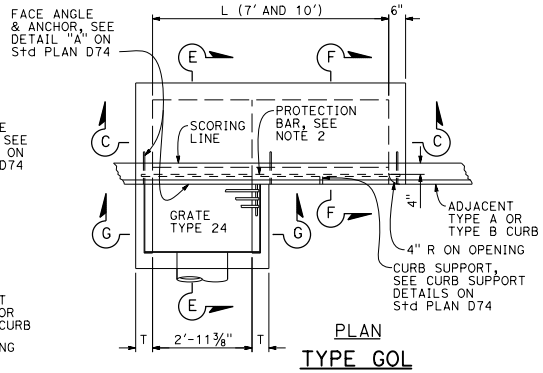
PLAN

TYPE OS



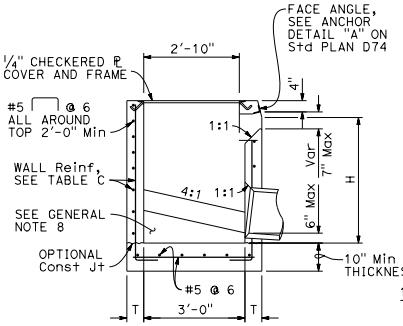
PLAN

TYPE OL

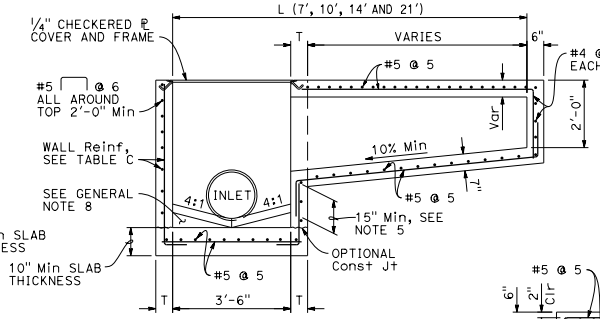


PLAN

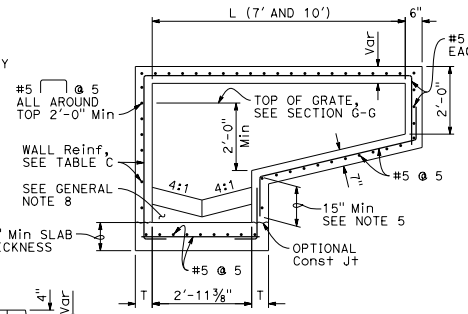
TYPE GOL



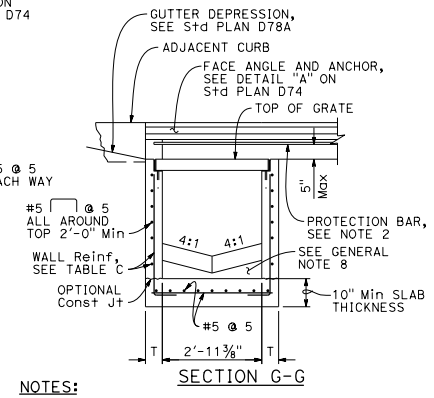
SECTION A-A



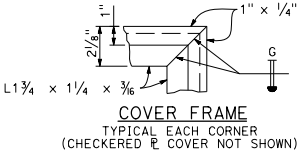
SECTION B-B



SECTION C-C

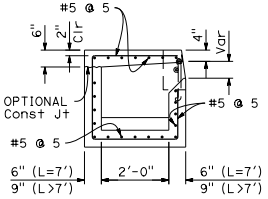


SECTION G-G



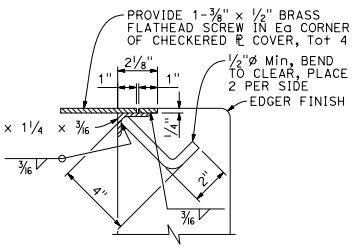
COVER FRAME

TYPICAL EACH CORNER
(CHECKERED P COVER NOT SHOWN)

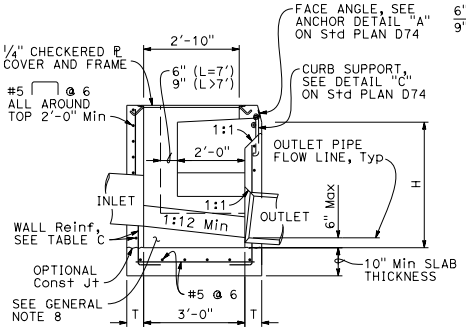


SECTION F-F

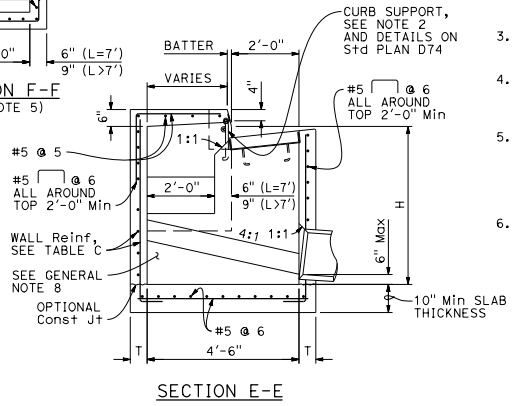
(SEE NOTE 5)



SECTION H-H



SECTION D-D



SECTION E-E

NOTES:

1. See Standard Plan D72F for General Notes and additional details. See Standard Plan D72G for tables, wall thickness "T" and quantities.
2. Where shown on the project plans, place a 3/4"ø plain round protection bar horizontally across the length of the opening and bend back 4" into the inlet wall on each side.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
5. Extend all horizontal bars from inlet extensions into adjacent concrete elements of main inlet box a minimum of 15". Where shown, bend horizontal bars into box. If necessary rotate bars to maintain 2" clear coverage.
6. Height of curb opening will vary with the type of curb and the depth of the local depression.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CIP DRAINAGE INLETS TYPES OS, OL AND GOL

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL

REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

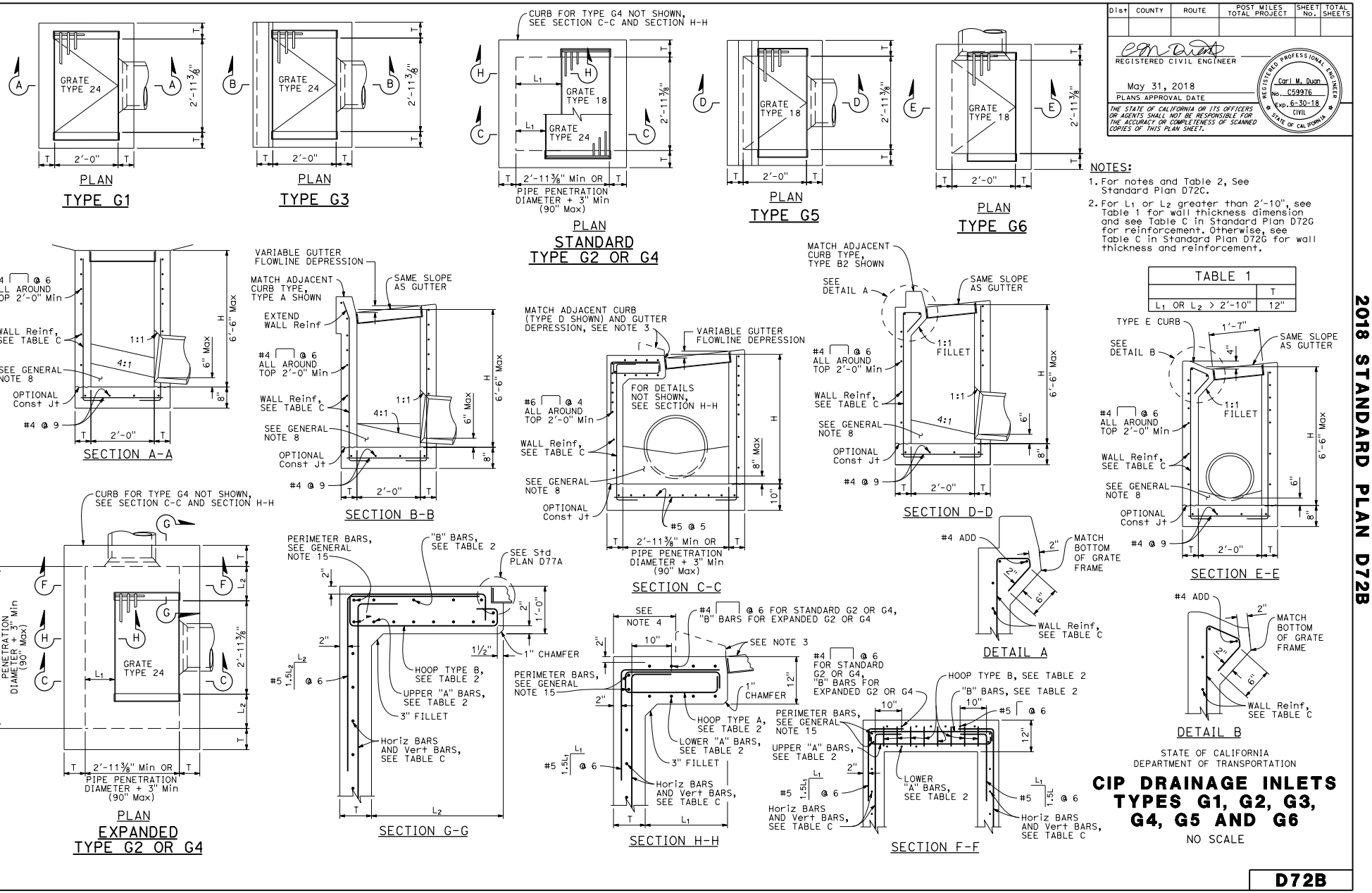
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

D72A

1-29-18

2018 STANDARD PLAN D72A

Return to Table of Contents



Return to Table of Contents

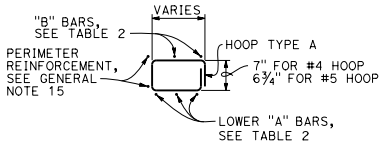
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

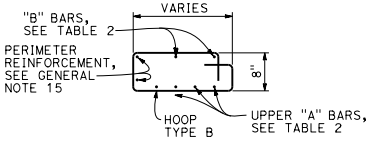
May 31, 2018
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



HOOP TYPE A

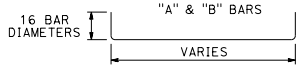


HOOP TYPE B

NOTES:

1. See Standard Plan D72F for General Notes and additional details. See Standard Plan D72G for tables and quantities.
2. Type G4 inlet can use Grate Type 18 or 24. Type G2 inlet uses Grate Type 24.
3. Type G4 inlet details are similar to Type G2 inlet details, except for the addition of a curb and sloped grate to match the adjacent curb and gutter depression.
4. Dimension will vary with different grates, curb types, box width and wall thickness.

TABLE 2 - TOP SLAB REINFORCEMENT



	W/ CURB	W/O CURB
"A" BARS	#4 @ 5 (2 BARS Min)	#5 @ 5 (3 BARS Min)
"B" BARS	#4 @ 10 (2 BARS Min)	#4 @ 12 (2 BARS Min)
HOOPS ("A" & "B")	#4 @ 5	#5 @ 5

ROTATE "A" AND "B" BARS SO HOOKED ENDS WILL MAINTAIN 2" CLEAR COVERAGE.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

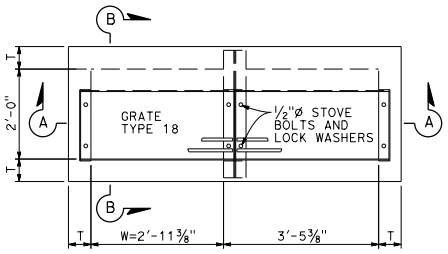
CIP DRAINAGE INLETS TYPES G1, G2, G3, G4, G5 AND G6

NO SCALE

D72C

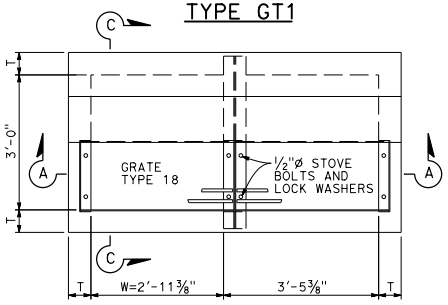
1-29-18

Return to Table of Contents



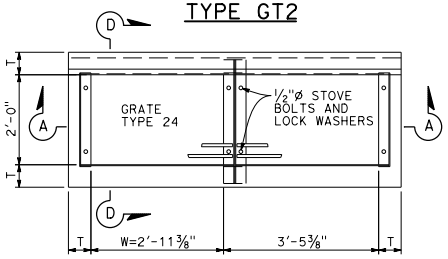
PLAN

TYPE GT1



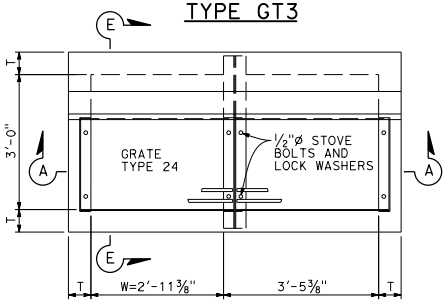
PLAN

TYPE GT2



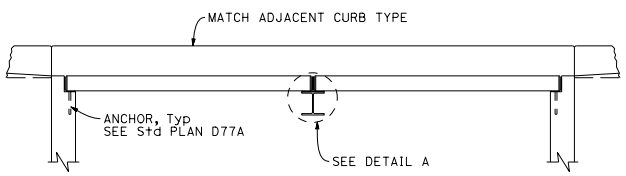
PLAN

TYPE GT3

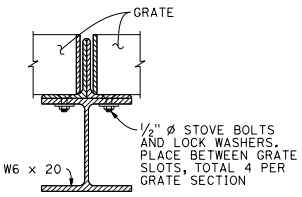


PLAN

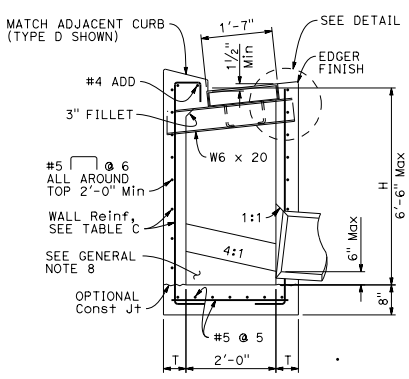
TYPE GT4



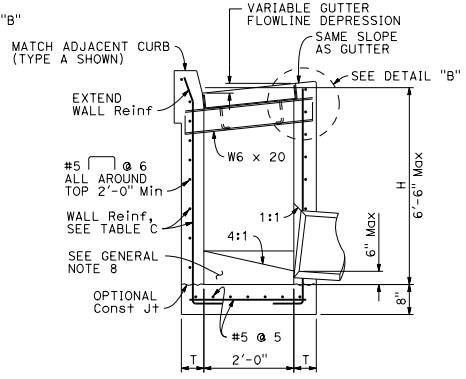
SECTION A-A



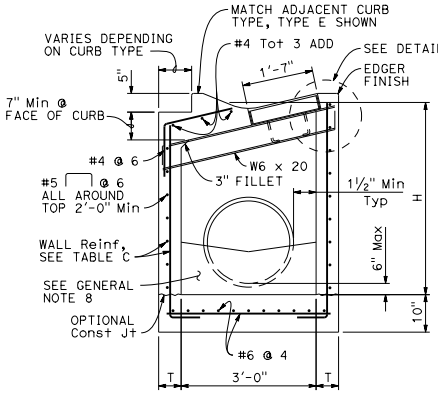
DETAIL A



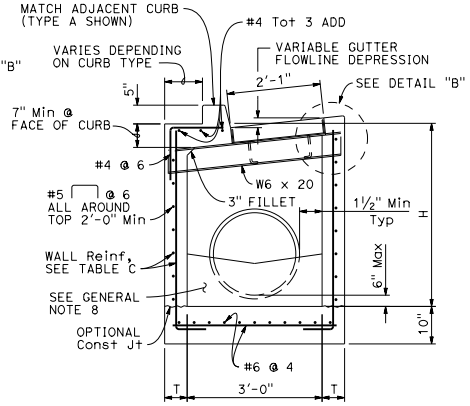
SECTION B-B



SECTION D-D



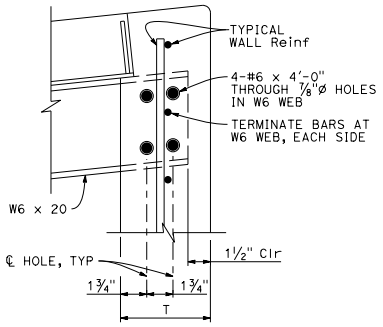
SECTION C-C



SECTION E-E

NOTES:

1. See Standard Plan D72F for General Notes and additional details. See Standard Plan D72G for tables, wall thickness "T" and quantities.
2. W=2'-11⅜" for one grate. Add 3'-5⅜" for additional grates in tandem.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.



DETAIL "B"

(SIMILAR OPPOSITE END OF W6)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA
REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CIP DRAINAGE INLETS TYPES GT1, GT2, GT3 AND GT4

NO SCALE

D72D

2018 STANDARD PLAN D72D

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

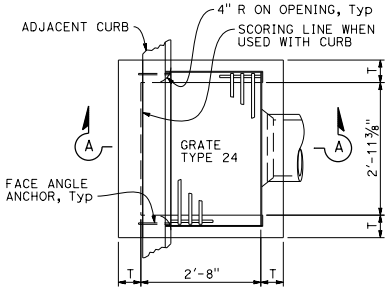
REGISTERED CIVIL ENGINEER

May 31, 2018

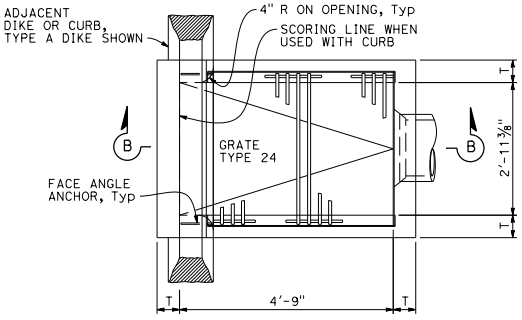
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

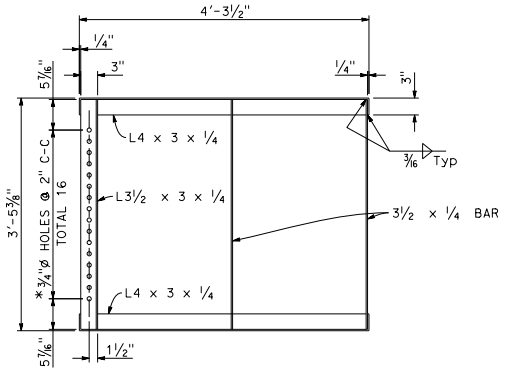
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



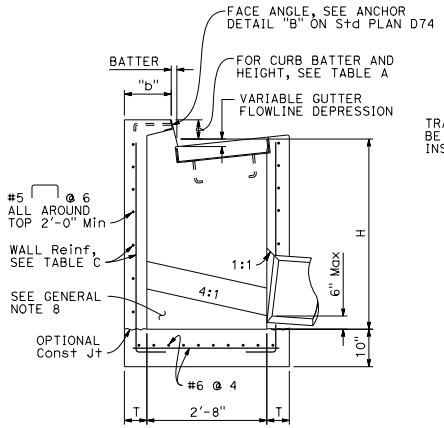
PLAN
TYPE GO



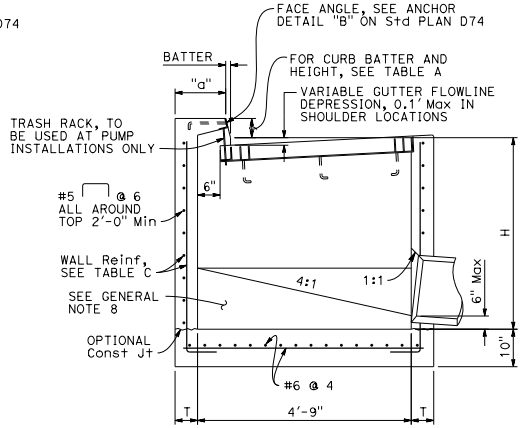
PLAN
TYPE GDO



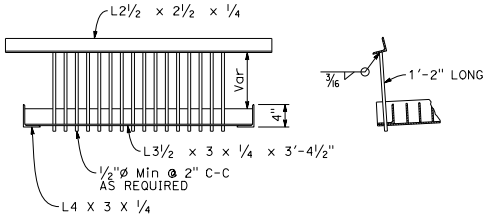
GRATE FRAME FOR TYPE GDO INLET
* HOLES REQUIRED ONLY WITH TRASH RACK



SECTION A-A



SECTION B-B



TRASH RACK
(FOR USE WITH PUMP INSTALLATION)

TABLE A				
CURB TYPE	NORMAL CURB HEIGHT	CURB BATTER	"a" DIMENSION	"b" DIMENSION
A1-6	6"	1½"	T+7½"	T+6½"
A1-8	8"	2"	T+7"	T+6"
B1-6	6"	4"	T+5"	T+4"
TYPE A DIKE	6"	3"	T+6"	T+5"

Height of curb opening will vary with the type of curb and the depth of the local depression.

NOTES:

1. See Standard Plan D72F for General Notes and additional details. See Standard Plan D72G for tables, wall thickness "T" and quantities.
2. Where shown on the project plans, place a ¾"ø plain round protection bar horizontally across the length of the opening and bend back 4" into the inlet wall on each side.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CIP DRAINAGE INLETS TYPES GO AND GDO

NO SCALE

D72E

1-29-18

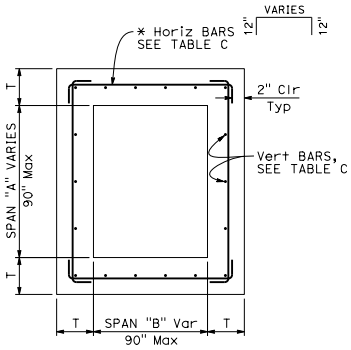
Return to Table of Contents

GENERAL NOTES:

1. "H" is measured from top of bottom slab to the normal gutter grade line undepressed at the curb face.
2. For "T" wall thickness and reinforcement, see Table C on Standard Plan D72G.
3. Wall reinforcement must be placed in the center of the wall thickness with horizontal bars placed on the exterior face. Bottom slab concrete cover must be 3" clear on the interior face unless otherwise noted. Top slab concrete cover must be 2" clear on the exterior face unless otherwise noted. Reinforcement spacing is in inches unless otherwise noted.
4. Steps - None required where "H" is less than 2'-6". Where "H" is 2'-6" or more, install steps with lowest rung 1'-0" above the floor and highest rung not more than 6" below bottom of lid. The distance between steps must not exceed 1'-0" and be uniform throughout the length of the wall. Place steps in the wall without an opening. Steps inserts may be substituted for the bar steps. Step inserts must comply with State Industrial Safety Requirements. See Standard PlaN D74 for step details.
5. Pipe(s) can be placed in any wall. Adjacent to each side of the opening, place additional reinforcement equivalent to half the interupted main reinforcement. For larger pipes greater than or equal to 42" diameter, also add 4 diagonal bars, 1 bar each side. Bars must be the same size as the larger of the main vertical or horizontal bars. Extend bars one development length past the intersection with the adjacent diagonal bar, or where bars intersect mid thickness of adjacent wall bottom or top of non-continuous wall, bend ends as required into same plane.
6. Set inlet so that grate bars are parallel to direction of principal surface flow.
7. Curb section must match adjacent curb.
8. Except for inlets used as junction boxes, basin floors must have wood trowel finish and a minimum slope of 4:1, unless otherwise noted, from all directions toward outlet pipe by casting grout fill on top of the bottom slab. The additional volume to achieve the 4:1 slope may also be achieved by casting the bottom slab and fill as a composite concrete element.
9. See Standard Plans D77A and D77B for grate and frame details and weights of miscellaneous iron and steel.
10. See Standard Plans D78A and D78B for gutter depression details.
11. See Standard PlanS A87A and A87B for curb and dike details.
12. Details shown apply to metal, concrete and plastic pipe(s).
13. The Contractor may use WWR instead of bar reinforcement. The ratio of bar reinforcement to WWR shall be based on the yield strength ratio.
14. Cast-in-place (CIP) inlets to be formed around all pipes/stubs intersecting the inlet, and concrete poured in one continuous operation.
15. Perimeter reinforcement must not be smaller than main bars and #4 and serves as a rigid frame to position and attach the required structural reinforcement and may be tack welded at outer corners when using ASTM A706 weldable bars.

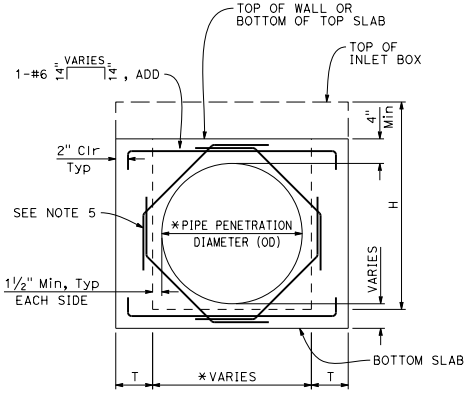
DESIGN NOTES:

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 6th edition with 2012 Interims and Errata and CA Amendments.
2. Live Load (AASHTO LRFD 3.6.1.2):
   HL-93, consists of design truck or tandem, and design lane load.
   Dynamic Load Allowance, IM = 33%
   Multiple Presence Factor, m = 1.0
   Design lane load was excluded in Top Slab design.
   A wheel load of 8 kips without impact factor was used for top slabs that are above a curb.
3. Earth Load:
   Vertical pressure = 140 pcf
   Lateral pressure:
   = 100 pcf for walls with flat embankment
   = 140 pcf For walls with slope embankment, 1.5:1 Max
4. Downdrag: ϕ = 34°and γ_E = 120 pcf.
5. Buoyancy: γ_W = 62.4 pcf to finished grade
6. Reinforced Concrete: f'c = 3.6 ksi, fy = 60.0 ksi.
7. Soil pressures shown are factored per AASHTO LRFD and include self-weight, live load and downdrag.



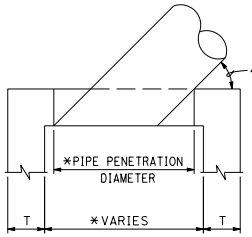
TYPICAL INLET PLAN

* ALTERNATIVE HORIZONTAL BARS



TYPICAL WALL W/ PIPE OPENING

* SEE "SKEWED PIPE PLAN"



SKEWED PIPE PLAN

* ADJUST PIPE PENETRATION AND BOX WIDTH FOR SKEWED PIPES.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CIP DRAINAGE INLET NOTES

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

2018 STANDARD PLAN D72F

D72F

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TABLE A - CONCRETE QUANTITIES

TYPE	H=3'-0" TO 8'-0"		H=8'-1" TO 20'-0"	
	H=3'-0" (CY)	ADDITIONAL CONCRETE PER FOOT (CY)	H=8'-1" (CY)	ADDITIONAL CONCRETE PER FOOT (CY)
G1	0.95	0.220	SEE NOTE 2	SEE NOTE 2
G2*	2.00	0.411	5.11	0.525
G3	1.03	0.220	SEE NOTE 2	SEE NOTE 2
G4 (TYPE 18)*	2.02	0.411	5.14	0.525
G4 (TYPE 24)*	1.99	0.411	5.10	0.525
G5	1.02	0.220	SEE NOTE 2	SEE NOTE 2
G6	1.04	0.220	SEE NOTE 2	SEE NOTE 2
OS	1.53	0.278	5.08	0.504
OL7	2.06	0.278	6.17	0.566
OL10	2.85	0.278	6.85	0.566
OL14	3.81	0.278	7.78	0.566
OL21	5.71	0.278	9.62	0.566
GOL7	2.48	0.313	6.89	0.630
GOL10	3.41	0.313	7.85	0.630
GT1	1.72	0.248	SEE NOTE 2	SEE NOTE 2
GT2	2.93	0.530	7.73	0.762
GT3	1.74	0.348	SEE NOTE 2	SEE NOTE 2
GT4	2.83	0.530	7.62	0.762
GO	1.26	0.245	4.90	0.506
GDO	1.74	0.322	6.33	0.647

* Quantities are based on the minimum interior dimensions.

TABLE B - REINFORCEMENT QUANTITIES

TYPE	H=3'-0" TO 8'-0"		H=8'-1" TO 20'-0"	
	H=3'-0" (LB)	ADDITIONAL REINFORCEMENT PER FOOT (LB)	H=8'-1" (LB)	ADDITIONAL REINFORCEMENT PER FOOT (LB)
G1	118	22.20	SEE NOTE 2	SEE NOTE 2
G2*	729	86.48	1794	171.79
G3	118	22.20	SEE NOTE 2	SEE NOTE 2
G4 (TYPE 18)*	647	86.48	1675	171.79
G4 (TYPE 24)*	647	86.48	1675	171.79
G5	118	22.20	SEE NOTE 2	SEE NOTE 2
G6	118	22.20	SEE NOTE 2	SEE NOTE 2
OS	245	49.88	1057	120.77
OL7	458	50.53	1324	126.75
OL10	729	50.53	1595	126.75
OL14	982	50.53	1849	126.75
OL21	1453	50.53	2320	126.75
GOL7	644	83.57	1969	148.79
GOL10	883	83.57	2208	148.79
GT1	486	96.91	SEE NOTE 2	SEE NOTE 2
GT2	1040	117.08	2543	233.37
GT3	486	96.91	SEE NOTE 2	SEE NOTE 2
GT4	1001	117.08	2556	237.88
GO	308	32.44	1013	96.56
GDO	519	57.09	1654	165.66

* Quantities are based on the minimum interior dimensions.

TABLE D

INLET	CURB USED IN QUANTITIES
G1	-
G2	-
G3	A1-6
G4 (Type 18)	A1-6
G4 (Type 24)	A1-6
G5	B1-4
G6	1/2E
OS	-
OL7	-
OL10	-
OL14	-
OL21	-
GOL7	-
GOL10	-
GT1	D-6
GT2	E
GT3	A2-8
GT4	A2-8
GO	-
GDO	-

TABLE C - WALL REINFORCEMENT

TYPE	H≤8 (T=6",UON)		8<H≤20 (T=11",UON)	
	HORIZ	VERTICAL	HORIZ	VERTICAL
OS	#4 @ 8	#4 @ 6	#5 @ 6	#6 @ 4.5
OL	#4 @ 6	#4 @ 6	#5 @ 6	#6 @ 4.5
GOL	#5 @ 6	#5 @ 8	#6 @ 5	#6 @ 4.5
G1 (H≤6-6")	#3 @ 6	#3 @ 6	-	-
G2	T=9" #5 @ 5	#5 @ 5	T=11" #6 @ 4	#6 @ 4.5
G3 (H≤6-6")	#3 @ 6	#3 @ 6	-	-
G4	T=9" #5 @ 5	#5 @ 5	T=11" #6 @ 4	#6 @ 4.5
G5 (H≤6-6")	#3 @ 6	#3 @ 6	-	-
G6 (H≤6-6")	#3 @ 6	#3 @ 6	-	-
GT1 (H≤6-6")	#5 @ 6	#5 @ 6	-	-
GT2	T=8" #5 @ 6	#5 @ 6	#6 @ 4	#6 @ 4.5
GT3 (H≤6-6")	#5 @ 6	#5 @ 6	-	-
GT4	T=8" #5 @ 6	#5 @ 6	#6 @ 4	#6 @ 4.5
GO	#4 @ 9	#4 @ 6	#4 @ 6	#6 @ 4.5
GDO	#4 @ 6	#4 @ 6	#5 @ 4	#6 @ 4.5

TABLE E

SOIL PRESSURE BELOW BASE SLAB (ksf)		
TYPE	H=8'-0"	8'-0"< H ≤20'-0"
OS	2.93	5.56
OL*	2.93	5.56
GOL*	2.50	5.06
G1	3.67	-
G2	2.99	5.91
G3	3.67	-
G4	2.99	5.91
G5	3.67	-
G6	3.67	-
GT1	3.66	-
GT2	3.91	6.07
GT3	3.86	-
GT4	3.91	6.07
GO	3.42	6.11
GDO	2.52	6.95

* Main Box

NOTES:

1. No deduction or adjustment was made to the quantities of concrete and reinforcement for pipe openings, floor alternatives or curb type.
2. Maximum allowable height is 6'-6".
3. Quantities are approximate and for design purposes only.
4. Design is based on envelope of level and sloped ground.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CIP DRAINAGE INLET TABLES

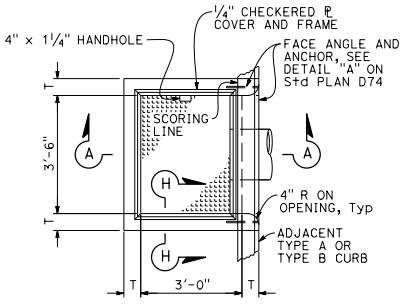
NO SCALE

D72G

2018 STANDARD PLAN D72G

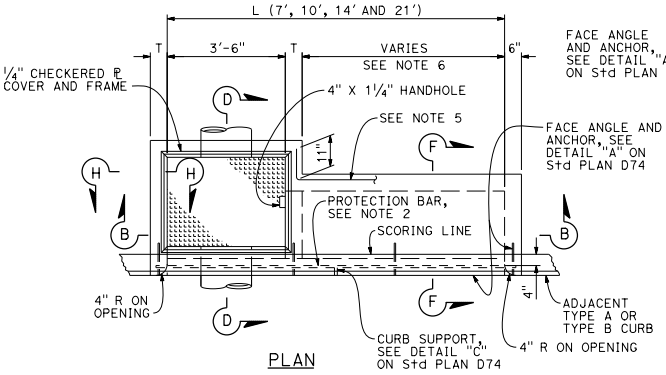
1-29-18

Return to Table of Contents



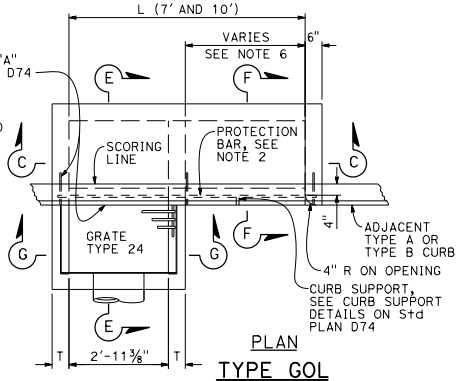
PLAN

TYPE OS



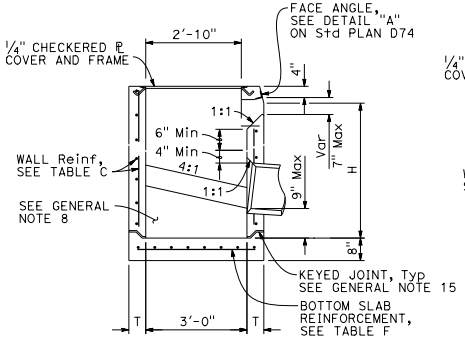
PLAN

TYPE OL

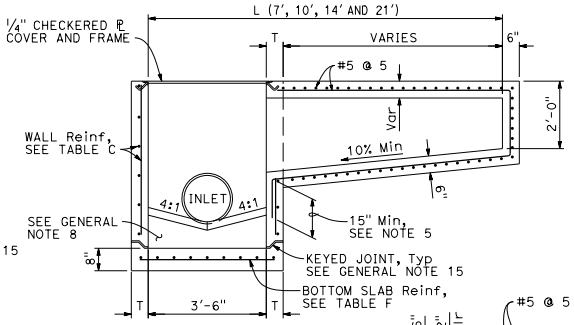


PLAN

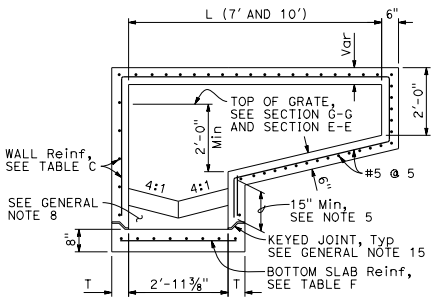
TYPE GOL



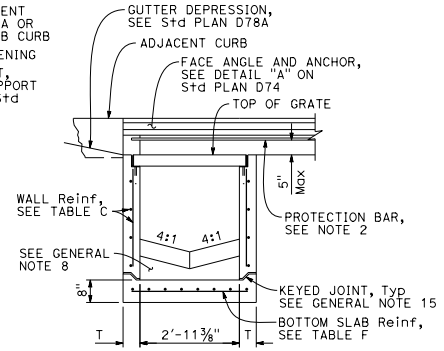
SECTION A-A



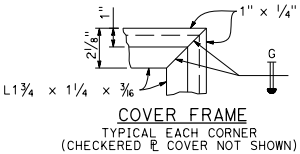
SECTION B-B



SECTION C-C



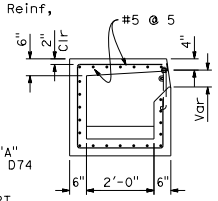
SECTION G-G



COVER FRAME

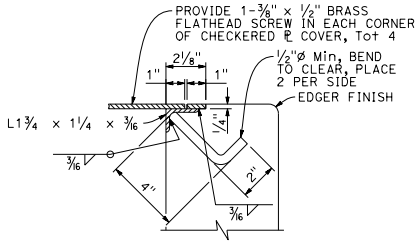
TYPICAL EACH CORNER

(CHECKERED ℄ COVER NOT SHOWN)

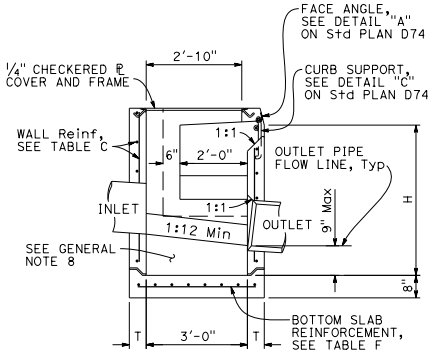


SECTION F-F

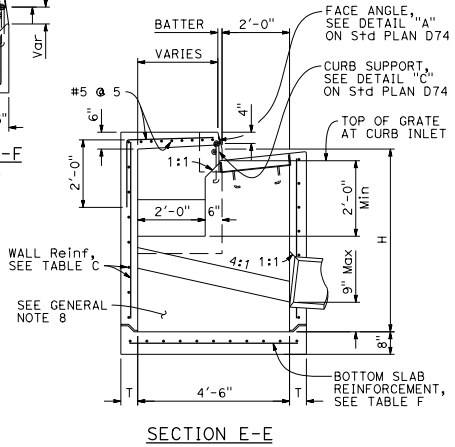
SEE NOTE 5



SECTION H-H



SECTION D-D



SECTION E-E

NOTES:

1. See Standard Plan D73F for General Notes and additional details. See Standard Plan D73G for tables, wall thickness "T" and quantities.
2. When shown on the project plans, place a ¾"ø plain round protection bar horizontally across the length of the opening and bend back 4" into the inlet wall on each side.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
5. Extend all horizontal bars from inlet extensions into adjacent concrete elements of main inlet box a minimum of 15". Where shown, bend horizontal bars into box. If necessary rotate bars to maintain 2" clear coverage.
6. Height of curb opening will vary with the type of curb and the depth of the local depression.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Carl M. Duan — No. C59976 — Exp. 6-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLETS TYPES OS, OL AND GOL

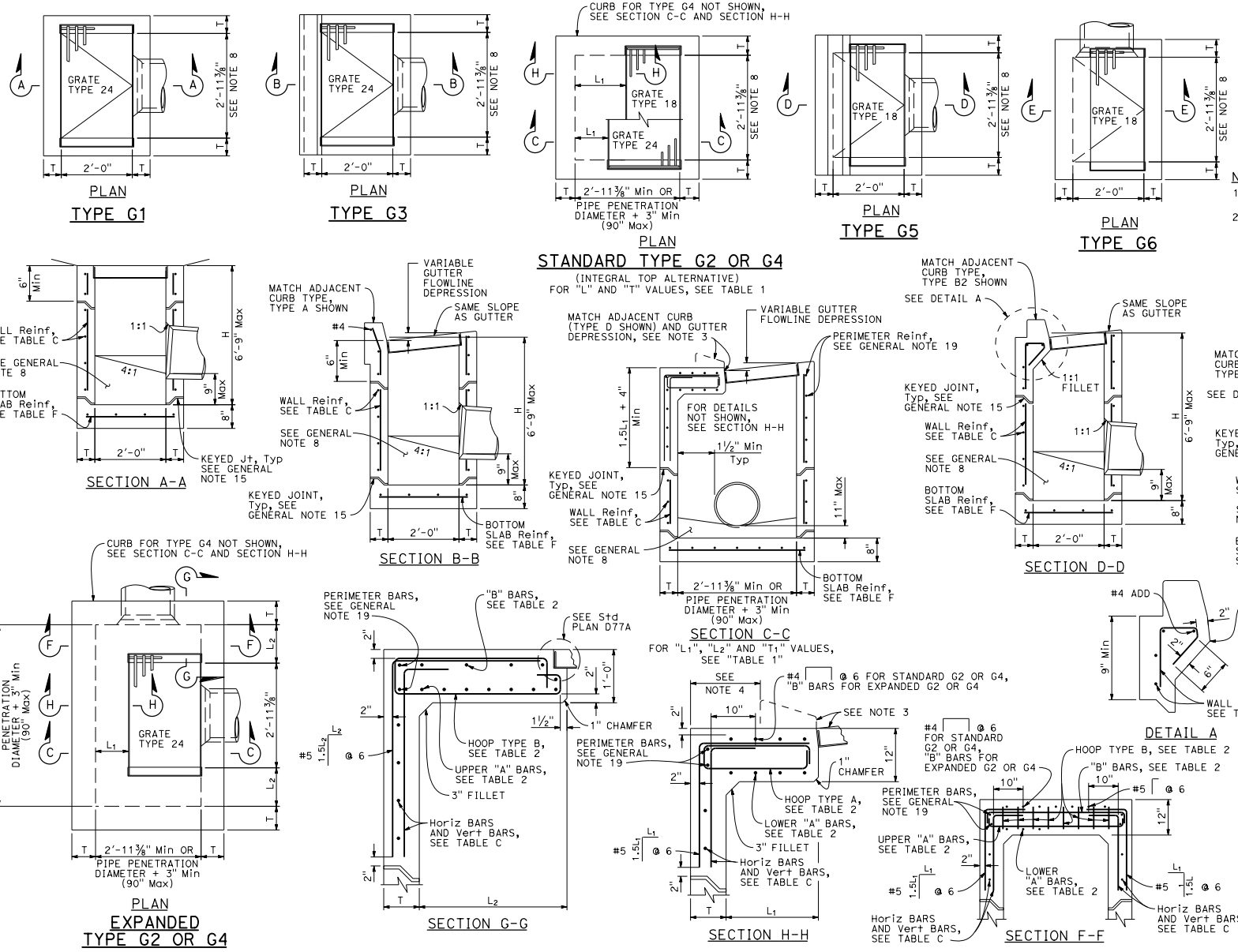
NO SCALE

D73A

1-29-18

2018 STANDARD PLAN D73A

Return to Table of Contents



Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLETS TYPES G1, G2, G3, G4, G5 AND G6

NO SCALE

D73B

2018 STANDARD PLAN D73B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

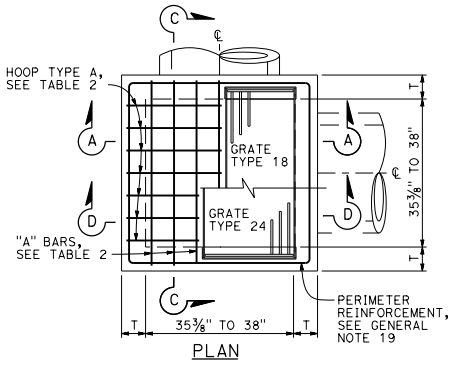
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

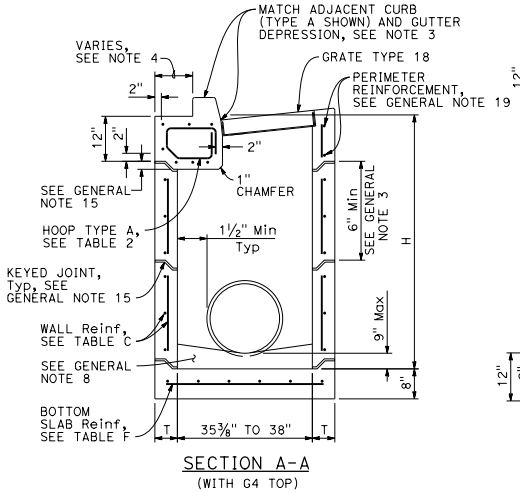
Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

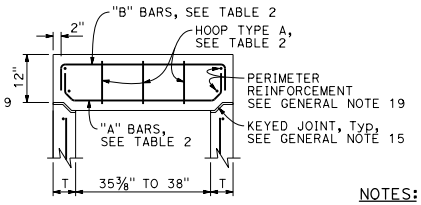


PLAN

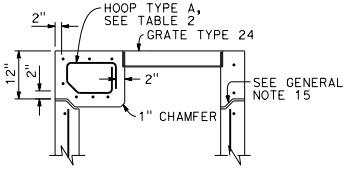
STANDARD TYPE G2 OR G4



SECTION A-A
(WITH G4 TOP)



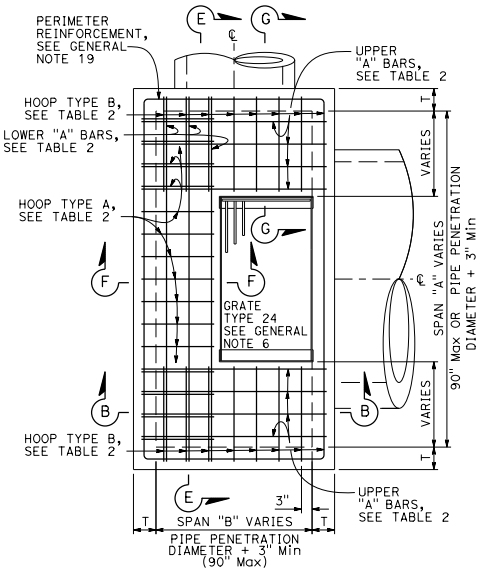
SECTION C-C



SECTION D-D
(WITH G2 TOP)

NOTES:

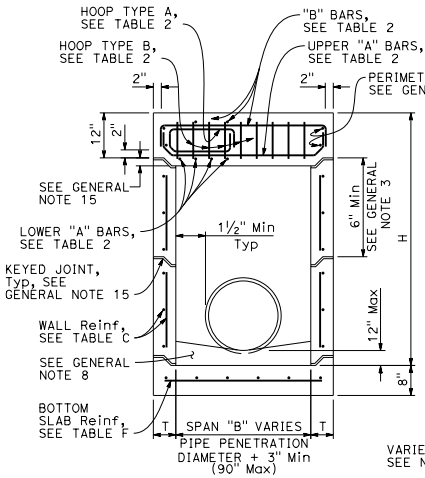
1. See Standard Plan D73F for General Notes and additional details. See Standard Plan D73G for additional tables, wall thickness "T" and quantities.
2. Type G4 inlet can use Grate Type 18 or 24. Type G2 inlet uses Grate Type 24.
3. G4 inlet details are the same as the G2 with the addition of a curb and sloped grate that matches the adjacent curb and gutter depression.
4. Dimension will vary with different grates, curb types, box width and wall thickness.
5. 2" unless inlet is expanded in the Span "A" direction, then clearance is 2" plus the diameter of the lower "A" bar.
6. See Standard Plan D73B for integral top slab alternative.
7. Interior dimension of lower sections of inlet for Types G2 and G4 may be 3'-0" provided top section conforms to the requirements for frame and grate types on Standard Plan D77A. The wall thickness of top sections may transition from "T" to "T"+5/8" to meet this requirement. Minimum height of thickened wall shall = "T".



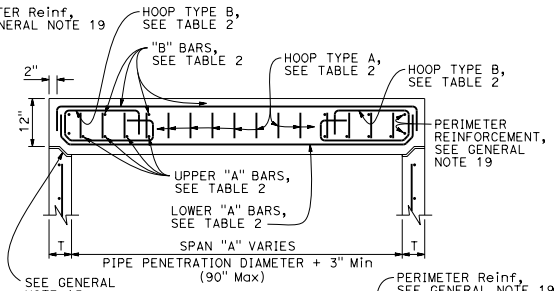
PLAN

EXPANDED TYPE G2 OR G4

(TOP REBAR NOT SHOWN)



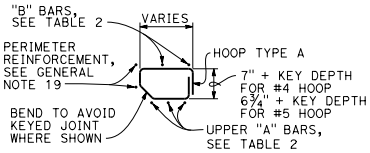
SECTION B-B
(WITH G2 TOP)



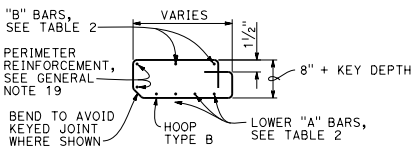
SECTION E-E

TABLE 2 - TOP SLAB REINFORCEMENT		
16 BAR DIAMETERS — "A" & "B" BARS VARIES — BEND TO AVOID KEYED JOINT WHERE SHOWN		
	W/ CURB	W/O CURB
"A" BARS	#4 @ 5 (2 BARS Min)	#5 @ 5 (3 BARS Min)
"B" BARS	#4 @ 10 (2 BARS Min)	#4 @ 10 (2 BARS Min)
HOOPS ("A" & "B")	#4 @ 5	#5 @ 5

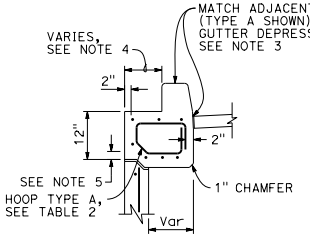
ROTATE "A" AND "B" BARS SO HOOKED ENDS WILL MAINTAIN 2" CLEAR COVERAGE.



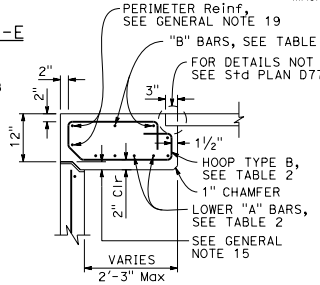
HOOP TYPE A



HOOP TYPE B



SECTION F-F
(WITH G4 TOP)



SECTION G-G

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

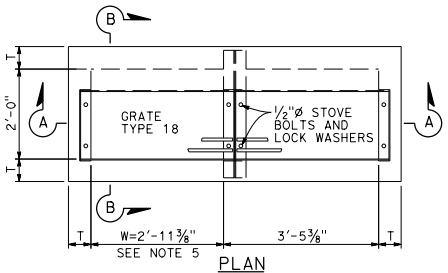
PRECAST DRAINAGE INLETS TYPES G1, G2 G3, G4, G5 AND G6

NO SCALE

D73C

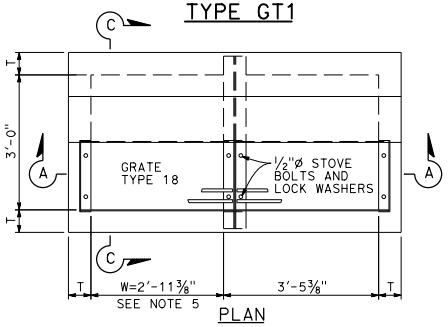
1-29-18

Return to Table of Contents



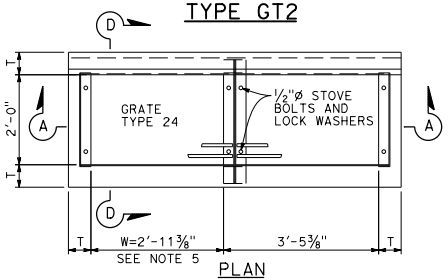
PLAN

TYPE GT1



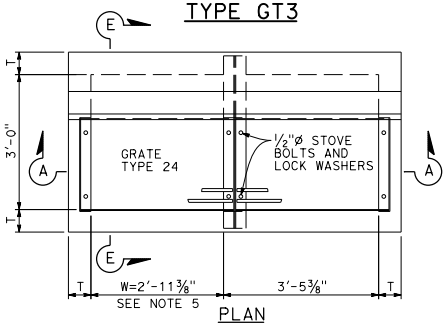
PLAN

TYPE GT2



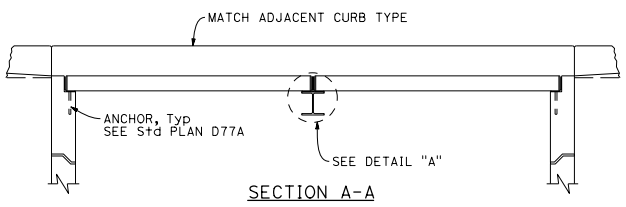
PLAN

TYPE GT3

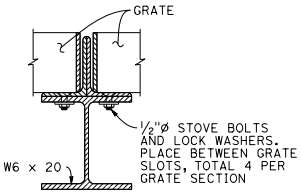


PLAN

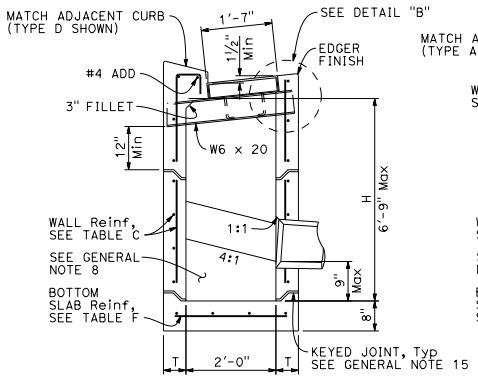
TYPE GT4



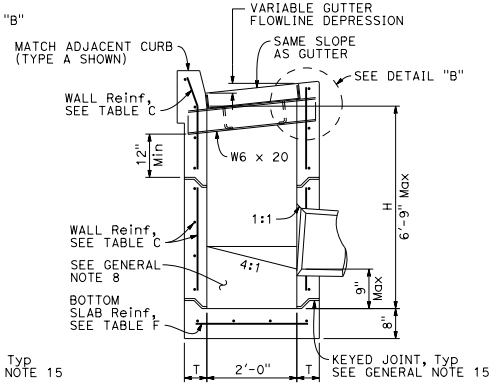
SECTION A-A



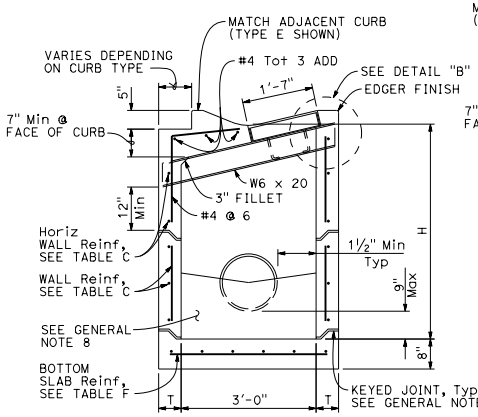
DETAIL "A"



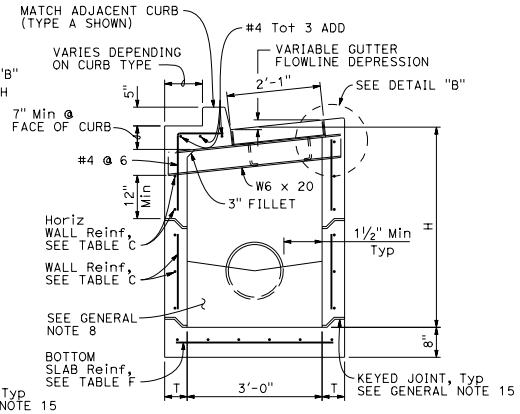
SECTION B-B



SECTION D-D



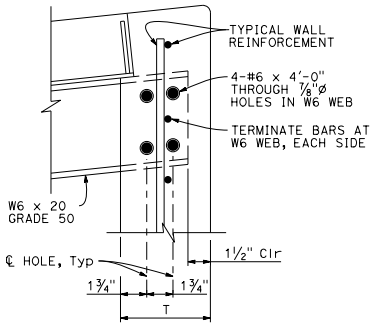
SECTION C-C



SECTION E-E

NOTES:

1. See Standard Plan D73F for General Notes and additional details. See Standard Plan D73G for tables, wall thickness "T" and quantities.
2. W=2'-11⅜" for one grate. Add 3'-5⅜" for additional grates in tandem.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
5. Overall interior length of lower sections may be 6'-6" provided top section conforms to the requirements for frame and grate types on Standard Plan D77A. The wall thickness of top sections may transition from "T" to "T"+5⅛" to meet this requirement. Minimum height of thickened wall shall = "T".



DETAIL "B"
(SIMILAR OPPOSITE END OF W6)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLETS TYPES GT1, GT2, GT3 AND GT4

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

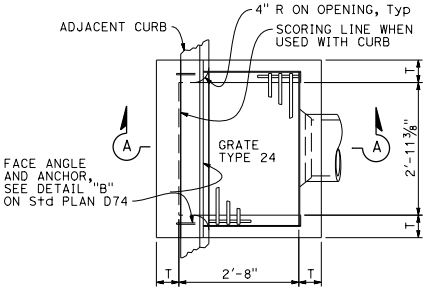
REGISTERED PROFESSIONAL ENGINEER
Carl M. Dugan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

2018 STANDARD PLAN D73D

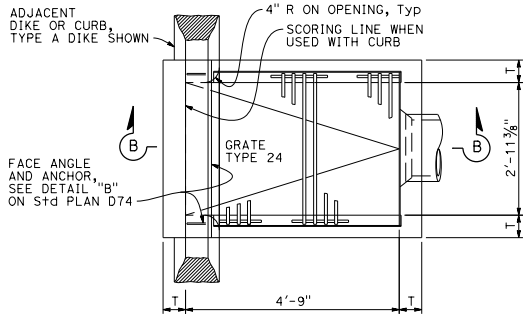
D73D

1-29-18

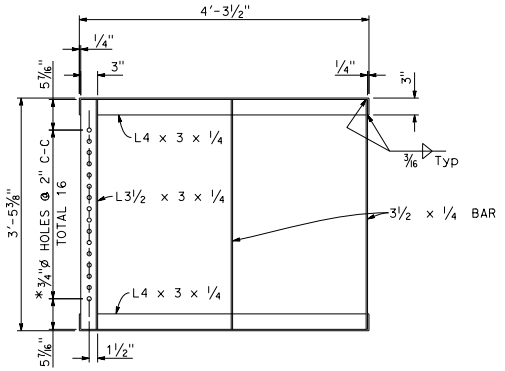
Return to Table of Contents



PLAN
TYPE GO

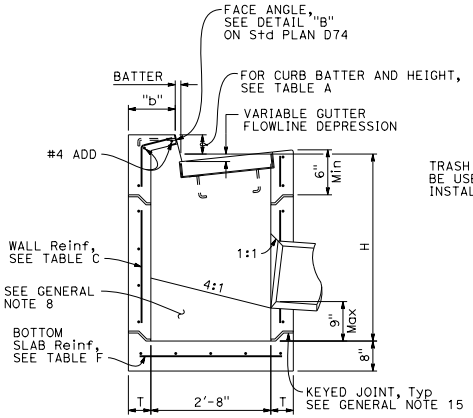


PLAN
TYPE GDO

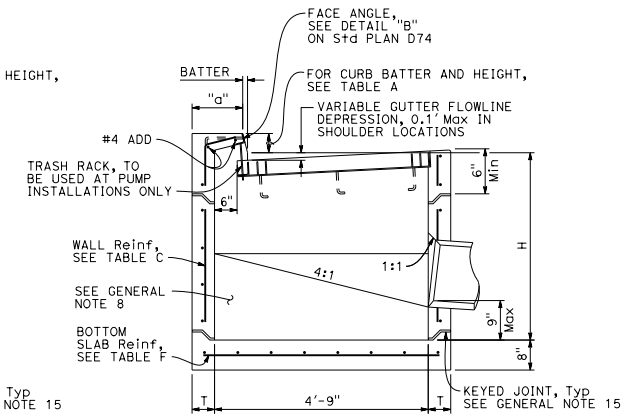


GRATE FRAME FOR TYPE GDO INLET

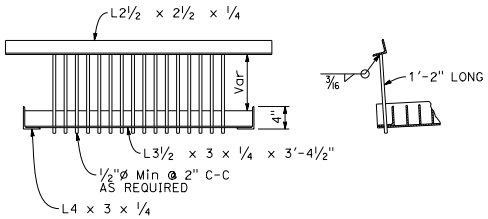
* HOLES REQUIRED ONLY WITH TRASH RACK



SECTION A-A



SECTION B-B



TRASH RACK
FOR USE WITH PUMP INSTALLATION

TABLE A				
CURB TYPE	NORMAL CURB HEIGHT	CURB BATTER	"a" DIMENSION	"b" DIMENSION
A1-6	6"	1½"	T+7½"	T+6½"
A1-8	8"	2"	T+7"	T+6"
B1-6	6"	4"	T+5"	T+4"
TYPE A DIKE	6"	3"	T+6"	T+5"

Height of curb opening will vary with the type of curb and the depth of the local depression.

NOTES:

1. See Standard Plan D73F for General Notes and additional details. See Standard Plan D73G for tables, wall thickness "T" and quantities.
2. Where shown on the project plans, place a ¾"* plain round protection bar horizontally across the length of the opening and bend back 4" into the inlet wall on each side.
3. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
4. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLETS TYPES GO AND GDO

NO SCALE

D73E

1-29-18

2018 STANDARD PLAN D73E

Return to Table of Contents

GENERAL NOTES:

1. "H" is measured from top of bottom slab to the normal gutter grade line undepressed at the curb face.
2. For "T" wall thickness and reinforcement, see Table C on Standard Plan D73G.
3. Wall reinforcement must be placed at the center of wall thickness with horizontal bars placed on the exterior face. Bottom slab concrete cover must be 3" clear on the interior side face unless otherwise noted. Top slab concrete cover must be 2" clear on the exterior face unless otherwise noted. Short independent wall sections or height adjustment rings 6" to 24" high must have a minimum of two #4 horizontal bars. Reinforcement spacing is in inches unless otherwise noted.
4. Steps - None required where "H" is less than 2'-6". Where "H" is 2'-6" or more, install steps with lowest rung 1'-0" above the floor and highest rung not more than 6" below bottom of lid. The distance between steps must not exceed 1'-0" and be uniform throughout the length of the wall. Place steps in the wall without an opening. Steps inserts may be substituted for the bar steps. Step inserts must comply with State Industrial Safety Requirements. See Standard Plan D74 for step details.
5. Pipe(s) can be placed in any wall. Adjacent to each side of the opening, place additional reinforcement equivalent to half the interupted main reinforcement. For larger pipes greater than or equal to 42" diameter, also add 4 diagonal bars, 1 bar each side. Bars must be the same size as the larger of the main vertical or horizontal bars. Extend bars one development length past the intersection with the adjacent diagonal bar, or where bars intersect mid thickness of adjacent wall bottom or top of non-continuous wall, bend ends as required into same plane.
6. Set inlet so that grate bars are parallel to direction of principal surface flow.
7. Curb section must match adjacent curb.
8. Except for inlets used as junction boxes, basin floors must have wood trowel finish and a minimum slope of 4:1, unless otherwise noted, from all directions toward outlet pipe by casting grout on top of the bottom slab. Grout must be placed prior to backfill.
9. See Standard Plans D77A and D77B for grate and frame details and weights of miscellaneous iron and steel.
10. See Standard Plans D78A and D78B for gutter depression details.
11. See Standard Plans A87A and A87B for curb and dike details.
12. Details shown apply to metal, concrete and plastic pipe(s).
13. The Contractor may use WWR instead of bar reinforcement. The ratio of bar reinforcement to WWR shall be based on the yield strength ratio.
14. Seal precast inlets connection openings between wall and pipe with non-shrink grout or resilient connectors as specified in the Special Provisions. Precast inlets shall have mortared connections conforming to details for Type GCP Inlet shown on Standard Plan D75B. See Standard Specifications for mortar composition.
15. Where shown, provide precast inlets with separate top sections for final grade adjustment. Provide keyed joints with butyl rubber sealant between the top section and wall, multiple wall sections, and wall and bottom slab. Joint design may vary but must be 1" to 3" in depth. For tongue type joints, tongue down orientation is not allowed. For keyed joints, keyway up, keyway down or tongue up configurations are allowed. Only one key type is allowed for each drainage inlet.
16. Non-shrink grout can be used for upper most joint to facilitate final top grade adjustment.
17. Provide a level and firm sand bedding on which to place precast inlets. Extend sand bedding under all structure backfill.
18. For Integral Base, see Detail "A".
19. Perimeter reinforcement must not be smaller than main bars and #4 and serves as a rigid frame to position and attach the required structural reinforcement and may be tack welded at outer corners when using ASTM A706 weldable bars.
20. Inlet extensions may be cast in place after placement of main box and placement and compaction of backfill. Concrete strength must be 3.6 ksi minimum. All slab and wall thicknesses must be per Standard Plan D72A. All reinforcement shall extend a minimum of 24" from precast main inlet box.

DESIGN NOTES:

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 6th edition with 2012 Interims and Errata and CA Amendments.
2. Live Load (AASHTO LRFD 3.6.1.2):
   HL-93, consists of design truck or tandem, and design lane load.
   Dynamic Load Allowance, IM = 33%
   Multiple Presence Factor, m = 1.0
   Design lane load was excluded in Top Slab design.
   A wheel load of 8 kips without impact factor was used for top slabs that are above a curb.
3. Earth Load:
   Vertical pressure = 140 pcf
   Lateral pressure:
   = 100 pcf for walls with flat embankment
   = 140 pcf For walls with slope embankment, 1.5:1 Max
4. Downdrag: ϕ = 34°and γ_E = 120 pcf.
5. Buoyancy: γ_W = 62.4 pcf to finished grade.
6. Reinforced Concrete: f'c = 5.0 ksi, fy = 60.0 ksi.
7. Tables are based on the worst case from the level ground and sloped ground.
8. Soil pressures shown are factored per AASHTO LRFD and include self-weight, live load and downdrag.

SPAN "A" OR "B" (IN)	L (IN)
<38	34
38 TO 50	40
51 TO 64	47
65 TO 76	53
77 TO 90	60

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

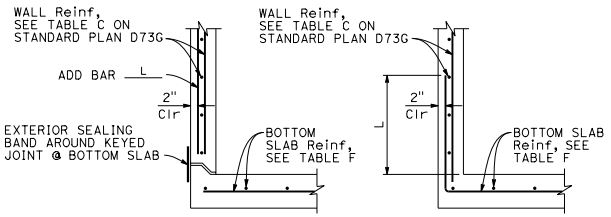
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan, No. C59976, Exp. 6-30-18, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

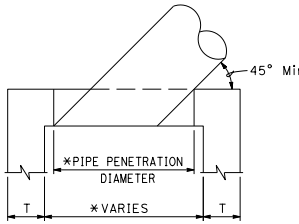
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



BASE WITH KEYED JOINT INTEGRAL BASE

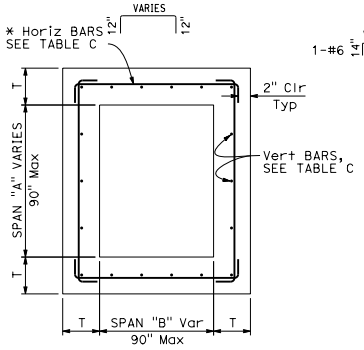
DETAIL "A"

FOR INTEGRAL BASE, CLEARANCE BETWEEN PIPE PENETRATION AND BASE SLAB MAY BE AS SHOWN IN CIP ALTERNATIVE STANDARD PLAN SHEET.



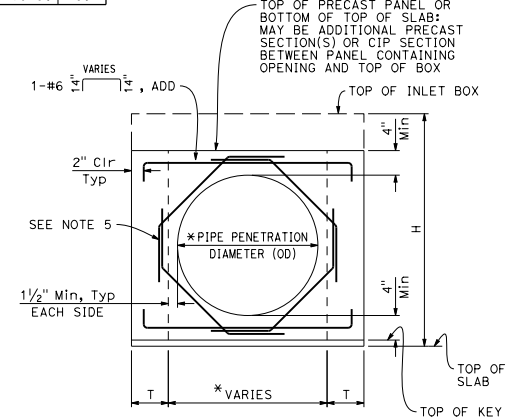
SKEWED PIPE PLAN

* ADJUST PIPE PENETRATION AND BOX WIDTH FOR SKEWED PIPES.

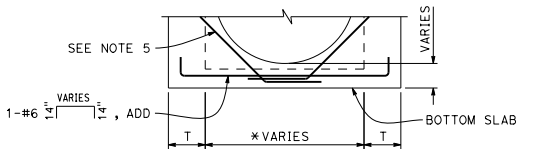


TYPICAL INLET PLAN

* ALTERNATIVE HORIZONTAL BARS



BASE WITH KEYED JOINT



INTEGRAL BASE

FOR DETAILS NOT SHOWN, SEE "BASE WITH KEYED JOINT"

TYPICAL WALL W/ PIPE OPENING

* SEE "SKEWED PIPE PLAN"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLET NOTES

NO SCALE

D73F

2018 STANDARD PLAN D73F

207

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TABLE A - CONCRETE QUANTITIES

TYPE	H=3'-0" TO 8'-0"		H=8'-1" TO 20'-0"	
	H=3'-0" (CY)	ADDITIONAL CONCRETE PER FOOT (CY)	H=8'-1" (CY)	ADDITIONAL CONCRETE PER FOOT (CY)
G1	0.95	0.220	SEE NOTE 2	SEE NOTE 2
G2*	1.25	0.255	2.55	0.255
G3	1.06	0.220	SEE NOTE 2	SEE NOTE 2
G4 (TYPE 18)*	1.41	0.255	2.71	0.255
G4 (TYPE 24)*	1.36	0.255	2.65	0.255
G5	1.09	0.220	SEE NOTE 2	SEE NOTE 2
G6	1.14	0.220	SEE NOTE 2	SEE NOTE 2
OS	1.28	0.278	2.69	0.278
OL7	1.92	0.278	3.33	0.278
OL10	2.43	0.278	3.84	0.278
OL14	3.16	0.278	4.57	0.278
OL21	4.58	0.278	5.99	0.278
GOL7	2.36	0.313	4.04	0.434
GOL10	2.84	0.313	4.53	0.434
GT1	2.30	0.480	SEE NOTE 2	SEE NOTE 2
GT2	2.71	0.530	5.40	0.530
GT3	2.29	0.480	SEE NOTE 2	SEE NOTE 2
GT4	2.69	0.530	5.39	0.530
GO	1.25	0.245	2.37	0.245
GDO	1.64	0.322	3.37	0.446

* Quantities are based on the minimum interior dimensions.

TABLE B - REINFORCEMENT QUANTITIES

TYPE	H=3'-0" TO 8'-0"		H=8'-1" TO 20'-0"	
	H=3'-0" (LB)	ADDITIONAL REINFORCEMENT PER FOOT (LB)	H=8'-1" (LB)	ADDITIONAL REINFORCEMENT PER FOOT (LB)
G1	88.5	21.90	SEE NOTE 2	SEE NOTE 2
G2*	151.5	24.54	277.4	38.64
G3	92.9	21.90	SEE NOTE 2	SEE NOTE 2
G4 (TYPE 18)*	134.4	24.54	260.3	38.64
G4 (TYPE 24)*	125.1	24.54	251.0	38.64
G5	92.5	21.90	SEE NOTE 2	SEE NOTE 2
G6	92.5	21.90	SEE NOTE 2	SEE NOTE 2
OS	145.8	35.57	327.8	49.60
OL7	328.0	35.57	510.0	49.60
OL10	467.5	35.57	649.5	49.60
OL14	667.5	35.57	849.5	49.60
OL21	1056.1	35.57	1238.1	49.60
GOL7	474.7	45.17	706.8	74.02
GOL10	604.9	45.17	836.9	74.02
GT1	349.0	80.48	SEE NOTE 2	SEE NOTE 2
GT2	403.7	86.82	849.1	135.15
GT3	347.0	80.48	SEE NOTE 2	SEE NOTE 2
GT4	403.7	86.82	849.1	135.15
GO	99.8	23.75	221.7	37.46
GDO	208.8	46.22	446.2	75.61

* Quantities are based on the minimum interior dimensions.

TABLE D

INLET	CURB USED IN QUANTITIES
G1	-
G2	-
G3	A1-6
G4 (Type 18)	A1-6
G4 (Type 24)	A1-6
G5	B1-4
G6	½E
OS	-
OL7	-
OL10	-
OL14	-
OL21	-
GOL7	-
GOL10	-
GT1	D-6
GT2	E
GT3	A2-8
GT4	A2-8
GO	-
GDO	-

TABLE C - WALL REINFORCEMENT

TYPE	H ≤8'-0" (T=6", UON)			8'-0"< H ≤20'-0" (T=8", UON)		
	HORIZONTAL	VERTICAL	*ADD	HORIZONTAL	VERTICAL	*ADD
OS	#4@6	#3@8	#3@8	#4@4 (T=6")	#3@8	#3@8
OL	#4@6	#3@8	#3@8	#4@4 (T=6")	#3@8	#3@8
GOL	#4@5	#3@8	#3@8	#5@5	#3@6	#3@6
G1 (H ≤6'-9")	#4@9	#3@8	#3@8	-	-	-
G2 & G4 (a** ≤38")	#4@9	#3@8	#3@8	#4@5 (T=6")	#3@8	#3@8
G2 & G4 (38" < a** ≤50")	#4@6	#3@8	#3@8	#4@4 (T=6")	#3@8	#3@8
G2 & G4 (50" < a** ≤64")	#4@5	#3@8	#3@8	#5@5	#3@6	#3@6
G2 & G4 (64"< a** ≤76")	#5@7 (T=8")	#3@6	#3@6	#5@4	#3@6	#5@6
G2 & G4 (76" < a** ≤90")	#5@5 (T=8")	#3@6	#3@6	#5@3	#3@6	#5@6
G3 (H ≤6'-9")	#4@9	#3@8	#3@8	-	-	-
G5 (H ≤6'-9")	#4@9	#3@8	#3@8	-	-	-
G6 (H ≤6'-9")	#4@9	#3@8	#3@8	-	-	-
GT1 (H ≤6'-9")	#5@5 (T=8")	#3@6	#3@6	-	-	-
GT2	#5@5 (T=8")	#3@6	#3@6	#5@3	#3@6	#5@6
GT3 (H ≤6'-9")	#5@5 (T=8")	#3@6	#3@6	-	-	-
GT4	#5@5 (T=8")	#3@6	#3@6	#5@3	#3@6	#5@6
GO	#4@9	#3@8	#3@8	#4@5 (T=6")	#3@8	#3@8
GDO	#4@5	#3@8	#3@8	#5@5	#3@6	#3@6

* See Detail A on Standard Plan D73F for additional vertical bars at the base.
** a = Larger interior span

TABLE E

SOIL PRESSURE BELOW BASE SLAB (ksf)		
TYPE	H ≤8'-0"	8'-0"< H ≤20'-0"
OS	2.89	5.68
OL*	2.89	5.68
GOL*	2.36	4.93
G1 (H ≤6'-9")	3.51	-
G2 & G4 (a** ≤38")	2.96	5.79
G2 & G4 (38" < a** ≤50")	2.21	4.51
G2 & G4 (50" < a** ≤64")	3.19	4.89
G2 & G4 (64"< a** ≤76")	2.50	4.23
G2 & G4 (76" < a** ≤90")	2.04	3.56
G3 (H ≤6'-9")	3.51	-
G5 (H ≤6'-9")	3.51	-
G6 (H ≤6'-9")	3.51	-
GT1 (H ≤6'-9")	3.41	-
GT2	3.60	6.42
GT3 (H ≤6'-9")	3.41	-
GT4	3.60	6.42
GO	3.37	6.46
GDO	2.48	7.30

* Main Box
** a = Larger interior span

TABLE F

BASE SLAB REINFORCEMENT (T=8", UON)		
TYPE	H ≤8'-0"	8'-0"< H ≤20'-0"
OS	#4@8 (EW)	#4@5 (EW)
OL*	#4@8 (EW)	#4@5 (EW)
GOL*	#4@6 (EW)	#4@4 (EW)
G1 (H ≤6'-9")	#4@10 (EW)	-
G2 & G4 (a** ≤38")	#4@10 (EW)	#4@6 (EW)
G2 & G4 (38" < a** ≤50")	#4@8 (EW)	#4@5 (EW)
G2 & G4 (50" < a** ≤64")	#4@6 (EW)	#4@4 (EW)
G2 & G4 (64"< a** ≤76")	#4@5 (EW)	#4@3 (EW)
G2 & G4 (76" < a** ≤90")	#4@4 (EW)	#5@3 (EW)
G3 (H ≤6'-9")	#4@10 (EW)	-
G5 (H ≤6'-9")	#4@10 (EW)	-
G6 (H ≤6'-9")	#4@10 (EW)	-
GT1 (H ≤6'-9")	#4@4 (EW)	-
GT2	#4@4 (EW)	#5@3 (EW)
GT3 (H ≤6'-9")	#4@4 (EW)	-
GT4	#4@4 (EW)	#5@3 (EW)
GO	#4@10 (EW)	#4@6 (EW)
GDO	#4@6 (EW)	#4@4 (EW)

(EW) Each Way
* Main Box
** a = Larger interior span

NOTES:

1. No deduction or adjustment was made to the quantities of concrete and reinforcement for pipe openings, floor alternatives or curb type.
2. Maximum allowable height is 6'-9".
3. Quantities are approximate and for design purposes only.
4. Design is based on envelope of level and sloped ground.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST DRAINAGE INLET TABLES

NO SCALE

D73G

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

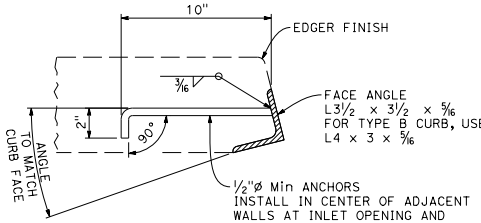
May 31, 2018

PLANS APPROVAL DATE

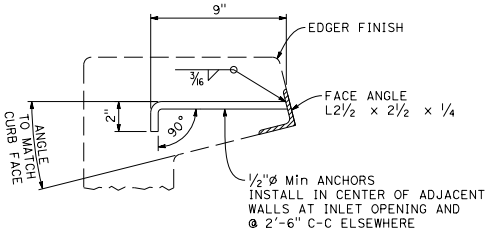
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Carl M. Duan — No. C59976 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

FACE ANGLE DETAIL "A"	
LENGTH OF CURB OPENING	No. OF ANCHORS
3'-6" OR LESS	2
7'-0"	3
10'-0"	4
14'-0"	5
21'-0"	7



DETAIL "A"

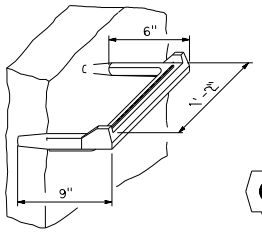


DETAIL "B"

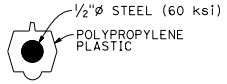
FACE ANGLE AND ANCHOR

NOTE:

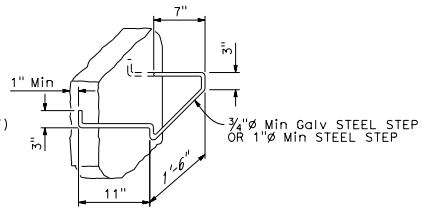
1. When shown on the project plans, place a ¾"ø plain round protection bar horizontally across the length of the opening and bend back 4" into the inlet wall on each side.



STEP INSERT

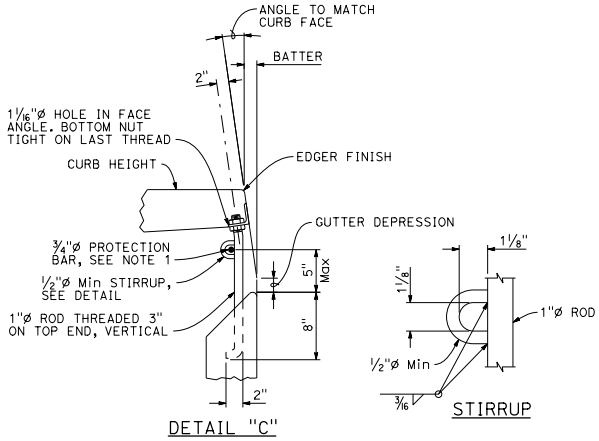


TYPICAL SECTION
(STEP INSERT)



BAR STEP

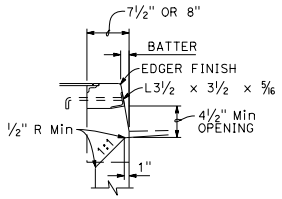
STEP DETAILS



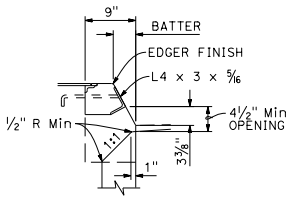
DETAIL "C"

CURB SUPPORT

CURB SUPPORTS SHALL BE EVENLY SPACED AND MINIMAL IN NUMBER SUCH THAT MAXIMUM SPAN OF UNSUPPORTED CURB IS 7'-0".



TYPE A CURBS



TYPE B CURBS

CURB OPENING DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET DETAILS

NO SCALE

D74

2018 STANDARD PLAN D74

209

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

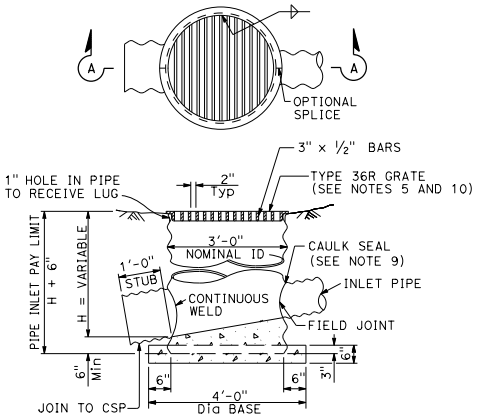
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Bruce D. Swanger, No. C61257, Exp. 6-30-19, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

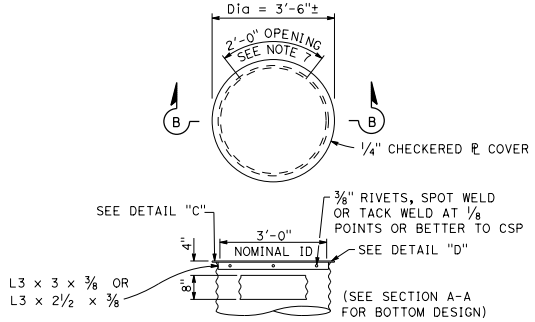
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A

TYPE GMP

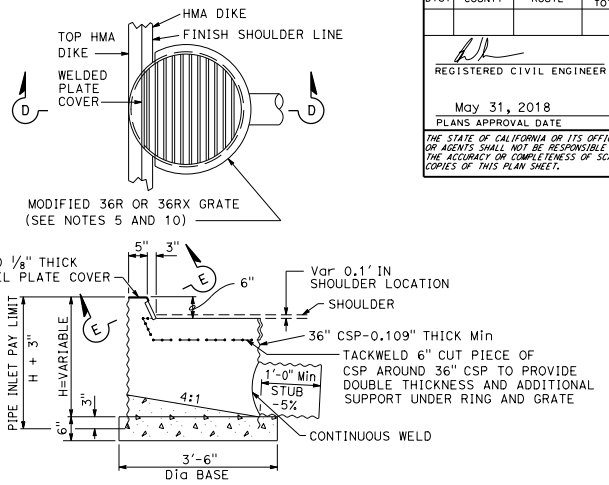
Steel pipe inlet with grate



SECTION B-B

TYPE OMP or OMPI

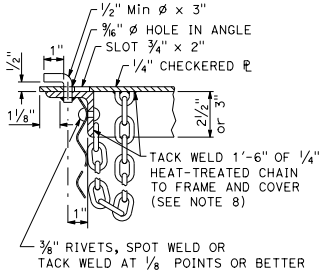
Steel pipe inlet with side opening and steel cover (see note 6)



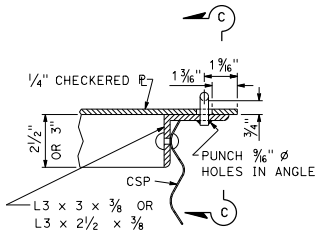
SECTION D-D

TYPE ODI

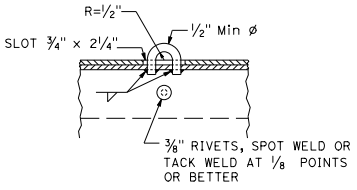
Steel pipe inlet with grate and raised opening at HMA dike flowline



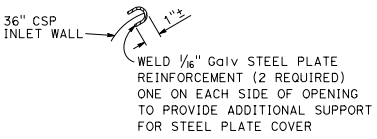
DETAIL "C"



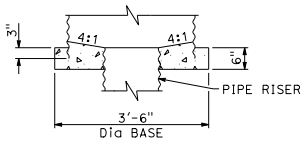
DETAIL "D"



SECTION C-C



SECTION E-E



TYPE ODI BASE DETAIL FOR PIPE RISER CONNECTION

NOTES:

1. For Details of concrete pipe inlets, see Standard Plan D75B.
2. For details of ladder and steps and when ladder or steps are required, see Standard Plan D75C.
3. Inlet pipes shall not protrude into basin.
4. Except for inlets used for junction boxes, basin floors shall have minimum slope of 4:1 from all directions toward outlet pipe, and a wood trowel finish.
5. See Standard Plans D77A and D77B for Grate and Frame Details and weights of Miscellaneous Iron and Steel.
6. Designation of Type OMPI pipe inlets on plans indicates trash racks are to be furnished and installed on all side openings. See Standard Plan D75C for trash rack details.
7. More than one side opening may be required. Location and number as ordered by the Engineer.
8. Chain to be provided when specified.
9. Caulk seal with pliable mixture of sand, portland cement, and emulsified asphalt (Mixture of 1 part portland cement, 3-5 parts sand, and 1½" parts SSI emulsified asphalt).
10. Place pipe so bars of grate will be parallel with main surface flow.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STEEL PIPE INLETS

NO SCALE

D75A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

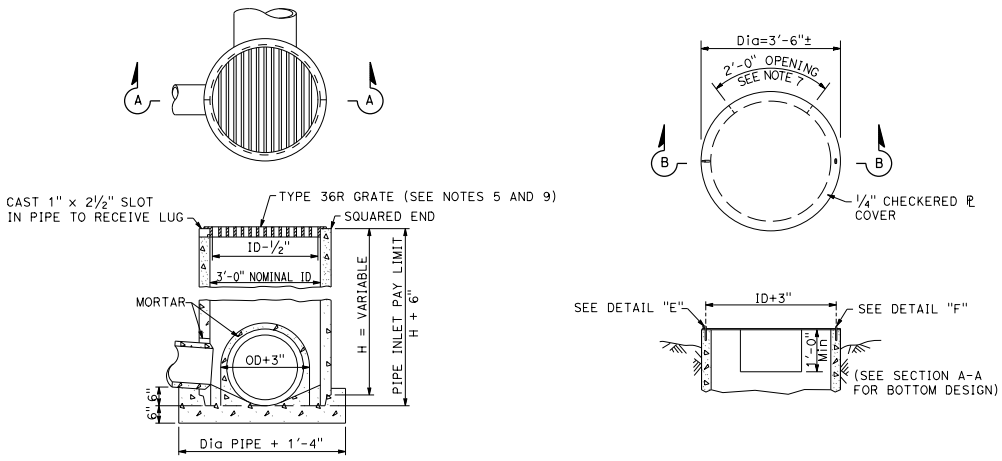
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA



SECTION A-A

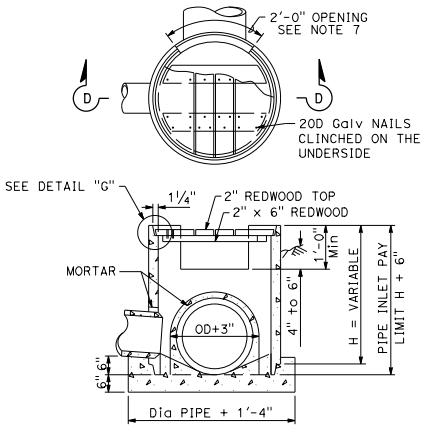
TYPE GCP

Concrete pipe inlet with grate

SECTION B-B

TYPE OCP or OCPI

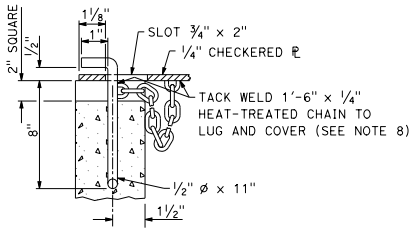
Concrete pipe inlet with steel cover
(See Note 6)



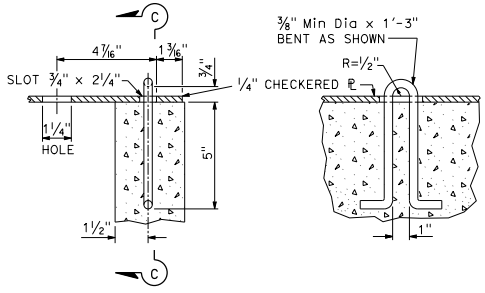
SECTION D-D

TYPE OCP or OCPI

Concrete pipe inlet with redwood cover
(See Notes 6 and 10)

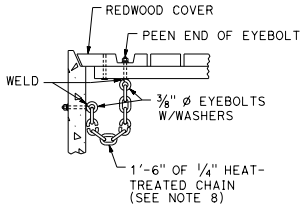


DETAIL "E"



DETAIL "F"

SECTION C-C



DETAIL "G"

NOTES:

1. For details of steel pipe inlets, see Standard Plan D75A.
2. For details of ladder and steps and when ladder or steps are required, see Standard Plan D75C.
3. Inlet pipes shall not protrude into basin.
4. Except for inlets used for junction boxes, basin floors shall have minimum slope of 4:1 from all directions toward outlet pipe, and a wood trowel finish.
5. See Standard Plan D77A and Standard Plan D77B for Grate and Frame Details and Weights of Miscellaneous Iron and Steel.
6. Designation of Type OCPI pipe inlets on plans indicates trash racks are to be furnished and installed on all side openings. See Standard Plan D75C for Trash Rack details.
7. More than one side opening may be required. Location and number as ordered by the Engineer. Opening may be cast in pipe.
8. Chain to be provided when specified.
9. Place pipe so bars of grate will be parallel with main surface flow.
10. Redwood covers shall only be placed at locations designated on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE PIPE INLETS

NO SCALE

D75B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

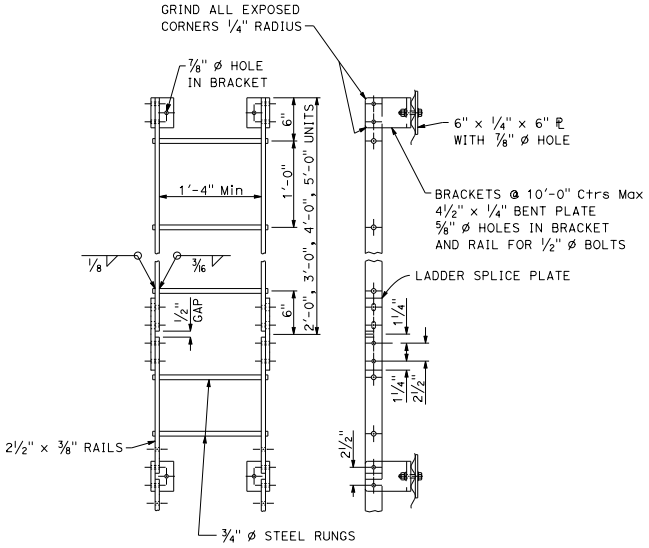
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

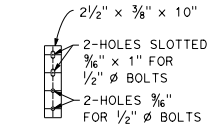
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



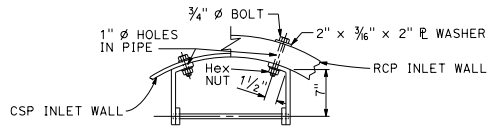
LADDER DETAILS

See Notes 1, 2, 3 and 4

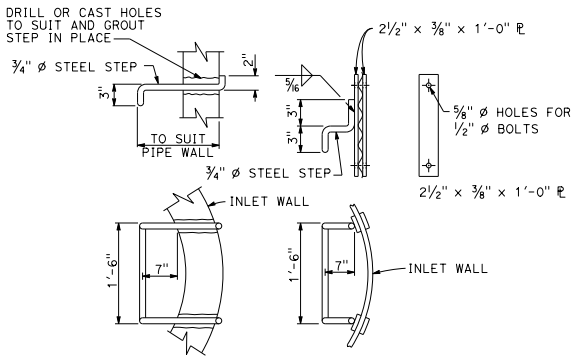


LADDER SPLICE PLATE

(See Note 4)



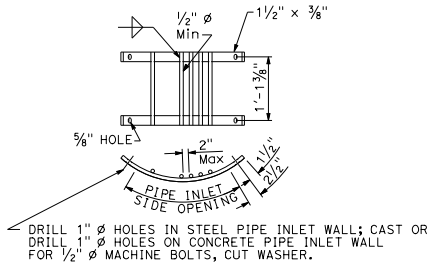
LADDER CONNECTION TO INLET



RCP INLET CSP INLET

STEP DETAILS

(See Note 1)



TRASH RACK DETAILS

(See Note 5)

NOTES:

1. Ladders and Steps - None required where "H" dimension of pipe inlet is less than 2'-6". Where "H" is 2'-6" or more, install steps or ladder with lowest rung not more than 1'-0" above the floor and highest rung not more than 1'-0" below top of inlet. The distance between steps or rungs shall not exceed 1'-0" and shall be uniform throughout the length of the wall. Place steps or ladder in the wall without an opening.
2. Ladder may be constructed in one length at contractor's option on RCP inlet.
3. On CSP inlet, connect ladder splice plate so joint can compress 1/2".
4. Ladder splice plate to be connected with 1/2" Ø bolts with double nuts.
5. Trash racks used on Type OCPI and OMPI inlets. Trash racks required for pumping installations.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE INLETS LADDER AND TRASH RACK DETAILS

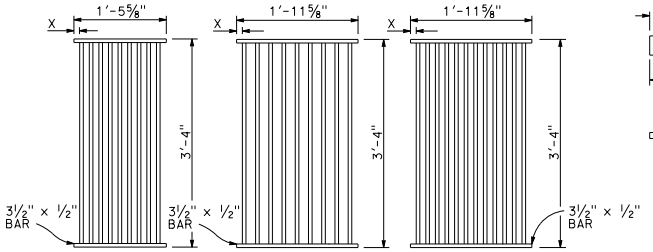
NO SCALE

D75C

2018 STANDARD PLAN D75C

1-29-18

Return to Table of Contents

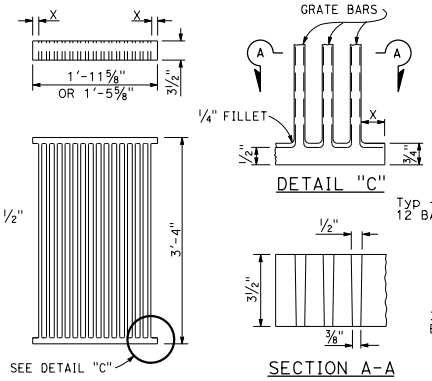


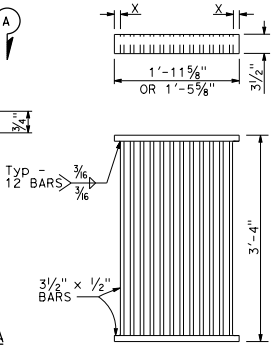
TYPE 18-9
1⅜" Clear spacing. Use within the roadbed on highways where bicycles and pedestrians are excluded.

TYPE 24-9
2" Clear spacing. Use in locations off the roadbed on all types of highways.

TYPE 24-12
1⅜" Clear spacing. Use within the roadbed on highways where bicycles and pedestrians are excluded.

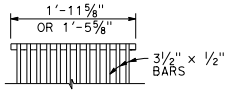
RECTANGULAR GRATE DETAILS
(See table below)



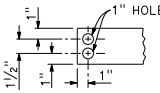


ALTERNATIVE CAST DUCTILE IRON GRATE OR CAST CARBON STEEL GRATE

ALTERNATIVE WELDED GRATE



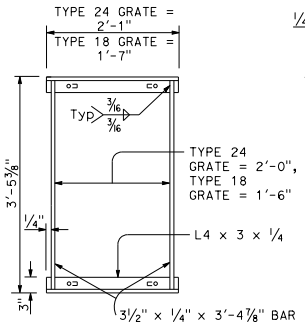
CAST END BLOCK



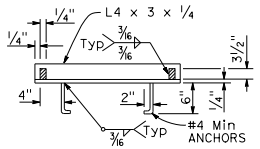
END OF BAR

NOTES:

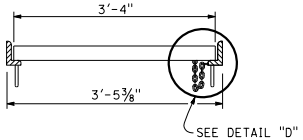
1. Grate type numbers refer to approximate width of grate in inches and number of bars, respectively.
2. Rounded top of bars optional on all grates.
3. Pipe inlets with a grate shall be placed so that bars parallel direction of principle surface flow.
4. Complete joint penetration butt welds may be substituted for the fillet welds on all anchors.
5. Standard square, hexagon, round or equivalent headed anchors may be substituted for the right angle hooks on the anchors shown on this plan.
6. Grate and frame weights are based on welded grates (weights of face angles, steps, protection bars, etc. are not included).
7. Connect chain to grate and frame only at locations shown on the plans. When chain is required, do not use cast ductile iron grates.



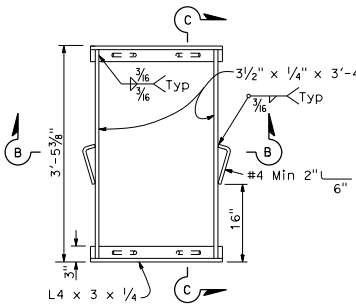
TYPICAL FRAME



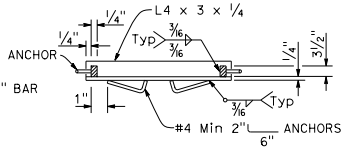
CROSS SECTION
(Thru frame)



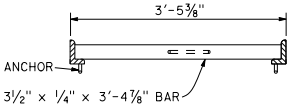
LONGITUDINAL SECTION
(Thru frame and grate)



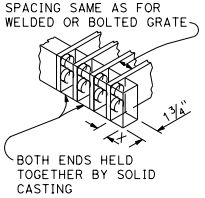
TYPICAL FRAME



SECTION B-B



SECTION C-C

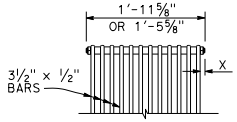


ALTERNATIVE CAST DUCTILE IRON OR CAST CARBON STEEL END BLOCK GRATE

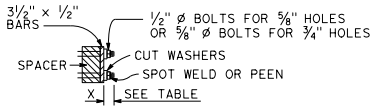
ALTERNATIVE ANCHOR FOR RECTANGULAR FRAME
(For details not shown, See Rectangular Frame Details)

RECTANGULAR FRAME DETAILS
(For all rectangular grates)

INLET TYPE	GRATE TYPE	No. OF GRATES	WEIGHT LB
GDO	24-12	2	634
GOL-7	24-12	1	326
GOL-10	24-12	1	326
GO,G1,G2,G3,G4 (TYPE 24)	24-9	1	263
	24-12	1	326
G4 (TYPE 18),G5,G6	18-9	1	249
GT1	18-9	2	498
GT2	18-9	2	498
GT3	24-12	2	652
GT4	24-12	2	652
TRASH RACK			22
GRATE CHAIN			3

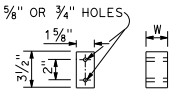


BOLTED END BLOCK

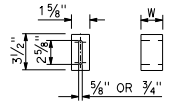


BOLTING DETAIL

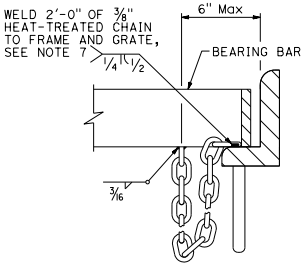
ALTERNATIVE BOLTED GRATE



BAR SPACER



ALTERNATIVE SPACER
W = 1⅜" or 2"



DETAIL "D"
(Steel grates only)

GRATE BAR SPACING TABLE

TYPE	No. OF BARS	CLEAR BAR SPACING	X
18-9	9	1⅜"	1⅛"
24-9	9	2"	1⅞"
24-12	12	1⅜"	1¼"

INLET TYPE	COVER TYPE	WEIGHT LB
OS	PLATE	174
OL-7	PLATE	170
OL-10	PLATE	170
OL-14	PLATE	170
OL-21	PLATE	170
OCP	PLATE	112
OCPI	PLATE	112
OCPI	REDWOOD	42
OMP	PLATE	177
OMPI	PLATE	177

BASIS FOR Misc IRON & STEEL FINAL PAY WEIGHTS FOR DRAINAGE INLETS
(See Note 6)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

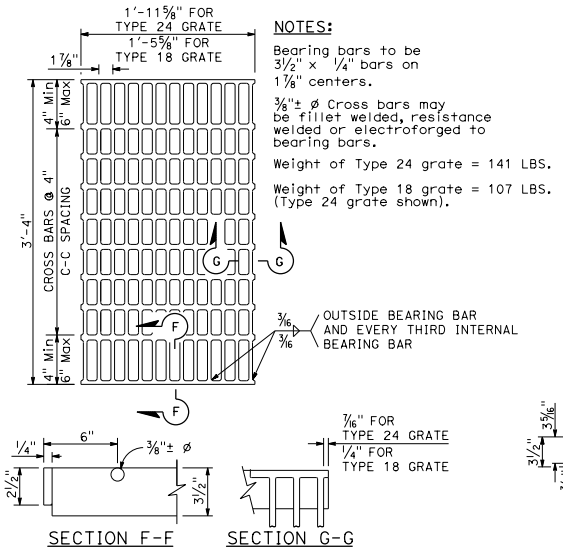
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
GRATE DETAILS No. 1
NO SCALE
D77A

1-29-18

2018 STANDARD PLAN D77A

Return to Table of Contents



NOTES:

Bearing bars to be 3½" x ¼" bars on 1⅞" centers.

⅜"± ø Cross bars may be fillet welded, resistance welded or electroforged to bearing bars.

Weight of Type 24 grate = 141 LBS.

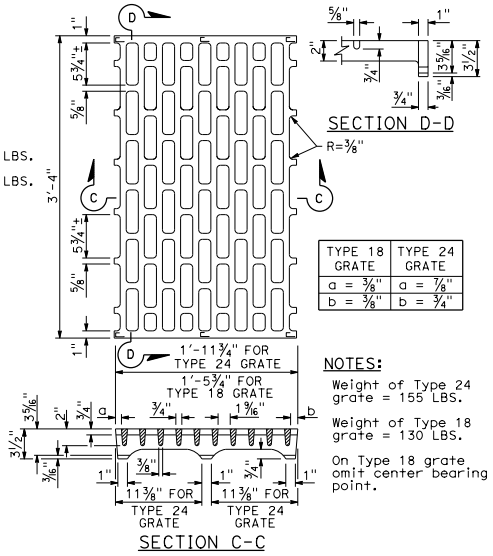
Weight of Type 18 grate = 107 LBS. (Type 24 grate shown).

SECTION F-F

SECTION G-G

TYPE 18-10 AND 24-13 GRATE

(Welded Steel)



NOTES:

Weight of Type 24 grate = 155 LBS.

Weight of Type 18 grate = 130 LBS.

On Type 18 grate omit center bearing point.

TYPE 18 GRATE	TYPE 24 GRATE
a = ⅜"	a = ⅞"
b = ⅜"	b = ¾"

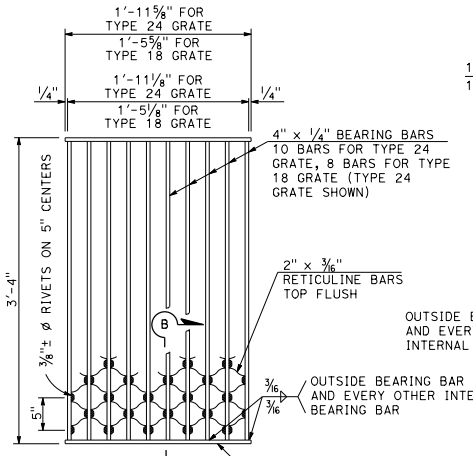
SECTION D-D

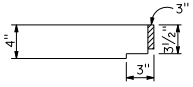
R=⅜"

SECTION C-C

TYPE 18-8C AND 24-10C GRATE

(Cast ductile iron)





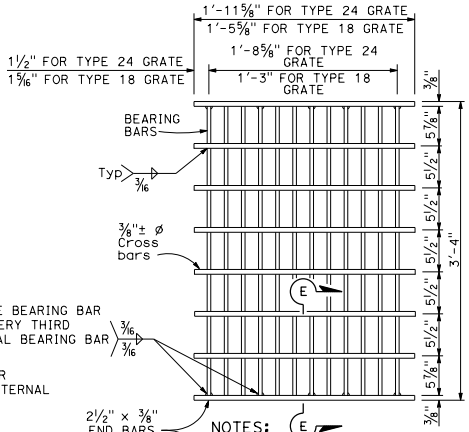
SECTION B-B

NOTES:

Weight of Type 24 grate = 182 LBS.
Weight of Type 18 grate = 145 LBS.

TYPE 18-8S AND 24-10S GRATE

(Welded Steel) Reticuline type



SECTION E-E

NOTES:

Bearing bars to be 3½" x ⅜" bars on 1⅛" centers.

12 Bars for Type 24 grate - 9 bars for Type 18 grates. (Type 24 grate shown).

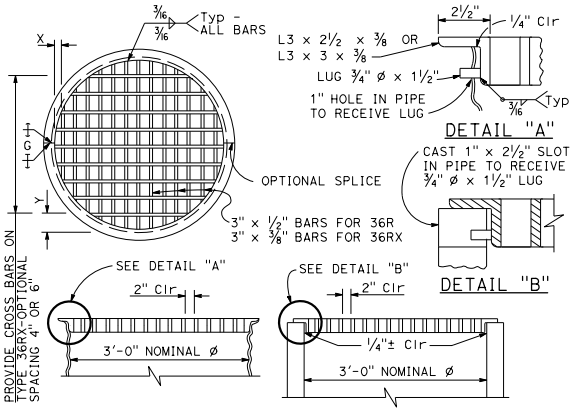
Weight of Type 24 grate = 192 LBS.

Weight of Type 18 grate = 145 LBS.

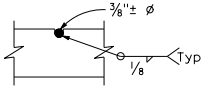
⅜"± ø Cross bars may be fillet welded, resistance welded or electroforged to bearing bars.

TYPE 18-9X AND 24-12X GRATE

(Welded Steel)

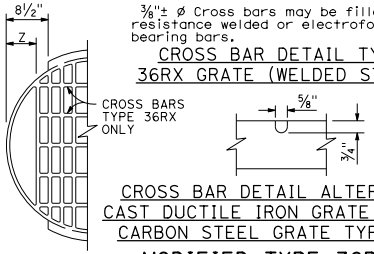


TYPE 36R AND 36RX GRATE DETAILS



⅜"± ø Cross bars may be fillet welded, resistance welded or electroforged to bearing bars.

CROSS BAR DETAIL TYPE 36RX GRATE (WELDED STEEL)



CROSS BAR DETAIL ALTERNATIVE CAST DUCTILE IRON GRATE OR CAST CARBON STEEL GRATE TYPE 36RX

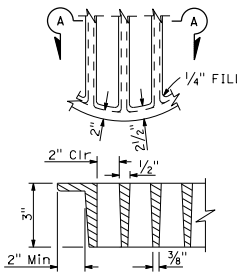
MODIFIED TYPE 36R AND 36RX GRATE FOR ODI INLET

NOTES:

1. When alternative grates are allowed - Final pay based on alternative with the lesser weight.
2. Use frame shown on Standard Plan D74A, D74B or D77A as appropriate.
3. When Type 24-10S, 24-12X or 24-13 grates are used with GDO Inlets, a ¼" x 3½" x 3'-4⅞" steel bar shall be welded across the center of inlet frame to separate the individual grates.
4. See Standard Plan D77A for connecting chain to welded grate and frame. When chain is required, do not use cast ductile iron grate.

GRATE BAR SPACING TABLE

TYPE	No. OF BARS	CLEAR BAR SPACING	X	Y		Z
				4" SPACING	6" SPACING	
36R	13	2"	2⅛"	-	-	-
36RX (STEEL)	15	2"	7/16"	3¾"	5¾"	-
36RX (CAST)	13	2"	2⅛"	3¾"	5¾"	-
36R Mod	12	2"	2⅛"	-	-	5"
36RX Mod (STEEL)	13	2"	9/16"	3¾"	5¾"	5 11/16"
36RX Mod (CAST)	12	2"	2⅛"	3¾"	5¾"	5"



SECTION A-A

ALTERNATIVE CAST DUCTILE IRON GRATE OR CAST CARBON STEEL GRATE TYPE 36R AND 36RX

BASIS FOR Misc IRON AND STEEL FINAL PAY WEIGHTS FOR DRAINAGE INLETS

INLET TYPE	GRATE TYPE	No. OF GRATES	WEIGHT LB
GDO (SEE NOTE 4)	24-10C	2	391
	24-10S	2	456
	24-12X	2	473
	24-13	2	374
G0,G0L,G1,G2, G3,G4 (TYPE 24)	24-10C	1	202
	24-10S	1	229
	24-12X	1	239
	24-13	1	188
G4 (TYPE 18) G5,G6	18-8S	1	187
	18-9X	1	187
	18-10	1	149
GT1,GT2	18-8S	2	374
	18-9X	2	374
	18-10	2	298
GT3,GT4	24-10C	2	404
	24-10S	2	458
	24-12X	2	478
	24-13	2	376
ODI	36RX (Mod)	1	196
GMP,GCP,GCPI	36RX	1	215
ODI	36R (Mod)	1	220
GMP,GCP,GCPI	36R	1	236
TRASH RACK			22
GRATE CHAIN			3

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GRATE DETAILS No. 2

NO SCALE

D77B

1-29-18

Return to Table of Contents

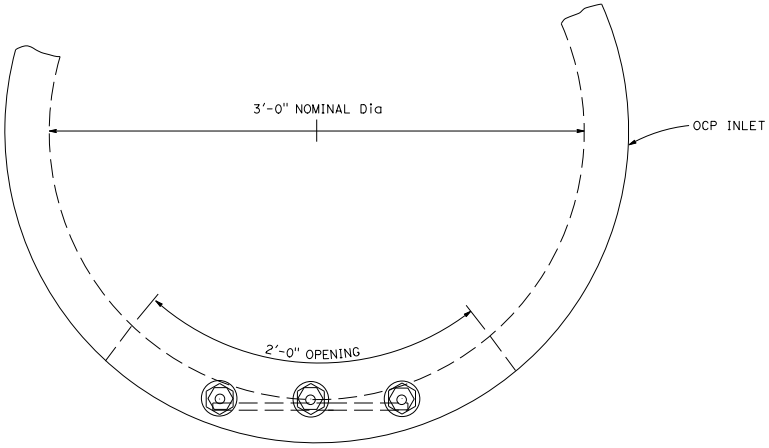
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

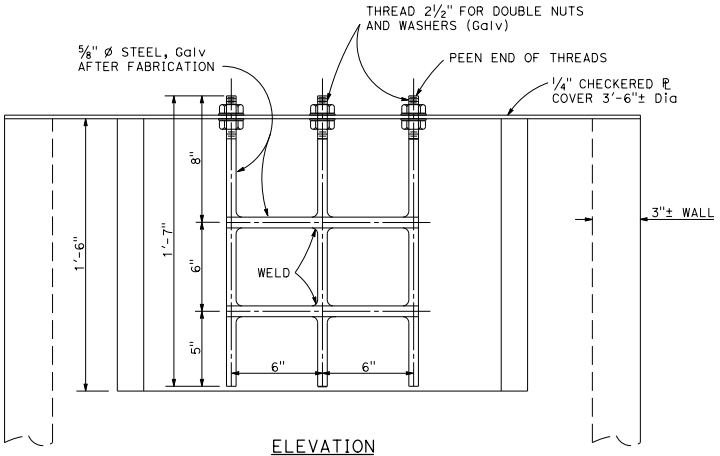
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



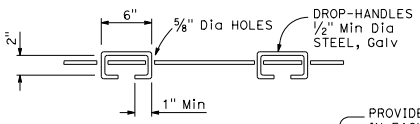
ELEVATION

ALTERNATIVE TRASH RACK FOR TYPE OCP INLET

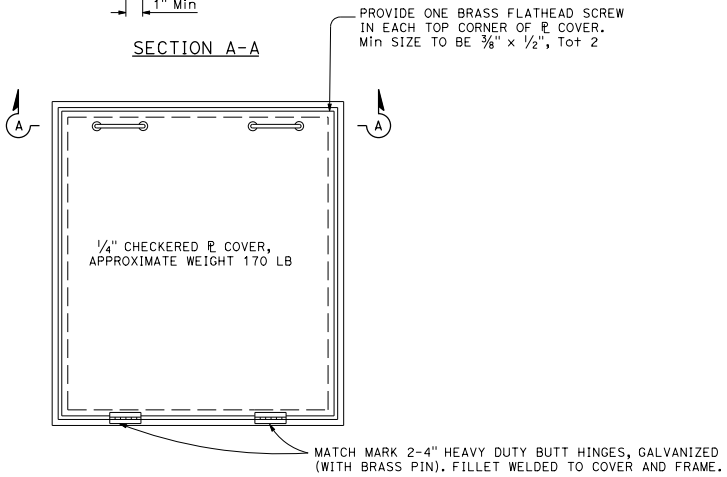
Single or double opening

NOTES:

1. Alternative methods of securing drop-handles to cover will be acceptable.
2. This hinged cover is to be used only on embankment or steep slopes.



SECTION A-A



PLAN

HINGED COVER FOR TYPE OL AND OS INLETS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ALTERNATIVE HINGED COVER FOR TYPE OL AND OS INLETS AND TRASH RACK FOR TYPE OCP INLET

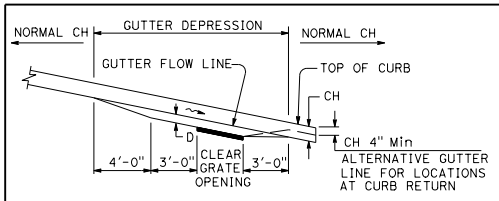
NO SCALE

D77C

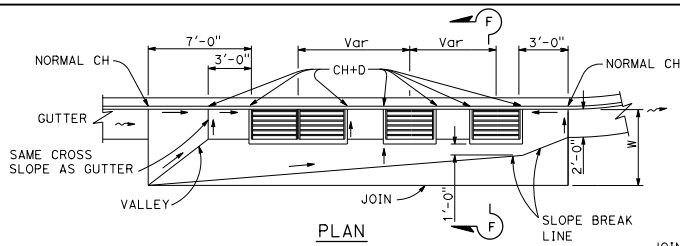
1-29-18

2018 STANDARD PLAN D77C

Return to Table of Contents

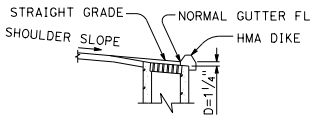


PROFILE



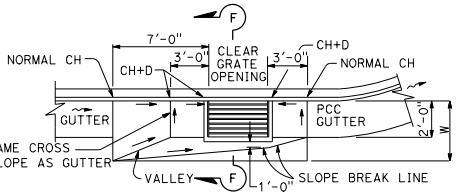
PLAN

GRATE INLET SERIES



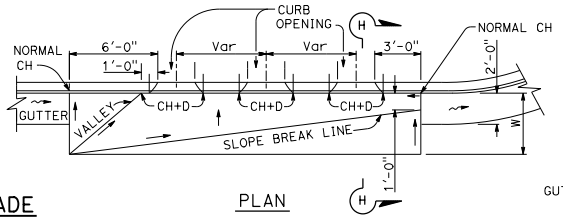
DETAIL OF INLET WITH DIKE

(Single grate shown)



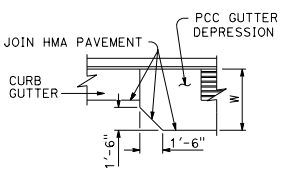
PLAN

TYPE GO AND G1 THRU G6 INLETS ON GRADE



PLAN

TYPE OS AND OL INLETS IN SERIES ON GRADE

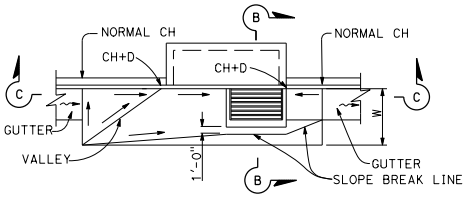


DETAIL OF HOT MIX ASPHALT PAVEMENT

(See Note 4)

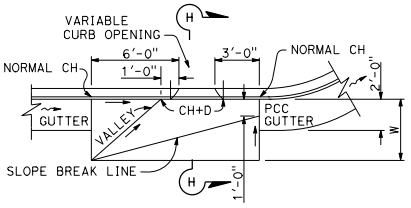
NOTES:

1. W= Width of depressed apron. Depressed aprons shall be 4'-0" on shoulder and 4'-0" to 6'-0" in city street gutters unless otherwise shown.
   D= Gutter depression. The gutter depression shall be 1¼" to 3" in city street gutter or locations outside of shoulder unless otherwise shown.
   CH= Curb Height.
   ⟶ = Straight grade, downward slope.
   ⇝ = Gutter or shoulders direction of flow.
2. Gutter depressions shall be 8" thick.
3. Establish curb opening height at midpoint of grate.
4. Details shown for concrete pavement. When hot mix asphalt pavement is used, corners to be cut off as shown on Detail of Hot Mix Asphalt Pavement.



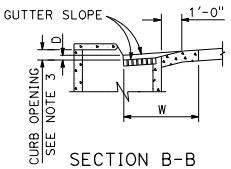
PLAN

TYPE GOL INLET ON GRADE

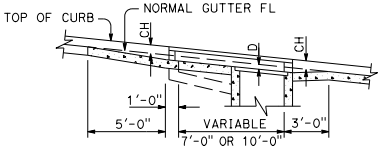


PLAN

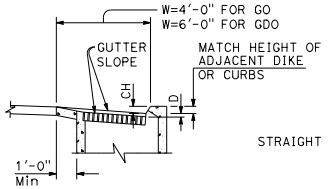
TYPE OS AND OL INLETS ON GRADE



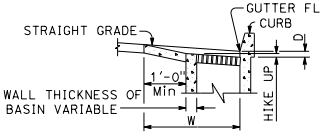
SECTION B-B



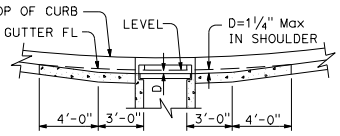
SECTION C-C



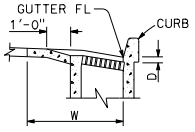
SECTION E-E



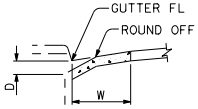
SECTION G-G



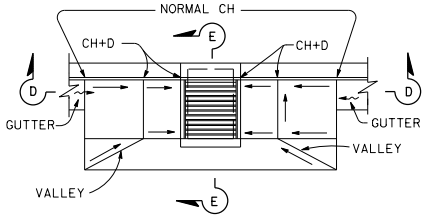
SECTION D-D



SECTION F-F



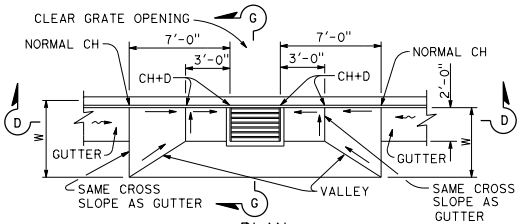
SECTION H-H



PLAN

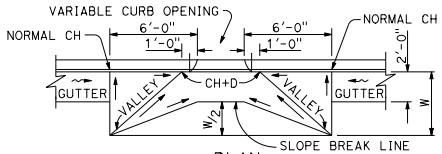
TYPE GO AND GDO INLET GRADE SAG

(GDO shown)



PLAN

TYPE G1 THRU G6 GT3 AND GT4 INLETS IN GRADE SAG



PLAN

TYPE OS AND OL INLETS IN GRADE SAG

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GUTTER DEPRESSIONS

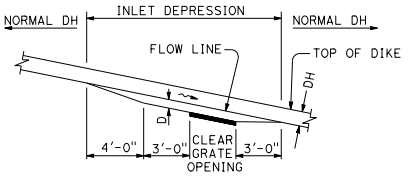
NO SCALE

D78A

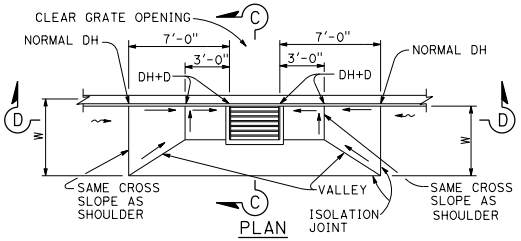
2018 STANDARD PLAN D78A

1-29-18

Return to Table of Contents

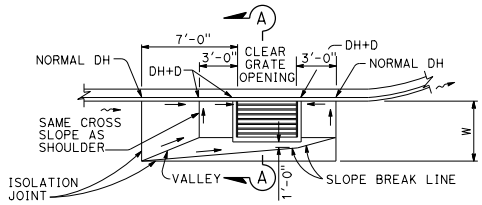


PROFILE



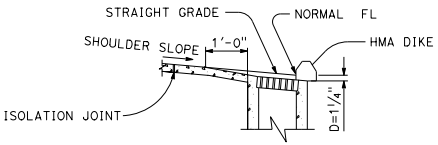
PLAN

TYPE G1 THRU G6 GT3 AND GT4 INLETS IN GRADE SAG

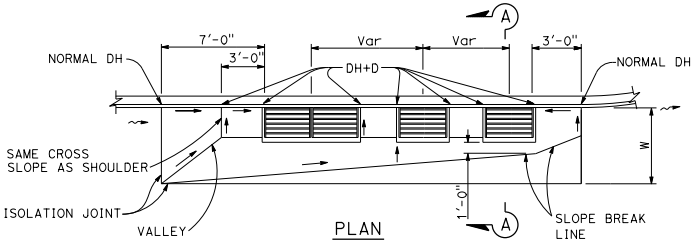


PLAN

TYPE GO AND G1 THRU G6 INLETS ON GRADE

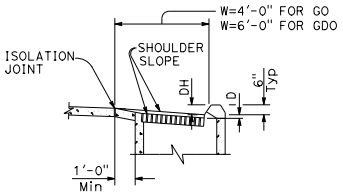


SECTION A-A
(Single grate shown)

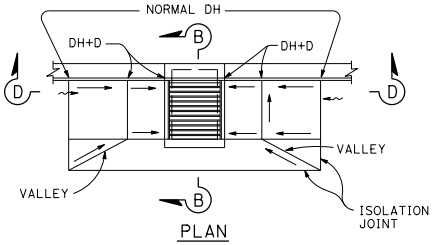


PLAN

GRATE INLET SERIES



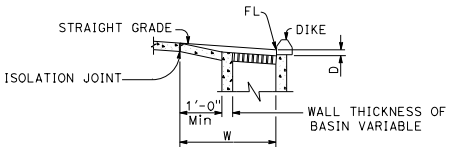
SECTION B-B



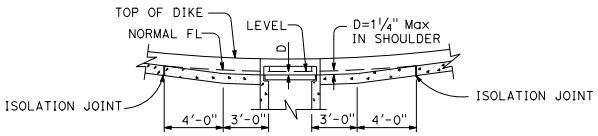
PLAN

TYPE GO AND GDO INLET GRADE SAG

(GDO shown)



SECTION C-C



SECTION D-D

NOTES:

1. W = Width of depressed apron. Depressed aprons shall be 4'-0" unless indicated otherwise.
   D = Inlet depression. The Inlet depression shall be 1¼" unless indicated otherwise.
   DH = Dike Height.
   → = Straight grade, downward slope.
   ~→ = Direction of flow.
2. Apron shall be portland cement concrete and match thickness of adjacent shoulder pavement.
3. Establish curb opening height of Type GO or GDO at midpoint of grate.
4. See Standard Plans P45 and P46 for Isolation Joint Details.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

INLET DEPRESSIONS CONCRETE SHOULDERS

NO SCALE

D78B

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

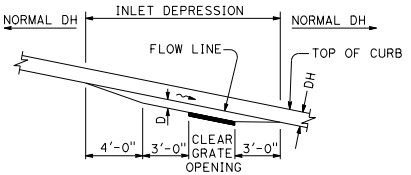
REGISTERED CIVIL ENGINEER

May 31, 2018

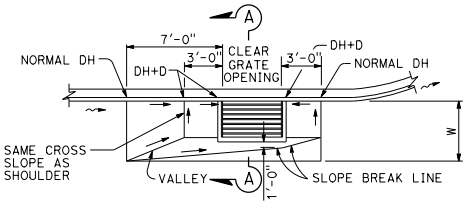
PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

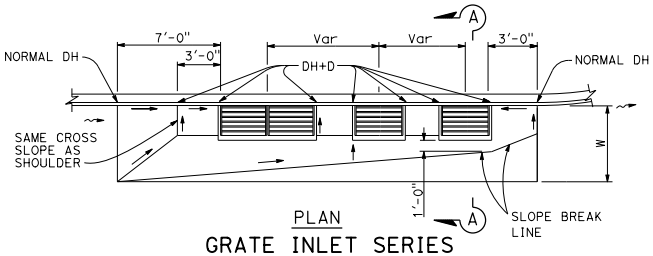


PROFILE



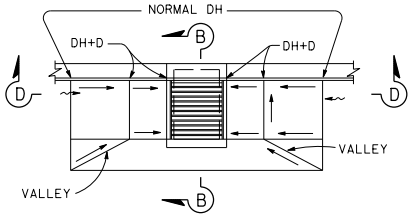
PLAN

TYPE G0 AND G1 THRU G6 INLETS ON GRADE



PLAN

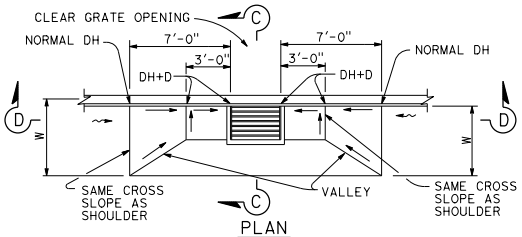
GRATE INLET SERIES



PLAN

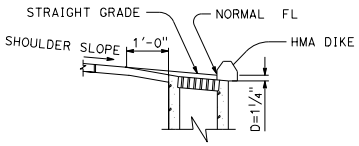
TYPE GO AND GDO INLET GRADE SAG

(GDO shown)



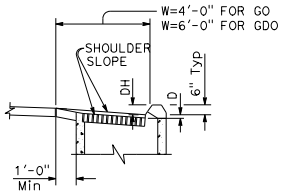
PLAN

TYPE G1 THRU G6 GT3 AND GT4 INLETS IN GRADE SAG

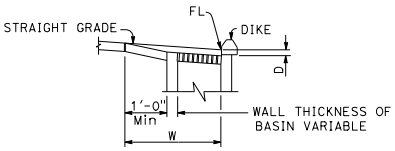


SECTION A-A

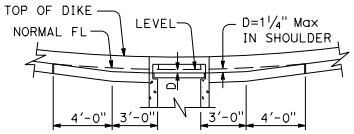
(Single grate shown)



SECTION B-B



SECTION C-C



SECTION D-D

NOTES:

1. W = Width of depressed apron. Depressed aprons shall be 4'-0" unless indicated otherwise.

   D = Inlet depression. The inlet depression shall be 1¼" unless indicated otherwise.

   DH = Dike Height.

   → = Straight grade, downward slope.

   ~→ = Direction of flow.

2. Apron shall be hot mix asphalt and match thickness of adjacent shoulder pavement.

3. Establish curb opening height of Type GO or GDO at midpoint of grate.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

INLET DEPRESSIONS
HOT MIX ASPHALT SHOULDERS

NO SCALE

D78C

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Dugan, No. C59976, Exp. 6-30-18, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WALL A

f'c = 6 ksi			MINIMUM COVER TO 10'-0" Max COVER									20'-0" Max COVER									40'-0" Max COVER	
			METHOD 1			METHOD 2			METHOD 3A			METHOD 1			METHOD 2			METHOD 3A			METHOD 3A	
	ID	t	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso
	24"	2½"	0.22	–	0.17	0.17	–	0.14	0.15	–	0.12	0.28	–	0.22	0.19	–	0.15	0.14	–	0.11	0.25	–
	30"	2¾"	0.29	–	0.21	0.23	–	0.17	0.19	–	0.14	0.28	0.16	0.29	0.27	–	0.19	0.18	–	0.13	0.27	0.22
	36"	3"	0.22	0.14	0.22	0.17	0.13	0.18	0.15	0.11	0.15	0.34	0.20	0.40	0.23	0.16	0.24	0.15	0.12	0.15	0.32	0.25
	42"	3½"	0.18	0.12	0.18	0.15	0.11	0.15	0.13	0.10	0.13	0.36	0.21	0.44	0.25	0.17	0.25	0.16	0.12	0.17	0.34	0.27
	48"	4"	0.20	0.12	0.20	0.14	0.10	0.14	0.11	0.08	0.11	0.38	0.23	0.48	0.27	0.19	0.27	0.18	0.13	0.18	0.36	0.28
	54"	4½"	0.21	0.13	0.22	0.15	0.11	0.16	0.10	0.08	0.11	0.41	0.25	0.52	0.29	0.20	0.30	0.19	0.14	0.20	0.39	0.30
	60"	5"	0.23	0.14	0.24	0.17	0.11	0.17	0.11	0.08	0.13	0.45	0.26	0.57	0.31	0.22	0.32	0.21	0.16	0.21	0.41	0.33
	66"	5½"	0.25	0.15	0.26	0.18	0.12	0.18	0.12	0.09	0.16	0.48	0.28	–	0.34	0.24	0.35	0.22	0.17	0.23	0.44	0.35
	72"	6"	0.27	0.16	0.28	0.19	0.13	0.20	0.13	0.10	0.19	0.52	0.30	–	0.36	0.25	0.37	0.24	0.18	0.24	0.47	0.40
	78"	6½"	0.29	0.17	0.30	0.21	0.14	0.22	0.14	0.10	0.22	0.56	0.33	–	0.39	0.27	0.40	0.26	0.19	0.26	0.50	0.45
	84"	7"	0.31	0.18	0.32	0.22	0.15	0.26	0.15	0.11	0.26	0.60	0.35	–	0.41	0.29	0.42	0.27	0.21	0.28	0.54	0.51
	90"	7½"	0.33	0.20	0.34	0.24	0.16	0.30	0.16	0.12	0.30	0.64	0.37	–	0.44	0.31	0.45	0.29	0.22	0.30	0.57	0.56
	96"	8"	0.35	0.21	0.36	0.26	0.18	0.34	0.17	0.13	0.34	0.68	0.39	–	0.47	0.33	0.48	0.31	0.23	0.34	0.60	0.62
	102"	8½"	0.38	0.22	0.39	0.27	0.19	0.38	0.19	0.14	0.38	0.73	0.41	–	0.49	0.34	0.51	0.33	0.25	0.38	0.63	0.68
	108"	9"	0.40	0.24	0.43	0.29	0.20	0.43	0.22	0.15	0.43	0.77	0.44	–	0.52	0.36	0.55	0.35	0.26	0.43	0.67	0.74
	114"	9½"	0.42	0.25	0.47	0.31	0.21	0.47	0.24	0.15	0.47	0.82	0.46	–	0.55	0.38	0.58	0.37	0.28	0.47	0.70	0.80
	120"	10"	0.45	0.26	0.52	0.32	0.22	0.52	0.26	0.16	0.52	0.86	0.48	–	0.58	0.40	0.62	0.39	0.29	0.52	0.74	0.86

WALL AA

f'c = 6 ksi			80'-0" Max COVER	
			METHOD 3B	
	ID	t	Asi	Aso
	24"	5¾"	0.14	0.07
	30"	6"	0.20	0.15
	36"	6½"	0.25	0.28
	42"	7"	0.31	0.42
	48"	7½"	0.37	0.56
	54"	8"	0.43	0.70
	60"	8½"	0.49	0.85
	66"	9"	0.55	1.00
	72"	9½"	0.61	1.15
f'c = 7 ksi	78"	10"	0.67	1.06
	84"	10½"	0.73	1.20

WALL B

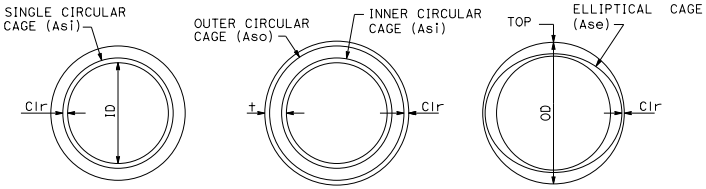
f'c = 5 ksi			MINIMUM COVER TO 10'-0" Max COVER									20'-0" Max COVER									40'-0" Max COVER	
			METHOD 1			METHOD 2			METHOD 3A			METHOD 1			METHOD 2			METHOD 3A			METHOD 3A	
	ID	t	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso
	24"	3"	0.19	–	0.13	0.15	–	0.11	0.13	–	0.09	0.25	–	0.17	0.17	–	0.12	0.12	–	0.09	0.26	–
	30"	3½"	0.23	–	0.14	0.19	–	0.12	0.16	–	0.10	0.34	–	0.20	0.23	–	0.14	0.17	–	0.10	0.21	0.17
	36"	4"	0.14	0.08	0.14	0.12	0.08	0.12	0.10	0.07	0.10	0.23	0.12	0.24	0.16	0.10	0.17	0.12	0.08	0.12	0.24	0.18
	42"	4½"	0.14	0.08	0.14	0.10	0.07	0.11	0.09	0.07	0.09	0.27	0.14	0.27	0.19	0.12	0.19	0.14	0.09	0.14	0.27	0.20
	48"	5"	0.16	0.09	0.16	0.11	0.07	0.12	0.09	0.07	0.09	0.30	0.17	0.31	0.21	0.14	0.22	0.16	0.10	0.16	0.31	0.26
	54"	5½"	0.18	0.10	0.18	0.13	0.08	0.13	0.09	0.07	0.11	0.34	0.19	0.35	0.24	0.15	0.24	0.17	0.12	0.18	0.34	0.33
	60"	6"	0.20	0.11	0.20	0.14	0.09	0.14	0.10	0.07	0.14	0.37	0.21	0.41	0.26	0.17	0.27	0.19	0.13	0.20	0.38	0.39
	66"	6½"	0.22	0.12	0.22	0.16	0.10	0.17	0.12	0.08	0.17	0.41	0.23	0.46	0.29	0.19	0.30	0.21	0.15	0.21	0.41	0.46
	72"	7"	0.24	0.13	0.24	0.17	0.11	0.20	0.13	0.09	0.20	0.45	0.25	0.52	0.32	0.21	0.32	0.23	0.16	0.23	0.45	0.52
	78"	7½"	0.26	0.15	0.26	0.19	0.12	0.23	0.14	0.09	0.23	0.48	0.27	0.57	0.34	0.23	0.35	0.25	0.17	0.25	0.48	0.59
	84"	8"	0.28	0.16	0.29	0.20	0.13	0.27	0.15	0.10	0.27	0.52	0.30	0.63	0.37	0.25	0.38	0.26	0.19	0.27	0.51	0.66
	90"	8½"	0.30	0.17	0.31	0.22	0.14	0.30	0.16	0.11	0.30	0.56	0.32	–	0.40	0.26	0.41	0.28	0.20	0.30	0.55	0.73
	96"	9"	0.32	0.18	0.34	0.23	0.15	0.34	0.17	0.12	0.34	0.60	0.34	–	0.43	0.28	0.44	0.30	0.22	0.34	0.58	0.80
	102"	9½"	0.35	0.20	0.39	0.25	0.17	0.39	0.20	0.13	0.39	0.64	0.37	–	0.45	0.30	0.46	0.32	0.23	0.39	0.62	0.88
	108"	10"	0.37	0.21	0.43	0.27	0.18	0.43	0.22	0.14	0.43	0.68	0.39	–	0.48	0.32	0.49	0.34	0.24	0.43	0.65	0.95
	114"	10½"	0.39	0.23	0.48	0.29	0.19	0.48	0.24	0.15	0.48	0.72	0.42	–	0.51	0.34	0.52	0.36	0.26	0.48	0.69	1.03
	120"	11"	0.42	0.24	0.53	0.30	0.20	0.53	0.27	0.16	0.53	0.77	0.44	–	0.54	0.36	0.55	0.38	0.27	0.53	0.73	1.10

WALL BB

f'c = 5 ksi			80'-0" Max COVER	
			METHOD 3B	
	ID	t	Asi	Aso
	24"	6½"	0.13	0.07
	30"	7"	0.17	0.11
	36"	7½"	0.22	0.27
	42"	8"	0.28	0.44
	48"	8½"	0.33	0.61
	54"	9"	0.39	0.78
	60"	9½"	0.45	0.95
	66"	10"	0.51	1.13
	72"	10½"	0.57	1.31
f'c = 6 ksi	78"	11"	0.62	1.18
	84"	11½"	0.68	1.33

WALL X

f'c = 6 ksi			Min COVER TO 10'-0" Max COVER						10.1' TO 20'-0" Max COVER						20.1' TO 30'-0" Max COVER			
			METHOD 3A			METHOD 3B			METHOD 3A			METHOD 3B			METHOD 3A		METHOD 3B	
	ID	t	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Asi	Aso
	24"	1⅞"	0.19	–	0.16	0.18	–	0.15	0.14	–	0.12	0.12	–	0.10	0.22	–	0.19	–
	30"	2⅛"	0.24	–	0.18	0.22	–	0.17	0.17	–	0.13	0.14	–	0.11	0.20	0.17	0.23	–
	36"	2⅜"	0.18	0.15	0.18	0.17	0.14	0.17	0.13	0.11	0.14	0.11	0.10	0.11	0.21	0.18	0.17	0.16
	42"	2½"	0.22	0.18	0.22	0.21	0.17	0.21	0.18	0.16	0.19	0.15	0.14	0.15	0.29	0.27	0.23	0.23
	48"	2⅝"	0.21	0.17	0.21	0.20	0.16	0.21	0.23	0.21	0.23	0.18	0.18	0.18	0.36	0.35	0.29	0.30
	54"	2⅞"	0.18	0.15	0.19	0.18	0.14	0.18	0.25	0.23	0.25	0.20	0.20	0.20	0.39	0.38	0.31	0.33
	60"	3½"	0.14	0.11	0.14	0.13	0.10	0.14	0.22	0.19	0.22	0.18	0.17	0.18	0.33	0.30	0.26	0.26
	66"	3¾"	0.13	0.11	0.15	0.13	0.10	0.15	0.24	0.21	0.24	0.19	0.19	0.20	0.37	0.34	0.29	0.29
	72"	4¼"	0.13	0.11	0.18	0.11	0.10	0.18	0.24	0.21	0.24	0.19	0.18	0.20	0.36	0.32	0.29	0.28
	78"	4¾"	0.13	0.11	0.22	0.11	0.10	0.22	0.24	0.21	0.24	0.19	0.18	0.22	0.36	0.32	0.29	0.28
	84"	5¼"	0.14	0.11	0.25	0.13	0.10	0.25	0.24	0.21	0.25	0.20	0.18	0.25	0.36	0.32	0.29	0.28
	90"	5¾"	0.15	0.12	0.29	0.15	0.11	0.29	0.26	0.22	0.29	0.22	0.20	0.29	0.39	0.34	0.32	0.30
	96"	6"	0.17	0.13	0.33	0.17	0.11	0.33	0.27	0.23	0.33	0.22	0.20	0.33	0.40	0.36	0.32	0.31
	102"	6½"	0.19	0.14	0.37	0.19	0.12	0.37	0.29	0.25	0.37	0.24	0.22	0.37	0.43	0.38	0.35	0.33
	108"	7"	0.21	0.15	0.41	0.21	0.13	0.41	0.32	0.27	0.41	0.26	0.23	0.41	0.46	0.40	0.38	0.35
	114"	7½"	0.23	0.16	0.46	0.23	0.14	0.46	0.34	0.28	0.46	0.28	0.25	0.46	0.49	0.42	0.41	0.37
	120"	8"	0.26	0.17	0.51	0.26	0.16	0.51	0.36	0.30	0.51	0.30	0.26	0.51	0.52	0.44	0.43	0.39



CAGE REINFORCEMENT

t = Pipe barrel wall thickness, inches

Asi = Inner cage reinforcement, or single circular cage reinforcement, square inches/LF

Aso = Outer cage reinforcement, square inches/LF

Ase = Elliptical single cage reinforcement, square inches/LF

Clr = Design clearance, inches (see Note 6)

DESIGN NOTES:

Design: AASHTO LRFD Bridge Design Specifications, 4th edition with California Amendments. ACPA DESIGN DATA 1, October 2007. DIRECT DESIGN METHOD

Earth Loading: Paris/Uniform Soil Pressure Distribution
Vertical: 140 pcf
Horizontal: Varies, see design lateral pressure chart (Circular Pipe only)

Unit Stresses: (Used in Design Tables)
fy = 65 ksi
f'c = See Tables

The RCP as shown on this sheet is not intended to be used in a corrosive environment. A special design may be required.

NOTES:

1. For details of the method of excavation, backfill and bedding (Method 1, Method 2, etc.), see Standard Plan A62D.
2. The tables for minimum allowable classes and D-loads of RCP on Standard Plan A62D shall not apply to direct design RCP.
3. Notes 3, 9 and 10 on Standard Plan A62D shall apply to direct design RCP.
4. Throughout the length of any given culvert, the direct design selected by the Contractor shall be the same, including the method of excavation, backfill and bedding.
5. The embankment height prior to excavation specified in note 5 of the Standard Plan A62D shall apply to the direct design RCP installation when Method 2, 3A or 3B are used.
6. For single circular cage reinforcement, minimum clearance shall be 40% of the wall thickness (t). For elliptical and double circular cage reinforcement where the wall thickness (t) is less than 2½", the minimum clearance (Clr) for reinforcement shall be ¾", and where the wall thickness (t) is 2½" or more, the minimum clearance (Clr) for reinforcement shall be 1".
7. Minimum cover measured at the edge of pavement shall be 2'-0" to top of HMA or existing AC pavement and 1'-0" to top of rigid pavement.
8. Cover greater than the table maximum requires a special design.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST REINFORCED CONCRETE PIPE DIRECT DESIGN METHOD

NO SCALE

D79

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Carl W. Dunn — No. C59976 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

2018 STANDARD PLAN D79A

f'c = 6 ksi

ID	t	WALL B																	
		MINIMUM COVER TO 10'-0" Max COVER									20'-0" Max COVER								
		INSTALLATION TYPE 1			INSTALLATION TYPE 2			INSTALLATION TYPE 3			INSTALLATION TYPE 1			INSTALLATION TYPE 2			INSTALLATION TYPE 3		
		Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase
24"	3"	0.14	–	0.09	0.15	–	0.10	0.18	–	0.12	0.15	–	0.10	0.21	–	0.14	0.28	–	0.18
30"	3½"	0.18	–	0.11	0.20	–	0.12	0.24	–	0.14	0.21	–	0.13	0.29	–	0.17	0.22	0.09	0.22
36"	4"	0.11	0.07	0.12	0.12	0.07	0.12	0.14	0.08	0.15	0.15	0.07	0.15	0.20	0.09	0.20	0.26	0.12	0.26
42"	4½"	0.10	0.07	0.10	0.12	0.07	0.12	0.15	0.07	0.16	0.17	0.09	0.17	0.23	0.11	0.23	0.30	0.14	0.30
48"	5"	0.10	0.07	0.11	0.14	0.07	0.14	0.18	0.08	0.18	0.19	0.10	0.20	0.26	0.13	0.26	0.34	0.16	0.34
54"	5½"	0.12	0.07	0.12	0.15	0.08	0.16	0.20	0.09	0.20	0.22	0.11	0.22	0.29	0.14	0.30	0.38	0.18	0.39
60"	6"	0.13	0.07	0.14	0.17	0.09	0.18	0.22	0.11	0.23	0.24	0.13	0.25	0.32	0.16	0.33	0.42	0.20	0.43
66"	6½"	0.14	0.08	0.17	0.19	0.10	0.19	0.25	0.12	0.25	0.27	0.14	0.27	0.36	0.18	0.36	0.46	0.22	0.47
72"	7"	0.16	0.09	0.20	0.21	0.11	0.21	0.27	0.13	0.28	0.29	0.16	0.30	0.39	0.20	0.40	0.51	0.25	0.52
78"	7½"	0.17	0.10	0.23	0.23	0.12	0.23	0.30	0.14	0.30	0.32	0.18	0.33	0.42	0.22	0.43	0.55	0.27	0.56
84"	8"	0.19	0.10	0.27	0.25	0.13	0.27	0.32	0.16	0.33	0.34	0.19	0.35	0.46	0.24	0.47	0.60	0.29	0.61
90"	8½"	0.20	0.11	0.30	0.27	0.14	0.30	0.35	0.17	0.35	0.37	0.21	0.38	0.49	0.25	0.50	0.64	0.32	0.66
96"	9"	0.22	0.12	0.34	0.29	0.15	0.34	0.37	0.18	0.38	0.40	0.22	0.41	0.53	0.27	0.54	0.69	0.34	0.71
102"	9½"	0.23	0.13	0.39	0.31	0.16	0.39	0.40	0.20	0.41	0.42	0.24	0.43	0.56	0.29	0.57	0.74	0.36	0.77
108"	10"	0.25	0.14	0.43	0.33	0.17	0.43	0.43	0.21	0.44	0.45	0.26	0.46	0.60	0.31	0.61	0.80	0.39	–
114"	10½"	0.26	0.15	0.48	0.35	0.18	0.48	0.45	0.23	0.48	0.48	0.28	0.49	0.63	0.33	0.65	–	–	–
120"	11"	0.28	0.16	0.53	0.37	0.20	0.53	0.48	0.24	0.53	0.50	0.29	0.53	0.67	0.35	0.69	–	–	–

f'c = 5 ksi

ID	t	WALL C																	
		MINIMUM COVER TO 10'-0" Max COVER									20'-0" Max COVER								
		INSTALLATION TYPE 1			INSTALLATION TYPE 2			INSTALLATION TYPE 3			INSTALLATION TYPE 1			INSTALLATION TYPE 2			INSTALLATION TYPE 3		
		Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase	Asi	Aso	Ase
24"	3¾"	0.11	–	0.07	0.12	–	0.08	0.15	–	0.09	0.13	–	0.08	0.18	–	0.10	0.24	–	0.14
30"	4¼"	0.16	–	0.09	0.17	–	0.10	0.20	–	0.11	0.18	–	0.10	0.25	–	0.13	0.33	–	0.18
36"	4¾"	0.09	0.07	0.09	0.10	0.07	0.10	0.11	0.07	0.12	0.12	0.07	0.12	0.16	0.07	0.16	0.21	0.08	0.22
42"	5¼"	0.08	0.07	0.09	0.10	0.07	0.10	0.13	0.07	0.13	0.14	0.07	0.15	0.19	0.08	0.20	0.25	0.10	0.26
48"	5¾"	0.09	0.07	0.09	0.12	0.07	0.12	0.15	0.07	0.16	0.17	0.07	0.17	0.22	0.10	0.23	0.29	0.13	0.30
54"	6¼"	0.10	0.07	0.12	0.14	0.07	0.14	0.18	0.08	0.18	0.19	0.09	0.19	0.26	0.11	0.26	0.33	0.15	0.34
60"	6¾"	0.12	0.07	0.14	0.15	0.07	0.16	0.20	0.09	0.20	0.21	0.10	0.22	0.29	0.13	0.29	0.38	0.17	0.38
66"	7¼"	0.13	0.07	0.17	0.17	0.08	0.18	0.22	0.10	0.23	0.24	0.12	0.24	0.32	0.15	0.33	0.42	0.19	0.43
72"	7¾"	0.14	0.07	0.20	0.19	0.09	0.20	0.25	0.11	0.25	0.26	0.13	0.27	0.35	0.17	0.36	0.46	0.21	0.47
78"	8¼"	0.16	0.08	0.23	0.21	0.10	0.23	0.27	0.13	0.28	0.29	0.15	0.30	0.39	0.19	0.40	0.51	0.24	0.52
84"	8¾"	0.17	0.09	0.27	0.23	0.11	0.27	0.30	0.14	0.30	0.32	0.16	0.32	0.42	0.21	0.43	0.55	0.26	0.56
90"	9¼"	0.19	0.10	0.31	0.25	0.12	0.31	0.32	0.15	0.33	0.34	0.18	0.35	0.46	0.23	0.47	0.60	0.28	0.61
96"	9¾"	0.20	0.11	0.35	0.27	0.13	0.35	0.35	0.17	0.36	0.37	0.20	0.38	0.49	0.25	0.50	0.64	0.31	0.66
102"	10¼"	0.22	0.12	0.39	0.29	0.14	0.39	0.38	0.18	0.39	0.39	0.21	0.40	0.53	0.26	0.54	0.69	0.33	0.70
108"	10¾"	0.23	0.14	0.44	0.31	0.16	0.44	0.40	0.19	0.44	0.42	0.23	0.44	0.56	0.29	0.57	0.73	0.36	–
114"	11¼"	0.25	0.15	0.49	0.33	0.17	0.49	0.43	0.21	0.49	0.45	0.25	0.49	0.60	0.31	0.61	–	–	–
120"	11¾"	0.27	0.17	0.54	0.35	0.18	0.54	0.46	0.22	0.54	0.48	0.27	0.54	0.63	0.33	0.65	–	–	–

f'c = 6 ksi

ID	t	WALL X					
		Min COVER TO 10'-0" Max COVER			10.1' TO 20'-0" Max COVER		
		INSTALLATION TYPE 1			INSTALLATION TYPE 1		
		Asi	Aso	Ase	Asi	Aso	Ase
24"	2"	0.22	–	0.17	0.24	–	0.17
30"	2½"	0.28	–	0.18	0.30	–	0.22
36"	2⅞"	0.22	0.16	0.22	0.29	0.20	0.29
42"	2¾"	0.26	0.21	0.27	0.37	0.26	0.38
48"	3"	0.26	0.20	0.26	0.42	0.30	0.43
54"	3¼"	0.28	0.21	0.29	0.47	0.34	0.48
60"	3½"	0.25	0.18	0.26	0.52	0.38	0.54
66"	3¾"	0.28	0.20	0.28	0.58	0.43	0.61
72"	4¼"	0.28	0.20	0.29	0.56	0.41	0.60
78"	4¾"	0.29	0.20	0.29	0.57	0.41	0.60
84"	5¼"	0.29	0.21	0.30	0.58	0.41	0.60
90"	5¾"	0.30	0.21	0.31	0.59	0.42	0.61
96"	6"	0.33	0.23	0.34	0.64	0.46	0.67
102"	6½"	0.34	0.24	0.37	0.65	0.47	0.68
108"	7"	0.35	0.25	0.41	0.67	0.48	0.70
114"	7½"	0.37	0.26	0.46	0.69	0.49	0.71
120"	8"	0.38	0.26	0.51	0.71	0.50	0.73

f'c = 6 ksi

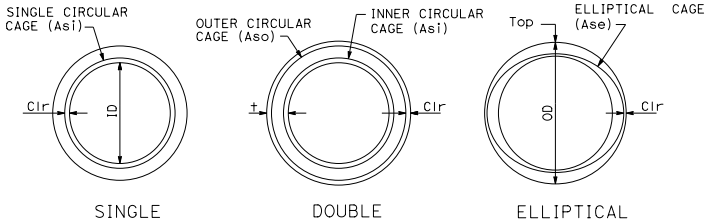
ID	t	WALL BB	
		40'-0" Max COVER	
		INSTALLATION TYPE 1	
		Asi	Aso
24"	3"	0.20	0.14
30"	3½"	0.25	0.15
36"	4"	0.30	0.16
42"	4½"	0.34	0.19
48"	5"	0.39	0.26
54"	5½"	0.44	0.32
60"	6"	0.49	0.40
66"	6½"	0.54	0.47
72"	7"	0.58	0.54
78"	7½"	0.63	0.62
84"	8"	0.68	0.70
90"	8½"	0.73	0.78
96"	9¾"	0.71	0.76
102"	10¼"	0.76	0.84
108"	10¾"	0.81	0.93
114"	11¼"	0.85	0.78
120"	11¾"	0.90	0.86

f'c = 7 ksi

f'c = 6 ksi

ID	t	WALL CC	
		80'-0" Max COVER	
		INSTALLATION TYPE 1	
		Asi	Aso
24"	6½"	0.15	0.07
30"	7"	0.21	0.17
36"	7½"	0.27	0.35
42"	8"	0.34	0.54
48"	8½"	0.42	0.73
54"	9"	0.50	0.92
60"	9½"	0.58	1.12
66"	10"	0.65	1.08
72"	11¼"	0.68	1.15
78"	13½"	0.66	1.06
84"	14"	0.73	1.24

f'c = 7 ksi



SINGLE DOUBLE ELLIPTICAL

CAGE REINFORCEMENT

t = Pipe barrel wall thickness, inches

Asi = Inner cage reinforcement, or single circular cage reinforcement, square inches/LF

Aso = Outer cage reinforcement, square inches/LF

Ase = Elliptical single cage reinforcement, square inches/LF

Clr = Design clearance, inches (see Note 5)

DESIGN NOTES:

Design: AASHTO LRFD Bridge Design Specifications, 4th edition with California Amendments. ACPA DESIGN DATA 1, October 2007. DIRECT DESIGN METHOD

Earth Loading: Heger Soil Pressure Distribution
γ = 140 pcf
VAF & HAF modification factor = 0.86

Unit Stresses: (Used in Design Tables)
fy = 65 ksi
f'c = See Tables

The RCP as shown on this sheet is not intended to be used in a corrosive environment. A special design may be required.

NOTES:

1. For details of the method of excavation, backfill and bedding (Installation Type 1, Installation Type 2, etc.), see Standard Plan A62DA.
2. The tables for minimum allowable classes and D-loads of RCP on Standard Plan A62DA shall not apply to direct design RCP.
3. Notes 3 and 7 on Standard Plan A62DA shall apply to direct design RCP.
4. Throughout the length of any given culvert, the direct design selected by the Contractor shall be the same, including the method of excavation, backfill and bedding.
5. For single circular cage reinforcement, minimum clearance shall be 40% of the wall thickness (t). For elliptical and double circular cage reinforcement where the wall thickness (t) is less than 2½", the minimum clearance (Clr) for reinforcement shall be ¾", and where the wall thickness (t) is 2½" or more, the minimum clearance (Clr) for reinforcement shall be 1".
6. Minimum cover measured at the edge of pavement shall be 2'-0" to top of HMA or existing AC pavement and 1'-0" to top of rigid pavement.
7. Cover greater than the table maximum requires a special design.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST REINFORCED CONCRETE PIPE DIRECT DESIGN METHOD

NO SCALE

D79A

1-29-18

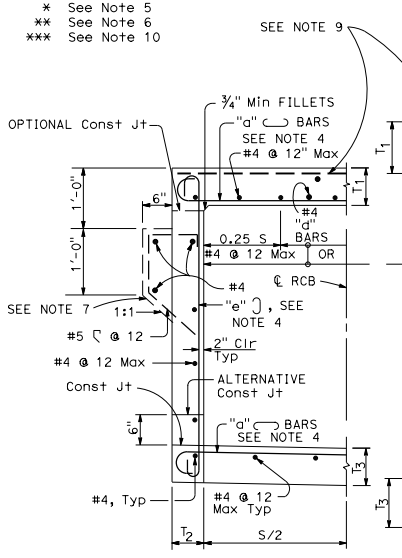
Return to Table of Contents

SPAN, S	4′						5′								6′								7′								8′									
HEIGHT, H	2′		3′		4′		2′		3′		4′		5′		3′		4′		5′		6′		3′		4′		5′		6′		7′		4′		5′		6′		7′		8′	
MAXIMUM EARTH COVER	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′
Conc ROOF T_1	7″	7½″	7″	7½″	7″	7½″	7½″	8″	7½″	8″	7½″	8″	7½″	8″	8″	9″	8″	9″	8″	9″	8″	9″	8″	10″	8″	10″	8″	10½″	8½″	10½″	8½″	10½″	8½″	11½″	8½″	11½″	8½″	11½″	8½″	11½″	8½″	11½″
Conc WALLS T_2	6″	6″	6½″	6½″	7″	7½″	6″	6″	6½″	6½″	7″	7″	6½″	8″	7″	7″	7″	7″	7½″	8″	8″	9½″	6½″	7″	6½″	7½″	7″	8″	7½″	9½″	8½″	11″	6½″	7½″	7″	8½″	7½″	9½″	8½″	11″	9″	12½″
Conc INVERT T_3	7″	7½″	7″	7½″	7″	7½″	7½″	8″	7½″	8″	7½″	8″	7½″	8″	8″	9″	8″	9½″	8″	9½″	8″	9½″	8″	10½″	8″	10½″	8″	10½″	8″	10½″	8½″	10½″	8½″	11½″	8½″	11½″	8½″	12″	8½″	12″	8½″	12″
Reinf SPACING	7″	6″	7″	6″	7″	6″	8½″	6″	8½″	5½″	8″	5½″	8″	5″	7½″	5″	7½″	5″	7″	5″	7″	4½″	6″	4½″	6″	4½″	6″	5½″	6″	5½″	6″	5½″	5½″	5″	5½″	5″	6″	4½″	5½″	4½″	5½″	4½″
Reinf "a" SIZE BAR	#6	#6	#6	#6	#6	#6	#7	#7	#7	#7	#7	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7
Reinf "e" SIZE BAR	#4	#4	#5	#6	#5	#6	#4	#4	#5	#5	#5	#6	#6	#6	#4	#5	#6	#6	#6	#6	#7	#6	#4	#4	#5	#5	#6	#7	#7	#7	#7	#7	#5	#6	#6	#6	#7	#6	#7	#7	#7	#7
QUANTITIES CONCRETE CF/LF	7.8	8.3	9.2	9.6	10.7	11.6	9.5	10.0	10.9	11.4	12.4	12.9	14.1	15.1	13.1	14.3	14.2	15.4	15.9	18.0	17.8	21.2	14.0	17.5	15.1	19.1	16.7	21.3	18.8	24.5	21.8	28.3	17.2	22.7	18.8	25.1	20.6	28.3	23.3	32.1	25.5	36.4
QUANTITIES REINFORCEMENT LB/LF	47.7	51.1	57.8	71.4	63.5	80.8	57.8	73.7	66.6	92.5	83.0	111	101	114	77.6	94.7	96.6	114	110	126	132	152	102	106	115	124	134	166	160	181	173	196	135	166	156	177	184	208	197	252	209	269
*** SOIL PRESSURE (ksf)	2.4	4.5	2.4	4.5	2.5	4.6	2.4	4.5	2.4	4.5	2.5	4.6	2.5	4.6	2.4	4.6	2.5	4.6	2.5	4.6	2.5	4.7	2.4	4.6	2.4	4.6	2.5	4.7	2.5	4.7	2.6	4.8	2.4	4.6	2.5	4.7	2.5	4.7	2.6	4.8	2.6	4.9

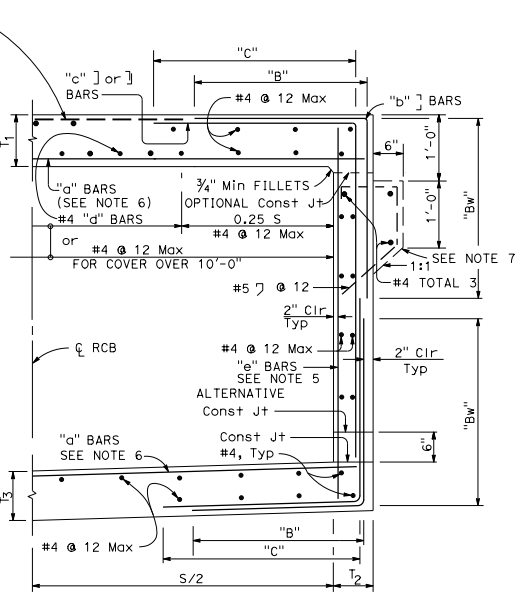
SPAN, S	10′										12′												14′																	
HEIGHT, H	5′		6′		7′		8′		9′		10′		6′		7′		8′		9′		10′		11′		12′		7′		8′		9′		10′		11′		12′		13′		14′	
MAXIMUM EARTH COVER	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′	10′	20′
Conc ROOF T_1	9½″	12″	9½″	12″	9½″	12″	9½″	12″	9½″	12″	9½″	12″	10½″	14½″	10½″	14½″	10½″	14½″	10½″	14½″	10½″	14½″	10½″	14½″	10½″	14½″	12″	16½″	12″	16½″	12″	16½″	12″	16½″	12″	16½″	12″	16½″	12″	16½″	12″	16½″
Conc WALLS T_2	8½″	8½″	8½″	9½″	9″	10½″	9″	12″	10″	13½″	11″	15″	9″	10½″	9″	10½″	9½″	12″	10″	13½″	11″	15″	12½″	16½″	13½″	18″	9½″	11″	9½″	12″	10″	13½″	11½″	15″	12½″	16½″	13½″	18″	15″	19½″	16½″	21½″
Conc INVERT T_3	10″	12½″	10″	12½″	10″	12½″	10″	13″	10″	13″	10″	13″	11″	14½″	11″	15″	11″	15″	11″	15″	11½″	15″	11½″	15½″	11½″	15½″	12½″	17″	12½″	17″	12½″	17″	12½″	17½″	12½″	17½″	13″	17½″	13″	18″	13″	18″
Reinf SPACING	11″	12″	12″	12″	11″	11″	10″	11″	10″	10″	11″	10″	9″	10″	9″	10″	9″	10″	8″	10″	8″	10″	10″	9″	9″	8″	10″	9″	10″	9″	10″	8″	10″	8″	9″	8″	8″	10″	10″	10″	10″	9″
Reinf **"a" SIZE BAR	#7	#8	#7	#8	#7	#7	#6	#7	#6	#7	#7	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#6	#6	#7	#8	#7	#8	#7	#7	#7	#7	#7	#7	#6	#8	#7	#7	#7	#7
Reinf "b" SIZE BAR	#7	#7	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#6	#7	#6	#7	#6	#8	#7	#8	#7	#8	#6	#7	#7	#7	#7	#7	#7	#7	#7	#8	#7	#8	#7	#7	#8	#7	#8	#8	#8	#8
Reinf "b" DIMENSION "B" ft-inch	2-11	2-11	2-11	3-0	2-11	3-9	2-11	3-9	2-11	3-9	2-11	3-9	3-1	3-2	3-9	3-9	3-9	3-9	3-7	3-9	3-7	4-4	3-7	4-4	4-4	4-4	2-9	4-2	3-4	4-4	3-4	4-6	3-5	4-6	3-6	4-6	3-6	4-6	4-6	4-9	6-0
Reinf "b" DIMENSION "Bw" ft-inch	4-10	5-0	4-10	5-0	4-10	5-0	4-10	5-0	4-10	5-0	4-7	4-7	6-0	5-10	6-2	6-7	6-2	6-7	4-11	4-11	4-11	4-11	4-11	4-11	4-4	4-4	6-5	7-0	7-0	8-4	7-0	8-4	6-0	6-0	6-0	6-0	6-0	6-0	5-0	6-0	4-6	6-0
Reinf "c" SIZE BAR #	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#7	#7	#6	#7	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7	#8	#8	#8	#8	#8	#8		
Reinf "c" DIMENSION "C" ft-inch	3-4	3-6	7-4	4-8	7-7	4-8	8-2	4-8	7-7	5-2	7-7	5-11	4-4	3-10	8-1	5-7	8-1	5-7	8-1	5-7	8-1	5-7	8-1	6-4	8-1	6-10	4-3	4-2	6-9	6-9	5-10	5-10	6-0	6-4	8-11	6-4	8-11	7-0	8-11	7-7	8-11	7-9
*"e" SIZE BAR	#4	#4	#4	#5	#6	#6	#6	#7	#7	#7	#8	#8	#4	#4	#4	#4	#4	#5	#4	#5	#5	#5	#6	#6	#6	#6	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#6	#7	#7	#7	#7	#7
QUANTITIES CONCRETE CF/LF	25.1	30.4	27.1	33.1	29.2	36.2	30.7	41	34	45.8	37.6	51	33.2	43.7	34.7	46.1	37	50.4	39.5	55.3	43.7	60.6	48.7	67.1	53.1	73.5	42.9	57	44.5	60.7	47	65.6	51.7	71.8	55.8	77.7	60.9	84.2	66.9	91.8	73.4	101
QUANTITIES REINFORCEMENT LB/LF	271	296	278	333	341	366	359	406	428	469	487	530	322	371	379	417	390	449	430	477	499	500	527	610	530	614	413	529	467	595	467	608	526	632	633	651	630	717	688	737	747	861
*** SOIL PRESSURE (ksf)	3.7	4.7	3.8	4.7	3.8	4.8	3.8	4.8	3.9	4.9	3.9	5.0	3.6	4.8	3.6	4.8	3.6	4.9	3.6	4.9	3.7	5.0	3.7	5.0	3.8	5.1	3.4	4.9	3.5	4.9	3.5	4.9	3.5	5.0	3.6	5.1	3.6	5.1	3.7	5.2	3.7	5.3

"d" BARS, FOR EARTH COVERS UP TO AND INCLUDING 10′-0"								
SPAN	4′	5′	6′	7′	8′	10′	12′	14′
NUMBER	7	8	9	10	11	12	15	20

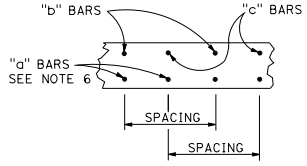
* See Note 5
** See Note 6
*** See Note 10



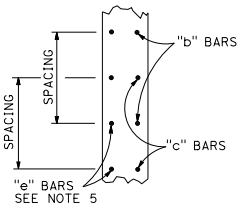
TYPICAL SECTION
SPANS 4′ THRU 8′



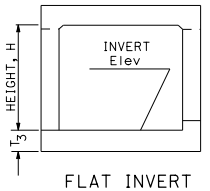
TYPICAL SECTION
SPANS 10′ THRU 14′



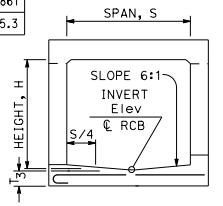
ROOF SECTION
SPANS 10′ THRU 14′
INVERT SIMILAR



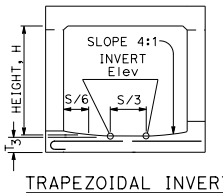
WALL SECTION
SPANS 10′ THRU 14′



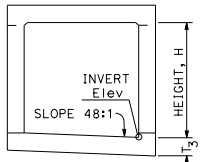
FLAT INVERT



V INVERT



TRAPEZOIDAL INVERT



SLOPED INVERT

ALTERNATIVE INVERTS

NOTES:

1. For boxes with span or height less than any of those shown in table, use next greater size box concrete dimensions and reinforcement. Make necessary changes in bar lengths and quantities.
2. Quantities are approximate and for design purposes only.
3. For boxes with span or height or cover greater than those shown in tables, a special design is required.
4. It is permissible to eliminate the 180° hooks on every other bar.
5. "e" bars are at half spacing (spans 10′ - 14′ only).
6. "a" bars are at half spacing (spans 10′ - 14′ only).
7. Provide paving notch when top is exposed and when pavement is concrete, and adjust quantities.
8. For design and details not shown, see Standard Plan D82.
9. For exposed top, provide #4 @ 12 each way, lap "c" bars 2′-0" or use full span length.
10. Soil pressures shown are factored per AASHTO LRFD and include soil weight of fill over box, self weight of box and live load where applicable.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE SINGLE BOX CULVERT

NO SCALE

D80

2018 STANDARD PLAN D80

1-29-18

Return to Table of Contents

SPAN, S			4′				5′						6′							7′								8′									
HEIGHT, H			2′	3′	4′		2′	3′	4′	5′			3′	4′	5′	6′				3′	4′	5′	6′	7′				4′	5′	6′	7′	8′					
MAXIMUM EARTH COVER			10′ 20′	10′ 20′	10′ 20′		10′ 20′	10′ 20′	10′ 20′	10′ 20′			10′ 20′	10′ 20′	10′ 20′	10′ 20′				10′ 20′	10′ 20′	10′ 20′	10′ 20′	10′ 20′				10′ 20′	10′ 20′	10′ 20′	10′ 20′	10′ 20′					
Conc	ROOF	T_1	7″ 7½″	7″ 7½″	7″ 7½″		7″ 9″	7″ 9″	7″ 9″	7″ 9″			7″ 10½″	7″ 10½″	7″ 10½″	7″ 10½″				7½″ 11½″	7½″ 11½″	7½″ 11½″	7½″ 11½″	8″ 11½″				8½″ 13″	8½″ 13″	8½″ 13″	8½″ 13″	8½″ 13″					
Conc	WALLS	T_2	6″ 6½″	6½″ 7″	7″ 8″		6″ 6½″	6½″ 7½″	7½″ 8″	8″ 9½″			6½″ 7½″	7″ 8½″	7½″ 10″	8½″ 11″				6½″ 7½″	7½″ 8″	7½″ 9½″	8½″ 11″	9½″ 13″				6½″ 8″	7½″ 9½″	8½″ 11½″	9½″ 13″	11″ 15″					
Conc	INVERT	T_3	7″ 7½″	7″ 7½″	7″ 7½″		7½″ 9″	7½″ 9″	8″ 9″	8″ 9″			8½″ 10½″	8½″ 10½″	8½″ 10½″	8½″ 10½″				9½″ 12″	9½″ 12″	9½″ 12″	9½″ 12″	9½″ 12″				10½″ 13½″	10½″ 13½″	10½″ 13½″	10½″ 13½″	10½″ 13½″					
Reinf	SPACING		12″ 12″	12″ 12″	12″ 12″		11½″ 12″	11½″ 12″	11½″ 12″	11½″ 12″			11½″ 12″	11½″ 12″	11½″ 12″	11½″ 12″				11″ 10½″	11″ 10½″	11″ 10½″	11″ 10½″	11″ 10½″				9″ 10″	9″ 10″	9″ 10″	9″ 10″	9″ 10″					
Reinf	"g"	SIZE BAR	#4 #7	#4 #7	#4 #7		#4 #7	#4 #7	#4 #7	#4 #7			#6 #7	#6 #7	#6 #7	#6 #7				#6 #7	#6 #7	#6 #7	#6 #7	#6 #7				#7 #7	#7 #7	#7 #7	#7 #7	#7 #7					
Reinf	"f"	SIZE BAR	#5 #5	#5 #5	#5 #5		#5 #5	#5 #5	#5 #5	#5 #5			#5 #5	#5 #5	#5 #6	#5 #6				#6 #5	#6 #5	#6 #5	#6 #5	#6 #6				#5 #6	#5 #6	#5 #6	#5 #6	#5 #6					
Reinf	"a"	SIZE BAR	#6 #4	#6 #4	#6 #4		#6 #4	#6 #4	#6 #4	#6 #4			#7 #4	#7 #4	#7 #4	#7 #4				#6 #4	#6 #4	#6 #4	#6 #4	#6 #4				#6 #4	#6 #4	#6 #4	#6 #4	#6 #4					
Reinf	"e"	SIZE BAR	#4 #4	#4 #5	#5 #6		#4 #4	#4 #5	#5 #6	#5 #7			#4 #5	#5 #6	#6 #6	#6 #7				#4 #5	#5 #6	#6 #6	#6 #7	#6 #7				#5 #6	#5 #6	#6 #6	#6 #7	#6 #7					
QUANTITIES	CONCRETE	CF/LF	14.1 15.1	15.9 17.1	17.9 19.6		16.9 20.5	18.8 22.9	21.7 25.1	24.0 28.5			22.3 29.3	24.3 32.0	26.5 35.6	29.5 38.5				26.8 36.1	29.3 38.3	31.1 41.9	34.0 46.0	38.0 51.3				34.2 46.7	36.9 50.4	39.9 55.2	43.2 59.9	47.7 66.0					
QUANTITIES	REINFORCEMENT	LB/LF	109 109	115 122	130 141		133 130	139 145	156 164	163 192			202 167	218 188	239 213	250 243				237 209	254 232	275 262	287 298	299 317				334 287	345 301	376 317	390 359	406 378					
** SOIL PRESSURE (ksf)			2.1 4.1	2.2 4.1	2.2 4.1		3.2 4.1	3.2 4.1	3.2 4.1	3.3 4.2			3.1 4.1	3.1 4.2	3.1 4.2	3.1 4.2				3.0 4.1	3.0 4.2	3.0 4.2	3.0 4.2	3.1 4.3				2.9 4.2	2.9 4.2	3.0 4.3	3.0 4.3	3.0 4.4					

SPAN, S			10′						12′							14′																					
HEIGHT, H			5′	6′	7′		8′	9′	10′		6′		7′	8′	9′	10′	11′	12′		7′	8′	9′		10′	11′	12′	13′	14′									
MAXIMUM EARTH COVER			10′ 20′	10′ 20′	10′ 20′		10′ 20′	10′ 20′	10′ 20′		10′ 20′		10′ 20′	10′ 20′	10′ 20′	10′ 20′	10′ 20′	10′ 20′		10′ 20′	10′ 20′	10′ 20′		10′ 20′	10′ 20′	10′ 20′	10′ 20′	10′ 20′									
Conc	ROOF	T_1	10½″ 15½″	10½″ 15½″	10½″ 15½″		10½″ 15½″	10½″ 15½″	10½″ 15½″		11½″ 18″		11½″ 18″	11½″ 18″	11½″ 18″	11½″ 18″	11½″ 18″	11½″ 18″		13″ 20½″	13″ 20½″	13″ 20½″		13″ 20½″	13″ 20½″	13″ 20½″	13″ 20½″	13″ 20½″									
Conc	WALLS	T_2	8½″ 8½″	8½″ 9½″	8½″ 10½″		9″ 12″	10″ 13½″	11″ 15″		8½″ 9½″		8½″ 10½″	9″ 12″	10″ 13½″	11″ 15″	12½″ 16½″	13½″ 18½″		9″ 11″	9″ 12″	10″ 13½″		11½″ 15″	12½″ 17″	13½″ 18½″	15″ 20″	16½″ 22″									
Conc	INVERT	T_3	10½″ 16″	10½″ 16″	10½″ 16″		10½″ 16″	10½″ 16″	10½″ 16″		12″ 19″		12″ 19″	12″ 19″	12″ 19″	12″ 19″	12″ 19″	12″ 19″		13½″ 21½″	13½″ 21½″	13½″ 21½″		13½″ 21½″	13½″ 21½″	13½″ 21½″	13½″ 21½″	13½″ 21½″									
Reinf	SPACING		11″ 7½″	10½″ 7½″	10″ 8″		10″ 8″	10½″ 8″	10½″ 8½″		9″ 8″		9″ 8″	8″ 7½″	8″ 7½″	8½″ 7½″	8½″ 8″	8½″ 8″		8½″ 8″	8½″ 8″	8½″ 8″		8½″ 8″	8½″ 8″	8½″ 8″	9″ 8″	9″ 8″									
Reinf	"g"	SIZE BAR	#7 #7	#7 #7	#7 #7		#7 #7	#7 #7	#7 #7		#7 #7		#7 #7	#7 #7	#7 #7	#7 #7	#7 #7	#7 #7		#8 #8	#8 #8	#8 #8		#8 #8	#8 #8	#8 #8	#8 #8	#8 #8									
Reinf	"f"	SIZE BAR	#7 #6	#7 #6	#7 #6		#7 #6	#7 #6	#7 #6		#7 #8		#7 #8	#7 #7	#7 #7	#7 #7	#7 #8	#7 #8		#7 #8	#7 #8	#7 #8		#7 #8	#7 #8	#7 #8	#7 #8	#7 #8									
Reinf	"a"	SIZE BAR	#4 #4	#4 #4	#4 #4		#4 #4	#4 #4	#4 #5		#4 #4		#4 #4	#4 #4	#4 #4	#4 #4	#4 #4	#4 #4		#4 #4	#4 #4	#4 #4		#4 #4	#4 #4	#4 #4	#4 #4	#4 #4									
Reinf	"b"	SIZE BAR	#5 #5	#4 #5	#5 #5		#5 #6	#5 #6	#6 #6		#5 #6		#5 #6	#6 #6	#6 #6	#6 #6	#6 #6	#6 #6		#5 #6	#6 #6	#6 #6		#5 #6	#6 #6	#6 #6	#6 #7	#7 #7									
Reinf	"b"	Dim "B" ft-inch	1-9 2-7	2-0 2-9	2-3 2-9		2-7 3-1	2-7 3-1	2-7 3-1		2-7 3-1		3-0 3-2	3-6 3-2	3-6 3-4	3-9 3-4	3-9 3-4	3-9 3-4		2-7 2-7	3-3 3-3	4-0 4-0		4-0 4-0	4-7 4-4	4-7 4-11	5-3 4-11	5-3 4-11									
Reinf	"b"	Dim "Bw" ft-inch	4-0 4-11	4-0 4-11	4-0 4-11		4-0 4-11	4-0 4-11	4-0 4-11		4-1 3-2		4-1 3-4	4-1 3-4	4-1 3-7	3-9 3-7	3-9 3-7	3-7 3-7		5-0 3-9	5-0 4-6	5-0 5-0		5-0 5-0	4-9 5-6	4-9 6-2	5-2 6-2	5-2 6-2									
Reinf	"c"	SIZE BAR	#6 #6	#6 #6	#6 #6		#6 #6	#6 #7	#6 #7		#6 #6		#6 #6	#6 #6	#6 #6	#6 #7	#7 #7	#7 #7		#6 #6	#6 #7	#7 #7		#7 #7	#7 #7	#7 #7	#7 #7	#8 #8									
Reinf	"c"	Dim "C" ft-inch	3-1 2-9	3-9 3-3	4-6 4-3		5-6 4-6	6-0 4-9	6-0 4-9		3-10 3-7		4-6 4-4	5-7 5-0	6-6 5-2	7-2 5-4	7-5 5-7	7-5 5-7		4-3 3-11	5-6 5-2	7-9 5-8		8-6 6-5	8-10 6-6	9-0 6-10	9-3 6-10	9-3 6-10									
Reinf	* "e"	SIZE BAR	#4 #4	#4 #4	#4 #4		#4 #4	#4 #4	#5 #5		#4 #4		#4 #4	#4 #4	#4 #4	#4 #4	#5 #5	#5 #5		#4 #4	#4 #4	#4 #4		#4 #4	#4 #4	#5 #5	#5 #5	#6 #6									
QUANTITIES	CONCRETE	CF/LF	49.1 68.4	51.1 71.9	53.2 75.8		56.1 80.8	60.1 86.4	64.4 92.5		63.6 94.4		65.7 98.4	68.6 104	72.6 109	76.9 115	82.6 122	87.7 131		88.8 124	84.0 129	88.0 134		93.4 141	98 149	103 156	110 164	117 174									
QUANTITIES	REINFORCEMENT	LB/LF	393 520	427 542	473 538		509 559	534 599	568 636		563 686		584 711	691 721	715 745	700 764	767 867	804 890		734 878	785 919	842 956		892 985	916 1015	964 1120	980 1141	1095 1269									
** SOIL PRESSURE (ksf)			2.8 4.8	2.8 4.9	2.9 4.9		2.9 4.9	2.9 4.9	2.9 5.0		2.8 4.8		2.8 4.9	2.8 4.9	2.8 4.9	2.8 4.9	2.9 5.0	2.9 5.0		2.8 4.8	2.8 4.9	2.8 4.9		2.8 4.9	2.8 5.0	2.9 5.0	2.9 5.0	2.9 5.1									

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

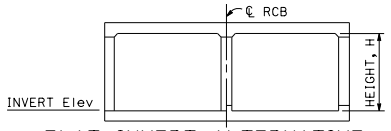
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Carl W. Duan — No. C59976 — Exp. 6-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

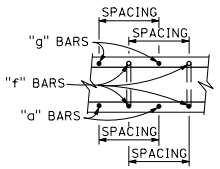
NOTES:

1. For boxes with span or height less than any of those shown in table, use next greater size box concrete dimensions and reinforcement. Make necessary changes in bar lengths and quantities.
2. For boxes with span or height or cover greater than those shown in tables, a special design is required.
3. Quantities are approximate and for design purposes only.
4. It is permissible to eliminate the 180° hooks on every other "e" bar.
5. "e" bars are at half spacing.
6. Provide paving notch when top is exposed and when pavement is concrete, and adjust quantities.
7. For design and details not shown, see Standard Plan D82.
8. This plan sheet may be used for multiple cell culverts by making necessary adjustments.
9. Soil pressures shown are factored per AASHTO LRFD and include soil weight of fill over box, self weight of box and live load where applicable.



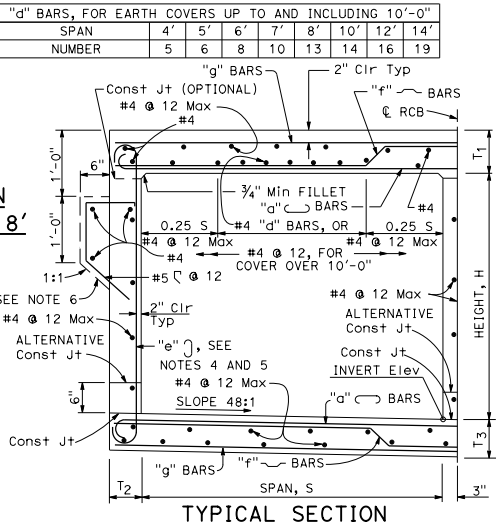
FLAT INVERT ALTERNATIVE

* See Note 5
** See Note 9

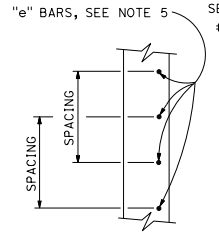


ROOF SECTION
SPANS 4′ THRU 8′
INVERT SIMILAR

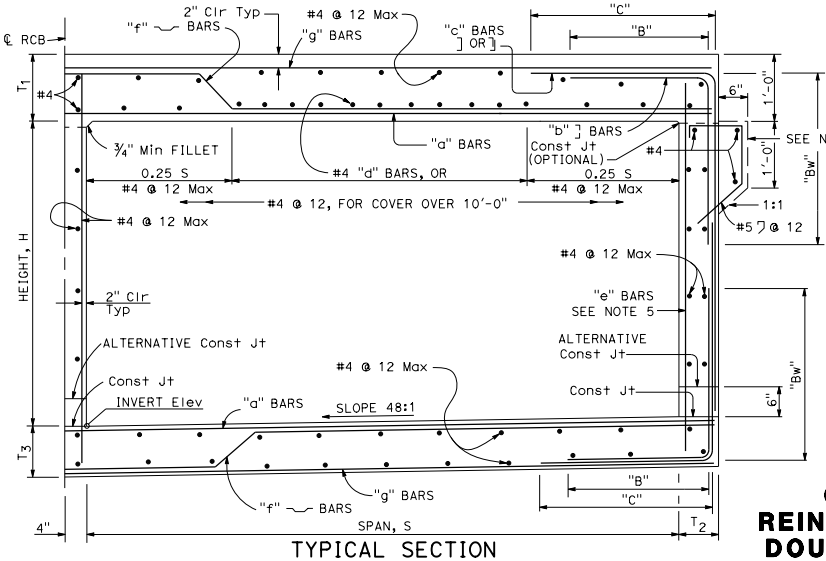
"d" BARS, FOR EARTH COVERS UP TO AND INCLUDING 10′-0"								
SPAN	4′	5′	6′	7′	8′	10′	12′	14′
NUMBER	5	6	8	10	13	14	16	19



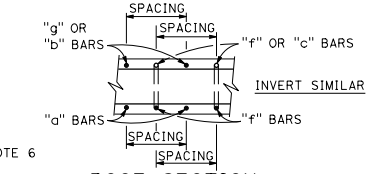
TYPICAL SECTION
SPANS 4′ THRU 8′



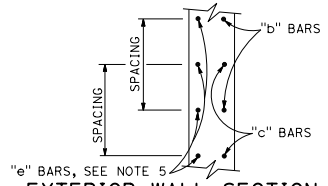
EXTERIOR WALL SECTION
SPANS 4′ THRU 8′



TYPICAL SECTION
SPANS 10′ THRU 14′



ROOF SECTION
SPANS 10′ THRU 14′



EXTERIOR WALL SECTION
SPANS 10′ THRU 14′

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE DOUBLE BOX CULVERT

NO SCALE

D81

2018 STANDARD PLAN D81

222

1-29-18

Return to Table of Contents

DESIGN NOTES:

Design Specifications:
AASHTO LRFD Bridge Design Specifications, 6th Edition with California Amendments.

Loading:
Live load: (AASHTO LRFD 3.6.1.2)
HL-93 consists of design truck or design tandem and design lane load.

Impact Factor: (Apply to roof slab only)
$IM = 33(1.0-0.125D_E) \geq 0\%$ (AASHTO LRFD 3.6.2.2)
D_E = minimum depth of earth cover

Earth load:
Earth pressure for two conditions:
140 pcf vertical, 42 pcf horizontal
140 pcf vertical, 140 pcf horizontal

Load Factors:
AASHTO LRFD Table 3.4.1.1 & Table 3.4.1.2

Unit stresses:
f'_c = 3600 psi
f_y = 60,000 psi

Distribution "d" bars:
Up to and including 10'-0" cover
Express as a percentage of main positive reinforcement required: $\frac{100}{\sqrt{S}}$, Max 50%,
Over 10'-0" cover,
4 @ 12 maximum

Shear:
$V_c = \{2.14\sqrt{f'_c}+4600\ \frac{A_s}{Dd_e}\ \frac{Vud_e}{Mu}\}\ b.d_e \leq 4.0\sqrt{f'_c}b.d_e$ (Pounds)
V_c shall not be less than $3.00\sqrt{f'_c}b.d_e$ for frame members and $2.5\sqrt{f'_c}b.d_e$ for simply supported members.

Exclusion:
Compressive reinforcement and negative moment reduction (for continuity) do not apply.
Axial loading on members has not been considered.

GENERAL NOTES:

Designation:
Standard single or multiple box culverts are shown on plans as span times height with maximum cover over roof thus: 8' x 5' RCB with 10' or double 10' x 5' RCB with 20', followed by alternatives.

Alternatives:
Single cell: Invert will be sloped unless "trapezoidal invert", "flat invert" or "V invert" is included in designation.
Multiple cell: Invert will be vee unless "flat invert" is specified. Ends of culvert will be rounded unless "square ends" are designated. Parapets will be as shown unless designated in plans. Such designations may be different for inlet and outlet ends.

Quantities:
Quantities do not include the following:
- Concrete for parapet, paving notches and cut-off wall.
- Reinforcement for 2% splices, parapets, paving notches, cut-off wall and additional required bars for exposed top slab (D-80, Note 9).

Reinforcement placement:
Main reinforcement is to be placed transversely or, for curved culverts, radially. When radial, reinforcing spacing of the "a", "f" and "g" bars is measured along the centerline. Stagger splices not shown. Hooks may be rotated or tilted, as necessary, for clearance.

Special reinforcement coverage:
Box standard plans are not to be used for culverts in a corrosive environment or where there is a severe abrasive flow condition or in freeze-thaw locations.

Special design:
Required for culverts with conditions, loads, design bearing pressures or sizes greater than those given on this plan or Standard Plans D80 & D81. Also required for multiple cell culverts with unequal spans. For culverts with railroad loading, see the current AREMA design specification.

3 or more cells:
For culverts with more than two cells, use dimensions and reinforcement for the standard "double box culvert" and adjust quantities accordingly.

CONSTRUCTION NOTES:

Construction loads:
Strutting required as shown on Standard Plan D88.
Strutting may be required on culvert extensions when existing parapet is removed.

Expansion joints:
Invert:
No expansion joints shall be permitted.

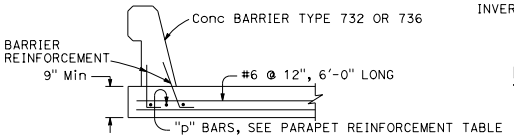
Roof and Walls:
When cover is less than span length-
Place ½" premolded expansion joint filler at 30'-0" ± centers outside the paved roadway lanes and place Bridge Detail 3-2, Standard Plan B0-3, at 30'-0" centers under paved roadway lanes.
When cover is more than span length-
Place ½" premolded expansion joint filler at 30'-0" ± centers and additional ½" premolded expansion joints at locations of change in foundation character, as directed by the Engineer.

Construction joints:
Temporary joints may be permitted if normal (or radial) to ℄ of RCB. Otherwise, the contractor is to submit a proposal for consideration.

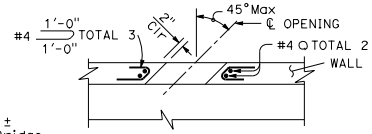
Cutoff walls:
4'-0" cutoff walls are to be provided at inlet and/or outlet unless adjacent channel is lined and unless otherwise shown. These walls are to be extended if scour conditions warrant.

Earthwork:
See Standard Plan A62E.

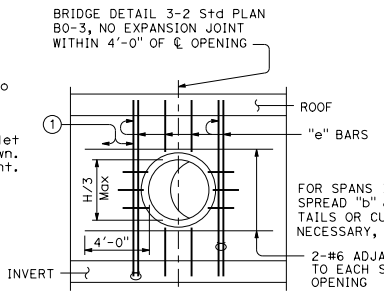
Backfill:
See Standard Specifications, except that the difference in level of backfill (against outside walls) shall not exceed 2'-0".



BARRIER SECTION (30'-0" MINIMUM)



PART PLAN-SECTION

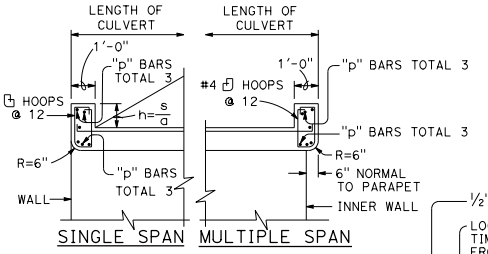


LONGITUDINAL SECTION

UTILITY OPENING-WALL

H=Height of box

① Adjacent to each side of the opening, place additional bars equivalent to half the interrupted main reinforcement.



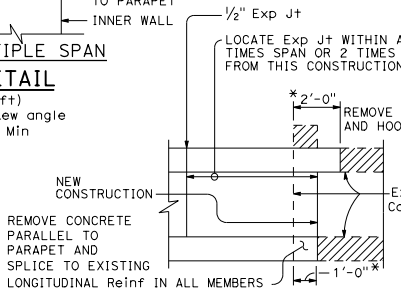
SINGLE SPAN MULTIPLE SPAN

PARAPET DETAIL

s = Clear span (ft)
a = 12 cosine skew angle
h = Height, 1'-0" Min

PARAPET "p" BARS			
SKEW ANGLE / SPAN	0° TO 15°	16° TO 30°	31° TO 45°
4'	#4	#4	#4
6'	#4	#4	#5
8'	#4	#5	#6
10'	#5	#6	#7
12'	#6	#7	#8
14'	#7	#8	#9

PARAPET REINFORCEMENT



DETAIL A

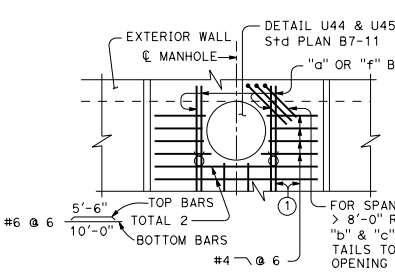
20° maximum skew as shown. If existing longitudinal and transverse reinforcing bars in top slab are lap spliced with new longitudinal and transverse reinforcing bars, the 20° skew may be exceeded. Lap splicing may require removal of top slab in excess of 2'-0" shown.

DETAIL B

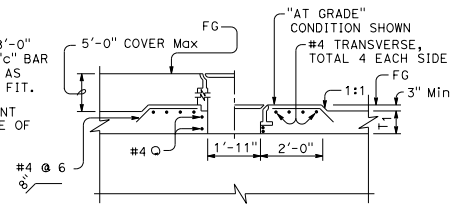
Single cell only, no skew allowed, 1'-0" minimum cover.

* Measured perpendicular to parapet

CULVERT EXTENSION

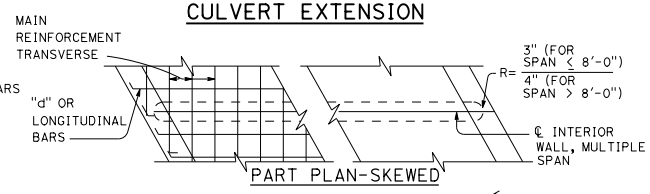


PART PLAN

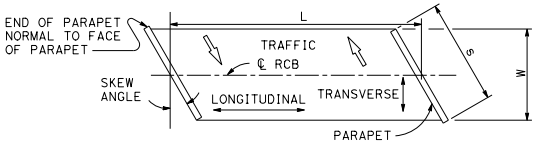


PART LONGITUDINAL SECTION

MANHOLE



PART PLAN-SKEWED



RCB TERMINOLOGY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE BOX CULVERT MISCELLANEOUS DETAILS

NO SCALE

D82

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

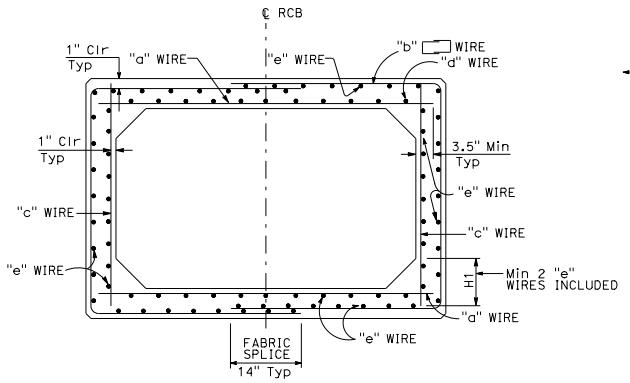
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

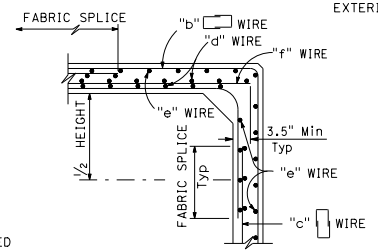
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

1-29-18

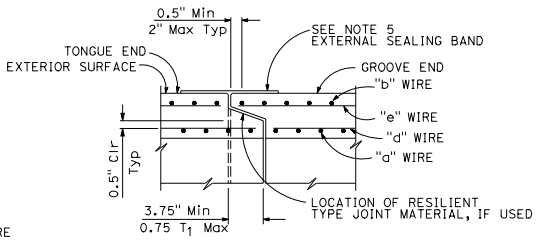
Return to Table of Contents



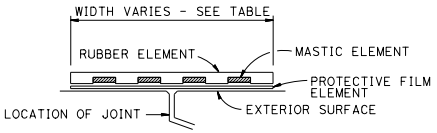
TYPICAL SECTION - SPANS 4'-0" THRU 12'-0"



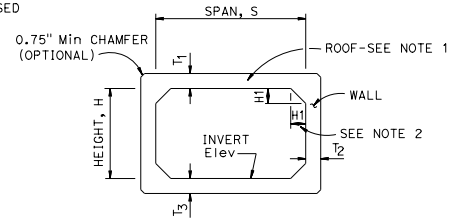
ALTERNATIVE DETAILING OPTION



END JOINT DETAIL



EXTERNAL SEALING BAND SCHEMATIC



SCHEMATIC

TABLE	
SPAN	EXTERNAL SEALING BAND WIDTH
4'-6'	9"
7'-8'	11"
10'-12'	13"

SPAN, S			4'						5'								6'								7'							
HEIGHT, H			2'		3'		4'		2'		3'		4'		5'		3'		4'		5'		6'		3'		4'		5'		6'		7'	
MAXIMUM EARTH COVER			10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
CONCRETE (INCH)	ROOF	T_1	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	6"	6"	6"	6"	6"	6"	6"	6"	7"	7"	7"	7"	7"	7"	7"	7"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
	SIDE WALL	T_2	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	6"	6"	6"	6"	6"	6"	6"	6"	7"	7"	7"	7"	7"	7"	7"	7"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
	INVERT	T_3	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	6"	6"	6"	6"	6"	6"	6"	6"	7"	7"	7"	7"	7"	7"	7"	7"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
MINIMUM WELDED WIRE FABRIC ($inch^2/ft$)		"a"	.33	.47	.34	.49	.34	.50	.40	.62	.41	.62	.42	.64	.43	.64	.44	.67	.45	.70	.46	.71	.47	.72	.47	.72	.48	.75	.50	.78	.50	.79	.51	.80
		"b"	.23	.28	.23	.25	.21	.23	.26	.36	.24	.36	.24	.33	.24	.30	.28	.44	.27	.40	.27	.37	.27	.38	.33	.52	.31	.48	.30	.45	.30	.43	.30	.48
		"c"	.11	.11	.11	.12	.18	.24	.11	.11	.11	.11	.13	.23	.24	.34	.11	.11	.11	.12	.19	.27	.27	.42	.11	.11	.11	.11	.13	.20	.26	.31	.30	.50
		"d"	.16	.11	.16	.11	.16	.11	.17	.11	.18	.11	.18	.11	.18	.11	.17	.11	.18	.11	.18	.11	.18	.11	.17	.11	.17	.11	.18	.11	.18	.11	.18	.11
		"e"	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
		"f"	.22	.36	.23	.37	.22	.26	.29	.51	.30	.51	.29	.41	.26	.30	.33	.56	.34	.58	.27	.44	.21	.30	.36	.61	.37	.64	.37	.57	.25	.48	.21	.30
* QUANTITY	Conc	CY/LF	.31		.34		.38		.37		.41		.44		.48		.51		.56		.60		.64		.63		.68		.73		.78		.83	
	Reinf	LB/LF	35	41	39	45	45	51	49	58	49	62	54	69	62	78	60	79	64	83	72	93	80	107	72	98	76	102	81	110	92	120	101	143
** SOIL PRESSURE (ksf)			2.3	4.4	2.4	4.5	2.4	4.5	3.1	4.4	3.1	4.5	3.1	4.5	3.2	4.5	2.7	4.5	2.8	4.5	2.8	4.6	2.8	4.6	2.5	4.5	2.5	4.6	2.5	4.6	2.5	4.6	2.6	4.6

SPAN, S			8'								10'								12'													
HEIGHT, H			4'		5'		6'		7'		8'		5'		6'		7'		8'		9'		10'		6'		7'		8'		9'		10'	
MAXIMUM EARTH COVER			10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
CONCRETE (INCH)	ROOF	T_1	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
	SIDE WALL	T_2	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
	INVERT	T_3	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	8.5"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
MINIMUM WELDED WIRE FABRIC ($inch^2/ft$)		"a"	.55	.87	.56	.90	.57	.92	.58	.93	.58	.94	.66	1.07	.67	1.10	.69	1.13	.70	1.14	.70	1.16	.71	1.16	.73	1.21	1.21	1.24	.77	1.27	1.24	1.29	1.27	1.31	.78	1.32	1.29	1.32
		"b"	.37	.59	.35	.55	.33	.52	.33	.52	.36	.57	.45	.74	.43	.70	.41	.67	.40	.64	.43	.67	.48	.67	.51	.85	.85	.81	.49	.77	.81	.74	.77	.77	.53	.79	.74	.79
		"c"	.11	.11	.11	.11	.20	.31	.31	.42	.38	.62	.11	.11	.11	.11	.22	.31	.36	.42	.40	.62	.54	.86	.11	.11	.11	.11	.23	.30	.37	.42	.42	.60	.54	.82	.42	1.06
		"d"	.19	.11	.19	.11	.20	.11	.20	.11	.20	.11	.20	.11	.20	.11	.21	.11	.21	.11	.21	.11	.21	.11	.20	.11	.20	.11	.21	.11	.22	.11	.22	.11	.22	.11	.22	.11
		"e"	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
		"f"	.44	.76	.45	.79	.37	.61	.27	.52	.20	.31	.55	.96	.56	.99	.47	.81	.34	.73	.31	.53	.16	.30	.62	1.10	1.10	1.13	.64	.97	1.13	.87	.97	.71	.40	.50	.87	.26
* QUANTITY	Conc	CY/LF	.78		.83		.88		.94		.99		1.10		1.17		1.23		1.29		1.35		1.41		1.56		1.63		1.70		1.78		1.85		1.93		2.00	
	Reinf	LB/LF	93	129	97	133	105	148	117	161	131	189	133	191	138	196	148	212	191	225	176	253	201	282	174	255	179	261	191	279	207	293	223	323	249	357	281	393
** SOIL PRESSURE (ksf)			2.5	4.6	2.5	4.6	2.5	4.6	2.5	4.6	2.5	4.6	3.8	4.6	3.8	4.7	3.8	4.7	4.6	4.7	3.9	4.7	3.9	4.8	3.6	4.7	3.7	4.7	3.7	4.8	3.7	4.8	3.7	4.8	3.8	4.9	3.8	4.9

* See Note 3 ** See Note 6

NOTES:

1. The inside and outside surfaces of the RCB roof shall be marked "TOP".
2. H1 minimum shall equal the wall thickness. H1 maximum shall be 8" for spans through 8' and 14" for spans over 8'.
3. Quantities are approximate and for design purposes only.
4. For design and details not shown see Standard Plan D83B.
5. For external sealing band applications see Standard Plan A62G.
6. Soil pressures shown are factored per AASHTO LRFD and include soil weight of fill over box, self weight of box and live load where applicable.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST REINFORCED CONCRETE BOX CULVERT

NO SCALE

D83A

2018 STANDARD PLAN D83A

1-29-18

Return to Table of Contents

DESIGN NOTES:

Specifications:

AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments.

Earth load:

Earth pressures for two conditions:
140 pcf Vert, 42 pcf Horiz
140 pcf Vert, 140 pcf Horiz

Unit stresses:

f'c = 5.0 ksi
fy = 65.0 ksi for weld wire fabric
n = 7

Shear:

Based on

$V_c = \{2.14\sqrt{f'_c} + 4600\,\frac{A_s}{b d_e}\,\frac{V_u d_e}{M_u}\}\,b.d_e \le 4.0\sqrt{f'_c}\,b.d_e$ (Pounds)

V_c shall not be less than $3.00\sqrt{f'_c}\,b.d_e$
for frame members and $2.5\sqrt{f'_c}\,b.d_e$
for simply supported members.

Exclusion:

Axial loading on the members has not been considered.

GENERAL NOTES:

Designation:

Standard single or multiple precast box culverts are shown on the plans as span times height with maximum cover over roof thus: 8' x 5' RCB with 10'-0" or double 10' x 5' RCB with 20'-0", followed by alternatives.

Alternatives:

Single cell:

Standard dimensions of AASHTO Material Specification 'M259' or 'M273'.

Multiple cell:

Constructed by placing single cells adjacent to each other. Inlet and outlet ends of culvert will be rounded unless square ends are designated. Parapet will be shown unless designated in plans. Such designation may be different for inlet and outlet ends.

Limitations:

Where the overfill is less than 12", Precast RCB culverts are not to be used. Precast RCB culverts are not to be used in siphon or pressurized installations unless appropriate "watertight" jointing is provided.

Special reinforcement coverage:

Precast RCB culvert standard plans are not to be used in a corrosive environment or where there is a severe abrasive flow condition or freeze-thaw locations.

Special design:

Required for culvert with different conditions, loads or design bearing pressures greater than those given on these plans. Required for culverts where end details need higher skew angles, higher parapets or barrier sections.

CONSTRUCTION NOTES:

Cutoff walls:

4'-0" Cutoff walls are to be provided at inlet and/or outlet unless channel is lined and unless otherwise shown. These walls are to be extended if scour conditions warrant. See Standard Plans D84, D85 and D86A.

Wingwalls:

Wingwalls shall be cast-in-place and shall conform to standard plan details for box culvert wingwalls. See Standard Plans D84, D85 and D86A.

Earthwork:

See Standard Plan A62G.

Construction loads:

Strutting may be required near temporary ends. For construction loads on culverts, See Standard Plan D88.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

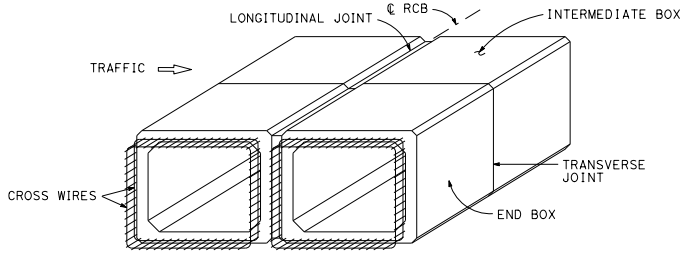
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

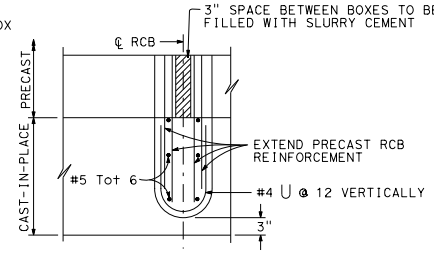
Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA
REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PRECAST RCB TERMINOLOGY

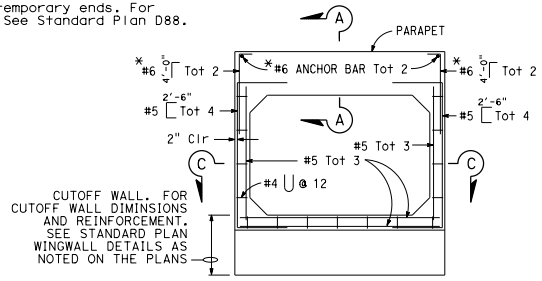
NOTE: Inner and outer reinforcement to be exposed as required to tie to cast-in-place construction. A minimum of two cross wires shall be exposed on all sides.



PARTIAL PLAN INTERIOR WALL MULTICELL CULVERT

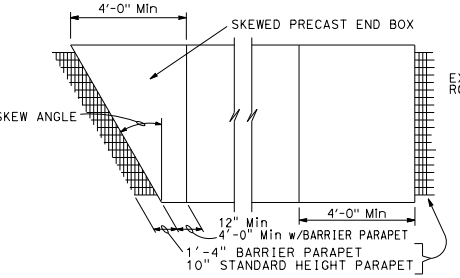
PARAPET "P" BARS			
SKEW ANGLE / SPAN	0° TO 15°	16° TO 30°	31° TO 45°
4'-0"	#5	#5	#5
5'-0"	#5	#5	#6
6'-0"	#6	#6	#6
7'-0"	#7	#7	#7
8'-0"	#7	#7	#8
10'-0"	#8	#8	#9
12'-0"	#9	#9	#10

BARRIER PARAPET REINFORCEMENT



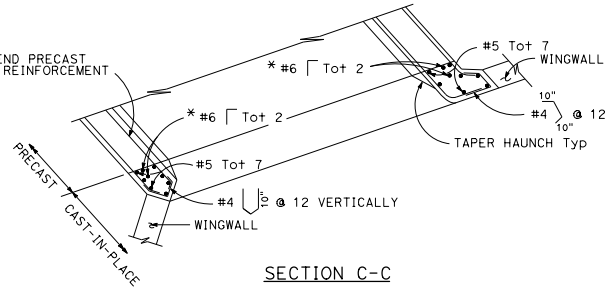
CAST-IN-PLACE END ELEVATION

* Reinforcing required for barrier parapet application only.



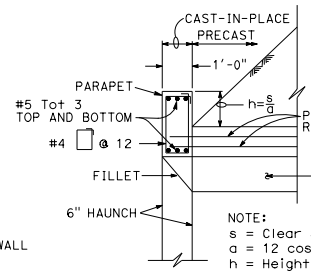
PARTIAL PLAN VIEW

For illustrative purposes only.
For correct skew direction see plans.

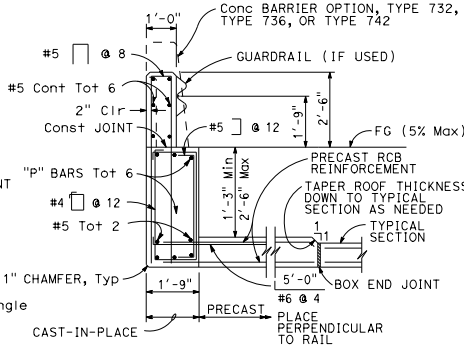


SECTION C-C

* Reinforcing required for barrier parapet application only.



SECTION A-A
(Standard Height Parapet)



SECTION A-A
(Barrier Parapet)

TYPICAL CULVERT END DETAILS

For wall and invert reinforcement not shown, See "End Elevation" detail.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST REINFORCED CONCRETE BOX CULVERT MISCELLANEOUS DETAILS

NO SCALE

D83B

2018 STANDARD PLAN D83B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

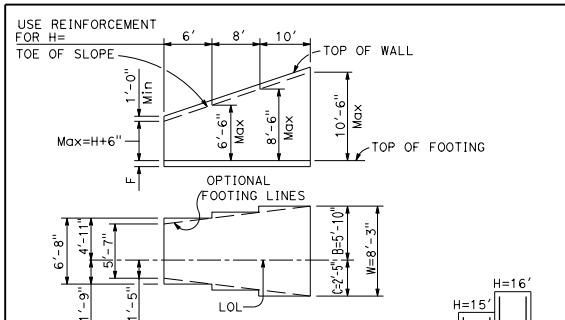
REGISTERED CIVIL ENGINEER

May 31, 2018

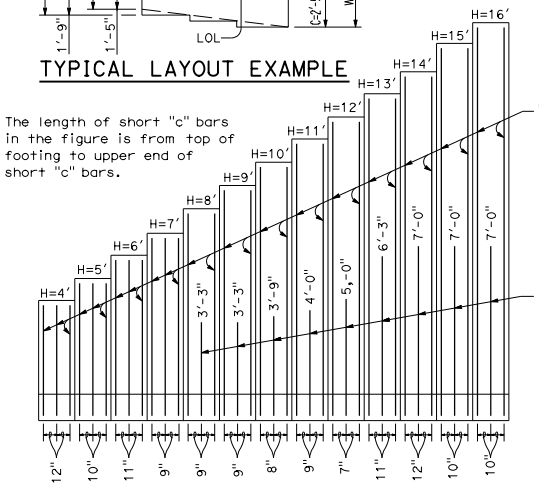
PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

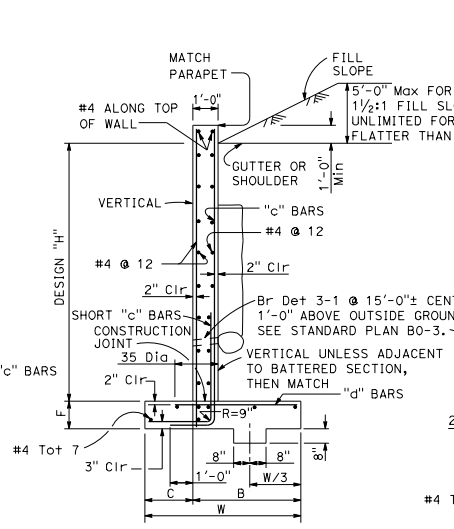
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



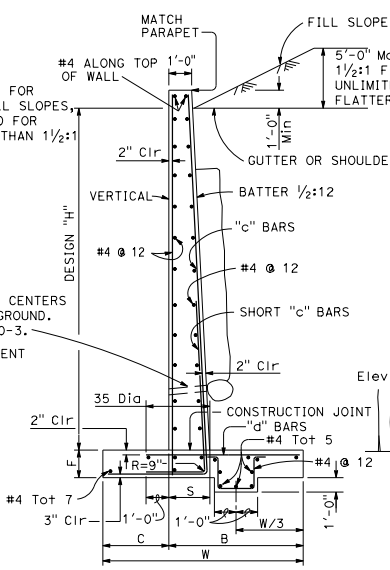
TYPICAL LAYOUT EXAMPLE



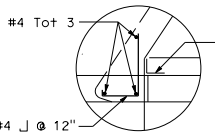
REINFORCED CONCRETE WINGWALLS



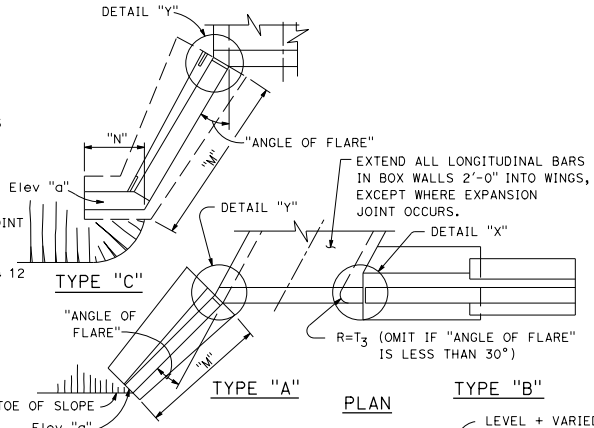
TYPICAL SECTION H=4' THRU 12'

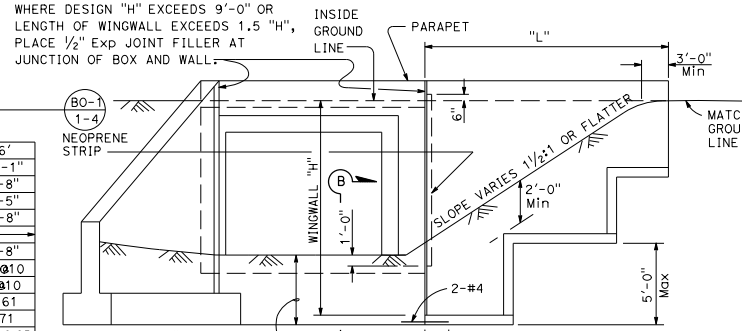


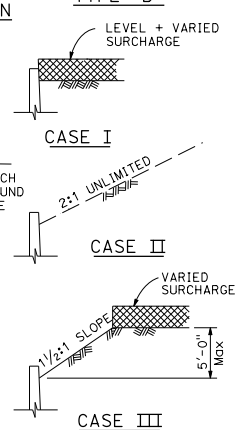
TYPICAL SECTION H=13' THRU 16'



DETAIL "X"







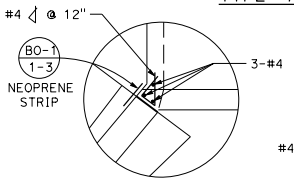
DETAIL OF DESIGN LOADING CASES

"H"	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'
W	5'-7"	6'-2"	6'-8"	7'-1"	7'-6"	7'-10"	8'-3"	8'-8"	9'-2"	9'-7"	10'-2"	10'-6"	11'-1"
C	1'-5"	1'-7"	1'-9"	1'-11"	2'-1"	2'-3"	2'-5"	2'-8"	2'-10"	3'-1"	3'-4"	3'-6"	3'-8"
B	4'-2"	4'-7"	4'-11"	5'-2"	5'-5"	5'-7"	5'-10"	6'-0"	6'-4"	6'-6"	6'-10"	7'-0"	7'-5"
F	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-3"	1'-5"	1'-5"	1'-6"	1'-6"	1'-8"
BATTER	None									½:12			
S	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6½"	1'-7"	1'-7½"	1'-8"
"c" BARS	#4@12	#4@10	#5@11	#5@9	#6@9	#7@9	#7@8	#8@9	#7@7	#8@11	#9@12	#10@10	#10@10
"d" BARS	#5@12	#5@10	#6@11	#6@9	#6@9	#6@9	#6@8	#7@9	#6@7	#7@11	#8@12	#8@10	#9@10
* Conc CY/LF	0.46	0.52	0.58	0.64	0.69	0.74	0.80	0.88	1.00	1.25	1.37	1.45	1.61
* Reinf LB/LF	26	32	41	50	59	70	81	95	102	99	120	156	171
** CASE I qu (ksf), B'(ft)	3.75,2.24	3.66,2.69	3.59,3.11	3.56,3.49	3.52,3.89	3.52,4.21	3.69,4.46	3.77,4.77	3.89,5.17	3.92,5.61	3.92,6.18	4.04,6.40	4.13,6.95
** CASE II qu (ksf), B'(ft)	1.16,5.58	1.33,6.13	1.51,6.55	1.69,6.86	1.88,7.16	2.08,7.33	2.29,7.60	2.50,7.86	2.77,8.14	2.97,8.47	3.18,8.93	3.41,9.05	3.70,9.43
** CASE III qu (ksf), B'(ft)	1.26,5.46	1.36,5.97	1.49,6.37	1.64,6.66	1.79,6.93	1.95,7.08	2.11,7.33	2.28,7.55	2.50,7.84	2.66,8.12	2.81,8.59	3.00,8.69	3.22,9.10

B'=B-(2) eccentricity, B' is the effective footing width.
* Quantities include 1'-0" extension above the design "H" limit.
** Soil bearing pressure shown in the table is the equivalent uniform pressure per AASHTO LRFD - 11.6.3.2

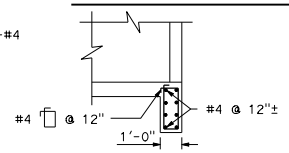
NOTES:

Unit Stresses: f'c=3,600 psi, fy=60,000 psi
Earth density: 120 pcf
Equivalent fluid pressure: 36 pcf
Elevations, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field.
Dimensions "H","L","M","N", Elevation "a" and "Angle of flare" (as applicable) are shown on the plans.
Wall height may be exceeded by 6" before going to next greater "H".
Eliminate cutoff wall if adjacent channel is paved and skew is 20° maximum.
For wall offset values, see Standard Plan B3-5.



DETAIL "Y"

STRAIGHT WINGWALLS



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT WINGWALLS TYPES A, B AND C

NO SCALE

D84

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

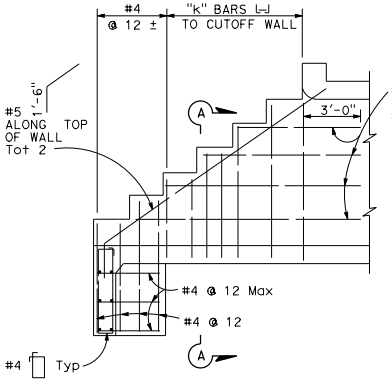
May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL

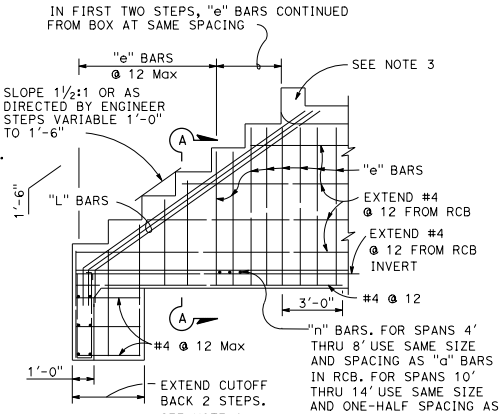
REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



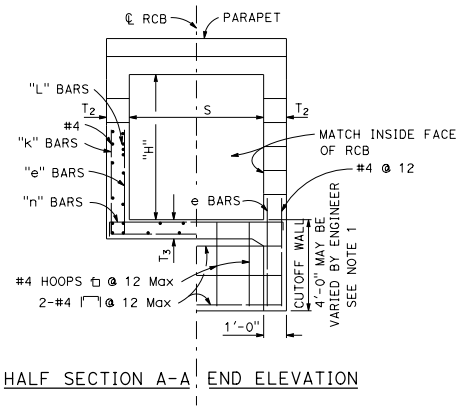
LONGITUDINAL SECTION

Showing reinforcement in outside face



LONGITUDINAL SECTION

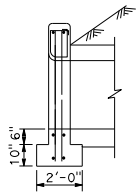
Showing reinforcement in inside face



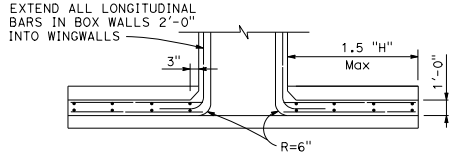
HALF SECTION A-A END ELEVATION

Dimensions S and T_3 to be same as adjacent RCB.

T_2 = Same as adjacent RCB (8" Min).

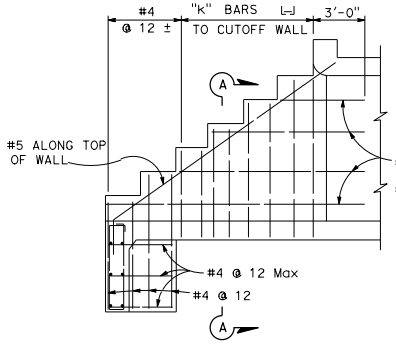


SECTION B-B



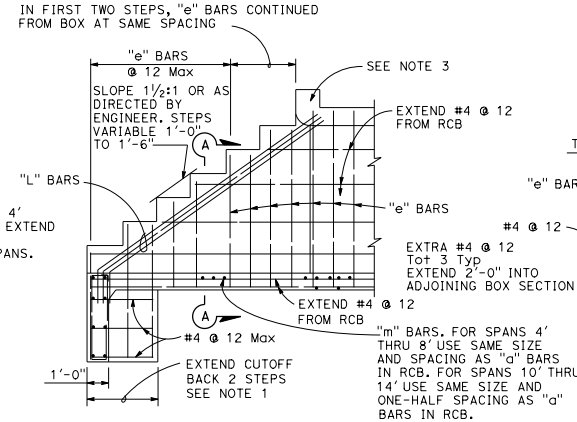
SECTION C-C

TYPE "E" STEPPED WINGWALL (SINGLE BOX CULVERT)



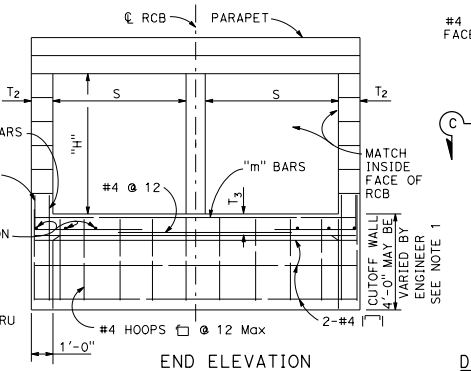
LONGITUDINAL SECTION

Showing reinforcement in outside face



LONGITUDINAL SECTION

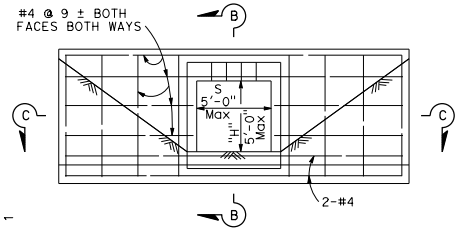
Showing reinforcement in inside face



END ELEVATION

Dimensions S and T_3 to be same as adjacent RCB.

T_2 = Same as adjacent RCB (8" Min).



ELEVATION

TYPE "D" STRAIGHT WINGWALL

Details similar for multiple span boxes. See Note 3.

DETAIL OF DESIGN LOADING CASES - TYPE "D" STRAIGHT WINGWALL

Case I Level + 240 psf surcharge
Case II 2:1 sloping ground with no surcharge
Case III 1½:1 limited slope (5'-0" Max height) + 240 psf surcharge

TYPE "E" STEPPED WINGWALL (MULTIPLE BOX CULVERT)

TABLE OF REINFORCEMENT FOR TYPE "E" WINGWALLS										
"H" (SEE NOTE 2)		3'	4'	5'	6'	7'	8'	10'	12'	14'
"K" BARS	BAR No.	#4	#4	#5	#5	#5	#5	#5	#5	#5
	SPACING	@ 12	@ 12	@ 12	@ 10	@ 9	@ 8	@ 7	@ 5	@ 4
"L" BARS	BAR No.	#5	#5	#6	#6	#7	#7	#7	#7	#7
	NUMBER EACH WALL	2	2	3	3	3	3	3	3	3

NOTES:

1. Eliminate cutoff walls if adjacent channel is paved.
2. For "H" not shown use reinforcement for next greater height.
3. For parapet details not shown see Standard Plan D82.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT WINGWALLS TYPES D AND E

NO SCALE

D85

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

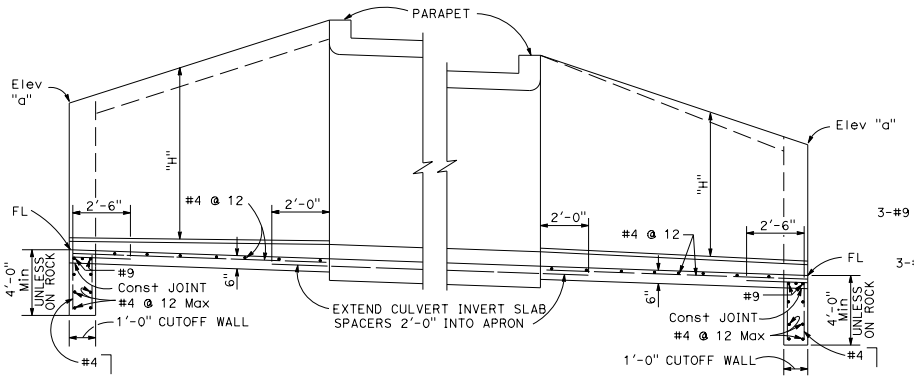
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

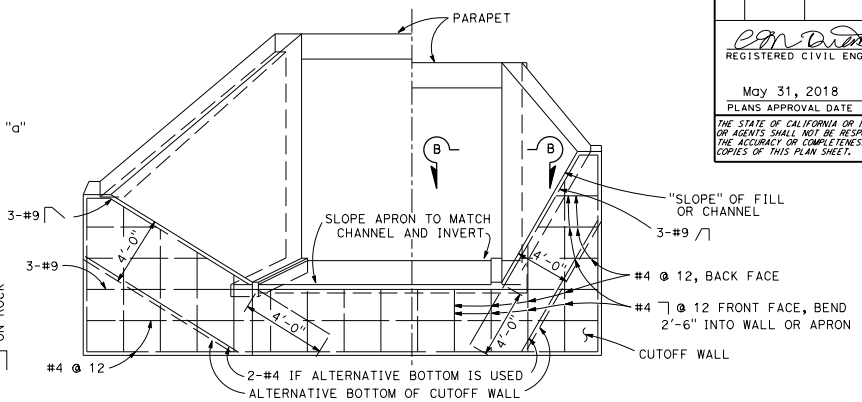
Carl W. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

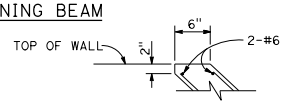


TYPICAL WITH STIFFENING BEAM TYPICAL WITHOUT STIFFENING BEAM

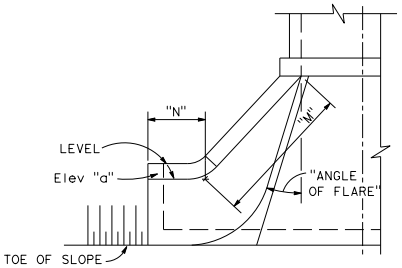
PART LONGITUDAL SECTION



END ELEVATION

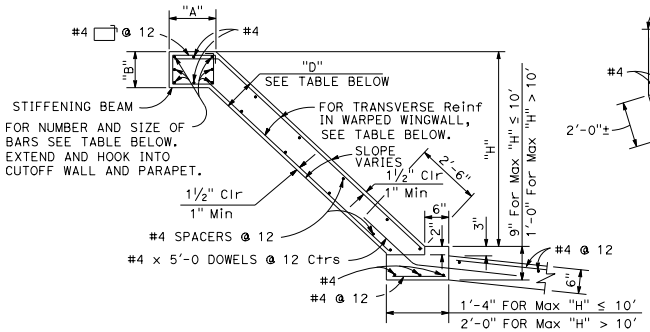


WITHOUT STIFFENING BEAM

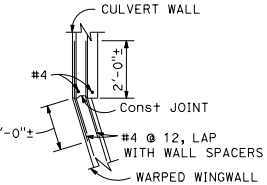


ALTERNATIVE WARPED WINGWALL

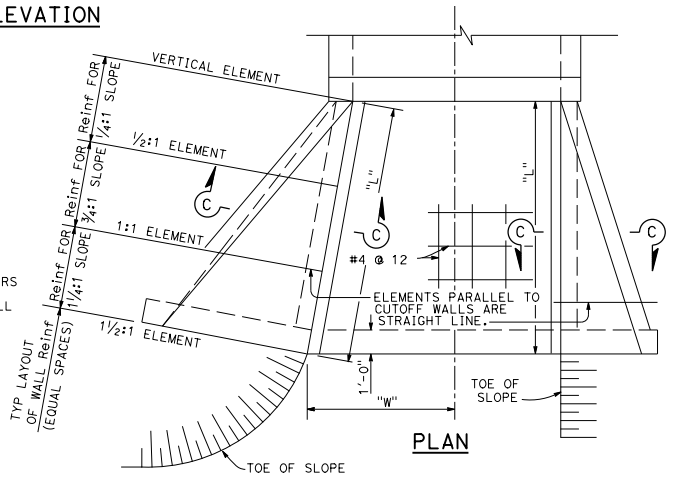
Use where additional protection to toe of embankment is required.



SECTION C-C



SECTION B-B



PLAN

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING

ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'	16'	18'	20'
¼:1	FRONT FACE Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#7 @ 7	#7 @ 6
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
¾:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 6	#4 @ 6
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 7	#4 @ 6	#5 @ 8
1¼:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
	REAR FACE Reinf	#4 @ 8	#4 @ 8	#4 @ 5	#5 @ 6	#6 @ 7	#6 @ 6	#7 @ 6
"D" AT CUTOFF WALL		6"	6"	6"	7½"	8"	9½"	11"
"D" AT CULVERT		6"	6"	6"	8"	9½"	11"	1'-1"

STIFFENING BEAM DIMENSIONS AND REINFORCING

"H" Max \ "L" Max	12'	14'	16'	18'	20'	25'	30'	35'	40'
6'	NO BEAM, PLACE 2-#6 IN EACH FACE ALONG TOP OF WALL.								
8'									
10'			"B"= 9"			"A"= 1'-6"			
12'								"A"= 1'-10"	
14'	TOTAL 6-#6		"B"= 1'-0"			"B"= 1'-3"		"A"= 2'-2"	
16'									"B"= 1'-6"
18'		TOTAL 6-#7			TOTAL 8-#8				
20'								TOTAL 8-#9	

NOTES: Walls designed for 2'-0" surcharge; earth density = 120 pcf; equivalent fluid pressure = 36 pcf.
Vary "D" of warped wall uniformly from that at cutoff wall to that at culvert, for maximum "H" > 12'-0".
Where abrasion is anticipated increase apron thickness to 7" minimum to provide 2" minimum reinforcement coverage.
Dimensions "L", "W", "H", "M", "N", Elevation "a", " Angle of flare", and end "Slope" (as applicable) are shown on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT WARPED WINGWALLS

NO SCALE

D86A

2018 STANDARD PLAN D86A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

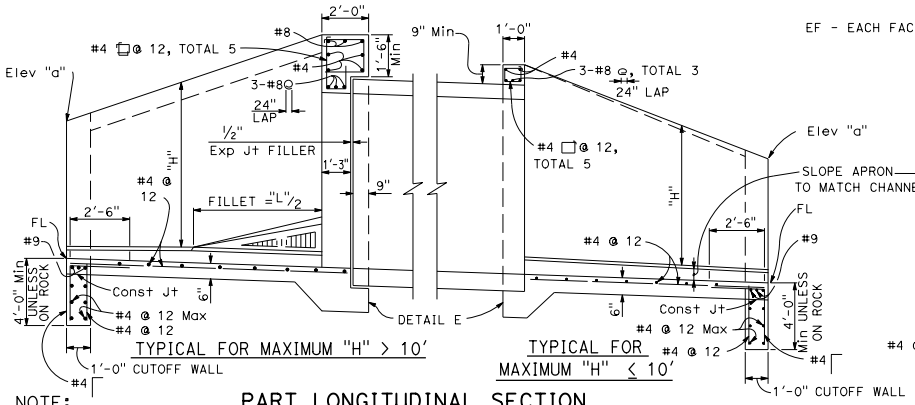
REGISTERED CIVIL ENGINEER

May 31, 2018

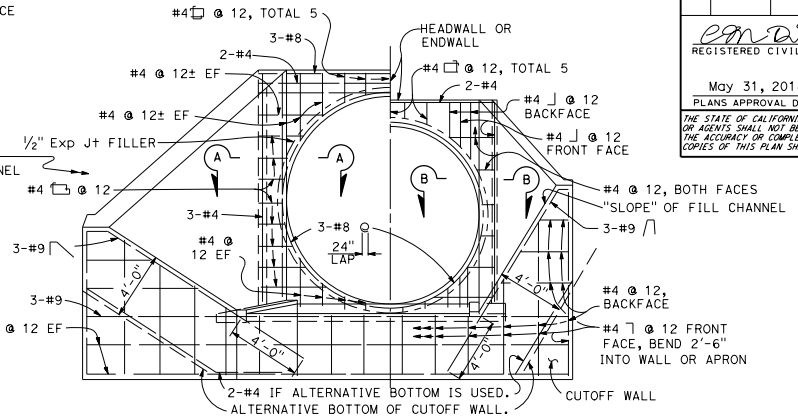
PLANS APPROVAL DATE

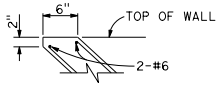
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Carl M. Dugan — No. C59976 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA



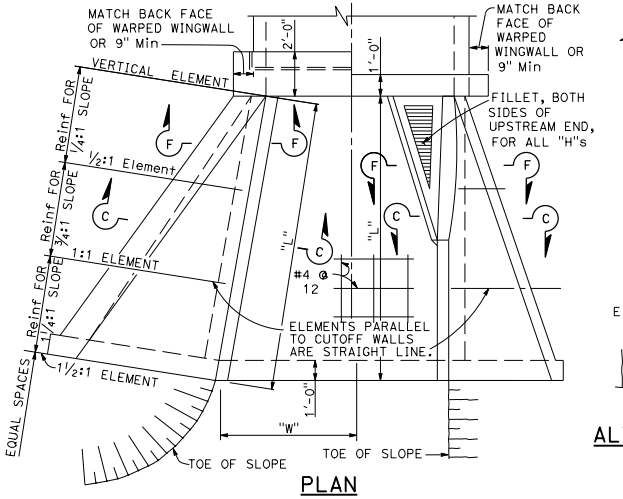
EF - EACH FACE



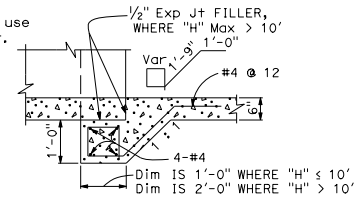


PART LONGITUDINAL SECTION

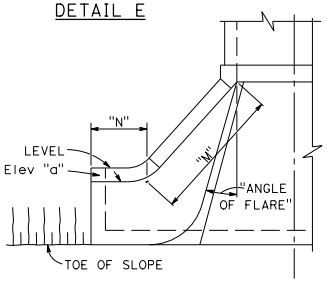
NOTE: RCP shown. Metal pipe similar except eliminate the expansion joint and use hook bolts @ 1'-7" ± spacing. Size and length provided by manufacturer.



PLAN



DETAIL E

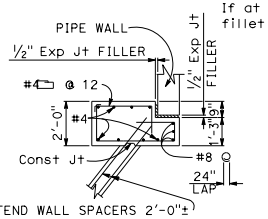


ALTERNATIVE WARPED WINGWALL

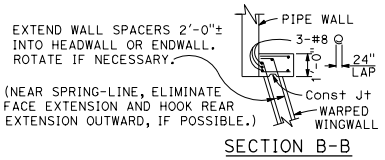
Use where additional protection to toe of embankment is required. If at upstream end, fillet is not shown.

END ELEVATION

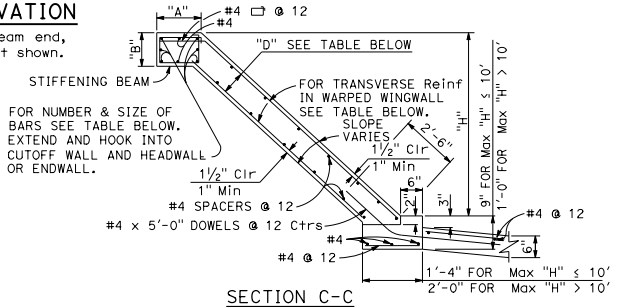
If at upstream end, fillet is not shown.



SECTION A-A

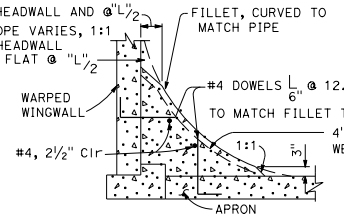


SECTION B-B



SECTION C-C

Where abrasion is anticipated, increase apron thickness to 7" minimum to provide 2" minimum reinforcement coverage.



SECTION F-F

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING									STIFFENING BEAM DIMENSIONS AND REINFORCING										
ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'	16'	18'	20'	"H" Max	"L" 12'	14'	16'	18'	20'	25'	30'	35'	40'
1/4:1	FRONT FACE Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#7 @ 7	#7 @ 6	6'	NO BEAM. PLACE 2-#6 IN EACH FACE ALONG TOP OF WALL.								
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	8'									
3/4:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 6	#4 @ 6	10'		"A"= 1'-0"							
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 7	#4 @ 6	#5 @ 8	12'		"B"= 9"		"A"= 1'-6"					
1 1/4:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	14'								"A"= 1'-10"	
	REAR FACE Reinf	#4 @ 8	#4 @ 8	#4 @ 5	#5 @ 6	#6 @ 7	#6 @ 6	#7 @ 6	16'	TOTAL 6-#6		"B"= 1'-0"		"B"= 1'-3"			"A"= 2'-2"	
"D" AT CUTOFF WALL		6"	6"	6"	7 1/2"	8"	9 1/2"	11"	18'			TOTAL 6-#7		TOTAL 8-#8			"B"= 1'-6"	
"D" AT CULVERT		6"	6"	6"	8"	9 1/2"	11"	1'-1"	20'								TOTAL 8-#9	

NOTES: Walls designed for 2'-0" surcharge; earth density = 120 pcf; equivalent fluid pressure = 36 pcf.
Vary "D" of warped wall uniformly from that at cutoff wall to that at headwall or endwall, for maximum "H" > 12'-0".
Dimensions "L", "W", "H", "M", "N", Elevation "a", Angle of flare", and end "Slope" (as applicable) are shown on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS

NO SCALE

D86B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

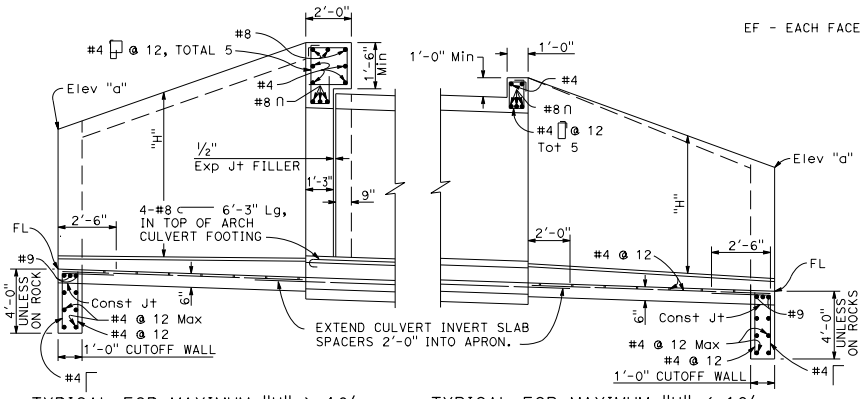
May 31, 2018

PLANS APPROVAL DATE

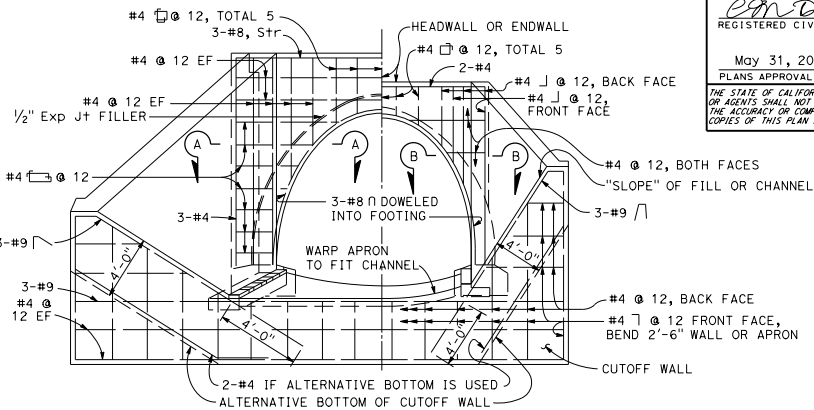
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Carl M. Duan — No. C59976 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

EF - EACH FACE



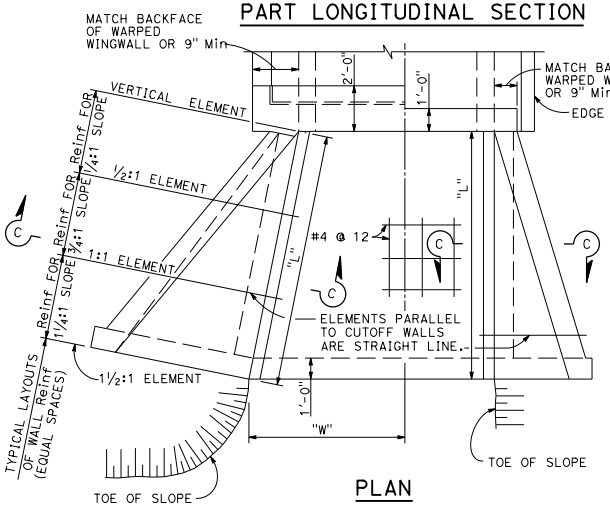
TYPICAL FOR MAXIMUM "H" > 10′ TYPICAL FOR MAXIMUM "H" ≤ 10′



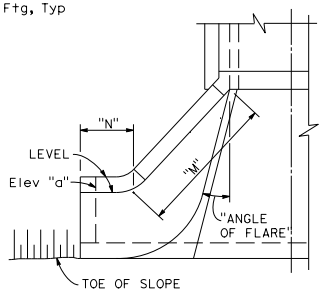
TYPICAL FOR MAXIMUM "H" > 10′ TYPICAL FOR MAXIMUM "H" ≤ 10′

PART LONGITUDINAL SECTION

END ELEVATION

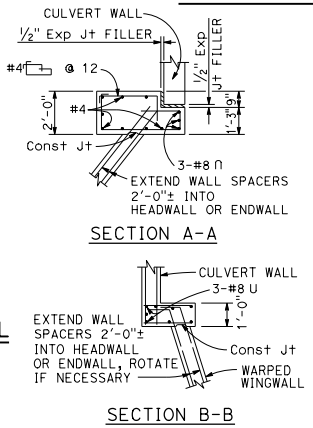


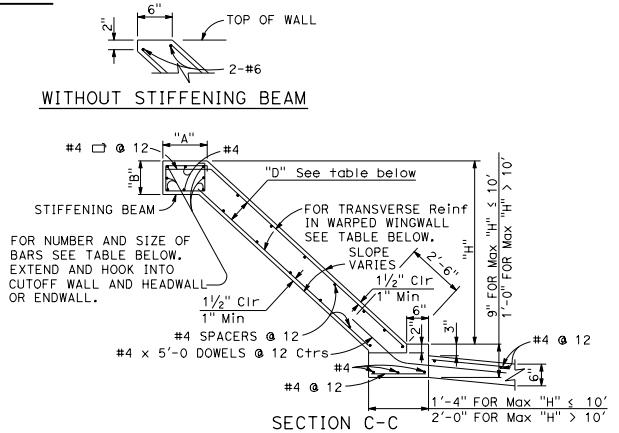
PLAN



ALTERNATIVE WARPED WINGWALL

Use where additional protection to toe of embankment is required.





Where abrasion is anticipated, increase apron thickness to 7" minimum to provide 2" minimum reinforcement coverage.

WARPED WINGWALLS

WALL DIMENSIONS AND REINFORCING									STIFFENING BEAM DIMENSIONS AND REINFORCING									
ELEMENT SLOPE	"H"	8′ OR LESS	10′	12′	14′	16′	18′	20′	"H" Max / "L"	12′	14′	16′	18′	20′	25′	30′	35′	40′
¼:1	FRONT FACE Reinf	#4 @ 12	#4 @ 7	#5 @ 7	#5 @ 5	#6 @ 6	#7 @ 7	#7 @ 6	6′	NO BEAM. PLACE 2-#6 IN EACH FACE ALONG TOP OF WALL.								
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	8′		"A"= 1′-0"							
¾:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 6	#4 @ 6	10′		"B"= 9"		"A"= 1′-6"					
	REAR FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 10	#4 @ 7	#4 @ 6	#5 @ 8	12′					"A"= 1′-10"				
1¼:1	FRONT FACE Reinf	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	14′	TOTAL 6-#6		"B"= 1′-0"		"B"= 1′-3"				
	REAR FACE Reinf	#4 @ 8	#4 @ 8	#4 @ 5	#5 @ 6	#6 @ 7	#6 @ 6	#7 @ 6	16′								"A"= 2′-2"	
"D" AT CUTOFF WALL		6"	6"	6"	7½"	8"	9½"	11"	18′		TOTAL 6-#7		TOTAL 8-#8				"B"= 1′-6"	
"D" AT CULVERT		6"	6"	6"	8"	9½"	11"	1′-1"	20′								TOTAL 8-#9	

NOTES:

Walls designed for 2′-0" surcharge; earth density = 120 pcf; equivalent fluid pressure = 36 pcf.
Vary "D" of warped wall uniformly from that at cutoff wall to that at headwall or endwall, for maximum "H" > 12′.
Dimensions "L", "W", "H", "M", "N", Elev "a", "Angle of flare", and "Slope" (as applicable) are shown on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

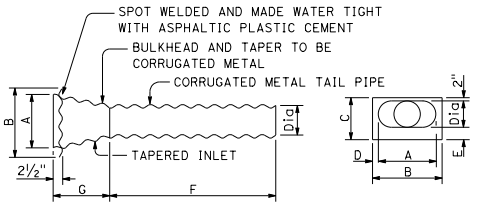
ARCH CULVERT HEADWALLS, ENDWALLS AND WARPED WINGWALLS

NO SCALE

D86C

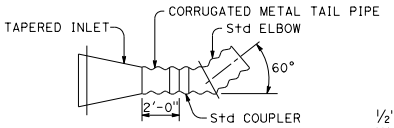
1-29-18

Return to Table of Contents



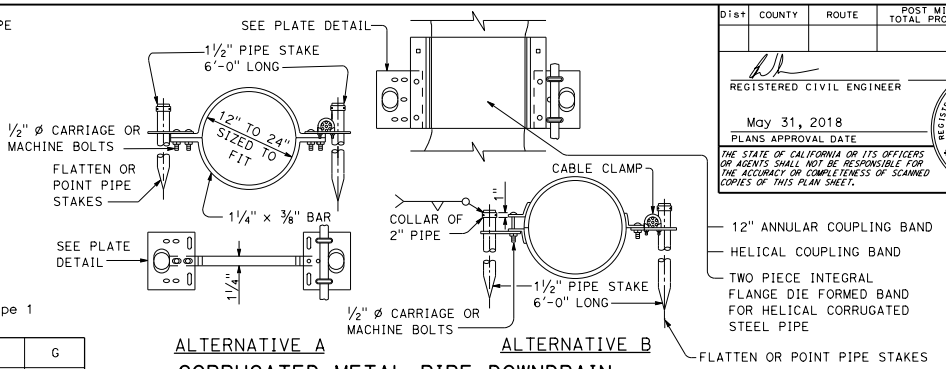
Bulkhead and taper of same thickness as tail pipe with 0.079" maximum. Tail pipe of same thickness as downdrain pipe.

ENTRANCE TAPER - TYPE 1 ALTERNATIVE A



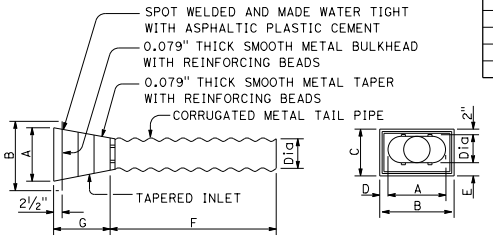
Tapered inlet of same construction and dimensions as Type 1 - Alternative A or B except tail pipe length will be 2'-0".

ENTRANCE TAPER - TYPE 2



CORRUGATED METAL PIPE DOWNDRAIN ANCHOR ASSEMBLY

Cable and cable clamps to be used when required by the Special Provisions.



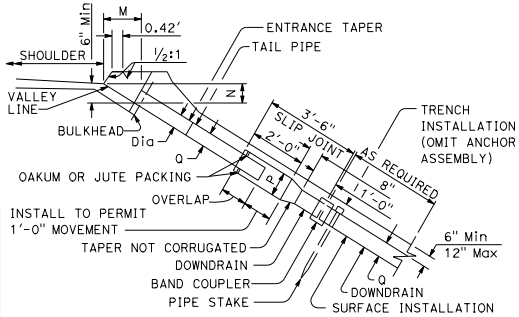
Tail pipe of same thickness as downdrain pipe.

ENTRANCE TAPER - TYPE 1 ALTERNATIVE B

Taper joints may be welded or riveted. Dimensions to be as tabulated below for Type 1 Alternatives A and B.

Dia	A	B	C	D	E	F	G
8"	1'-4"	2'-1½"	1'-3"	4¾"	5"	6'-0"	2'-0"
12"	1'-6"	2'-1½"	1'-7"	3¾"	5"	6'-0"	2'-0"
15"	1'-9"	2'-6"	1'-11"	4½"	6"	6'-0"	2'-0"
18"	2'-0"	2'-10"	2'-3"	5"	7"	6'-0"	2'-0"
24"	2'-10"	3'-10"	2'-11"	6"	9"	4'-0"	4'-0"

ENTRANCE TAPER - TYPE 1 ALTERNATIVE A AND B



SECTION A-A TYPE 1

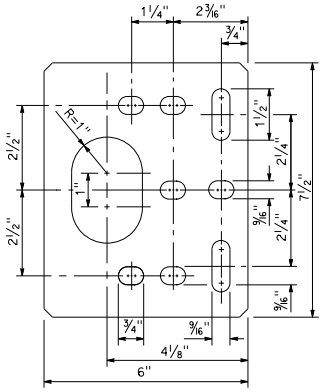


PLATE DETAIL

Material to be ¼" plate galvanized after fabrication.

NOTES:

1. Either Alternative A or Alternative B anchor assemblies and pipe stakes may be used at Contractor's option for corrugated steel pipe or corrugated aluminum pipe. Alternative A anchor assembly only to be placed in annular corrugation. Alternative A anchor assembly may be placed on annular coupling band if securely fastened on downstream side of joint. Alternative B anchor assembly to be fastened to pipe sections and not to a band coupler used to join sections.
2. For cable anchorage system details, see Standard Plan D87C.

CMP dimensions as tabulated below

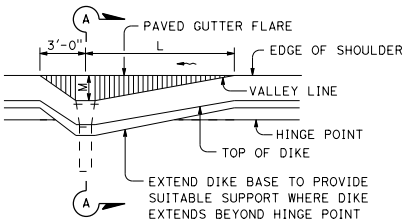
	10"	15"	18"	21"	27"
P					
Q	8"	12"	15"	18"	24"

Slip joint to be same thickness as downdrain pipe.

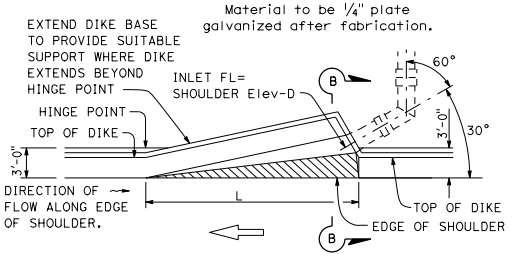
Dia	Min L	M	N
8"	10'-0"	1'-6"	8"
12"	15'-0"	1'-8"	1'-0"
15"	25'-0"	2'-0"	1'-3"
18"	30'-0"	2'-6"	1'-4"
24"	40'-0"	3'-0"	1'-6"

NOTES:

1. Cable, slip joint or anchor assembly to be used when specified.
2. Slip joint to be omitted when completely buried.
3. Slip joint for Type 1 entrance taper shown. Type 2 similar.



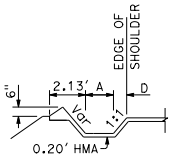
MOUNTABLE DIKE TYPE 1



MOUNTABLE DIKE TYPE 2

(For use on full freeway sections ONLY with grades of 2% or greater)

Dia D	Min L
8"	15'
12"	20'
15"	30'
18"	35'
24"	45'



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE DOWNDRAIN DETAILS

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

ENTRANCE TAPER AND PIPE DOWNDRAIN

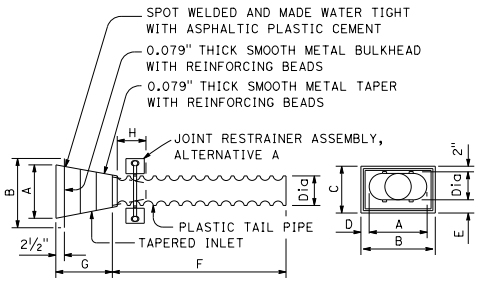
D87A

1-29-18

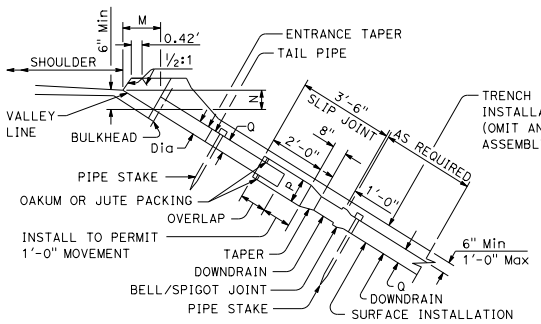
2018 STANDARD PLAN D87A

231

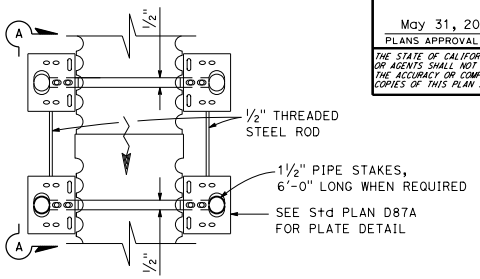
Return to Table of Contents



ENTRANCE TAPER - TYPE 1



SECTION - TYPE 1



PLAN

NOTES:

1. Cable or slip joint to be used when specified.
2. Slip joint to be omitted when completely buried.

PLASTIC PIPE DIMENSIONS AS TABULATED BELOW.

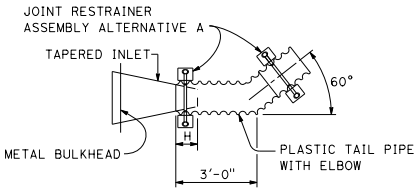
P	10"	15"	18"	21"	27"
Q	8"	12"	15"	18"	24"

Dia	Min L	M	N
8"	10'-0"	1'-6"	8"
12"	15'-0"	1'-8"	1'-0"
15"	25'-0"	2'-0"	1'-3"
18"	30'-0"	2'-6"	1'-4"
24"	40'-0"	3'-0"	1'-6"

TAPER JOINTS MAY BE WELDED OR RIVETED.
DIMENSIONS TO BE AS TABULATED BELOW.

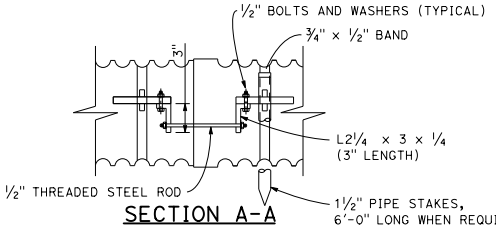
Dia	A	B	C	D	E	F	G	H
8"	1'-4"	2'-1½"	1'-3"	4¾"	5"	6'-0"	2'-0"	1'-0"
12"	1'-6"	2'-1½"	1'-7"	3¾"	5"	6'-0"	2'-0"	1'-0"
15"	1'-9"	2'-6"	1'-11"	4½"	6"	6'-0"	2'-0"	1'-2"
18"	2'-0"	2'-10"	2'-3"	5"	7"	6'-0"	2'-0"	1'-4"
24"	2'-10"	3'-10"	2'-11"	6"	9"	4'-0"	4'-0"	1'-6"

ENTRANCE TAPER - TYPE 1



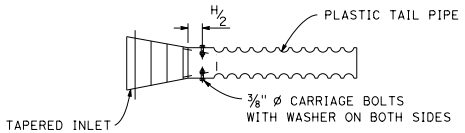
Tapered inlet of same construction and dimensions as type 1.

ENTRANCE TAPER - TYPE 2



SECTION A-A
PLASTIC PIPE JOINT RESTRAINER ASSEMBLY

Alternative B

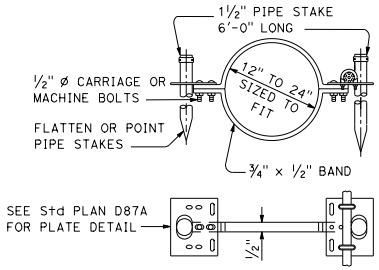


PLAN

Alternative tail pipe to entrance pipe connection

DETAIL "A"

(See Note 5)



PLASTIC PIPE JOINT RESTRAINER ASSEMBLY

Alternative A

NOTES:

1. See Standard Plan D87A for details of entrance taper placement at dike.
2. Pipe stakes to be used with joint restrainer when specified.
3. Entrance taper "H" dimension is length of insertion of metal taper into plastic pipe.
4. For cable anchorage system details, see Standard Plan D87C.
5. At contractors option, tail pipe and tapered inlet may be supplied from manufacturer as a pre-connected unit as shown in Detail "A".

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PLASTIC PIPE DOWNDRAIN DETAILS

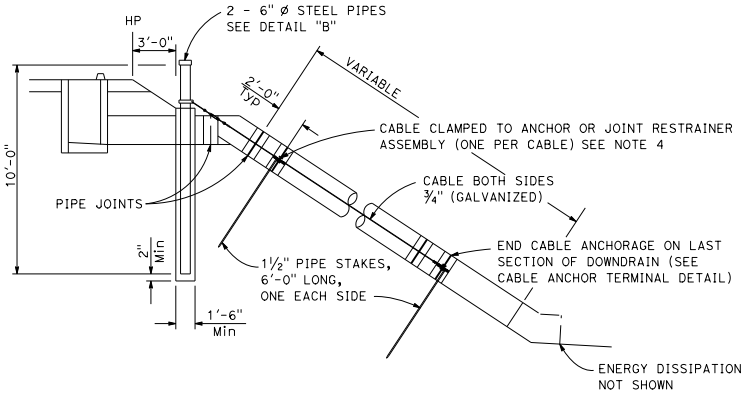
NO SCALE

D87B

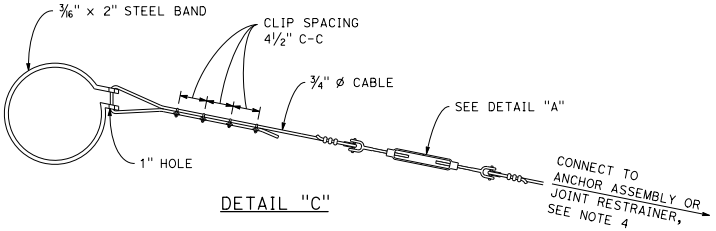
2018 STANDARD PLAN D87B

1-29-18

Return to Table of Contents

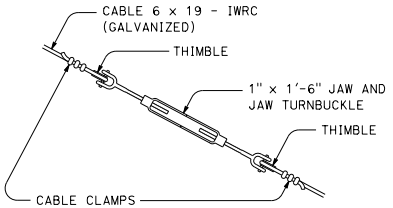


CABLE ANCHORAGE SYSTEM

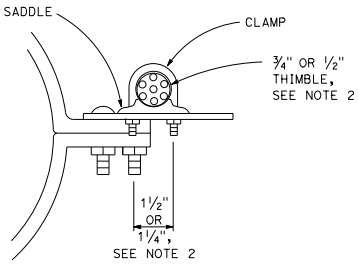


DETAIL "C"

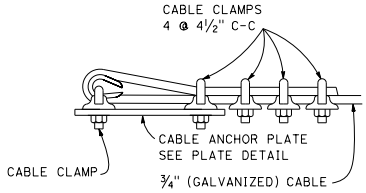
BAND AND CABLE ASSEMBLY DETAIL FOR CABLE ANCHORAGE SYSTEM



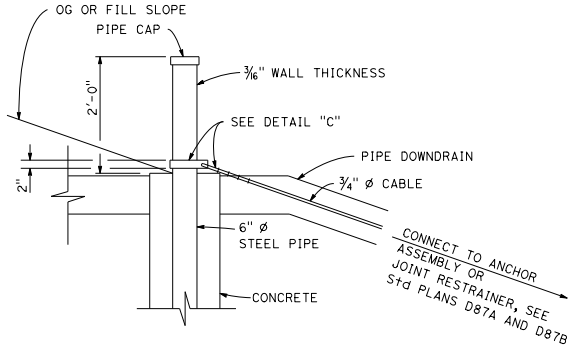
DETAIL "A"



END VIEW



CABLE ANCHOR TERMINAL DETAIL



DETAIL "B"

STEEL PIPE PILE DETAILS FOR CABLE ANCHORAGE SYSTEM

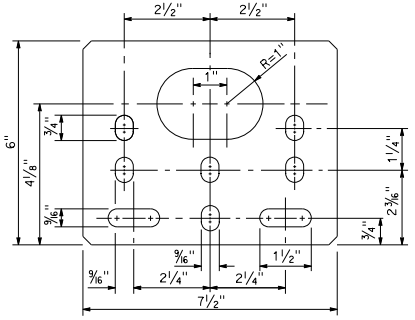


PLATE DETAIL

NOTES:

1. Diameter of downdrain 24" maximum.
2. ¾" ø cable shown, ½" ø cable is allowable for pipe downdrain diameters of 8" to 15". Use 1½" dimension for ¾" cable and 1¼" dimension for ½" cable.
3. Slip joints not shown.
4. See Standard Plan D87A for Corrugated Metal Pipe Downdrain Anchor Assembly. See Standard Plan D87B for Plastic Pipe Joint Restrainer Assembly.
5. Cable shall not contact soil in finished position. Either adjust position, or replace affected portion of cable with galvanized steel rod of equivalent diameter.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CABLE ANCHORAGE SYSTEM

NO SCALE

D87C

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

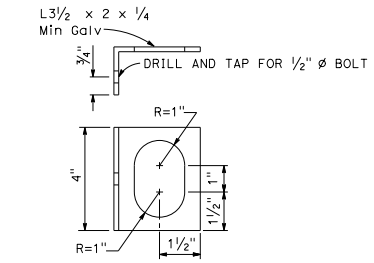
REGISTERED CIVIL ENGINEER

May 31, 2018

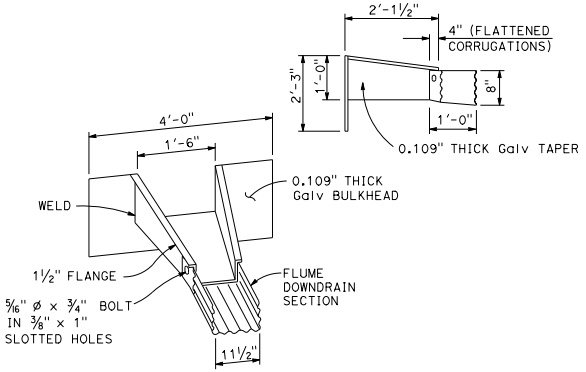
PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

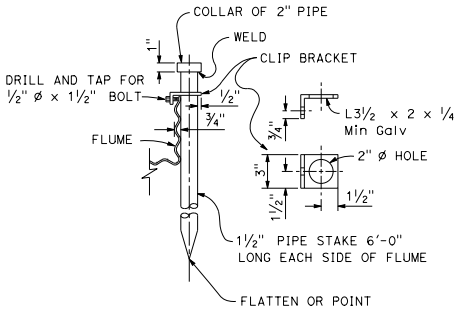
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



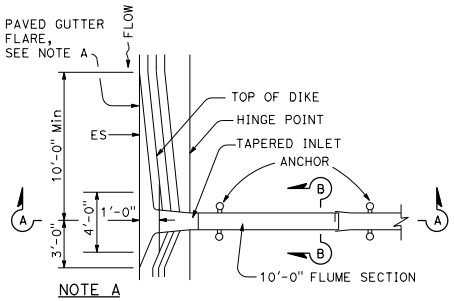
ALTERNATIVE CLIP BRACKET DETAIL



TAPERED INLET



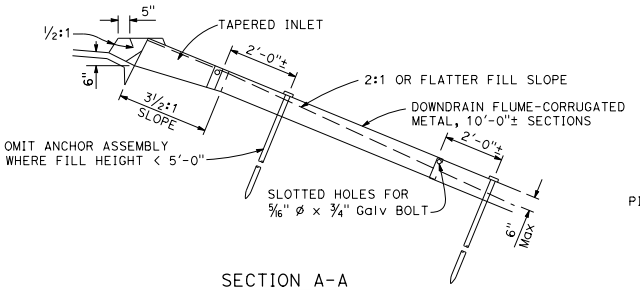
PIPE STAKE ANCHOR DETAIL



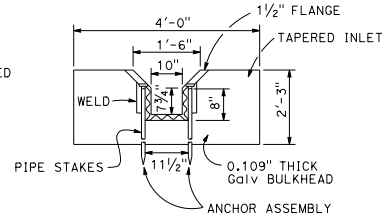
NOTE A

In sag location, use 10'-0" length of paved gutter flare on both sides of inlet.

PLAN

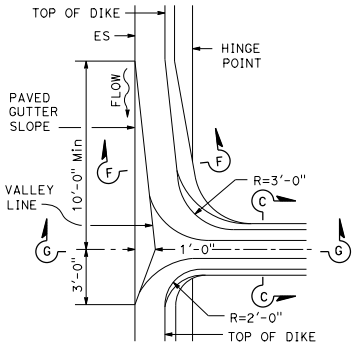


SECTION A-A



SECTION B-B

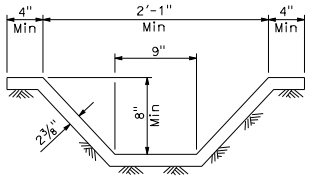
TAPERED INLET AND FLUME DOWNDRAIN



PLAN

MOUNTABLE DIKE

HOT MIX ASPHALT OVERSIDE DRAINS

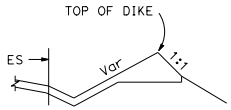


SECTION C-C

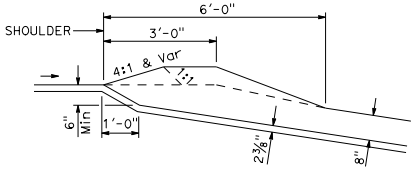
See Note 1

NOTE:

1. Cross section of slope ditch may be semicircular, vee or trapezoidal.



SECTION F-F



SECTION G-G

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERSIDE DRAINS

NO SCALE

D87D

1-29-18

Return to Table of Contents

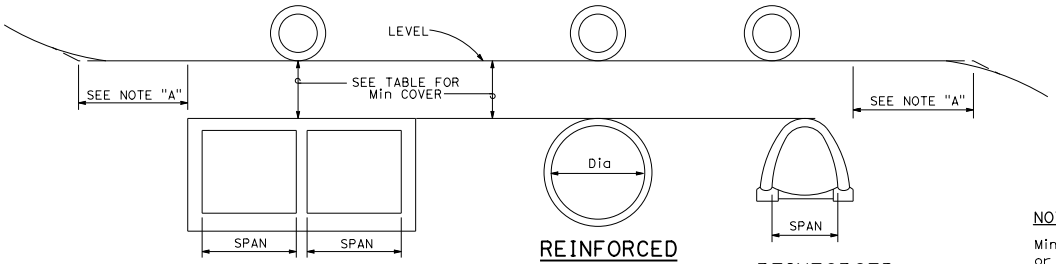
TABLE OF MINIMUM COVER AND STRUTTING REQUIREMENTS FOR CONSTRUCTION LOADS

TYPE					18-50 k AXLE		50-75 k AXLE		75-110 k AXLE		110-150 k AXLE	
	MAXIMUM DESIGN FILL	SPAN	CELLS	Min COVER	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING	STRUTS REQUIRED	STRUT SIZE AND SPACING
BOX CULVERTS	10'-0" AND 20'-0"	4'-0" TO 8'-0"	SINGLE AND MULTIPLE	5'-0"	———	———	———	———	———	———	———	———
	10'-0"	10'-0" TO 14'-0"	SINGLE AND MULTIPLE	5'-0"	———	———	⅓ Points	STRUTS 6" x 6" @ 3'-6" SILLS 6" x 8"	⅓ Points	STRUTS 6" x 8" @ 3'-6" SILLS 6" x 8"	⅓ Points	STRUTS 6" x 8" @ 3'-6" SILLS 6" x 8"
	20'-0"	10'-0" TO 14'-0"	SINGLE AND MULTIPLE	5'-0"	———	———	———	———	———	———	———	———

TABLE OF MINIMUM COVER FOR CONSTRUCTION LOADS

TYPE		Dia OR SPAN	18-50 k AXLE	50-75 k AXLE	75-110 k AXLE	110-150 k AXLE
REINFORCED CONCRETE CULVERTS	PIPES	Dia 12" TO 39"	2'-0"	3'-0"	3'-0"	3'-0"
		Dia 42" TO 108"	$\frac{Dia}{1.75}$ OR 3'-0"	$\frac{Dia}{1.75}$ OR 3'-0"	$\frac{Dia}{1.75}$ OR 3'-0"	$\frac{Dia}{1.75}$ OR 3'-0"
	ARCHES	SPANS TO 14'-0"	$\frac{SPAN}{2.5}$ OR 4'-0"	$\frac{SPAN}{2.5}$ OR 4'-0"	$\frac{SPAN}{2.5}$ OR 4'-0"	$\frac{SPAN}{2.5}$ or 4'-0"
		SPANS 15'-0" TO 22'-0"	$\frac{SPAN}{3.5}$ OR 6'-0"	$\frac{SPAN}{3.5}$ OR 6'-0"	$\frac{SPAN}{3.5}$ OR 6'-0"	$\frac{SPAN}{3.5}$ OR 6'-0"
METAL CULVERTS	PIPES	Dia TO 120"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"
		Dia OVER 120"	$\frac{Dia}{3}$ OR 6'-0"	$\frac{Dia}{3}$ OR 6'-0"	$\frac{Dia}{3}$ OR 6'-0"	$\frac{Dia}{3}$ OR 6'-0"
	PIPE ARCHES	All Spans	$\frac{SPAN}{3}$ OR 4'-0"	$\frac{SPAN}{3}$ OR 4'-0"	$\frac{SPAN}{3}$ OR 4'-0"	$\frac{SPAN}{3}$ OR 4'-0"
	STRUCTURAL PLATE PIPE, ARCHES AND VEHICULAR UNDERCROSSINGS	ALL SPANS	$\frac{SPAN}{3}$ OR 5'-0"	$\frac{SPAN}{3}$ OR 5'-0"	$\frac{SPAN}{3}$ OR 5'-0"	$\frac{SPAN}{3}$ OR 5'-0"
PLASTIC PIPE		Dia 12" TO 60"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"	$\frac{Dia}{1.75}$ OR 4'-0"

NOTE: Minimum cover shall be the greater value of alternatives shown. The diameter and spans shown in the table to calculate the minimum cover (Example: $\frac{Dia}{1.75}$) is the diameter or span of the facility expressed in number of feet.



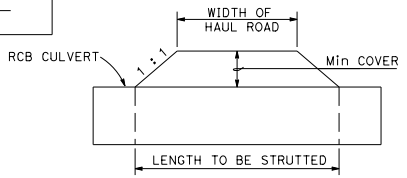
BOX CULVERTS

REINFORCED CONCRETE PIPES, PLASTIC PIPES AND METAL CULVERTS

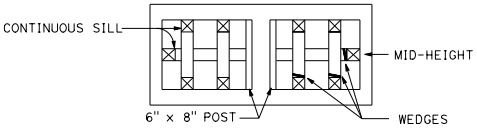
REINFORCED CONCRETE ARCH CULVERTS

NOTE "A"

Minimum distance equals 3 times the span or 3 times the diameter.



MINIMUM LENGTH OF STRUTTING



RCB STRUTTING DETAILS

NOTES:

Length of strutting to be determined by the Engineer, but shall not be less than as shown in the sketch above.

Assumed tire patterns:
- 50 k axle 2'-0" x 1'-6"
- 75 k axle 3'-0" x 2'-0"
- 110 k axle 3'-0" x 2.5'
- 150 k axle 3'-0" x 3'-0"

Impact = 10%

Sills to be glue-laminated or solid timber.

For strutting requirements of Structural Steel Plate Vehicular Undercrossing, Structural Steel Plate Arches and Structural Steel Plate Pipes during construction, see Standard Plan D88A.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Carl M. Duan — No. C59976 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONSTRUCTION LOADS ON CULVERTS

NO SCALE

D88

1-29-18

2018 STANDARD PLAN D88

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

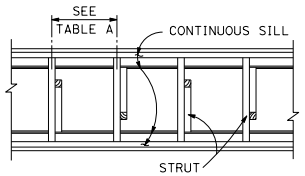
TABLE A

TIMBER STRUTS FOR STRUCTURAL STEEL PLATE PIPE			
PIPE Dia	STRUT SIZE	HEIGHT OF FILL	
		0 TO 20'-0"	GREATER THAN 20'-0"
240" THRU 252"	8" x 8"	5'-0" SPACING	3'-0" SPACING
	10" x 10"	8'-0" SPACING	4'-6" SPACING

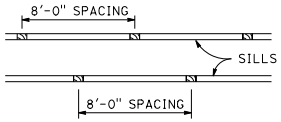
TABLE B

TIMBER STRUTS FOR STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING		
SPAN	STRUT SIZE	SILL SIZE
13'-2" - 15'-6"	4" x 4"	4" x 6"
15'-9" - 17'-3"	4" x 4"	4" x 8"
Over 17'-3"	6" x 6"	6" x 8"

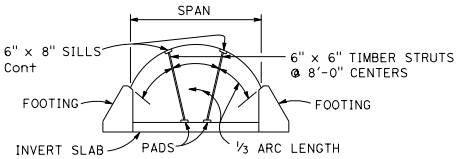
Tabular data in Table B based on 6" x 2" corrugations, (Structural steel plate).



SECTION A-A



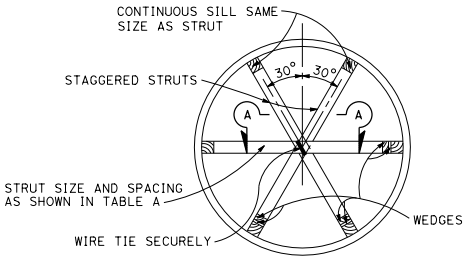
SECTION B-B



TYPICAL SECTION

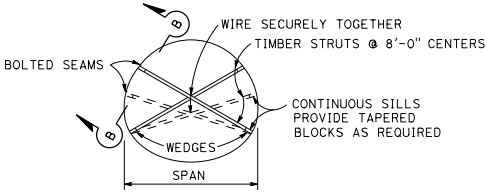
STRUCTURAL STEEL PLATE ARCHES

Struts required when span of structural steel plate arch exceeds 18'-0" pad size as directed by Engineer.



TYPICAL SECTION

STRUCTURAL STEEL PLATE PIPES



TYPICAL SECTION

STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING

NOTES:

1. Struts shown are minimum required during construction when construction vehicle loading exceeds 32 kip/axle, and minimum cover is less than that shown for metal culverts in the table on Standard Plan D88.
2. Backfill shall be brought up uniformly on both sides of the structure.
3. For minimum cover over structure for construction loads, see Standard Plan D88.
4. Strut all situations where overfill is removed in an unbalanced manner.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUT DETAILS FOR STRUCTURAL STEEL PIPES, ARCHES AND VEHICULAR UNDERCROSSING

NO SCALE

D88A

2018 STANDARD PLAN D88A

1-29-18

Return to Table of Contents

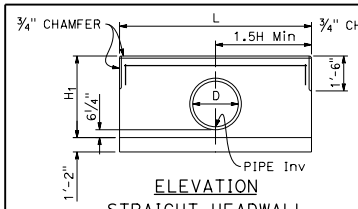
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

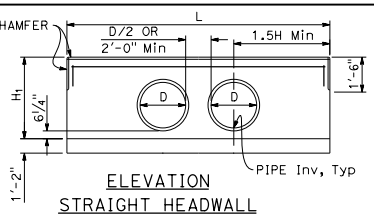
May 31, 2018
PLANS APPROVAL DATE

Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

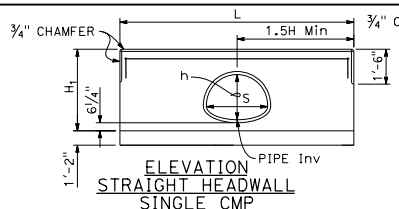
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



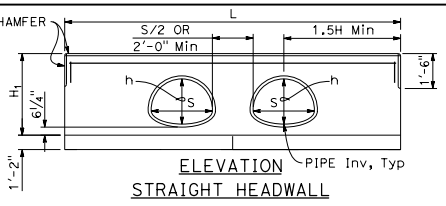
ELEVATION
STRAIGHT HEADWALL
SINGLE CIRCULAR PIPE



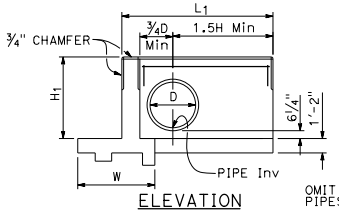
ELEVATION
STRAIGHT HEADWALL
DOUBLE CIRCULAR PIPE



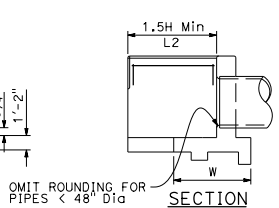
ELEVATION
STRAIGHT HEADWALL
SINGLE CMP



ELEVATION
STRAIGHT HEADWALL
DOUBLE CMP

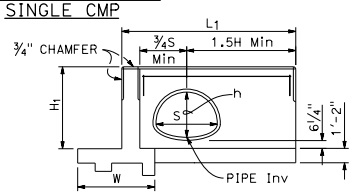


ELEVATION
"L" HEADWALL

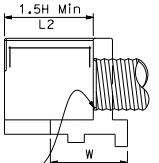


SECTION
"L" HEADWALL

H	CIRCULAR PIPE SIZE D	CMP ARCH SIZE S x h
2'-8"	12"	-
2'-11"	15"	21" x 15"
3'-2"	18"	24" x 18"
3'-5"	21"	28" x 20"
3'-8"	24"	35" x 24"
3'-11"	27"	-
4'-2"	30"	42" x 29"
4'-5"	33"	49" x 33"
4'-8"	36"	-
4'-11"	39"	57" x 38"
5'-2"	42"	64" x 43"
5'-5"	45"	-
5'-8"	48"	71" x 47"
5'-11"	51"	-
6'-2"	54"	-



ELEVATION
"L" HEADWALL

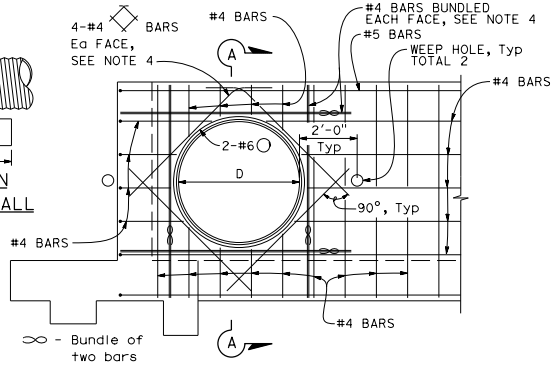


OMIT ROUNDING FOR
PIPES < 48" Dia

SECTION
"L" HEADWALL

CMP ARCH CULVERT HEADWALLS

See Note 2

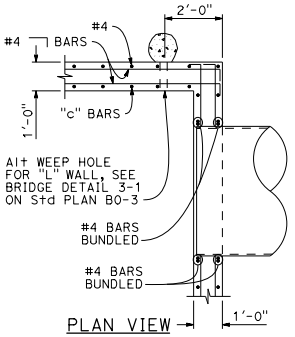


REINFORCEMENT MODIFICATION

"L" headwall shown. Straight headwall similar.
Circular pipe shown. CMP arch similar.

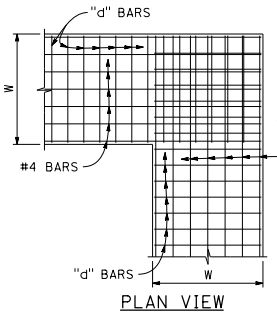
CIRCULAR PIPE CULVERT HEADWALLS

See Note 2



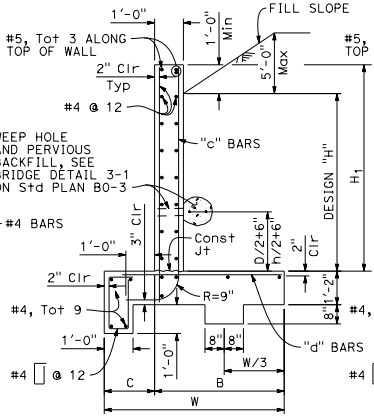
PLAN VIEW
STEM WALL

"L" headwall shown.
Straight headwall similar.

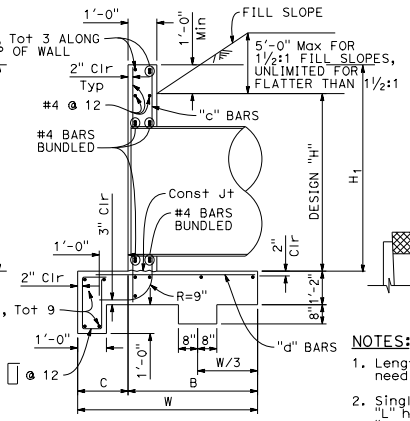


PLAN VIEW
FOOTING

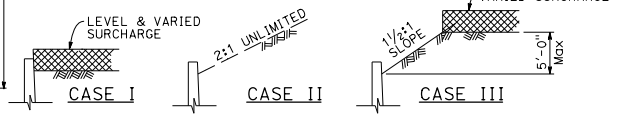
"L" headwall shown.
Straight headwall similar.



TYPICAL SECTION



SECTION A-A



DETAIL OF DESIGN LOADING CASES

NOTES:

1. Length of wall from ℄ pipe to end of wall is 1.5H Min. The ends of headwall need to be embedded into the slope by two feet.
2. Single circular pipe or single CMP shown for "L" headwall. For double pipe in "L" headwall, see "ELEVATION STRAIGHT HEADWALL DOUBLE CIRCULAR PIPE" or "ELEVATION STRAIGHT HEADWALL DOUBLE CMP" detail for additional information.
3. Cable railing to be installed on top of headwall when shown on Project Plans. See Standard Plan B11-47 for cable railing details.
4. Adjacent to each side of the opening, place additional reinforcement equivalent to half the interrupted main reinforcement. For pipes 42" diameter and greater, add 4 diagonals, 1 bar each side. Extend bars one development length past the intersection with the adjacent diagonal bar, or where bars intersect mid thickness of adjacent wall, bottom slab or at top of wall, bend ends as required into same plane.
5. Quantities are approximate and for design purposes only. No deduction is made for pipe or arch occupancy.

H		2'-8"	2'-11"	3'-2"	3'-5"	3'-8"	3'-11"	4'-2"	4'-5"	4'-8"	4'-11"	5'-2"	5'-5"	5'-8"	5'-11"	6'-2"
W		4'-7"	4'-9"	4'-10"	5'-0"	5'-1"	5'-2"	5'-3"	5'-5"	5'-6"	5'-7"	5'-8"	5'-9"	5'-11"	6'-0"	6'-3"
C		1'-2"	1'-2"	1'-2"	1'-3"	1'-3"	1'-3"	1'-3"	1'-4"	1'-4"	1'-4"	1'-5"	1'-5"	1'-6"	1'-6"	1'-9"
B		3'-5"	3'-7"	3'-8"	3'-9"	3'-10"	3'-11"	4'-0"	4'-1"	4'-2"	4'-3"	4'-3"	4'-4"	4'-5"	4'-6"	4'-6"
"c" BARS		#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12
"d" BARS		#4 @ 12	#4 @ 8	#4 @ 8	#4 @ 8	#4 @ 8	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 8	#5 @ 8	#5 @ 8	#5 @ 8	#6 @ 8	#6 @ 8
* Conc CY/LF		0.404	0.412	0.415	0.423	0.426	0.430	0.433	0.440	0.444	0.448	0.451	0.455	0.462	0.466	0.477
* Reinf LB/LF		23	24	24	25	25	26	27	27	28	28	29	29	30	31	32
**CASE I	Ser (q'o, B')	0.79, 4.66	0.83, 4.57	0.88, 4.58	0.89, 4.73	0.93, 4.74	0.93, 4.75	1.02, 4.75	1.02, 4.92	1.07, 4.93	1.11, 4.94	1.12, 4.98	1.16, 4.99	1.17, 5.16	1.21, 5.18	1.15, 5.53
	Str (q'o, B')	1.48, 1.75	1.53, 1.80	1.65, 1.76	1.64, 1.88	1.76, 1.85	1.89, 1.83	2.02, 1.80	1.97, 1.95	2.08, 1.94	2.20, 1.93	2.28, 1.92	2.39, 1.92	2.31, 2.08	2.41, 2.09	2.17, 2.41
	Extr (q'o, B')	0.65, 4.16	0.68, 4.27	0.72, 4.29	0.74, 4.44	0.78, 4.46	0.82, 4.47	0.86, 4.47	0.87, 4.63	0.92, 4.63	0.96, 4.64	0.98, 4.69	1.03, 4.69	1.04, 4.84	1.09, 4.84	1.05, 5.18
**CASE II	Ser (q'o, B')	0.41, 4.52	0.44, 4.67	0.48, 4.73	0.51, 4.90	0.55, 4.95	0.59, 5.00	0.63, 5.04	0.65, 5.21	0.70, 5.26	0.74, 5.30	0.77, 5.37	0.81, 5.40	0.83, 5.58	0.88, 5.61	0.86, 5.96
	Str (q'o, B')	1.05, 4.49	1.10, 4.64	1.15, 4.69	1.19, 4.86	1.24, 4.90	1.30, 4.94	1.36, 4.98	1.39, 5.15	1.46, 5.18	1.52, 5.22	1.56, 5.28	1.62, 5.31	1.62, 5.48	1.72, 5.51	1.69, 5.85
	Extr (q'o, B')	0.98, 3.90	1.03, 4.00	1.10, 4.01	1.13, 4.15	1.19, 4.15	1.26, 4.15	1.33, 4.14	1.37, 4.28	1.44, 4.27	1.52, 4.26	1.57, 4.29	1.65, 4.28	1.68, 4.41	1.77, 4.40	1.72, 4.71
**CASE III	Ser (q'o, B')	0.61, 4.53	0.64, 4.73	0.68, 4.76	0.70, 4.91	0.74, 4.91	0.79, 4.94	0.83, 4.93	0.85, 5.08	1.17, 4.03	1.23, 4.03	1.27, 4.06	1.34, 4.02	1.36, 4.15	1.43, 4.11	1.36, 4.45
	Str (q'o, B')	0.99, 4.28	1.04, 4.67	1.10, 4.69	1.13, 4.83	1.19, 4.82	1.25, 4.83	1.32, 4.82	1.35, 4.95	2.02, 2.66	2.16, 2.62	2.25, 2.59	2.44, 2.48	2.49, 2.54	2.70, 2.44	2.50, 2.72
	Extr (q'o, B')	0.90, 3.88	0.95, 3.93	1.01, 3.91	1.04, 4.02	1.11, 3.97	1.18, 3.92	1.25, 3.90	1.28, 4.00	1.35, 3.94	1.43, 3.92	1.11, 5.14	1.55, 3.87	1.58, 3.97	1.67, 3.91	1.60, 4.22

* Quantities include 1'-0" extension above the design "H" limit.
** q'o = net bearing stress (ksf), B' = effective footing width (ft)
Ser - service limit
Str - strength limit
Extr - extreme event

REINFORCED CONCRETE HEADWALL

Quantities do not include added diagonals and do not consider pipe occupancy.

NOTE: Reinforced Concrete: fy = 60,000 psi
f'c = 3,600 psi
Earth Density: 120 pcf
Equivalent Fluid Pressure: 36 pcf

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT HEADWALLS STRAIGHT AND "L"

NO SCALE

D89

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan, No. C59976, Exp. 6-30-18, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

USE REINFORCEMENT FOR H= TOE OF SLOPE

TOP OF WALL

Max=H+6"

TOP OF FOOTING

OPTIONAL FOOTING LINES

LOL

TYPICAL LAYOUT EXAMPLE

The length of short "c" bars in the figure from top of footing to upper end of short "c" bars.

"c" BARS

SHORT "c" BARS

REINFORCED CONCRETE WINGWALLS

INLET OUTLET

RC PIPE DETAILS

Var

½" Exp Jt FILLER

PART PLAN A-A

If required, slope protection details are as shown on the Project Plans , or as directed by the Engineer.

NEOPRENE STRIP, Typ

SECTION B-B

SECTION C-C

SECTION D-D

#6 BARS FOR CONCRETE PIPE ONLY

HOOK BOLTS FOR METAL PIPE

Const Jt

DESIGN "H"= 0.6 Dia + 6"

Reinf SHOWN IS IN ADDITION TO REGULAR WALL Reinf.

ADDITIONAL #4 BARS

CUTOFF WALL IF REQUIRED AND AS DIRECTED BY THE ENGINEER. MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS IN THE FIELD.

SECTION F-F

LEVEL + VARIED SURCHARGE

CASE I

2:1 UNLIMITED

CASE II

VARIED SURCHARGE

1½:1 SLOPE

5'-0" Max

CASE III

DETAIL OF DESIGN LOADING CASES

GROUND LINE OR CHANNEL SLOPE

USE HOOK BOLTS @ 1'-7"± SPACING, SIZE AND LENGTH PROVIDED BY MANUFACTURER FOR METAL PIPES ONLY.

2-#6 BARS FOR RC PIPES

Dia=60" OR GREATER

0.6 Dia

TYPE C WALL

MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS IN THE FIELD.

SECTION E-E

REINFORCED CONCRETE WINGWALLS

"H"	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
W	5'-7"	6'-2"	6'-8"	7'-1"	7'-6"	7'-10"	8'-3"	8'-8"	9'-2"	9'-7"	10'-2"	10'-6"	11'-1"	11'-6"	11'-11"	12'-5"	12'-10"
C	1'-5"	1'-7"	1'-9"	1'-11"	2'-1"	2'-3"	2'-5"	2'-8"	2'-10"	3'-1"	3'-4"	3'-6"	3'-8"	3'-10"	4'-0"	4'-2"	4'-4"
B	4'-2"	4'-7"	4'-11"	5'-2"	5'-5"	5'-7"	5'-10"	6'-0"	6'-4"	6'-6"	6'-10"	7'-0"	7'-5"	7'-8"	7'-11"	8'-3"	8'-6"
F	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-3"	1'-5"	1'-5"	1'-6"	1'-6"	1'-8"	1'-10"	1'-10"	2'-0"	2'-0"
D	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	0'-8"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
BATTER	None									½:12							
S	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6½"	1'-7"	1'-7½"	1'-8"	1'-8½"	1'-9"	1'-9½"	1'-10"
"c" BARS	#4@12	#4@10	#5@11	#5@9	#6@9	#7@9	#7@8	#8@9	#7@7	#8@11	#9@12	#10@10	#10@10	#10@10	#10@9	#10@9	#11@9
"d" BARS	#5@12	#5@10	#6@11	#6@9	#6@9	#6@9	#6@8	#7@9	#6@7	#7@11	#8@12	#8@10	#9@10	#9@10	#9@9	#9@9	#10@9
* Conc CY/LF	0.459	0.522	0.58	0.635	0.69	0.742	0.797	0.879	0.995	1.247	1.368	1.448	1.611	1.772	1.865	2.043	2.143
* Reinf LB/LF	26	32	41	50	59	70	81	95	102	99	120	156	171	181	190	217	267
** Case I qu (ksf), B' (ft)	3.75,2.24	3.66,2.69	3.59,3.11	3.56,3.49	3.52,3.89	3.52,4.21	3.69,4.46	3.77,4.77	3.89,5.17	3.92,5.61	3.92,6.18	4.03,6.40	4.13,6.95	4.28,7.26	4.39,7.57	4.65,7.82	4.85,8.02
** Case II qu (ksf), B' (ft)	1.16,5.58	1.33,6.13	1.51,6.55	1.69,6.86	1.88,7.16	2.08,7.33	2.29,7.60	2.50,7.86	2.77,8.14	2.97,8.47	3.18,8.93	3.41,9.05	3.70,9.43	4.02,9.58	4.26,9.80	4.57,10.05	4.82,10.27
** Case III qu (ksf), B' (ft)	1.26,5.46	1.36,5.97	1.49,6.37	1.64,6.66	1.79,6.93	1.95,7.08	2.11,7.33	2.28,7.55	2.50,7.84	2.66,8.12	2.81,8.59	3.00,8.69	3.22,9.10	3.49,9.18	3.65,9.79	3.89,9.74	4.07,9.96

B'=B-(2) eccentricity, B' is the effective footing width.

* Quantities include 1'-0" extension above the design "H" limit.

** Soil pressure shown in the table is the equivalent uniform pressure per AASHTO LRFD - 11.6.3.2

MATCH PARAPET

FILL SLOPE

#4 ALONG TOP OF WALL

5'-0" Max FOR 1½:1 FILL SLOPES, UNLIMITED FOR FLATTER THAN 1½:1

GUTTER OR SHOULDER

VERTICAL

"c" BARS

#4 @ 12

2" Clr

DESIGN "H"

Br Det 3-1 @ 15'-0"± CENTERS 1'-0" ABOVE OUTSIDE GROUND. SEE STANDARD PLAN B0-3.

SHORT "c" BARS

Const Jt

35 Dia

VERTICAL UNLESS ADJACENT TO BATTERED SECTION, THEN MATCH "d" bars

#4 TOTAL 7

3" Clr

BATTER ½:12

SHORT "c" BARS

"d" BARS

#4 @ Tot 5

TYPICAL SECTION H=4' THRU 12'

TYPICAL SECTION H=13' THRU 20'

"L"

INSIDE GROUND LINE

NEOPRENE STRIP (Typ)

½" Exp Jt FILLER

SLOPE VARIES 1½:1 OR FLATTER

Dia=60" OR GREATER

2-#6

2-#6 @ 12

TYPE A

END ELEVATION

STRAIGHT WINGWALLS

TYPE B

For footing step dimensions and reinforcement see "Footing Step" on Std Plan B3-5

NOTES:

Unit Stresses: fy = 60,000 psi
f'c = 3,600 psi
Earth density: 120 pcf
Equivalent fluid pressure: 36 pcf
Elevation, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field. Wall height may be exceeded by 6" before going to the next greater "H".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT HEADWALLS, ENDWALLS AND WINGWALLS TYPES A, B AND C

NO SCALE

D90

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

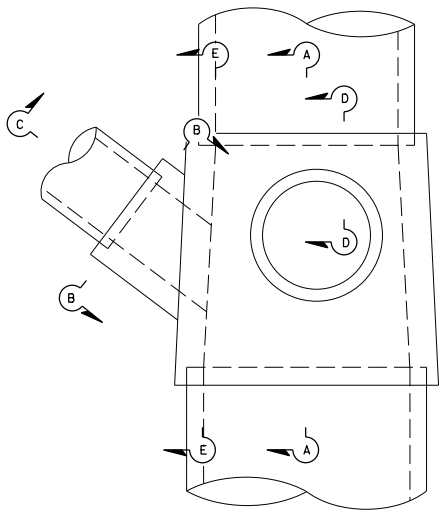
REGISTERED CIVIL ENGINEER

May 31, 2018

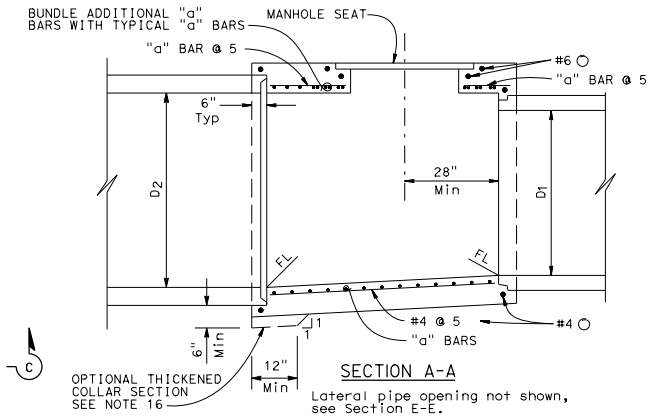
PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

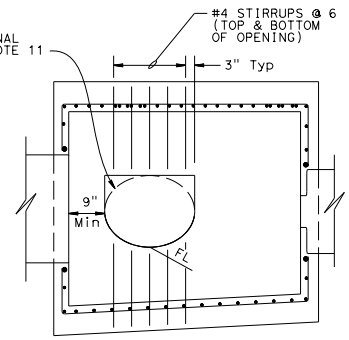


PLAN

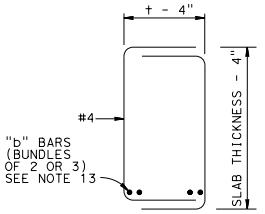


SECTION A-A

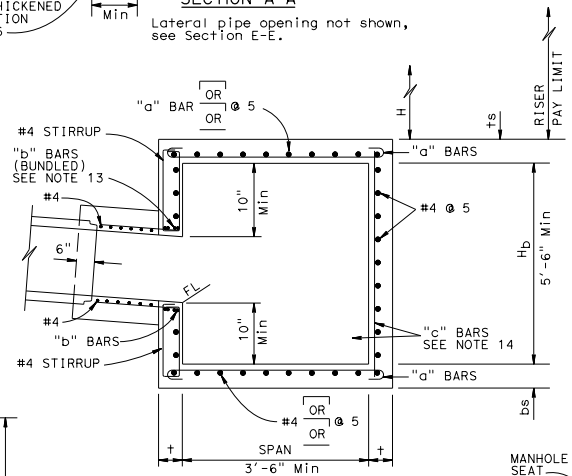
Lateral pipe opening not shown, see Section E-E.



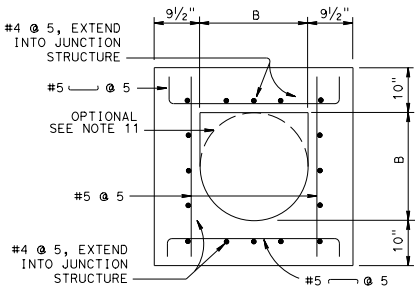
SECTION E-E



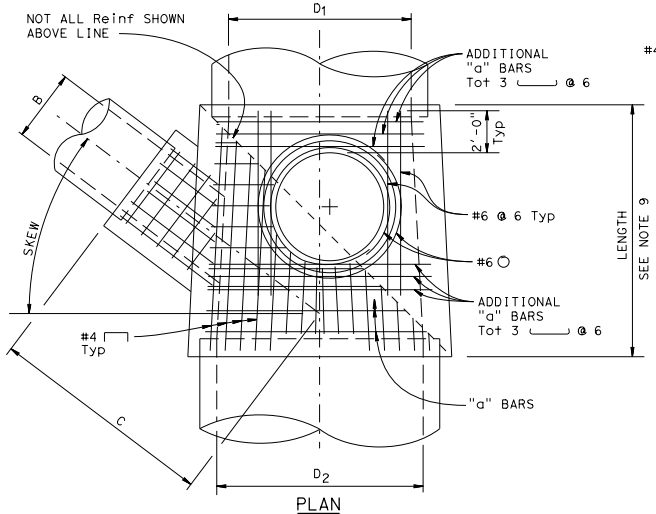
STIRRUPS



SECTION C-C

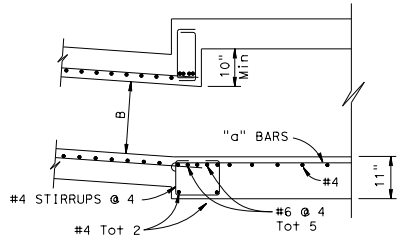


SECTION B-B



PLAN

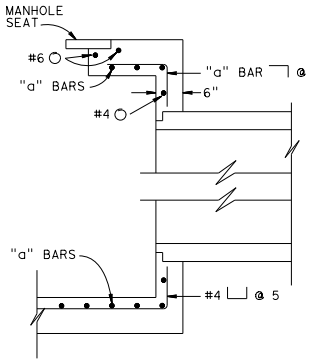
Not all reinforcement shown.



SECTION C-C (OPTIONAL)

Maximum fill height = 10.0'

For reinforcement and details not shown, see Section C-C.



SECTION D-D

For Design Notes, General Notes, Design Tables and additional details, see Standard Plan D91B.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE JUNCTION STRUCTURE

NO SCALE

D91A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Carl M. Duan No. C59976 Exp. 6-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN NOTES:

Design Specifications:
AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments.

Loading:
Live load: (AASHTO LRFD Chapter 3.6.1.2)
HL-93 consists of design truck or design tandem and design lane load

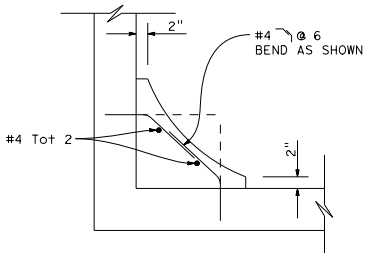
Impact Factor: (Apply to top slab only)
$IM = 33(1.0-0.125D_E) \geq 0\%$
D_E = minimum depth of earth cover

Earth load:
Earth pressure for one condition:
140 pcf vertical, 100 pcf horizontal

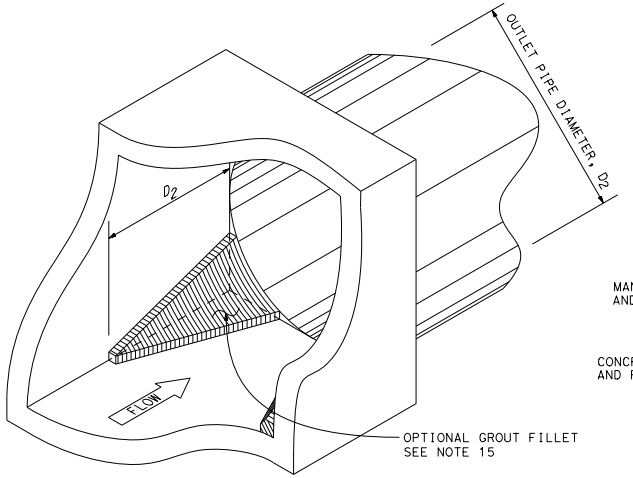
Load Factors:
AASHTO LRFD Table 3.4.1.1 & Table 3.4.1.2

Unit stresses:
f'_c = 3600 psi
fy = 60,000 psi

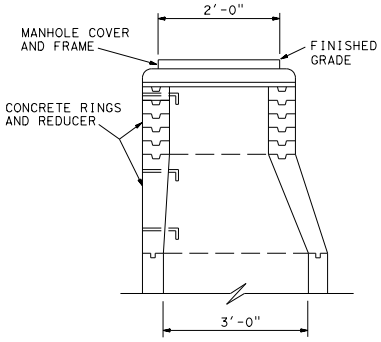
Shear:
$V_c = \text{Beta}\sqrt{f'_c}\, b_v d_v$ (Pounds)



TYPICAL FILLET SECTION



ISOMETRIC FILLET DETAIL



TYPE MH

UPPER STRUCTURE

GENERAL NOTES:

1. Risers shall be positioned to either side of the structure as shown.
2. Each riser shall have a ladder. For details see Standard Plan D93A.
3. Thickness of deck shall vary as necessary to provide a level manhole seat. Hb is equal to the largest inside height dimension between the top and bottom slabs.
4. Reinforcing steel shall be placed 2" clear, except as shown.
5. Maximum skew of lateral pipe B is 45°.
6. Lateral pipe may be placed in either side wall.
7. Where D_1 or D_2 is less than 3.5', clear distance between side walls shall be 3.5'. Where D_1 or D_2 is less than 5.5', Hb shall be 5.5'. D_1 and D_2 limited to 10' maximum diameter. End walls shall be 6" thick with #4 @ 12 placed both ways.
8. Side walls shall be flush with the inside of the inlet and outlet pipes when pipe diameters are 3.5' or more. Span is equal to the largest inside width dimension between the side walls.
9. Length is 5'-0" minimum.
10. When C is not specified, bring the lateral pipe directly into the wall of the structure.
11. When C is specified, the Contractor may, at his option, bring the lateral pipe directly into the wall for use as an inside form. A collar conforming with the wall thickness and reinforcement as shown in section B-B shall be poured around the pipe.
12. When the lateral pipe is extended directly into the wall, it shall be mitered as necessary to be flush with wall.
13. "b" bars shall extend a minimum of 8" on either side of the opening.
14. Adjacent to each side of the opening, place additional reinforcement equivalent to half the interrupted main reinforcement.
15. Optional fillet at outlet pipe placed at the direction of the Engineer.
16. Minimum thickness around pipe connections shall be 6". Wall and slab thicknesses may be increased beyond the minimums shown in the design tables or a thickened collar may be added to the local pipe connection area to achieve the minimum thickness. If a thickened collar is used, minimum width shall be one half of the corresponding pipe diameter and centered on the pipe section.

	10.0' Max COVER		20.0' Max COVER	
SPAN	"a" BARS	TOP AND BOTTOM SLAB THICKNESS (ts, bs)	"a" BARS	TOP AND BOTTOM SLAB THICKNESS (ts, bs)
3.5'	#4 @ 7	14.5"	#4 @ 7	14.5"
4.0'	#4 @ 7	14.5"	#4 @ 7	14.5"
4.5'	#4 @ 6	13.5"	#4 @ 6	13.5"
5.0'	#4 @ 5	12"	#4 @ 5	12"
5.5'	#4 @ 4	10.5"	#4 @ 4	10.5"
6.0'	#4 @ 4	10.5"	#5 @ 5	10.5"
6.5'	#5 @ 6	10"	#5 @ 4.5	10.5"
7.0'	#5 @ 6	10"	#5 @ 4.5	11.5"
7.5'	#5 @ 5.5	10"	#5 @ 4.5	12.5"
8.0'	#5 @ 5	10"	#5 @ 4.5	13.5"
8.5'	#6 @ 5	9.5"	#6 @ 5.5	13.5"
9.0'	#6 @ 4.5	9.5"	#6 @ 5.5	14.5"
9.5'	#6 @ 4.5	10"	#6 @ 5	15.5"
10.0'	#6 @ 4.5	10.5"	#6 @ 5	16.5"

	10.0' Max COVER		20.0' Max COVER	
H_b	"c" BARS	SIDEWALL THICKNESS (t)	"c" BARS	SIDEWALL THICKNESS (t)
5.5'	#4 @ 6	8"	#4 @ 4.5	9.5"
6.0'	#4 @ 5	8"	#5 @ 5.5	9.5"
6.5'	#5 @ 6	8"	#5 @ 4.5	9.5"
7.0'	#5 @ 5	8"	#5 @ 4.5	10"
7.5'	#5 @ 4.5	8"	#5 @ 4.5	11"
8.0'	#5 @ 4	8.5"	#5 @ 4	11.5"
8.5'	#6 @ 5	9"	#6 @ 6	12.5"
9.0'	#6 @ 5	9.5"	#6 @ 5	13"
9.5'	#6 @ 4.5	10"	#6 @ 5	14"
10.0'	#6 @ 4.5	10.5"	#6 @ 5	15"

B	"b" BARS TOP & BOTTOM
2.5'	#5 Tot 4
3.0'	#5 Tot 4
3.5'	#5 Tot 4
4.0'	#5 Tot 4
4.5'	#5 Tot 4
5.0'	#6 Tot 4
5.5'	#6 Tot 6
6.0'	#6 Tot 6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE REINFORCED CONCRETE JUNCTION STRUCTURE

NO SCALE

D91B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

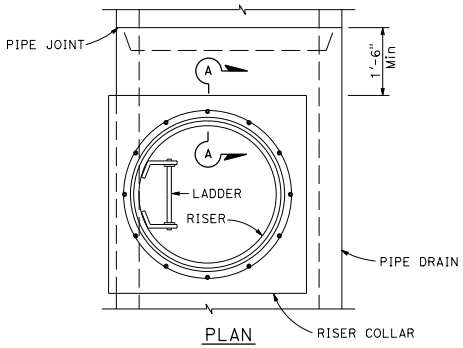
REGISTERED CIVIL ENGINEER

May 31, 2018

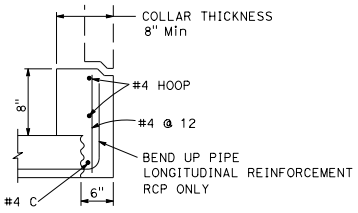
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

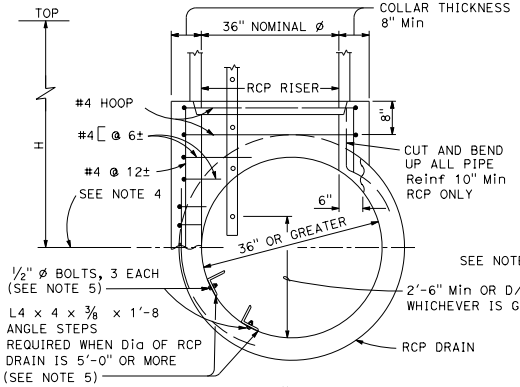
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



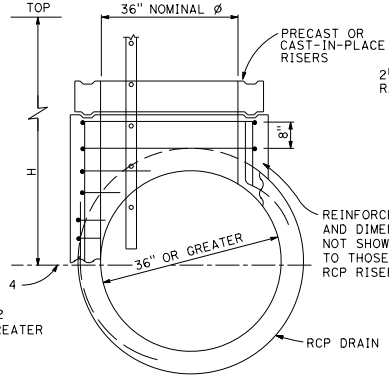
PLAN



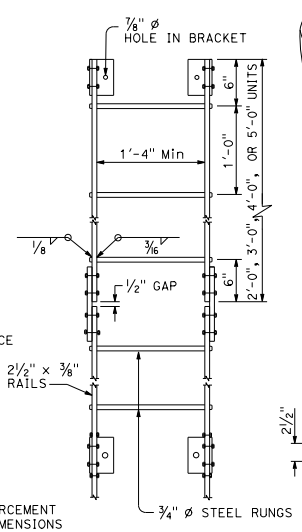
SECTION A-A

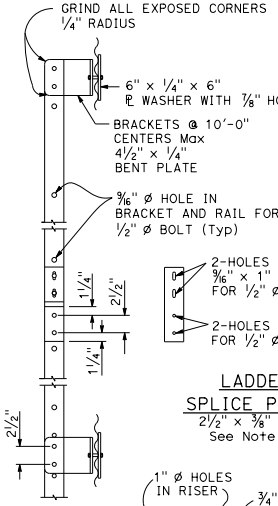


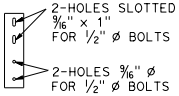
WITH 36" RCP RISER



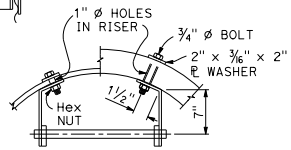
WITH 36" PRECAST RISERS





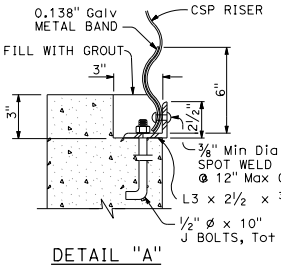


LADDER
SPLICE PLATE
2½" x ⅜" x 10"
See Note 3

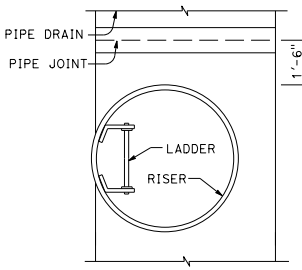


LADDER CONNECTION TO RISER

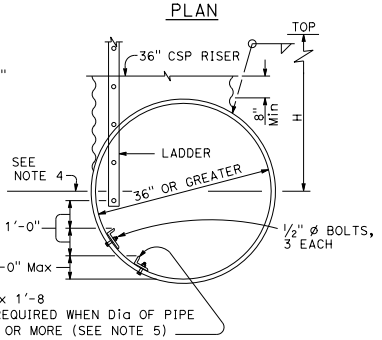
LADDER DETAILS
See Notes 1, 2 and 6



DETAIL "A"

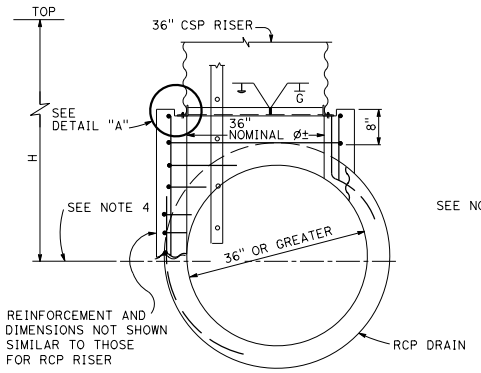


PLAN

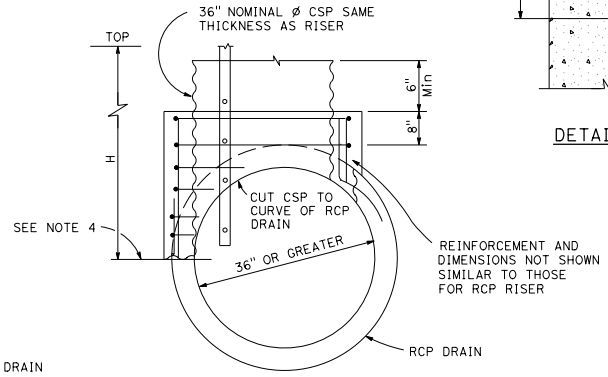


WITH 36" CSP RISER

CORRUGATED STEEL PIPE OR
STRUCTURAL PLATE PIPE DRAIN



WITH 36" CSP RISER



WITH 36" CSP RISER
ALTERNATIVE COLLAR DETAIL

REINFORCED CONCRETE PIPE DRAIN

NOTES:

1. Ladder may be constructed in one length at contractor's option on reinforced concrete pipe risers.
2. On corrugated steel pipe riser, connect ladder splice plate so joint can compress ½".
3. Ladder splice plate to be connected with ½" Ø bolts with double nuts.
4. Pay limit for 36" risers to centerline of cross pipe.
5. Where angle steps are required, the lowest angle shall not be more than 1'-0" above the flowline of the drain. The distance between angle steps and between the uppermost angle step and the lowest rung of the ladder shall not exceed 1'-0". Power driven fasteners, equivalent to the ½" bolts shown, may be used for fixing the angle steps to the wall of the reinforced concrete pipe drain.
6. Install ladder so that the highest rung is not more than 1'-0" below the top of the riser.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE RISER CONNECTIONS

NO SCALE

D93A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

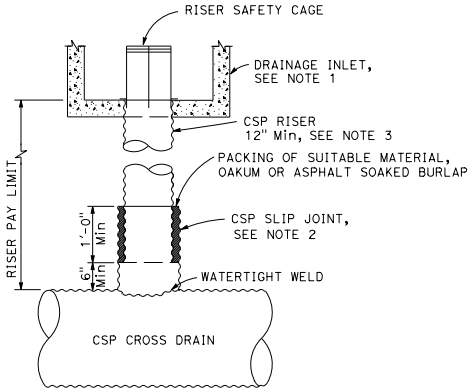
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

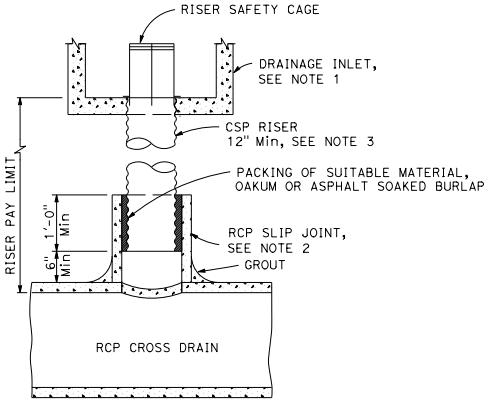
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

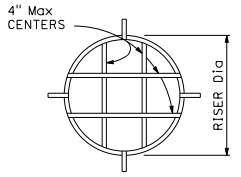
1. Structure at top of riser may be any standard drainage inlet or pipe inlet.
2. Diameter of slip joint to be 3" greater than diameter of riser.
3. Plastic pipe riser may be substituted for CSP riser shown. Slip joint diameter to be as necessary to accommodate plastic pipe outside diameter.
4. For plastic pipe cross drain, use fabricated reducing tee of same material as cross drain as appropriate to provide watertight connection.



CSP RISER FOR DRAINAGE INLET

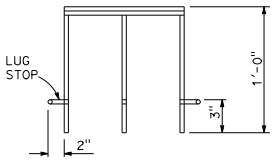


CSP RISER FOR DRAINAGE INLET



PLAN

#3 Bars throughout with welded joints



ELEVATION

RISER SAFETY CAGE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DRAINAGE INLET RISER CONNECTIONS

NO SCALE

D93B

1-29-18

2018 STANDARD PLAN D93B

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

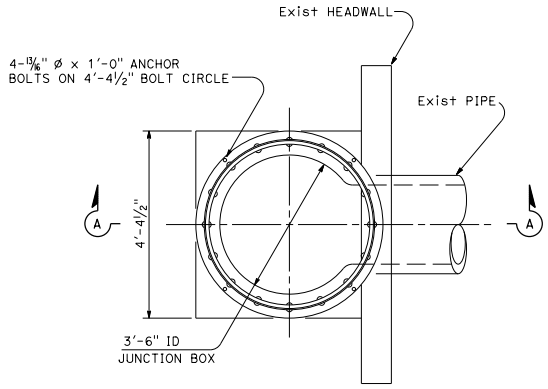
REGISTERED CIVIL ENGINEER

May 31, 2018

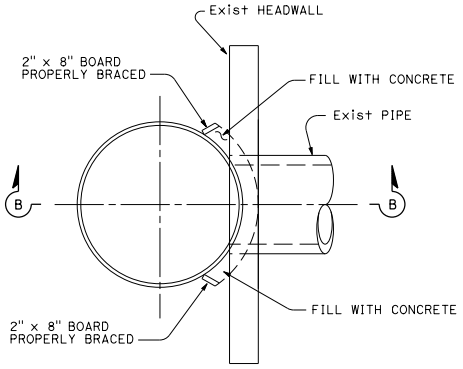
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

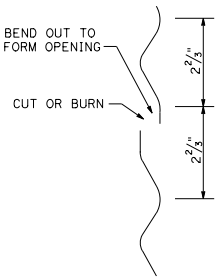
REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA



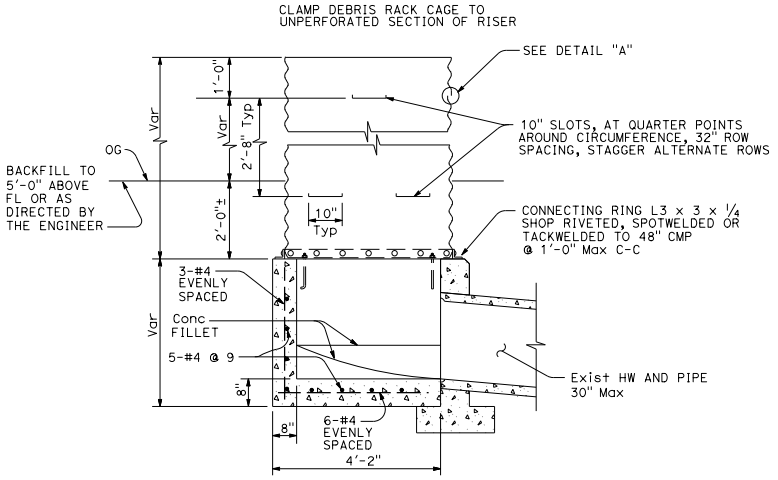
PLAN



PLAN



DETAIL "A"

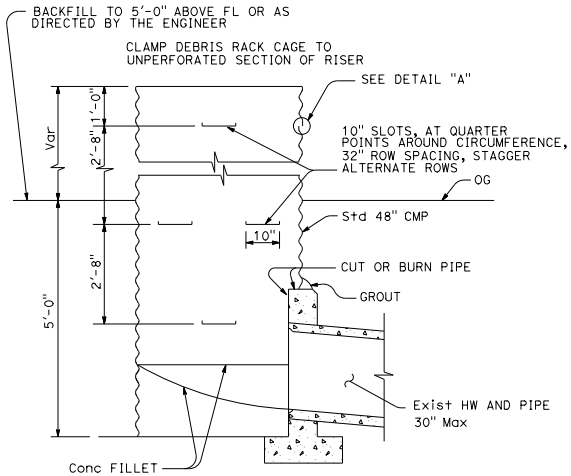


SECTION A-A

CMP RISER

AND JUNCTION BOX

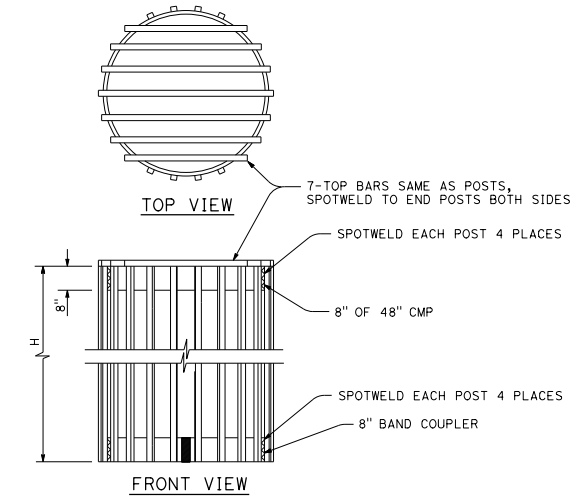
TYPE A



SECTION B-B

CMP RISER

TYPE B



H = 22 Posts- 6'-0" or 8'-0" lengths use 2" pipe or L2 x 2 x ⅜ (Galvanized steel or aluminum)

DEBRIS RACK CAGE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE RISER WITH DEBRIS RACK CAGE

NO SCALE

D93C

1-29-18

2018 STANDARD PLAN D93C

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

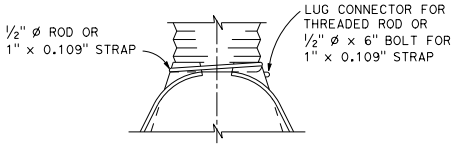
REGISTERED CIVIL ENGINEER

May 31, 2018

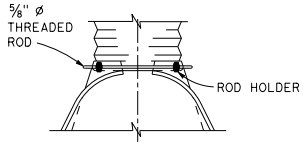
PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

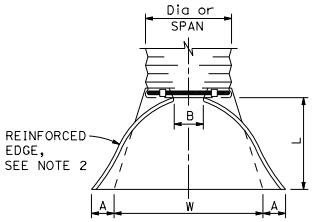
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



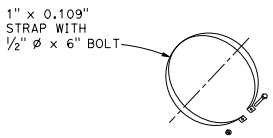
TYPE I



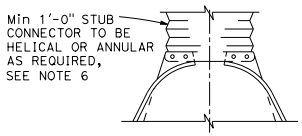
TYPE II



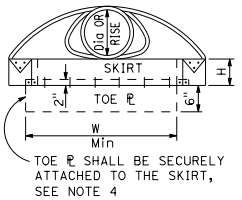
PLAN



CONNECTOR STRAP DETAIL



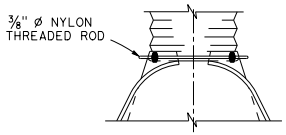
TYPE III



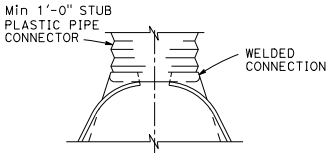
ELEVATION

ALTERNATIVE CONNECTIONS FOR PIPE TO METAL FLARED END SECTIONS

See Note 7

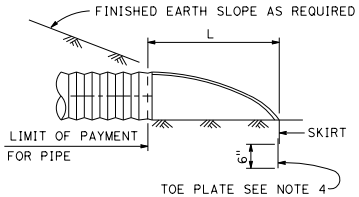


TYPE A
12" - 24"



TYPE B
30" - 36"

ALTERNATIVE CONNECTIONS FOR PIPE TO PLASTIC FLARED END SECTIONS



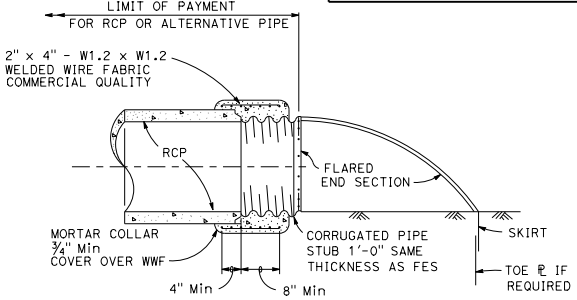
TYPICAL CROSS-SECTION

CIRCULAR PIPES						
PIPE Dia	END SECTION THICKNESS	DIMENSION				
		A	B	H	L	W
		1"±	Max	1"±	1½"±	2"±
12"*	0.064"	6"	6"	6"	1'-9"	2'-0"
15"*	0.064"	7"	8"	6"	2'-2"	2'-6"
18"*	0.064"	8"	10"	6"	2'-7"	3'-0"
21"	0.064"	9"	1'-0"	6"	3'-0"	3'-6"
24"*	0.064"	10"	1'-1"	6"	3'-5"	4'-0"
30"*	0.079"	1'-0"	1'-4"	8"	4'-3"	5'-0"
36"*	0.079"	1'-2"	1'-7"	9"	5'-0"	6'-0"
42"	0.109"	1'-4"	1'-10"	11"	5'-9"	7'-0"
48"	0.109"	1'-6"	2'-3"	1'-0"	6'-6"	7'-6"
54"	0.109"	1'-6"	2'-6"	1'-0"	7'-0"	8'-6"
60"	0.109"	1'-6"	2'-9"	1'-0"	7'-3"	9'-6"
66"	0.109"	1'-6"	3'-0"	1'-0"	7'-3"	10'-0"
72"	0.109"	1'-6"	3'-3"	1'-0"	7'-3"	10'-6"
78"	0.109"	1'-6"	3'-6"	1'-0"	7'-3"	11'-0"
84"	0.109"	1'-6"	3'-9"	1'-0"	7'-3"	11'-6"

* Equivalent plastic FES to meet AASHTO M-294 and ASTM D-1248 Specifications, and shall conform to all dimensions shown above except for end section thickness, which may be 0.004" thinner.

PIPE-ARCHES							
DESIGNATION		END SECTION THICKNESS	DIMENSION				
			A	B	H	L	W
SPAN	RISE		1"±	Max	1"±	1½"±	2"±
21"	15"	0.064"	7"	10"	6"	1'-11"	3'-0"
24"	18"	0.064"	8"	1'-0"	6"	2'-4"	3'-6"
28"	20"	0.064"	9"	1'-2"	6"	2'-8"	4'-0"
35"	24"	0.079"	10"	1'-4"	6"	3'-3"	5'-0"
42"	29"	0.079"	1'-0"	1'-6"	8"	3'-10"	6'-3"
49"	33"	0.109"	1'-1"	1'-9"	9"	4'-5"	7'-1"
57"	38"	0.109"	1'-6"	2'-2"	1'-0"	5'-3"	7'-6"
64"	43"	0.109"	1'-6"	2'-6"	1'-0"	5'-10"	8'-6"
71"	47"	0.109"	1'-6"	2'-9"	1'-0"	6'-5"	9'-6"
77"	52"	0.109"	1'-6"	3'-0"	1'-0"	6'-5"	10'-6"
83"	57"	0.109"	1'-6"	3'-3"	1'-0"	6'-5"	11'-6"

FLARED END SECTIONS FOR CORRUGATED METAL AND PLASTIC PIPE CULVERTS



FLARED END SECTION CONNECTION TO RCP

NOTES:

1. All 3-piece bodies to have 0.109" thick sides and 0.138" thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by rivets or bolts.
2. Reinforced edges to be supplemented with stiffener angles for the 60" thru 84" round, 77" x 52" and 83" x 57" pipe-arch sizes. The angles will be 2" x 2" x ¼" for the 60" thru 72" round, 77" x 52" and 83" x 57" pipe-arch sizes and 2½" x 2½" x ¼" for 78" and 84" round. The angles to be attached by ⅜" ø nuts and bolts.
3. Angle reinforcement shall be placed under the center panel seams on the 77" x 52" and 83" x 57" pipe-arch sizes.
4. Toe plate to be available as an accessory when specified.
5. End of pipe to be finished with annular corrugations to conform flared end section so that minimal leakage results from the connection. Other designs may be used with approval of the Engineer.
6. For 12" thru 24" helical end section connection, a universal coupling band attached to the metal end section by rivets, bolts or 1" long shop tack welds spaced at same intervals as dimples may be used in place of the 12" stub. See Standard Plan D97C.
7. The types of alternative connections for pipe to metal flared end sections shall conform to the following:

   CIRCULAR PIPES -
   12" thru 24" Type I or III
   30" thru 84" Type II or III

   PIPE-ARCHES -
   21" x 15" thru 57" x 38" Type II or III
   64" x 43" thru 83" x 57" Type III

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

METAL AND PLASTIC FLARED END SECTIONS

NO SCALE

D94A

1-29-18

Return to Table of Contents

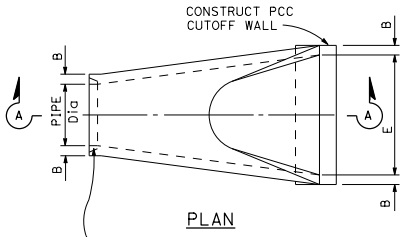
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

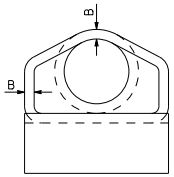
REGISTERED CIVIL ENGINEER

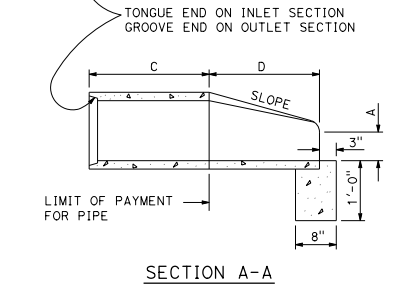
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

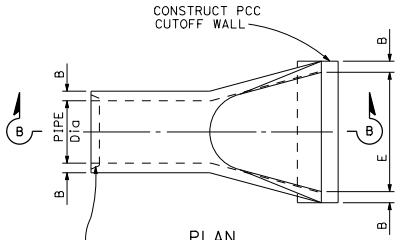


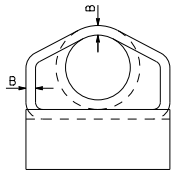


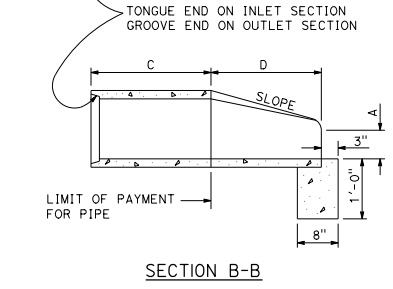


MINIMUM DIMENSIONS						
PIPE Dia	A	B	C	D	E	SLOPE
12"	4"	1¾"	SEE NOTE 2	2'-0"	2'-0"	2:1 OR FLATTER
18"	9"	2¼"		2'-3"	3'-0"	
24"	9½"	2¾"		3'-7½"	4'-0"	
30"	1'-0"	3¼"		4'-6"	5'-0"	
36"	1'-3"	3¾"		5'-3"	6'-0"	
42"	1'-9"	4¼"		5'-3"	6'-6"	
48"	2'-0"	4¾"		6'-0"	7'-0"	
54"	2'-3"	5¼"		5'-5"	7'-6"	

PRECAST CONCRETE FLARED END SECTION TYPE A







MINIMUM DIMENSIONS						
PIPE Dia	A	B	C	D	E	SLOPE
12"	4"	1½"	SEE NOTE 2	1'-10"	2'-0"	2:1 OR FLATTER
18"	9"	1¾"		2'-1"	3'-0"	
24"	9½"	2¼"		3'-6"	4'-0"	
30"	1'-0"	2¾"		4'-5"	5'-0"	
36"	1'-3"	3¼"		5'-2"	6'-0"	
42"	1'-9"	3½"		5'-3"	6'-6"	
48"	2'-0"	4"		6'-0"	7'-0"	
54"	2'-3"	4⅜"		5'-6"	6'-10"	

PRECAST CONCRETE FLARED END SECTION TYPE B

NOTES:

1. Contractor has the option of using either Type A or B precast concrete flared end section.
2. "C" dimension varies by manufacturer and will be paid for as concrete pipe.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE FLARED END SECTIONS

NO SCALE

D94B

1-29-18

Return to Table of Contents

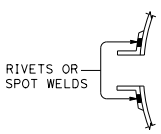
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

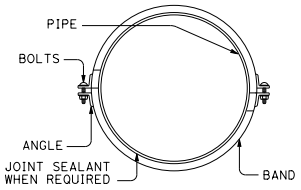
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

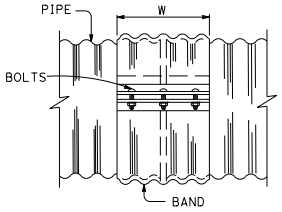
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



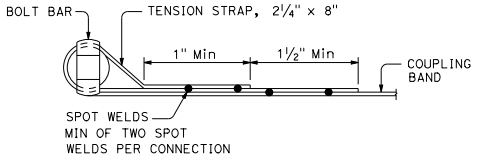


END VIEW

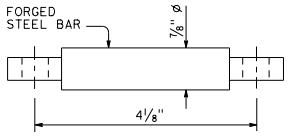


SIDE VIEW

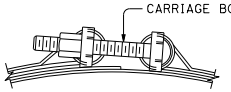
ANNULAR BAND



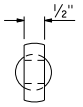
STRAP DETAIL



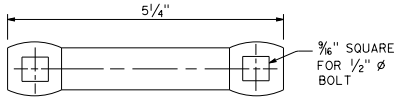
TOP VIEW



BOLT DETAIL



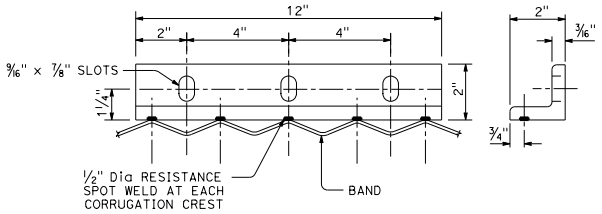
LEFT SIDE
VIEW



FRONT VIEW

BAR DETAIL

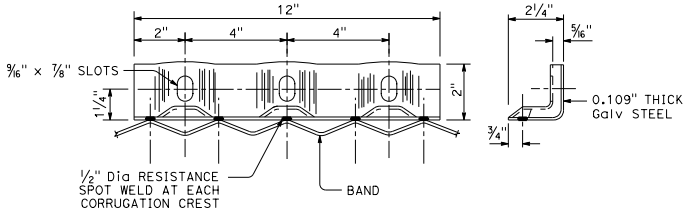
BAR AND STRAP CONNECTOR



SIDE VIEW END VIEW

2" x 2" x 3/16" ANGLE

See tables on Standard Plans D97E, D97F and D97G for width, W=12" shown.



SIDE VIEW END VIEW

DIE-FORMED ANGLE

See tables on Standard Plans D97E and D97G for width, W=12" shown.

Alternate only for standard joints on pipes through 72" diameter and downdrains through 24" diameter.

ANGLE CONNECTORS

NOTES:

1. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard Specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 1 ANNULAR COUPLING BAND BAR AND STRAP AND ANGLE CONNECTIONS

NO SCALE

D97A

1-29-18

Return to Table of Contents

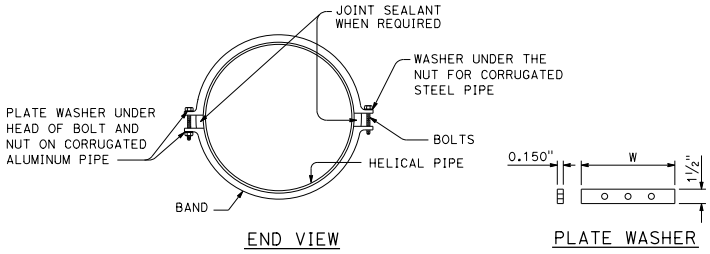
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

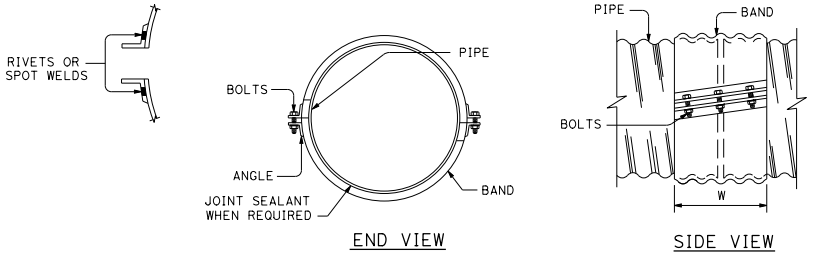
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

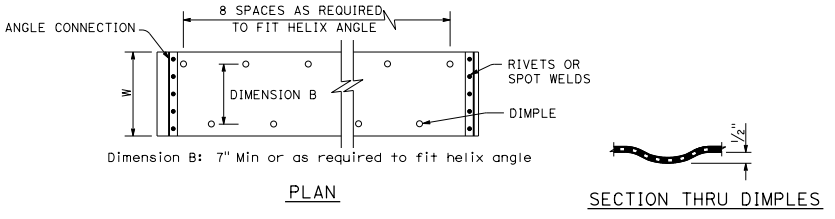


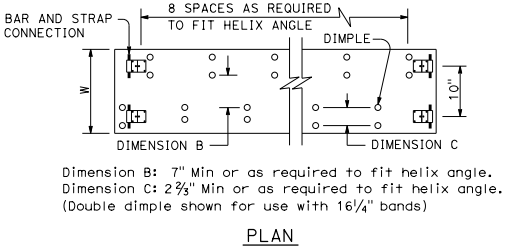
TWO PIECE INTEGRAL FLANGE DIE FORMED BAND



HELICAL COUPLING BANDS

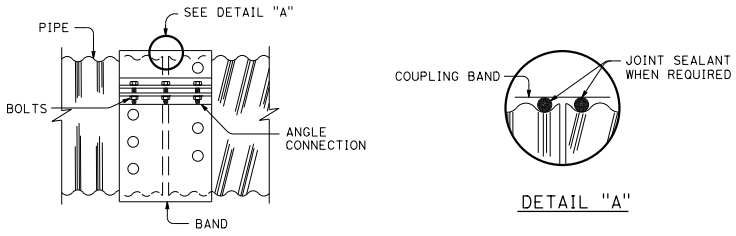
HELICAL BAND





NOTES:

1. All ferrous metal coupling band connection hardware shall be galvanized or electroplated in accordance with the Standard specifications.
2. Dimensions and thicknesses shown are minimum.
3. Spot welds shall develop minimum required strength of strap.
4. Fillet welds of equivalent strength may be substituted for spot welds or rivets.



UNIVERSAL COUPLING BANDS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 3 HELICAL AND UNIVERSAL COUPLERS

NO SCALE

D97C

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

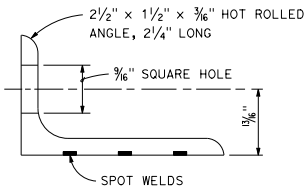
REGISTERED CIVIL ENGINEER

May 31, 2018

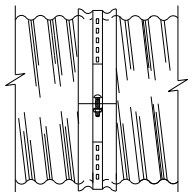
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

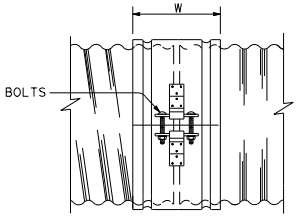
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



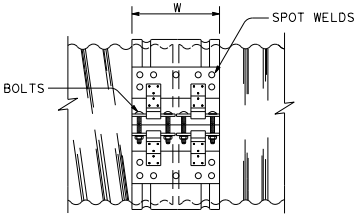
ANGLE



SIDE VIEW
ANGLE



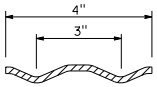
SIDE VIEW
SINGLE BAR AND STRAP



SIDE VIEW
DOUBLE BAR AND STRAP

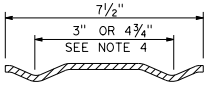
NOTES:

1. Dimensions and thicknesses shown are minimum.
2. Spot welds shall develop minimum required strength of strap.
3. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
4. Dimension depends upon whether end condition is lips up or lips down.



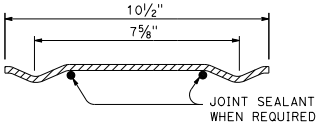
SECTION

H-4 HUGGER BAND



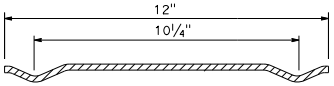
SECTION

H-7 HUGGER BAND



SECTION

H-10 HUGGER BAND



SECTION

H-12 HUGGER BAND

HUGGER COUPLING BANDS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 4 HUGGER COUPLING BANDS

NO SCALE

D97D

1-29-18

2018 STANDARD PLAN D97D

Return to Table of Contents

ANNULAR AND HELICAL PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No.- Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	CSP	CAP	CSP	CAP	CSP	CAP	CSP
TWO PIECE INTEGRAL FLANGE	1½" x ¼"	6"-10"	7"	0.052"-0.079"	0.048"-0.060"	0.052"	0.060"							2-⅜"	2-⅜"			
		12"-18"	7"	0.052"-0.079"		0.064"								2-½"				
	2⅔" x ½"	12"-24"	7"	0.052"-0.079"	0.060"-0.105"	0.064"	0.060"							2-½"	2-½"			
UNIVERSAL	2⅔" x ½"	THROUGH 36"	12"	0.052"-0.138"	0.060"-0.135"	0.052"	0.060"					2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	3-½"
		42"-60"	12"	0.052"-0.168"	0.075"-0.164"	0.052"	0.060"					2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		THROUGH 72"	12"	0.052"-0.168"	0.164"	0.052"	0.105"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		78"-84"	16¼"	0.168"		0.079"		DOUBLE 0.079"	½"	⅞"	32 ksi							
ANNULAR	2⅔" x ½"	THROUGH 36"	7"	0.064"-0.138"	0.060"-0.135"	0.052"	0.060"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	2-½"	2-½"	3-⅜"	3-⅜"	3-½"
		42"-72"	12"	0.064"-0.168"	0.075"-0.164"	0.052"	0.105"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		78"-84"	12"	0.168"		0.079"		0.109"	½"	⅞"	45 ksi	2" x 2" x 3/16"		3-½"		3-⅜"		5-½"
	3" x 1"	48"-90"	14"	0.064"-0.109"		0.052"		0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"		3-½"		3-⅜"		5-½"
		96"-120"	14"	0.079"-0.109"		0.052"		0.109"	½"	⅞"	45 ksi	2" x 2" x 3/16"		3-½"		4-⅜"		
		42"-108"	14"		0.060"-0.135"		0.060"						2" x 2" x 3/16"		3-½"		3-⅜"	
HELICAL	2⅔" x ½"	THROUGH 36"	12"	0.052"-0.138"	0.060"-0.135"	0.052"	0.060"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	3-½"
		42"-72"	12"	0.052"-0.168"	0.075"-0.164"	0.052"	0.060"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		78"-84"	12"	0.168"		0.079"		0.109"	½"	⅞"	45 ksi	2" x 2" x 3/16"		3-½"		3-⅜"		5-½"
	3" x 1"	48"-90"	14"	0.064"-0.109"		0.052"		0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"		3-½"		3-⅜"		5-½"
		96"-120"	14"	0.079"-0.109"		0.052"		0.109"	½"	⅞"	45 ksi	2" x 2" x 3/16"		3-½"		4-⅜"		
		42"-108"	14"		0.060"-0.135"		0.060"						2" x 2" x 3/16"		3-½"		3-⅜"	
HUGGER	2⅔" x ½" REROLLED END	12"-54"	4"	0.052"-0.109"		0.052"						2½" x 1½" x 3/16"	2½" x 1½" x 3/16"	1-½"				3-½"
		60"-66"	4"	0.109"		0.064"						2½" x 1½" x 3/16"	2½" x 1½" x 3/16"	1-½"				3-½"
		36"-48"	4"	0.138"		0.064"						2½" x 1½" x 3/16"	2½" x 1½" x 3/16"	1-½"				3-½"
		THROUGH 72"	10½"	0.052"-0.168"		0.052"		0.079"	½"	⅞"	32 ksi							
		78"-84"	10½"	0.168"		0.079"		0.109"	½"	⅞"	45 ksi							
	3" x 1" REROLLED END	48"-90"	10½"	0.064"-0.109"		0.052"		0.079"	½"	⅞"	32 ksi							
		96"-120"	10½"	0.079"-0.109"		0.052"		0.109"	½"	⅞"	45 ksi							
	5" x 1" REROLLED END	48"-66"	7½"	0.064"-0.109"		0.064"		0.079"	½"	⅞"	32 ksi	2½" x 1½" x 3/16"	2½" x 1½" x 3/16"	1-½"				3-½"
		72"-90"	7½"	0.064"-0.079"		0.064"		0.079"	½"	⅞"	32 ksi	2½" x 1½" x 3/16"	2½" x 1½" x 3/16"	1-½"				3-½"
		48"-90"	7½"	0.064"-0.138"		0.064"		0.079"	½"	⅞"	32 ksi							
		48"-120"	12") SEE	0.064"-0.109"		0.064"		0.079"	½"	⅞"	32 ksi							
		48"-84"	12") NOTE	0.138"		0.064"		0.079"	½"	⅞"	32 ksi							
		90"-120"	12") 10	0.138"		0.064"		DOUBLE 0.079"	½"	⅞"	32 ksi							

SPIRAL RIB PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (SSRP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No.- Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				SSRP	ASRP	SSRP	ASRP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	SSRP	ASRP	SSRP	ASRP	SSRP	ASRP	SSRP
ANNULAR	2⅔" x ½" * REROLLED END	24"-36"	12"	0.064"-0.109"	0.060"-0.105"	0.052"	0.060"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-60"	12"	0.064"-0.109"	0.075"-0.105"	0.052"	0.105"	0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		66"-72"	12"	0.064"-0.109"		0.052"		0.079"	½"	⅞"	32 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		78"-114"	12"	0.079"-0.109"		0.079"		0.109"	½"	⅞"	45 ksi	2" x 2" x 3/16"	2" x 2" x 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
HUGGER	2⅔" x ½" * REROLLED END	24"-72"	10½"	0.064"-0.109"		0.052"		0.079"	½"	⅞"	32 ksi							
		78"-84"	10½"	0.109"		0.079"		0.109"	½"	⅞"	45 ksi							

* See Note 13.

13. All profiles of Spiral Rib Pipe (¾" x ¾" ribs at 7½" pitch and ¾" x 1" ribs at 11½" pitch in both steel and aluminum and ¾" x 1" ribs at 8½" pitch in steel only) shall be manufactured with rerolled ends. Corrugation profile of the rerolled ends shall be 2⅔" x ½" annual corrugations with a minimum of two full corrugations at each end.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
2. Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
3. Use 1¼" gage line dimension on attached angle leg for rivets and spot welds.
4. Band thickness shall not be less than:
   a. 3 standard thicknesses lighter than the thickness of the pipe for Corrugated Steel Pipe.
   b. 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 0.060" for Corrugated Aluminum Pipe.
5. Dimensions, thicknesses and strengths shown are minimum.
6. For pipe arches use same width band as for round pipe of equal periphery.
7. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
8. Spot welds shall develop minimum required strength of strap.
9. Pipe with rerolled ends having at least two 2⅔" x ½" annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 2⅔" x ½" corrugations.
10. In the case of H-12 huggerbands, two piece bands are required for diameters through 96" and three piece bands are required for diameters 102" through 120".
11. Two piece bands are required for pipes greater than 42" diameter.
12. The 2¼" x 2" x 0.109" thick galvanized die-formed angle connector may be used in lieu of the 2" x 2" x ⅜" angle connector for standard joints only on pipes through 72" diameter.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 5 STANDARD JOINT

NO SCALE

D97E

1-29-18

2018 STANDARD PLAN D97E

Return to Table of Contents

ANNULAR AND HELICAL PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No. - Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	CSP	CAP	CSP	CAP	CSP	CAP	CSP
TWO PIECE INTEGRAL FLANGE	1½" × ¼"	6"-10"	7"	0.064"-0.079"	0.060"	0.064"	0.060"							2-⅜"	2-⅜"			
	2⅔" × ½"	12"-24"	12"		0.060"-0.105"		0.060"								3-½"			
UNIVERSAL	2⅔" × ½"	THROUGH 36"	12"	0.064"-0.138"	0.060"-0.135"	0.064"	0.060"	0.079"	½"	⅞"	32 ksi	2" × 2" × 3/16"	2" × 2" × 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-60"	16¼"	0.064"-0.168"	0.060"-0.164"	0.064"	0.060"	DOUBLE 0.079"	½"	⅞"	32 ksi	2" × 2" × ¼"	2" × 2" × ¼"	4-½"	4-½"	5-⅜"	5-⅜"	
ANNULAR	2⅔" × ½"	THROUGH 36"	12"	0.064"-0.138"	0.060"-0.135"	0.064"	0.060"					2" × 2" × 3/16"	2" × 2" × 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-60"	12"	0.064"-0.079"		0.064"						2" × 2" × 3/16"		3-½"		3-⅜"		5-½"
		42"-60"	12"	0.109"-0.168"	0.135"-0.164"	0.064"	0.075"					2" × 2" × ¼"	2" × 2" × ¼"	3-½"	3-½"	5-⅜"	5-⅜"	
		66"-72"	24"		0.164"		0.105"						2" × 2" × ¼"		5-½"		5-½"	
		66"-84"	24"	0.109"-0.168"		0.064"						2" × 2" × ¼"		5-½"		7-⅞"		
		42"-54"	12"		0.060"-0.105"		0.060"						2" × 2" × 3/16"		3-½"		3-⅜"	
	3" × 1"	48"-60"	14"	0.064"-0.079"		0.064"						2" × 2" × 3/16"		3-½"		3-⅜"		5-½"
		48"-60"	14"	0.109"		0.064"						2" × 2" × 3/16"		3-½"		5-⅜"		
		66"-120"	25"	0.064"-0.109"		0.064"						2" × 2" × 3/16"		5-½"		9-⅜"		
		42"-60"	14"		0.060"-0.105"		0.060"						2" × 2" × 3/16"		3-½"		5-⅜"	
		42"-60"	14"		0.135"		0.075"						2" × 2" × ¼"		3-½"		5-⅞"	
		66"-96"	25"		0.060"-0.135"		0.060"						2" × 2" × ¼"		5-½"		7-⅜"	
		96"-108"	25"		0.135"		0.075"						2" × 2" × ¼"		5-½"		7-⅜"	
HELICAL	2⅔" × ½"	THROUGH 36"	12"	0.064"-0.138"	0.060"-0.135"	0.064"	0.060"					2" × 2" × 3/16"	2" × 2" × 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-54"	12"		0.060"-0.105"		0.060"						2" × 2" × 3/16"		3-½"		3-⅜"	
		42"-60"	12"	0.064"-0.079"		0.064"						2" × 2" × 3/16"		3-½"		3-⅜"		5-½"
		42"-60"	12"	0.109"-0.168"	0.135"-0.164"	0.064"	0.075"					2" × 2" × ¼"	2" × 2" × ¼"	3-½"	3-½"	5-⅜"	5-⅜"	
		66'-84"	24"	0.109"-0.168"		0.064"						2" × 2" × ¼"		5-½"		7-⅜"		
		66"-72"	24"		0.164"		0.105"						2" × 2" × ¼"		5-½"		5-⅜"	
	3" × 1"	48"-60"	14"	0.064"-0.079"		0.064"						2" × 2" × 3/16"		3-½"		3-⅜"		5-½"
		48"-60"	14"	0.109"		0.064"						2" × 2" × 3/16"		3-½"		5-⅜"		
		66"-120"	25"	0.064"-0.109"		0.064"						2" × 2" × 3/16"		5-½"		9-⅜"		
		42"-60"	14"		0.060"-0.105"		0.060"						2" × 2" × 3/16"		3-½"		5-⅜"	
		42"-60"	14"		0.135"		0.075"						2" × 2" × ¼"		3-½"		5-⅜"	
		66"-96"	25"		0.060"-0.135"		0.060"						2" × 2" × ¼"		5-½"		7-⅜"	
		96"-108"	25"		0.135"		0.075"						2" × 2" × ¼"		5-½"		7-⅜"	
HUGGER	2⅔" × ½" REROLLED END	THROUGH 48"	10½"	0.109"		0.064"		0.079"	½"	⅞"	32 ksi							
		54"- 66"	10½"	0.109"		0.064"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		THROUGH 54"	10½"	0.064"-0.079"		0.064"		0.079"	½"	⅞"	32 ksi							
		THROUGH 60"	10½"	0.138"		0.079"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		66"-72"	10½"	0.138"		0.109"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		THROUGH 72"	10½"	0.168"		0.109"		DOUBLE 0.109"	½"	⅞"	45 ksi							
	3" × 1" REROLLED END	48"-84"	10½"	0.109"		0.079"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		48"-90"	10½"	0.064"-0.079"		0.064"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		96"-102"	10½"	0.079"		0.079"		DOUBLE 0.079"	½"	⅞"	32 ksi							
		90"-120"	10½"	0.109"		0.109"		DOUBLE 0.109"	½"	⅞"	45 ksi							

SPIRAL RIB PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (SSRP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No.- Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				SSRP	ASRP	SSRP	ASRP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	SSRP	ASRP	SSRP	ASRP	SSRP	ASRP	SSRP
ANNULAR	2⅔" × ½" * REROLLED END	24"-36"	12"	0.064"-0.109"	0.060"-0.105"	0.064"	0.060"	0.079"	½"	⅞"	32 ksi	2" × 2" × 3/16"	2" × 2" × 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-60"	12"	0.064"-0.079"	0.075"-0.105"	0.064"	0.075"	0.079"	½"	⅞"	32 ksi	2" × 2" × 3/16"	2" × 2" × 3/16"	3-½"	3-½"	3-⅜"	3-⅜"	5-½"
		42"-60"	12"	0.109"		0.064"		0.079"	½"	⅞"	32 ksi	2" × 2" × ¼"		3-½"		5-⅜"		
		66"-84"	24"	0.109"		0.064"		0.079"	½"	⅞"	32 ksi	2" × 2" × ¼"		5-½"		7-⅜"		
HUGGER	2⅔" × ½" * REROLLED END	24"-54"	10½"	0.064"-0.079"		0.064"		0.079"	½"	⅞"	32 ksi							
		24"-48"	10½"	0.109"		0.064"		0.079"	½"	⅞"	32 ksi							
		54"-66"	10½"	0.109"		0.064"		DOUBLE 0.079"	½"	⅞"	32 ksi							

* See Note 12.

12. All profiles of Spiral Rib Pipe (¾" × ¾" ribs at 7½" pitch and ¾" × 1" ribs at 11½" pitch in both steel and aluminum and ¾" × 1" ribs at 8½" pitch in steel only) shall be manufactured with rerolled ends. Corrugation profile of the rerolled ends shall be 2⅔" × ½" annual corrugations with a minimum of two full corrugations at each end.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
2. Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
3. Use 1¼" gage line dimension on attached angle leg for rivets and spot welds.
4. Band thickness shall not be less than:
   a. 3 standard thicknesses lighter than the thickness of the pipe for Corrugated Steel Pipe.
   b. 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 0.060" for Corrugated Aluminum Pipe.
5. Dimensions, thicknesses and strengths shown are minimum.
6. For pipe arches use same width band as for round pipe of equal periphery.
7. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
8. Spot welds shall develop minimum required strength of strap.
9. Pipe with rerolled ends having at least two 2⅔" × ½" annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 2⅔" × ½" corrugations.
10. In the case of H-12 huggerbands, two piece bands are required for diameters through 96" and three piece bands are required for diameters 102" through 120".
11. Two piece bands are required for pipes greater than 42" diameter.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 6 POSITIVE JOINT

NO SCALE

D97F

2018 STANDARD PLAN D97F

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

ANNULAR AND HELICAL PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W OR A	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (CSP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No.- Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				CSP	CAP	CSP	CAP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	CSP	CAP	CSP	CAP	CSP	CAP	CSP
TWO PIECE INTEGRAL FLANGE	1½′ × ¼"	6"	7"	0.064"-0.168"		0.052"								3-⅜"				
	1½′ × ¼"	8"-10"	7"	0.064"-0.168"	0.060"-0.164"	0.064"	0.060"							3-⅜"	3-⅜"			
ANNULAR	2⅔" × ½"	THROUGH 24"	12"	0.064"-0.168"	0.060"-0.164"	0.064"	0.060"					2" × 2" × ⅜"	2" × 2" × ⅜"	3-½"	3-½"	3-⅜"	3-⅜"	3-½"
HUGGER	2⅔" × ½" REROLLED END	THROUGH 24"	10½"	0.064"-0.168"		0.064"		0.079"	½"	⅞"	32 ksi							

SPIRAL RIB PROFILE

COUPLING TYPE	PIPE CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS		BAND THICKNESS		BAR AND STRAP (SSRP ONLY)				ANGLE						
												DIMENSIONS		BOLTS (No.- Dia)		RIVETS ANGLE TO BAND		SPOT WELDS ANGLE TO BAND
				SSRP	ASRP	SSRP	ASRP	STRAP THICKNESS	BOLTS Dia	BAR Dia	BAR YIELD STRENGTH	SSRP	ASRP	SSRP	ASRP	SSRP	ASRP	SSRP
ANNULAR	2⅔" × ½" * REROLLED END	24"	12"	0.064"-0.168"	0.060"-0.164"	0.064"	0.060"					2" × 2" × ⅜"	2" × 2" × ⅜"	3-½"	3-½"	3-⅜"	3-⅜"	3-½"
HUGGER	2⅔" × ½" * REROLLED END	24"	10½"	0.064"-0.168"		0.064"		0.079"	½"	⅞"	32 ksi							

* See Note 11.

11. All profiles of Spiral Rib Pipe (¾" × ¾" ribs at 7½" pitch and ¾" × 1" ribs at 11½" pitch in both steel and aluminum and ¾" × 1" ribs at 8½" pitch in steel only) shall be manufactured with rerolled ends. Corrugation profile of the rerolled ends shall be 2⅔" × ½" annual corrugations with a minimum of two full corrugations at each end.

NOTES:

1. For helically corrugated coupling bands, the connection angles may be oriented parallel to the pipe axis, provided connecting holes are slotted lengthwise sufficiently to allow adjustment for the helix angle.
2. Tension strap may be connected to band with either spot welds or fillet welds that develop minimum required strength of strap.
3. Use 1¼" gage line dimension on attached angle leg for rivets and spot welds.
4. Band thickness shall not be less than:
   a. 3 standard thicknesses lighter than the thickness of the pipe for Corrugated Steel Pipe.
   b. 2 standard thicknesses lighter than the thickness of the pipe and in no case lighter than 0.060" for Corrugated Aluminum Pipe.
5. Dimensions, thicknesses and strengths shown are minimum.
6. For pipe arches use same width band as for round pipe of equal periphery.
7. Fillet welds of equivalent strength may be substituted for spot welds or rivets.
8. Spot welds shall develop minimum required strength of strap.
9. Pipe with rerolled ends having at least two 2⅔" × ½" annular corrugations at each end with or without an upturned flange may be connected with any of the annular coupling bands shown for pipe of the same diameter and wall thickness and having 2⅔" × ½" corrugations.
10. For downdrain applications, two piece integral flange couplers shall have factory applied sleeve type rubber gaskets with a minimum length of 7" measured along the length of the pipe.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED METAL PIPE COUPLING DETAILS No. 7 DOWNDRAIN

NO SCALE

D97G

1-29-18

Return to Table of Contents

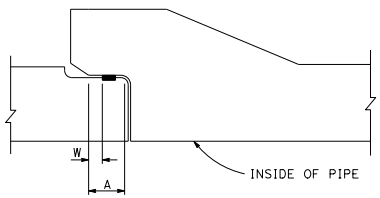
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

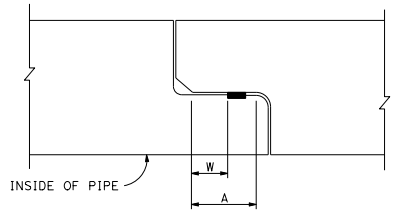
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



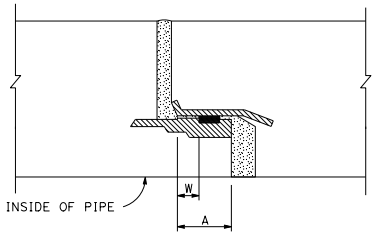
CONCRETE JOINT-FLARED BELL DESIGN



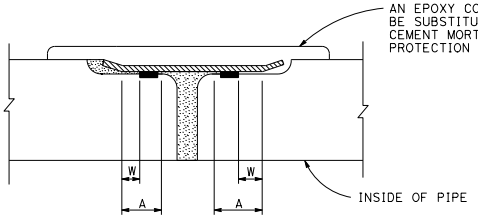
CONCRETE JOINT-FLUSH BELL DESIGN

LEGEND

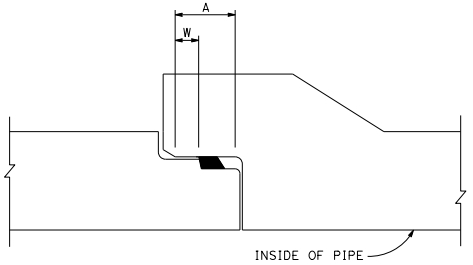
- CEMENT MORTAR
- RUBBER GASKET
- STEEL



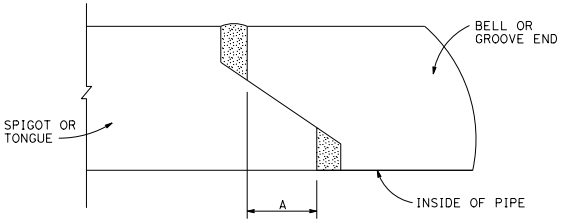
STEEL JOINT-FLUSH BELL DESIGN



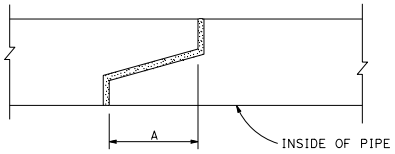
CONCRETE JOINT-DOUBLE GASKET DESIGN



CONCRETE JOINT-SINGLE OR DOUBLE OFFSET DESIGN
(Flared or Flush Bell)



SELF-CENTERING TONGUE & GROOVE
(See Note 4)



TONGUE & GROOVE DESIGN

NOTES:

1. For pipe sections installed on straight alignment, the pipe sections shall be joined to provide maximum joint overlap at all points on the joint periphery, but in no case less than the values shown in Table A for "W" if the installation is required to be watertight or "A" for all other installations.
2. For pipe sections installed on curved alignment, the pipe sections shall be joined to provide maximum joint overlap on one side of the joint and not less than ¼" overlap on the other. The ¼" overlap shall be the "W" dimension for installations required to be watertight, or the "A" dimension for all other installations.
3. Watertight joint requirement shall typically be met with the use of rubber gaskets as shown. Pipe installed with rubber gaskets shall have a minimum overlap meeting or exceeding the indicated "W" dimension shown in Table A or indicated in Note 2. Joints shown with rubber gaskets may be installed without gaskets in non-watertight applications, in which case the joint shall be sealed with sealing materials and the minimum joint overlap shall meet or exceed the "A" dimension shown in Table A or indicated in Note 2.
4. For Self-Centering Tongue and Groove Joints, the mortar shall be applied after the pipe ends are pushed together. The mortar shall be applied to the joint gap on the inside of the pipe for pipe diameters of 24" or more, or to the gap on the outside of the pipe for pipe smaller than 24" in diameter.
5. When watertight joints are required (See Note 3) and cement mortar joints are not allowed, the taper on surfaces within the "W" dimension at full joint closure and the opposing sealing surfaces of the bells and spigots on which the rubber gaskets may bear during closure of the joint and at any degree of partial closure shall form an angle of not more than 2 degrees with the longitudinal axis of the pipe.

TABLE A

PIPE DIAMETER LIMITS	MINIMUM JOINT OVERLAP			
	STANDARD "A"	POSITIVE "A"	STANDARD "W"	POSITIVE "W"
6" THROUGH 12"	1/4"	1/2"	1/4"	3/8"
15" THROUGH 33"	1/2"	3/4"	1/4"	1/2"
GREATER THAN 33"	3/4"	1"	3/8"	5/8"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

REINFORCED CONCRETE PIPE OR NON-REINFORCED CONCRETE PIPE STANDARD AND POSITIVE JOINTS

NO SCALE

D97H

1-29-18

2018 STANDARD PLAN D97H

Return to Table of Contents

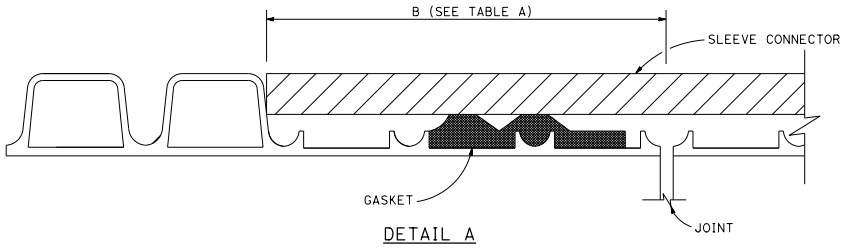
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

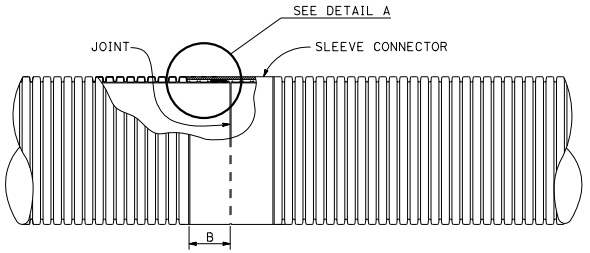
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

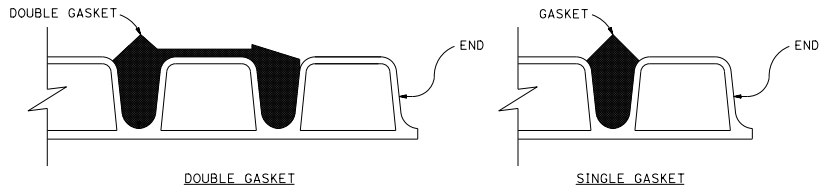
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



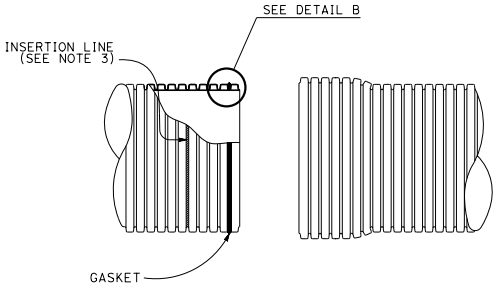
DETAIL A



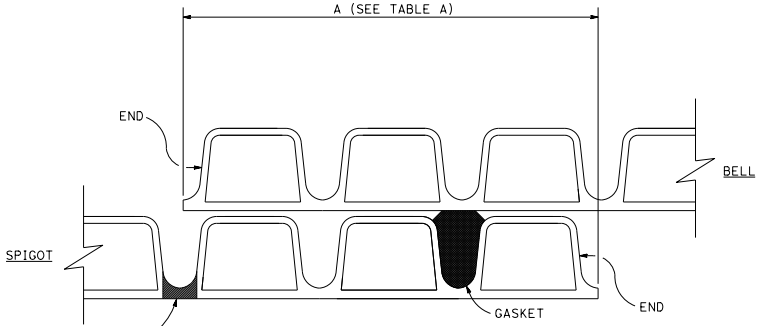
PLAN VIEW
LINER INSERT
See Note 4



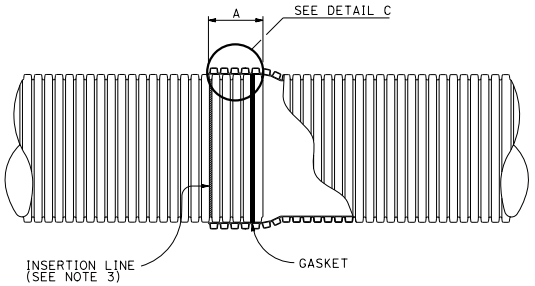
DETAIL B



SPIGOT BELL



DETAIL C
(Single gasket shown)



BELL AND SPIGOT JOINT

NOTES:

1. For pipe sections installed on straight alignment, the pipe sections shall be joined to achieve maxium joint overlap at all points on the periphery as indicated in Table A where the plans call for positive or watertight joints. Maxium joint overlap is recommended where the plans call for standard joints, but in no case shall the joint overlap be less than 3½".
2. For pipe sections installed on curved alignment, the maxium angle of deflection from straight alignment at any joint shall not exceed two degrees. Where the plans call for watertightness, field testing for compliance is required. Where plans call for positive joints, the pipe sections shall be joined to achieve Table A Dimensions on one side of the joint. Joints classified as standard shall have no less than 3½" joint overlap at any point on the periphery.
3. Factory applied insertion line limit shall be placed on spigot.
4. Liner insert to be used inside of existing pipe.

TABLE A

JOINT OVERLAP DIMENSIONS		
PIPE Dia (NOMINAL)	A	B
12"	5¾"	4¼"
15"	6¾"	5⅝"
18"	6¾"	5⅝"
21"	8½"	5⅝"
24"	8½"	6⅛"
30"	8½"	7⅛"
36"	8½"	8⅛"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CORRUGATED POLYVINYL CHLORIDE PIPE WITH SMOOTH INTERIOR STANDARD AND POSITIVE JOINTS

NO SCALE

D97I

2018 STANDARD PLAN D97I

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

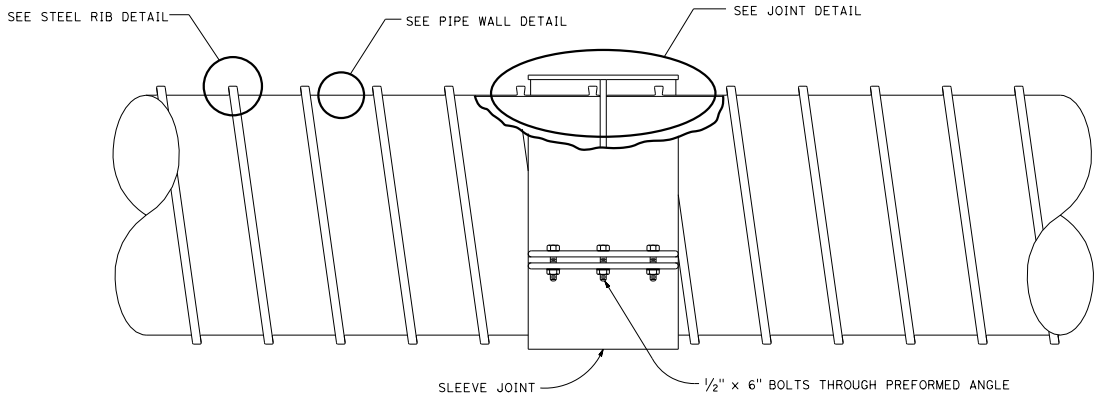
REGISTERED CIVIL ENGINEER

May 31, 2018

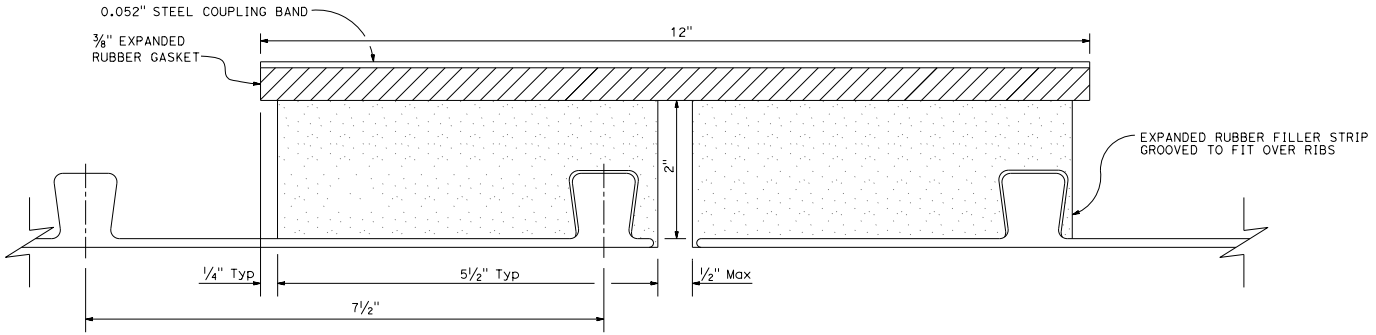
PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

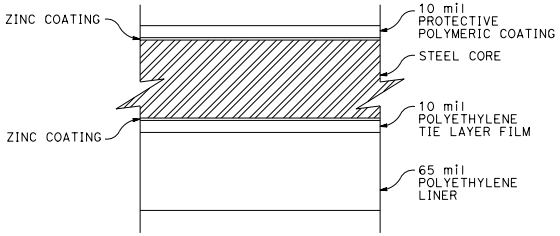
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



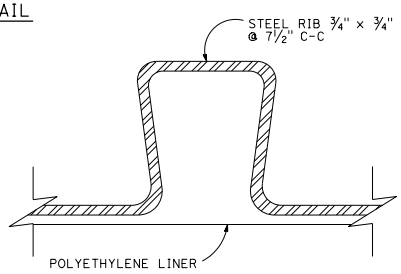
COMPOSITE STEEL SPIRAL RIB PIPE



JOINT DETAIL



PIPE WALL DETAIL



STEEL RIB DETAIL

NOTES:

1. See Standard Plan A62F for backfill details.
2. See Standard Plan D97C for Universal Coupling details.
3. Strap joint connection shall consist of 2 separate bolted preformed connectors joined to form one strap when pipe inside diameter is greater than or equal to 60".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

COMPOSITE STEEL SPIRAL RIB PIPE WITH SMOOTH INTERIOR STANDARD JOINT

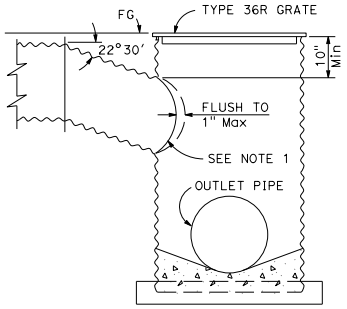
NO SCALE

D97J

2018 STANDARD PLAN D97J

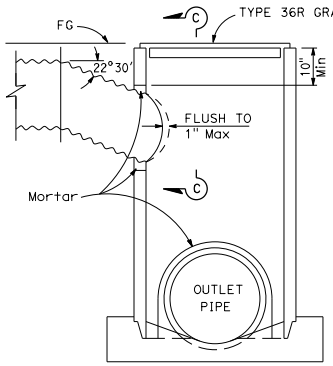
1-29-18

Return to Table of Contents



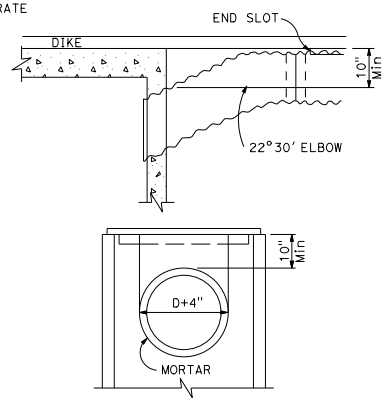
TYPE GMP INLET

See Standard Plans D75A, D75C and D77B for additional inlet details.



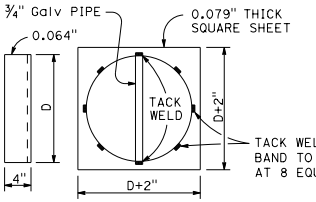
TYPE GCP INLET

See Standard Plans D75B, D75C and D77B for additional inlet details.



SECTION C-C

SLOTTED DRAIN CONNECTIONS TO STANDARD INLET STRUCTURES



METAL CAP DETAIL

See Note 2

NOTES:

1. Either field joint sealed with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of 1 part portland cement, 3-5 parts sand and 1½ parts SSI emulsified asphalt) or continuous weld.
2. "D" equals nominal pipe diameter.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

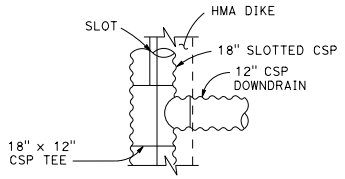
May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

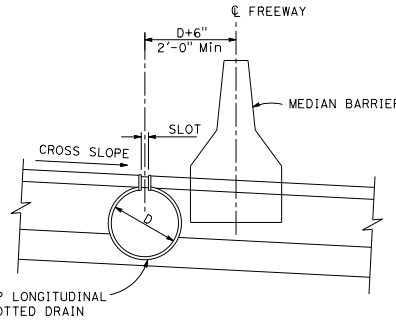
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

ELEVATION

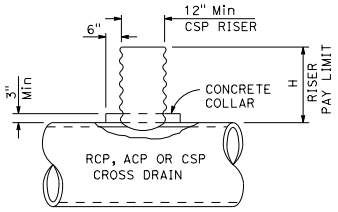


PLAN

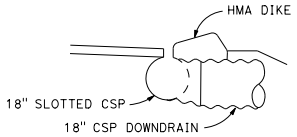
SHOULDER INSTALLATION 18" SLOTTED CSP TO 12" DOWNDRAIN



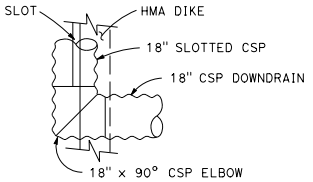
TYPICAL CROSS SECTION



RISER CONNECTION DETAIL

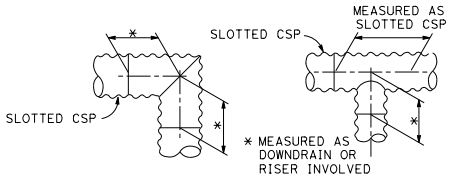


ELEVATION

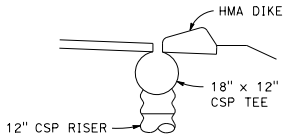


PLAN

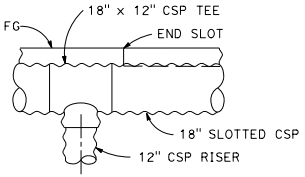
SHOULDER INSTALLATION 18" SLOTTED CSP TO 18" CSP DOWNDRAIN



MEASUREMENT OF CORRUGATED STEEL PIPE ELBOWS AND TEES USED WITH SLOTTED DRAINS



ELEVATION-END VIEW



ELEVATION-SIDE VIEW

SHOULDER INSTALLATION 18" SLOTTED CSP TO 12" CSP RISER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

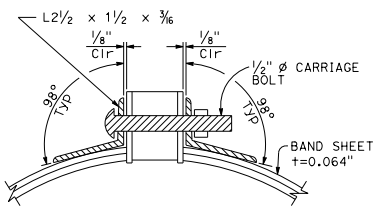
SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS

NO SCALE

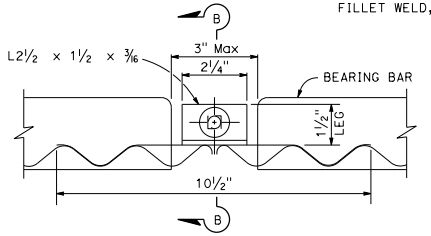
D98A

1-29-18

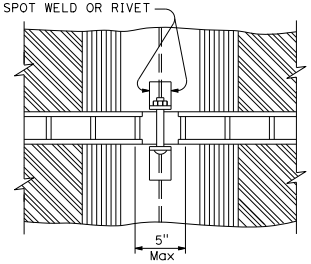
Return to Table of Contents



SECTION B-B

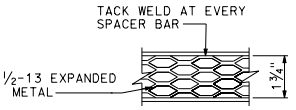


ELEVATION



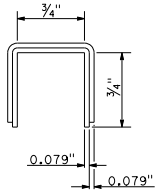
PART PLAN

MODIFIED HUGGER BAND

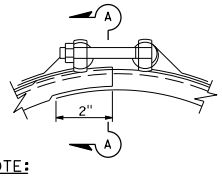


HEEL GUARD

See Note 8



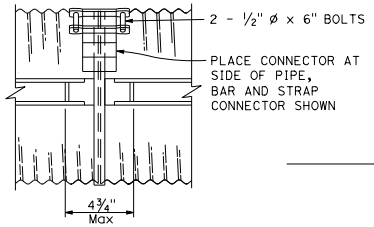
PARTIAL SECTION A-A



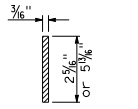
NOTE:

As an alternate to swagged end an oversized bridge clip may be used.

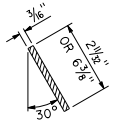
SIDE VIEW



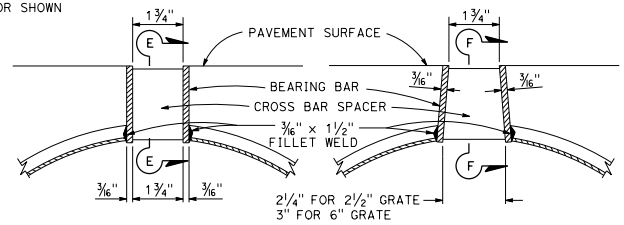
PART PLAN



SECTION E-E

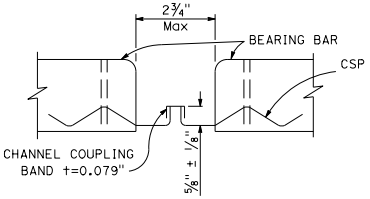


SECTION F-F



RECTANGULAR SPACER TAPERED SPACER

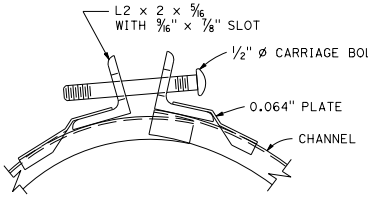
GRATE SLOT-SECTION



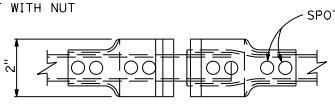
ELEVATION

BAR & STRAP CONNECTOR

See Standard Plan D97A



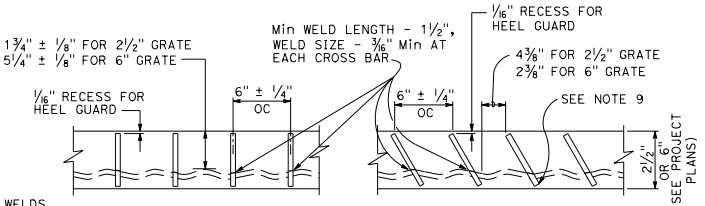
SIDE VIEW



PART PLAN

ANGLE CONNECTOR

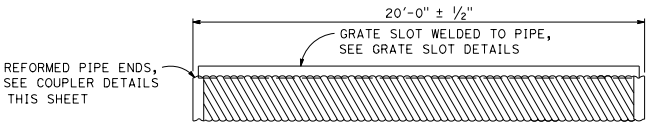
CHANNEL COUPLING BAND



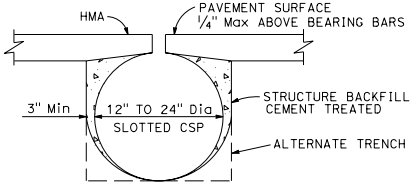
RECTANGULAR SPACER TAPERED SPACER

GRATE SLOT-LONGITUDINAL ELEVATION VIEW

See Note 10



SLOTTED CORRUGATED STEEL PIPE



BACKFILL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Bruce D. Swanger No. C61257 Exp. 6-30-19 CIVIL

REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Drain pipe seams may be continuous helical lock seam or helical weld seam.
2. Drain sections shall be assembled with either of the coupling bands shown.
3. The cross bar spacer shall be welded to the bearing bars in such a manner as to develop a minimum tensile strength of 12,000 LBS normal to the longitudinal axis of the bearing bars.
4. The maximum variance from a straight line between the extreme top corners of the bearing bars shall be ½" in 20'-0".
5. Spot welds shall develop minimum required strength of strap.
6. Dimensions shown are minimums.
7. Minimum pipe wall thickness is 0.064".
8. Use heel guard when specified.
9. Bottom edge of cross bar spacer offset in direction of flow.
10. Unless otherwise shown on the plans or specified in the special provisions, cross bar spacers shall be either rectangular or tapered at the contractor's option.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SLOTTED CORRUGATED STEEL PIPE DRAIN DETAILS

NO SCALE

D98B

1-29-18

2018 STANDARD PLAN D98B

Return to Table of Contents

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

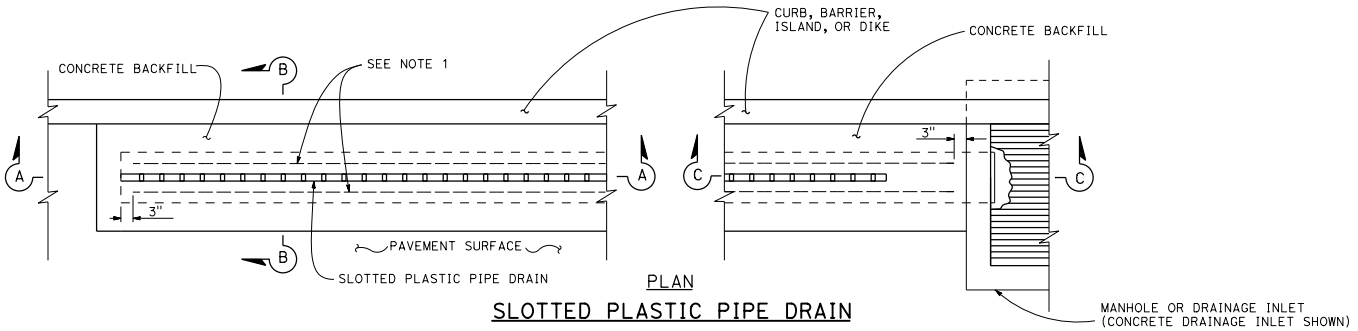
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

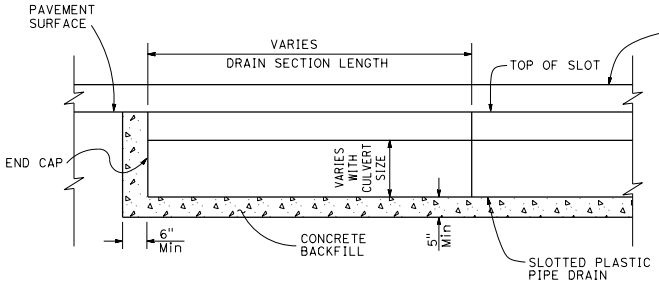


PLAN

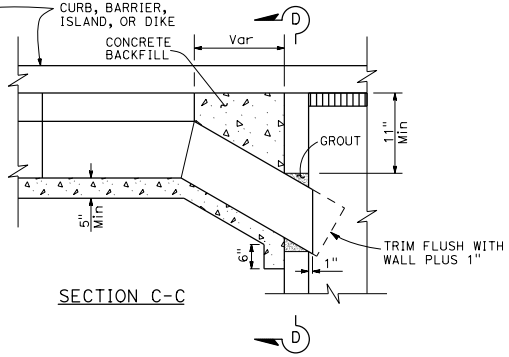
SLOTTED PLASTIC PIPE DRAIN

NOTES:

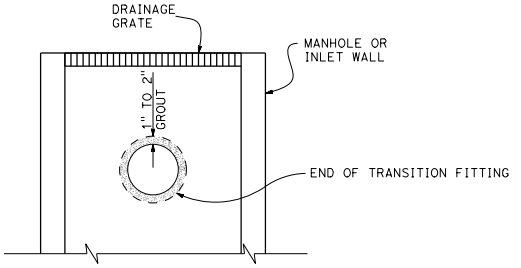
1. Lateral support, #4 bar, to be placed on both sides of slotted plastic pipe throat.
2. Slot plastic pipe cross section is a generic shape. Shape shall conform to allowable manufacturer's cross sections.



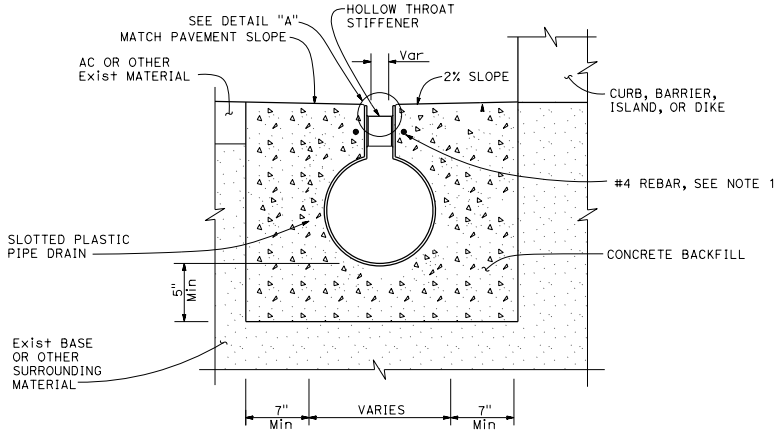
SECTION A-A



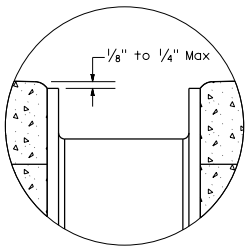
SECTION C-C



SECTION D-D



SECTION B-B



DETAIL A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SLOTTED PLASTIC PIPE DRAIN DETAILS

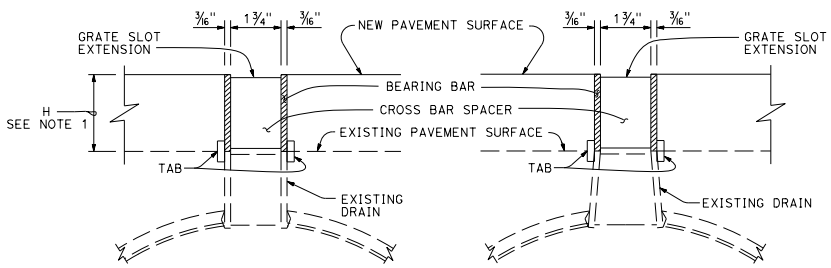
NO SCALE

D98D

1-29-18

2018 STANDARD PLAN D98D

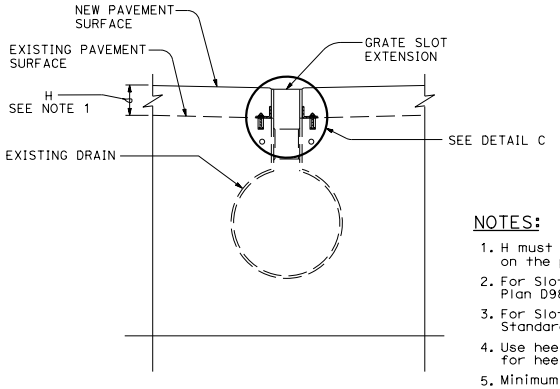
Return to Table of Contents



RECTANGULAR SPACER SECTION TAPERED SPACER

SLOTTED CORRUGATED STEEL PIPE

Grate slot extension



SECTION

SLOTTED PLASTIC PIPE

Grate slot extension

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

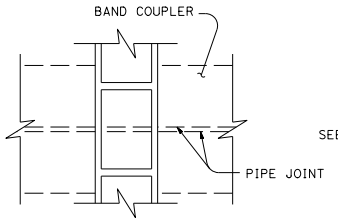
PLANS APPROVAL DATE

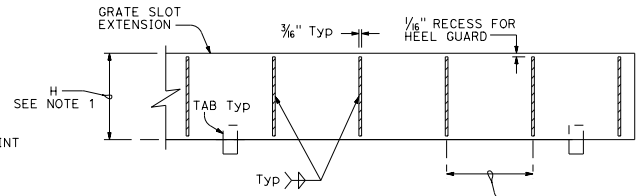
REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

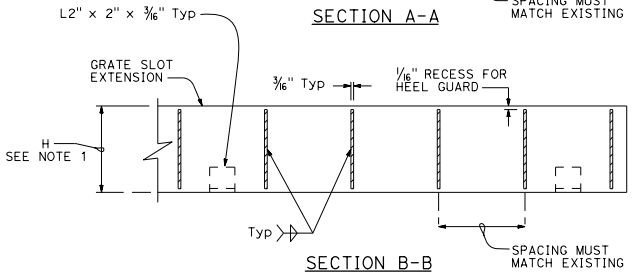
NOTES:

1. H must be a minimum of 2½", or otherwise shown on the plans.
2. For Slotted Plastic Pipe Drain Details, see Standard Plan D98D.
3. For Slotted Corrugated Steel Pipe Drain Details, see Standard Plans D98A and D98B.
4. Use heel guard when shown. See Standard Plan D98B for heel guard details.
5. Minimum grate slot extension length is 80".
6. The top corners of the grate slot extension's bearing bars must not vary from a straight line more than ½" in 20'-0".
7. Cross bar spacers must be welded to the grate slot extension's bearing bars to achieve a minimum tensile strength of 12,000 LB normal to the longitudinal axis of the bearing bars.

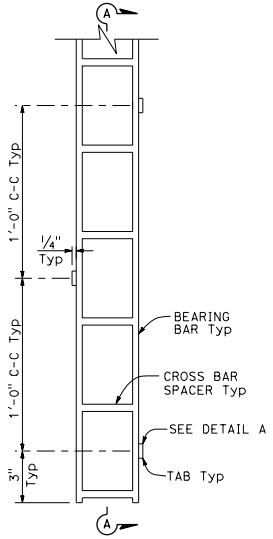




SECTION A-A



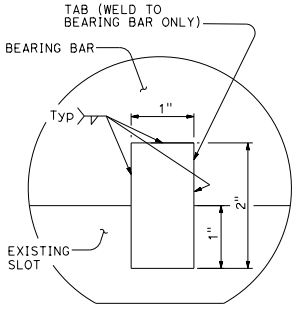
SECTION B-B



PLAN

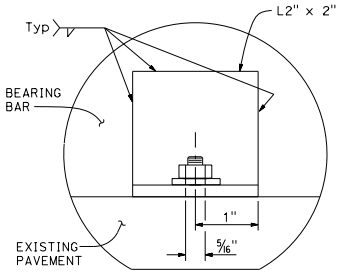
SLOTTED CORRUGATED STEEL PIPE

Grate slot extension



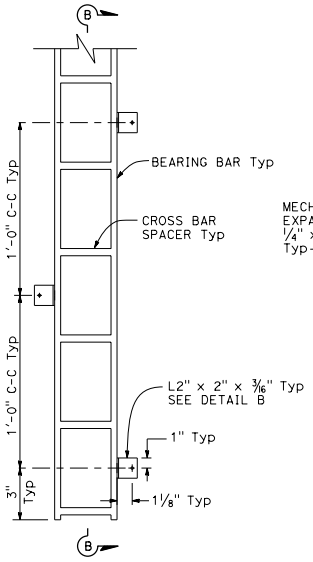
DETAIL A

Tab alignment



DETAIL B

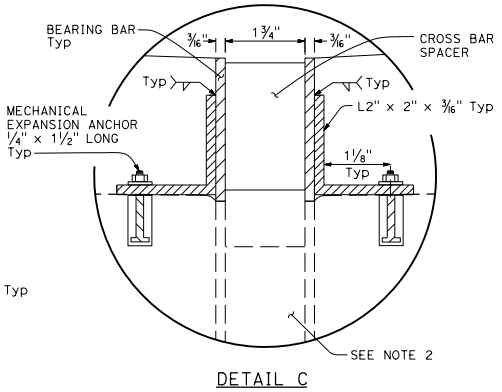
Angle alignment



PLAN

SLOTTED PLASTIC PIPE

Grate slot extension



DETAIL C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SLOTTED PIPE GRATE EXTENSION DETAILS

NO SCALE

D98F

1-29-18

2018 STANDARD PLAN D98F

Return to Table of Contents

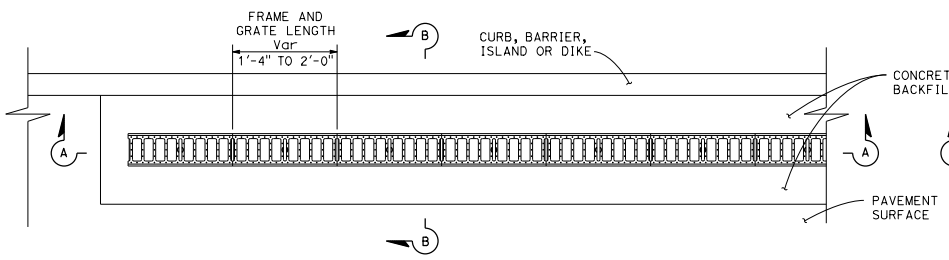
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

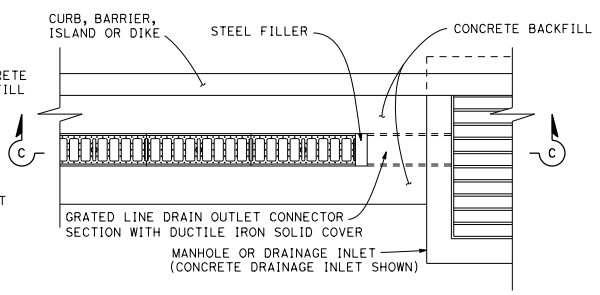
REGISTERED CIVIL ENGINEER

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

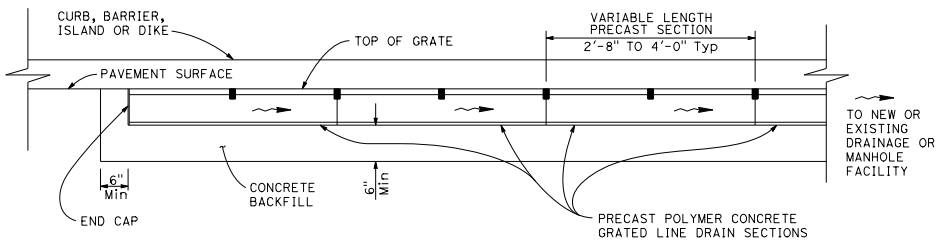
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

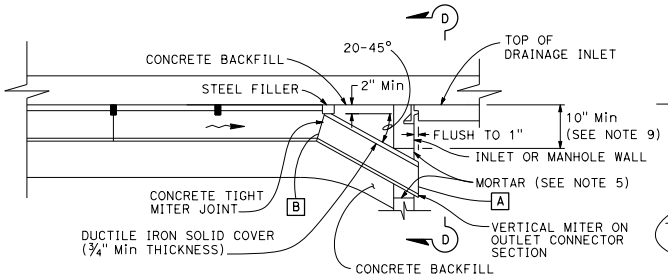




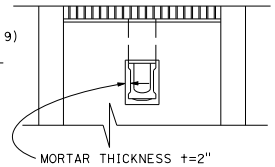
PLAN



SECTION A-A



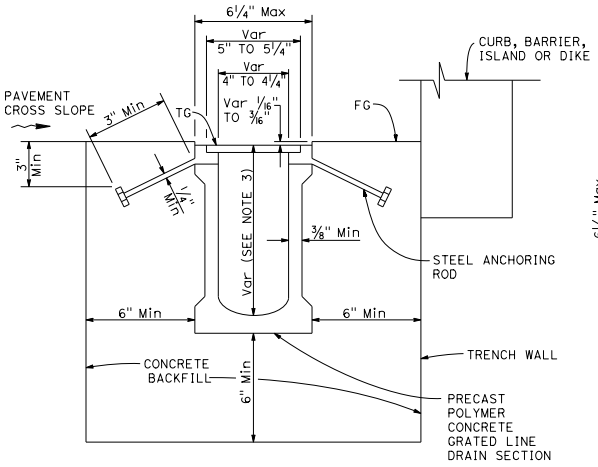
SECTION C-C



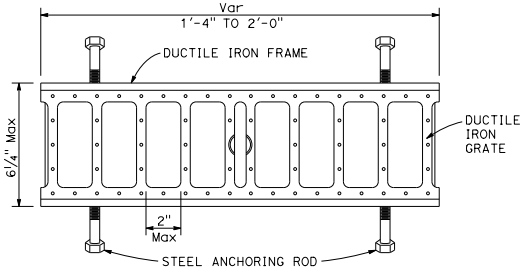
SECTION D-D

NOTES:

1. See Quanitiy Sheets for discharge capacity requirements.
2. Discharge capacity (cfs) at point A must be equivalent to maximum channel discharge capacity of grated line drain at point B.
3. Precast polymer concrete drain sections are available in non-sloped uniform depth sections 4⅞" to 12" or in 0.6 percent pre-sloped sections with graduated depths from 4⅞" to 12". See Project Plans for trench sections to be installed.
4. Nominal dimensions shown. Allowable tolerance ± 2% .
5. For GMP inlet connection, seal field joint with a pliable mixture of sand, portland cement and emulsified asphalt (mixture of 1 part portland cement, 3-5 parts sand and 1½ part SS1 emulsified asphalt).
6. Within designated pedestrian paths of travel, the maximum grate opening in the direction of pedestrian traffic must not exceed ½".
7. Grate patterns may vary from detail shown. See Special Provisions.
8. ⅜" maximum gap between adjacent gratings.
9. Contractor to field verify minimum depth to avoid conflict with inlet top.



SECTION B-B
(Precast grated line drain with non-integral frame)



FRAME AND GRATE DETAIL
See Notes 6, 7 and 8

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

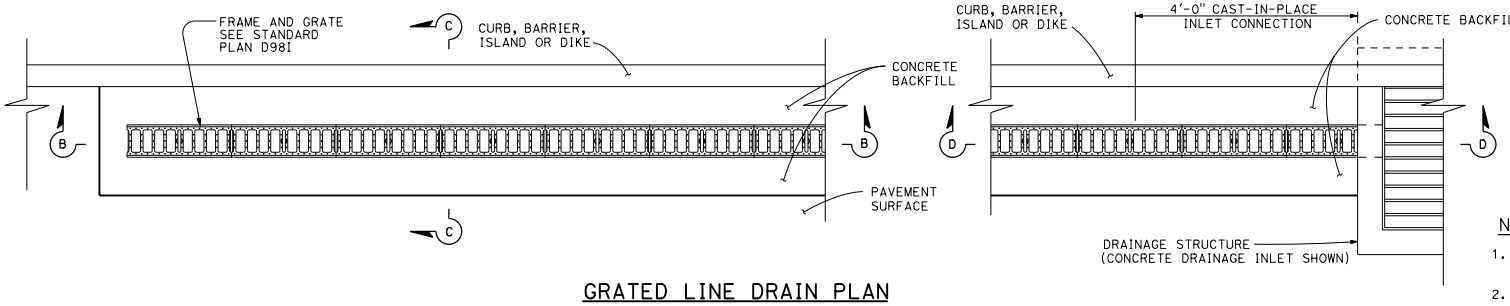
GRATED LINE DRAIN DETAILS No. 1 - POLYMER CONCRETE, 4" NOMINAL WIDTH

NO SCALE

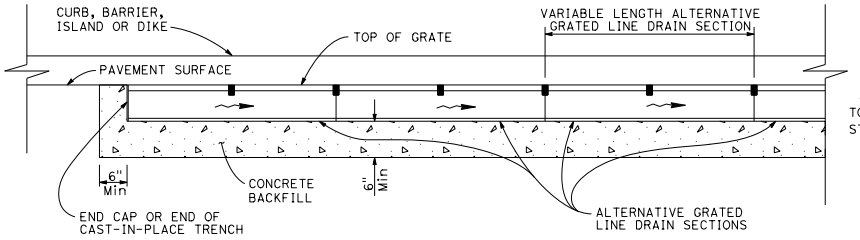
D98G

1-29-18

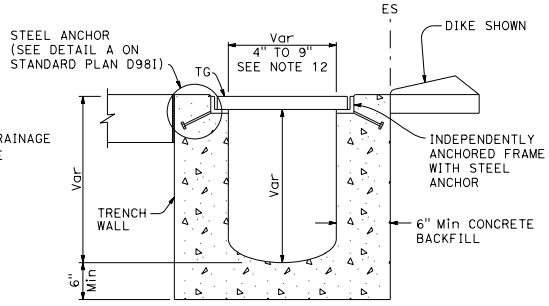
Return to Table of Contents



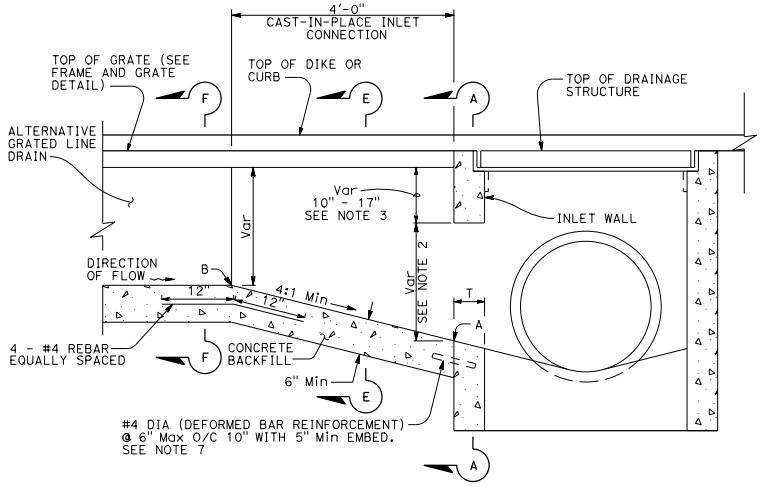
GRATED LINE DRAIN PLAN



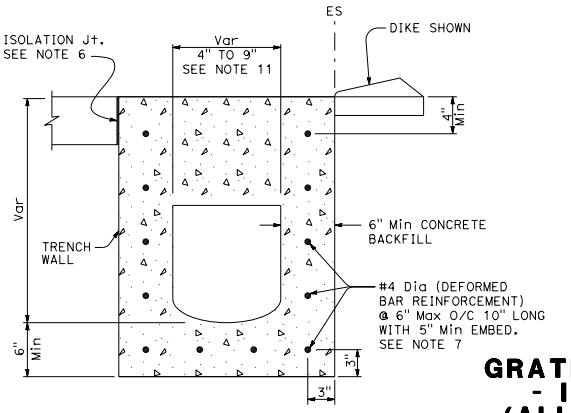
SECTION B-B



SECTION E-E



SECTION D-D



SECTION A-A

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. See Quantity Sheets for discharge capacity requirements.
2. Discharge capacity (cfs) at point A must be equivalent to maximum channel discharge capacity of grated line drain at point B.
3. Contractor to field verify minimum depth to avoid conflict with inlet top.
4. Grate patterns may vary from details shown. See special provisions.
5. See Standard Plan D98G for 4" polymer concrete grated line details.
6. Within PCC pavement, a 0.5" isolation joint must be made between pavement and concrete backfill. See isolation joint details on Standard Plans P45 and P46.
7. Bottom row of dowels to match inlet connection slope with 2" Min clear to inside of box. Place other dowels normal to inlet wall with 1½" Min clear to inside of box. (When T = 6" use 4½" Min embed)
8. Channel section shape and frame and grate configuration may vary.
9. Nominal dimensions shown. Allowable tolerances ±2%.
10. 3/16" maximum gap between adjacent grates.
11. Minimum channel width must be equal or greater than maximum channel width of grated line drain section.
12. See Standard Plan D98I for Section C-C and Section F-F.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GRATED LINE DRAIN DETAILS No. 2 - INLET CONNECTION DETAILS (ALL TYPES EXCEPT 4" NOMINAL WIDTH POLYMER CONCRETE)

NO SCALE

D98H

1-29-18

Return to Table of Contents

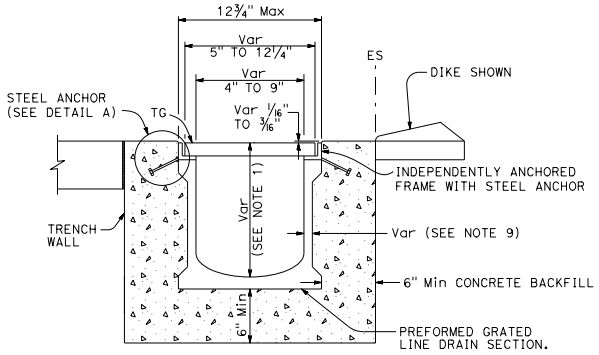
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

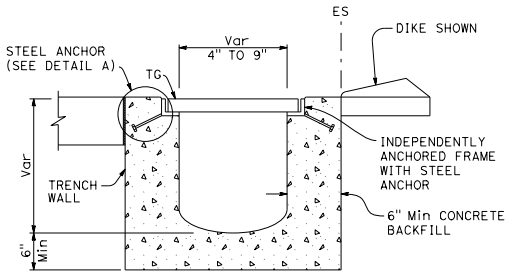
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

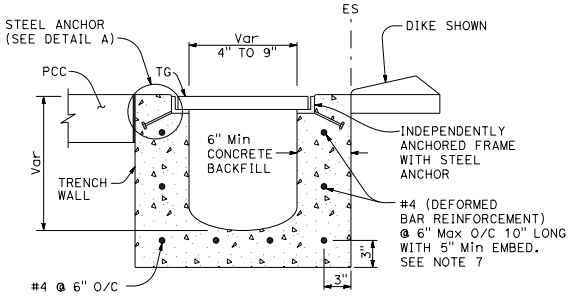


SECTION C-C
(See Note 1)

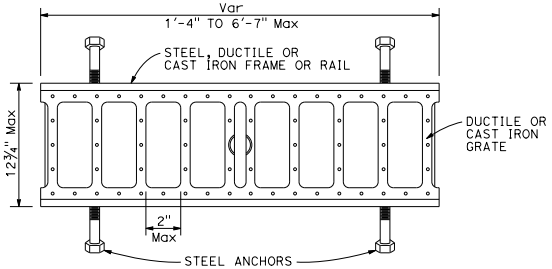


CAST-IN-PLACE ALTERNATIVE

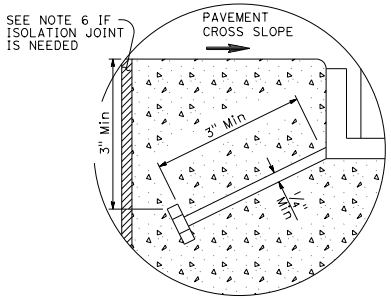
SECTION C-C
(See Note 1)



SECTION F-F
FOR CAST-IN-PLACE AND PRECAST INLETS
(See Note 1)



FRAME AND GRATE DETAIL
(See Note 1)



DETAIL A

NOTE:

1. See Standard Plan D98H for corresponding notes.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GRATED LINE DRAIN DETAILS No. 3 (ALL TYPES EXCEPT 4" NOMINAL WIDTH POLYMER CONCRETE)

NO SCALE

D98I

1-29-18

Return to Table of Contents

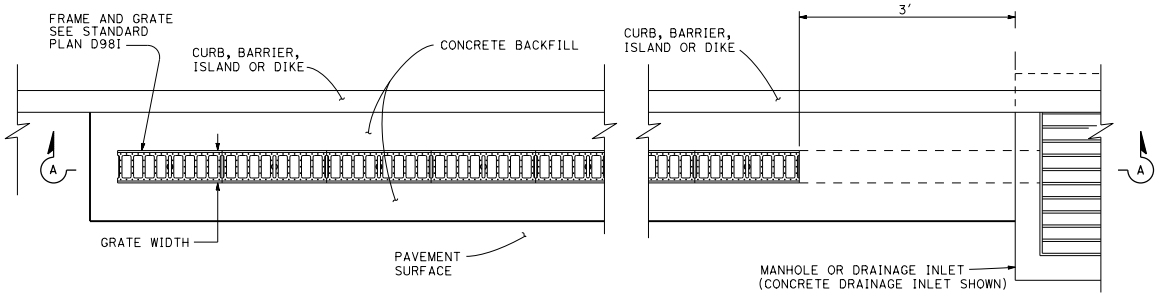
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

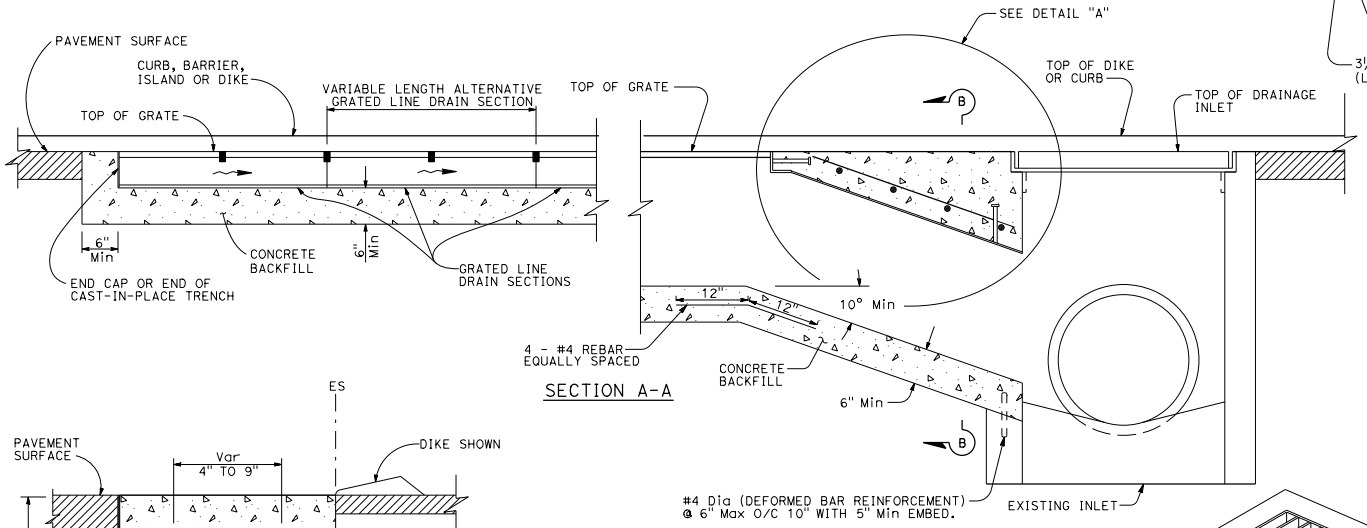
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

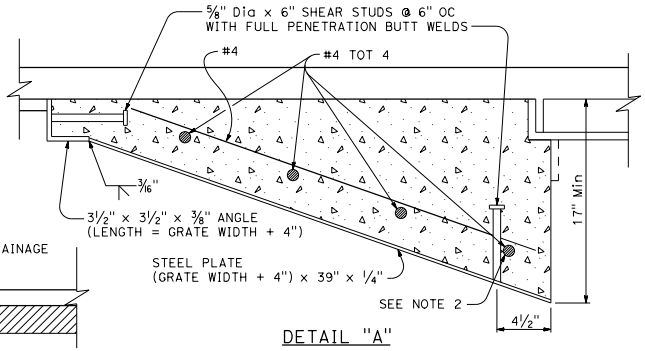
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



GRATED LINE DRAIN PLAN



SECTION A-A



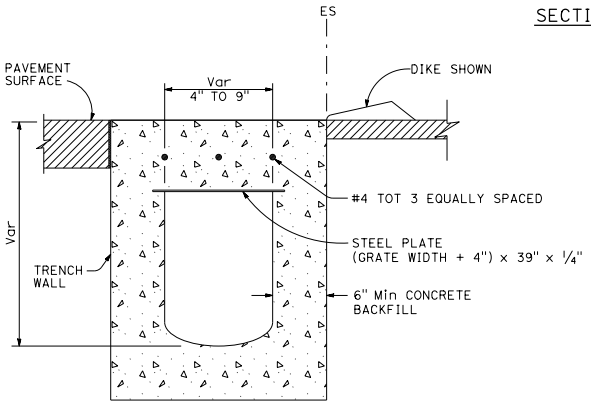
DETAIL "A"

LEGEND:

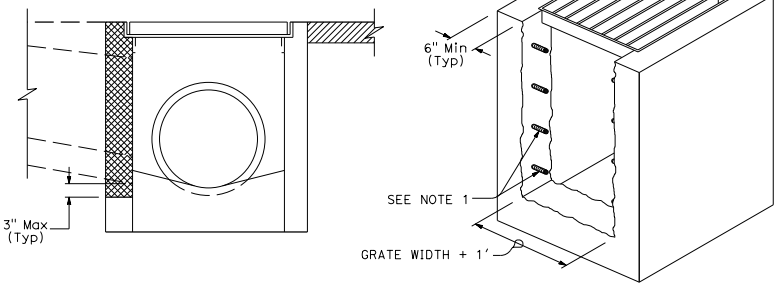
- Pavement
- Limits of Removal

NOTES:

1. Preserve existing rebar during removal of side wall to tie to trench drain reinforcement. Install additional rebar to facilitate connection to drop inlet and replace damaged existing rebar. Doweling perpindicular to side wall in lieu of connecting to existing rebar is not permitted.
2. Drill rebar ends 3" into existing concrete, overlap and connect with double barrel mechanical coupler.



SECTION B-B



PARTIAL REMOVAL OF EXISTING DROP INLET

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GRATED LINE DRAIN DETAILS No. 4 - CONNECTION TO EXISTING DRAINAGE STRUCTURE

NO SCALE

D98J

1-29-18

Return to Table of Contents

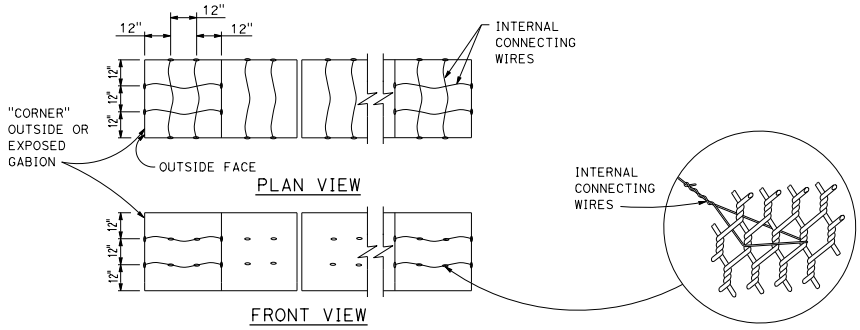
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

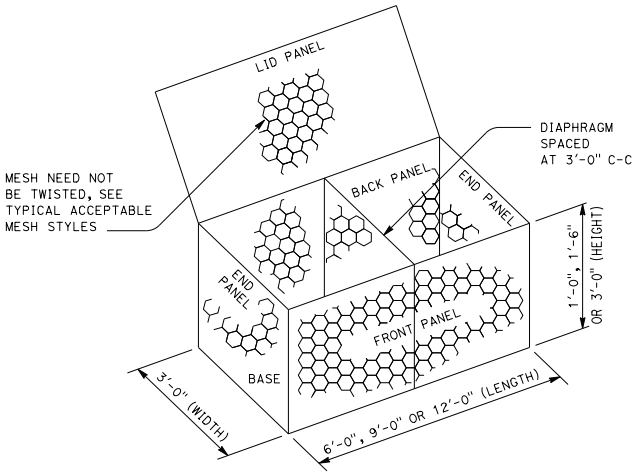
REGISTERED PROFESSIONAL ENGINEER
Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



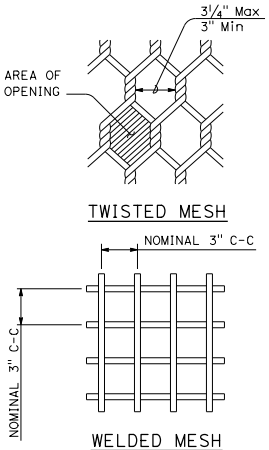
13.5-GAGE INTERNAL CONNECTING WIRES

STANDARD GABION SIZES					
LETTER CODE	LENGTH	WIDTH	HEIGHT	NUMBER OF DIAPHRAGMS	VOLUME CY
A	6'-0"	3'-0"	3'-0"	1	2.0
B	9'-0"	3'-0"	3'-0"	2	3.0
C	12'-0"	3'-0"	3'-0"	3	4.0
D	6'-0"	3'-0"	1'-6"	1	1.0
E	9'-0"	3'-0"	1'-6"	2	1.5
F	12'-0"	3'-0"	1'-6"	3	2.0
G	6'-0"	3'-0"	1'-0"	1	0.66
H	9'-0"	3'-0"	1'-0"	2	1.0
I	12'-0"	3'-0"	1'-0"	3	1.33



TYPICAL GABION BASKET

NOTE:
Area of opening not to exceed 10.3 square inches.



TYPICAL ACCEPTABLE MESH STYLES

NOTES:

1. Internal connecting wire (13.5-gage) to be installed across width of interior gabions and across width and length of end gabions.
2. Internal connecting wires required on all gabions 3'-0" high.
3. Preformed stiffeners (11-gage or 9-gage) are an acceptable alternative to internal connecting wires. Install them as recommended by manufacturer or as directed by the Engineer at ⅓ points.
4. Place rock in end gabion cell first, and continue by filling interior gabion cells.
5. For gabion dimensions, refer to table "Standard Gabion Sizes".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GABION BASKET DETAILS No. 1

NO SCALE

D100A

2018 STANDARD PLAN D100A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

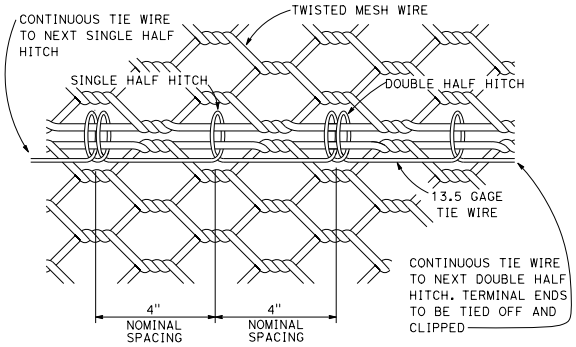
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

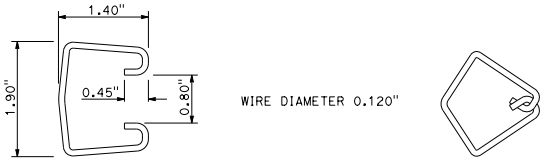
REGISTERED PROFESSIONAL ENGINEER — Bruce D. Swanger — No. C61257 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



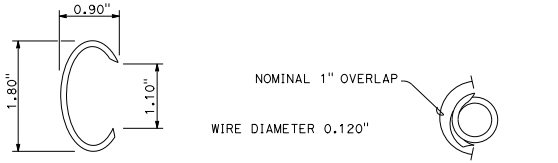
STANDARD TIE WIRE DETAIL

Alternating single and double half hitches (locked loops)
(See Note 2)



BEFORE CLOSURE AFTER CLOSURE

INTERLOCKING FASTENER



BEFORE CLOSURE AFTER CLOSURE

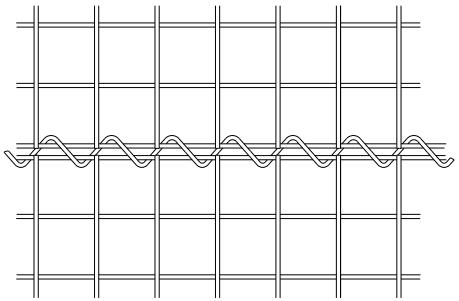
OVERLAPPING FASTENER

ALTERNATIVE GABION JOINT MATERIAL FASTENERS

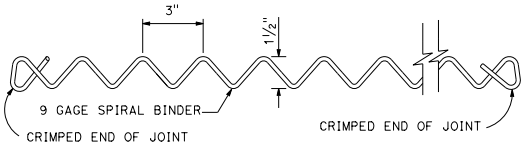
(Fastener dimensions nominal)
(See Note 3)

NOTES:

1. A joint connection must be made where any panel edge meets another panel. This includes adjacent gabion baskets, individual panels within a basket, diaphragm edges, etc.
2. Standard tie wire may be used as a joint connector for either twisted or welded mesh. Spiral binder is to be used with welded mesh only.
3. When alternative gabion joint material fasteners are not capable of enclosing all wires along a joint, especially at Basket-To-Basket Joints, either standard tie wire or spiral binder, as applicable, must be used.

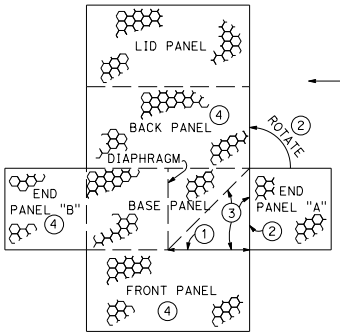


SPIRAL BINDER LACING



STANDARD SPIRAL BINDER

(See Note 2)



FLAT LAYOUT OF GABION BASKET

To Assemble Transitional Gabion Basket:

Step 1 Cut mesh along joint between Front Panel and Base Panel.

Step 2 Unfasten End Panel "A" from Base Panel and rotate End Panel "A". Fasten End Panel Panel "A" to Back Panel.

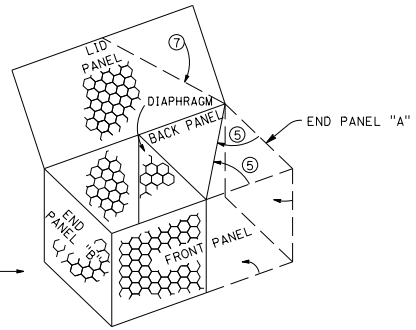
Step 3 Fold the cut portion of the Base Panel into upright position along diagonal from the diaphragm to the corner of the Back Panel.

Step 4 Fold the Back Panel, Front Panel and End Panel "B" into upright positions. Fasten End Panel "B" to the Back Panel and the Front Panel.

Step 5 Rotate End Panel "A" and the cut portion of the Front Panel inward against the upturned portion of the Base Panel. Fasten along the overlapped portion of the Front Panel and End Panel "A". Fasten the overlapped portion of the Front Panel and End Panel "A" to the folded upright portion of the Base Panel along the diagonal (described in Step 3).

Step 6 Fill the Transitional Gabion Basket with rock as per specifications.

Step 7 Close lid and fold over corner of Lid Panel. Fasten along Lid Panel edges.



ASSEMBLED TRANSITIONAL GABION BASKET

TRANSITIONAL GABION BASKET

(For 6'-0", 9'-0" or 12'-0" gabion)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GABION BASKET DETAILS No. 2

NO SCALE

D100B

2018 STANDARD PLAN D100B

1-29-18

Return to Table of Contents

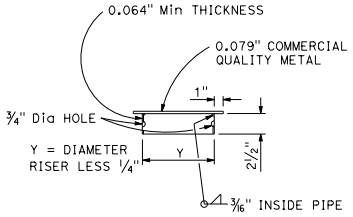
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

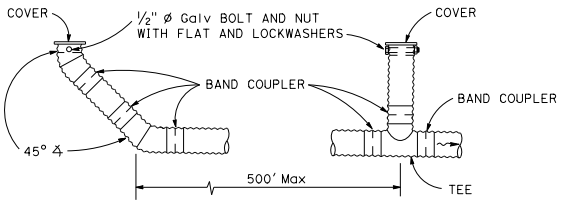
May 31, 2018
PLANS APPROVAL DATE

Bruce D. Swanger
No. C61257
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

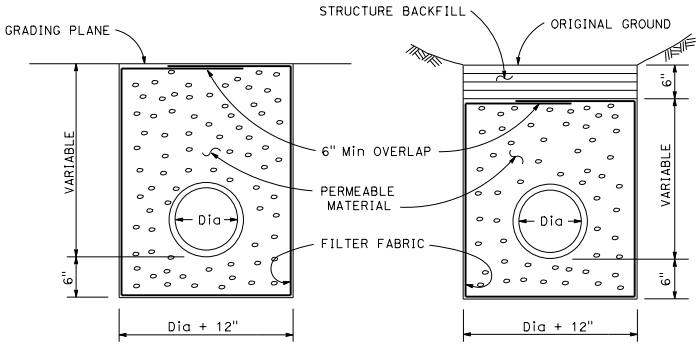


WELDED METAL COVER

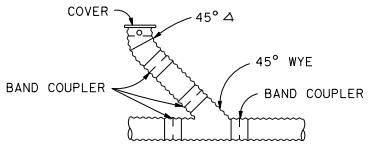


TERMINAL RISER VERTICAL RISER

Metal pipe risers and perforated metal pipe underdrain shown. Use type of pipe specified.

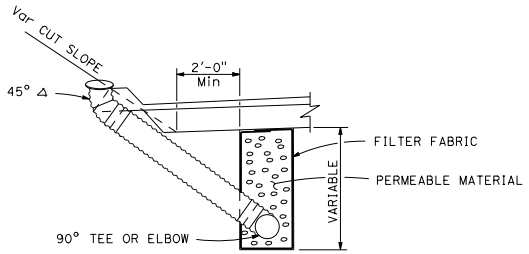


EXCAVATION AND BACKFILL



45° RISER

UNDERDRAIN RISERS



UNDERDRAIN LOCATION AND RISERS ANGLED TO CUT SLOPE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

UNDERDRAINS

NO SCALE

D102

1-29-18

Return to Table of Contents

EXISTING	NEW	ITEM DESCRIPTION
		WATER METER (WM)
		BACKFLOW PREVENTER ASSEMBLY (BPA)
		BACKFLOW PREVENTER ENCLOSURE (BPE)
		BOOSTER PUMP (BP)
		TRUCK LOADING STANDPIPE (TLS)
	FS	FLOW SENSOR (FS)
		MASTER IRRIGATION CONTROLLER (MIC)
		AUXILIARY IRRIGATION CONTROLLER (AIC)
		IRRIGATION CONTROLLER (IC) IRRIGATION CONTROLLER (IC) (BATTERY) IRRIGATION CONTROLLER (IC) (SOLAR) IRRIGATION CONTROLLER (IC) (TWO WIRE)
		IRRIGATION CONTROLLER(S) IN CONTROLLER ENCLOSURE CABINET (ICC)
acc	ACC	ARMOR-CLAD CONDUCTORS (ACC)
		CONTROL AND NEUTRAL CONDUCTORS (CNC)
		IRRIGATION CONDUIT
		IRRIGATION SLEEVE
dip	DIP	DUCTILE IRON PIPE (SUPPLY LINE) (MAIN) (DIP)
		GALVANIZED STEEL PIPE (SUPPLY LINE) (MAIN) (GSP)
		GALVANIZED STEEL PIPE (SUPPLY LINE) (LATERAL) (GSP)
		PLASTIC PIPE (SUPPLY LINE) (MAIN)
		PLASTIC PIPE (SUPPLY LINE) (LATERAL)
cp	CP	COPPER PIPE (SUPPLY LINE)
dit	DIT	DRIP IRRIGATION TUBING
		REMOTE CONTROL VALVE (RCV) REMOTE CONTROL VALVE (MASTER) (RCVM) REMOTE CONTROL VALVE (MASTER) W/FLOW METER (RCVMF)
		REMOTE CONTROL VALVE W/PRESSURE REGULATOR (RCVP)
		EXISTING MANUAL CONTROL VALVE (MCV)
		DRIP VALVE ASSEMBLY (DVA)
		WYE STRAINER ASSEMBLY (WSA)

EXISTING	NEW	ITEM DESCRIPTION
		GATE VALVE (GV)
		BALL VALVE (BV)
		QUICK COUPLING VALVE (QCV)
		CAM COUPLER ASSEMBLY (CCA)
		GARDEN VALVE ASSEMBLY (GARVA)
		PRESSURE REGULATING VALVE (PRV)
		PRESSURE RELIEF VALVE (PRLV)
		FLOW CONTROL VALVE (FCV)
		COMBINATION AIR RELEASE VALVE (CARV)
		CHECK VALVE (CV)
		FLUSH VALVE (FV)
		EXISTING NOZZLE LINE W/TURNING UNION
		EXISTING IRRIGATION SYSTEM
		EXISTING IRRIGATION SYSTEM TO BE REMOVED
		CHAIN LINK GATE
		QUICK COUPLING VALVE W/SPRINKLER PROTECTOR
	3	SPRINKLER W/SPRINKLER PROTECTOR
	C	CONNECT TO EXISTING SYSTEM
		CAP
		CAP EXISTING
	FR	FIBER ROLL
	CS	COMPOST SOCK

RCV SIZE
IRRIGATION CONTROLLER
CONTROLLER STATION
VALVE IN PARALLEL (IF APPLICABLE)
GPM
QUANTITY OF SPRINKLERS (WHEN SHOWN)

* (2½"-A-2b-40-60)

VALVE CODE

* VALVE CODES FOR EXISTING VALVES ARE SHOWN IN A DASHED ENCLOSURE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT
Stephen T. Ferreira 3981
Signature
9-30-19
Renewal Date
Date
STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE AND EROSION CONTROL SYMBOLS

NO SCALE

H1

2018 STANDARD PLAN H1

1-26-18

Return to Table of Contents

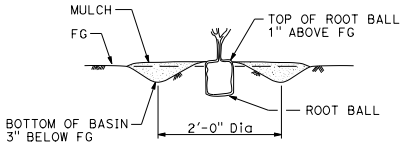
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

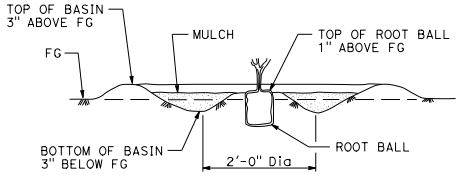
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

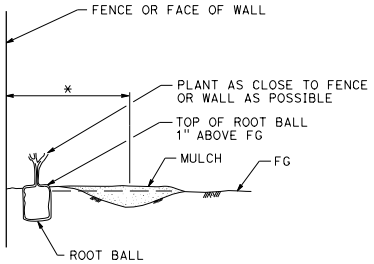
LICENSED LANDSCAPE ARCHITECT
Stephen C. Ferrara 5063
Signature
9-30-19
Renewal Date
Date
STATE OF CALIFORNIA



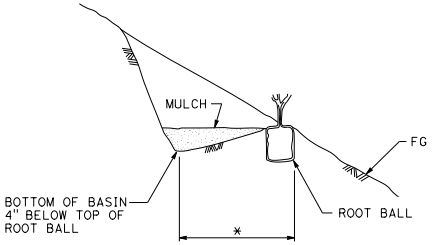
SECTION
(Flat Area)



SECTION
(Flat Area)

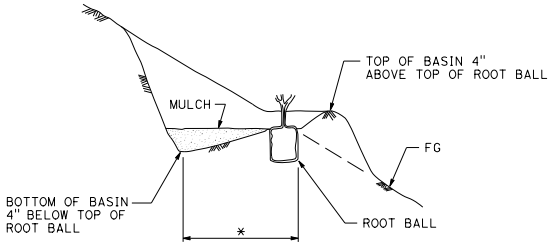


SECTION
(Flat Area)



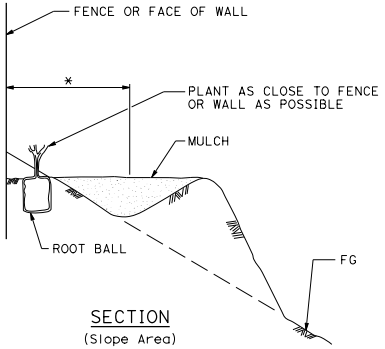
SECTION
(Slope Area)

BASIN TYPE I



SECTION
(Slope Area)

BASIN TYPE II



SECTION
(Slope Area)

BASIN TYPE III

* Basin area equivalent to 2'-0" Dia

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

NO SCALE

H2

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

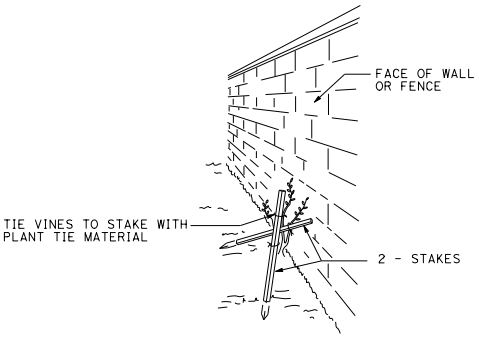
LICENSED LANDSCAPE ARCHITECT

May 31, 2018

PLANS APPROVAL DATE

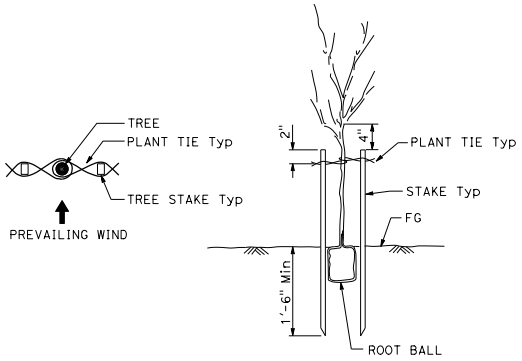
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Shannon C. Ferrara — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA

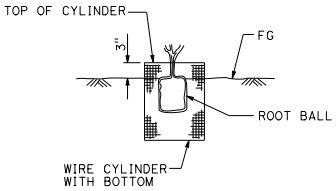


PERSPECTIVE

VINE STAKING

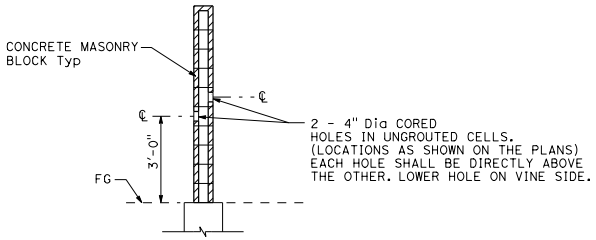


TREE STAKING



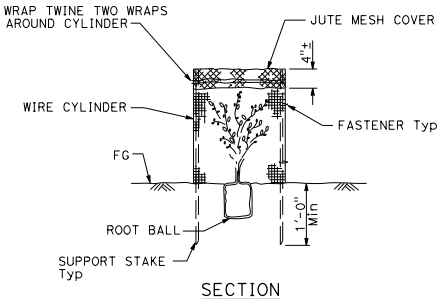
SECTION

ROOT PROTECTOR



SECTION

CORE HOLE (VINE)



SECTION

FOLIAGE PROTECTOR

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

NO SCALE

H3

1-26-18

2018 STANDARD PLAN H3

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

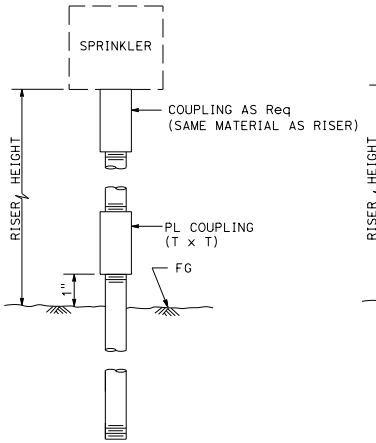
LICENSED LANDSCAPE ARCHITECT

May 31, 2018

PLANS APPROVAL DATE

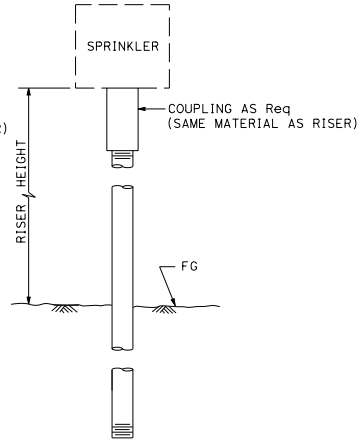
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Stephen C. Ferrone, 5060 — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA



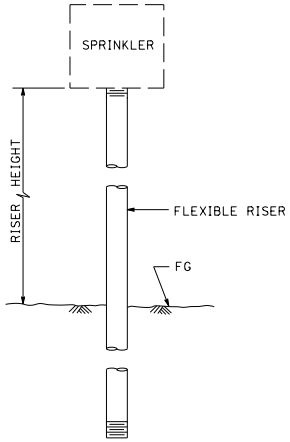
ELEVATION

RISER TYPE I



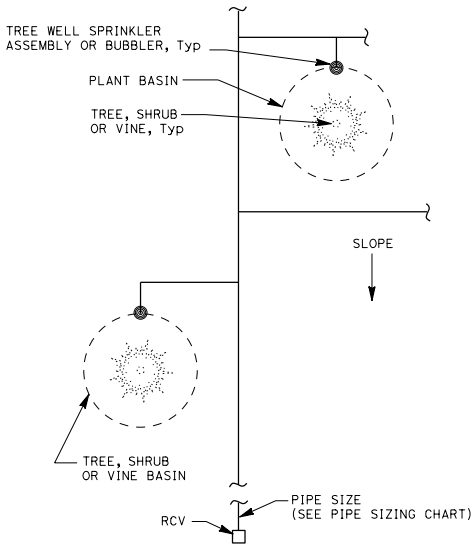
ELEVATION

RISER TYPE II



ELEVATION

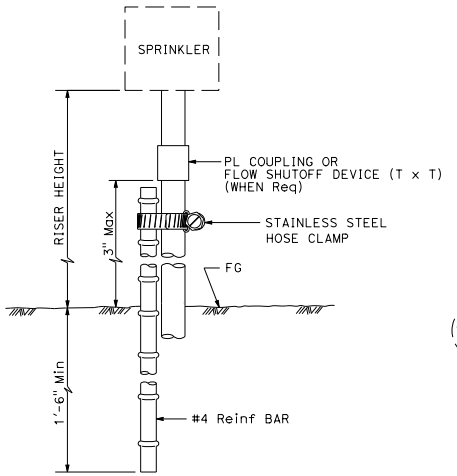
RISER TYPE III



PLAN

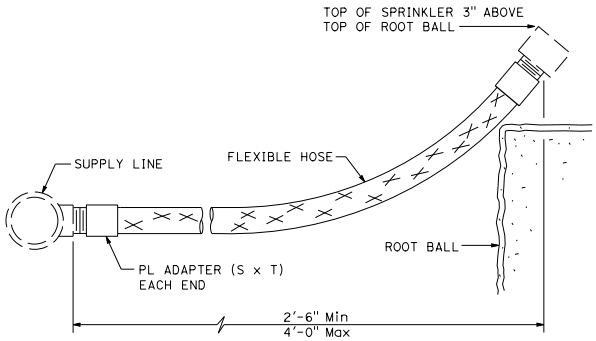
NOTES:

1. Install tree well sprinkler assembly on up-hill side of plant when on slope.
2. Install bubbler within basin.



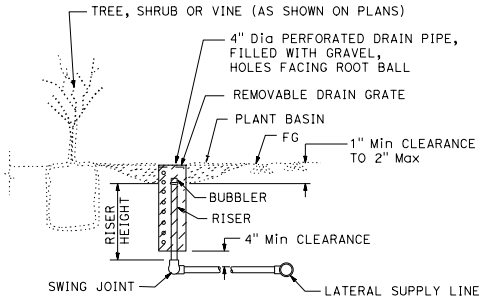
ELEVATION

RISER TYPE IV



ELEVATION

RISER TYPE V



SECTION

TREE WELL SPRINKLER ASSEMBLY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS (RISER SPRINKLER ASSEMBLY)

NO SCALE

H4

1-26-18

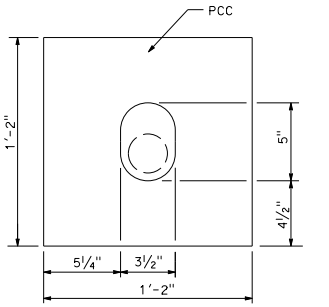
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

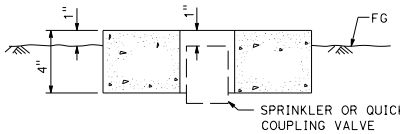
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

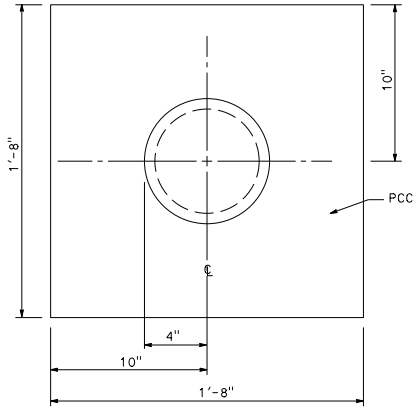


PLAN

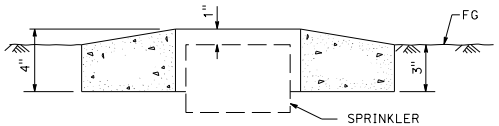


SECTION

SPRINKLER PROTECTOR TYPE I

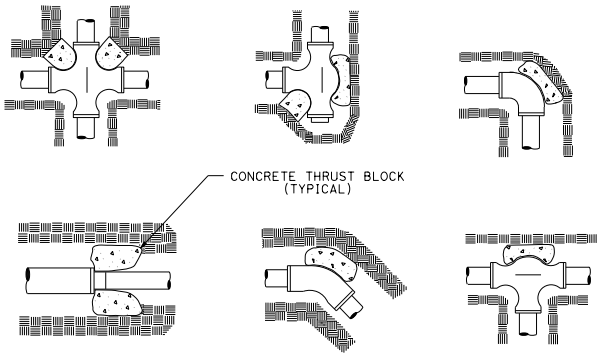


PLAN

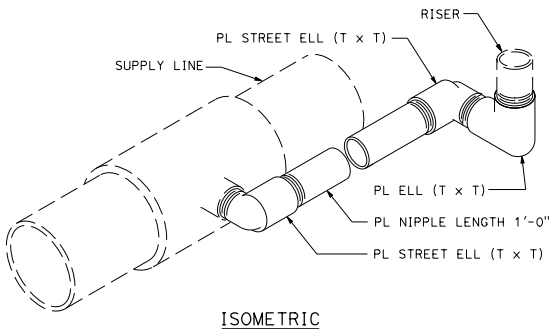


SECTION

SPRINKLER PROTECTOR TYPE II

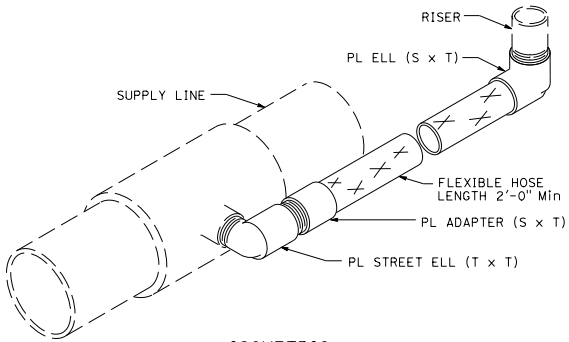


TYPICAL THRUST BLOCKS



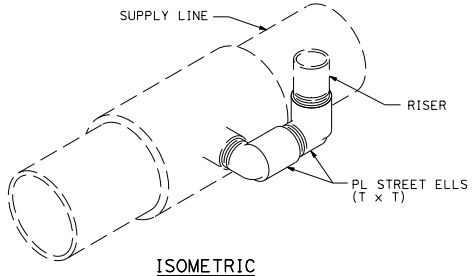
ISOMETRIC

SWING JOINT TYPE I



ISOMETRIC

SWING JOINT TYPE II



ISOMETRIC

SWING JOINT TYPE III

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS (SWING JOINT AND PROTECTOR)

NO SCALE

H5

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

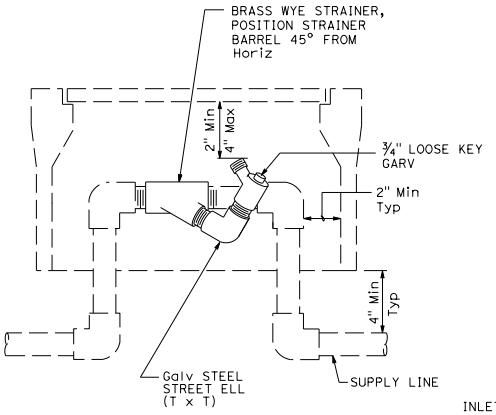
LICENSED LANDSCAPE ARCHITECT

May 31, 2018

PLANS APPROVAL DATE

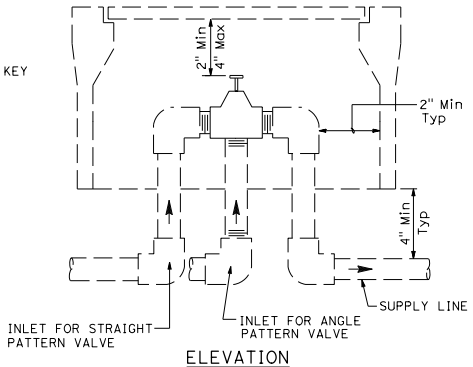
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Stephen C. Ferrara — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA



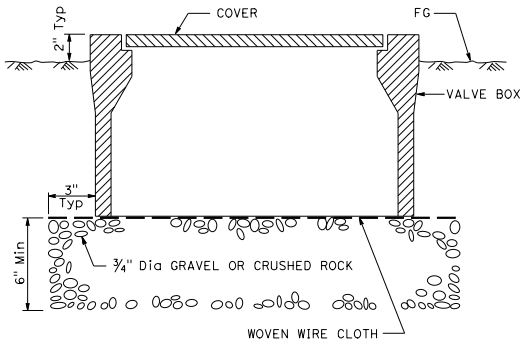
ELEVATION

WYE STRAINER ASSEMBLY



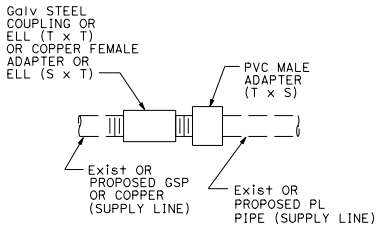
ELEVATION

VALVE

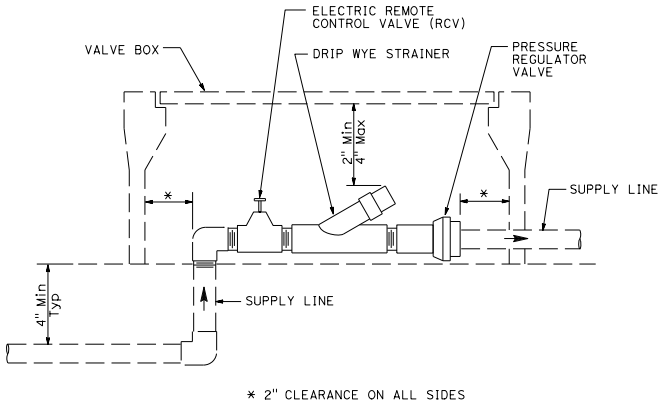


SECTION

VALVE BOX

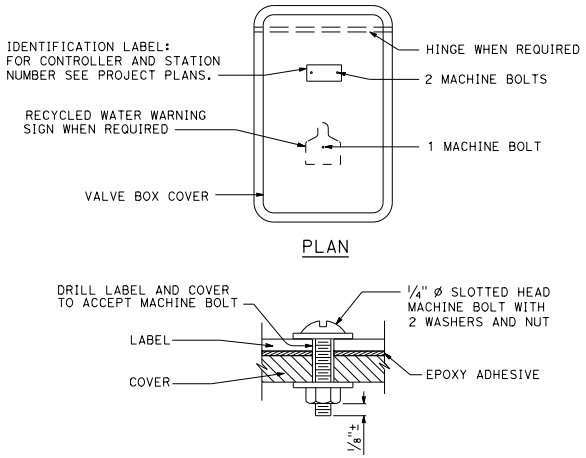


GALVANIZED OR COPPER PIPE CONNECTION TO PLASTIC PIPE



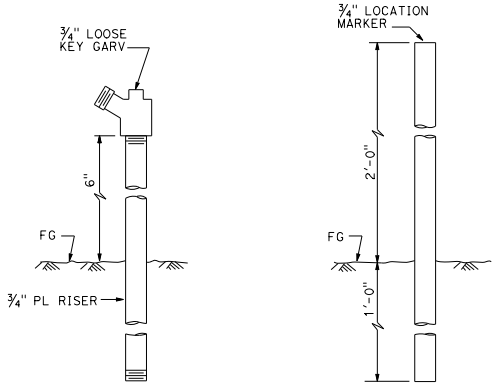
ELEVATION

DRIP VALVE ASSEMBLY



SECTION

VALVE BOX IDENTIFICATION



ELEVATION

GARDEN VALVE ASSEMBLY

ELEVATION

LOCATION MARKER

GARDEN VALVE ASSEMBLY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

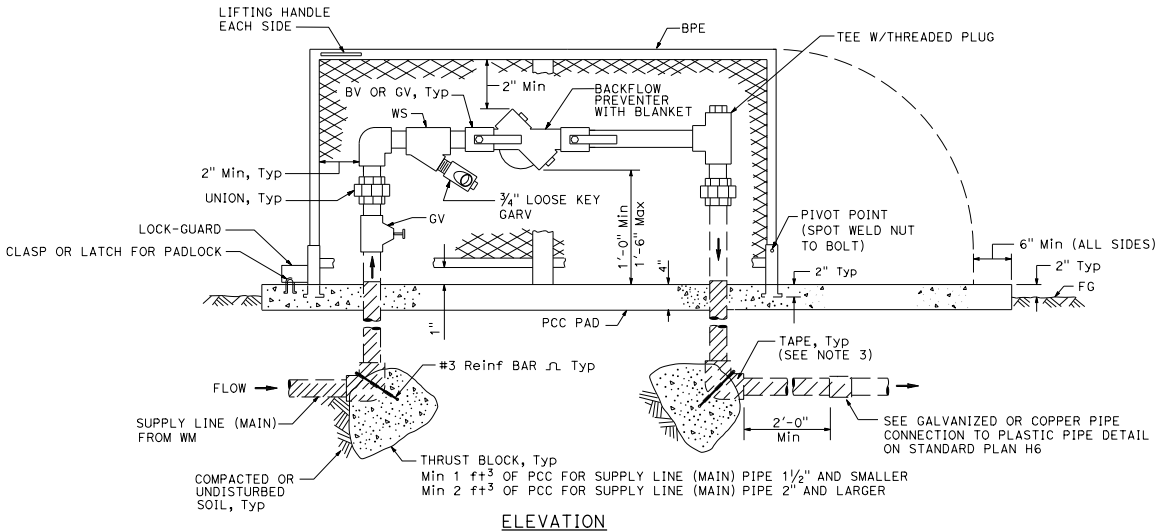
NO SCALE

H6

1-26-18

2018 STANDARD PLAN H6

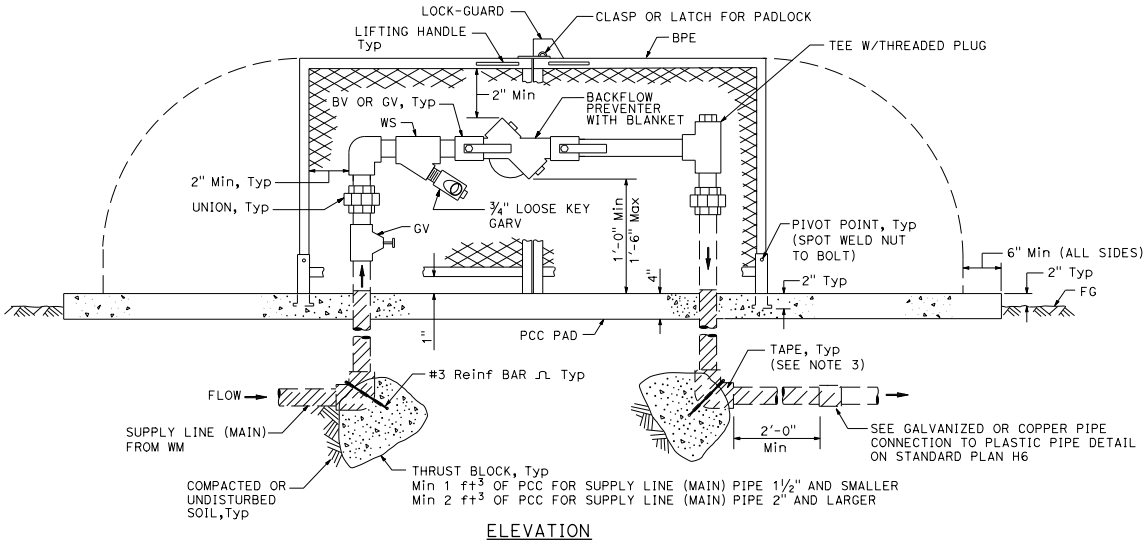
Return to Table of Contents



ELEVATION

BACKFLOW PREVENTER ASSEMBLY

IN ONE PIECE ENCLOSURE



ELEVATION

BACKFLOW PREVENTER ASSEMBLY

IN TWO PIECE ENCLOSURE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

May 31, 2018

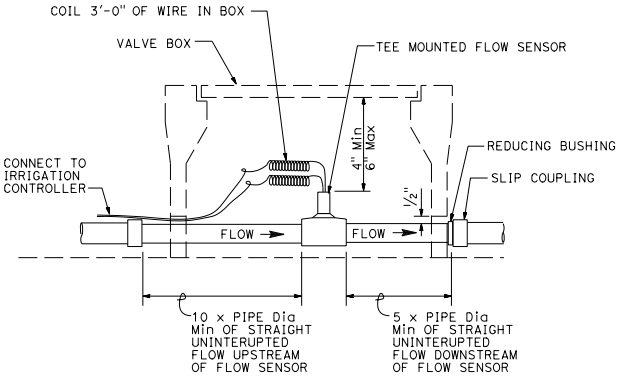
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Stephen T. Ferrone, 5663 — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA

NOTES:

1. Wye strainer and fittings must be the same size as the backflow preventer shown on the plans.
2. Backflow preventer assembly manifold pipe must be the same pipe as the supply line (main) pipe to be installed from the water meter to the backflow preventer assembly.
3. All metal in contact with soil and Portland Cement Concrete must be wrapped with 2" wide plastic backed adhesive polyethylene tape 20 mil thick with ½" overlap.



SECTION

FLOW SENSOR

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

NO SCALE

H7

1-26-18

2018 STANDARD PLAN H7

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

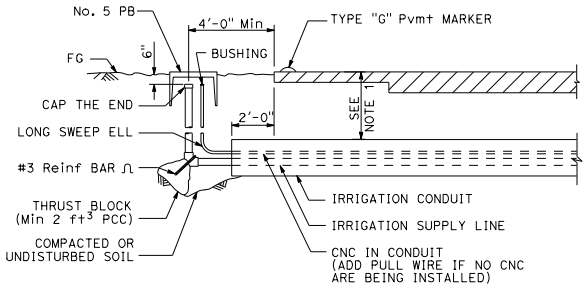
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Shannon C. Ferrero — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA

NOTES:

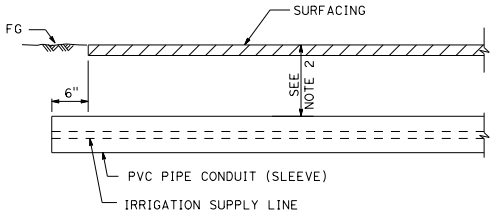
1. 40" - 50"
2. 12" downstream of RCV
   18" upstream of RCV



SECTION

IRRIGATION CONDUIT

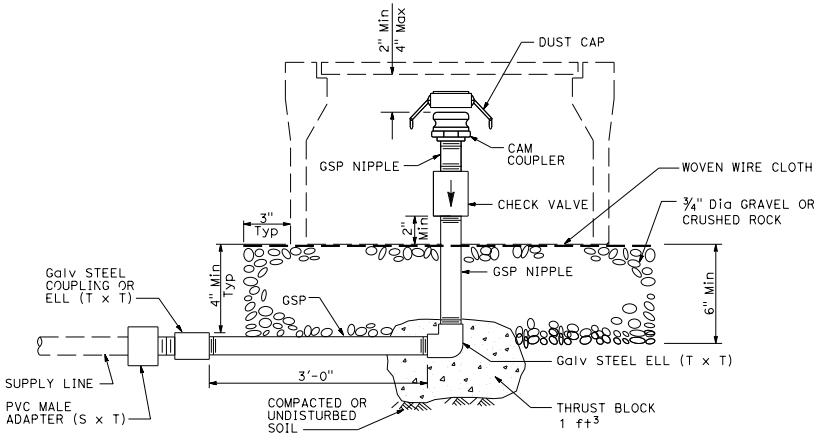
UNDER TRAVELED WAY



SECTION

PVC PIPE CONDUIT (SLEEVE)

UNDER SIDEWALKS, DRIVEWAYS PAVEMENT, SLOPE PAVING, PAVED DITCHES AND PATHS



ELEVATION

CAM COUPLER ASSEMBLY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

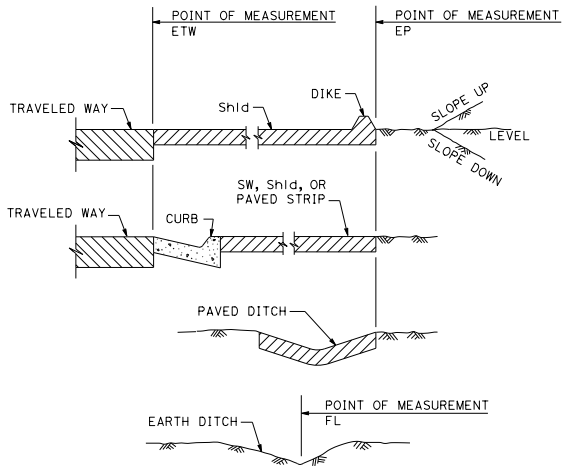
NO SCALE

H8

1-26-18

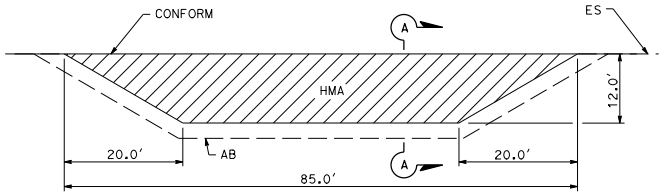
2018 STANDARD PLAN H8

Return to Table of Contents

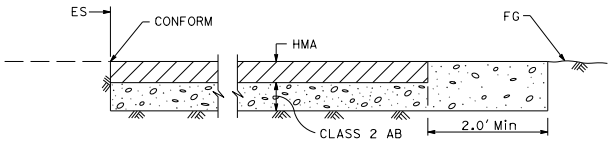


SECTION

POINTS OF MEASUREMENT



PLAN

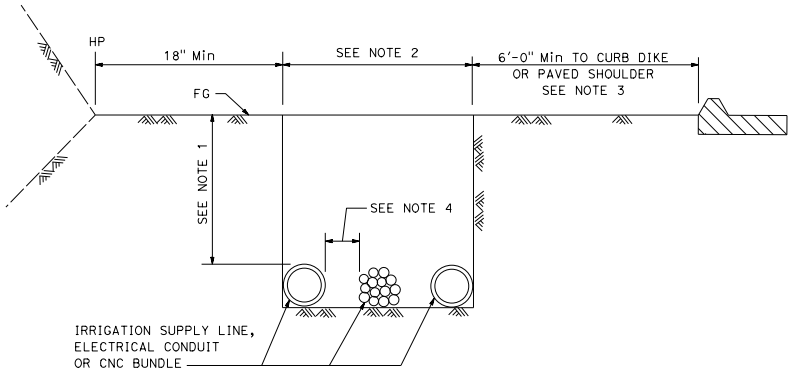


SECTION A-A

MAINTENANCE VEHICLE PULLOUT

NOTES:

1. 12" downstream of RCV
   18" upstream of RCV
2. Width sufficent to allow snaking of pipe and CNC bundles without stacking.
3. 1 ft minimum to back of sidewalk.
4. 2" Min or Dia of largest pipe in trench.



SECTION

IRRIGATION TRENCH DETAIL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT
Stephen C. Ferrara 5063
Signature
9-30-19
Renewal Date
Date
STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LANDSCAPE DETAILS

NO SCALE

H9

1-26-18

2018 STANDARD PLAN H9

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

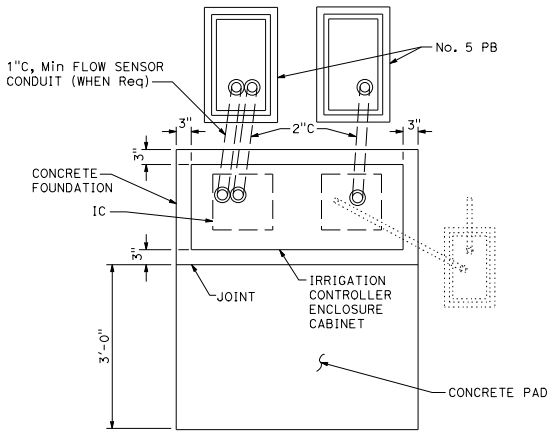
LICENSED LANDSCAPE ARCHITECT

May 31, 2018

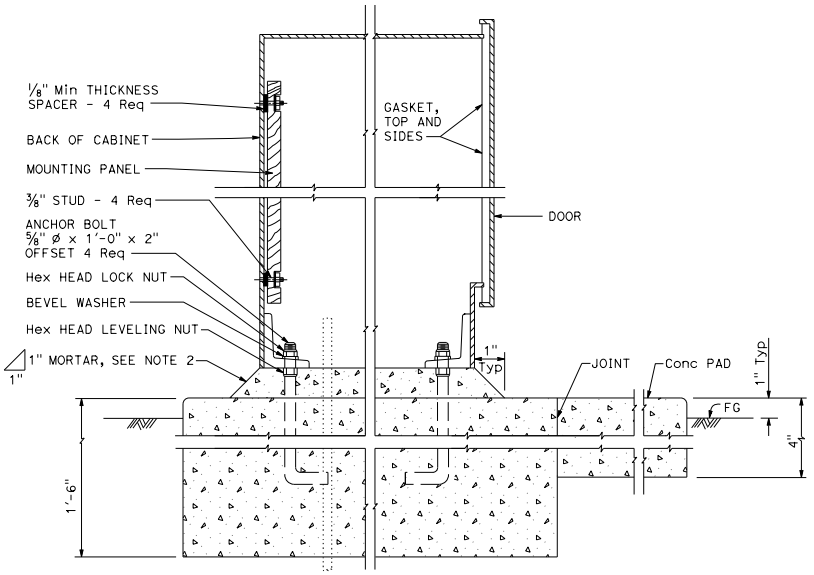
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Stephen T. Ferreira — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA



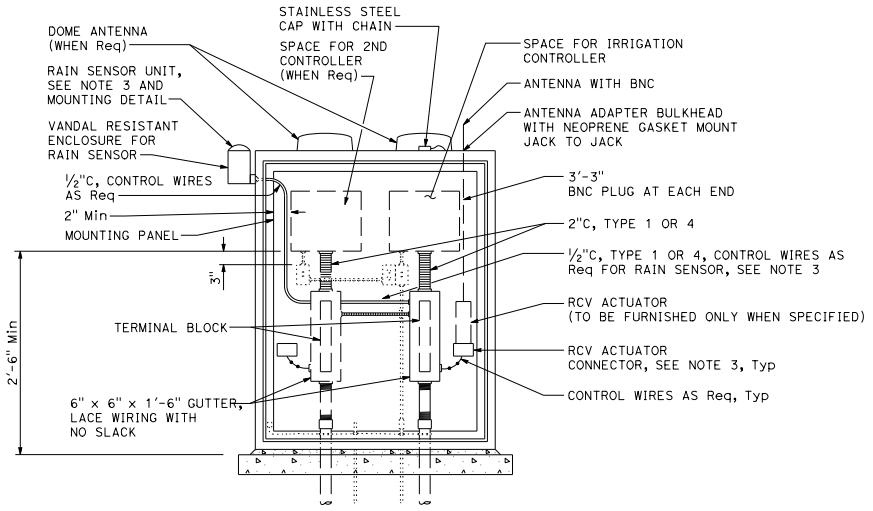
PLAN



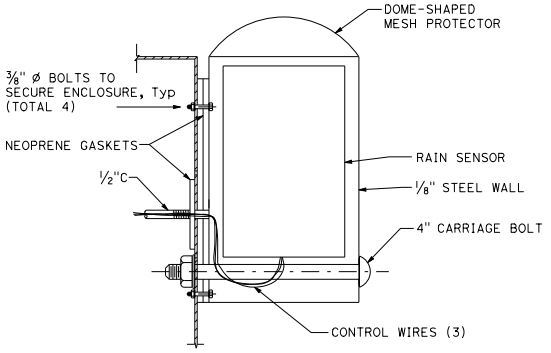
CABINET SECTION

NOTES:

1. All dimensions are nominal.
2. Mortar shall be 1-part cement, 2-parts plaster sand.
3. Rain sensor unit and remote control valve actuator connectors to be provided when specified.
4. See project plans for location and number of irrigation controllers for each cabinet. Install the cabinet with the back facing the direction of oncoming traffic in the nearest traffic lane.
5. The electrical items shown in dropout are not labeled. See Standard Plan ES-3H for electrical requirements.



ELEVATION



RAIN SENSOR UNIT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

IRRIGATION CONTROLLER ENCLOSURE CABINET

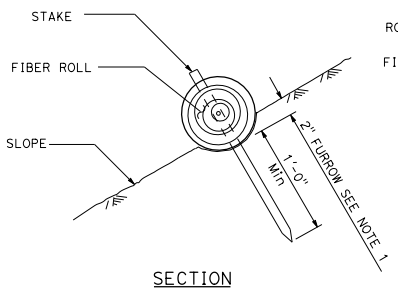
NO SCALE

H10

1-26-18

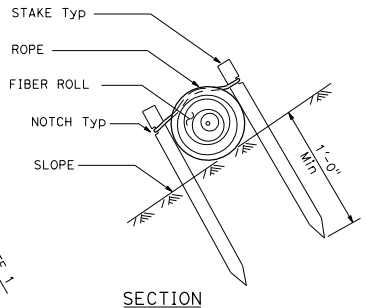
2018 STANDARD PLAN H10

Return to Table of Contents

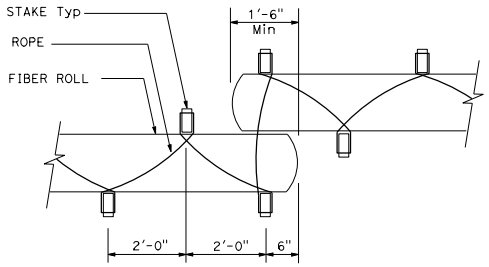


SECTION

FIBER ROLL (TYPE 1)

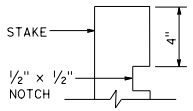


SECTION



PLAN

FIBER ROLL (TYPE 2)



ELEVATION

STAKE NOTCH DETAIL

NOTE:

1. Installations shown in the perspectives are for slope inclination of 10:1 (Horiz:Vert) and steeper.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

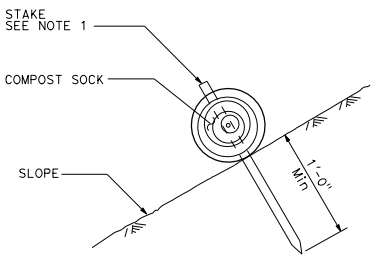
LICENSED LANDSCAPE ARCHITECT

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT Stephen T. Ferrone 5663 Signature 9-30-19 Renewal Date Date STATE OF CALIFORNIA

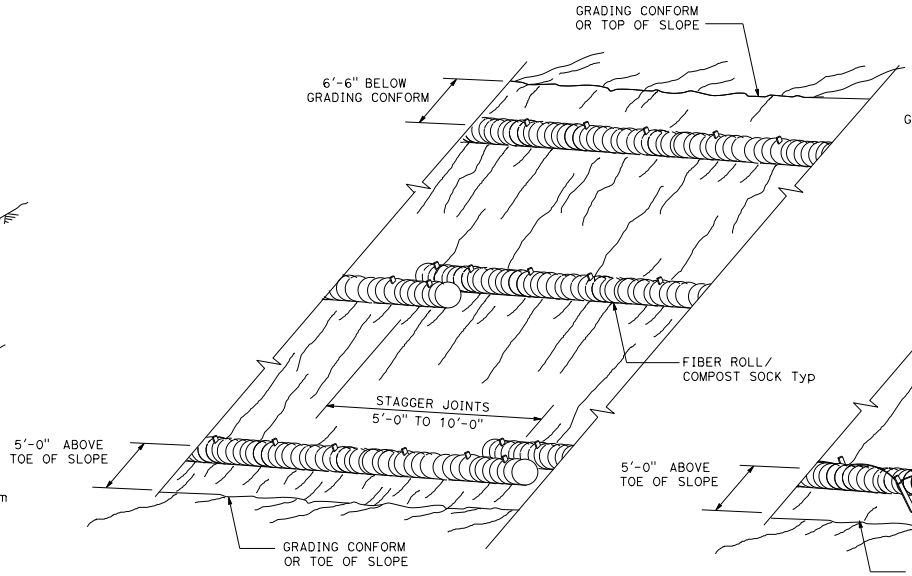


SECTION

COMPOST SOCK

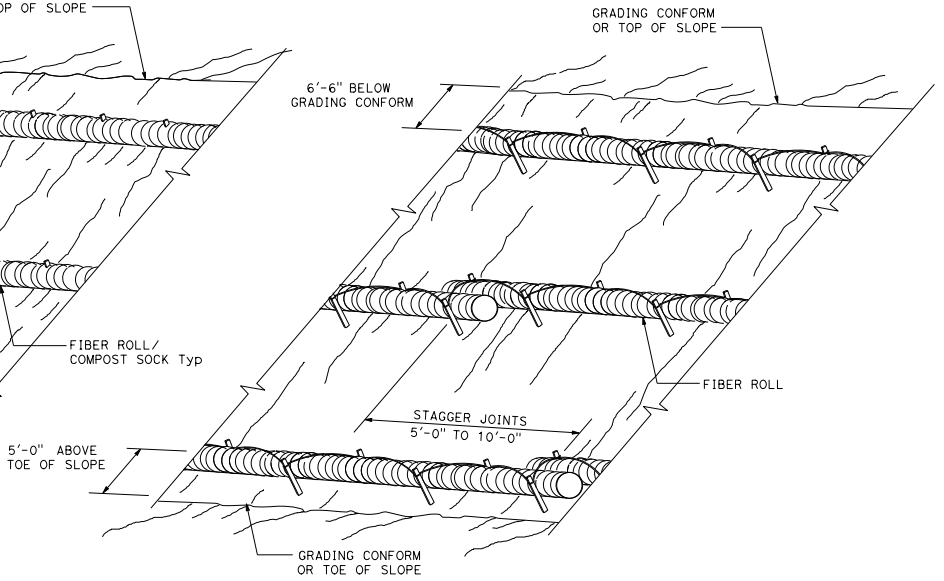
NOTE:

1. May install stake adjacent to bottom edge of compost sock.



PERSPECTIVE

FIBER ROLL (TYPE 1) COMPOST SOCK



PERSPECTIVE

FIBER ROLL (TYPE 2)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

EROSION CONTROL DETAILS FIBER ROLL AND COMPOST SOCK

NO SCALE

H51

1-26-18

2018 STANDARD PLAN H51

Return to Table of Contents

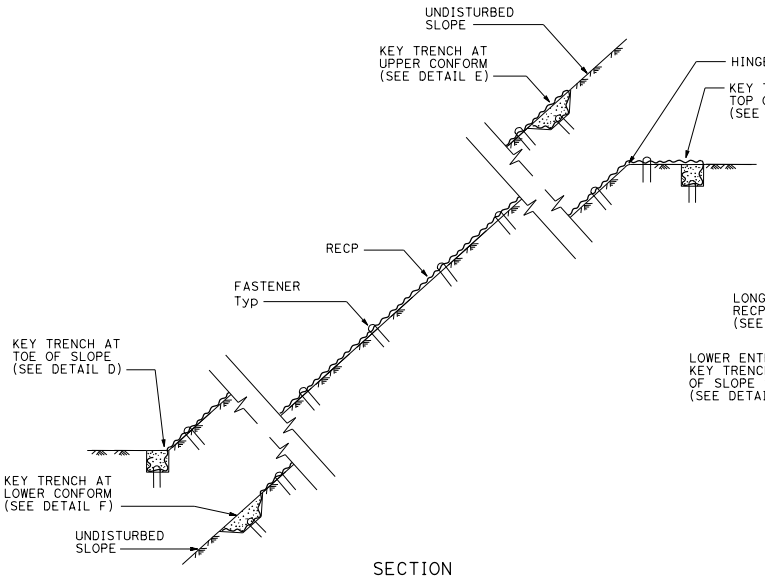
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

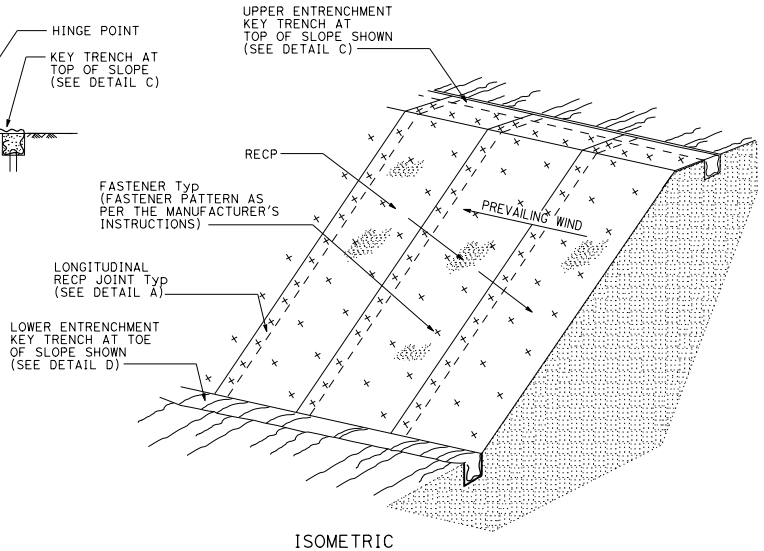
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Stephen T. Ferreira — Signature — 9-30-19 Renewal Date — Date — STATE OF CALIFORNIA



SECTION

ROLLED EROSION CONTROL PRODUCT ON SLOPE WITH VARIOUS KEY ENTRENCHMENTS

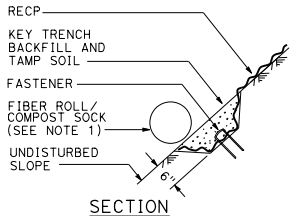


ISOMETRIC

ROLLED EROSION CONTROL PRODUCT ON SLOPE

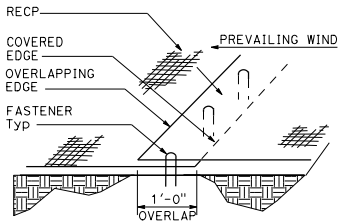
NOTES:

1. Fiber Roll/Compost Sock shown for reference purposes only.
2. If transverse rolled erosion control product joints are required on slopes, see Detail B.



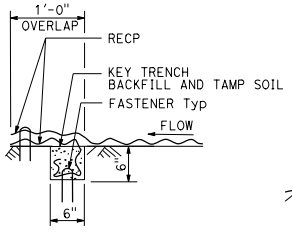
SECTION

DETAIL F KEY TRENCH AT LOWER CONFORM



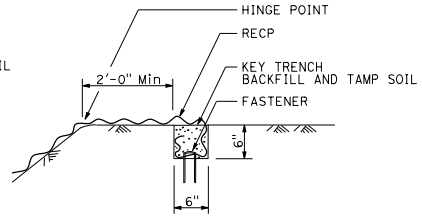
PERSPECTIVE

DETAIL A LONGITUDINAL ROLLED EROSION CONTROL PRODUCT JOINT



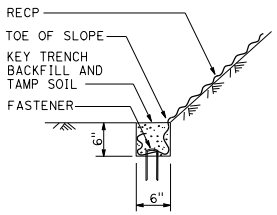
SECTION

DETAIL B TRANSVERSE ROLLED EROSION CONTROL PRODUCT JOINT



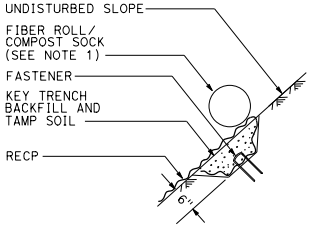
SECTION

DETAIL C KEY TRENCH AT TOP OF SLOPE



SECTION

DETAIL D KEY TRENCH AT TOE OF SLOPE



SECTION

DETAIL E KEY TRENCH AT UPPER CONFORM

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROLLED EROSION CONTROL PRODUCT

NO SCALE

H52

1-26-18

2018 STANDARD PLAN H52

Return to Table of Contents

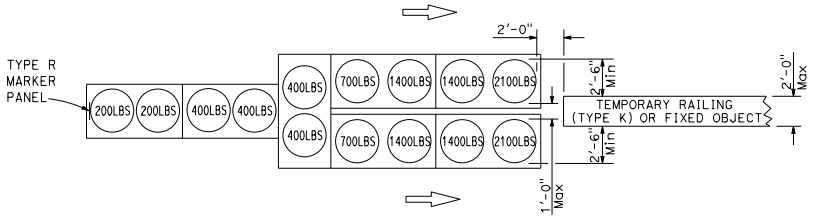
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

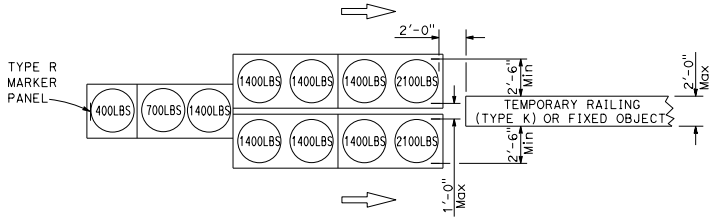
Randell D. Hiatt No. C50200 Exp. 6-30-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



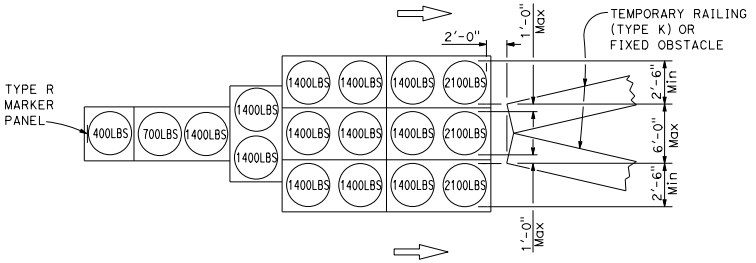
ARRAY 'TU14'

Approach speed 45 mph or more



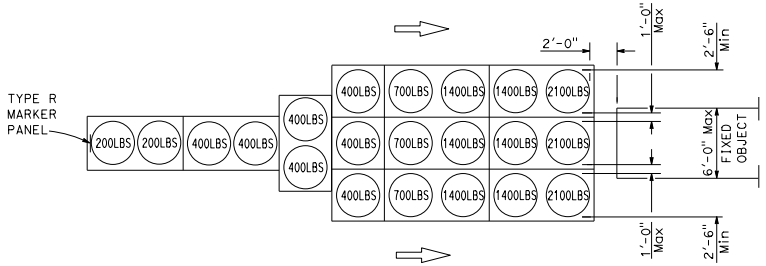
ARRAY 'TU11'

Approach speed less than 45 mph



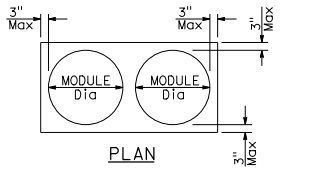
ARRAY 'TU17'

Approach speed less than 45 mph

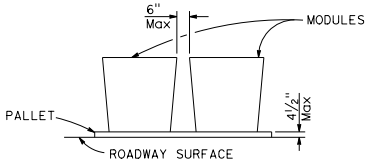


ARRAY 'TU21'

Approach speed 45 mph or more



PLAN



ELEVATION

CRASH CUSHION PALLET DETAIL

NOTES:

1. (XXX) Indicates sand filled module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the module.
2. All sand weights are nominal.
3. Refer to Standard Plan A73B for marker details.
4. Approach speeds indicated conform to NCHRP 350 Report criteria.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY CRASH CUSHION, SAND FILLED (UNIDIRECTIONAL)

NO SCALE

T1A

2018 STANDARD PLAN T1A

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

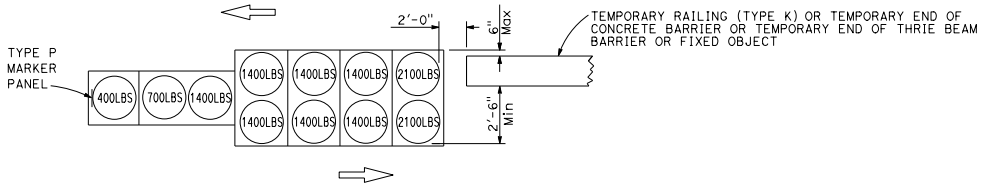
Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Randell D. Hiatt
No. C50200
Exp. 6-30-19
CIVIL

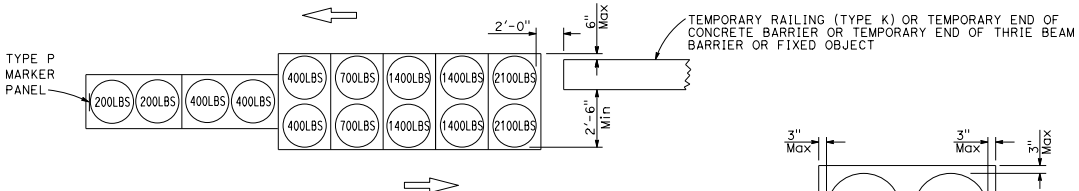
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



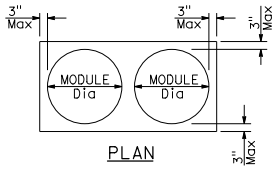
ARRAY 'TB11'

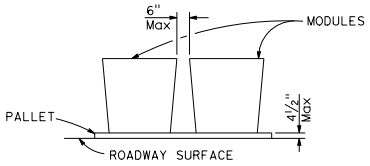
Approach speed less than 45 mph



ARRAY 'TB14'

Approach speed 45 mph or more





CRASH CUSHION PALLET DETAIL

NOTES:

1. (XXX) Indicates sand filled module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the module.
2. All sand weights are nominal.
3. Refer to Standard Plan A73B for marker details.
4. Approach speeds indicated conform to NCHRP 350 Report criteria.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY CRASH CUSHION, SAND FILLED (BIDIRECTIONAL)

NO SCALE

T1B

2018 STANDARD PLAN T1B

1-29-18

Return to Table of Contents

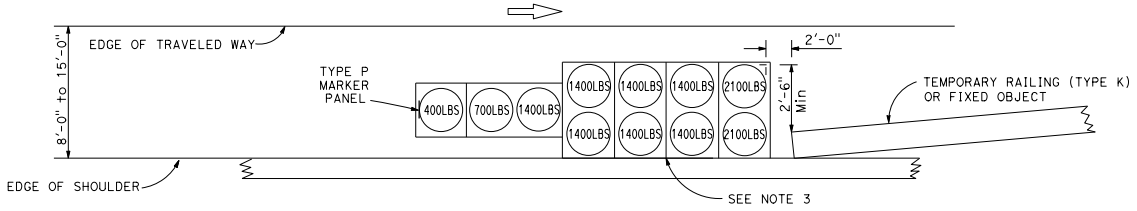
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

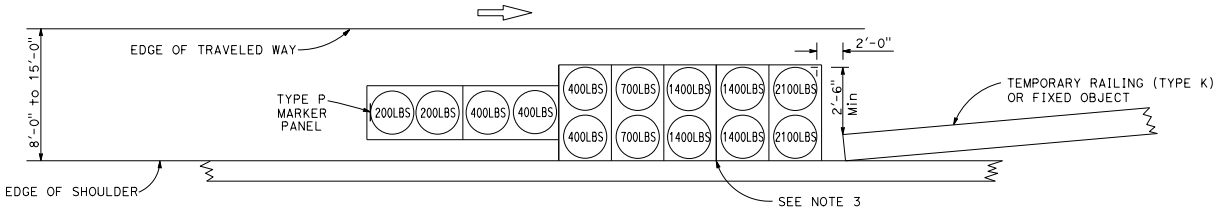
REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



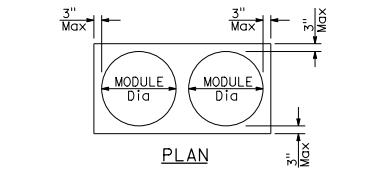
ARRAY 'TS11'

Approach speed less than 45 mph
See Note 6

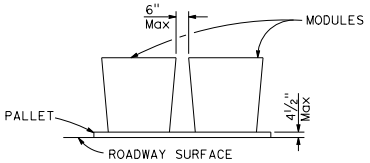


ARRAY 'TS14'

Approach speed 45 mph or more
See Note 6



PLAN



ELEVATION

CRASH CUSHION PALLET DETAIL

NOTES:

1. (XXX) Indicates sand filled module location and weight of sand in pounds for each module. Module spacing is based on the greater diameter of the module.
2. All sand weights are nominal.
3. The temporary crash cushion arrays shown on this plan shall be used only in locations where there will be traffic on one side of the temporary crash cushion array.
4. Arrays for median shoulders shall conform to details shown on this plan for outside shoulders.
5. Refer to Standard Plan A73B for marker details.
6. For shoulder widths less than 8'-0", appropriate approved crash cushion protection, other than sand filled modules, shall be provided at fixed objects and at approach ends of temporary railing. The specific type of crash cushion shall be as shown on the project plans or as specified in the Special Provisions, or if not shown on the project plans or specified in the Special Provisions, shall be as approved by the Engineer.
7. Approach speeds indicated conform to NCHRP 350 Report criteria.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

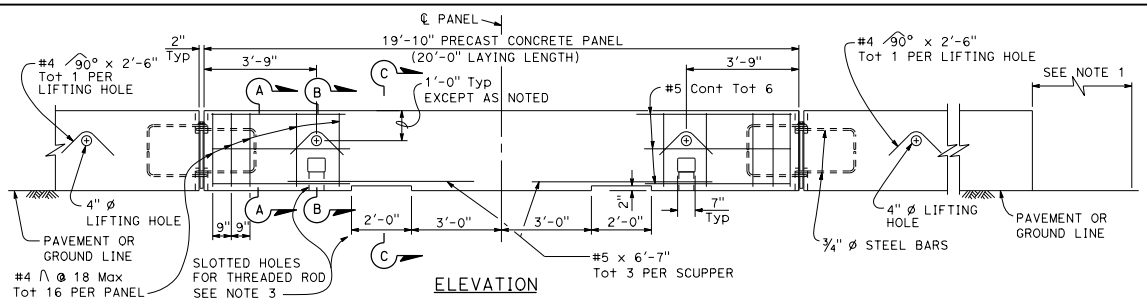
TEMPORARY CRASH CUSHION, SAND FILLED (SHOULDER INSTALLATIONS)

NO SCALE

T2

1-29-18

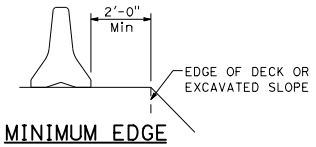
Return to Table of Contents



ELEVATION

TYPICAL PANEL

Weight per panel: 3.9 tons



MINIMUM EDGE DISTANCE

See Note 3

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

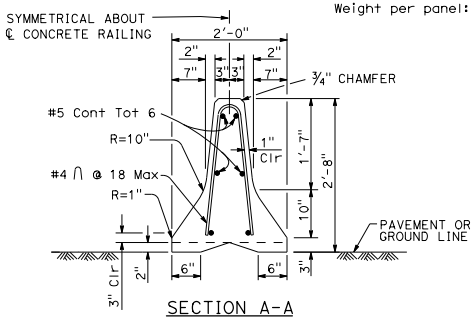
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

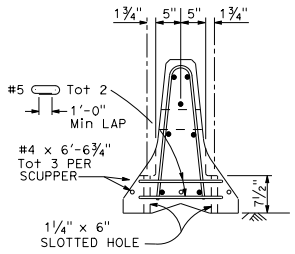
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

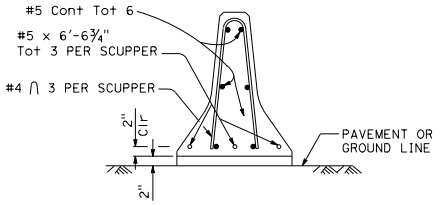
1. For end treatment, layout and crash cushions, where needed, see Project Plans or Special Provisions.
2. All 3½" gaps at removable panels are to be backed at the base with #8 x 10" dowel or 1" ø pin each side of joint. See Section G-G.
3. Where the offset distance from the exposed edge of deck to the closest edge of the temporary railing is less than 2'-0", attach each panel to deck slab with 1" diameter threaded rods (total four per panel) inserted through the slotted holes of the panel and bond in drilled holes 6" deep in the deck slabs. See "Bridge Memo to Designers" Manual.



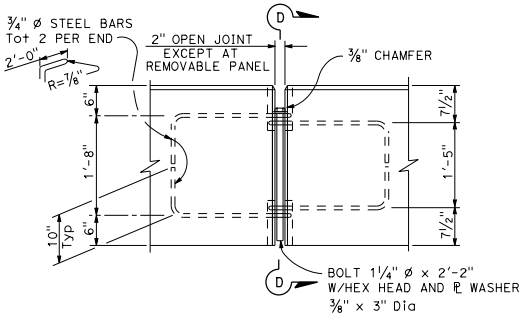
SECTION A-A



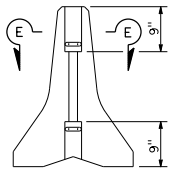
SECTION B-B



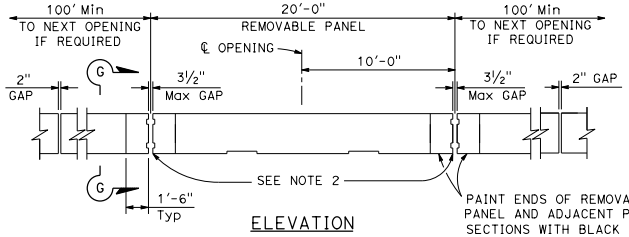
SECTION C-C



ELEVATION

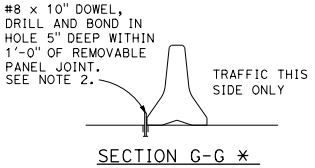


SECTION D-D



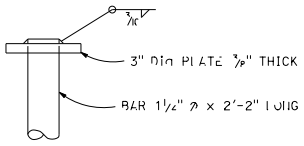
ELEVATION

TYPICAL OPENING DETAIL

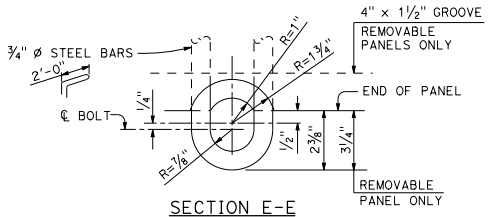


SECTION G-G *

* Section G-G is for concrete pavement. Alternative detail, 1" ø pins 2'-0" long driven in existing AC or HMA.

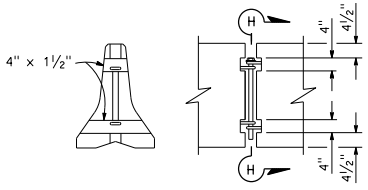


ALTERNATIVE HEAD DETAIL



SECTION E-E

BOLT CONNECTION DETAIL



SECTION H-H ELEVATION

REMOVABLE PANEL GROOVE DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY RAILING (TYPE K)

NO SCALE

T3A

1-29-18

Return to Table of Contents

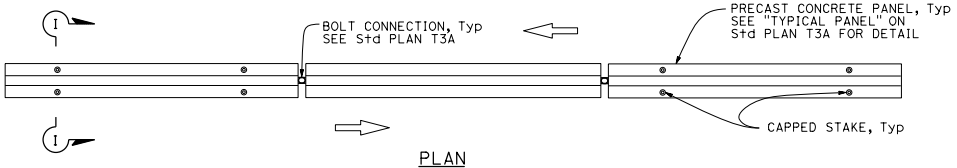
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

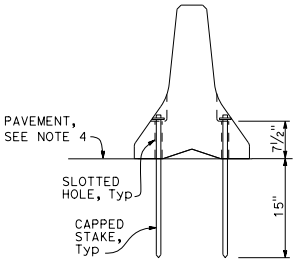
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

RAILING STAKING CONFIGURATION FOR TWO-WAY TRAFFIC

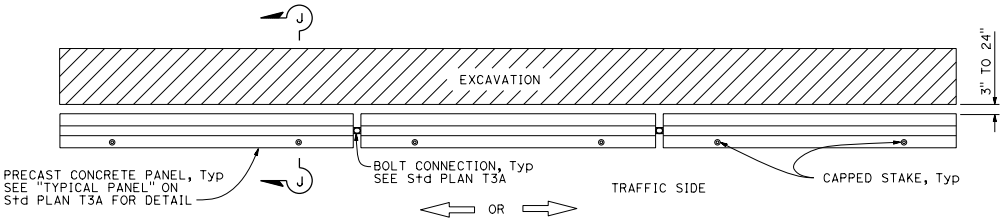
See Note 2



SECTION I-I

NOTES:

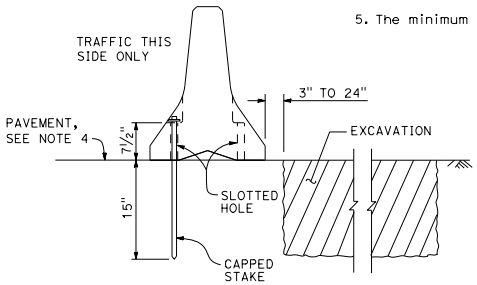
1. Where Type K Temporary Railing is placed on curves and radii that are too severe to connect panels with bolted joints, the railing must be backed continuously with earth fill. See Section F-F.
2. Where Type K Temporary Railing is placed as a temporary or long term barrier in two-way traffic on highways with less than 24" from the edge of traveled way, use four capped stakes per every other panel with end panels staked.
3. Where Type K Temporary Railing is placed 3" to 24" from the edge of an excavation on highways, use two capped stakes per panel along the traffic side.
4. Staked Type K Temporary Railing must be supported by at least 4" thick concrete, hot mix asphalt or existing asphalt concrete pavement.
5. The minimum yield strength for the washer must be 60,000 psi.



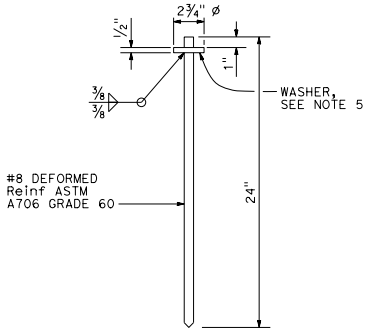
PLAN

RAILING STAKING CONFIGURATION ADJACENT TO AN EXCAVATION

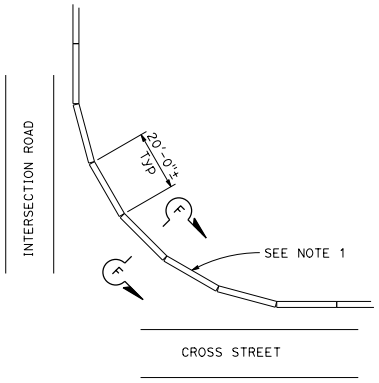
See Note 3



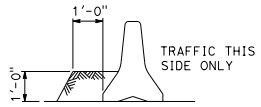
SECTION J-J



CAPPED STAKE DETAIL



CURVED LAYOUT



SECTION F-F

See Note 1

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY RAILING (TYPE K)

NO SCALE

T3B

2018 STANDARD PLAN T3B

1-29-18

Return to Table of Contents

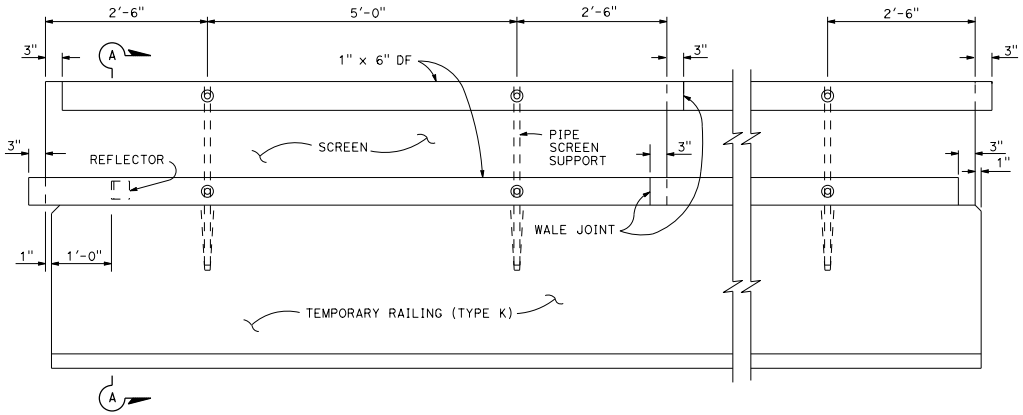
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

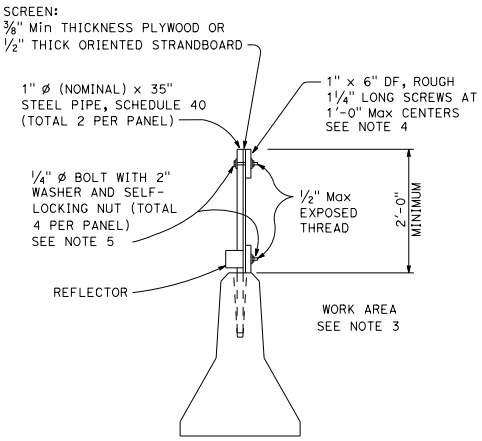
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



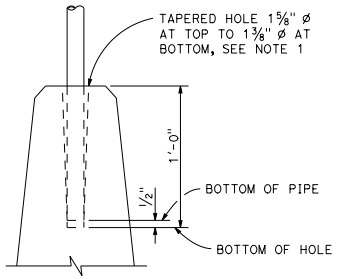
ELEVATION



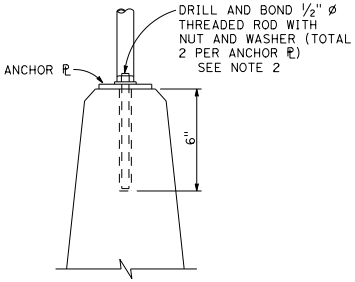
SECTION A-A

NOTES:

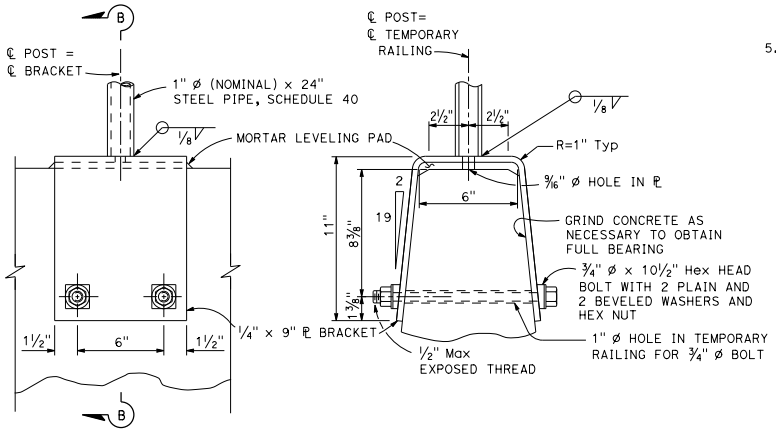
1. Straight holes 1½" ø of the depth shown may be used in lieu of the tapered holes.
2. Resin capsule-type anchorage devices may be substituted for threaded rods.
3. Place screen on work area side of the temporary railing where traffic will only be on one side of the temporary railing.
4. Clinched 8d box nails may be substituted for screws. The nails shall be clinched on the work area side of the screen where traffic will only be on one side of the temporary railing.
5. U-bolts may be substituted for 1/4" ø bolts.



SCREEN ANCHORAGE DETAIL



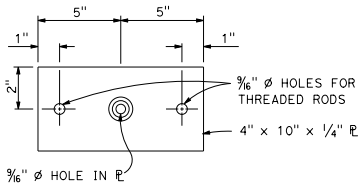
SCREEN ANCHORAGE DETAIL
ALTERNATIVE "A"



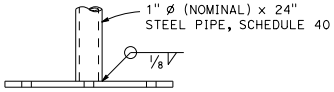
ELEVATION

SECTION B-B

SCREEN ANCHORAGE DETAIL
ALTERNATIVE "B"



PLAN



ELEVATION

ANCHOR PLATE DETAIL
ALTERNATIVE "A"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY TRAFFIC SCREEN

NO SCALE

T4

1-29-18

2018 STANDARD PLAN T4

Return to Table of Contents

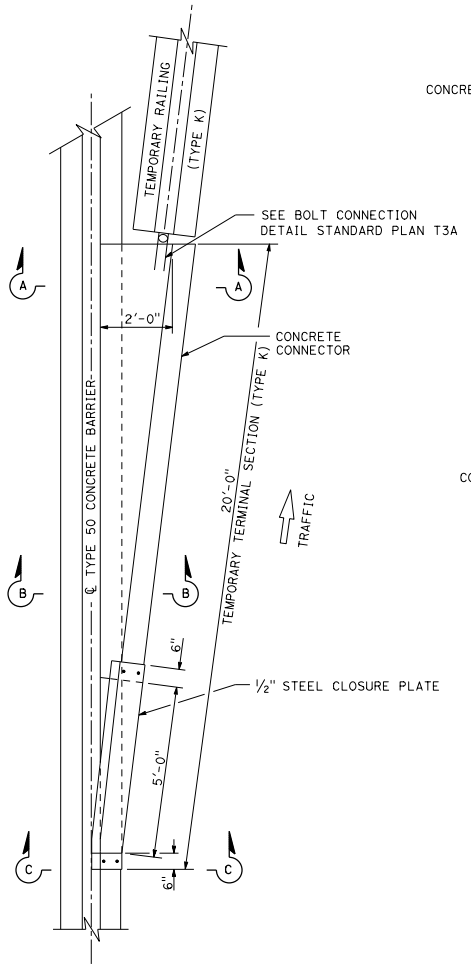
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Randell D. Hiatt
REGISTERED CIVIL ENGINEER

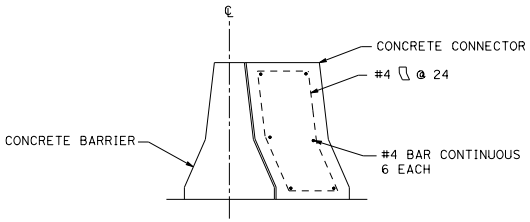
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Randell D. Hiatt — No. C50200 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

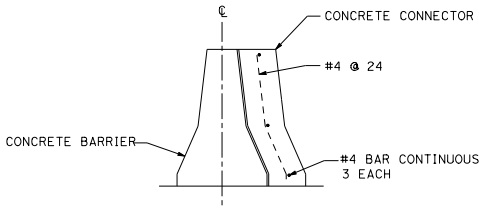
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



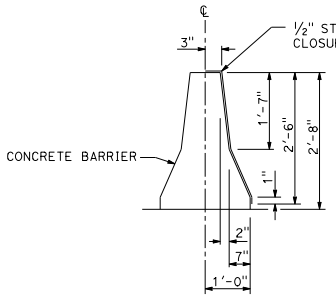
PLAN



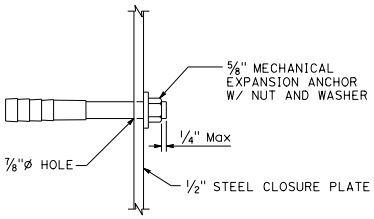
SECTION A-A



SECTION B-B



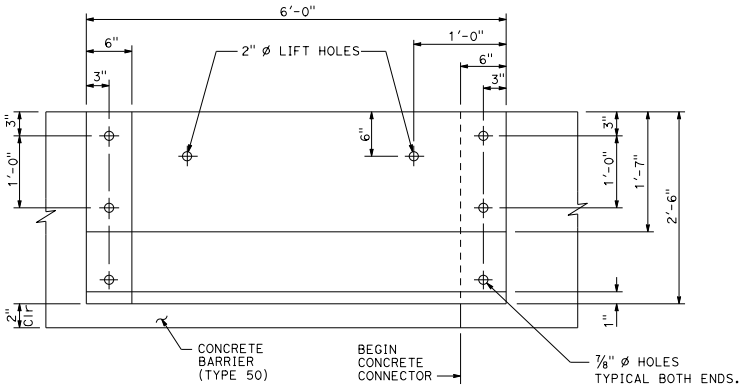
SECTION C-C



CLOSURE PLATE ANCHOR BOLT DETAIL

NOTE:

1. If lifting holes are used with the concrete connector, they shall conform to the lifting hole details shown on Standard Plan T3A.



CLOSURE PLATE (SIDE VIEW)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY TERMINAL SECTION (TYPE K)

NO SCALE

T5

2018 STANDARD PLAN T5

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TABLE 1

TAPER LENGTH CRITERIA AND CHANNELIZING DEVICE SPACING

SPEED (S)	MINIMUM TAPER LENGTH * FOR WIDTH OF OFFSET 12 FEET (W)				MAXIMUM CHANNELIZING DEVICE SPACING		
					X	Y	Z **
	TANGENT 2L	MERGING L	SHIFTING L/2	SHOULDER L/3	TAPER	TANGENT	CONFLICT
mph	ft	ft	ft	ft	ft	ft	ft
20	160	80	40	27	20	40	10
25	250	125	63	42	25	50	12
30	360	180	90	60	30	60	15
35	490	245	123	82	35	70	17
40	640	320	160	107	40	80	20
45	1080	540	270	180	45	90	22
50	1200	600	300	200	50	100	25
55	1320	660	330	220	50	100	25
60	1440	720	360	240	50	100	25
65	1560	780	390	260	50	100	25
70	1680	840	420	280	50	100	25
75	1800	900	450	300	50	100	25

* - For other offsets, use the following merging taper length formula for L:
For speed of 40 mph or less, $L = WS^2/60$
For speed of 45 mph or more, $L = WS$

Where: L = Taper length in feet
W = Width of offset in feet
S = Posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

** - Use for taper and tangent sections where there are no pavement markings or where there is a conflict between existing pavement markings and channelizers (CA).

TABLE 2

LONGITUDINAL BUFFER SPACE AND FLAGGER STATION SPACING

SPEED *	Min D **	DOWNGRADE Min D ***		
		-3%	-6%	-9%
mph	ft	ft	ft	ft
20	115	116	120	126
25	155	158	165	173
30	200	205	215	227
35	250	257	271	287
40	305	315	333	354
45	360	378	400	427
50	425	446	474	507
55	495	520	553	593
60	570	598	638	686
65	645	682	728	785
70	730	771	825	891
75	820	866	927	1003

* - Speed is posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

** - Longitudinal buffer space or flagger station spacing

*** - Use on sustained downgrade steeper than -3 percent and longer than 1 mile.

TABLE 3

ADVANCE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS *		
	A	B	C
	ft	ft	ft
URBAN - 25 mph OR LESS	100	100	100
URBAN - MORE THAN 25 mph TO 40 mph	250	250	250
URBAN - MORE THAN 40 mph	350	350	350
RURAL	500	500	500
EXPRESSWAY / FREEWAY	1000	1500	2640

* - The distances are approximate, are intended for guidance purposes only, and should be applied with engineering judgment. These distances should be adjusted by the Engineer for field conditions, if necessary, by increasing or decreasing the recommmended distances.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM TABLES FOR LANE AND RAMP CLOSURES

NO SCALE

T9

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 CIVIL — STATE OF CALIFORNIA

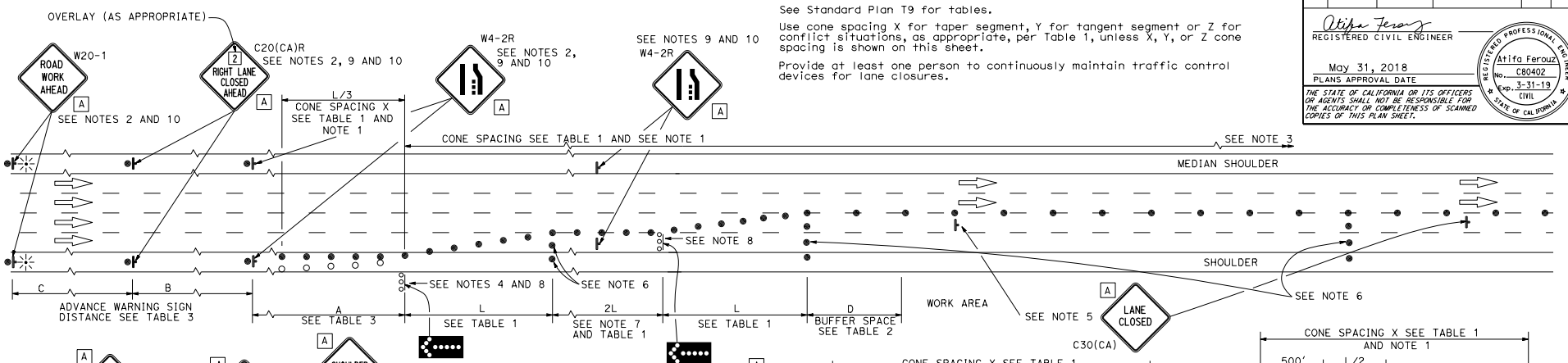
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

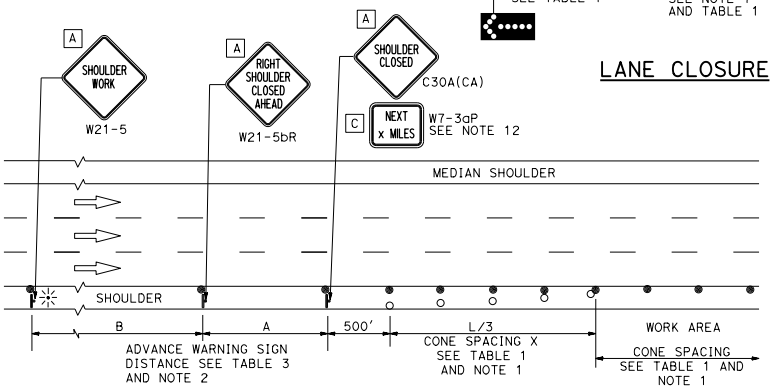
See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

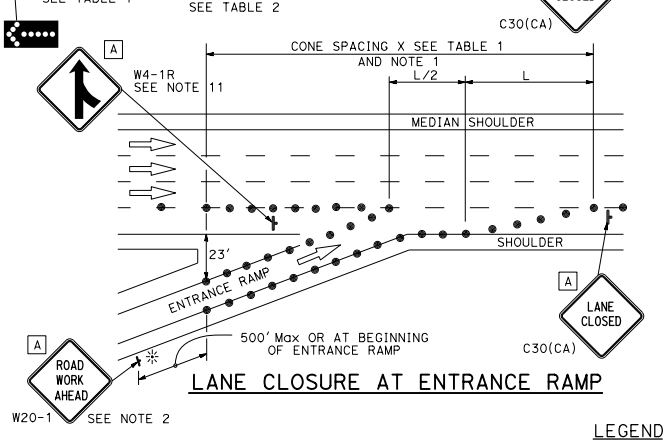
Provide at least one person to continuously maintain traffic control devices for lane closures.



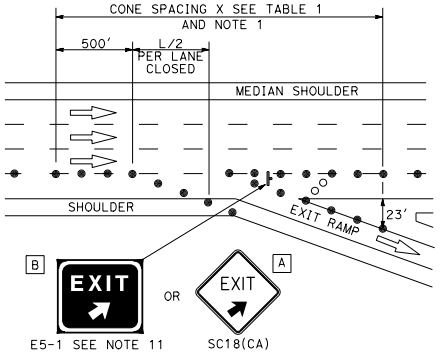
LANE CLOSURE



SHOULDER CLOSURE



LANE CLOSURE AT ENTRANCE RAMP



LANE CLOSURE AT EXIT RAMP

SEE NOTE 13

NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, with minimum size of 48" x 24" as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest verticle curve or on a horizontal curve.
5. Place a C30(CA) sign every 1000 ' throughout length of lane closure.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder at each location where a taper across a traffic lane ends and every 1000' as shown on the "Lane Closure" detail. Two type II barricades may be used instead of the 3 cones. The transverse alignment of the cones or barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.
7. The 2L tangent shown along lane lines shall be used between the L tapers required for each closed traffic lane.
8. Use one flashing arrow sign for each lane closed. The flashing arrow sign shall be Type I.
9. Median lane closures shall conform to the details as shown except that C20(CA)L and W4-2L signs shall be used.
10. Duplicate sign installations are not required:
    a) On opposite shoulder if at least one-half of the available lanes remain open to traffic.
    b) In the median if the width of the median shoulder is less than 8' and the outside lanes are to be closed.
11. The E5-1 or SC18(CA) and W4-1 signs shall be used as shown.
12. A W7-3aP "NEXT _____ MILES" plaque must be used if the shoulder closure extends beyond the distance that can be perceived by road users.
13. For the warning sign requirements at the Exit Ramp, when work is proposed on the local street, see CA MUTCD Figure 6H-22 to 6H-27.

LEGEND

- TRAFFIC CONE
- TRAFFIC CONE (OPTIONAL TAPER)
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- A 48" x 48"
- B 72" x 60"
- C 36" x 30"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON FREEWAYS AND EXPRESSWAYS

NO SCALE

T10

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

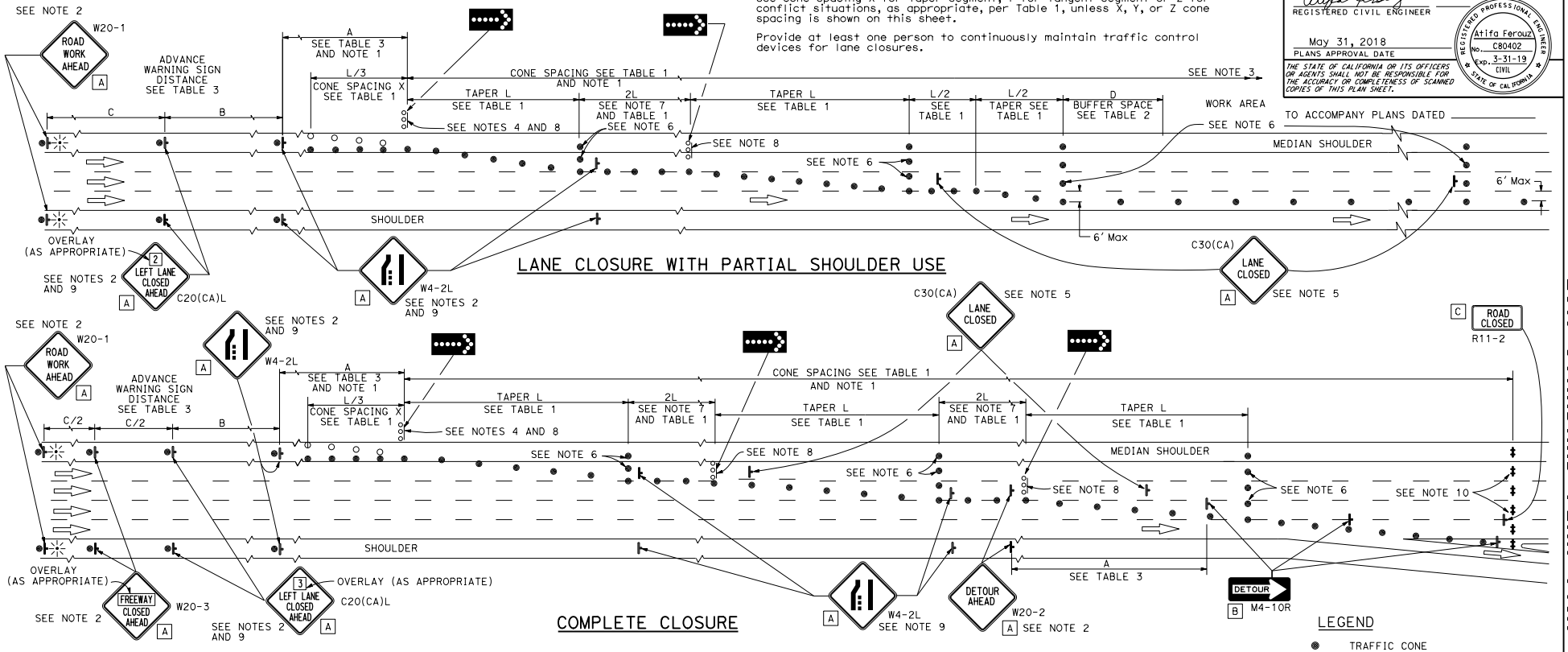
TO ACCOMPANY PLANS DATED _____

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, with minimum size of 48" x 24" as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within a larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place a C30(CA) sign every 1000 ' throughout length of lane closure.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder at each location where a taper across a traffic lane ends and every 1000' as shown on the "Lane Closure with Partial Shoulder USE" detail. Two type II barricades may be used instead of the 3 cones. The transverse alignment of the cones or barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.
7. The 2L tangent shown along lane lines shall be used between the L tapers required for each closed traffic lane.
8. Use one flashing arrow sign for each lane closed. The flashing arrow sign shall be Type I.
9. Lane closures on the right side using partial median shoulder as a traffic lane shall conform to the details shown except that C20(CA)R and W4-2R signs shall be used.
10. A minimum of Two Type II or III barricades shall be placed across each closed lane and shoulder at the location shown and every 2000' within the complete closure area. Within the complete closure area, the transverse alignment of the barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.

SIGN PANEL SIZE (Min)

- A 48" x 48"
- B 48" x 18"
- C 48" x 30"

LEGEND

- TRAFFIC CONE
- TRAFFIC CONE (OPTIONAL TAPER)
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON FREEWAYS AND EXPRESSWAYS

NO SCALE

T10A

1-29-18

Return to Table of Contents

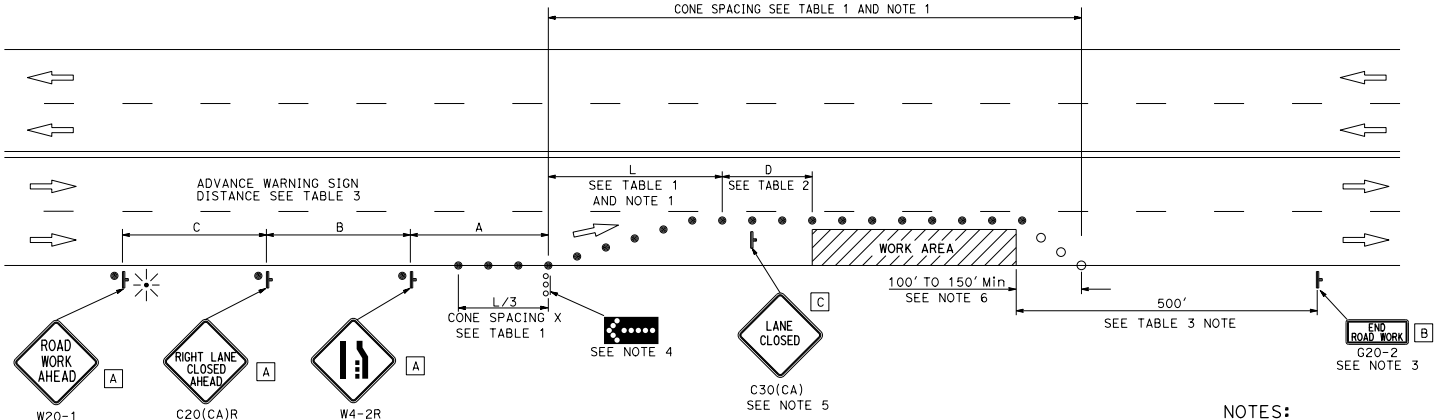
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPICAL LANE CLOSURE

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

LEGEND

- TRAFFIC CONE
- TRAFFIC CONE (OPTIONAL TAPER)
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- A 48" x 48"
- B 36" x 18"
- C 30" x 30"

NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area.
6. Length may be reduced by the Engineer to address site conditions.
7. Median lane closures shall conform to the details shown except that C20(CA)L and W4-2L signs shall be used.
8. For approach speeds over 50 MPH, use the "Traffic Control System for Lane Closure on Freeways and Expressways" plan for lane closure details and requirements.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS

NO SCALE

T11

1-29-18

Return to Table of Contents

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- [A] 48" x 48"
- [B] 24" x 24"
- [C] 36" x 18"

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

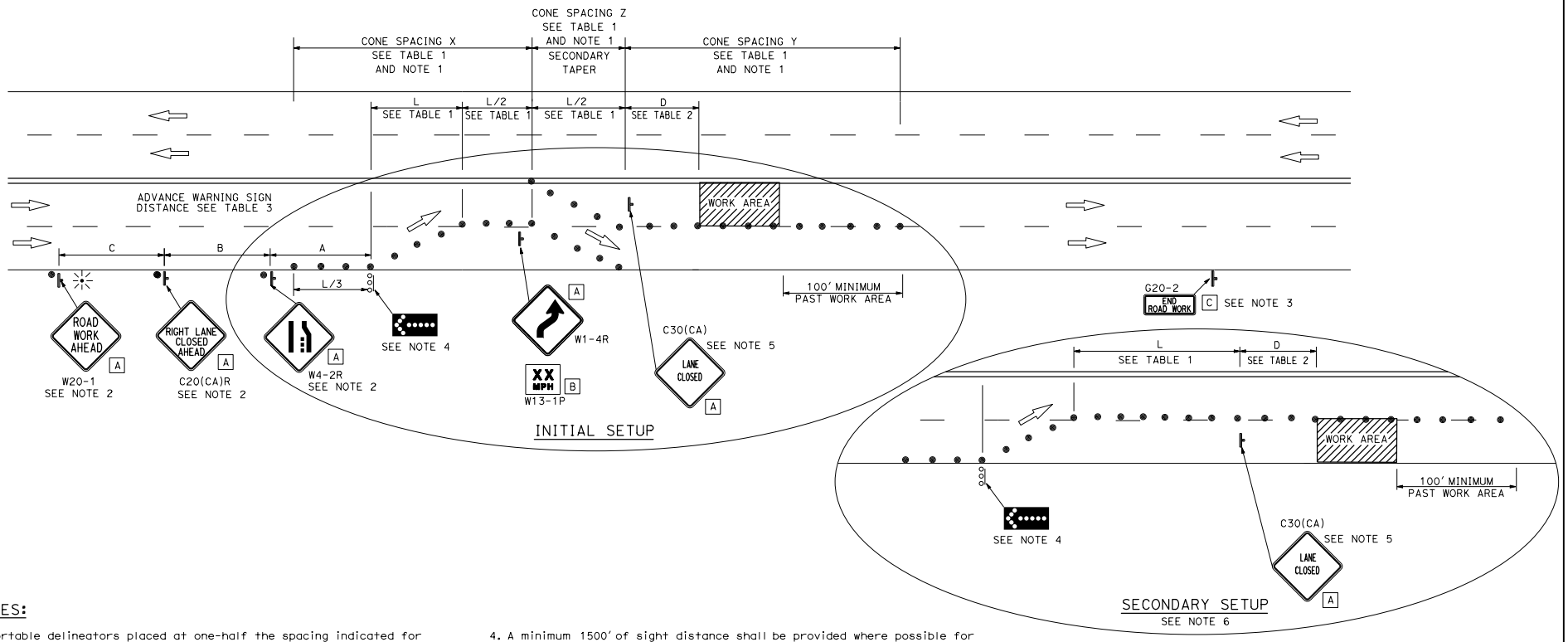
Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TYPICAL CHANGEABLE LANE CLOSURE



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacon shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area.
6. Relocate secondary taper to tangent location and relocate C30(CA) sign. Remove W1-4R/W13-1P sign package.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR CHANGEABLE LANE CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS

NO SCALE

T11A

1-29-18

2018 STANDARD PLAN T11A

Return to Table of Contents

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- [A] 48" x 48"
- [B] 24" x 24"
- [C] 36" x 18"

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

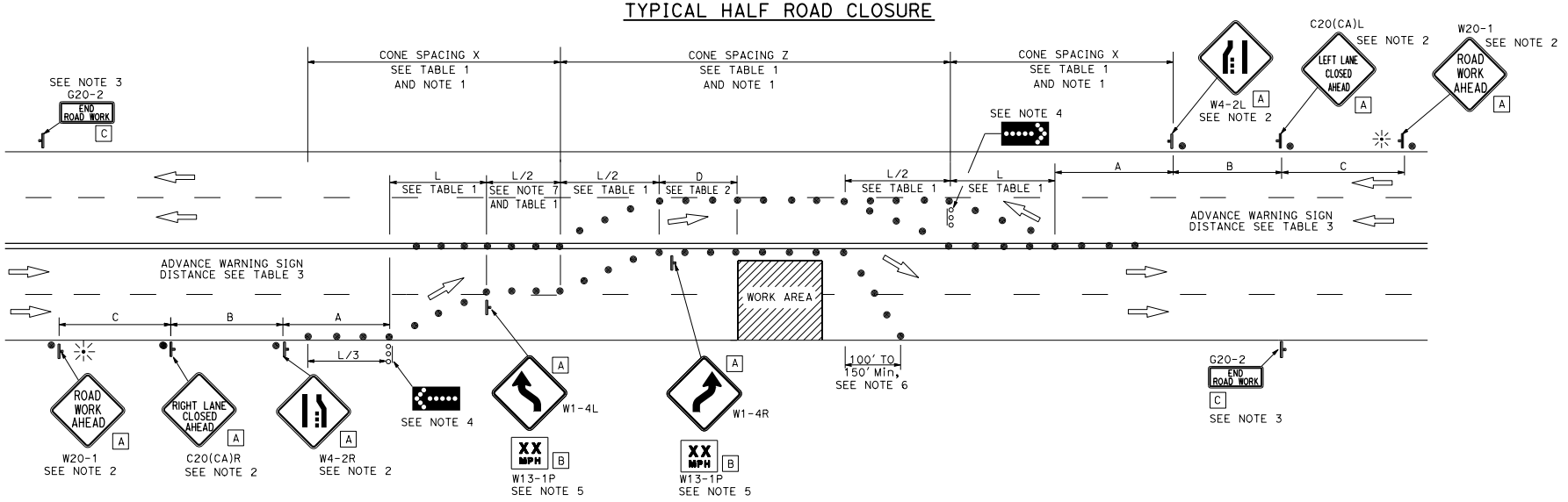
Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TYPICAL HALF ROAD CLOSURE



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest verticle curve or on a horizontal curve.
5. Advisory speed will be determined by the Engineer, The W13-1P Plaque will not be required when advidory speed is more than the posted or maximum speed limit.
6. Length may be reduced by the Engineer to address site conditions.
7. The tangent (L/2) shall be used.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR HALF ROAD CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS

NO SCALE

T12

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

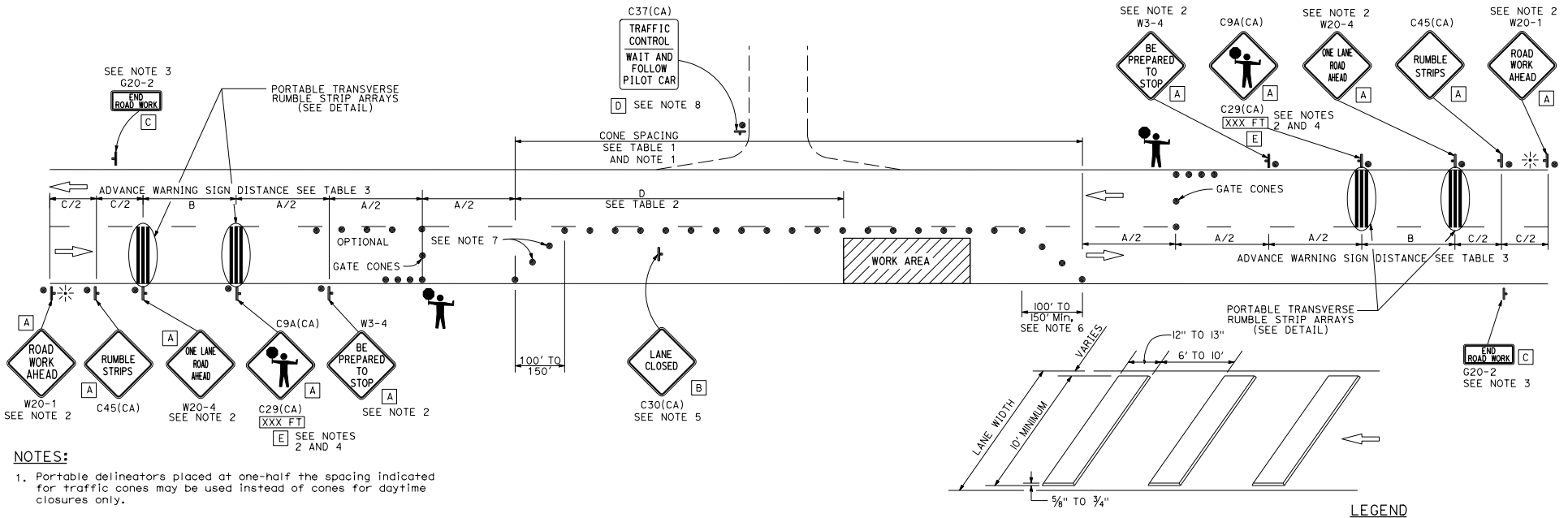
NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

TYPICAL LANE CLOSURE WITH REVERSIBLE CONTROL



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. An optional C29(CA) sign may be placed below the C9A(CA) sign.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area. They are optional if the work area is visible from nthe flagger station.
6. Length may be reduced by the Engineer to address site conditions.
7. Either traffic cones or barricades shall be placed on the taper. Barricades shall be Type I, II, or III.
8. When a pilot car is used, place a C37(CA) "TRAFFIC CONTROL-WAIT AND FOLLOW PILOT CAR" sign with black legend on white background at all intersections, driveways and alleys without a flagger within the traffic control area.

PORTABLE TRANSVERSE RUMBLE STRIP ARRAY DETAIL

SIGN PANEL SIZE (Min)

A	48" x 48"
B	30" x 30"
C	36" x 18"
D	36" x 42"
E	20" x 7"

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- PORTABLE FLASHING BEACON
- FLAGGER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON TWO LANE CONVENTIONAL HIGHWAYS

NO SCALE

T13

1-29-18

2018 STANDARD PLAN T13

Return to Table of Contents

TYPICAL RAMP CLOSURES

SIGN PANEL SIZE (Min)

A	48" x 48"
B	48" x 30"
C	36" x 36"
D	48" x 36"

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- BARRICADES
- PORTABLE FLASHING BEACON

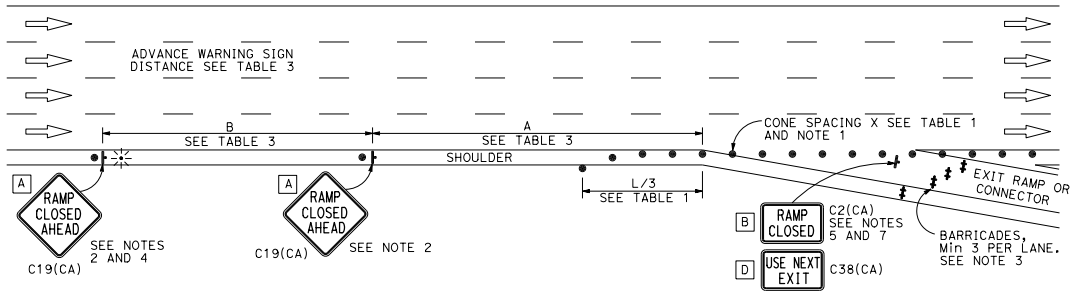
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

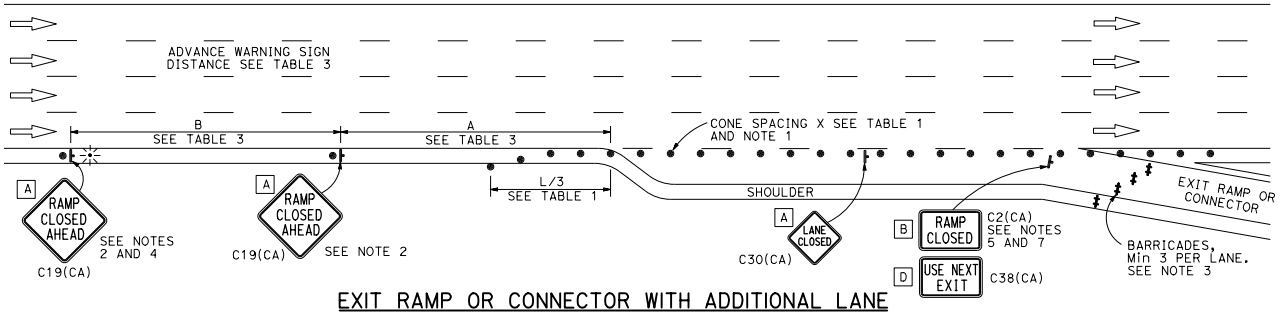
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Atifa Ferouz — No. C80402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

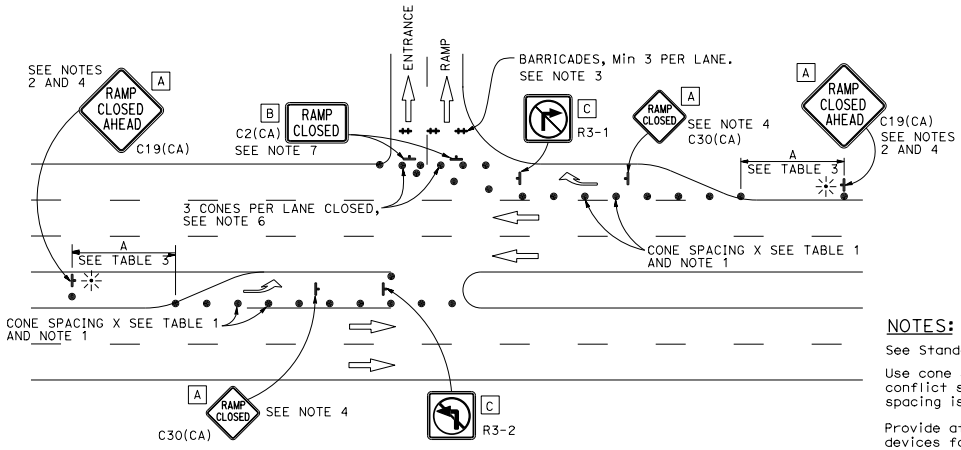
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



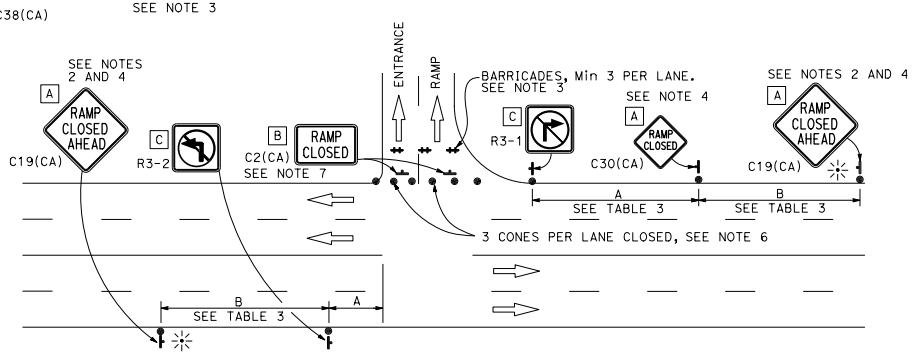
EXIT RAMP OR CONNECTOR



EXIT RAMP OR CONNECTOR WITH ADDITIONAL LANE



ENTRANCE RAMP WITH TURNING POCKETS



ENTRANCE RAMP WITHOUT TURNING POCKETS

NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning C19(CA) "RAMP CLOSED AHEAD" sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. A flashing beacon shall be placed on top of the first C19(CA) sign during hours of darkness.
3. Barricades shall be Type I, II or III for closures lastind one week or less and Type III for closures lasting longer than one week.
4. In addition to placing the C19(CA) "RAMP CLOSED AHEAD" and C30(CA) "RAMP CLOSED" signs, black on orange overlay plates with the word "closed" may be mounted. As directed by the Engineer on all guide signs that refer to the closed ramp. The letter size on the overlay shall be the same as the guide sign.
5. The existing "EXIT" signs shall be covered during ramp closures.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder.
7. C2(CA) sign shall be black and white.

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR RAMP CLOSURE

NO SCALE

T14

1-29-18

2018 STANDARD PLAN T14

Return to Table of Contents

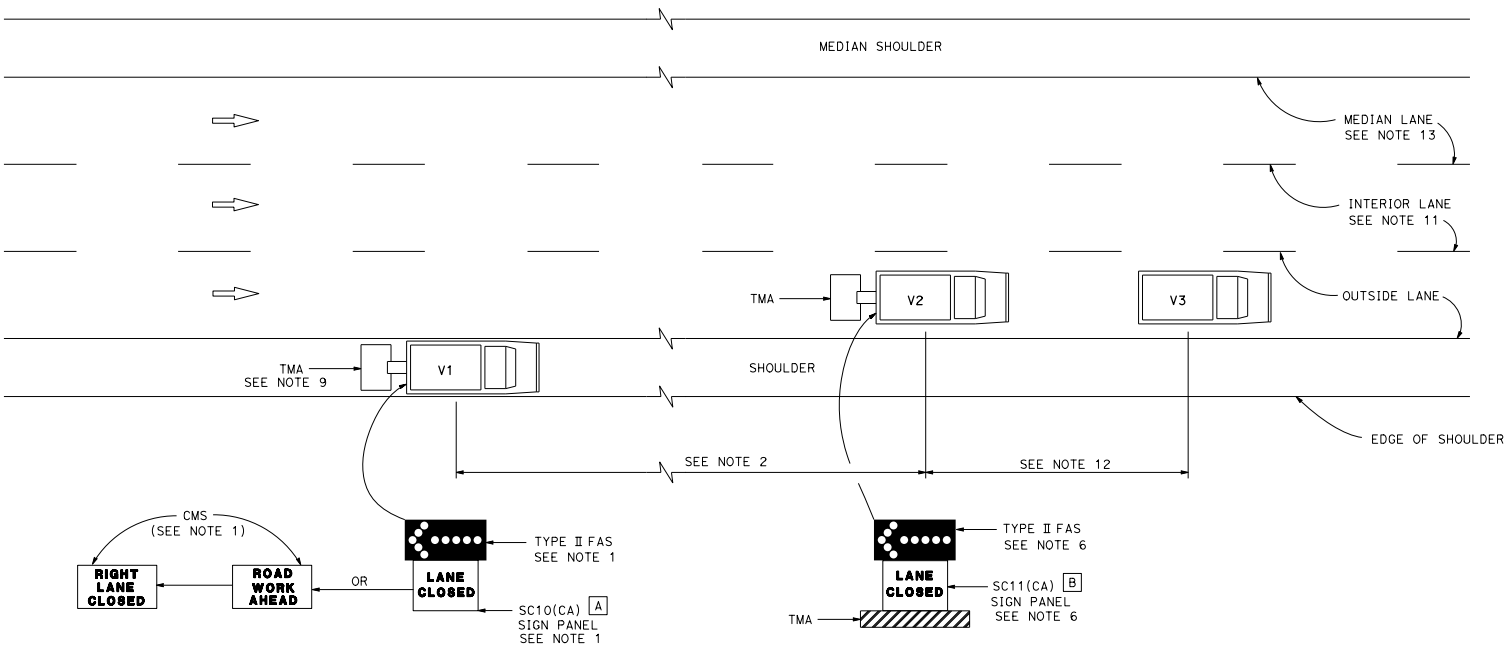
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



MOVING LANE CLOSURE ON MEDIAN LANE OR OUTSIDE LANE OF MULTILANE HIGHWAYS

SIGN PANEL SIZE (Min)

A 66" x 36"
B 54" x 42"

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
	FLASHING ARROW SIGN (FAS)
CMS	CHANGEABLE MESSAGE SIGN
TMA	TRUCK-MOUNTED ATTENUATOR

NOTES:

1. Either a changeable message sign or a SC10(CA) sign panel and a Type II flashing arrow sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "RIGHT LANE CLOSED" message. For median lane closure, the flashing arrow symbol shall be reversed with the arrowhead on the right and the changeable message sign shall show "LEFT LANE CLOSED".
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 1500' should be provided in advance of sign vehicle V1.
4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 1500'.
5. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
6. Shadow vehicle V2 shall be equipped with a truck-mounted attenuator. The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2. For median lane closure the flashing arrow sign symbol shall be displayed with the arrowhead on the right.
7. All vehicles used for lane closures shall be equipped with two-way radios, and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.
9. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11, etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on interior lane of multilane highways, use Standard Plan T16.
12. The spacing between work vehicle(s) and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.
13. When the work/application vehicle V3 occupies the median lane, sign vehicle V1 should drive in the median shoulder and indicate left lane closed ahead.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON MULTILANE HIGHWAYS

NO SCALE

T15

1-29-18

Return to Table of Contents

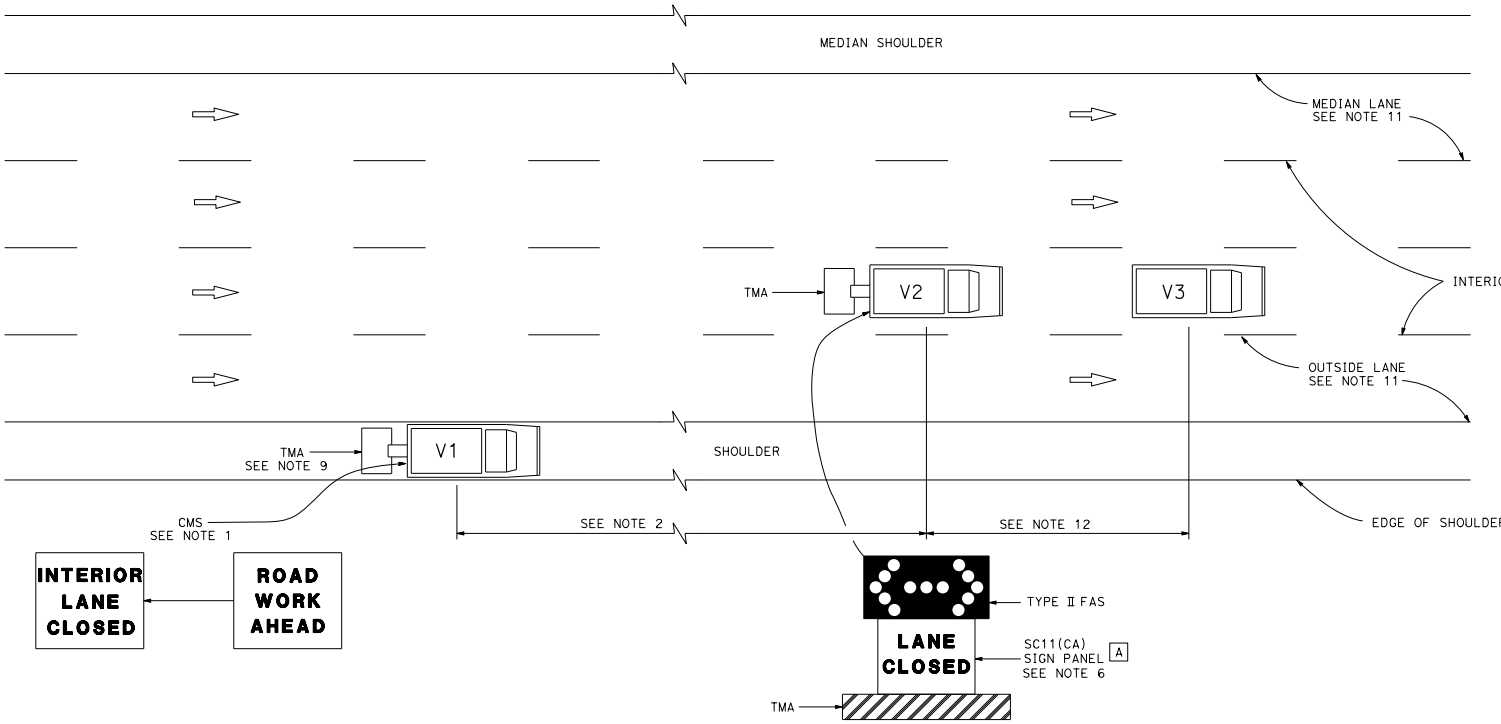
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SIGN PANEL SIZE (Min)

A 54" x 42"

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
	FLASHING ARROW SIGN (FAS) IN FLASHING DOUBLE ARROW MODE
CMS	CHANGEABLE MESSAGE SIGN
TMA	TRUCK-MOUNTED ATTENUATOR

MOVING LANE CLOSURE ON INTERIOR LANE OF MULTILANE HIGHWAYS

NOTES:

1. A changeable message sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "INTERIOR LANE CLOSED" message. The message "CENTER LANE CLOSED" may be used in place of the "INTERIOR LANE CLOSED" message.
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 1500' should be provided in advance of sign vehicle V1.
4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 1500'.
5. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
6. Shadow vehicle V2 shall be equipped with a truck-mounted attenuator. The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2.
7. All vehicles used for lane closures shall be equipped with two-way radios, and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.
9. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11 etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on median lane or outside lane of multilane highways, use Standard Plan T15.
12. The spacing between work vehicle(s) and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON MULTILANE HIGHWAYS

NO SCALE

T16

1-29-18

Return to Table of Contents

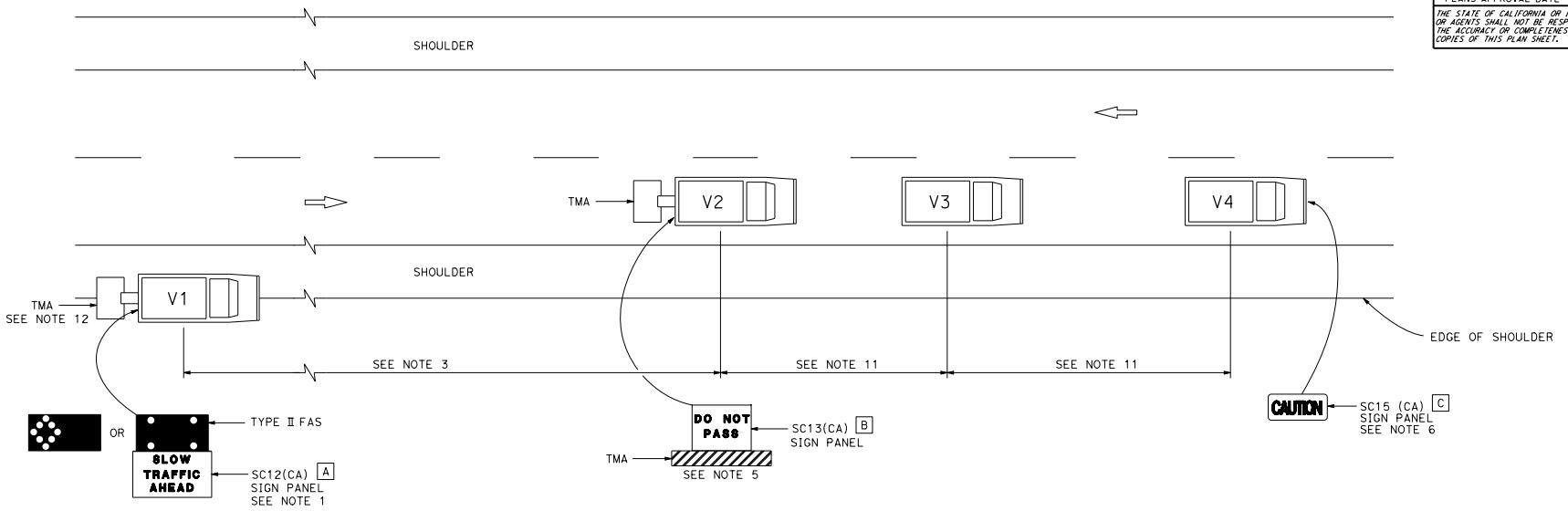
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



NOTES:

1. Either a changeable message sign or a SC12(CA) "SLOW TRAFFIC AHEAD" sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "CAUTION" message first, follow by the "SLOW TRAFFIC AHEAD" message. A Type II flashing arrow sign may be used with the SC12(CA) sign panel.
2. Sign vehicle V1 should be positioned where highly visible when shoulders are not available.
3. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue.
4. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
5. Shadow vehicle shall be equipped with a truck-mounted attenuator. The sign panel shown shall be mounted on the rear of shadow vehicle V2. The message "LANE CLOSED" may be used in place of the "DO NOT PASS" message.
6. The sign panel shown shall be mounted on the front of sign vehicle V4, facing opposing traffic.
7. All vehicles shall be equipped with flashing or rotating amber lights.
8. Sign vehicle V4 will not be required when the work and vehicles V2 and V3 are 2' or more from the centerline of the highway during the work or application operations.
9. All vehicles used for lane closures shall be equipped with two-way radios and the vehicle operators shall maintain communication during the work or application operation.
10. This plan shall not be used where workers would be on foot in the work area. Use a stationary type lane closure (Standard Plan T13) for this condition.
11. Minimize spacing between vehicles V2 and V3 and vehicles V3 and V4 to deter road users from driving in between them.
12. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
V4	SIGN VEHICLE
TMA	TRUCK-MOUNTED ATTENUATOR
	FLASHING ARROW SIGN (FAS) IN FLASHING CAUTION MODE
	FLASHING ARROW SIGN (FAS) IN ALTERNATING DIAMOND CAUTION

SIGN PANEL SIZE (Min)

A	72" x 42"
B	54" x 42"
C	54" x 24"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON TWO LANE HIGHWAYS

NO SCALE

T17

1-29-18

Return to Table of Contents

NOTES:

1. Only signs related to pedestrians are shown. For all other signs see appropriate T-sheets.
2. Barricades closing sidewalk shall cover the full width of the sidewalk. Use R9-11 sign when there are destination points between the detour and the work area. Locate the R9-11 sign to allow pedestrian access.
3. Advance warning sign is not required if the work area is within the limits of a larger work zone. Sign shall be equipped with at least two flags for daytime closure. Each flag shall be orange or fluorescent red-orange in color.

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1 unless X,Y, or Z cone spacing is shown on this sheet.

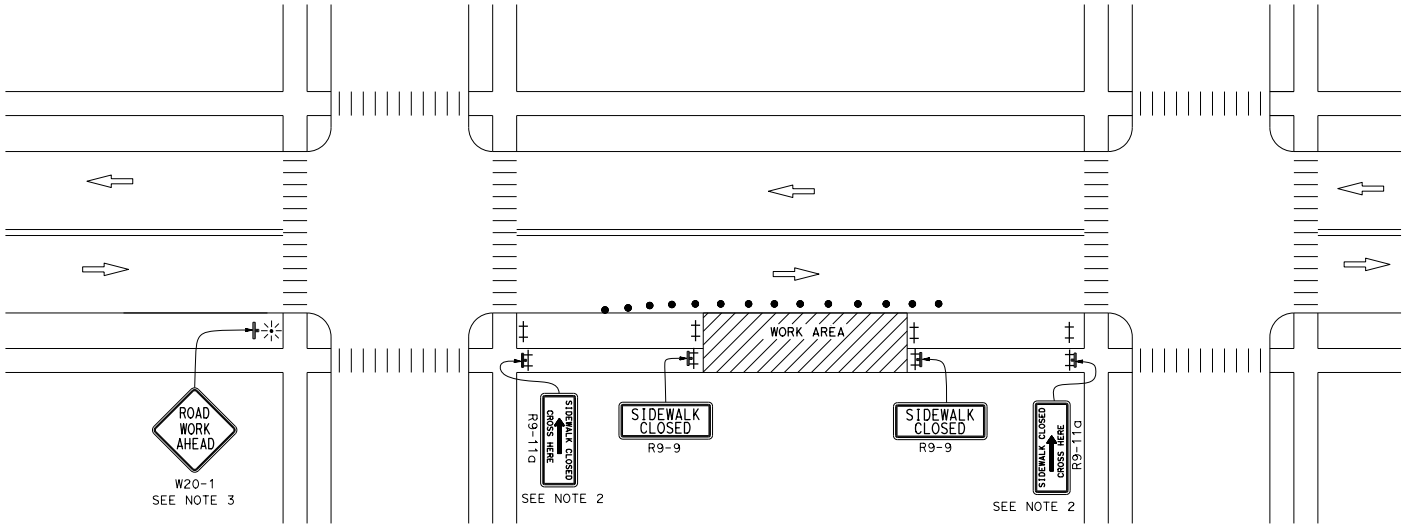
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



LEGEND:

- BARRICADE
- TRAFFIC CONE
- PORTABLE FLASHING BEACON
- SIGN
- TEMPORARY TRAFFIC CONTROL SIGN ON BARRICADE

SIGN PANEL SIZE (Min)

SIGN DESIGNATION	SIGN OR PLAQUE	SIGN SIZE
R9-9	SIDEWALK CLOSED	24" x 12"
R9-11	SIDEWALK CLOSED AHEAD CROSS HERE	24" x 18"
R9-11a	SIDEWALK CLOSED CROSS HERE	24" x 12"
W20-1	ROAD WORK AHEAD	36" x 36"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY PEDESTRIAN ACCESS ROUTES TYPICAL SIDEWALK CLOSURE AND PEDESTRIAN DETOUR

NO SCALE

T30

1-29-18

Return to Table of Contents

NOTES:

1. Only signs related to pedestrians are shown. For all other signs see appropriate T-sheets.
2. Separate pedestrian walkway from traffic and work zone activities, when temporary walkway is adjacent to traffic.
3. The temporary pedestrian access route must not lead into conflict with vehicles or work.
4. Advance warning sign is not required if the work area is within the limits of a larger work zone. Sign shall be equipped with at least two flags for daytime closure. Each flag shall be orange or fluorescent red-orange in color.
5. All devices used to channelize pedestrian flow must connect such that gaps do not allow pedestrians to stray from the channelized path.
6. Barricades closing sidewalk shall cover the full width of the sidewalk.
7. Separate the temporary pedestrian access route from traffic using a temporary barrier and a crash cushion if necessary.
8. When it is not possible to maintain a minumum of 60 inches throughout the length of the pedestrian route, maintain a minimum width of 48 inches and provide a 60 X 60-inch passing space at least every 200 feet.
9. See Standard Plan A88A for detectable warning surface for curb ramps to apply to temporary curb ramps.
10. See Standard Plan T34 for temporary curb ramp options.

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1 unless X,Y, or Z cone spacing is shown on this sheet.

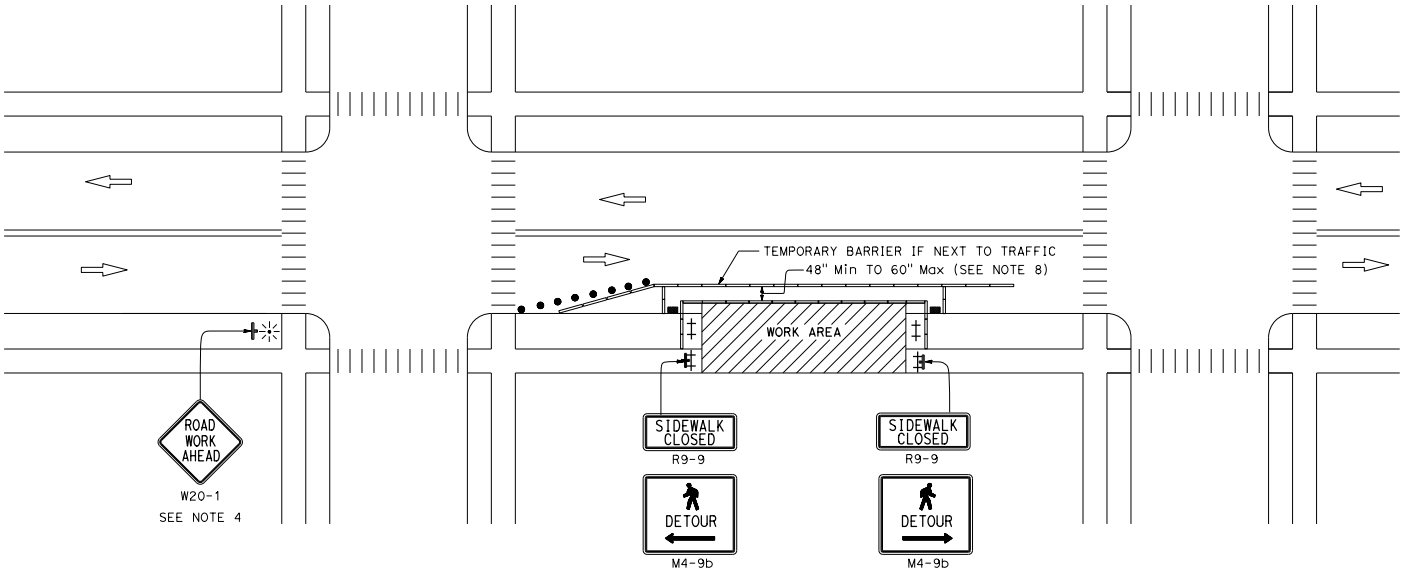
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



LEGEND:

- BARRICADE
- TEMPORARY CURB RAMP
- CHANNELIZING DEVICE
- TRAFFIC CONE
- PORTABLE FLASHING BEACON
- TEMPORARY TRAFFIC CONTROL SIGN
- TEMPORARY TRAFFIC CONTROL SIGN ON BARRICADE

SIGN PANEL SIZE (Min)

SIGN DESIGNATION	SIGN OR PLAQUE	SIGN SIZE
M4-9b	PEDESTRIAN DETOUR	30" x 24"
R9-9	SIDEWALK CLOSED	24" x 12"
W20-1	ROAD WORK AHEAD	36" x 36"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY PEDESTRIAN ACCESS ROUTES
TYPICAL SIDEWALK DIVERSION WITHIN ROADBED

NO SCALE

T31

1-29-18

2018 STANDARD PLAN T31

Return to Table of Contents

NOTES:

1. Only signs related to pedestrians are shown. For all other signs see appropriate T-sheets.
2. Barricades closing sidewalk shall cover the full width of the sidewalk. Use R9-11 sign when there are destination points between the detour and the work area. Locate the R9-11 sign to allow pedestrian access.
3. Advance warning sign is not required if the work area is within the limits of a larger work zone. Sign shall be equipped with at least two flags for daytime closure. Each flag shall be orange or fluorescent red-orange in color.

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1 unless X,Y, or Z cone spacing is shown on this sheet.

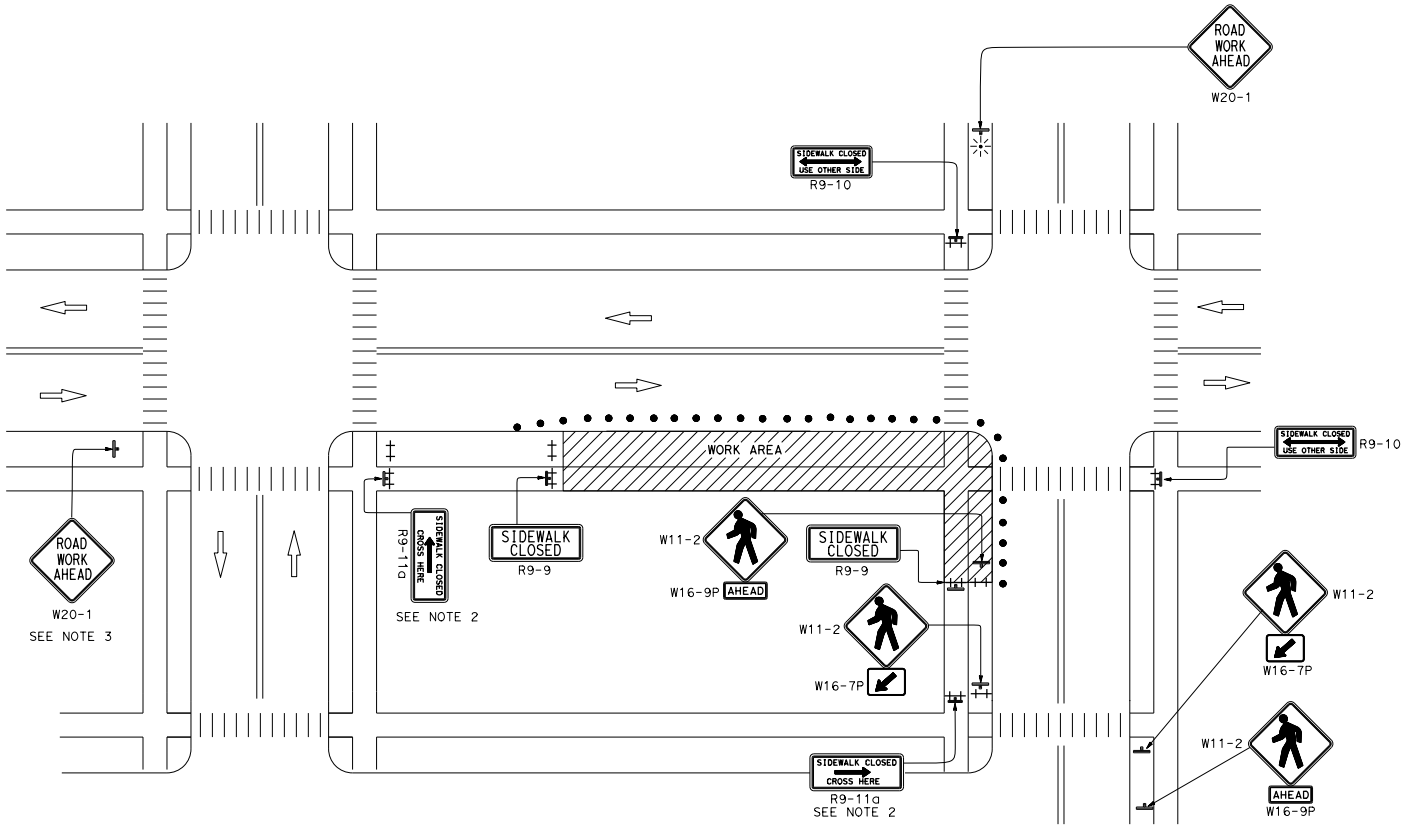
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



LEGEND:

- BARRICADE
- TRAFFIC CONE
- PORTABLE FLASHING BEACON
- TEMPORARY TRAFFIC CONTROL SIGN
- TEMPORARY TRAFFIC CONTROL SIGN ON BARRICADE

SIGN PANEL SIZE (Min)

SIGN DESIGNATION	SIGN OR PLAQUE	SIGN SIZE
R9-9	SIDEWALK CLOSED	24" x 12"
R9-10	SIDEWALK CLOSED USE OTHER SIDE	24" x 12"
R9-11	SIDEWALK CLOSED AHEAD CROSS HERE	24" x 18"
R9-11a	SIDEWALK CLOSED CROSS HERE	24" x 12"
W11-2	PEDESTRIAN	36" x 36"
W16-7P	DIAGONAL DOWNWARD POINTING ARROW (PLAQUE)	24" x 12"
W16-9P	AHEAD (PLAQUE)	24" x 12"
W20-1	ROAD WORK AHEAD	36" x 36"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY PEDESTRIAN ACCESS ROUTES TYPICAL SIDEWALK/CROSSWALK CLOSURE AND PEDESTRIAN DETOUR

NO SCALE

T32

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

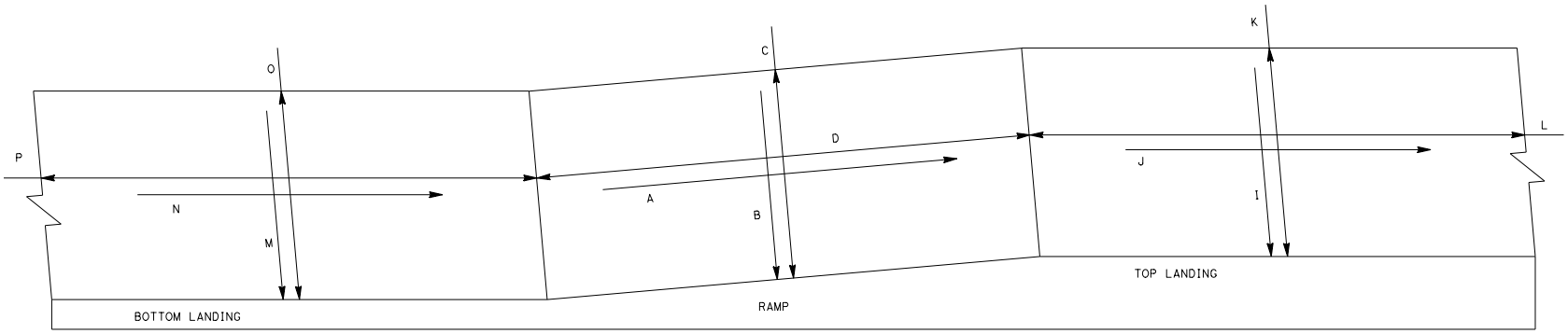
Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RAMP				HAND RAIL		EDGE PROTECTION	
SLOPE	CROSS SLOPE	WIDTH	LENGTH	HEIGHT RIGHT SIDE	HEIGHT LEFT SIDE	RAIL RIGHT SIDE	RAIL LEFT SIDE
A	B	C	D	E	F	G	H
8.3% OR LESS	2.0% OR LESS	48 INCHES OR GREATER	30 FEET OR LESS	34 TO 38 INCHES	34 TO 38 INCHES	WITHIN 2 INCHES FROM GROUND	WITHIN 2 INCHES FROM GROUND
TOP LANDING				BOTTOM LANDING			
CROSS SLOPE	SLOPE	WIDTH	DEPTH	CROSS SLOPE	SLOPE	WIDTH	DEPTH
I	J	K	L	M	N	O	P
2.0% OR LESS	2.0% OR LESS	48 INCHES OR GREATER	60 INCHES OR GREATER	2.0% OR LESS	2.0% OR LESS	48 INCHES OR GREATER	60 INCHES OR GREATER



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY PEDESTRIAN ACCESS ROUTES
RAMP

NO SCALE

T33

1-29-18

Return to Table of Contents

CURB RAMP			TOP LANDING				DETECTABLE WARNING SURFACE
SLOPE	CROSS SLOPE	WIDTH	CROSS SLOPE	SLOPE	WIDTH	DEPTH	DEPTH
A	B	C	D	E	F	G	K
8.3% OR LESS	2.0% OR LESS	48 INCHES OR GREATER	2.0% OR LESS	2.0% OR LESS	48 INCHES OR GREATER	60 INCHES OR GREATER	MINIMUM 36 INCHES

NOTES: If the above requirements cannot be met, on existing sites with space limitations, the following slopes are allowed:

For a maximum rise of 6 inches a slope between 1:12 to 1:10 is allowed.
For a maximum rise of 3 inches a slope between 1:10 to 1:8 is allowed.

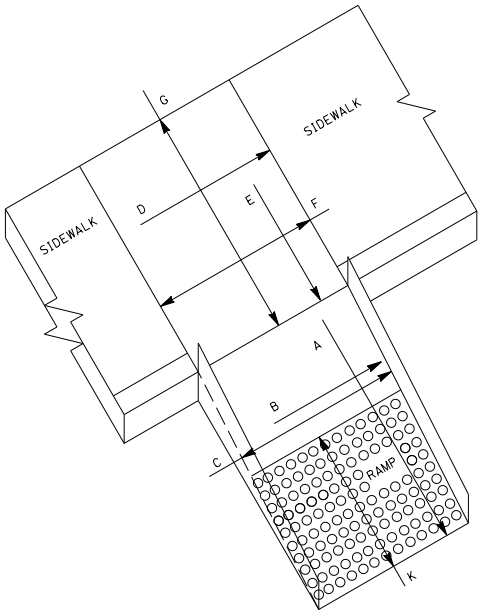
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Atifa Ferouz
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

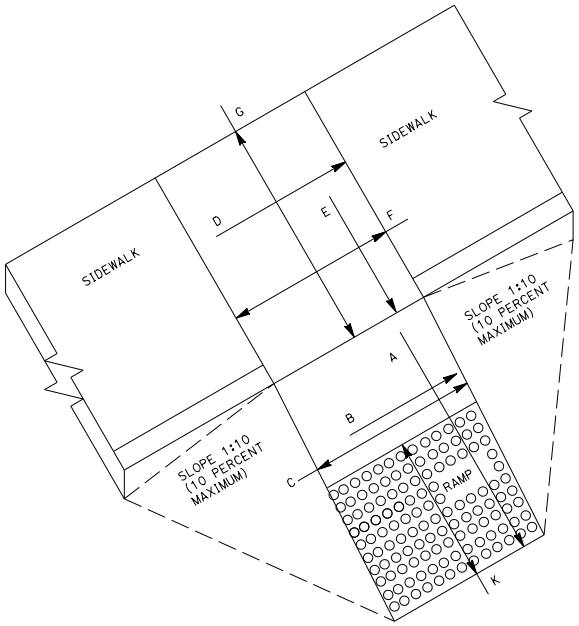
REGISTERED PROFESSIONAL ENGINEER
Atifa Ferouz
No. C80402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



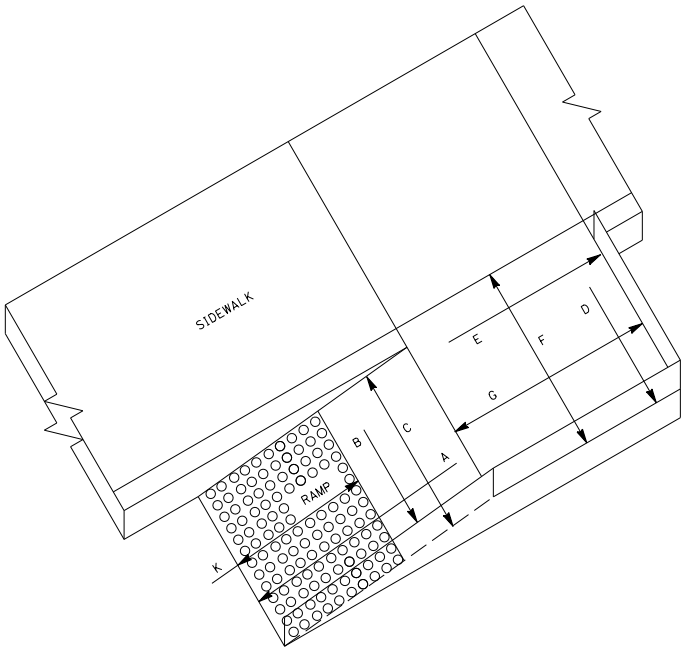
OPTION A

SHOWN WITH SIDE EDGE



OPTION B

SHOWN WITH SIDE APRON



OPTION C

PARALLEL RAMP

SHOWN WITH SIDE EDGE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

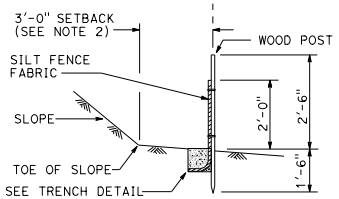
TEMPORARY PEDESTRIAN ACCESS ROUTES CURB RAMP OPTIONS

NO SCALE

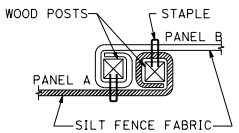
T34

1-29-18

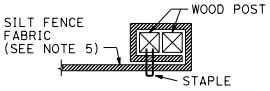
Return to Table of Contents



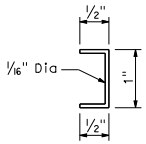
SECTION A-A
TEMPORARY SILT FENCE



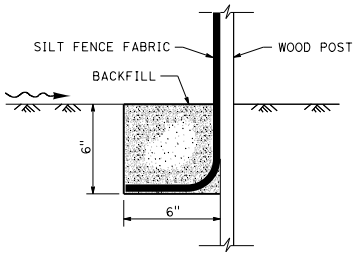
PLAN
POST AT JOINTS
(SEE NOTE 3)



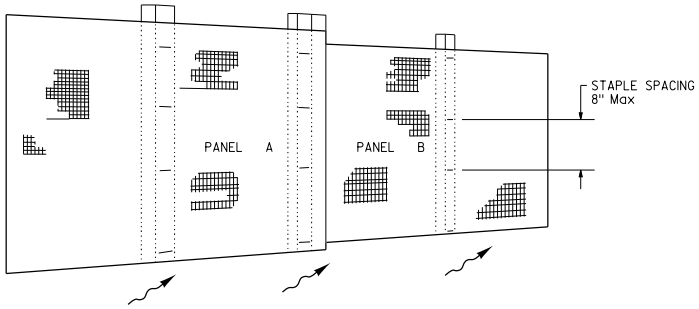
PLAN
END POST DETAIL



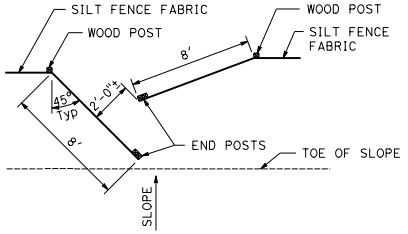
STAPLE DETAIL
(SEE NOTE 6)



SECTION
TRENCH DETAIL



PERSPECTIVE
SILT FENCE PANELS AT JOINTS



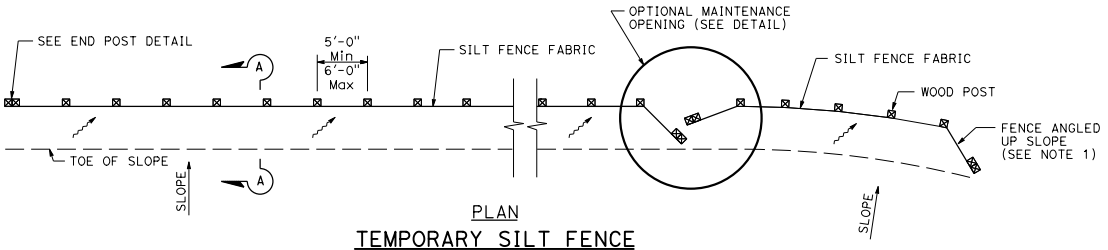
PLAN
OPTIONAL MAINTENANCE OPENING DETAIL

NOTES:

1. The down stream end of the temporary silt fence shall have the last 8' angled up slope.
2. Setback dimensions may vary to fit field conditions.
3. Posts to overlap and fence fabric to fold around each post one full turn. Secure fabric with 4 staples for each post.
4. Posts shall be driven tightly together to prevent potential flow-through of sediment at the joint. The tops of the posts shall be secured to each other with wire.
5. For each end post, fence fabric shall be folded around two posts one full turn and secured with 4 staples.
6. Minimum of 4 staples shall be installed per post. Dimensions shown are typical.
7. Maintenance openings shall be constructed in a manner to ensure that sediment is retained by the temporary silt fence.
8. Joint sections shall not be placed at sump locations.

LEGEND

TAMPED BACKFILL
SLOPE DIRECTION
DIRECTION OF FLOW



PLAN
TEMPORARY SILT FENCE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT
Robert B. Schatt
Signature
11-30-18
Renewal Date
Date
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY SILT FENCE)

NO SCALE

T51

1-29-18

2018 STANDARD PLAN T51

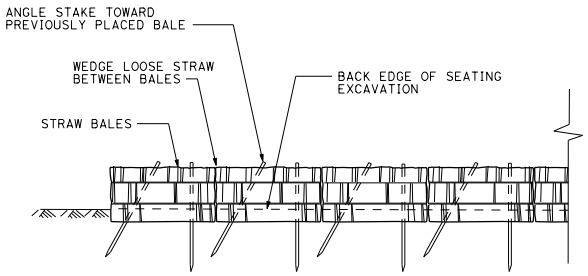
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

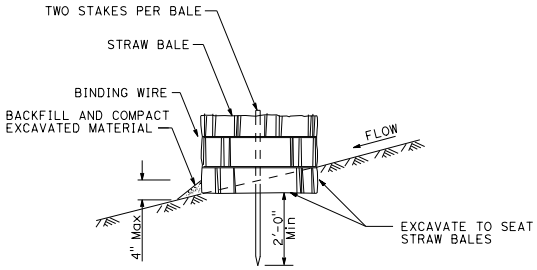
Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FRONT ELEVATION

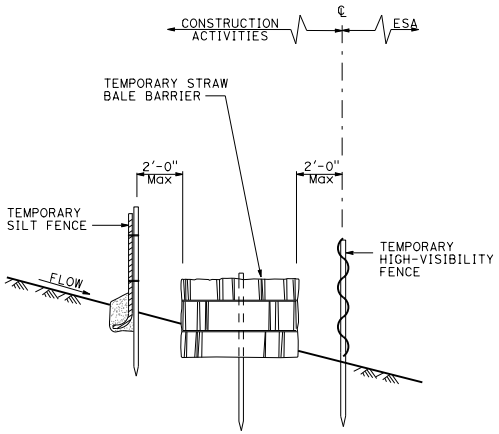


SECTION

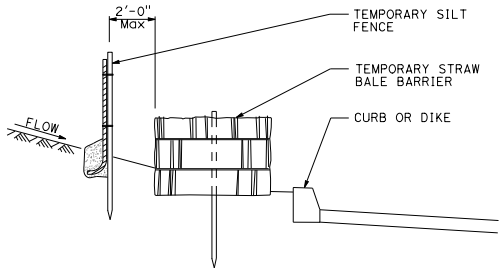
TEMPORARY STRAW BALE BARRIER

NOTE:

1. Temporary silt fence and temporary high-visibility fence shown for reference purposes only.



SECTION
PLACEMENT DETAIL
FOR TEMPORARY SILT FENCE
AND TEMPORARY HIGH-VISIBILITY FENCE
USED WITH TEMPORARY STRAW BALE BARRIER
(See Note 1)



SECTION
PLACEMENT DETAIL
FOR TEMPORARY SILT FENCE
USED WITH TEMPORARY
STRAW BALE BARRIER
(See Note 1)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY STRAW BALE BARRIER)

NO SCALE

T52

1-29-18

2018 STANDARD PLAN T52

Return to Table of Contents

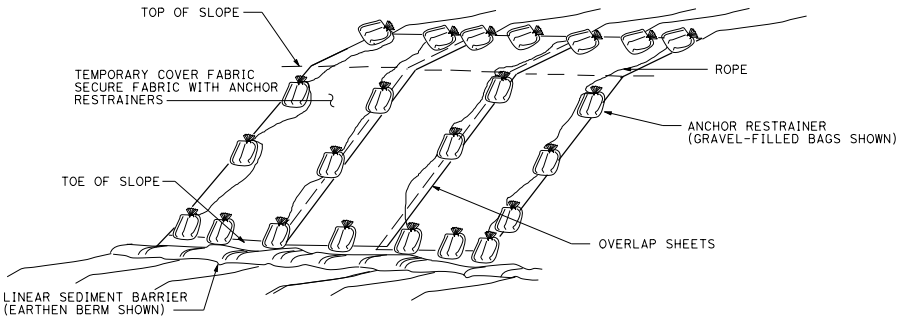
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

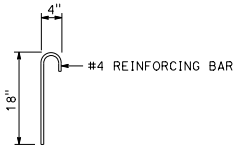
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

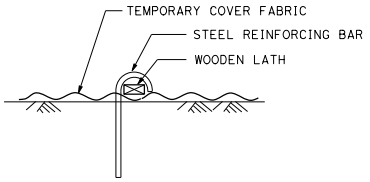
LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



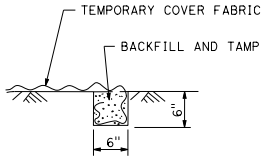
PERSPECTIVE
TEMPORARY COVER ON SLOPE



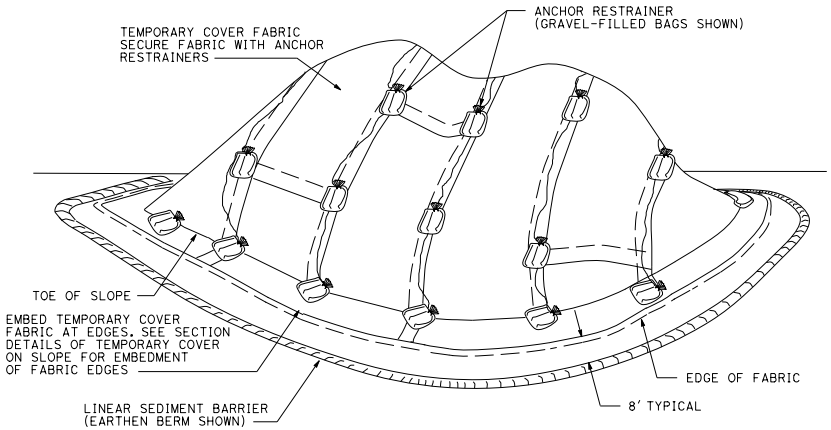
STEEL REINFORCING BAR DETAIL



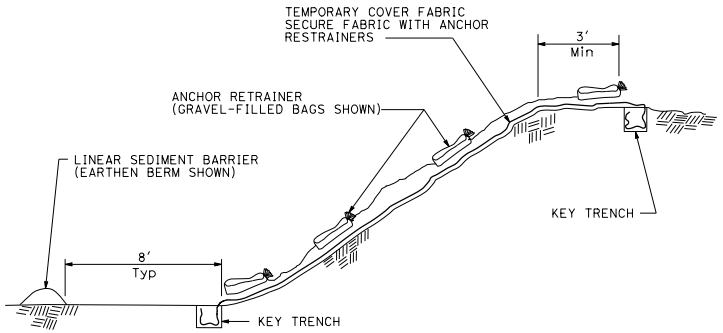
SECTION
ANCHOR RESTRAINER
(Steel bar and wooden lath)



SECTION
KEY TRENCH DETAIL



PERSPECTIVE
TEMPORARY COVER ON STOCKPILE



SECTION
TEMPORARY COVER ON SLOPE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY COVER)

NO SCALE

T53

2018 STANDARD PLAN T53

1-29-18

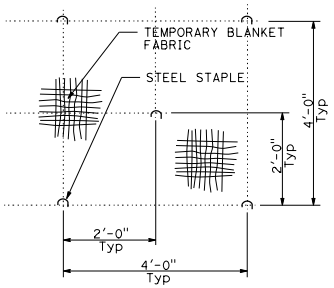
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

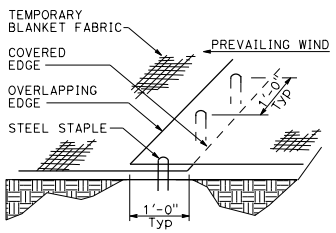
Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

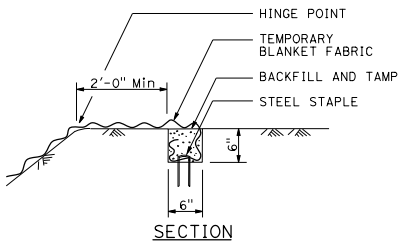
LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature — 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



STAPLE PATTERN
DETAIL A

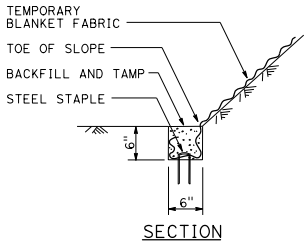


LONGITUDINAL BLANKET JOINT
DETAIL B



SECTION

KEY TRENCH AT TOP OF SLOPE
DETAIL C

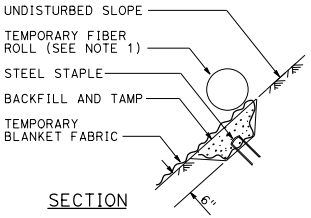


SECTION

KEY TRENCH AT TOE OF SLOPE
DETAIL D

NOTE:

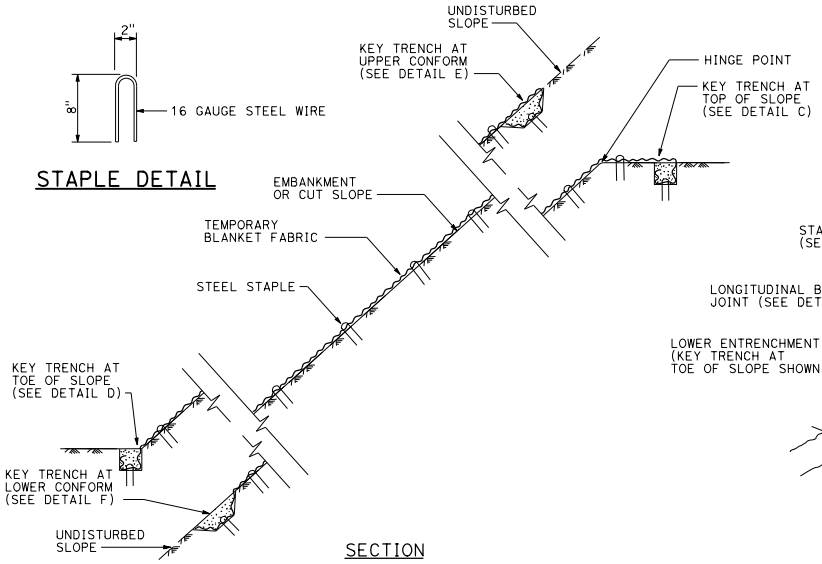
1. Temporary fiber roll shown for reference purposes only.



SECTION

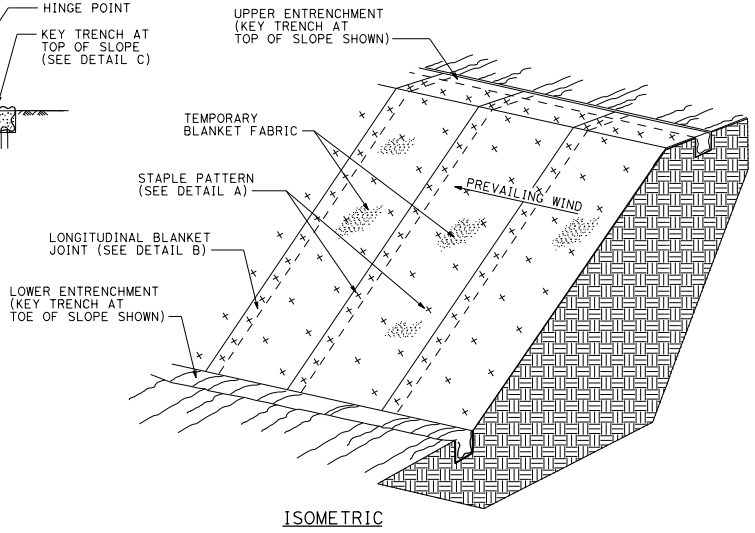
KEY TRENCH AT UPPER CONFORM
DETAIL E

STAPLE DETAIL



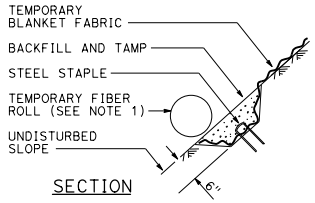
SECTION

TEMPORARY EROSION CONTROL BLANKET ON SLOPE WITH VARIOUS KEY ENTRENCHMENTS



ISOMETRIC

TEMPORARY EROSION CONTROL BLANKET ON SLOPE



SECTION

KEY TRENCH AT LOWER CONFORM
DETAIL F

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY EROSION CONTROL BLANKET)

NO SCALE

T54

1-29-18

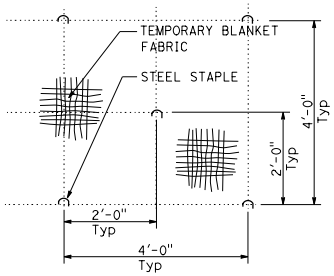
2018 STANDARD PLAN T54

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

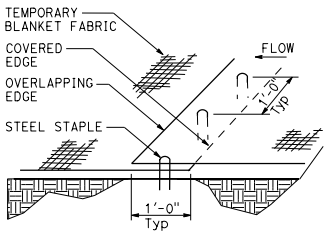
Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



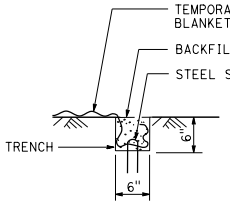
PLAN

DETAIL A
STAPLE PATTERN



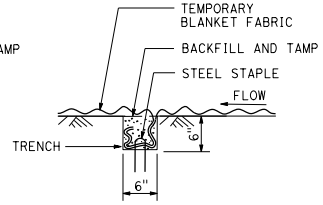
PERSPECTIVE

DETAIL B
LONGITUDINAL BLANKET JOINT



SECTION

DETAIL C
KEY TRENCH

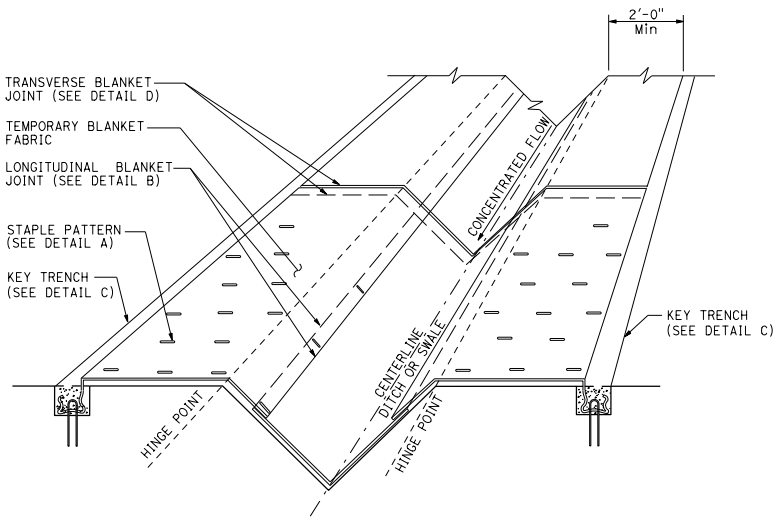


SECTION

DETAIL D
TRANSVERSE BLANKET JOINT

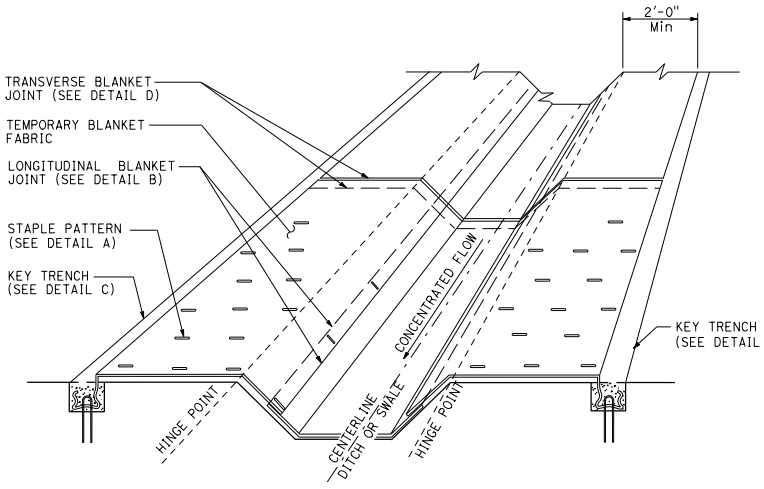
NOTE:

1. For clarity, perspective view does not show all staples.



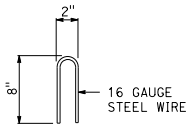
PERSPECTIVE

TEMPORARY EROSION CONTROL BLANKET IN V-DITCH OR SWALE



PERSPECTIVE

TEMPORARY EROSION CONTROL BLANKET IN TRAPEZOIDAL DITCH OR SWALE



STAPLE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY EROSION CONTROL BLANKET)

NO SCALE

T55

2018 STANDARD PLAN T55

1-29-18

Return to Table of Contents

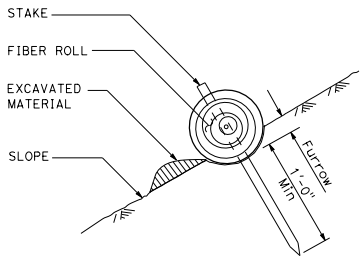
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

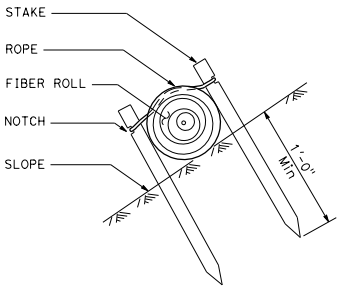
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA

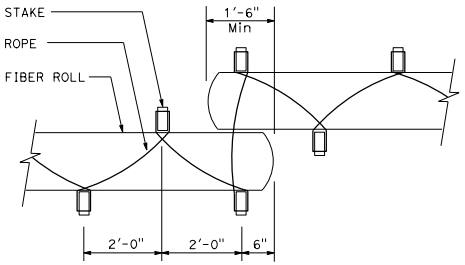


SECTION

TEMPORARY FIBER ROLL (TYPE 1)

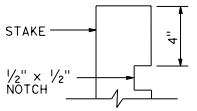


SECTION



PLAN

TEMPORARY FIBER ROLL (TYPE 2)

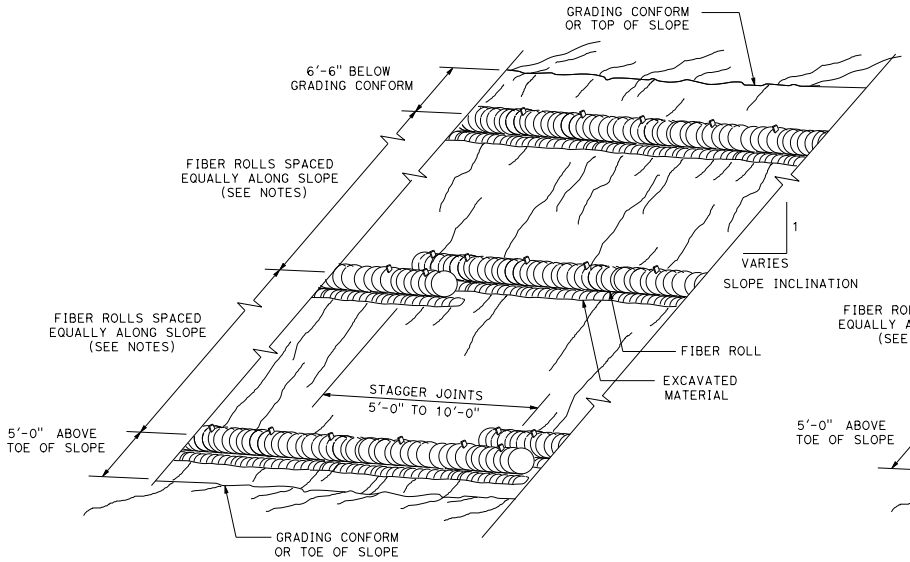


ELEVATION

STAKE NOTCH DETAIL

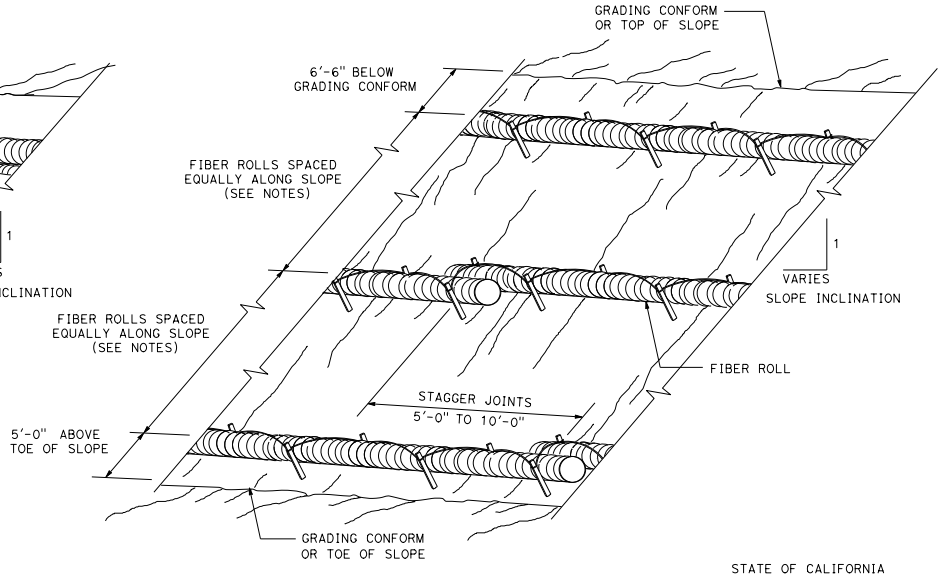
NOTES:

1. Temporary fiber roll spacing varies depending upon slope inclination.
2. Installations shown in the perspectives are for slope inclination of 10:1 and steeper.



PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 1)



PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 2)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY FIBER ROLL)

NO SCALE

T56

1-29-18

2018 STANDARD PLAN T56

Return to Table of Contents

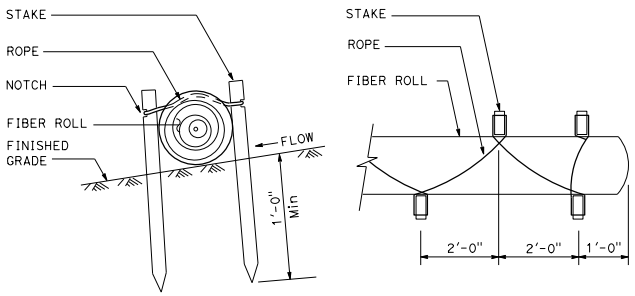
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

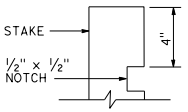
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



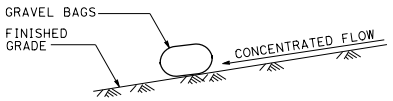
SECTION PLAN

STAKING AND LASHING DETAIL



ELEVATION

STAKE NOTCH DETAIL

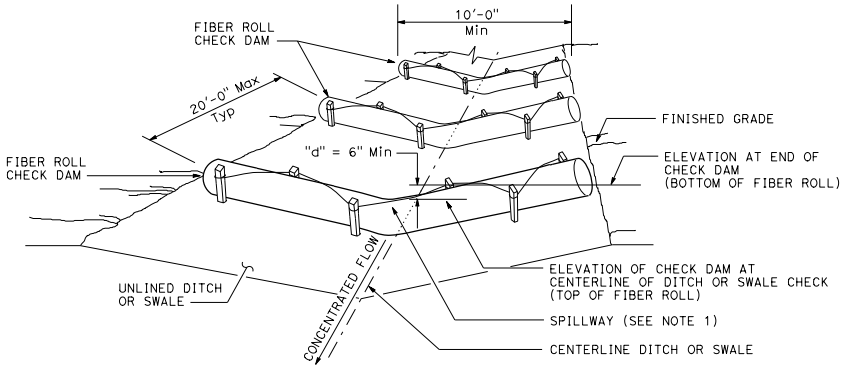


SECTION

TEMPORARY CHECK DAM (TYPE 2)

NOTE:

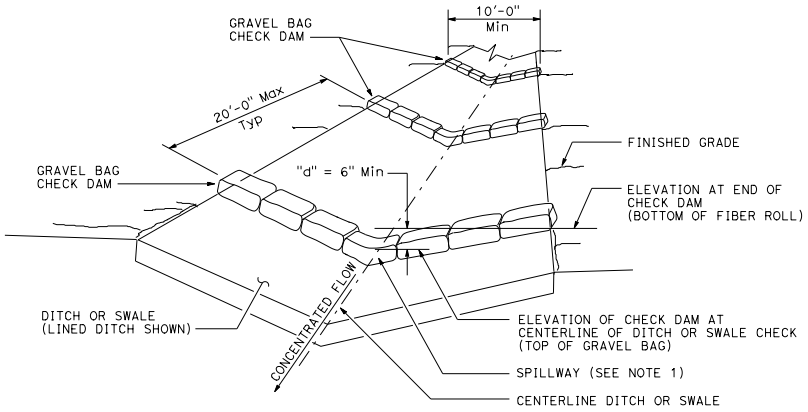
1. Spillway depth "d" shall be maintained to prevent flanking of concentrated flow around the ends of each check dam.



PERSPECTIVE

TEMPORARY CHECK DAM (TYPE 1)

(Total of 3 check dams shown)



PERSPECTIVE

TEMPORARY CHECK DAM (TYPE 2)

(Total of 3 check dams shown)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CHECK DAM)

NO SCALE

T57

1-29-18

Return to Table of Contents

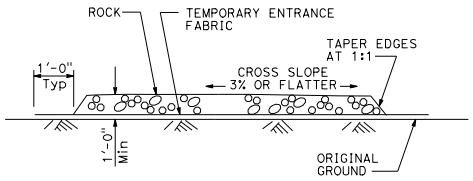
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

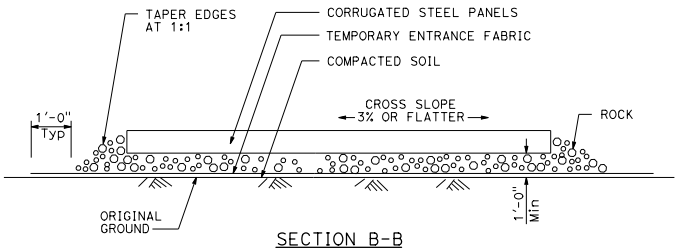
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

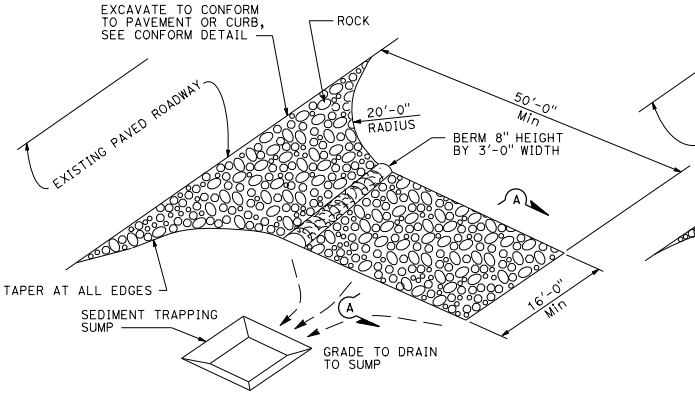
LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



SECTION A-A

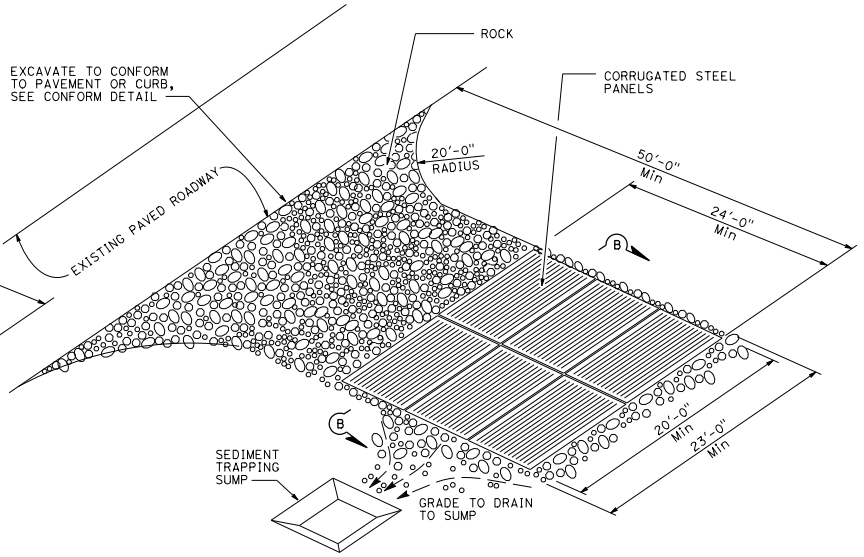


SECTION B-B



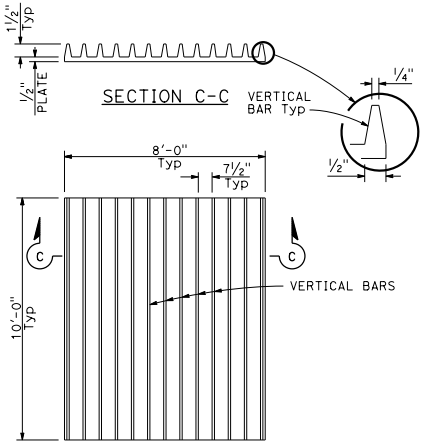
PERSPECTIVE

TEMPORARY CONSTRUCTION ENTRANCE (TYPE 1)



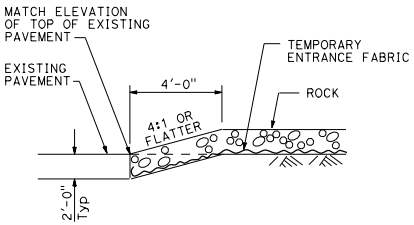
PERSPECTIVE

TEMPORARY CONSTRUCTION ENTRANCE (TYPE 2)



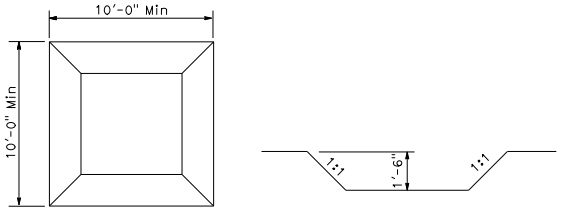
PLAN

TYPICAL CORRUGATED STEEL PANEL DETAIL



SECTION

CONFORM DETAIL



PLAN ELEVATION

SEDIMENT TRAPPING SUMP

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

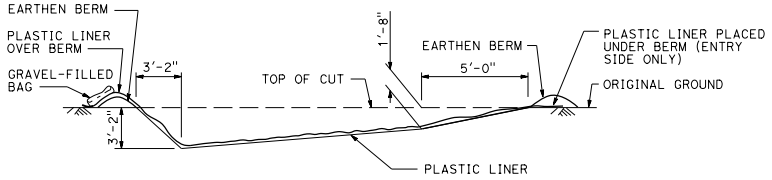
TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ENTRANCE)

NO SCALE

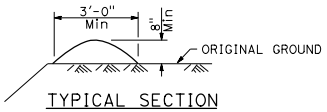
T58

1-29-18

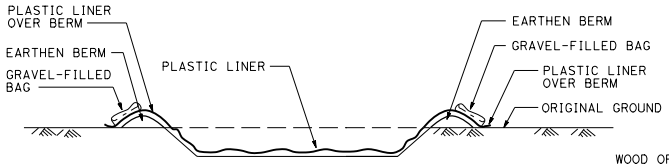
Return to Table of Contents



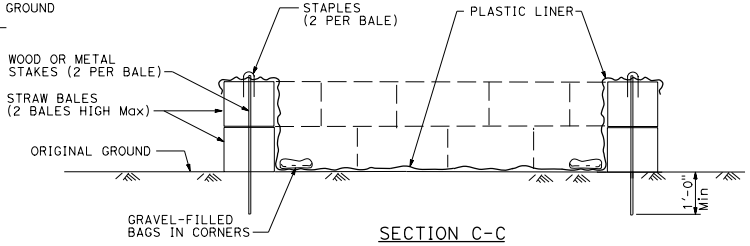
SECTION B-B



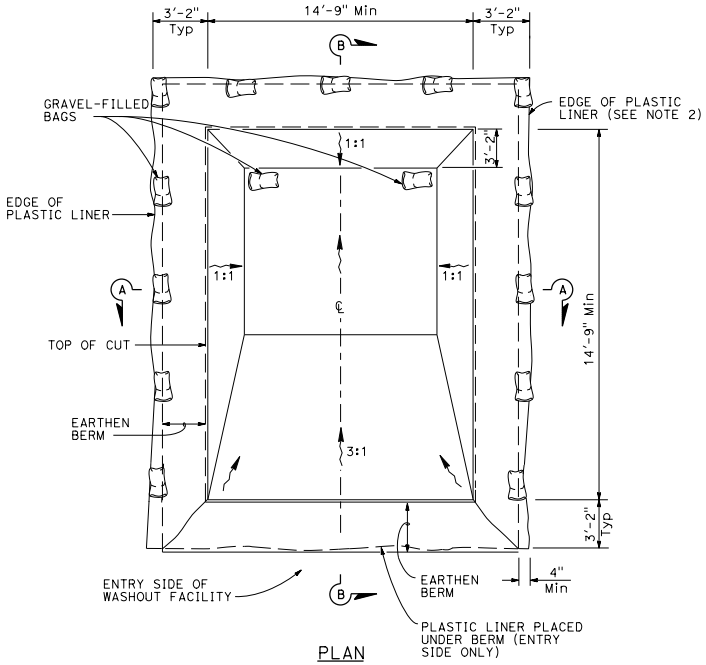
TYPICAL SECTION
EARTHEN BERM



SECTION A-A

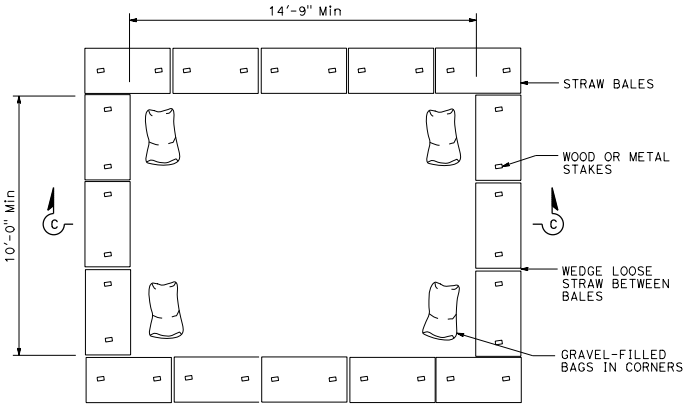


SECTION C-C



PLAN

TEMPORARY CONCRETE WASHOUT FACILITY
(Below Grade)



PLAN
TEMPORARY CONCRETE WASHOUT FACILITY
(On Grade)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

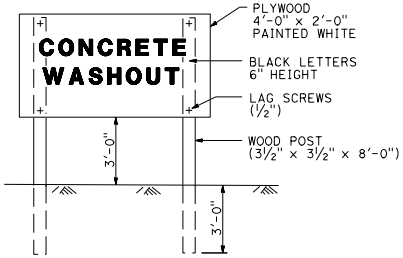
Robert B Schott
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

LICENSED LANDSCAPE ARCHITECT Robert B. Schott Signature 11-30-18 Renewal Date Date STATE OF CALIFORNIA

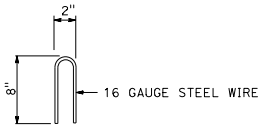
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. The concrete washout sign shall be installed within 32'-10" of the temporary concrete washout facility.
2. Plastic liner shall be anchored with gravel-filled bags for below grade concrete washout facility.



CONCRETE WASHOUT SIGN DETAIL



STAPLE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONCRETE WASHOUT FACILITY)

NO SCALE

T59

1-29-18

2018 STANDARD PLAN T59

Return to Table of Contents

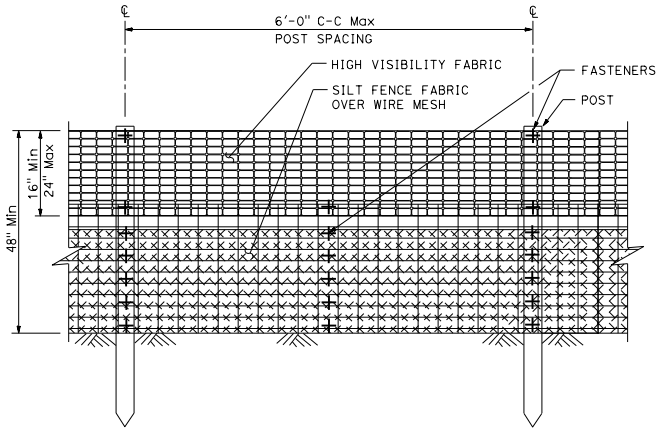
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT

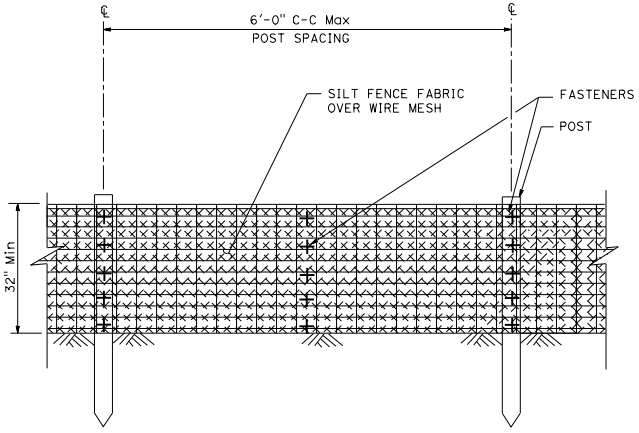
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

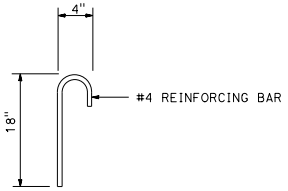
LICENSED LANDSCAPE ARCHITECT — Robert B. Schatt — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



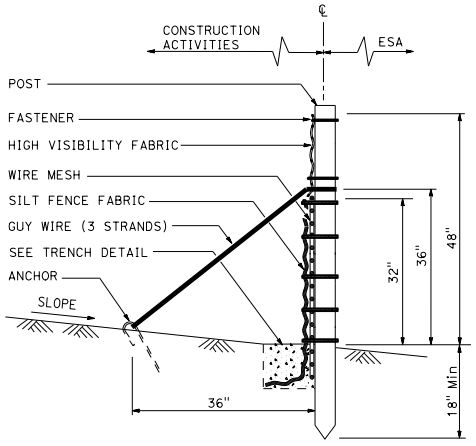
ELEVATION



ELEVATION

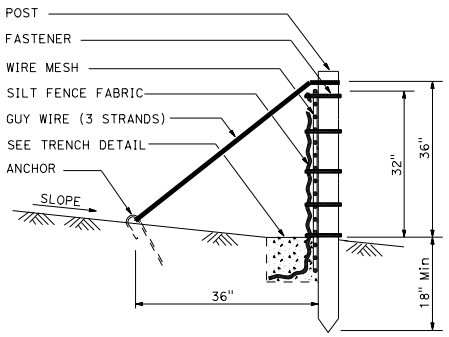


ANCHOR



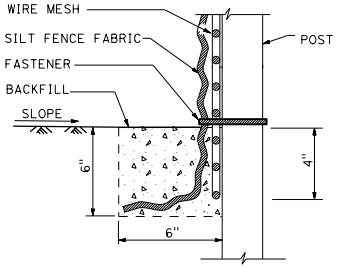
SECTION

TEMPORARY REINFORCED SILT FENCE (TYPE 1)



SECTION

TEMPORARY REINFORCED SILT FENCE (TYPE 2)



SECTION

TRENCH DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY REINFORCED SILT FENCE)

NO SCALE

T60

2018 STANDARD PLAN T60

1-29-18

Return to Table of Contents

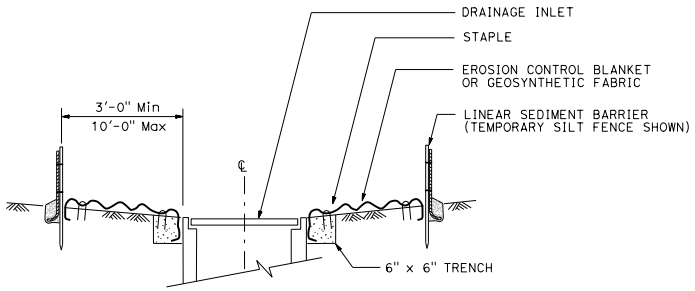
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

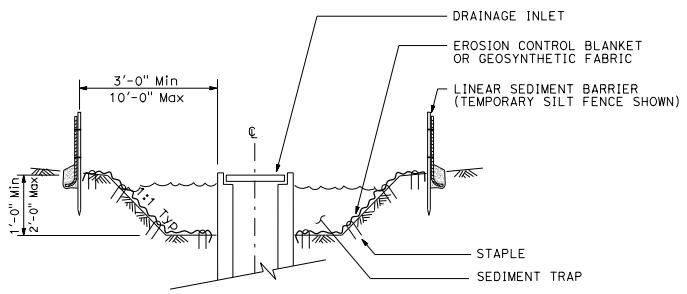
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schott — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



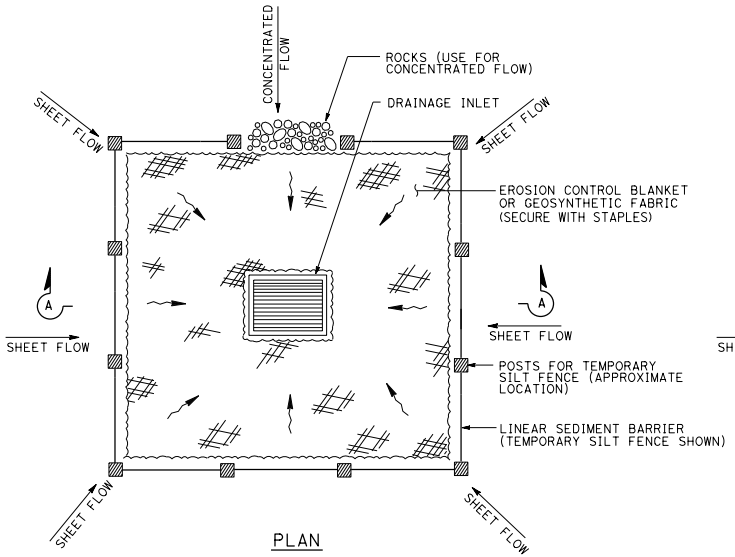
SECTION A-A



SECTION B-B

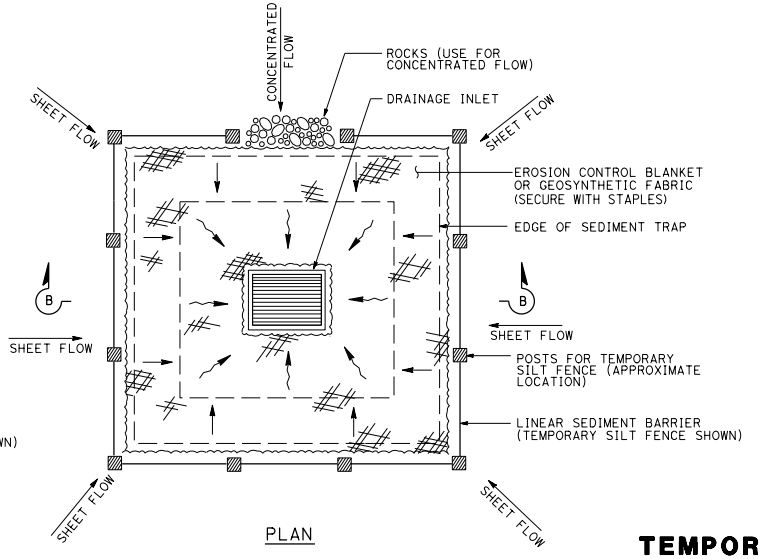
NOTES:

1. See Standard Plan T51 for Temporary Silt Fence.
2. Dimensions may vary to fit field conditions.



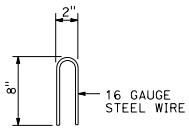
PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 1)



PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 2) (EXCAVATED SEDIMENT TRAP)



STAPLE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

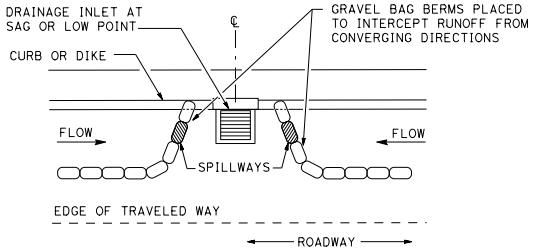
NO SCALE

T61

2018 STANDARD PLAN T61

1-29-18

Return to Table of Contents



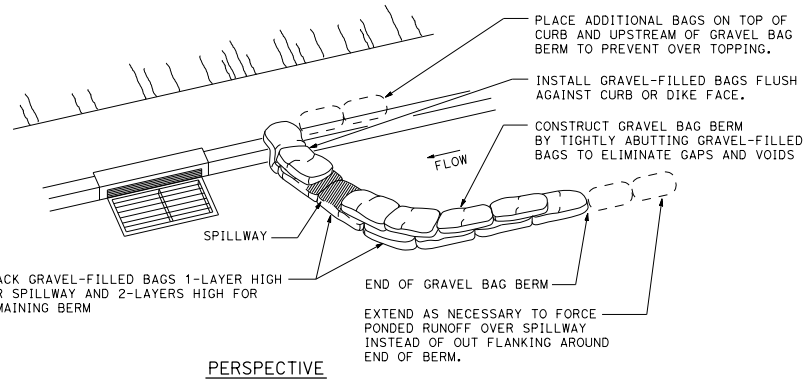
PLAN

CONFIGURATION FOR SAG POINT INLET (GRAVEL BAG BERM)

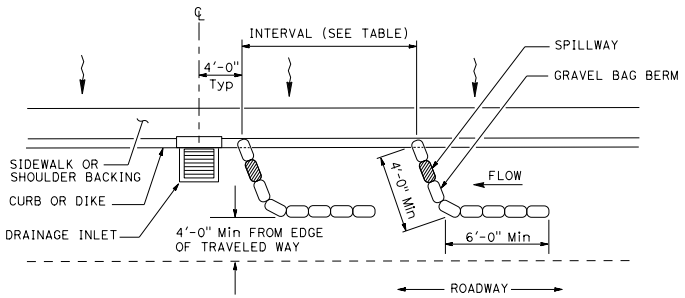
GRAVEL BAG BERM (TYPE 3A) SPACING TABLE

SLOPE OF ROADWAY (PERCENT)	1 TO 3.9	4 TO 5.9	6 TO 7.9	8 TO 10	10+
INTERVAL BETWEEN BERM	100′	75′	50′	25′	12′

For slope of less than 1%, install barriers only if erosion/sediment is prevalent

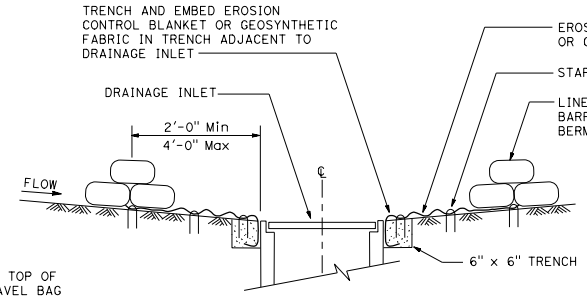


PERSPECTIVE

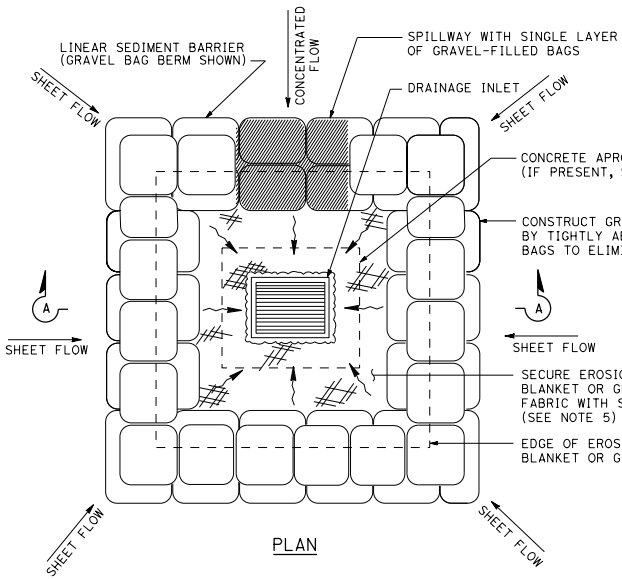


PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 3A) (GRAVEL BAG BERM)



SECTION A-A

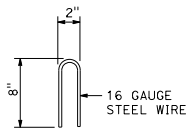


PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 3B)

NOTES:

1. Place safety cones adjacent to drainage inlet protection.
2. Dimensions may vary to fit field conditions.
3. Install a minimum of 3 gravel bag berms upstream of each drainage inlet to be protected.
4. Position erosion control blanket or geosynthetic fabric at edge of concrete apron and secure in trench.
5. Erosion control blanket or geosynthetic fabric is not required if the area adjacent to the drainage inlet is vegetated or paved.



STAPLE DETAIL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schatt
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT Robert B. Schatt Signature 11-30-18 Renewal Date Date STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

NO SCALE

T62

2018 STANDARD PLAN T62

1-29-18

Return to Table of Contents

FLEXIBLE SEDIMENT BARRIER SPACING TABLE

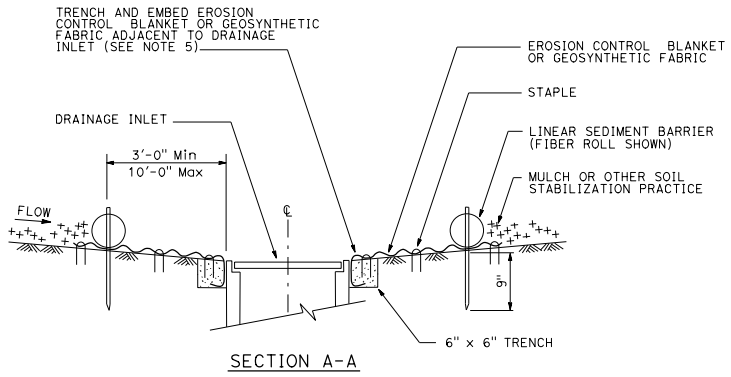
SLOPE OF ROADWAY (PERCENT)	0 TO 0.9	1 TO 1.9	2 TO 2.9	3 TO 4	5+
INTERVAL BETWEEN BARRIERS	50′	35′	30′	25′	20′
ANGLE FROM FACE OF CURB	70°	70°	70°	45°	45°
SUGGESTED BARRIER LENGTH	6′	6′	6′	6′	6′

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

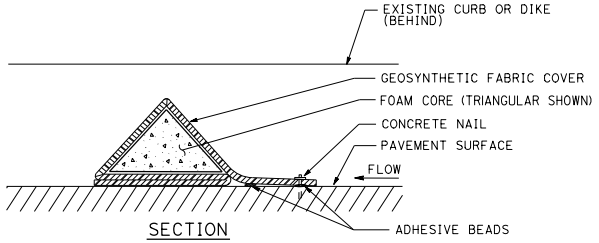
Robert B. Schatz
LICENSED LANDSCAPE ARCHITECT
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schatz — Signature — 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



SECTION A-A

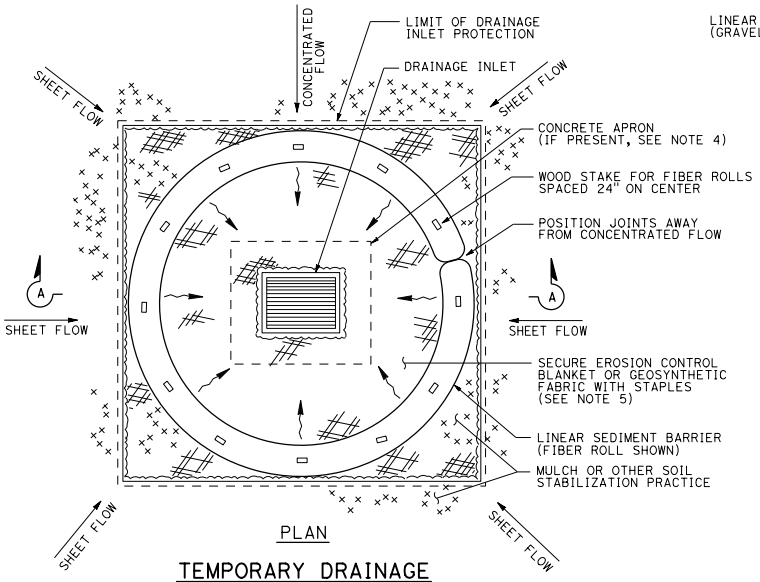


SECTION

FLEXIBLE SEDIMENT BARRIER DETAIL (FOAM BARRIER SHOWN)

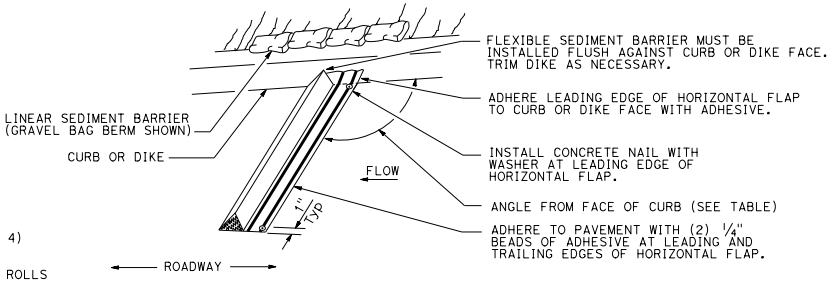
NOTES:

1. See Standard Plan T51 for Temporary Silt Fence.
2. Dimensions may vary to fit field conditions.
3. Install a minimum of 3 flexible sediment barriers upstream of each drainage inlet to be protected.
4. Position erosion control blanket or geosynthetic fabric at edge of concrete apron and secure in trench.
5. Erosion control blanket or geosynthetic fabric is not required if the area adjacent to the drainage inlet is vegetated.

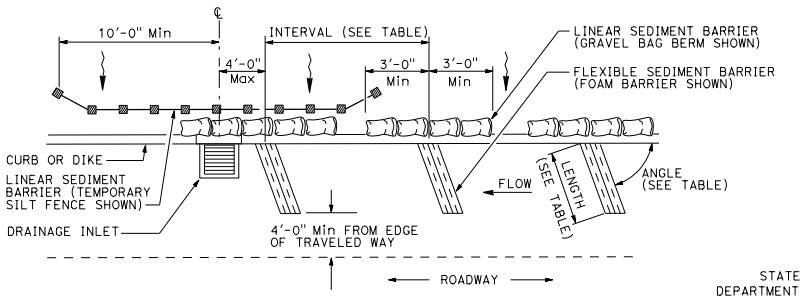


PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 4A)

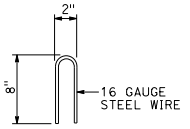


PERSPECTIVE



PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 4B) FLEXIBLE SEDIMENT BARRIER



STAPLE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

NO SCALE

T63

2018 STANDARD PLAN T63

1-29-18

Return to Table of Contents

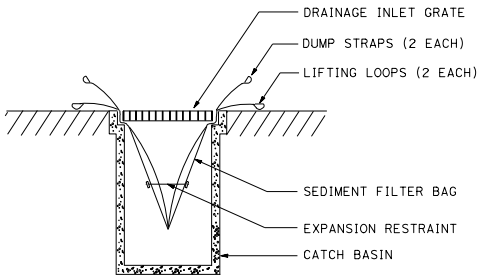
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

May 31, 2018
PLANS APPROVAL DATE

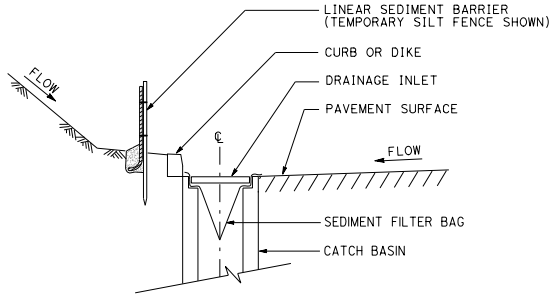
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schott — Signature — 11-30-18 — Renewal Date — Date — STATE OF CALIFORNIA

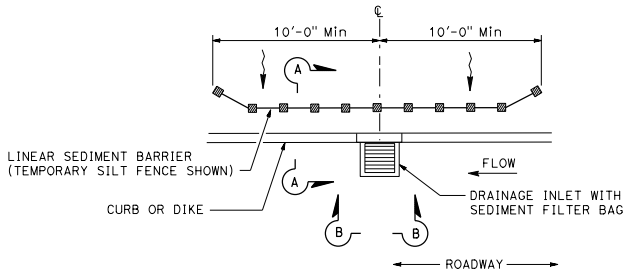


SECTION B-B

SEDIMENT FILTER BAG DETAIL

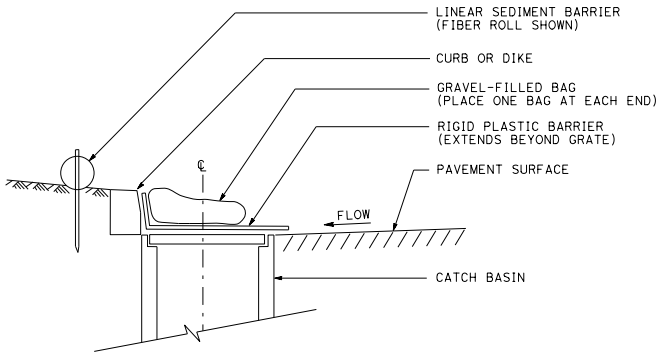


SECTION A-A



PLAN

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 5) (SEDIMENT FILTER BAG)

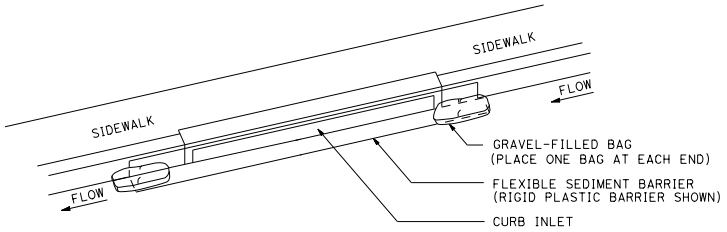


SECTION

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 6A) (CATCH BASIN WITH GRATE)

NOTES:

1. See Standard Plan T51 for Temporary Silt Fence.
2. Dimensions may vary to fit field conditions.



PERSPECTIVE

TEMPORARY DRAINAGE INLET PROTECTION (TYPE 6B) (CURB INLET WITHOUT GRATE)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY DRAINAGE INLET PROTECTION)

NO SCALE

T64

1-29-18

Return to Table of Contents

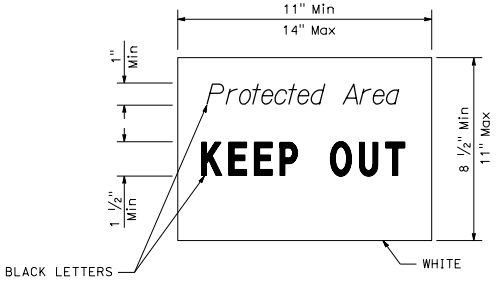
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

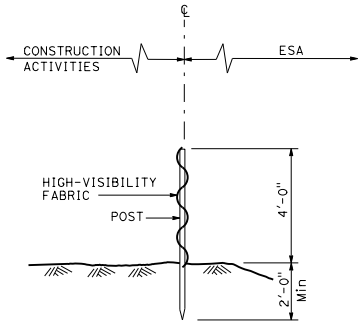
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

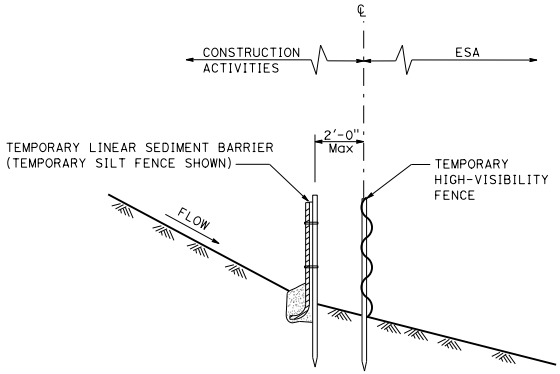
LICENSED LANDSCAPE ARCHITECT — Robert B. Schott — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA



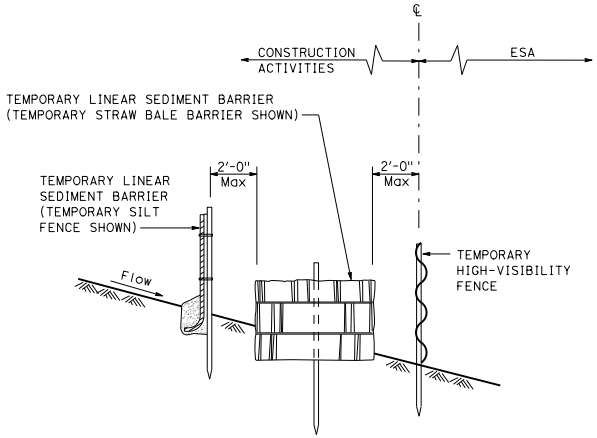
SIGN DETAIL



SECTION
TEMPORARY HIGH-VISIBILITY FENCE



SECTION
PLACEMENT DETAIL
FOR TEMPORARY LINEAR SEDIMENT BARRIER
USED WITH TEMPORARY
HIGH-VISIBILITY FENCE



SECTION
PLACEMENT DETAIL
FOR TEMPORARY SILT FENCE
AND TEMPORARY STRAW BALE BARRIER
USED WITH TEMPORARY HIGH-VISIBILITY FENCE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY HIGH-VISIBILITY FENCE)

NO SCALE

T65

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

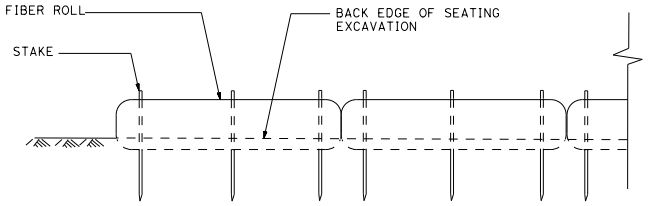
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT — Robert B. Schott — Signature 11-30-18 Renewal Date — Date — STATE OF CALIFORNIA

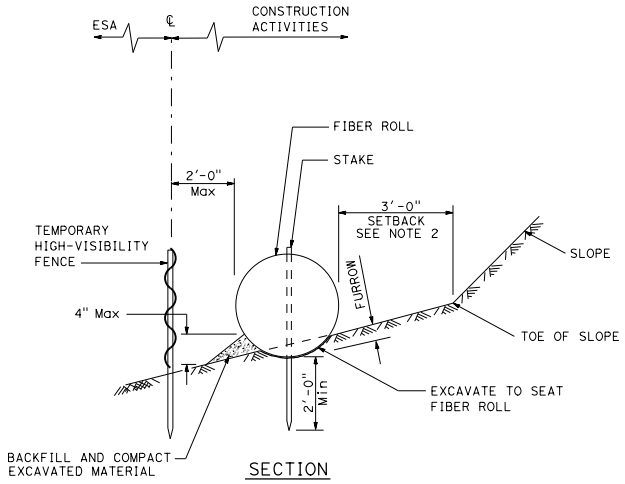
NOTES:

1. Temporary high-visibility fence shown for reference purposes only.
2. Setback dimension may vary according to field conditions or as designated on plans.



FRONT ELEVATION

TEMPORARY LARGE SEDIMENT BARRIER



SECTION

PLACEMENT DETAIL
FOR TEMPORARY HIGH-VISIBILITY FENCE
USED WITH TEMPORARY LARGE SEDIMENT BARRIER

(See Note 1)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY LARGE SEDIMENT BARRIER)

NO SCALE

T66

2018 STANDARD PLAN T66

1-29-18

Return to Table of Contents

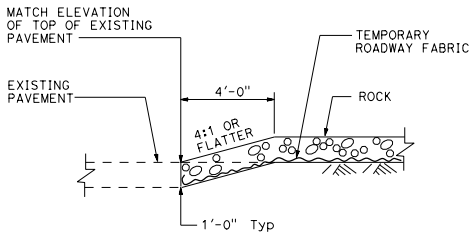
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Robert B. Schott
LICENSED LANDSCAPE ARCHITECT

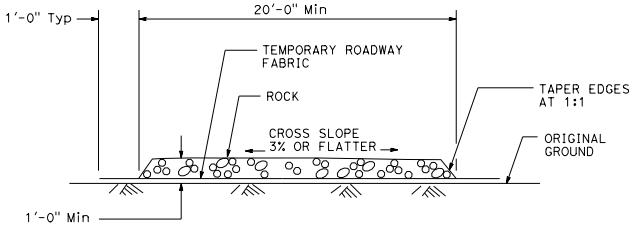
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LICENSED LANDSCAPE ARCHITECT
Robert B. Schott
Signature
11-30-18
Renewal Date
Date
STATE OF CALIFORNIA



SECTION
CONFORM DETAIL



SECTION
TEMPORARY CONSTRUCTION ROADWAY

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WATER POLLUTION CONTROL DETAILS (TEMPORARY CONSTRUCTION ROADWAY)

NO SCALE

T67

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

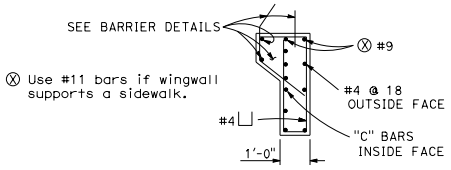
Peter W. Norboe
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

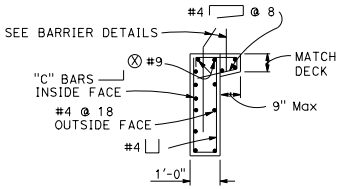
BRIDGE DESIGNATIONS

J Outer, outer left bridge
K Outer left bridge
S Outer right bridge
T Outer, outer right bridge

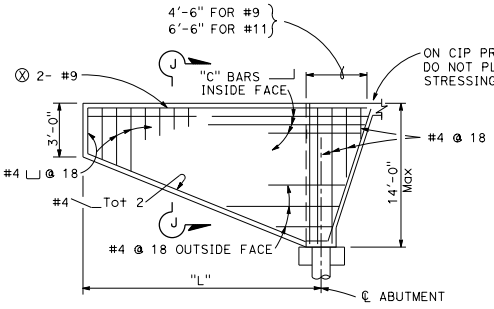


Ⓧ Use #11 bars if wingwall supports a sidewalk.

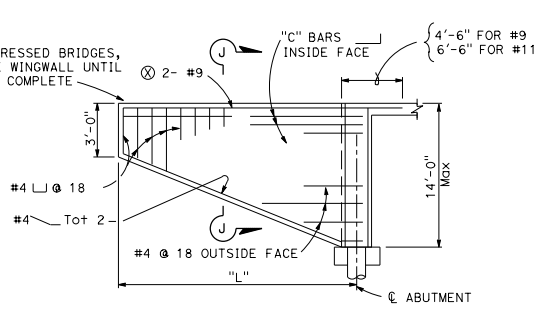
SECTION J-J
Without overhang



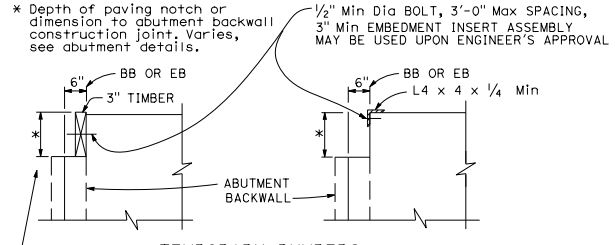
SECTION J-J
With overhang



ELEVATION
SLOPING ABUTMENT



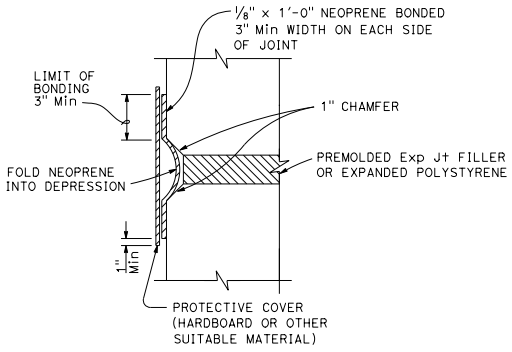
ELEVATION
VERTICAL ABUTMENT



TEMPORARY BUMPERS
BRIDGE DETAIL 1-2

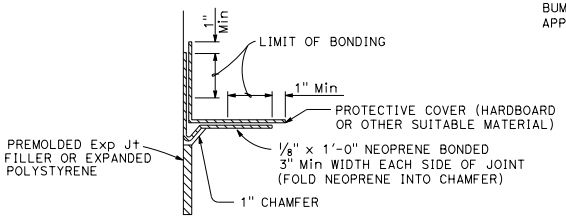
ALTERNATIVE 1 ALTERNATIVE 2

TOP OF BUMPER TO BE AT OR ABOVE THE TOP OF DECK CONCRETE. BUMPERS AND BOLTS TO BE REMOVED IMMEDIATELY PRIOR TO PLACING APPROACH PAVEMENT



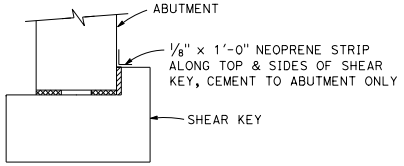
BRIDGE DETAIL 1-3
STRIP WATERSTOP DETAIL

When used on CIP prestressed bridges, do not apply waterstop until stressing is complete.

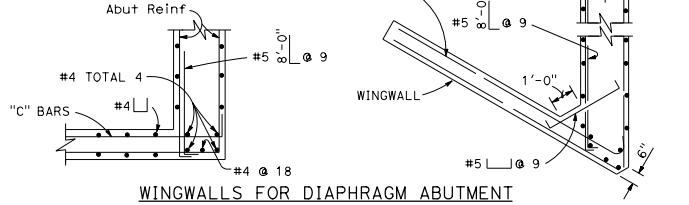


BRIDGE DETAIL 1-4
STRIP WATERSTOP CORNER DETAIL

When used on CIP prestressed bridges, do not apply waterstop until stressing is complete.



BRIDGE DETAIL 1-6
SHEAR KEY JOINT PROTECTION



WINGWALLS FOR DIAPHRAGM ABUTMENT
BRIDGE DETAIL 1-5

CORNER DETAIL
FOR SKEW 20° AND LESS

CORNER DETAIL
FOR SKEW OVER 20°

"L"	"C" BARS
12'-0"	#5 @ 9"
14'-0"	#6 @ 9"
16'-0"	#7 @ 9"
18'-0"	#8 @ 9"
20'-0"	#9 @ 9"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAILS

NO SCALE

B0-1

1-29-18

Return to Table of Contents

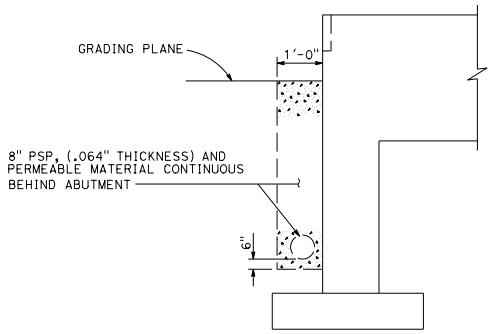
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gary Wang
REGISTERED CIVIL ENGINEER

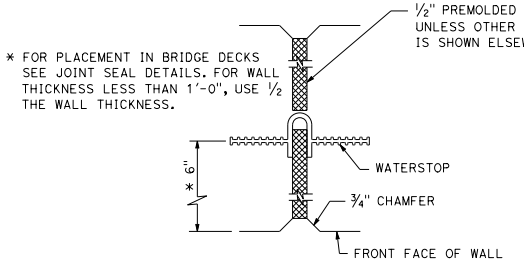
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

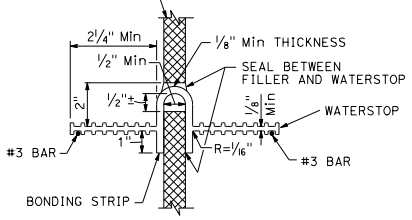
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



BRIDGE DETAIL 3-5
8" PSP AND PERMEABLE MATERIAL



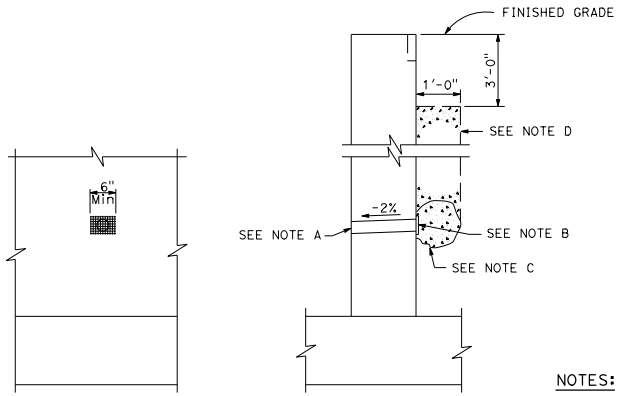
BRIDGE DETAIL 3-4
WALL EXPANSION JOINT



BRIDGE DETAIL 3-6
WATERSTOP

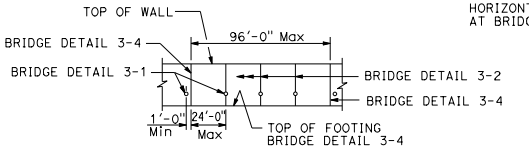
NOTES:

1. Holes will be permitted in the outer ½" of the web for wire, rings, etc. Tie web to #3 reinforcing bars @ 12 maximum intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.
2. Waterstop to have 5 or more pairs of raised ribs to provide 0.1 square inch minimum rib cross-section area on each half of the waterstop.

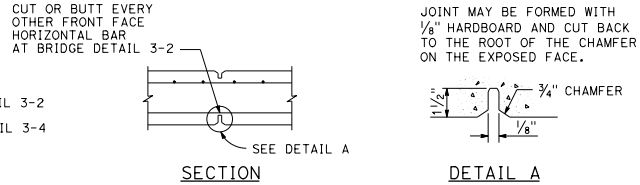


ELEVATION SECTION

BRIDGE DETAIL 3-1
WEEP HOLE AND PERVIOUS BACKFILL



BRIDGE DETAIL 3-3
WALL EXPANSION JOINTS AND WEAKENED PLANES



SECTION DETAIL A

BRIDGE DETAIL 3-2
WEAKENED PLANES

NOTES:

A. 4" Ø Drains @ 25'-0" maximum center to center. For walls adjacent to sidewalks or curbs, provide 4" plastic pipe under the sidewalk to discharge thru curb face. Exposed wall drains shall be located 3"± above finished grade.

B. 6" square aluminum or galvanized steel wire ¼" mesh hardware cloth, minimum wire diameter 0.025". Anchor firmly to backface.

C. One cubic foot pervious backfill material in a nonwoven filter fabric, securely tied.

D. Pervious backfill material continuous behind retaining wall or abutment.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAILS

NO SCALE

B0-3

1-29-18

Return to Table of Contents

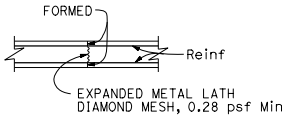
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Peter W. Norboe
REGISTERED CIVIL ENGINEER

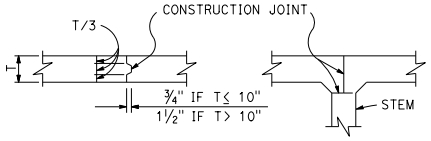
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



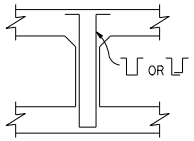
ALTERNATIVE DECK CONSTRUCTION JOINTS



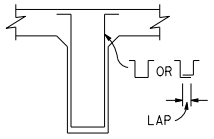
BRIDGE DETAIL 5-2 Top or bottom slab

BRIDGE DETAIL 5-3

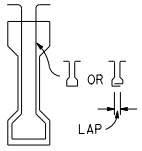
DECK CONSTRUCTION JOINTS



REINFORCED BOX GIRDER
Girder or diaphragm



T-BEAM
Girder, bent cap or diaphragm



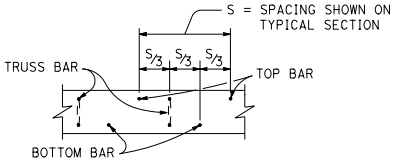
PRECAST GIRDER

STIRRUP SIZE	LAP
#4	5"
#5	6"
#6	7½"
#7	9"
#8	10"

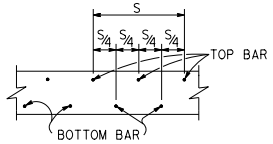
A reinforcement bar must be placed inside of each stirrup hook or 90° bend.

BRIDGE DETAIL 5-5

ALTERNATIVE STIRRUPS

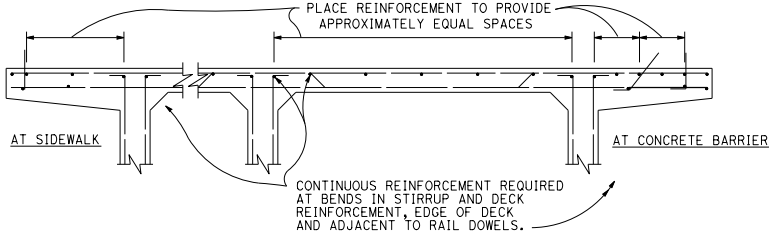


BRIDGE DETAIL 5-10



BRIDGE DETAIL 5-11

TRANSVERSE DECK REINFORCEMENT SPACING DIAGRAMS



BRIDGE DETAIL 5-15

TOP GIRDER REINFORCEMENT

NOTES:

1. In simple spans, transverse joints are not permitted unless approved by the Engineer.
2. In continuous spans, transverse joints may be located at about the ¼ point of the span.
3. Reinforcing steel shall be continuous through all construction joints.
4. Longitudinal joints shall be located at the edge of a traffic lane unless otherwise permitted by the Engineer.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAILS

NO SCALE

B0-5

1-29-18

Return to Table of Contents

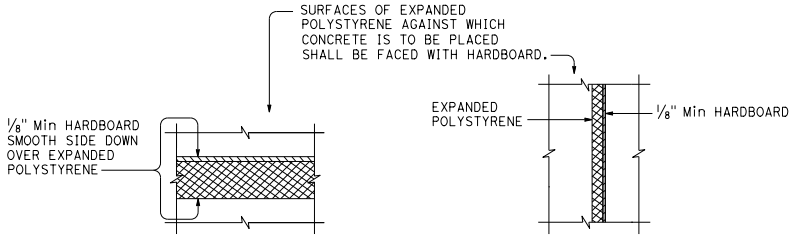
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Peter W. Norboe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

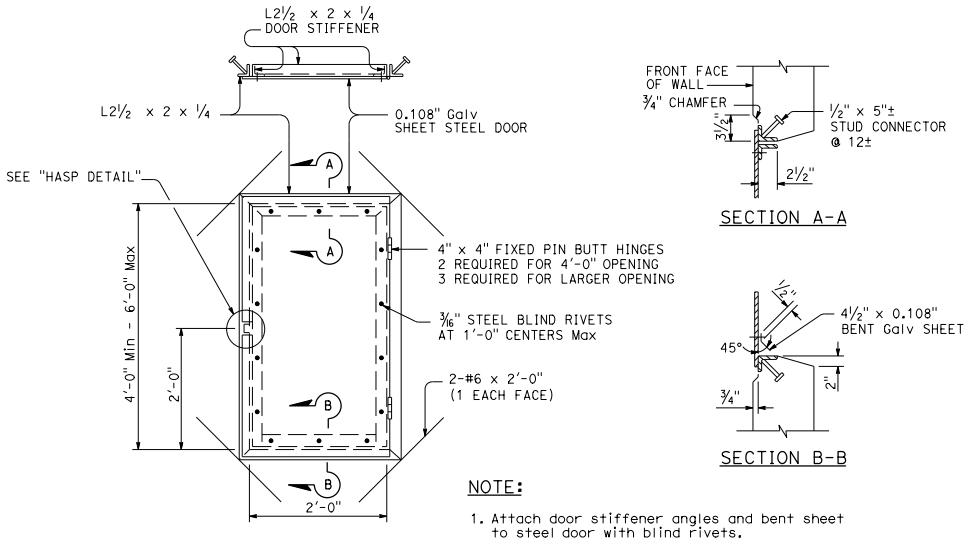


BRIDGE DETAIL 13-1

PROTECTION OF HORIZONTAL POLYSTYRENE

BRIDGE DETAIL 13-2

PROTECTION OF VERTICAL POLYSTYRENE



ELEVATION

SECTION A-A

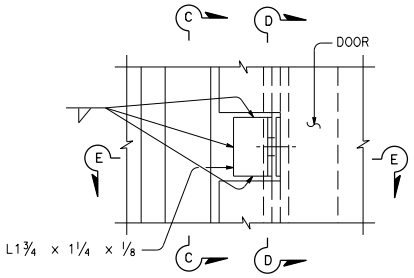
SECTION B-B

NOTE:

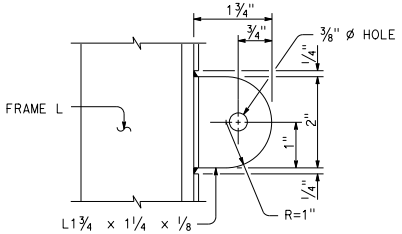
1. Attach door stiffener angles and bent sheet to steel door with blind rivets.

BRIDGE DETAIL 13-3

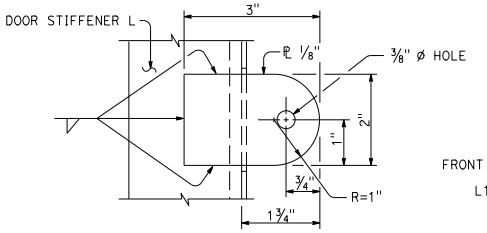
ACCESS DOOR



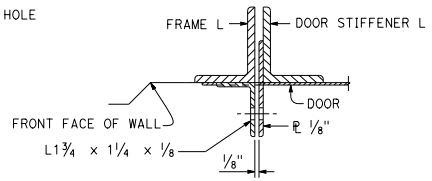
ELEVATION



SECTION C-C



SECTION D-D



SECTION E-E

HASP DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

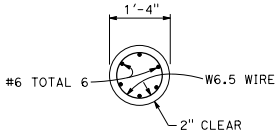
BRIDGE DETAILS

NO SCALE

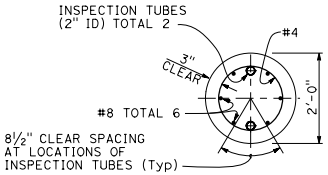
B0-13

1-29-18

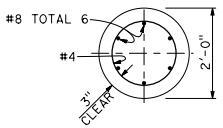
Return to Table of Contents



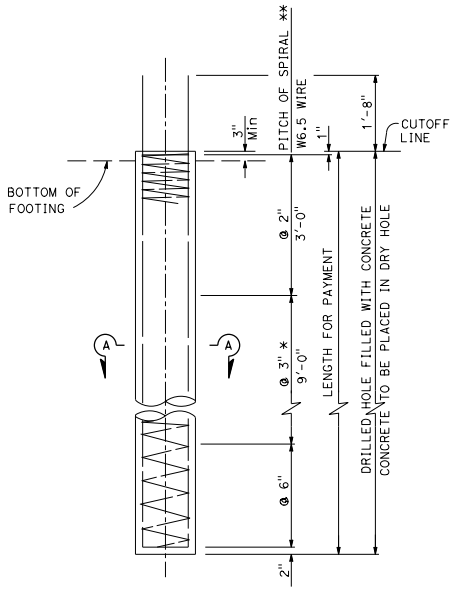
SECTION A-A



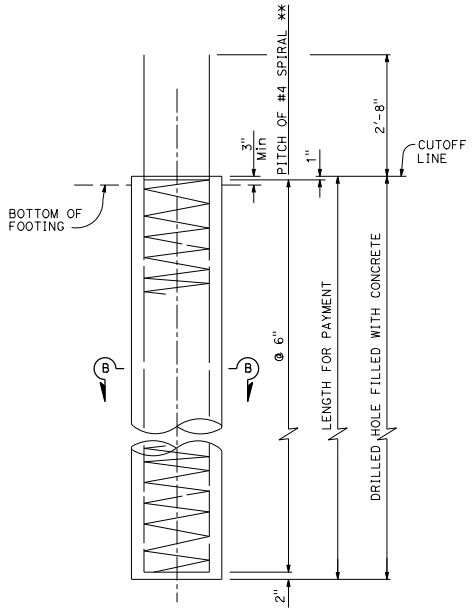
SECTION B-B
(With inspection tubes)



SECTION B-B
(Without inspection tubes)



ELEVATION
90 kip AND 140 kip
DESIGN CAPACITY



ELEVATION
200 kip
DESIGN CAPACITY

* @ 2" at option of Contractor

** Extend at 2" pitch to top of anchor piles and load test piles. For longitudinal reinforcement for anchor piles and load test piles, see "Load Test Pile Details (2)", Standard Plan B2-10.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Reinforcement extending into footing shall be hooked as required to provide clearance to top of footing.
2. Piles shall be extended only in accordance with details shown on the Project Plans.

DESIGN NOTES:

REINFORCED CONCRETE

f_y = 60,000 psi

f'_c = 4,000 psi

DESIGN CAPACITY

90 kip and 140 kip PILE

COMPRESSION:

140 kip (Service state)
280 kip (Nominal axial structural resistance)

TENSION:

56 kip (Service state)
140 kip (Nominal axial structural resistance)

200 kip PILE

COMPRESSION:

200 kip (Service state)
400 kip (Nominal axial structural resistance)

TENSION:

80 kip (Service state)
200 kip (Nominal axial structural resistance)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

16" AND 24" CAST-IN-DRILLED-HOLE CONCRETE PILE

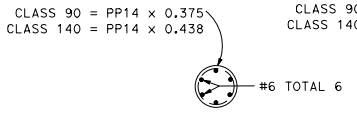
NO SCALE

B2-3

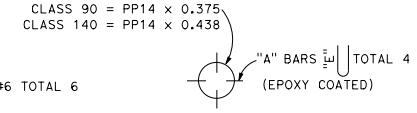
1-29-18

2018 STANDARD PLAN B2-3

Return to Table of Contents

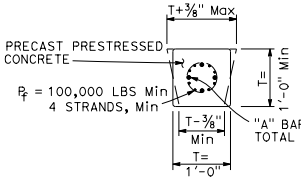


SECTION V-V



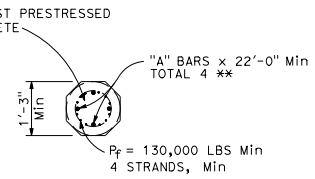
SECTION W-W

PP = Steel pipe pile

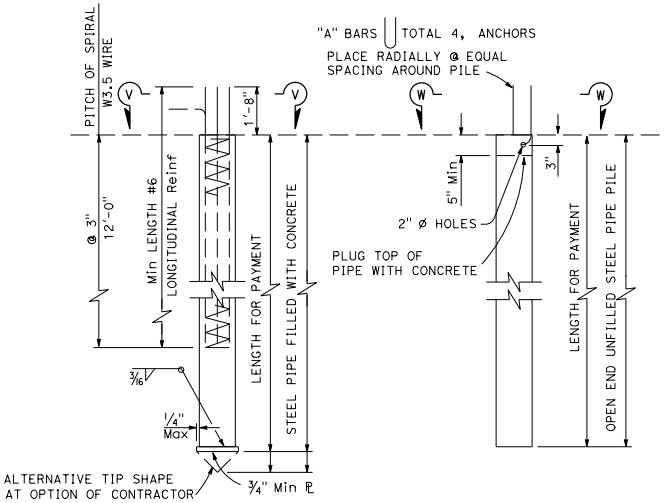


SECTION X-X

** To be in place when pile is cast

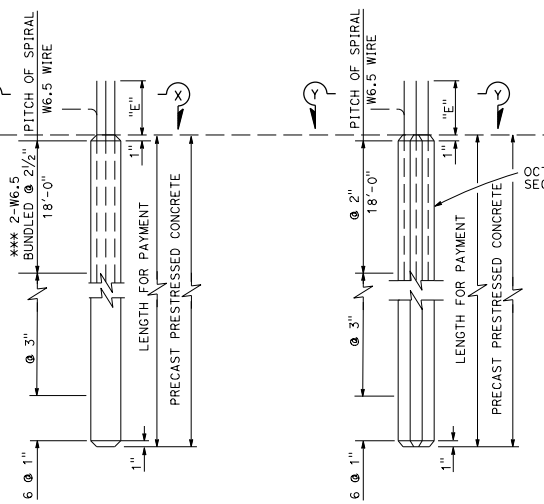


SECTION Y-Y



ALTERNATIVE "V"

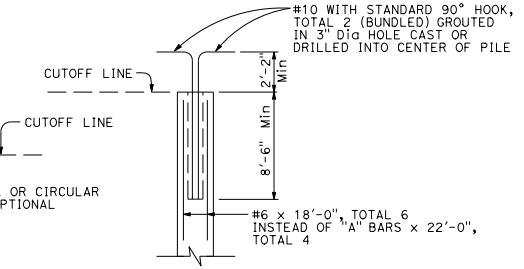
ALTERNATIVE "W"



ALTERNATIVE "X"

*** W11.0 at 2" may be substituted

ALTERNATIVE "Y"



ALTERNATIVE PILE ANCHOR FOR PRESTRESSED PILES

DESIGN NOTES

PRECAST PRESTRESSED PILES

P_f = Prestressing force (after losses)

If section used is larger than the minimum section shown, then "P_f" shall provide 700 psi minimum.

Concrete Strength: f'c @ 28 days= 6,000 psi (Alternative "X")
5,000 psi (Alternative "Y")
f'ci @ transfer= 4,000 psi

REINFORCED CONCRETE

f'c = 4,000 psi
fy = 60,000 psi

STEEL PIPE PILE

Fy (Minimum yield strength) = 45,000 psi
Fu (Minimum tensile strength) = 66,000 psi

DESIGN CAPACITY

Class 90

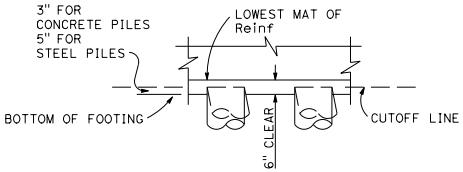
Compression = 90 kip (Service state)
= 180 kip (Nominal axial structural resistance)

Tension = 36 kip (Service state)
= 90 kip (Nominal axial structural resistance)

Class 140

Compression = 140 kip (Service state)
= 280 kip (Nominal axial structural resistance)

Tension = 56 kip (Service state)
= 140 kip (Nominal axial structural resistance)



PILE EMBEDMENT

	REQUIRED NOMINAL RESISTANCE (TENSION) *	
	60 kips OR LESS	GREATER THAN 60 kips
"A" BARS	#6	#8
"E" DIMENSION	1'-8"	2'-8"

* See Pile Data Table on the Project Plans for Nominal Resistance (Tension) Requirements

NOTES:

1. Details are the same for both Class 90 and Class 140 piles unless noted otherwise.
2. At the Contractor's option, alternative steel pipe with at least the diameter and wall thickness shown on these plans may be used. The diameter shall not exceed 1'-6".
3. Pile reinforcement and steel pile anchor bars extending into a footing shall be hooked as required to provide clearance to top of footing. Piles shall be extended only with details shown on the Project Plans.
4. 2" clearance to spiral reinforcement shall be maintained if section used is larger than the minimum section shown.
5. Maximum cutoff length at the top of the Alternative "X" and Alternative "Y" Piles is 10'-0".
6. For longitudinal reinforcement and prestressing for anchor piles and load test piles, see "Load Test Pile Details (2)", Standard Plan B2-10.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PILE DETAILS
CLASS 90 AND CLASS 140

NO SCALE

B2-5

1-29-18

Return to Table of Contents

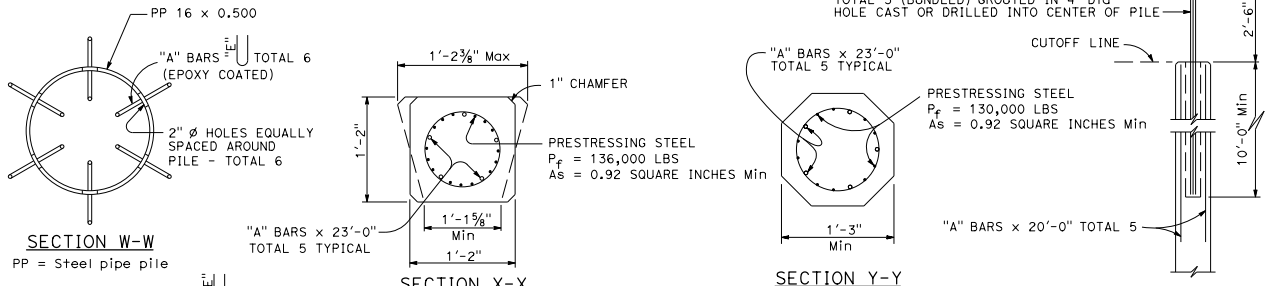
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

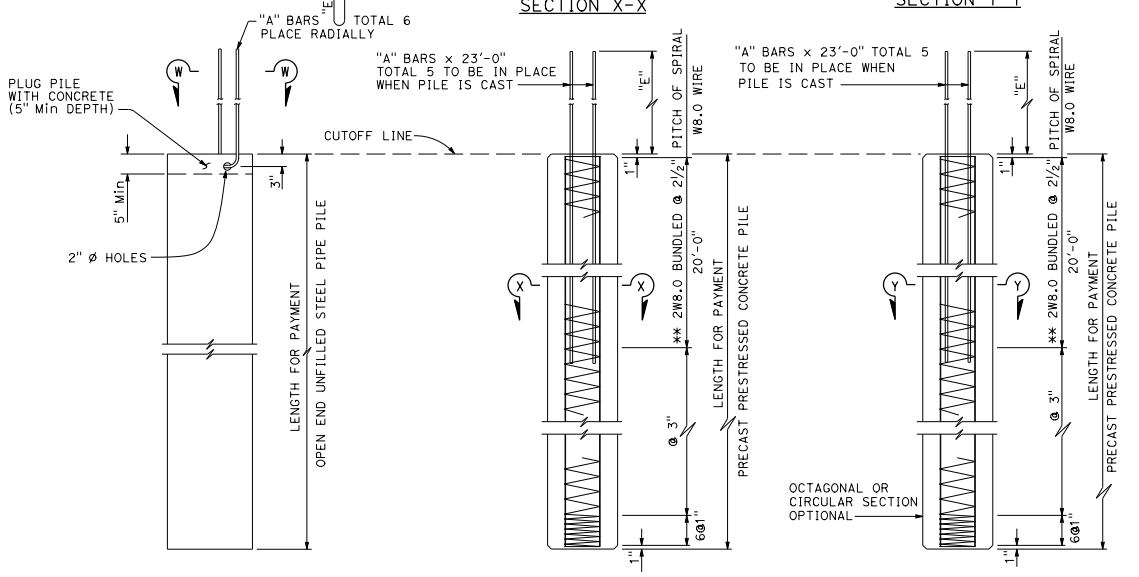
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

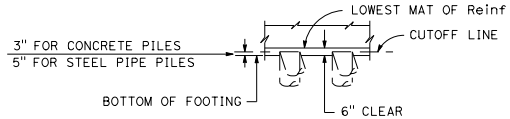
REGISTERED PROFESSIONAL ENGINEER
Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
STATE OF CALIFORNIA





	REQUIRED NOMINAL RESISTANCE (TENSION) *	
	75 kips OR LESS	GREATER THAN 75 kips
"A" BARS	#6	#8
"E" DIMENSION	1'-8"	2'-8"

* See Pile Data Table on the Project Plans for Nominal Resistance (Tension) Requirements



PILE EMBEDMENT

DESIGN NOTES:

DESIGN CAPACITY
Compression = 200 kip (Service state)
= 400 kip (Nominal axial structural resistance)
Tension = 80 kip (Service state)
= 200 kip (Nominal axial structural resistance)

REINFORCED CONCRETE
f'_c = 4,000 psi
f_y = 60,000 psi

PRECAST PRESTRESSED PILES
P_f = Prestress Force (After losses)
Concrete Strength f'_c @ 28 days = 7,000 psi
f'_{ci} @ transfer = 4,000 psi

STEEL PIPE PILE
Fy (minimum yield strength) = 45,000 psi
Fu (minimum tensile strength) = 66,000 psi

NOTES:

1. Pile reinforcement extending into footing shall be hooked as required to provide clearance to top of footing. Piles shall be extended only with details shown on the Project Plans.
2. At the Contractor's option, alternative steel pipe with at least the diameter and wall thickness shown on these plans may be used. The diameter shall not exceed 1'-6".
3. Maximum cut-off length at the top of the Alternative "X" and Alternative "Y" piles is 10'-0".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PILE DETAILS CLASS 200

NO SCALE

B2-8

1-29-18

2018 STANDARD PLAN B2-8

Return to Table of Contents

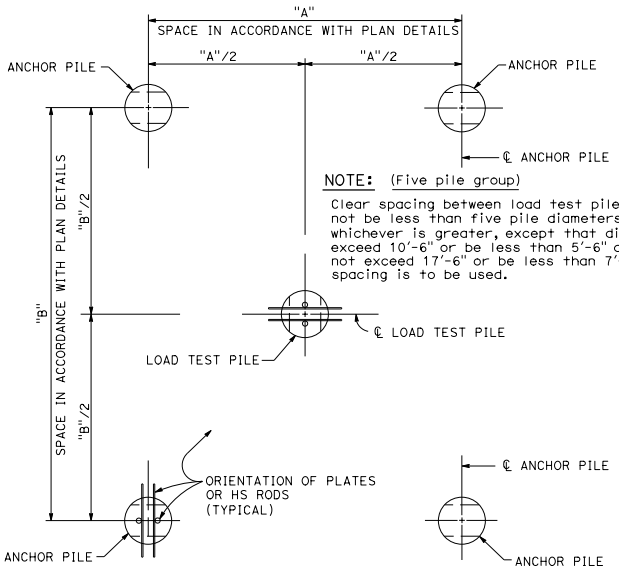
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

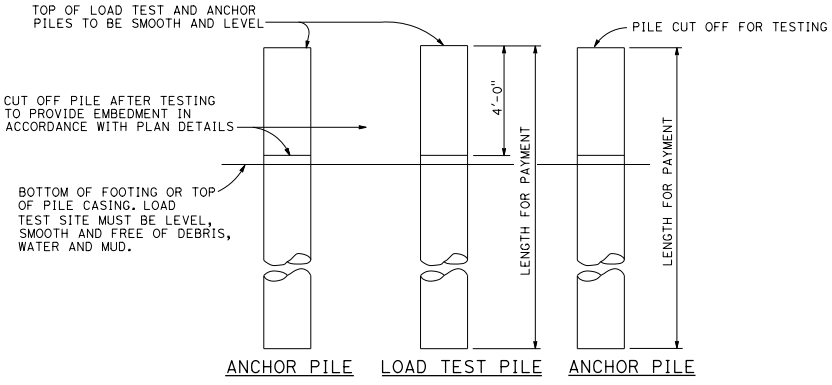
Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

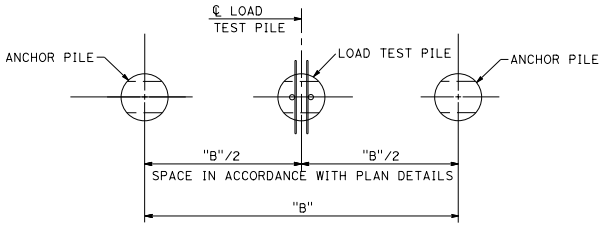
NOTE: (Five pile group)
Clear spacing between load test pile and anchor pile shall not be less than five pile diameters or 7'-0", whichever is greater, except that dimension "A" shall not exceed 10'-6" or be less than 5'-6" and dimension "B" shall not exceed 17'-6" or be less than 7'-6". When possible, maximum spacing is to be used.



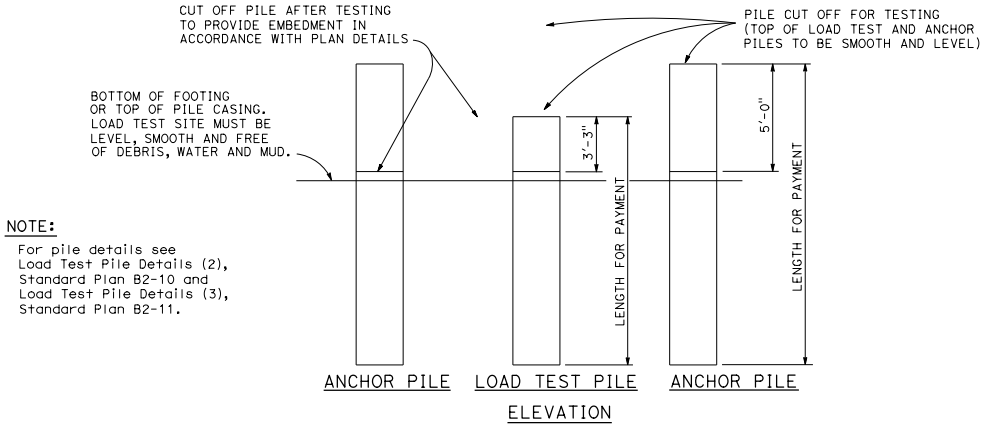
ELEVATION

FIVE - PILE LOAD TEST PILE GROUP
(FOR COMPRESSION - TENSION PILE LOAD TESTS)

NOTE: (Three pile group)
Clear spacing between load test pile and anchor pile shall not be less than five pile diameters or 7'-0", whichever is greater, except that dimension "B" shall not exceed 17'-6" or be less than 6'-6". When possible, maximum spacing is to be used.



PLAN



ELEVATION

NOTE:
For pile details see Load Test Pile Details (2), Standard Plan B2-10 and Load Test Pile Details (3), Standard Plan B2-11.

THREE - PILE LOAD TEST PILE GROUP
(FOR TENSION PILE LOAD TESTS ONLY)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LOAD TEST PILE DETAILS (1)

NO SCALE

B2-9

1-29-18

Return to Table of Contents

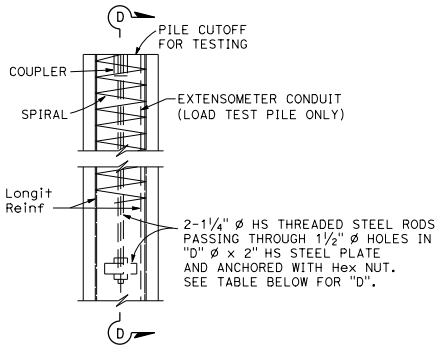
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

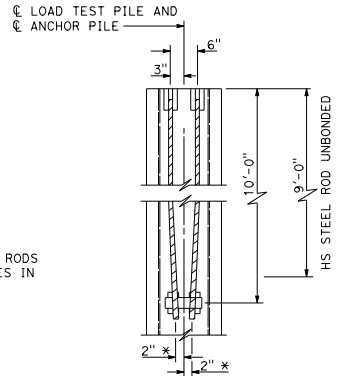
May 31, 2018
PLANS APPROVAL DATE

Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

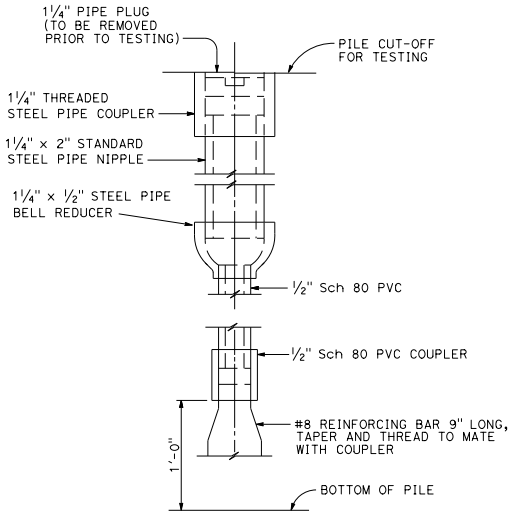


ELEVATION

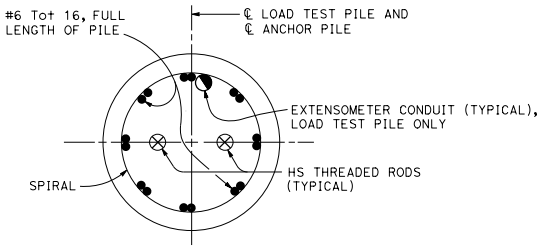


SECTION D-D

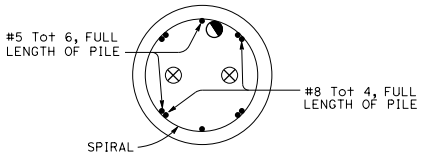
* 1½" for Alt "X"



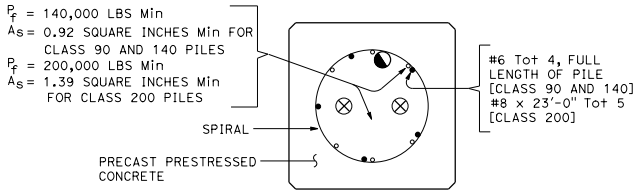
EXTENSOMETER CONDUIT DETAILS



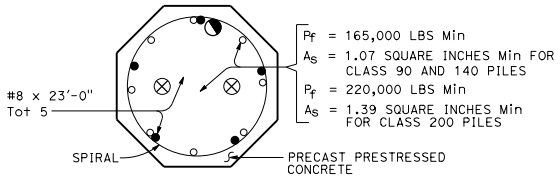
16" CIDH CONCRETE PILE



ALTERNATIVE "V"



ALTERNATIVE "X"



ALTERNATIVE "Y"

CONCRETE PILE DETAILS

PILE TYPE	"D"	MAXIMUM TENSILE TEST FORCE PER PILE
CLASS 90 AND 140 Alt "V","Y"	7"	210 kips
CLASS 90 AND 140 Alt "X"	6"	210 kips
CLASS 200 Alt "X","Y"	6¾"	300 kips
CIDH	8"	300 kips

NOTES:

1. For details not shown, see applicable pile details shown on the Project Plans.
2. For the additional top 4'-0" of pile for testing, the spiral reinforcment shall be the same size and placed at the same pitch as detailed for the top of piles shown in the Project Plans.
3. Details applicable for load test and anchor piles.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LOAD TEST PILE DETAILS (2)

NO SCALE

B2-10

1-29-18

Return to Table of Contents

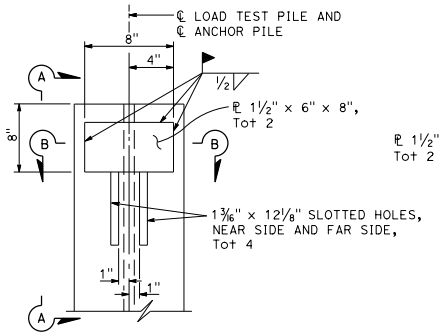
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

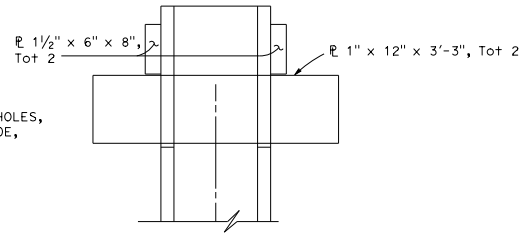
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

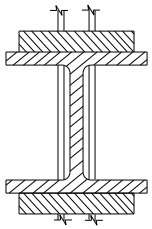
Amir M. Malek
No. C62397
Exp. 9-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





SECTION A-A



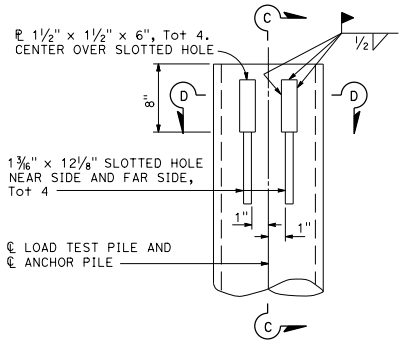
SECTION B-B

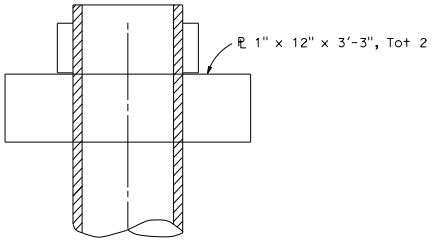
Maximum Tensile Test Force Per Pile : HP 10 x 42 = 180 kips
HP 10 x 57 = 245 kips
HP 14 x 89 = 300 kips

STEEL H-PILE DETAILS

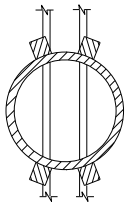
NOTE:

Alignment of slots and 1½" ℄'s shall permit a ℄ 1" x 12" x 3'-3" to pass through pile parallel to ℄ web of pile and achieve a snug fit. Details applicable for load test and anchor piles. Slots to be cut after piles are driven.





SECTION C-C



SECTION D-D

Maximum Tensile Test Force Per Pile : Class 90 (PP 14 x 0.375) = 180 kips
Class 140 (PP 14 x 0.438) = 280 kips
Class 200 (PP 16 x 0.50) = 300 kips

ALTERNATIVE "W" STEEL PIPE - PILE

NOTES:

Alignment of slots and 1½" ℄'s shall permit a ℄ 1" x 12" x 3'-3" to pass through pile.
Details applicable for load test and anchor piles.
Slots to be cut after piles are driven.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

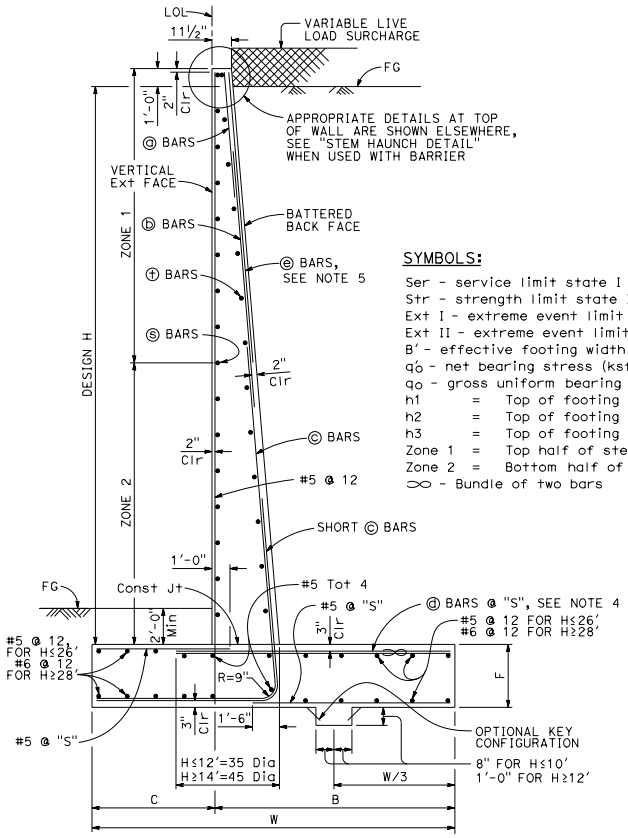
LOAD TEST PILE DETAILS (3)

NO SCALE

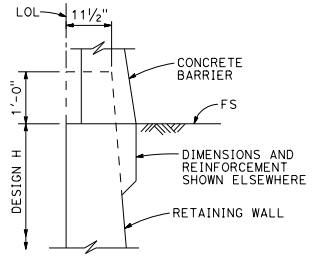
B2-11

1-29-18

Return to Table of Contents



TYPICAL SECTION



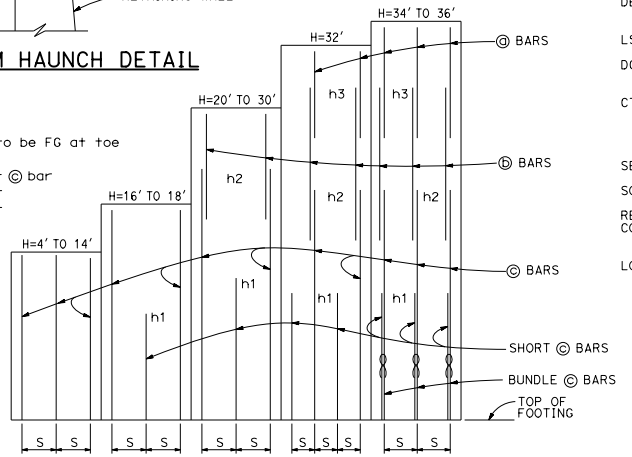
STEM HAUNCH DETAIL

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext I - extreme event limit state I
Ext II - extreme event limit state II
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)
h1 = Top of footing to top of short ⓒ bar
h2 = Top of footing to top of ⓒ bar
h3 = Top of footing to top of ⓑ bar
Zone 1 = Top half of stem height
Zone 2 = Bottom half of stem height
⊃⊂ - Bundle of two bars

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.



ELEVATION

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

CT: 54 kip transverse force applied at He = 32", distributed over 10 feet at the top of wall and 1 : 1 distribution down and outward. Distribution below footing taken no less than 40'.

SEISMIC: k_h = 0.2, k_v = 0.0

SOIL: ø = 34°, γ = 120 pcf

REINFORCED CONCRETE: f'c = 3,600 psi, fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I	Q = αDC+βEV+ηEH+1.75LS
Extreme I	Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE
Extreme II	Q = 1.00DC+1.00EV+1.00EH+1.00CT

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia
CT:	Vehicular Collision Force

NOTES:

1. For details not shown and drainage notes see B3-5
2. For wall stem joint details see B0-3 3-3 and B0-3 3-4
3. At ⓒ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.
4. Bundle ⓓ bars for H = 34' & 36'.
5. Provide #6 @ 10" x 16'-0" ⓔ bars over a distance of 8'-0" measured from all expansion joints, begin wall and end wall locations. For H ≤ 14', hook ⓔ bar into footing and reduce bar length as needed to maintain Min Clr cover.

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	4'	6'	8'	10'	12'	14'	16'	18'	20'	22'	24'	26'	28'	30'	32'	34'	36'
W	6'-10"	7'-0"	7'-3"	7'-7"	8'-4"	9'-7"	10'-9"	12'-0"	13'-3"	14'-6"	15'-9"	17'-1"	18'-5"	19'-10"	21'-2"	22'-7"	24'-0"
C	2'-2"	2'-3"	2'-3"	2'-4"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-5"	6'-0"	6'-6"	7'-2"	7'-8"	8'-2"	9'-0"
B	4'-8"	4'-9"	5'-0"	5'-3"	5'-10"	6'-7"	7'-3"	8'-0"	8'-9"	9'-6"	10'-4"	11'-1"	11'-11"	12'-8"	13'-6"	14'-5"	15'-0"
F	1'-4"	1'-4"	1'-4"	1'-4"	1'-6"	1'-8"	1'-8"	1'-9"	1'-9"	1'-11"	2'-2"	2'-5"	2'-10"	3'-3"	3'-6"	4'-0"	4'-3"
BATTER	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	⅝: 12	⅝: 12	¾: 12	⅞: 12	1 : 12	1 : 12	1 : 12
SPACING "S"	9"	9"	9"	9"	9"	7"	6"	5"	6"	6"	6"	6"	6"	6"	6"	10"	8"
ⓐ BARS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	#7	#7	#6
ⓑ BARS	-	-	-	-	-	-	-	-	#7	#7	#7	#7	#7	#7	#9	#9	#8
ⓒ BARS	#6	#6	#6	#6	#6	#6	#7	#7	#8	#9	#9	#10	#10	#10	#11	#11	#11
ⓓ BARS	#5	#5	#6	#6	#6	#6	#7	#8	#8	#9	#9	#10	#10	#10	#11	#11	#11
h1	-	-	-	-	-	-	5'-9"	5'-10"	8'-0"	9'-0"	10'-1"	11'-0"	12'-1"	13'-0"	13'-0"	12'-7"	11'-6"
h2	-	-	-	-	-	-	-	-	10'-5"	13'-0"	14'-7"	17'-6"	19'-0"	20'-5"	19'-0"	18'-0"	20'-2"
h3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21'-2"	21'-10"	24'-0"
ZONE 1 ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
ZONE 2 ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#6 @ 12	#6 @ 12	#6 @ 12	#7 @ 12	#7 @ 12
ZONE 1 ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
ZONE 2 ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
Ser: B', q'_o	6.8, 0.7	6.5, 1.0	6.2, 1.3	6.0, 1.6	6.3, 2.0	7.5, 2.1	8.6, 2.2	9.8, 2.3	11.0, 2.4	12.1, 2.5	13.2, 2.8	14.4, 2.9	15.5, 3.1	16.8, 3.3	18.0, 3.5	19.2, 3.7	20.6, 3.7
Str: B', q_o	6.6, 1.6	5.0, 1.8	3.6, 2.3	3.0, 3.3	3.2, 4.0	4.3, 3.8	5.3, 3.7	6.4, 3.7	7.4, 3.8	8.2, 4.1	9.0, 4.4	9.9, 4.6	10.7, 4.9	11.7, 5.2	12.6, 5.4	13.6, 5.8	14.6, 5.9
Ext I: B', q_o	5.2, 1.1	4.7, 1.5	3.9, 2.2	3.1, 3.4	2.8, 4.8	3.2, 5.3	3.6, 5.7	4.1, 6.1	4.6, 6.4	5.0, 6.9	5.3, 7.6	5.8, 8.1	6.1, 8.9	6.7, 9.4	7.1, 10.0	7.5, 10.7	8.2, 10.9
Ext II: B', q_o	2.6, 2.2	2.7, 2.6	2.8, 3.1	2.9, 3.6	3.7, 3.6	5.2, 3.3	6.7, 3.1	8.3, 3.0	9.8, 3.0	11.2, 3.1	12.5, 3.2	13.9, 3.4	15.2, 3.6	16.7, 3.8	18.0, 4.0	19.3, 4.2	20.8, 4.3

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER — May 31, 2018 — PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 1 (CASE 1)

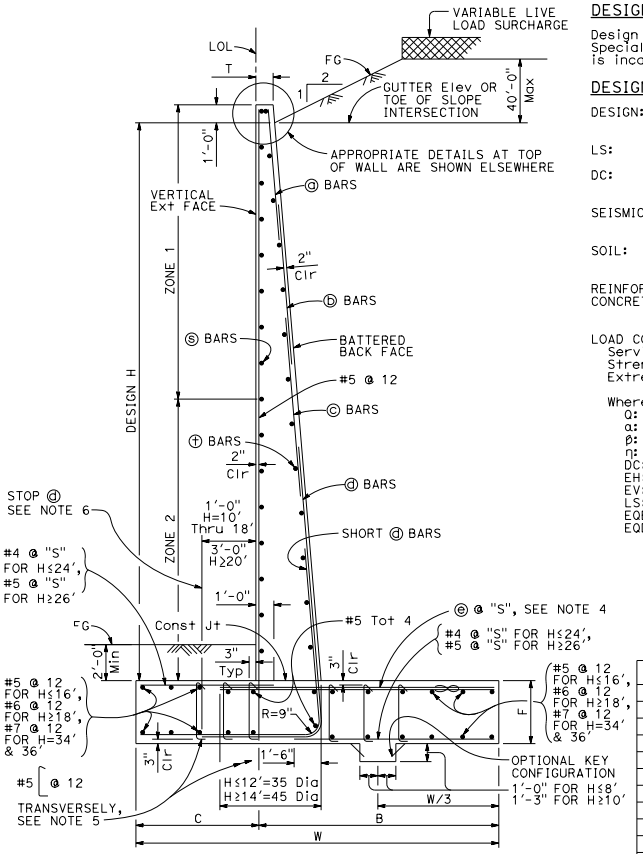
NO SCALE

B3-1A

2018 STANDARD PLAN B3-1A

1-29-18

Return to Table of Contents



TYPICAL SECTION

NOTES:

1. For details not shown and drainage notes see B3-5
2. For wall stem joint details see B0-3 3-3 and B0-3 3-4
3. At ⓓ and short ⓓ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.
4. Bundle ⓔ bars for H ≥ 26'.
5. Hook stirrups around & space with alternating transverse reinforcement at 2 x "S". For required number of toe or heel stirrup rows, see table. The first stirrups are placed adjacent to the stem as shown.
6. Extend ⓓ bars to end of toe for H=4' to 8'.

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

SEISMIC: k_h = 0.2, k_v = 0.0

SOIL: ø = 34°, γ = 120 pcf

REINFORCED CONCRETE: f'c = 3,600 psi, fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I	Q = αDC+βEV+ηEH+1.75LS
Extreme I	Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia

SYMBOLS:

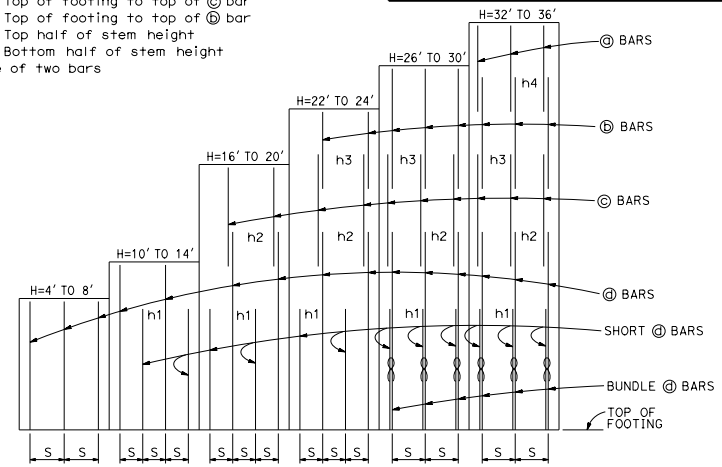
Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)
h1 = Top of footing to top of short ⓓ bar
h2 = Top of footing to top of ⓓ bar
h3 = Top of footing to top of ⓒ bar
h4 = Top of footing to top of ⓑ bar
Zone 1 = Top half of stem height
Zone 2 = Bottom half of stem height
∞ - Bundle of two bars

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	4'	6'	8'	10'	12'	14'	16'	18'	20'	22'	24'	26'	28'	30'	32'	34'	36'
W	6'-0"	7'-6"	9'-6"	11'-0"	12'-6"	15'-6"	17'-3"	19'-6"	21'-9"	23'-6"	26'-0"	28'-1"	30'-3"	31'-6"	33'-0"	34'-8"	35'-11"
C	2'-0"	2'-6"	3'-3"	3'-6"	4'-3"	5'-0"	5'-3"	5'-9"	6'-9"	7'-3"	8'-3"	8'-9"	9'-0"	9'-6"	10'-0"	10'-10"	11'-3"
B	4'-0"	5'-0"	6'-3"	7'-6"	8'-3"	10'-6"	12'-0"	13'-9"	15'-0"	16'-3"	17'-9"	19'-4"	21'-3"	22'-0"	23'-0"	23'-10"	24'-8"
F	1'-6"	1'-6"	2'-0"	2'-3"	2'-6"	2'-8"	2'-10"	3'-0"	3'-4"	3'-6"	3'-6"	3'-7"	3'-7"	3'-9"	3'-9"	4'-0"	4'-4"
T	11½"	11½"	11½"	11½"	11½"	11½"	11½"	11½"	11½"	11½"	11½"	11½"	1'-2"	1'-5"	1'-10"	2'-3"	2'-9"
BATTER	½: 12	½: 12	½: 12	½: 12	½: 12	⅝: 12	⅝: 12	¾: 12	⅞: 12	1 : 12	1⅛: 12	1⅛: 12	1⅛: 12	1⅛: 12	1⅛: 12	1⅛: 12	1⅛: 12
SPACING "S"	16"	12"	10"	7"	7"	7"	7"	7"	7"	6"	6"	10"	8"	7"	7"	7"	7"
ⓐ BARS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	#5	#5	#5
ⓑ BARS	-	-	-	-	-	-	-	-	-	#5	#5	#5	#5	#5	#7	#7	#7
ⓒ BARS	-	-	-	-	-	-	#6	#6	#6	#7	#8	#8	#8	#8	#9	#9	#9
ⓓ BARS	#5	#5	#6	#6	#7	#8	#9	#10	#10	#10	#11	#11	#11	#11	#11	#11	#11
ⓔ BARS	#5	#5	#6	#6	#7	#8	#9	#10	#10	#10	#11	#11	#11	#11	#11	#11	#11
h1	-	-	-	5'-3"	6'-4"	7'-6"	8'-9"	9'-9"	11'-0"	11'-3"	11'-6"	10'-3"	11'-9"	12'-3"	12'-6"	13'-3"	13'-8"
h2	-	-	-	-	-	-	12'-8"	15'-6"	17'-0"	16'-6"	17'-3"	18'-0"	17'-6"	17'-4"	14'-10"	15'-9"	16'-4"
h3	-	-	-	-	-	-	-	-	-	18'-9"	21'-3"	21'-3"	22'-4"	22'-8"	18'-0"	18'-6"	19'-6"
h4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26'-3"	27'-4"	28'-6"
No. of Toe Stirrups	0	0	0	0	0	0	0	0	0	0	0	5	5	6	7	8	9
No. of Heel Stirrups	0	0	0	0	0	0	0	0	4	6	7	8	10	10	11	11	11
ZONE 1 Ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#6 @ 12	#6 @ 12	#6 @ 10	#6 @ 10
ZONE 2 Ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#6 @ 12	#6 @ 12	#7 @ 12	#7 @ 12	#7 @ 12	#7 @ 12	#7 @ 10	#7 @ 10
ZONE 1 Ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
ZONE 2 Ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#6 @ 12	#6 @ 12	#6 @ 12
Ser: B', q'_o	4.0, 0.9	5.5, 1.0	9.3, 1.0	10.9, 1.3	12.3, 1.5	14.8, 1.9	16.6, 2.1	18.7, 2.4	20.6, 2.7	22.3, 3.0	24.2, 3.3	26.1, 3.5	28.2, 3.9	29.6, 4.0	31.1, 4.2	32.7, 4.4	34.1, 4.6
Str: B', q_o	2.2, 2.2	3.5, 2.2	5.1, 2.3	6.3, 2.6	7.6, 2.7	12.9, 3.1	14.3, 3.6	16.5, 3.9	19.4, 4.5	20.7, 4.8	22.5, 5.2	24.3, 5.6	26.2, 6.0	27.5, 6.3	28.8, 6.6	30.3, 6.9	31.8, 7.2
Ext: B', q_o	2.3, 3.4	2.7, 4.4	3.6, 5.0	3.8, 6.5	4.5, 7.0	7.0, 6.1	7.6, 6.9	9.3, 7.0	11.0, 7.1	11.8, 7.6	14.1, 7.4	15.6, 7.7	17.1, 8.0	17.2, 8.7	18.1, 9.0	19.0, 9.4	19.4, 10.0

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 1 (CASE 2)

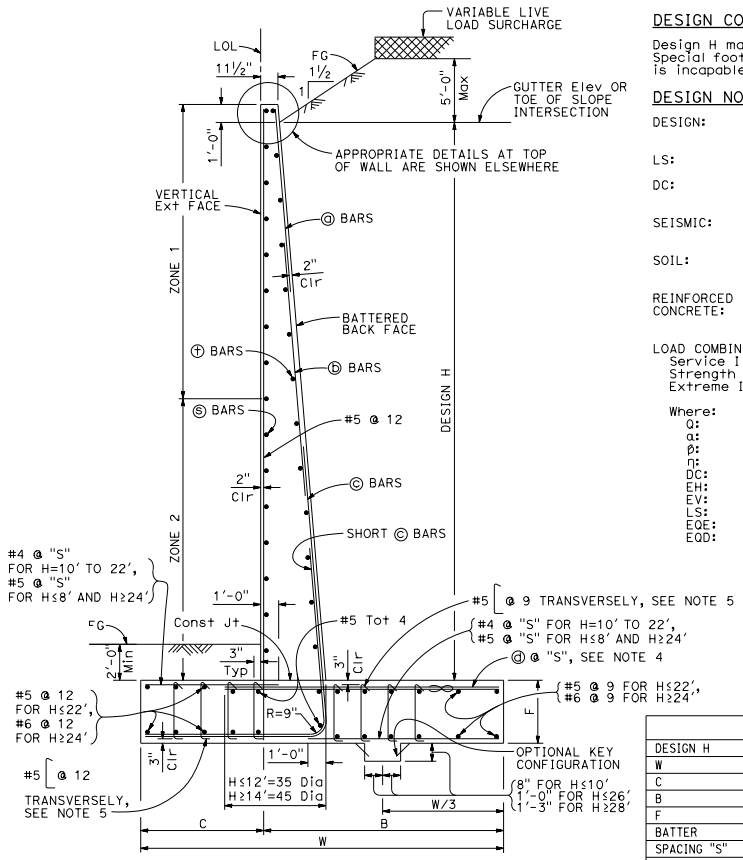
NO SCALE

B3-1B

1-29-18

2018 STANDARD PLAN B3-1B

Return to Table of Contents



TYPICAL SECTION

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

SEISMIC: $k_h = 0.2$, $k_v = 0.0$

SOIL: $\phi = 34°$, $\gamma = 120$ pcf

REINFORCED CONCRETE: $f'c = 3{,}600$ psi, $fy = 60{,}000$ psi

LOAD COMBINATIONS AND LIMIT STATES:

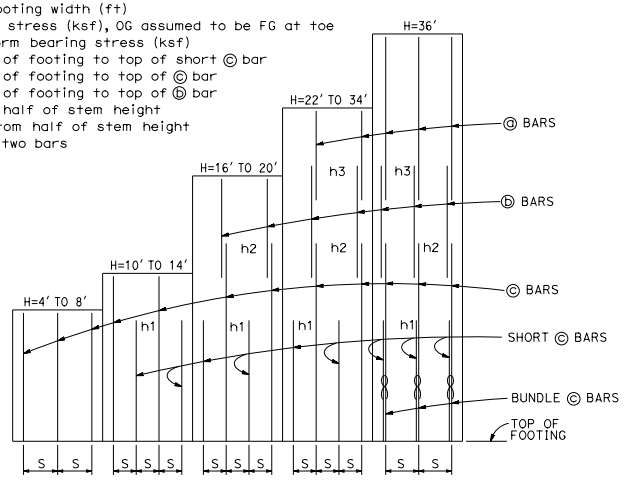
Service I	$Q = 1.00DC+1.00EV+1.00EH+1.00LS$
Strength I	$Q = \alpha DC+\beta EV+\eta EH+1.75LS$
Extreme I	$Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE$

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q_o' - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)
h1 = Top of footing to top of short ⓒ bar
h2 = Top of footing to top of ⓒ bar
h3 = Top of footing to top of ⓑ bar
Zone 1 = Top half of stem height
Zone 2 = Bottom half of stem height
⊃⊂ - Bundle of two bars



ELEVATION

NOTES:

1. For details not shown and drainage notes see B3-5
2. For wall stem joint details see B0-3 3-3 and B0-3 3-4
3. At ⓒ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.
4. Bundle ⓓ bars for H = 36'.
5. Hook stirrups around & space with alternating transverse reinforcement at 2 x "S". For required number of toe or heel stirrup rows, see table. The first stirrups are placed adjacent to the stem as shown.

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	4'	6'	8'	10'	12'	14'	16'	18'	20'	22'	24'	26'	28'	30'	32'	34'	36'
W	6'-5"	7'-3"	8'-3"	9'-3"	10'-8"	12'-6"	13'-9"	15'-1"	16'-6"	17'-10"	19'-3"	20'-4"	21'-5"	22'-8"	23'-11"	25'-1"	26'-4"
C	2'-2"	2'-6"	3'-0"	3'-6"	3'-8"	3'-11"	4'-0"	4'-7"	5'-3"	6'-0"	7'-0"	7'-9"	8'-3"	8'-8"	9'-0"	9'-6"	9'-10"
B	4'-3"	4'-9"	5'-3"	5'-9"	7'-0"	8'-7"	9'-9"	10'-6"	11'-3"	11'-10"	12'-3"	12'-7"	13'-2"	14'-0"	14'-11"	15'-7"	16'-6"
F	1'-4"	1'-4"	1'-4"	1'-6"	1'-6"	1'-6"	1'-8"	2'-0"	2'-4"	2'-9"	3'-2"	3'-0"	3'-0"	3'-0"	3'-3"	3'-3"	3'-3"
BATTER	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	½: 12	⅝: 12	¾: 12	1 : 12	1 : 12	1⅛: 12	1⅛: 12	1⅛: 12
SPACING "S"	16"	16"	16"	8"	8"	7"	7"	7"	6"	6"	7"	7"	7"	6"	6"	6"	8"
ⓐ BARS	-	-	-	-	-	-	-	-	-	#5	#5	#5	#5	#5	#5	#6	#6
ⓑ BARS	-	-	-	-	-	-	#5	#5	#5	#7	#7	#7	#8	#8	#8	#9	#9
ⓒ BARS	#5	#5	#6	#5	#6	#6	#7	#8	#8	#9	#10	#10	#10	#10	#10	#11	#11
ⓓ BARS	#5	#5	#6	#5	#6	#8	#9	#9	#9	#10	#11	#9	#9	#9	#10	#10	#9
h1	-	-	-	4'-2"	4'-7"	6'-2"	7'-3"	8'-6"	8'-8"	9'-8"	11'-0"	12'-2"	14'-0"	13'-0"	15'-10"	14'-6"	12'-0"
h2	-	-	-	-	-	-	10'-6"	12'-9"	14'-2"	13'-8"	17'-0"	18'-6"	17'-10"	18'-9"	20'-3"	21'-0"	17'-0"
h3	-	-	-	-	-	-	-	-	-	15'-6"	17'-9"	19'-6"	21'-8"	23'-0"	24'-8"	25'-6"	24'-8"
No. of Toe Stirrups	0	0	0	0	0	0	0	0	0	0	0	6	6	7	7	7	8
No. of Heel Stirrups	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	6
ZONE 1 Ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
ZONE 2 Ⓢ BARS	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 18	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#6 @ 12	#6 @ 12	#6 @ 12	#7 @ 12	#7 @ 12	#7 @ 12
ZONE 1 Ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12	#4 @ 12
ZONE 2 Ⓣ BARS	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 18	#4 @ 12	#4 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12	#5 @ 12
Ser: B', q_o	4.3, 0.8	4.9, 1.1	5.6, 1.3	7.1, 1.5	8.0, 1.8	9.3, 2.1	10.6, 2.3	11.9, 2.5	13.3, 2.6	14.6, 2.8	15.9, 2.9	17.0, 3.0	18.0, 3.1	19.3, 3.3	20.4, 3.5	21.5, 3.7	22.7, 3.9
Str: B', q_o	2.4, 2.2	2.4, 2.7	2.7, 3.2	3.0, 3.7	4.3, 3.8	5.9, 3.8	7.0, 4.1	7.9, 4.3	9.0, 4.5	9.9, 4.7	10.8, 4.9	11.6, 5.0	12.3, 5.2	13.3, 5.4	14.2, 5.7	15.0, 5.9	16.0, 6.1
Ext: B', q_o	4.1, 1.5	3.9, 2.1	3.8, 2.8	3.5, 3.9	3.6, 4.9	4.2, 5.5	4.6, 6.3	5.0, 7.0	5.6, 7.4	6.0, 8.0	6.5, 8.4	6.9, 8.6	7.2, 9.2	7.7, 9.6	8.1, 10.4	8.4, 10.9	8.9, 11.3

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gary Wang
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER Gary Wang No. C58298 Exp. 6-30-18 CIVIL STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 1 (CASE 3)

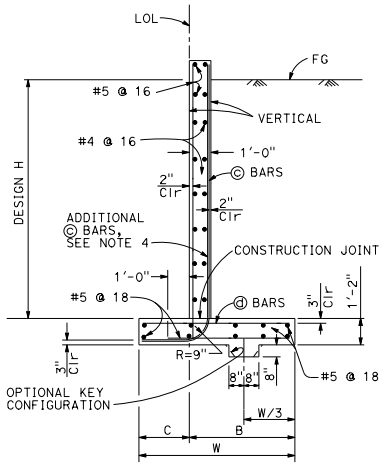
NO SCALE

B3-1C

1-29-18

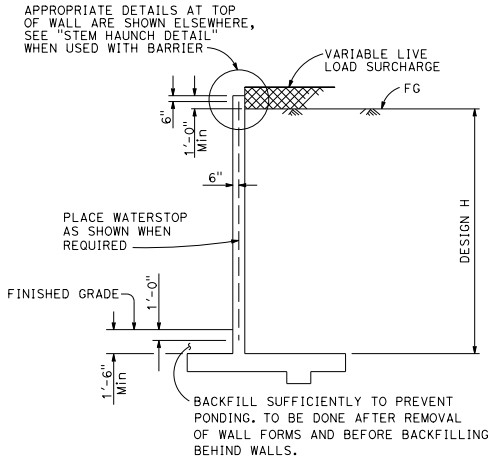
2018 STANDARD PLAN B3-1C

Return to Table of Contents

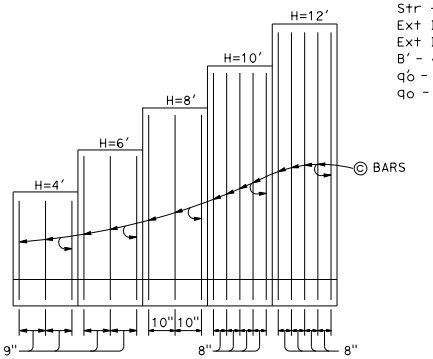


SPREAD FOOTING SECTION

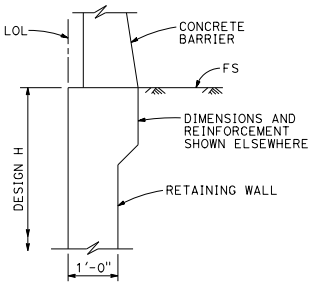
Place concrete in toe against undisturbed material, except as permitted by the Engineer.



DESIGN SECTION



ELEVATION



STEM HAUNCH DETAIL

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
DESIGN H	4'	6'	8'	10'	12'
W	7'-0"	7'-0"	7'-3"	7'-5"	8'-2"
C	2'-3"	2'-3"	2'-3"	2'-5"	2'-7"
B	4'-9"	4'-9"	5'-0"	5'-0"	5'-7"
Ⓒ BARS	#6 @ 9	#6 @ 9	#7 @ 10	#7 @ 8	#7 @ 8
Ⓓ BARS	#5 @ 9	#5 @ 9	#6 @ 10	#7 @ 8	#7 @ 8
Ser: B', q_o	6.7, 0.8	6.7, 1.0	6.3, 1.3	5.8, 1.6	6.2, 1.9
Str: B', q_o	6.6, 1.6	5.2, 1.7	3.7, 2.2	2.8, 3.3	3.0, 3.9
Ext I: B', q_o	5.6, 0.9	4.8, 1.4	4.1, 2.0	3.1, 3.2	2.7, 4.5
Ext II: B', q_o	2.8, 1.9	2.7, 2.5	2.8, 3.0	2.6, 3.7	3.4, 3.6

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext I - extreme event limit state I
Ext II - extreme event limit state II
B' - effective footing width (ft)
q_o' - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

CT: 54 kip transverse force applied at He = 32", distributed over 10 feet at the top of wall and 1 : 1 distribution down and outward. Distribution below footing taken no less than 40'.

SEISMIC: $k_h = 0.2$, $k_v = 0.0$

SOIL: $\phi = 34°$, $\gamma = 120$ pcf

REINFORCED CONCRETE: f'c = 3,600 psi, fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	$Q = 1.00DC+1.00EV+1.00EH+1.00LS$
Strength I	$Q = \alpha DC+\beta EV+\eta EH+1.75LS$
Extreme I	$Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE$
Extreme II	$Q = 1.00DC+1.00EV+1.00EH+1.00CT$

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia
CT:	Vehicular Collision Force

NOTES:

1. For details not shown and drainage notes see B3-5
2. For wall stem joint details see B0-3 / 3-3 and B0-3 / 3-4
3. At Ⓒ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.
4. Provide #6 @ 8" Ⓒ bars in addition to tabulated Ⓒ bars over a distance of 8'-0" measured from all expansion joints, begin wall and end wall location.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 1A (CASE 1)

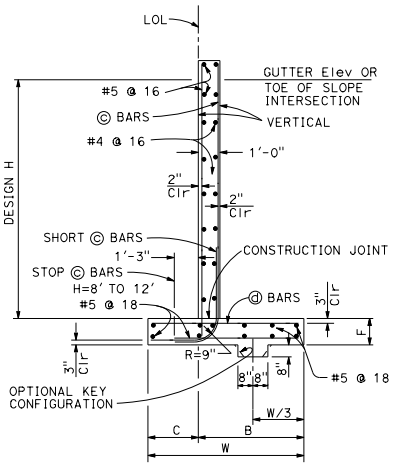
NO SCALE

B3-3A

2018 STANDARD PLAN B3-3A

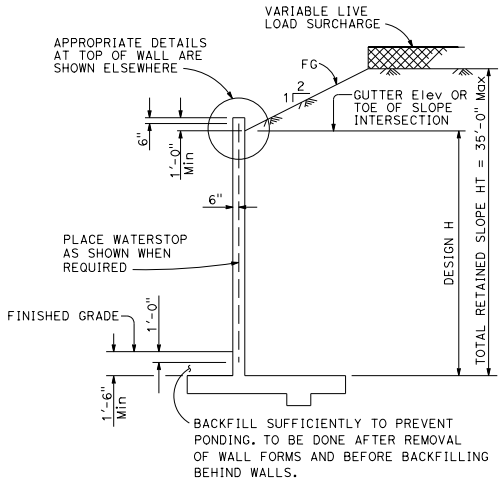
1-29-18

Return to Table of Contents

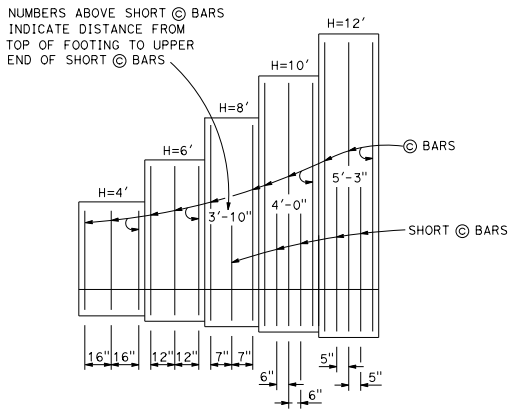


SPREAD FOOTING SECTION

Place concrete in toe against undisturbed material, except as permitted by the Engineer.



DESIGN SECTION



ELEVATION

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
DESIGN H	4'	6'	8'	10'	12'
W	5'-10"	7'-7"	9'-0"	11'-0"	12'-5"
C	2'-4"	2'-7"	3'-0"	3'-6"	4'-0"
B	3'-6"	5'-0"	6'-0"	7'-6"	8'-5"
F	1'-4"	1'-7"	1'-7"	1'-9"	1'-9"
Ⓒ BARS	#5 @ 16	#5 @ 12	#5 @ 7	#6 @ 6	#7 @ 5
Ⓓ BARS	#5 @ 16	#5 @ 12	#5 @ 7	#6 @ 6	#7 @ 5
Ser: B', q'_o	4.0, 0.8	5.6, 1.0	8.8, 1.1	10.6, 1.3	12.0, 1.6
Str: B', q_o	1.9, 2.0	3.5, 2.1	4.5, 2.3	6.5, 2.3	7.7, 2.5
Ext: B', q_o	2.8, 2.3	3.3, 3.3	3.9, 3.9	5.3, 4.1	5.9, 4.5

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Gary Wang
No. C58298
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

SEISMIC: $k_h = 0.2$, $k_v = 0.0$

SOIL: $\phi = 34°$, $\gamma = 120$ pcf

REINFORCED CONCRETE: $f'c = 3{,}600$ psi, $fy = 60{,}000$ psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	$Q = 1.00DC+1.00EV+1.00EH+1.00LS$
Strength I	$Q = \alpha DC+\beta EV+\eta EH+1.75LS$
Extreme I	$Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE$

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia

NOTES:

1. For details not shown and drainage notes see B3-5
2. For wall stem joint details see B0-3 3-3 and B0-3 3-4
3. At Ⓒ and short Ⓒ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 1A (CASE 2)

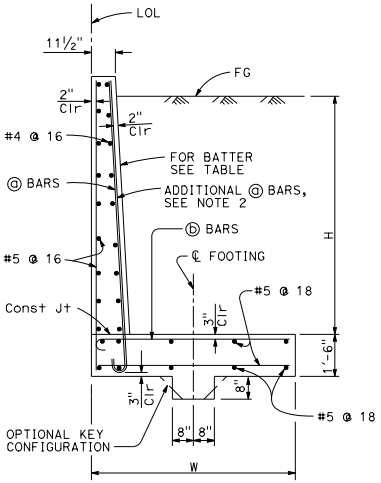
NO SCALE

B3-3B

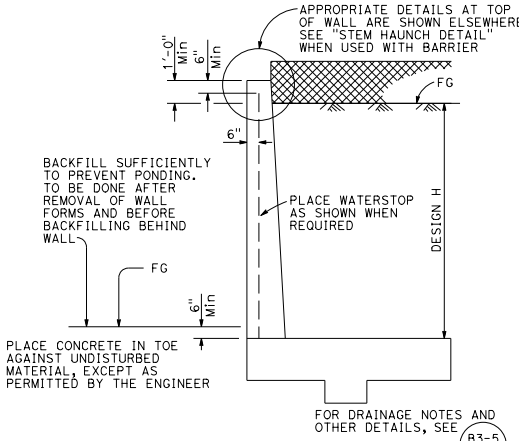
2018 STANDARD PLAN B3-3B

1-29-18

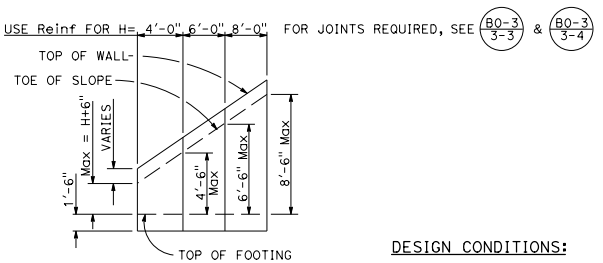
Return to Table of Contents

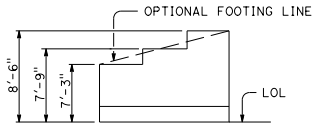


SPREAD FOOTING SECTION

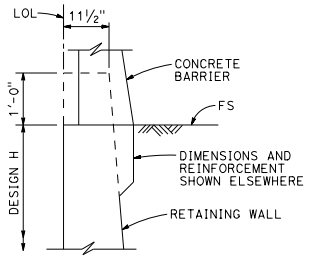


DESIGN SECTION

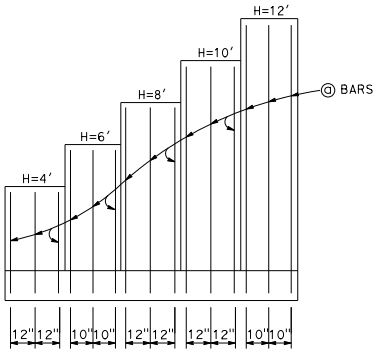




TYPICAL LAYOUT EXAMPLE



STEM HAUNCH DETAIL



ELEVATION

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext I - extreme event limit state I
Ext II - extreme event limit state II
B' - effective footing width (ft)
q_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
DESIGN H	4'	6'	8'	10'	12'
W	7'-3"	7'-9"	8'-6"	9'-6"	10'-6"
BATTER	NONE	NONE	100 : 2	100 : 3	100 : 4
ⓐ BARS	#7 @ 12	#7 @ 10	#7 @ 12	#7 @ 12	#7 @ 10
ⓑ BARS	#7 @ 12	#7 @ 10	#8 @ 12	#9 @ 12	#10 @ 10
Ser: B', q_o	6.2, 1.4	6.1, 1.8	6.4, 2.1	7.0, 2.5	7.7, 2.8
Str: B', q_o	6.2, 2.4	6.1, 2.9	5.3, 3.0	6.0, 3.5	6.6, 4.0
Ext I: B', q_o	4.4, 1.5	4.1, 2.2	4.0, 3.1	4.1, 3.9	4.2, 4.8
Ext II: B', q_o	2.5, 2.7	3.1, 3.0	3.8, 3.2	4.9, 3.3	5.8, 3.5

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

LS: Varied surcharge on level ground surface

DC: Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered

CT: 54 kip transverse force applied at He = 32", distributed over 10 feet at the top of wall and 1 : 1 distribution down and outward. Distribution below footing taken no less than 40'.

SEISMIC: k_h = 0.2, k_v = 0.0

SOIL: ø = 34°, γ = 120 pcf

REINFORCED CONCRETE: f'c = 3,600 psi, fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I	Q = αDC+βEV+ηEH+1.75LS
Extreme I	Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE
Extreme II	Q = 1.00DC+1.00EV+1.00EH+1.00CT

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia
CT:	Vehicular Collision Force

NOTES:

1. At ⓐ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.

2. Provide #6 @ 8" ⓐ bars in addition to tabulated ⓐ bars over a distance of 8'-0" measured from all expansion joints, begin wall and end wall locations.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER Gary Wang No. C58298 Exp. 6-30-18 CIVIL STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

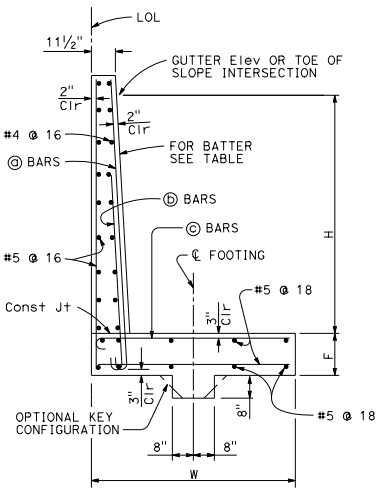
RETAINING WALL TYPE 5 (CASE 1)

NO SCALE

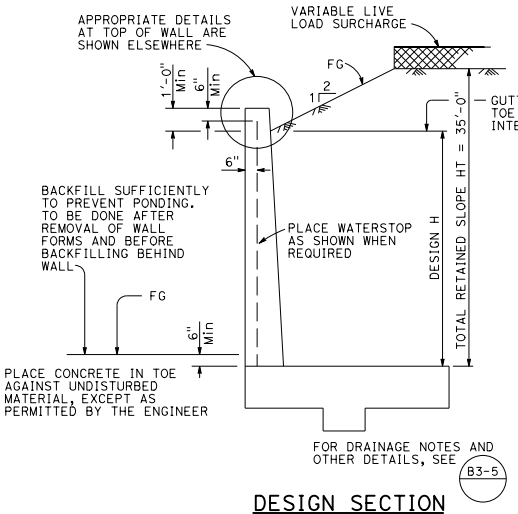
B3-4A

1-29-18

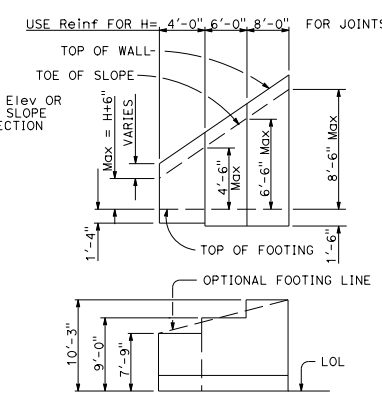
Return to Table of Contents



SPREAD FOOTING SECTION



DESIGN SECTION



TYPICAL LAYOUT EXAMPLE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

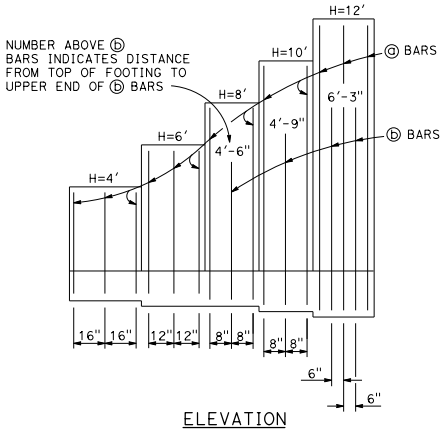
DESIGN:	AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments
LS:	Varied surcharge on level ground surface
DC:	Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered
SEISMIC:	k_h = 0.2 k_v = 0.0
SOIL:	ø = 34° γ = 120 pcf
REINFORCED CONCRETE:	f'c = 3,600 psi fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I	Q = αDC+βEV+ηEH+1.75LS
Extreme I	Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia



ELEVATION

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	4'	6'	8'	10'	12'
W	7'-9"	9'-0"	10'-3"	11'-6"	13'-3"
F SPREAD FOOTING	1'-4"	1'-6"	1'-6"	1'-6"	1'-10"
BATTER	NONE	NONE	NONE	100 : 3	100 : 5
ⓐ BARS	#5 @ 16	#5 @ 12	#5 @ 16	#6 @ 16	#5 @ 12
ⓑ BARS	NONE	NONE	#6 @ 16	#6 @ 16	#6 @ 12
ⓒ BARS	#7 @ 8	#7 @ 12	#8 @ 8	#9 @ 8	#10 @ 6
Ser: B', q'_o	5.2,1.3	6.0,1.8	9.1,1.8	10.0,2.3	11.4,2.7
Str: B', q_o	3.6,2.2	4.1,2.8	4.8,3.4	5.5,3.9	6.7,4.3
Ext: B', q_o	3.7,2.9	3.6,4.5	3.7,5.9	3.9,7.2	4.4,8.4

NOTES:

1. At ⓐ and ⓑ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

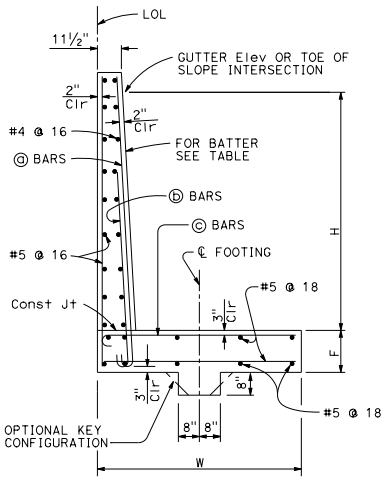
RETAINING WALL TYPE 5 (CASE 2)

NO SCALE

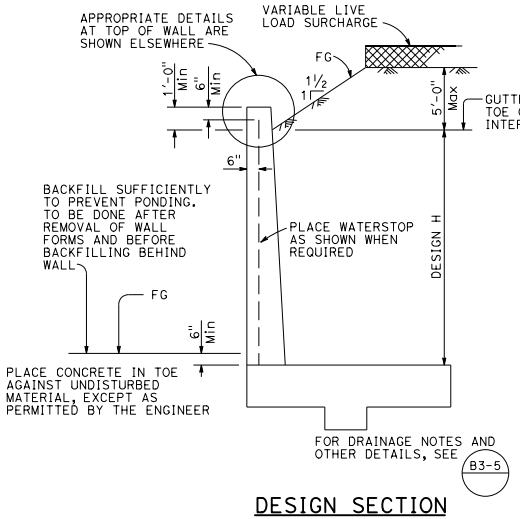
B3-4B

1-29-18

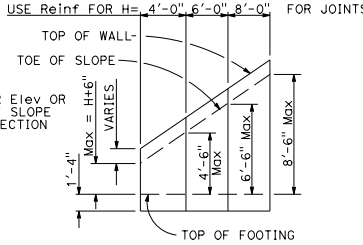
Return to Table of Contents

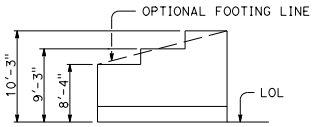


SPREAD FOOTING SECTION



DESIGN SECTION





TYPICAL LAYOUT EXAMPLE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Gary Wang — No. C58298 — Exp. 6-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN CONDITIONS:

Design H may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in the table.

DESIGN NOTES:

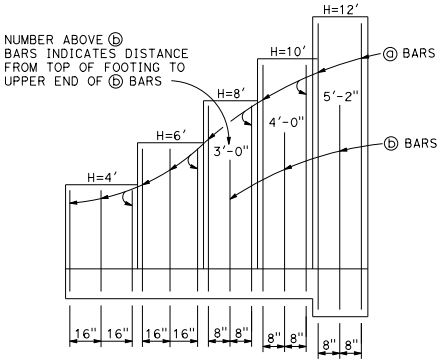
DESIGN:	AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments
LS:	Varied surcharge on level ground surface
DC:	Stem Architectural Treatment of thickness up to 6" of concrete (75 psf) considered
SEISMIC:	k_h = 0.2 k_v = 0.0
SOIL:	ø = 34° γ = 120 pcf
REINFORCED CONCRETE:	f'c = 3,600 psi fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I	Q = αDC+βEV+ηEH+1.75LS
Extreme I	Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia



ELEVATION

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	4'	6'	8'	10'	12'
W	8'-4"	9'-3"	10'-3"	11'-0"	12'-4"
F SPREAD FOOTING	1'-4"	1'-4"	1'-4"	1'-4"	1'-7"
BATTER	NONE	NONE	NONE	100 : 3	100 : 5
ⓐ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16
ⓑ BARS	NONE	NONE	#5 @ 16	#5 @ 16	#5 @ 16
ⓒ BARS	#6 @ 8	#7 @ 8	#8 @ 8	#9 @ 8	#9 @ 8
Ser: B', q'_o	5.6, 1.4	6.4, 1.8	7.4, 2.2	7.8, 2.6	8.9, 3.0
Str: B', q_o	3.6, 2.4	4.2, 3.0	5.0, 3.4	5.3, 4.0	6.4, 4.2
Ext: B', q_o	4.4, 2.1	4.2, 3.0	4.2, 4.0	3.9, 5.5	4.2, 6.7

NOTES:

1. At ⓐ and ⓑ bars:
   H ≤ 6', no splices are allowed within 1'-8" above the top of footing.
   H > 6', no splices are allowed within H/4 above the top of footing.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 5 (CASE 3)

NO SCALE

B3-4C

2018 STANDARD PLAN B3-4C

1-29-18

Return to Table of Contents

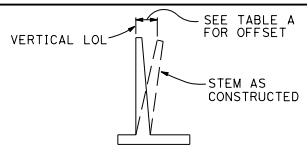
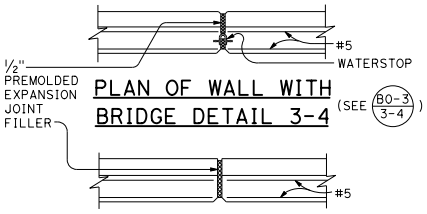


TABLE A

H	OFFSET
4'-12'	H/200
14'-16'	H/160
18'-20'	H/140
22'-24'	H/130
26'-36'	2½"

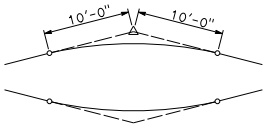
APPROXIMATE WALL OFFSET VALUES

Values for offseting forms to be determined by the Engineer.



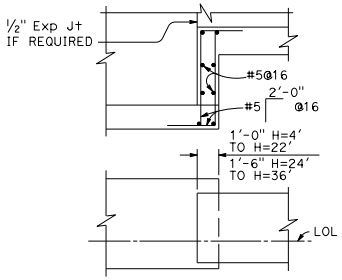
PLAN OF WALL WITH BRIDGE DETAIL 3-4

PLAN OF WALL WITH EXPANSION JOINT ONLY

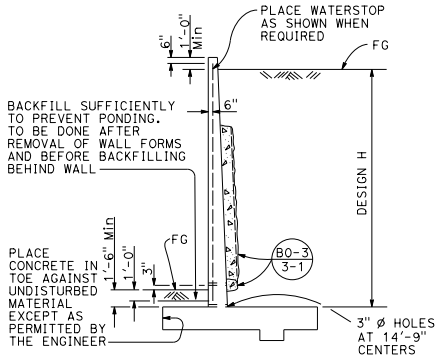


20'-0" VC AT TOP OF WALL SLOPE CHANGE

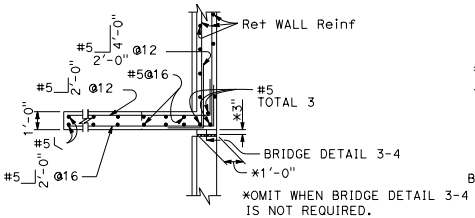
Where shown on the plans



FOOTING STEP

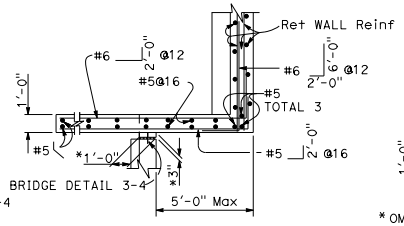


DESIGN AND DRAINAGE



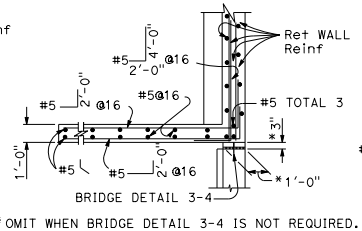
PLAN

(For return wall Type "A")



PLAN

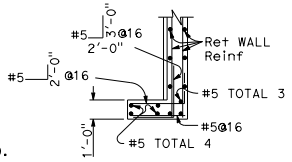
(For return wall Type "B")



*OMIT WHEN BRIDGE DETAIL 3-4 IS NOT REQUIRED.

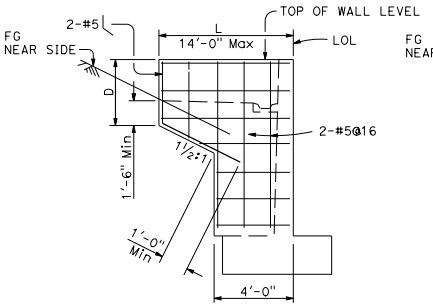
PLAN

(For return wall Type "C")



PLAN

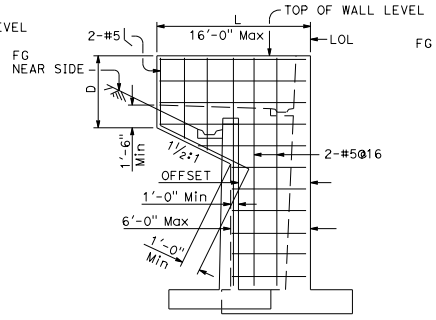
(For return wall Type "D")



ELEVATION

RETURN WALL TYPE "A"

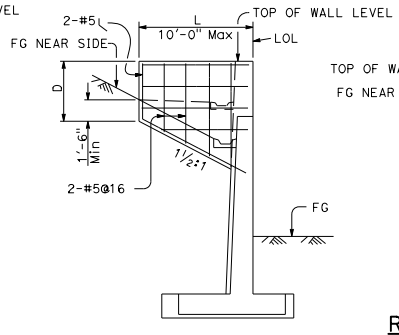
Use where H=8' or less



ELEVATION

RETURN WALL TYPE "B"

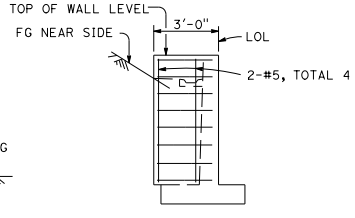
Use where H=10' or more on offset walls



ELEVATION

RETURN WALL TYPE "C"

Use where H=10' or more on straight walls



ELEVATION

RETURN WALL TYPE "D"

Use where H=6' or less

DESIGN CONDITIONS:

Design "H" may be exceeded by 6" before going to the next size. Special footing design is required where foundation material is incapable of supporting bearing stress listed in table

Return wall not required unless shown elsewhere

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th edition with California Amendments

LIVE LOAD: Surcharge on level ground surface

SOIL: ø = 34°
γ = 120 pcf

REINFORCED CONCRETE: fy = 60,000 psi
fc' = 3,600 psi

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gary Wang
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Gary Wang
No. C58298
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL DETAILS No. 1

NO SCALE

B3-5

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

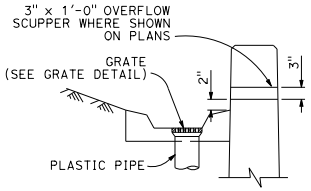
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

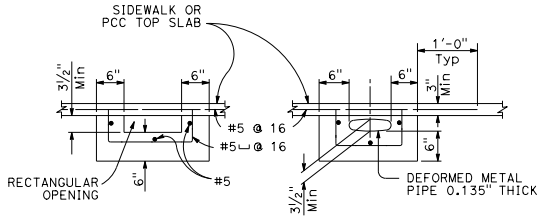
Gary Wang
No. C58298
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



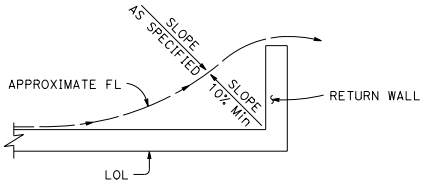
WALL DRAIN DETAIL



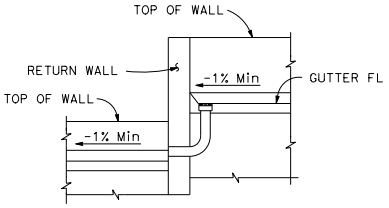
NOTES:

Area of opening to be not less than that of pipe from wall gutter. Make opening transition in wall. Edge opening in curb face to ¾" minimum radius.

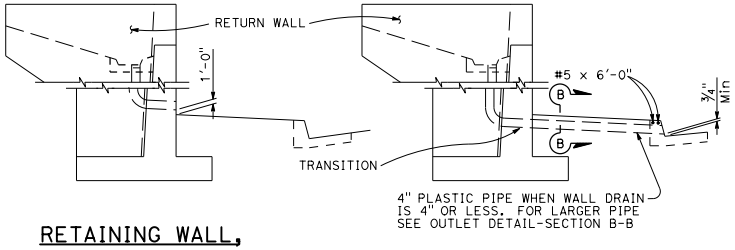
OUTLET DETAIL - SECTION B-B



WALL DRAINAGE
WHERE GUTTER NOT REQUIRED

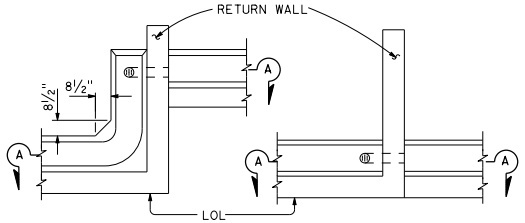


SECTION A-A



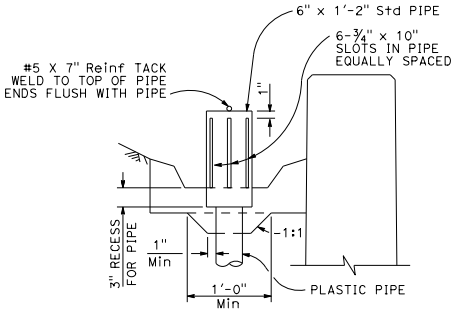
RETAINING WALL,
FACE OF WALL OUTLET

RETAINING WALL, GUTTER OUTLET

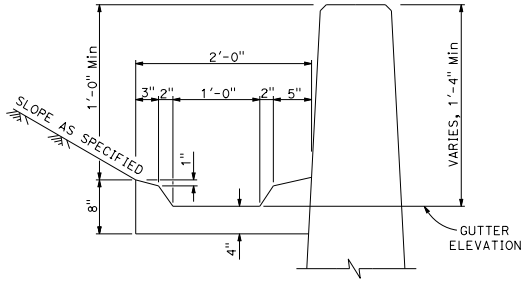


PLAN-OFFSET WALL PLAN-CONTINUOUS WALL

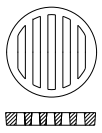
DRAIN THROUGH RETURN WALL



WALL DRAIN WITH PIPE DOME

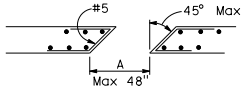


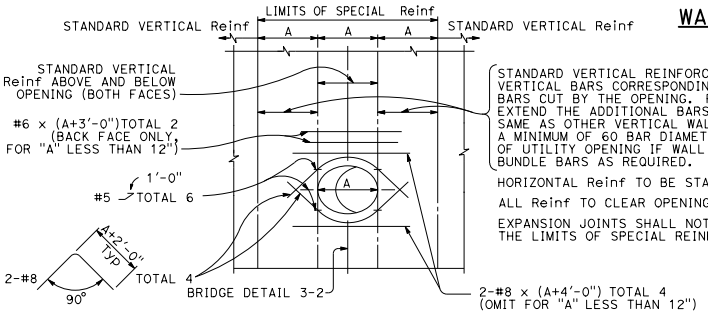
TYPICAL GUTTER DETAIL



GRATE DETAIL

Sizes to fit standard hubs





STANDARD VERTICAL REINFORCEMENT PLUS ADDITIONAL VERTICAL BARS CORRESPONDING IN SIZE AND NUMBER TO BARS CUT BY THE OPENING. PLACE HALF ON EACH SIDE. EXTEND THE ADDITIONAL BARS INTO THE FOOTING THE SAME AS OTHER VERTICAL WALL REINFORCEMENT AND TO A MINIMUM OF 60 BAR DIAMETERS ABOVE THE TOP OF UTILITY OPENING IF WALL HEIGHT PERMITS. BUNDLE BARS AS REQUIRED.

HORIZONTAL Reinf TO BE STANDARD EXCEPT AS SHOWN.

ALL Reinf TO CLEAR OPENING BY 2" MINIMUM.

EXPANSION JOINTS SHALL NOT BE LOCATED WITHIN THE LIMITS OF SPECIAL REINFORCING

RETAINING WALL UTILITY OPENING

Max size of opening (A) = 48"
To be used in conjunction with sheet B3-5

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

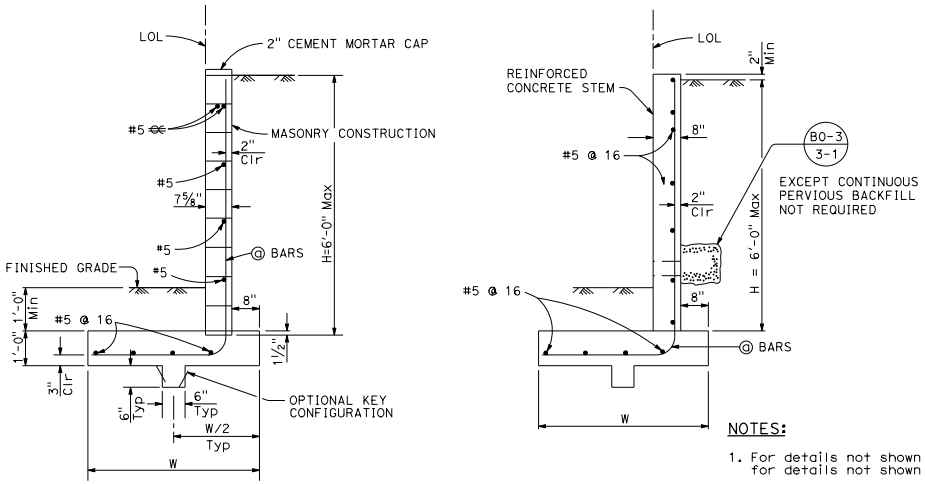
RETAINING WALL DETAILS No. 2

NO SCALE

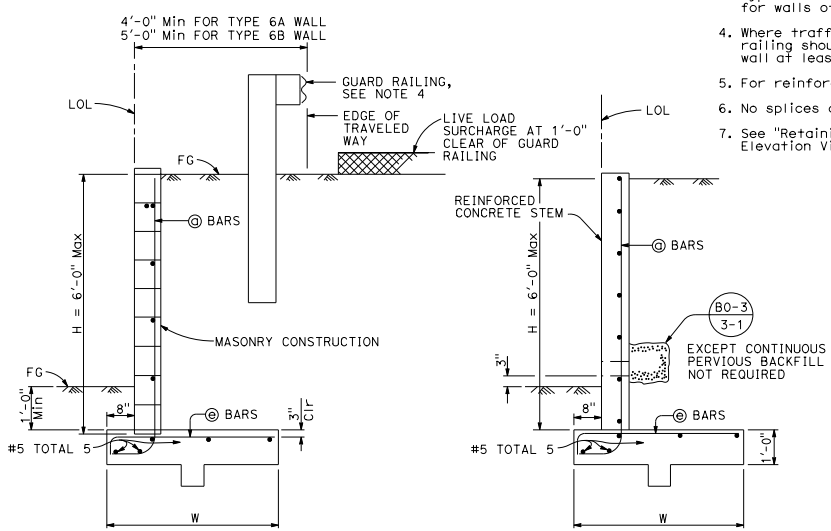
B3-6

1-29-18

Return to Table of Contents



TYPE 6A WALL



TYPE 6B WALL

SYMBOLS:

Ser - service limit state I
Str - strength limit state I
Ext - extreme event limit state I
B' - effective footing width (ft)
q'_o - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

NOTES:

1. For details not shown at "6B", see "6A", similarly, for details not shown at "6A", see "6B".
2. Design loading for both Type "6A" and "6B" is as shown at "6B".
3. Type 6 retaining wall shall be limited to use for walls of Design H of 6'-0" or less.
4. Where traffic is adjacent to the top of wall, guard railing should be set back from the top front face of wall at least 4'-0" or 5'-0", dependent on wall type.
5. For reinforced concrete wall stem joint details, See B0-3 3-3 and B0-3 3-4
6. No splices are allowed on @ bars.
7. See "Retaining Wall Type 6 Details" sheet for Elevation View and Footing Step Details.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments

Building Code Requirements for Masonry Structures (TMS 402-08/ACI 530-08/ASCE 5-08)

LS: 240 psf surcharge on level ground surface as limited by Guard Railing location

SEISMIC: $k_h = 0.2$, $k_v = 0.0$

SOIL: $\phi = 34°$, $\gamma = 120$ pcf

REINFORCED CONCRETE: $f'c = 3{,}600$ psi, $fy = 60{,}000$ psi

REINFORCED MASONRY: $fm' = 1{,}500$ psi, $fy = 60{,}000$ psi

LOAD COMBINATIONS AND LIMIT STATES:

Service I	$Q = 1.00DC+1.00EV+1.00EH+1.00LS$
Strength I	$Q = \alpha DC+\beta EV+\eta EH+1.75LS$
Extreme I	$Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE$

Where:

Q:	Force Effects
α:	1.25 or 0.90, Whichever Controls Design
β:	1.35 or 1.00, Whichever Controls Design
η:	1.50 or 0.90, Whichever Controls Design
DC:	Dead Load of Structure Components
EH:	Horizontal Earth Fill Pressure
EV:	Vertical Earth Pressure from Earth Fill Weight
LS:	Live Load Surcharge
EQE:	Seismic Earth Pressure
EQD:	Soil and Structural and Nonstructural Components Inertia

TYPE 6A WALL - TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
DESIGN H	3'-4"	4'-0"	4'-8"	5'-4"	6'-0"
W	3'-0"	3'-3"	3'-8"	4'-2"	4'-8"
@ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16
Ser: B', q'_o	2.8, 0.2	3.0, 0.3	3.4, 0.3	3.8, 0.3	4.3, 0.3
Str: B', q_o	2.7, 0.6	2.9, 0.7	3.2, 0.7	3.6, 0.7	3.3, 0.6
Ext: B', q_o	1.7, 0.8	1.6, 0.9	1.7, 1.0	2.0, 1.0	2.1, 1.0

TYPE 6B WALL - TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA					
DESIGN H	3'-4"	4'-0"	4'-8"	5'-4"	6'-0"
W	3'-0"	3'-9"	4'-0"	4'-6"	4'-9"
@ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16
ⓔ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16
Ser: B', q'_o	2.6, 0.4	3.4, 0.4	2.7, 0.8	3.1, 0.8	3.2, 1.0
Str: B', q_o	2.6, 0.8	3.3, 0.9	1.7, 1.6	2.1, 1.6	2.0, 1.8
Ext: B', q_o	1.5, 1.1	2.0, 1.1	2.0, 1.4	2.2, 1.5	2.1, 1.9

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gary Wang
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER Gary Wang No. C58298 Exp. 6-30-18 CIVIL STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 6 (CASE 1)

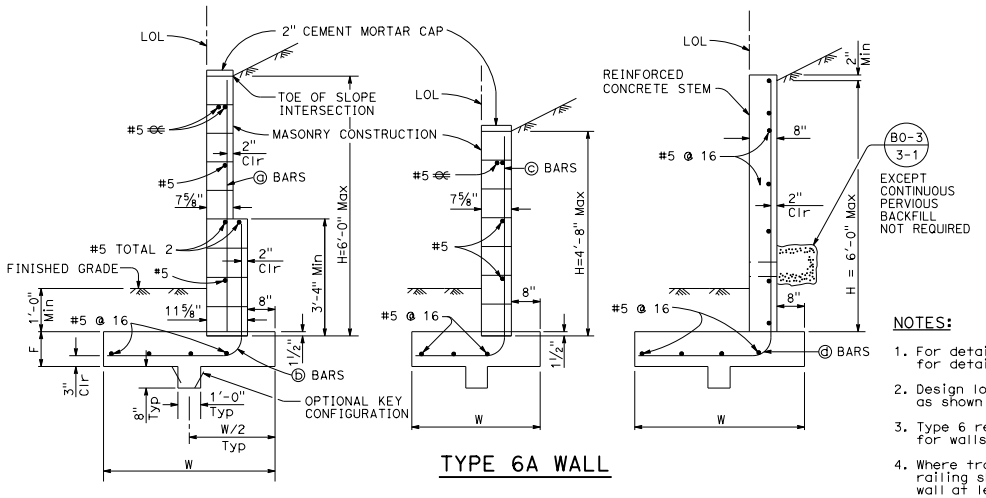
NO SCALE

B3-7A

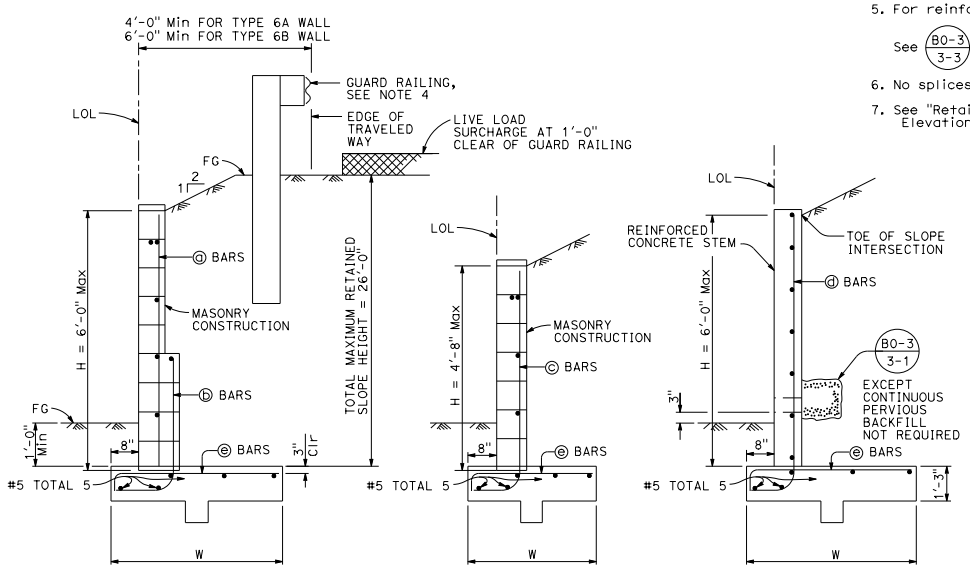
1-29-18

2018 STANDARD PLAN B3-7A

Return to Table of Contents



TYPE 6A WALL



TYPE 6B WALL

SYMBOLS:

Ser - service limit state 1
Str - strength limit state 1
Ext - extreme event limit state I
B′ - effective footing width (ft)
q_o' - net bearing stress (ksf), OG assumed to be FG at toe
q_o - gross uniform bearing stress (ksf)

NOTES:

1. For details not shown at "6B", see "6A", similarly, for details not shown at "6A", see "6B".
2. Design loading for both Type "6A" and "6B" is as shown at "6B".
3. Type 6 retaining wall shall be limited to use for walls of Design H of 6'-0" or less.
4. Where traffic is adjacent to the top of wall, guard railing should be set back from the top front face of wall at least 4'-0" or 6'-0", dependent on wall type.
5. For reinforced concrete wall stem joint details, See BO-3 3-3 and BO-3 3-4
6. No splices are allowed on ⓐ, ⓑ, ⓒ and ⓓ bars.
7. See "Retaining Wall Type 6 Details" sheet for Elevation View and Footing Step Details.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Gary Wang No. C58298 Exp. 6-30-18 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN NOTES:

DESIGN: AASHTO LRFD Bridge Design Specifications, 4th Edition with California Amendments
Building Code Requirements for Masonry Structures (TMS 402-08/ACI 530-08/ASCE 5-08)

LS: 240 psf surcharge on level ground surface as limited by Guard Railing location

SEISMIC: k_h = 0.2, k_v = 0.0

SOIL: ø = 34°, γ = 120 pcf

REINFORCED CONCRETE: f′c = 3,600 psi, fy = 60,000 psi

REINFORCED MASONRY: fm′ = 1,500 psi, fy = 60,000 psi

LOAD COMBINATIONS AND LIMIT STATES:
Service I Q = 1.00DC+1.00EV+1.00EH+1.00LS
Strength I Q = αDC+βEV+ηEH+1.75LS
Extreme I Q = 1.00DC+1.00EV+1.00EH+1.00EQD+1.00EQE

Where:
Q: Force Effects
α: 1.25 or 0.90, Whichever Controls Design
β: 1.35 or 1.00, Whichever Controls Design
η: 1.50 or 0.90, Whichever Controls Design
DC: Dead Load of Structure Components
EH: Horizontal Earth Fill Pressure
EV: Vertical Earth Pressure from Earth Fill Weight
LS: Live Load Surcharge
EQE: Seismic Earth Pressure
EQD: Soil and Structural and Nonstructural Components Inertia

TYPE 6A WALL - TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	3′-4"	4′-0"	4′-8"	5′-4"	6′-0"
W	3′-8"	4′-1"	4′-8"	5′-3"	6′-9"
F	1′-0"	1′-0"	1′-2"	1′-3"	1′-4"
ⓐ BARS	NONE	NONE	NONE	#5 @ 16"	#5 @ 16"
ⓑ BARS	NONE	NONE	NONE	#5 @ 16"	#5 @ 16"
ⓒ BARS	#5 @ 16	#5 @ 16	#5 @ 16	NONE	NONE
ⓓ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#6 @ 16
Ser: B′, q_o'	3.4, 0.3	3.8, 0.3	4.3, 0.3	4.9, 0.4	6.0, 0.4
Str: B′, q_o	3.3, 0.7	3.6, 0.7	4.1, 0.8	4.7, 0.8	5.7, 0.9
Ext: B′, q_o	1.3, 1.9	1.4, 2.0	1.7, 2.1	1.9, 2.2	3.9, 1.4

TYPE 6B WALL - TABLE OF REINFORCING STEEL, DIMENSIONS AND DATA

DESIGN H	3′-4"	4′-0"	4′-8"	5′-4"	6′-0"
W	4′-6"	5′-1"	5′-7"	6′-2"	6′-9"
ⓐ BARS	NONE	NONE	NONE	#5 @ 16"	#5 @ 16"
ⓑ BARS	NONE	NONE	NONE	#5 @ 16"	#5 @ 16"
ⓒ BARS	#5 @ 16	#5 @ 16	#5 @ 16	NONE	NONE
ⓓ BARS	#5 @ 16	#5 @ 16	#5 @ 16	#5 @ 16	#6 @ 16
ⓔ BARS	#5 @ 16	#5 @ 16	#6 @ 16	#6 @ 16	#7 @ 16
Ser: B′, q_o'	3.3, 0.6	3.7, 0.8	4.0, 0.9	4.5, 1.0	4.1, 1.4
Str: B′, q_o	1.9, 1.4	2.3, 1.6	2.5, 1.8	2.8, 1.9	1.8, 3.6
Ext: B′, q_o	1.5, 2.8	1.8, 3.1	1.9, 3.6	2.1, 3.8	2.4, 3.9

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 6 (CASE 2)

NO SCALE

B3-7B

2018 STANDARD PLAN B3-7B

1-29-18

Return to Table of Contents

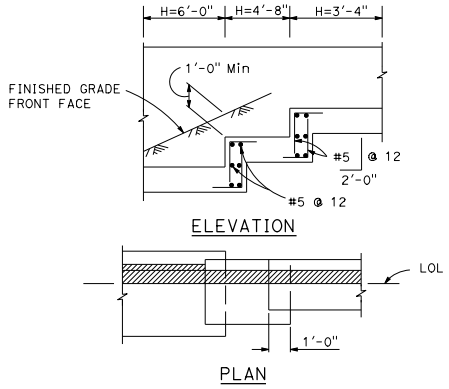
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gary Wang
REGISTERED CIVIL ENGINEER

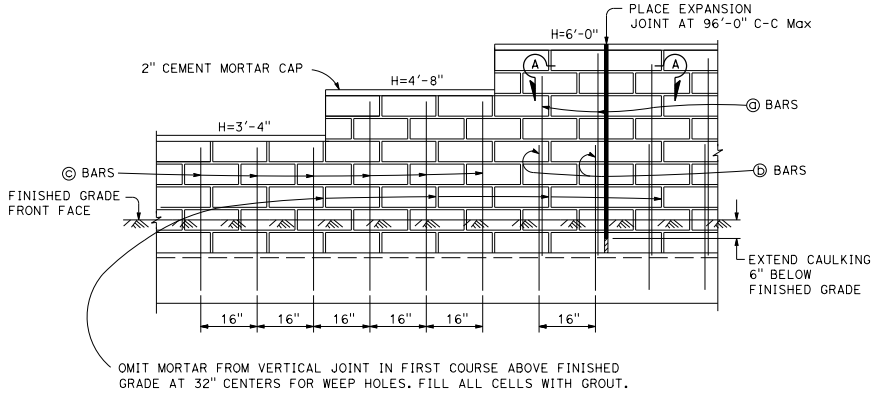
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Gary Wang
No. C58298
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

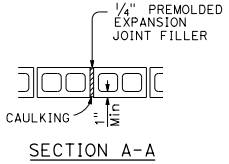
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FOOTING STEP DETAILS



ELEVATION - MASONRY CONSTRUCTION



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

RETAINING WALL TYPE 6 DETAILS

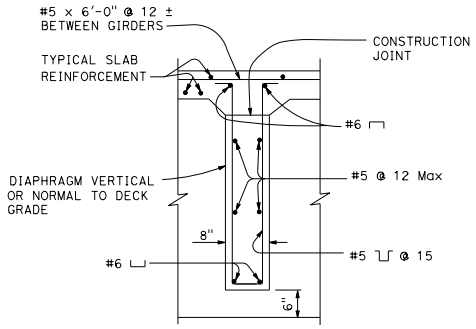
NO SCALE

B3-7C

2018 STANDARD PLAN B3-7C

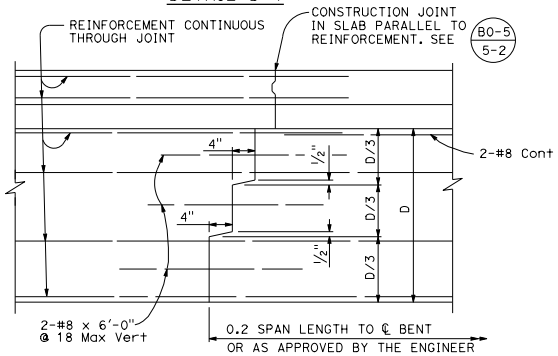
1-29-18

Return to Table of Contents



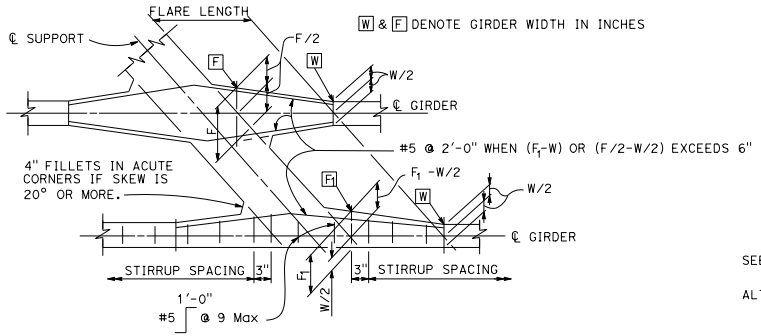
INTERMEDIATE DIAPHRAGM SECTION

DETAIL D-1



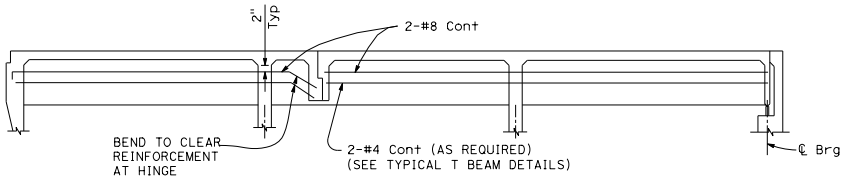
TRANSVERSE GIRDER CONSTRUCTION JOINTS

DETAIL J-3



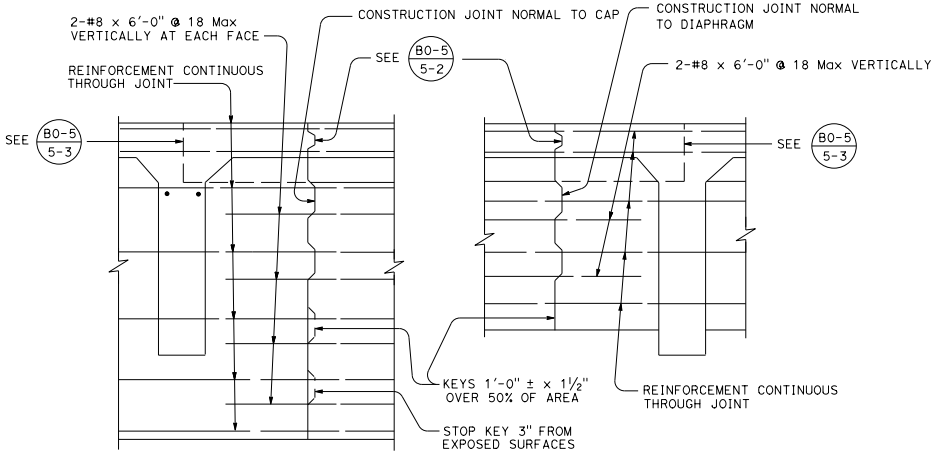
TYPICAL GIRDER FLARE AND STIRRUP SPACING DIAGRAM

DETAIL S-3



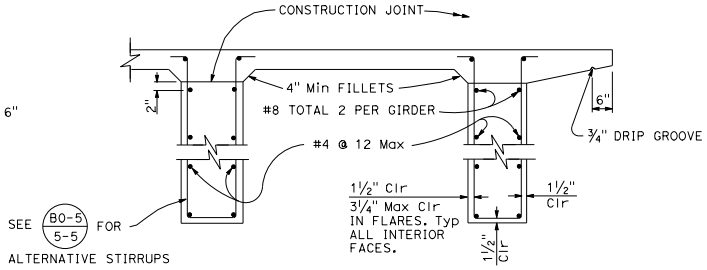
GIRDER WEB REINFORCEMENT

DETAIL J-1



LONGITUDINAL CONSTRUCTION JOINTS

DETAIL J-4



TYPICAL T BEAM DETAILS

DETAIL T-1

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Peter W. Norboe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

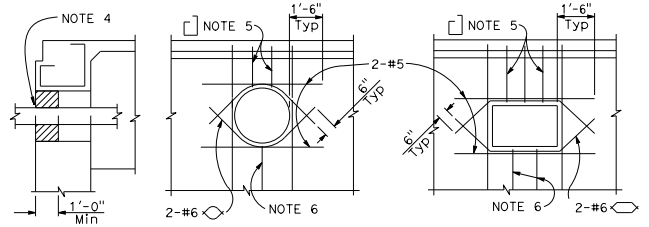
T-BEAM DETAILS

NO SCALE

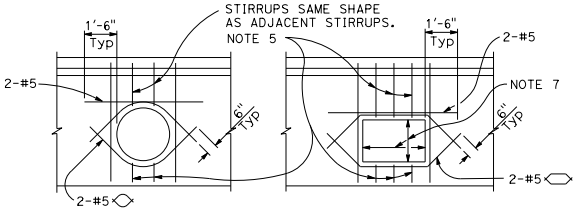
B6-1

1-29-18

Return to Table of Contents

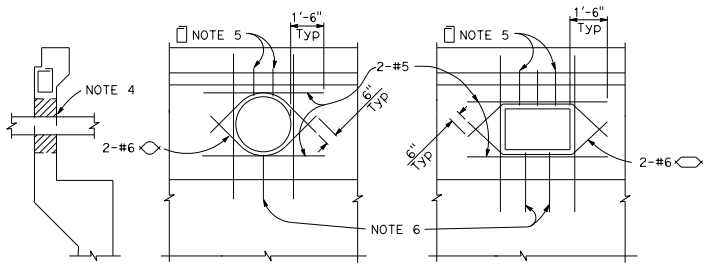


DETAIL U-11

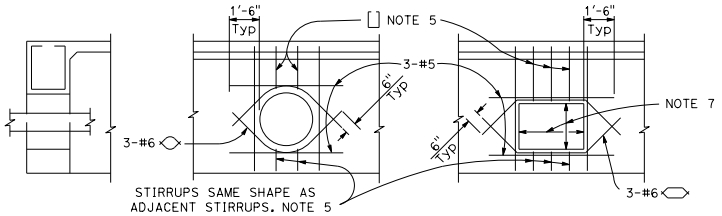


DETAIL U-15

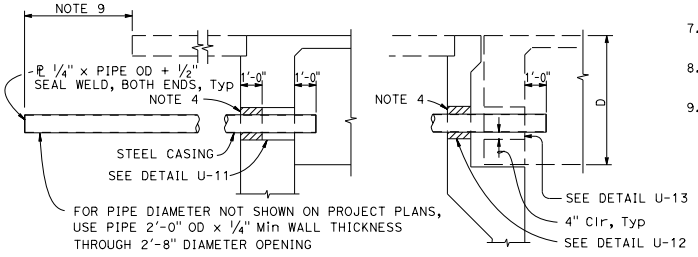
INTERMEDIATE DIAPHRAGMS



DETAIL U-12



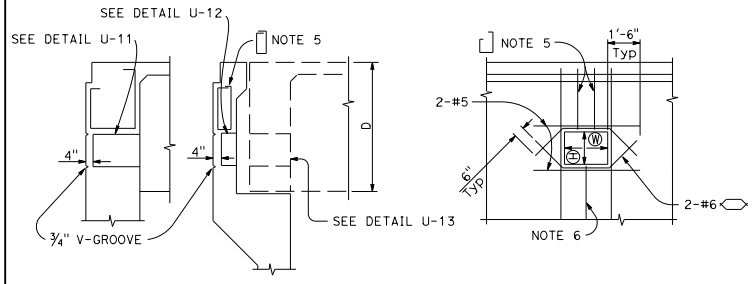
DETAIL U-13



DETAIL U-16

(For future utility provisions under approach slab)

ABUTMENT DIAPHRAGMS



DETAIL U-14

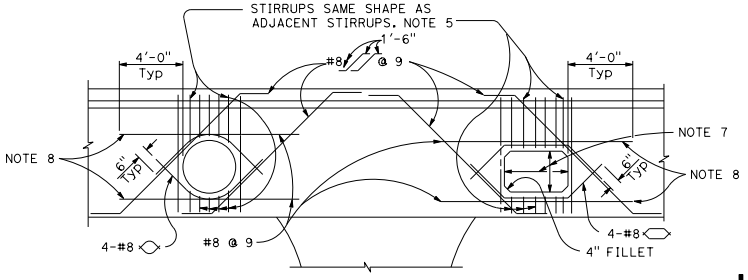
(For future utility opening)

ABUTMENT DIAPHRAGMS

For future utility opening dimensions not shown on Project Plans use:

(H) = 1/3 D or 1'-3" Min, whichever is greater.

(W) = 1/3 D or 1'-3" Min, whichever is greater.



DETAIL U-17

BENT CAPS

Near or between columns

NOTES:

1. The exact location, elevation, size and direction of openings shall be in accordance with the Project Plans and as directed by the Engineer.
2. Girders not shown. See Project Plans.
3. All reinforcement detailed to be placed in addition to reinforcement shown on Project Plans.
4. Seal utilities at abutments with concrete or mortar, after tightly wrapping utility with 2 layers of 15 LBS building paper.
5. Reinforcement to be same bar size, and 2/3 the spacing of adjacent reinforcement shown on Project Plans.
6. Reinforcement to be same bar size and shape as adjacent reinforcement shown on Project Plans.
7. For future utility opening dimensions, see Project Plans and Detail U-14.
8. When there is insufficient space to place reinforcement as shown, hook reinforcement into exterior girder.
9. Unless otherwise shown on Project Plans, casing shall extend to the greater of 5'-0" beyond the end of the approach slab, 5'-0" beyond the end of the adjacent wingwall, or 20'-0" beyond the back of the abutment.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Peter W. Norboe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Peter W. Norboe
No. C57519
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

UTILITY OPENINGS T-BEAM

NO SCALE

B6-10

2018 STANDARD PLAN B6-10

1-29-18

Return to Table of Contents

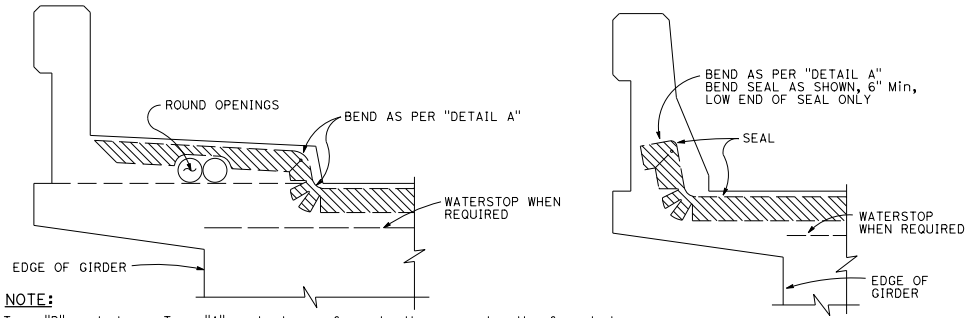
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Efthymios Delis — No. C51434 — Exp. 6-30-20 CIVIL — STATE OF CALIFORNIA

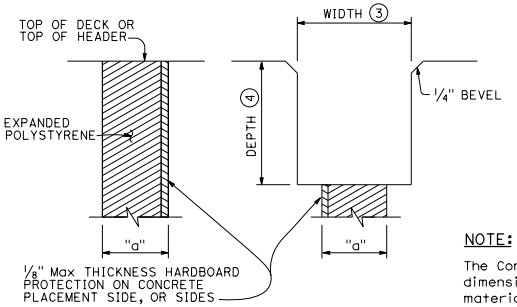
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



NOTE:
Type "B" seal shown. Type "A" seals to comform to the general path of seal shown, cuts for bending not required. Bend type "A" seals 3" up into curb or barrier rail on only the low end of the seal.

CONCRETE BARRIER AND SIDEWALK

CONCRETE BARRIER

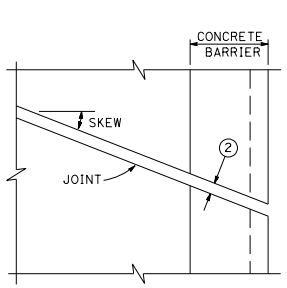


FORMING DETAIL

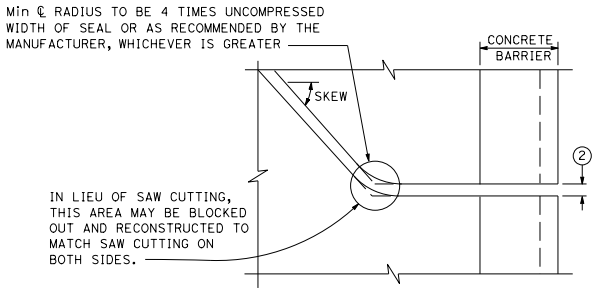
SAWCUT DETAIL

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

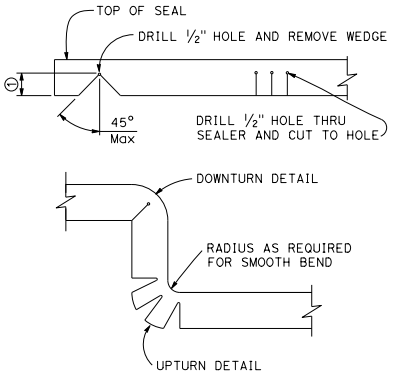
JOINT SEALS DETAILS



PLAN OF JOINT (SKEW ≤ 20°)



PLAN OF JOINT (SKEW > 20°)



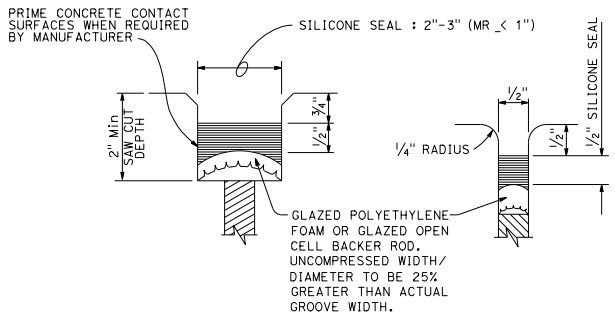
DETAIL A

NOTES:

1. Make smooth cuts from the bottom of seal to 1½" clear of top leaving at least one complete cell between the top of the cut and top of the seal. When necessary cut back of seal to clear conduit and round openings.
2. Opening in barrier to match width of sawn deck joint.
3. Sawcut groove widths shall be as ordered by the Engineer.
4. Depth of sawcut: Type A - Depth to be 2" minimum.
   Type B - Depth to be equal to or greater than the depth of seal measured along the contact surface, when compressed to minimum width position (W_2) plus dimensions shown.
5. MR (movement rating) as shown on other plan sheets.
6. Other depths must be approved by the Engineer.
7. A sidewalk joint shall be covered by an expansion joint armor.

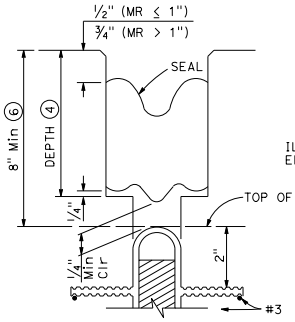
DIMENSIONS "a" OF JOINT REQUIRED

MOVEMENT RATING (MR) (5)	BRIDGE TYPE	"a" DIMENSION DECK CONCRETE PLACED		
		WINTER	FALL-SPRING	SUMMER
2"	ALL EXCEPT CIP/PS	1½"	1¼"	¾"
	CIP/PS	1¼"	1"	½"
1½"	ALL EXCEPT CIP/PS	1¼"	1"	½"
	CIP/PS	1"	¾"	½"
1"	ALL EXCEPT CIP/PS	1"	¾"	½"
	CIP/PS	¾"	½"	½"
½"	ALL EXCEPT CIP/PS	¾"	¾"	½"
	CIP/PS	½"	½"	½"

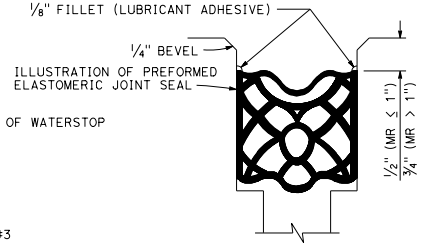


TYPE A SEAL
Movement rating : Silicone = 1" Max

TYPE AL SEAL
Longitudinal joints only



TYPE B JOINT SEAL
IN MINIMUM WIDTH POSITION (W_2)



TYPE B SEAL
Movement Rating ≤ 2"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

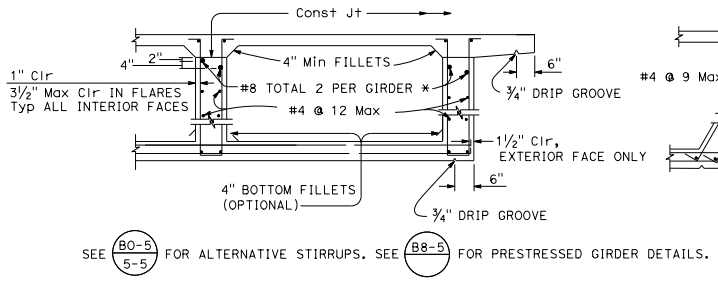
JOINT SEALS (MAXIMUM MOVEMENT RATING = 2")

NO SCALE

B6-21

1-29-18

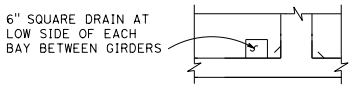
Return to Table of Contents



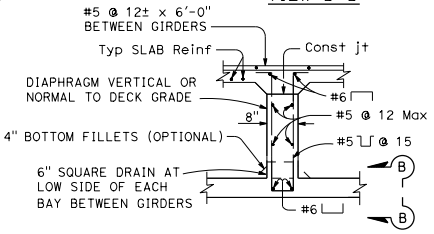
TYPICAL BOX GIRDER DETAILS

DETAIL B-1

* At all web construction joints

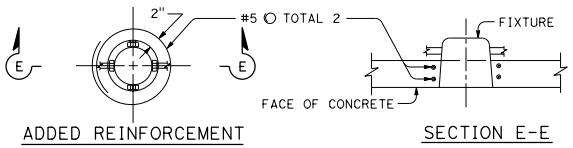


VIEW B-B



INTERMEDIATE DIAPHRAGM SECTION

DETAIL D-1

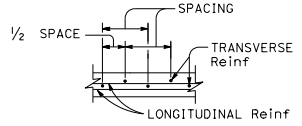


ADDED REINFORCEMENT

SECTION E-E

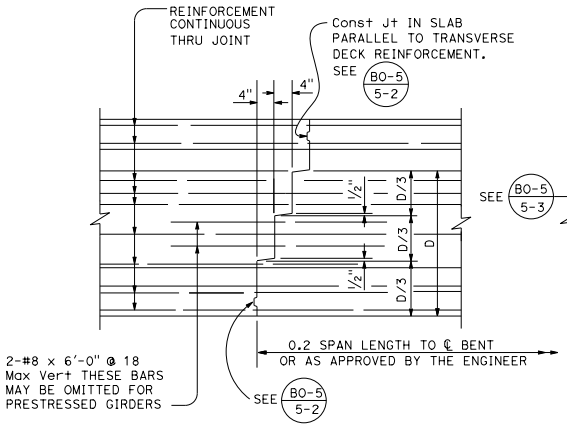
RECESSED SOFFIT LIGHT

DETAIL F-1



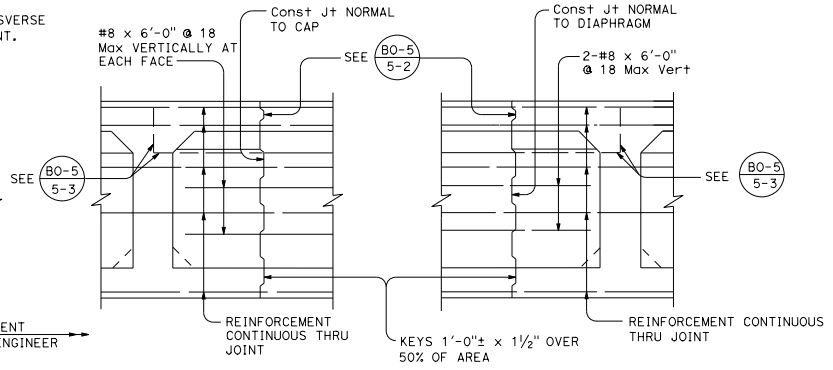
DETAIL S-2

BOTTOM SLAB TRANSVERSE REINFORCEMENT SPACING DIAGRAM



TRANSVERSE GIRDER CONSTRUCTION JOINTS

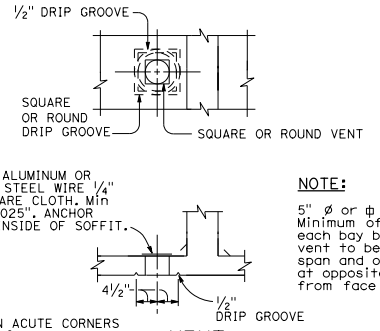
DETAIL J-3

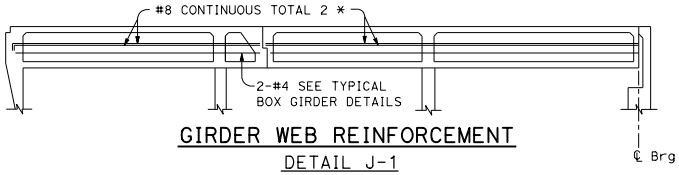


BENT CAP DIAPHRAGMS

LONGITUDINAL CONSTRUCTION JOINTS

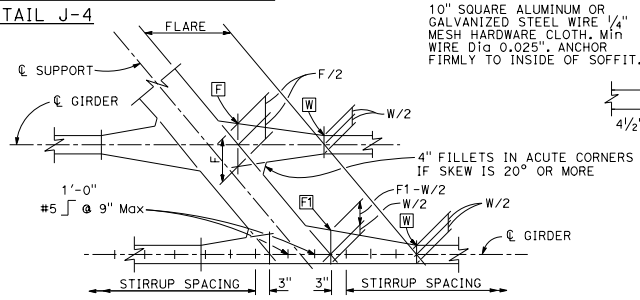
DETAIL J-4





GIRDER WEB REINFORCEMENT

DETAIL J-1



TYPICAL GIRDER FLARE AND STIRRUP SPACING DIAGRAM

DETAIL S-3

W and F denote girder width in inches.

VENT

DETAIL V-1

NOTE:

5" ø or ϕ vent in lower slab. Minimum of two vents per span in each bay between girders. One vent to be located at low point of span and other vent to be located at opposite end of span @ 1'-6" from face of abutment or bent.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Peter W. Norboe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Peter W. Norboe
No. C57519
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BOX GIRDER DETAILS

NO SCALE

B7-1

2018 STANDARD PLAN B7-1

1-29-18

Return to Table of Contents

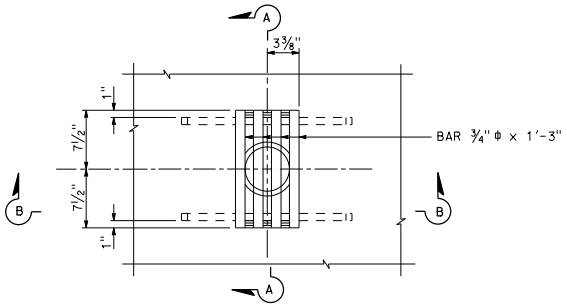
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

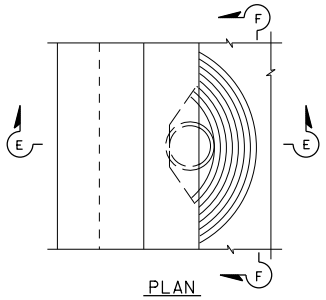
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — C.J. Sims — No. C46471 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

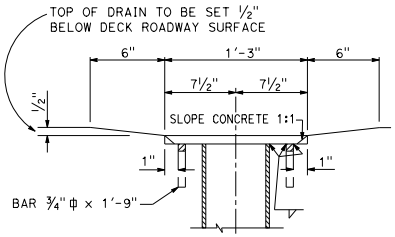
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



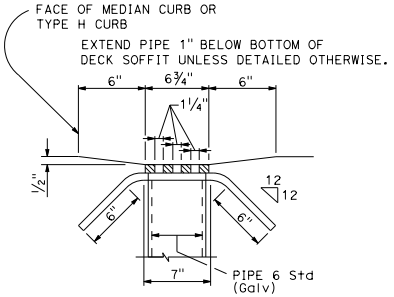
PLAN



PLAN

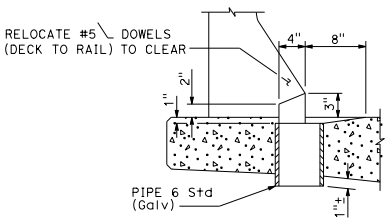


SECTION A-A

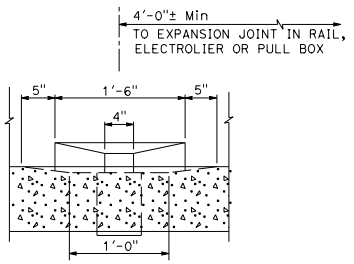


SECTION B-B

DRAIN - TYPE "A" DETAIL 7-1



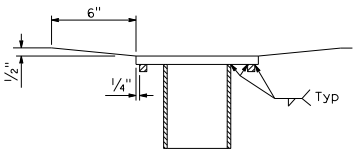
SECTION E-E



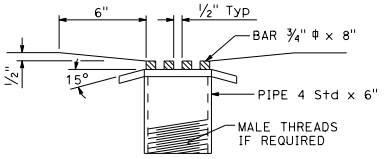
SECTION F-F

DRAIN - TYPE "B" DETAIL 7-3

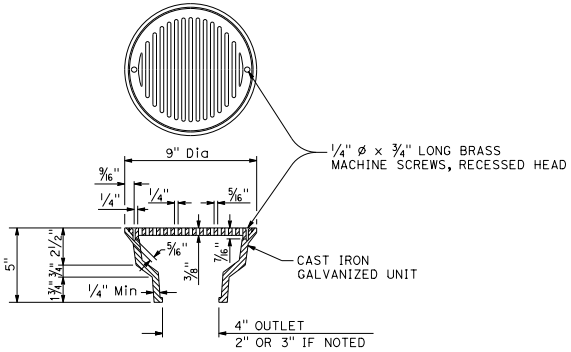
For Type 25 barrier railing



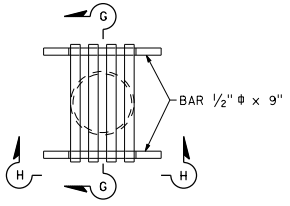
SECTION G-G



SECTION H-H

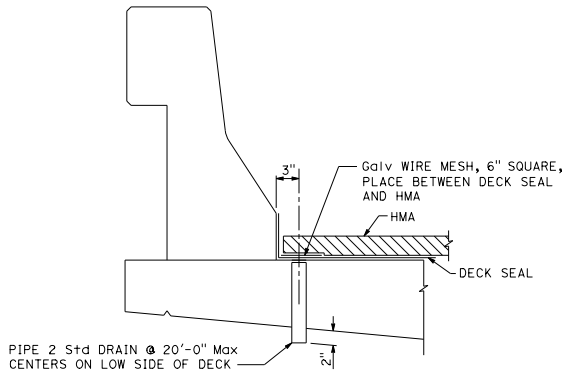


AREA DRAIN DETAIL 7-4



PLAN

PEDESTRIAN STRUCTURE DRAIN DETAIL 7-5



DECK BLEEDER DRAIN DETAIL 7-6

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

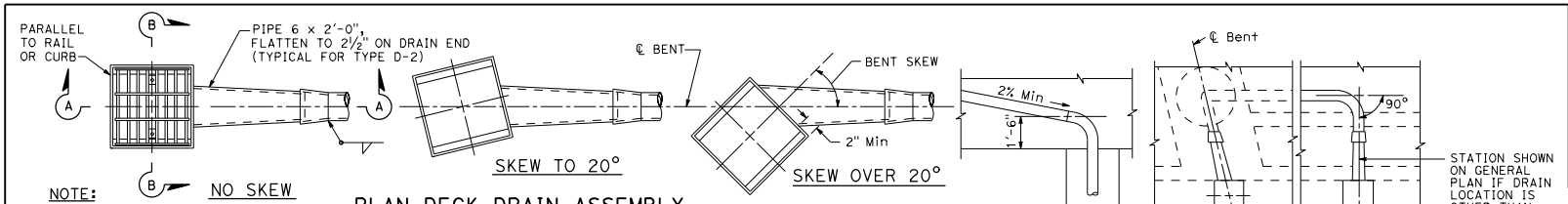
DECK DRAINS

NO SCALE

B7-5

1-29-18

Return to Table of Contents

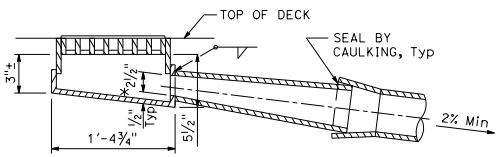


NOTE: D-2 shown, D-1 similar except for pan depth and pipe not flattened.

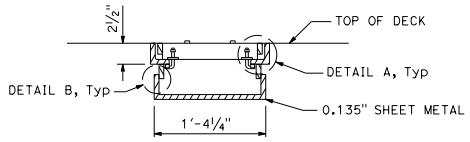
NO SKEW

PLAN-DECK DRAIN ASSEMBLY

DRAIN PIPE ALIGNMENT



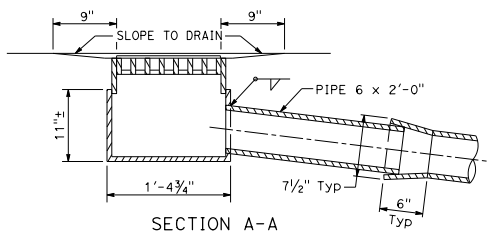
SECTION A-A



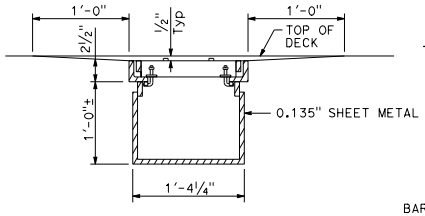
SECTION B-B

TYPE D-2 DETAIL 7-8

* 2½" Flattened pipe opening to be maintained. Cut skirt of frame if it encroaches on the opening.

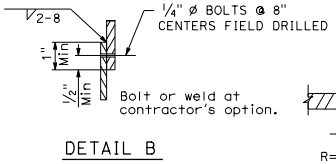


SECTION A-A

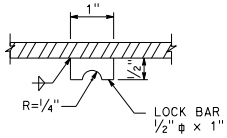


SECTION B-B

TYPE D-1 DETAIL 7-7

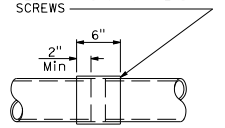


DETAIL B

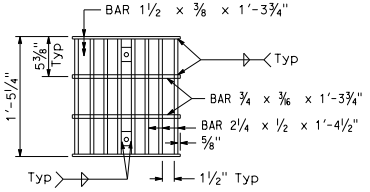


LOCK BAR

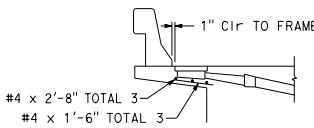
Sleeve inside diameter no greater than pipe outside diameter + 1/16"



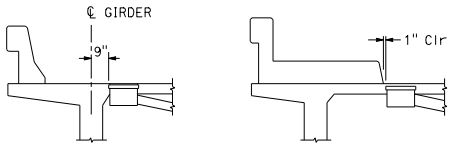
SLEEVE CONNECTION



GRATE

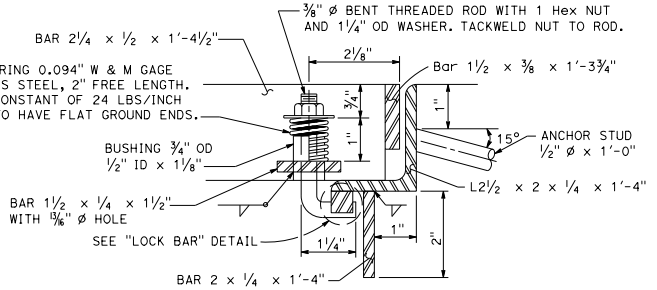


D-2 IN OVERHANG

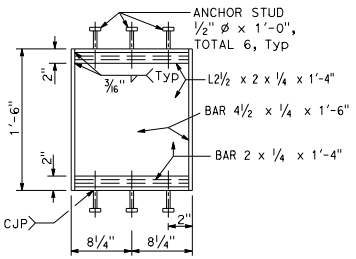


D-1 IN BAY

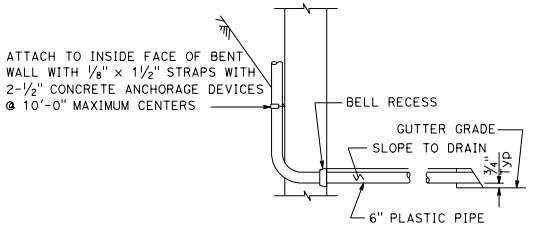
ELEVATION-DECK DRAIN LOCATIONS



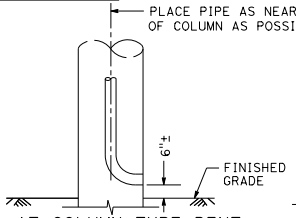
DETAIL A



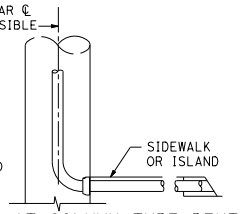
FRAME



AT WALL TYPE BENT



AT COLUMN TYPE BENT ABOVE GROUND



AT COLUMN TYPE BENT UNDER CURB

DRAIN OUTLET

NOTE:

All pipe to be NPS 6 x 0.135" welded steel pipe except as noted and galvanized if not encased in concrete. Fittings and bends shall have a minimum wall thickness of ⅛". All joints or connections to be butt welded or connected by a steel pipe sleeve and to be smooth throughout inside of pipe except as noted. All bends to be on 1'-6" minimum radius measured along ℄ pipe. All bends to be smooth. Pipes not encased in concrete to be supported by suitable galvanized hangers @ 10'-0" maximum spacing throughout. Galvanize deck drain assembly after fabrication.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER C.J. Sims No. C46471 Exp. 6-30-19 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DECK DRAINS TYPES D-1 AND D-2

NO SCALE

B7-6

1-29-18

Return to Table of Contents

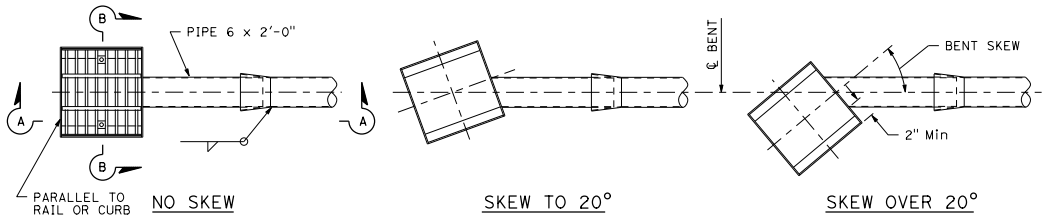
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

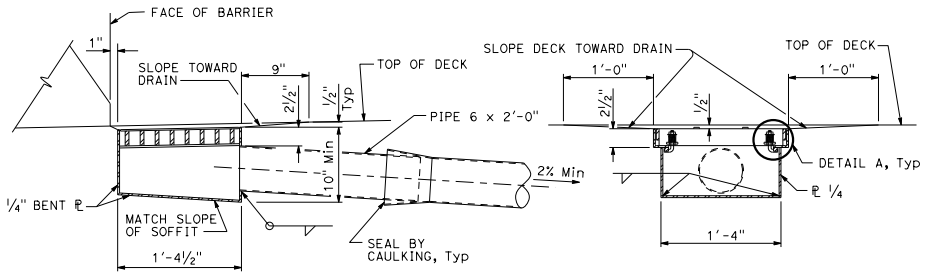
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
C.J. Sims
No. C46471
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

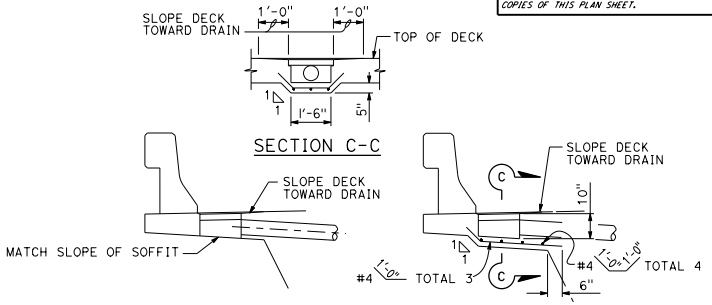
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



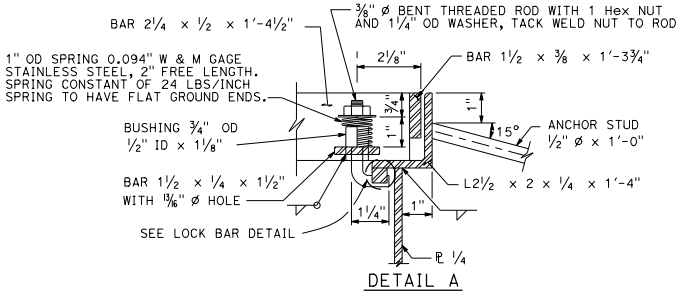
PLAN-DECK DRAIN ASSEMBLY

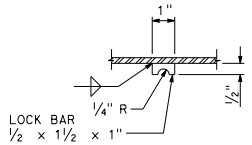


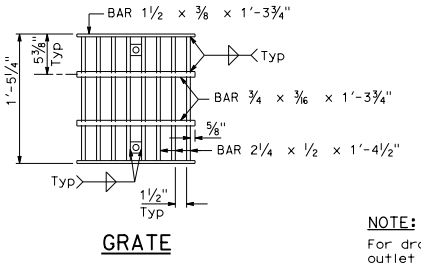
DECK DRAIN ASSEMBLY DETAIL

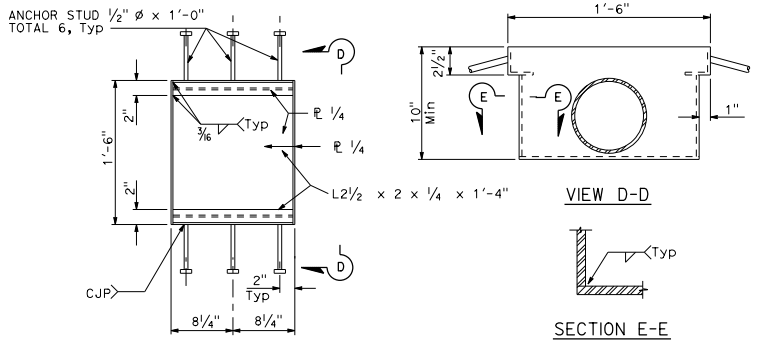


ELEVATION-DECK DRAIN LOCATIONS









NOTE:
For drain pipe alignment, sleeve connection, drain outlet details and notes, see Standard Plan B7-6.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

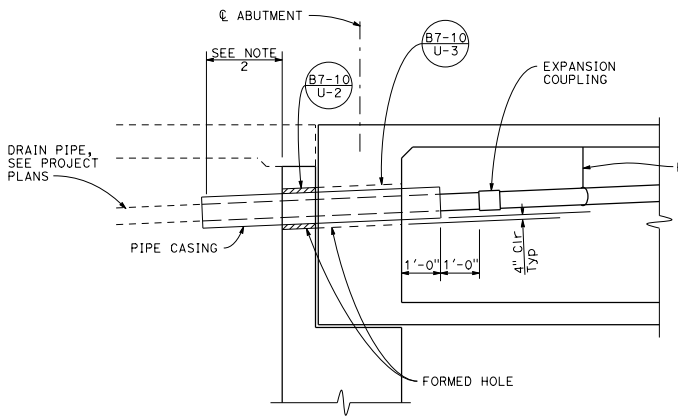
DECK DRAIN TYPE D-3

NO SCALE

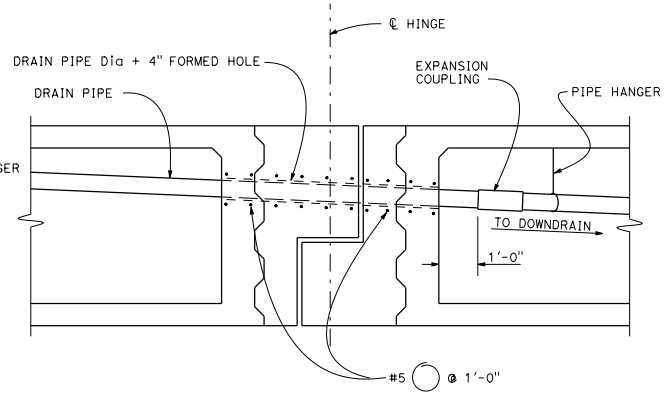
B7-7

1-29-18

Return to Table of Contents



ABUTMENT

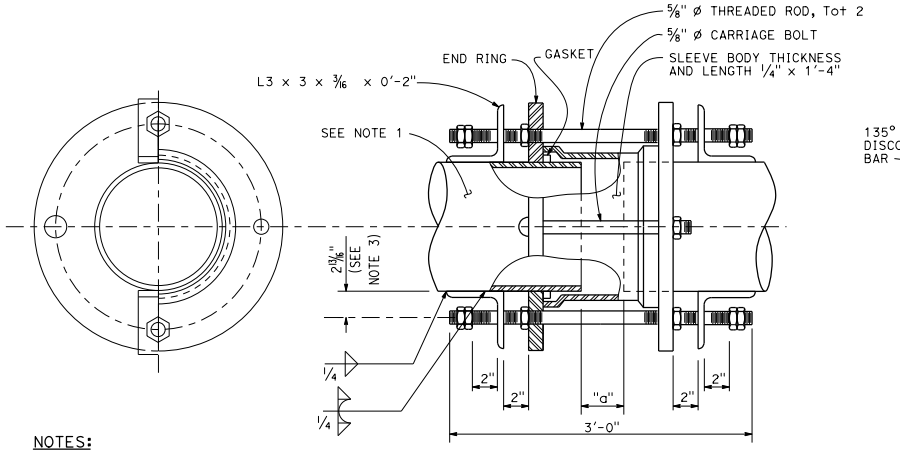


HINGE

DECK DRAIN PIPE DETAIL

NOTES:

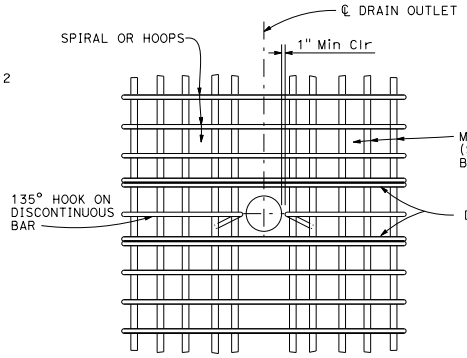
1. Pipe casing OD = Drain pipe Dia + 4" (¼" Min wall thickness)
2. Unless otherwise shown on Project Plans, casing shall extend to the greater of 5'-0" beyond the end of approach slab or 20'-0" beyond the back of abutment.



NOTES:

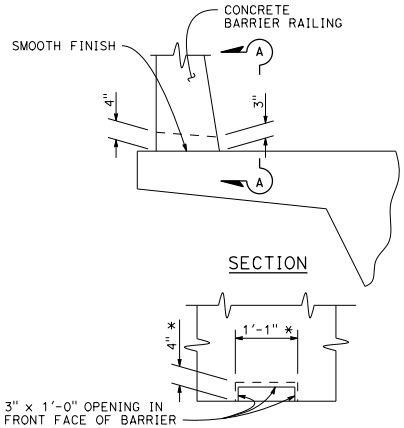
1. For "a" dimension and pipe diameter, see Project Plans.
2. Expansion coupling with 4 bolts shown. Coupling with a greater number of bolts allowed.
3. Adjust dimension to suit coupler end ring bolt circle.

EXPANSION COUPLING



NOTE:
Adjust spacing of main column reinforcement to clear drain outlet.

COLUMN REINFORCEMENT AT DRAIN OUTLET



ELEVATION A-A

SCUPPER DETAIL

* At exterior face of barrier

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER C.J. Sims No. C46471 Exp. 6-30-19 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DECK DRAINAGE DETAILS

NO SCALE

B7-8

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

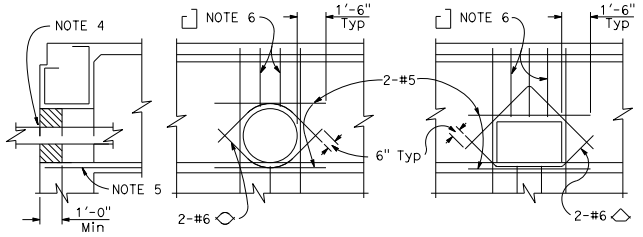
Peter W. Norboe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

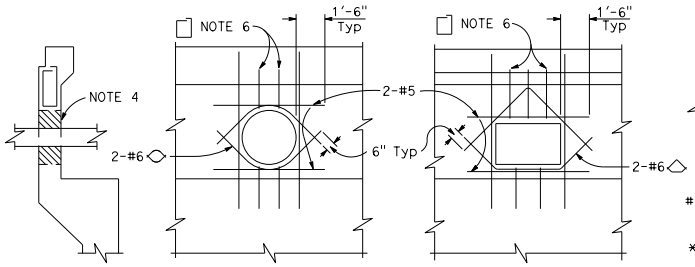
REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

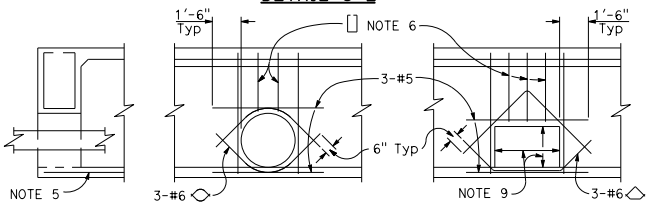
ABUTMENT DIAPHRAGMS



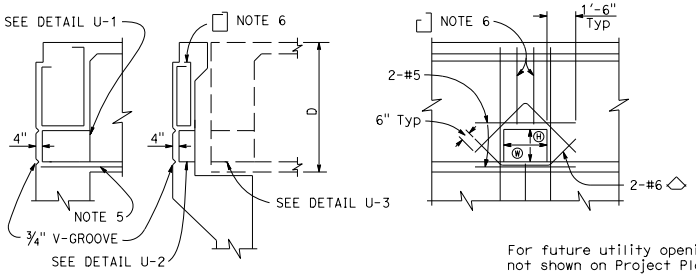
DETAIL U-1



DETAIL U-2

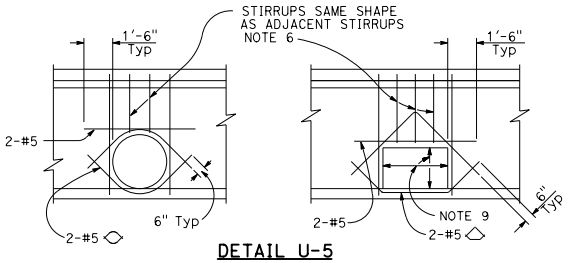


DETAIL U-3

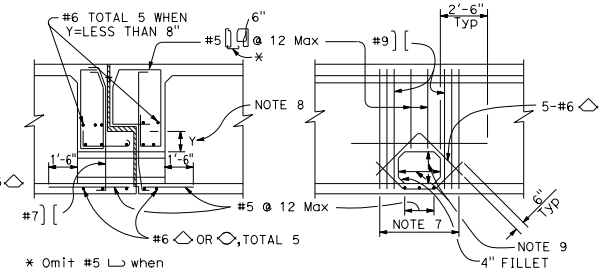


DETAIL U-4
(FOR FUTURE UTILITY OPENING)

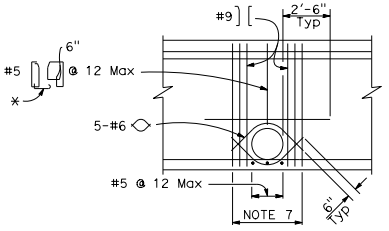
INTERMEDIATE DIAPHRAGMS AND HINGES



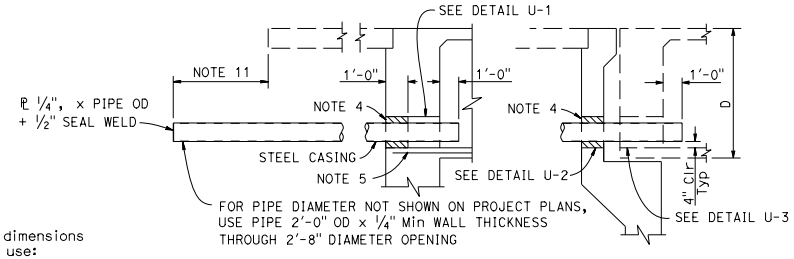
DETAIL U-5
AT INTERMEDIATE DIAPHRAGM



* Omit #5 ⌙ when Y=less than 8"



DETAIL U-6
AT HINGE



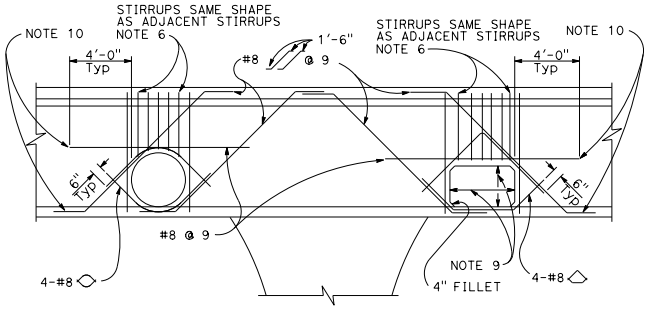
DETAIL U-8
(FOR FUTURE UTILITY PROVISIONS UNDER APPROACH SLAB)

For future utility opening dimensions not shown on Project Plans use:

Ⓗ = ⅓ D or 1'-6" minimum, whichever is greater.

Ⓦ = ⅓ D or 2'-0" minimum, whichever is greater.

BENT CAPS



DETAIL U-7
NEAR OR BETWEEN COLUMNS

NOTES:

1. The exact location, elevation, size, and direction of openings shall be in accordance with the Project Plans and as directed by the Engineer.
2. Girders not shown. See Project Plans.
3. All reinforcement detailed to be placed in addition to reinforcement shown on Project Plans.
4. Seal utilities at abutments with concrete or mortar, after tightly wrapping utility with 2 layers of 15 LBS building paper. If structure is prestressed, seal to be placed after stressing is completed.
5. Main reinforcement to clear opening.
6. Reinforcement to be same bar size and ⅔ the spacing of adjacent reinforcement shown on Project Plans.
7. Replace each set of 2-#9 bars cut off by opening. Place ½ on each side of opening.
8. When "Y" is less than 8", extend top of opening to bottom of bearing seat elevation.
9. For future utility opening dimensions, see Project Plans and Detail U-4.
10. When there is insufficient space to place reinforcement as shown, hook reinforcement into exterior girder.
11. Unless otherwise shown on Project Plans, casing shall extend to the greater of 5'-0" beyond the end of the approach slab, 5'-0" beyond the end of the adjacent wingwall, or 20'-0" beyond the back of the abutment.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

UTILITY OPENING BOX GIRDER

NO SCALE

B7-10

1-29-18

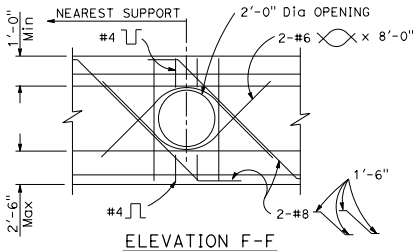
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

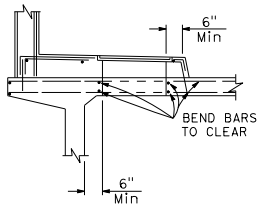
Peter W. Norboe
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Peter W. Norboe — No. C57519 — Exp. 12-31-19 — CIVIL — STATE OF CALIFORNIA

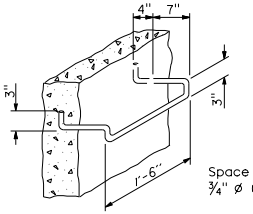
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION F-F



SECTION C-C

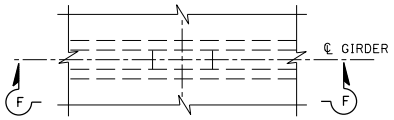


Space ladder rung @ 12
¾" ø Galvanize after fabrication

BAR STEP

LADDER RUNG DETAILS

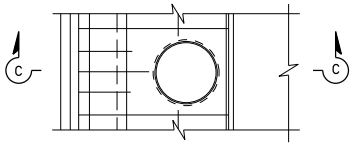
DETAIL U44



PART PLAN

GIRDER STEM ACCESS OPENING

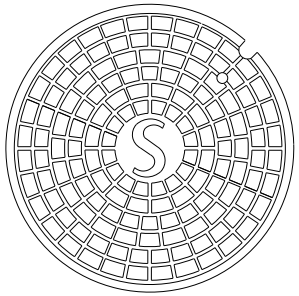
DETAIL U41



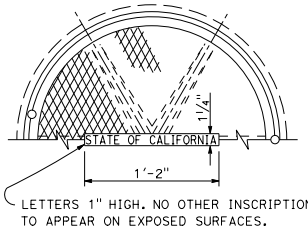
PART PLAN

SIDEWALK ACCESS OPENING

DETAIL U42



TOP OF MANHOLE COVER

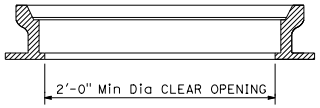


LETTERS 1" HIGH. NO OTHER INSCRIPTION TO APPEAR ON EXPOSED SURFACES.

TOP OF MANHOLE FRAME & COVER

NOTES:

1. For exact location of openings see other sheets.
2. Location and size of manholes may be modified as directed by the Engineer, provided minimum dimensions are maintained.
3. All reinforcement detailed to be placed in addition to reinforcement shown on other sheets.



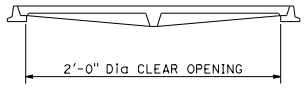
SECTION THROUGH FRAME

NON-ROCKING MANHOLE FRAME & COVER FOR DECKS

DETAIL U45

NOTES:

1. Step inserts may be substituted for the standard step detail. Step inserts shall comply with State Industrial Safety requirements.
2. Covers for use on sewer structures shall bear the letter "S"; on storm drain structures the letter "D"; on openings for utilities the letter "U".



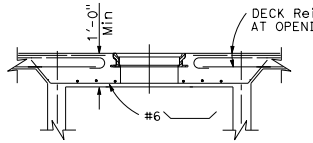
SECTION THROUGH FRAME & COVER

MANHOLE FRAME & COVER FOR SIDEWALKS

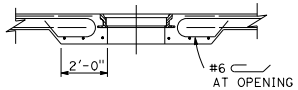
DETAIL U46

NOTES:

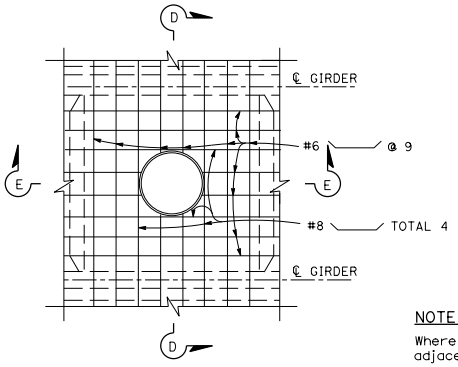
1. Frame and cover shall be cast iron.
2. Cover shall be supplied with bolt down or locking devices.



SECTION D-D



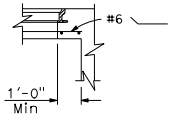
SECTION E-E



PART PLAN

NOTE:

Where manhole is located adjacent to a diaphragm or abut, substitute half Section E-E on one side of Section E-E.



HALF SECTION E-E

DECK ACCESS OPENING

DETAIL U43

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

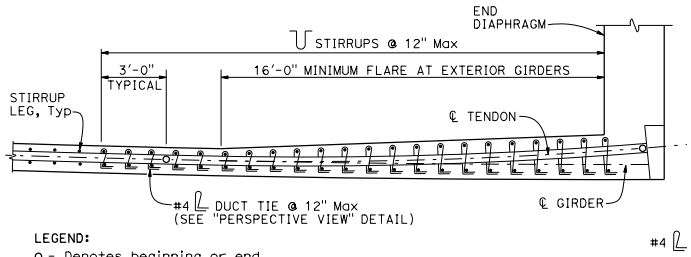
UTILITY DETAILS

NO SCALE

B7-11

1-29-18

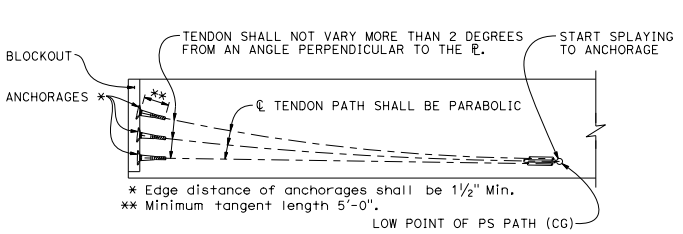
Return to Table of Contents



PLAN

PERSPECTIVE VIEW

DUCT TIES AT TENDON HORIZONTAL ANGLE CHANGES
DETAIL 5-1



ELEVATION - ANCHORAGES AND PRESTRESSING PATH
DETAIL 5-2

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

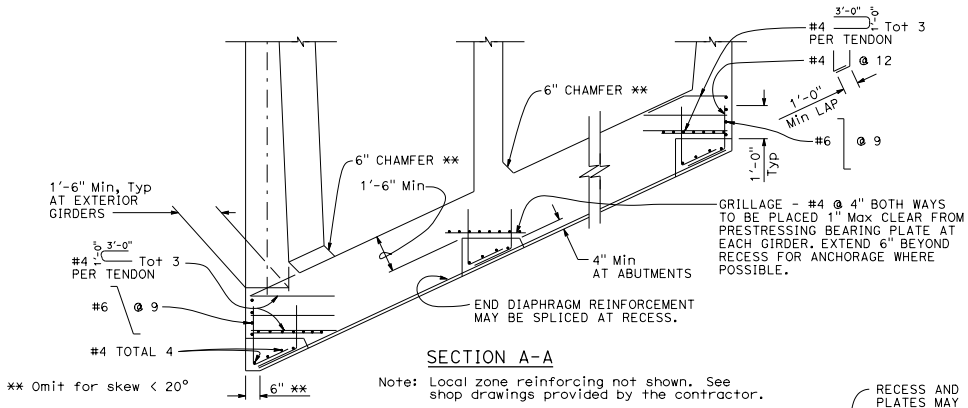
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Marc Friedheim — No. C57968 — Exp. 6-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

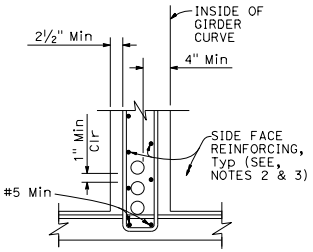
NOTES FOR DETAIL 5-1

1. Tendon horizontal angle change at end diaphragm shown. Duct tie placement similar for other locations where tendon horizontal angle changes occur. For curved girders place duct ties at tendon angle changes where ℄ tendon radius is smaller than ℄ girder radius.
2. Adjacent duct ties may be staggered vertically to facilitate placement if stirrup spacing is 6 inches or less.
3. Place closed end of duct ties toward inside of tendon curve.
4. Wrap duct ties around both stirrup legs.
5. Individual duct ties may only be used to anchor one duct.

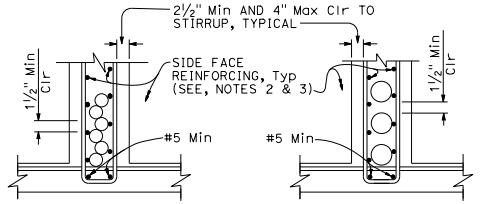


SECTION A-A

Note: Local zone reinforcing not shown. See shop drawings provided by the contractor.



DUCTS 4½" OD AND LESS FOR HORIZONTAL CURVE RADIUS ≤ 2000'



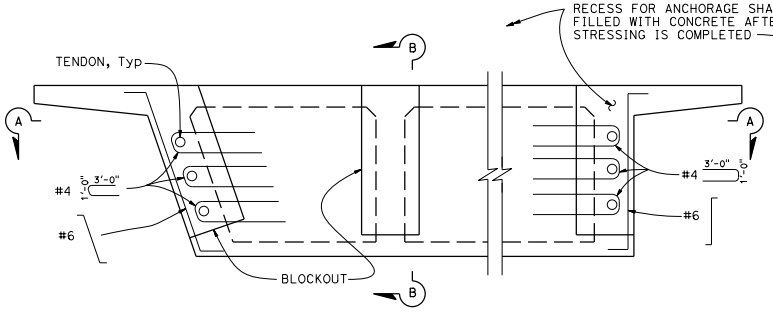
DUCTS 4½" OD AND LESS

DUCTS OVER 4½" OD

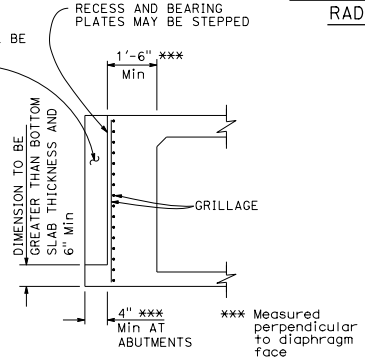
CLEARANCE REQUIREMENTS FOR DUCTS
DETAIL 5-4

NOTES FOR DETAIL 5-4:

1. ⊔ Stirrups may also be used.
2. For additional details, see Standard Plan B7-1, and Project Plans.
3. Bar reinforcing which interferes with prestressing ducts may be adjusted as approved by the Engineer.
4. The detail for "DUCTS OVER 4½" OD" shall be used on tangent and horizontally curved alignments.



PRESTRESS ANCHORAGE DETAILS AT END DIAPHRAGMS
DETAIL 5-3



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CAST-IN-PLACE POST-TENSIONED GIRDER DETAILS

NO SCALE

B8-5

2018 STANDARD PLAN B8-5

1-29-18

Return to Table of Contents

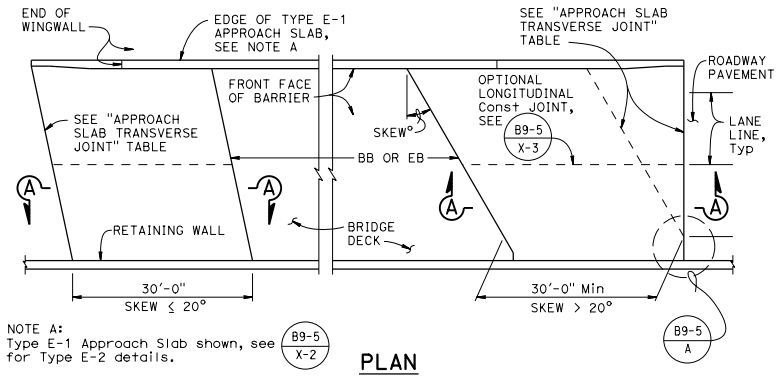
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

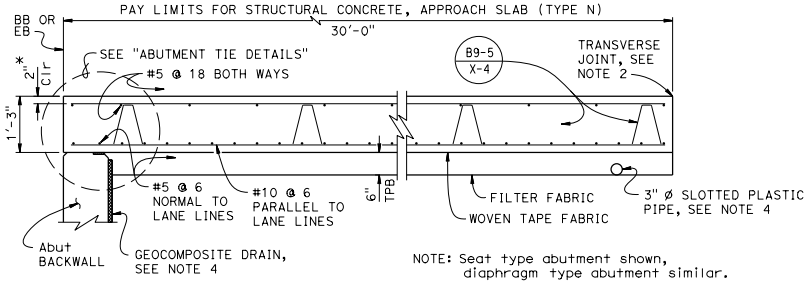
REGISTERED PROFESSIONAL ENGINEER — C.J. Sims — No. C46471 — Exp. 6-30-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

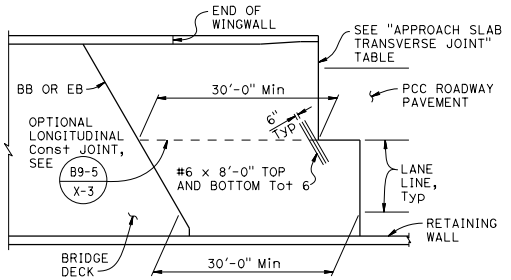


PLAN

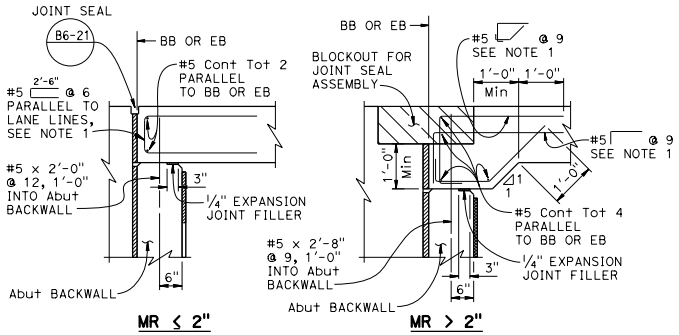
APPROACH SLAB TRANSVERSE JOINT		
APPROACH SKEW, ×	WITH HMA ROADWAY PAVEMENT	WITH PCC ROADWAY PAVEMENT
× < 20°	PARALLEL TO BB OR EB	PARALLEL TO BB OR EB
20° < × < 45°	PARALLEL TO BB OR EB (B9-5 A)	STAGGER AT LANE LINES 24' TO 36' APART, SEE "END STAGGER DETAIL"
× > 45°	PARALLEL TO BB OR EB (B9-5 A)	STAGGER AT EACH LANE LINE, SEE "END STAGGER DETAIL"



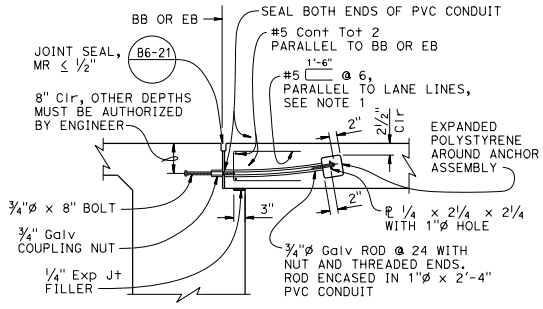
SECTION A-A



END STAGGER DETAIL



SEAT TYPE ABUTMENT (B9-5 C)



DIAPHRAGM TYPE ABUTMENT

ABUTMENT TIE DETAILS

LEGEND:

* - All approach slab reinforcement shall be epoxy coated and minimum top mat cover 2½" in Freeze-Thaw Area.

NOTES:

1. For MR ≤ 2", adjust reinforcement to clear sawcut for sealed joint. For MR > 2", reinforcement must be normal to BB or EB and spaced to avoid joint seal assembly anchorage.
2. Transverse Joint must be a minimum of 5'-0" from an existing or constructed weakened plane joint in approach PCC roadway pavement. Refer to Standard Plans P10 and P14.
3. At the Contractor's option, approach slab transverse reinforcement may be placed parallel to BB or EB. Spacing of transverse reinforcement is measured along ℄ roadway.
4. For structure approach drainage details, refer to Standard Plan B9-6.
5. For details not shown, refer to Standard Plan B9-5.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE APPROACH TYPE N (30)

NO SCALE

B9-1

1-29-18

Return to Table of Contents

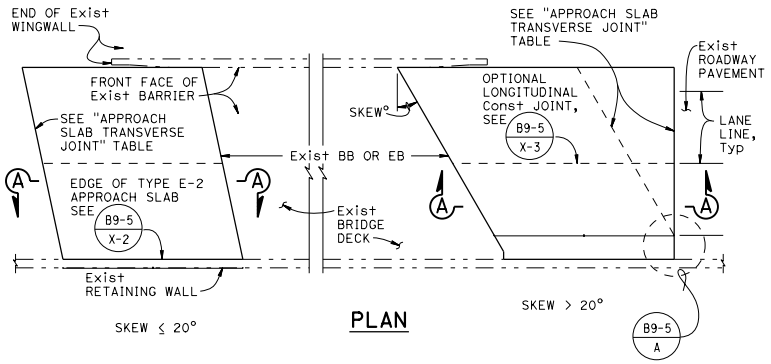
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

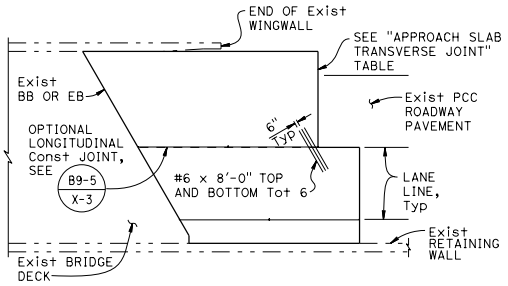
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

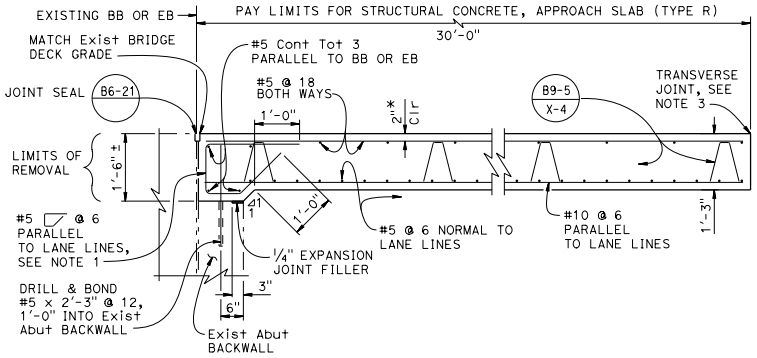
C.J. Sims
No. C46471
Exp. 6-30-19
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

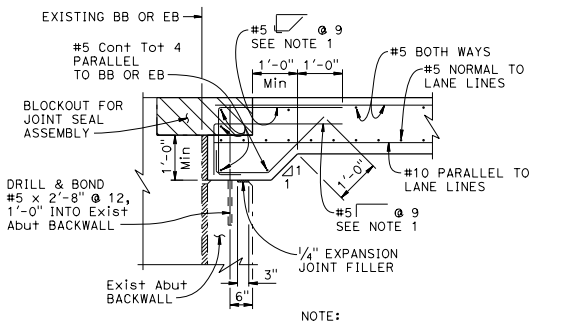
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

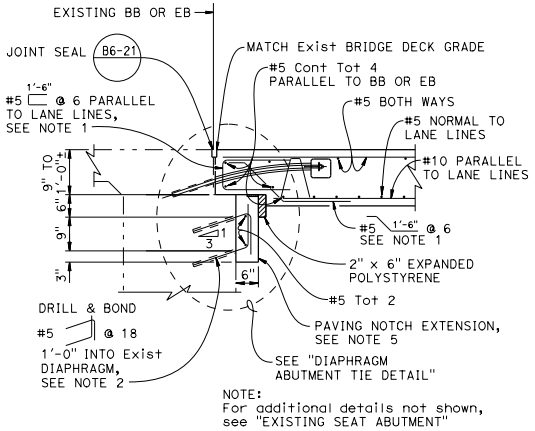


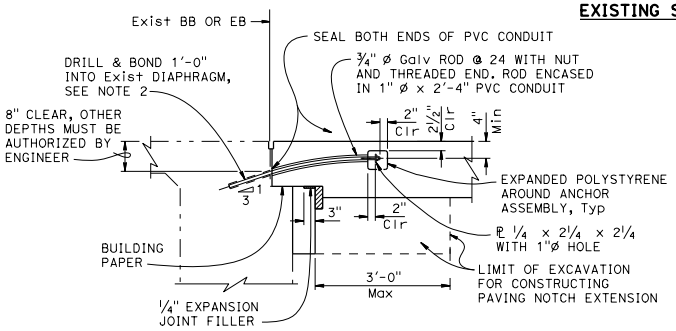


APPROACH SLAB TRANSVERSE JOINT		
APPROACH SKEW, x	WITH HMA ROADWAY PAVEMENT	WITH PCC ROADWAY PAVEMENT
x < 20°	PARALLEL TO BB OR EB	PARALLEL TO BB OR EB
20° < x < 45°	PARALLEL TO BB OR EB (B9-5 A)	STAGGER AT LANE LINES 24' TO 36' APART, SEE "END STAGGER DETAIL"
x > 45°	PARALLEL TO BB OR EB (B9-5 A)	STAGGER AT EACH LANE LINE, SEE "END STAGGER DETAIL"









SECTION A-A

NOTES:

1. For MR < 2", adjust reinforcement to clear sawcut for sealed joint. For MR > 2", reinforcement must be normal to BB or EB and spaced to avoid joint seal assembly anchorage.
2. Space reinforcement and abutment ties to avoid existing prestressing anchorages and other reinforcement in abutment, as needed.
3. Transverse Joint must be a minimum of 5'-0" from an existing or constructed weakened plane joint in approach PCC roadway pavement. Refer to Standard Plans P10 and P14.
4. At the Contractor's option, approach slab transverse reinforcement may be placed parallel to BB or EB. Spacing of transverse reinforcement is measured along ℄ roadway.
5. Paving notch extension is required if existing diaphragm paving notch is < 6".
6. For details not shown, refer to Standard Plan B9-5.

LEGEND:

— - - — Indicates Existing Structure

* - All approach slab reinforcement shall be epoxy coated and top mat cover 2½" clear in Freeze-Thaw Area.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

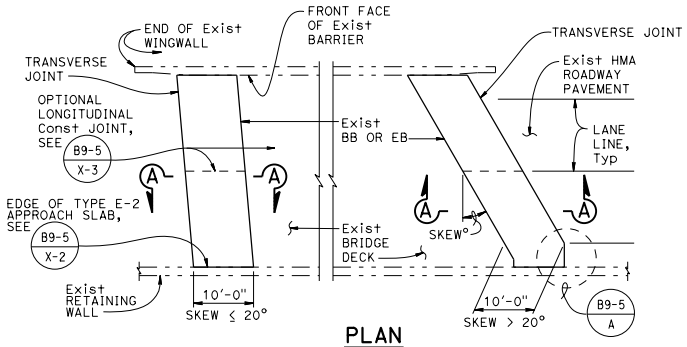
STRUCTURE APPROACH TYPE R (30)

NO SCALE

B9-2

1-29-18

Return to Table of Contents



PLAN

LEGEND:

— - - — Indicates Existing Structure

* - All approach slab reinforcement shall be epoxy coated and top mat cover 2½" clear in Freeze-Thaw Area.

NOTES:

1. For MR ≤ 2", adjust reinforcement to clear sawcut for sealed joint. For MR > 2", reinforcement must be normal to BB or EB and spaced to avoid joint seal assembly anchorage.
2. Space reinforcement and abutment ties to avoid existing prestressing anchorages and other reinforcement in abutment, as needed.
3. At the Contractor's option, approach slab transverse reinforcement may be placed parallel to BB or EB. Spacing of transverse reinforcement is measured along ℄ roadway.
4. Paving notch extension is required if existing diaphragm paving notch is < 6".
5. For details not shown, refer to Standard Plan B9-5.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

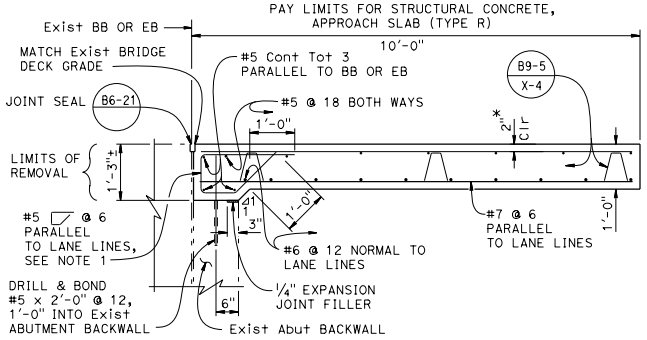
REGISTERED CIVIL ENGINEER

May 31, 2018

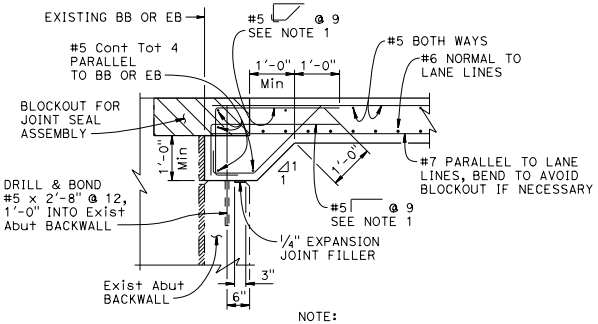
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER C.J. Sims No. C46471 Exp. 6-30-19 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

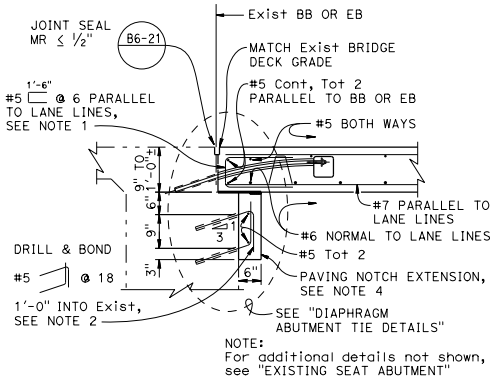


SEALED JOINT



NOTE:
For additional details not shown, see "SEALED JOINT"

JOINT SEAL ASSEMBLY

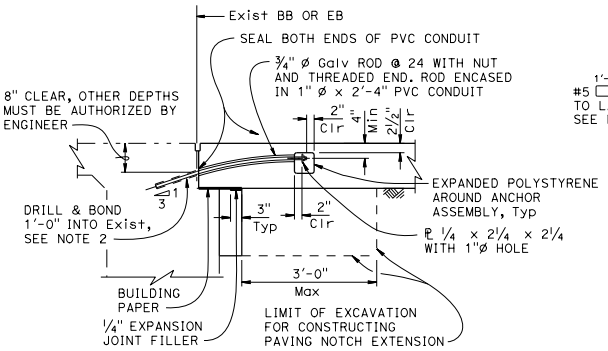


NOTE:
For additional details not shown, see "EXISTING SEAT ABUTMENT"

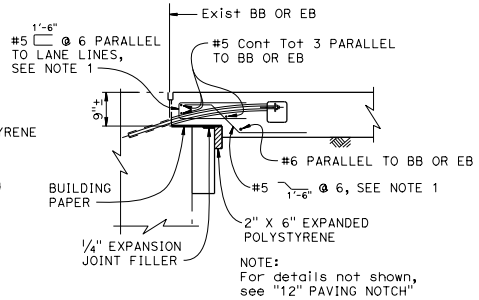
EXISTING DIAPHRAGM ABUTMENT

EXISTING SEAT ABUTMENT

SECTION A-A



12" PAVING NOTCH



NOTE:
For details not shown, see "12" PAVING NOTCH"

9" PAVING NOTCH

DIAPHRAGM ABUTMENT TIE DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE APPROACH TYPE R (10)

NO SCALE

B9-3

1-26-18

2018 STANDARD PLAN B9-3

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

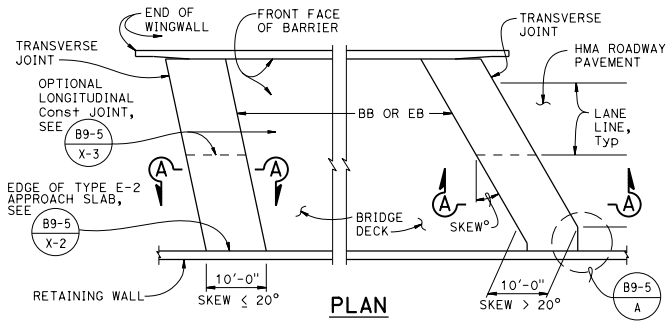
REGISTERED CIVIL ENGINEER

May 31, 2018

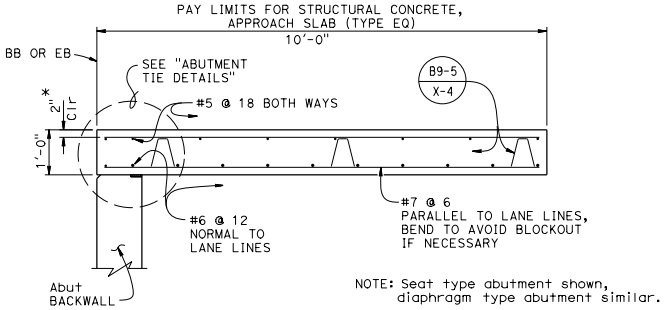
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — C.J. Sims — No. C46471 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



NOTE: Seat type abutment shown, diaphragm type abutment similar.

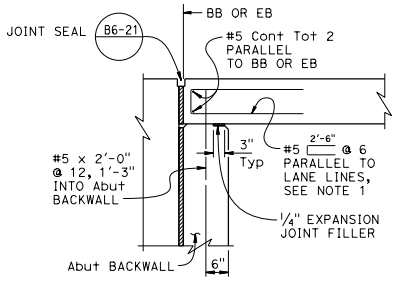
SECTION A-A

LEGEND:

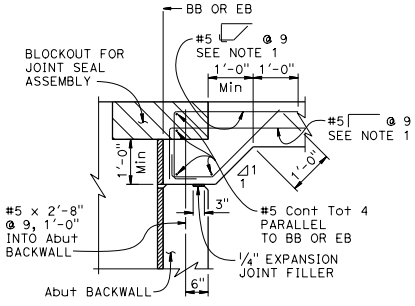
* - All approach slab reinforcement shall be epoxy coated and minimum top mat cover 2½" in Freeze-Thaw Area.

NOTES:

1. For MR ≤ 2", adjust reinforcement to clear sawcut for sealed joint. For MR > 2", reinforcement must be normal to BB or EB and spaced to avoid joint seal assembly anchorage.
2. At the Contractor's option, approach slab transverse reinforcement may be placed parallel to BB or EB. Spacing of transverse reinforcement is measured along ℄ roadway.
3. For details not shown, refer to Standard Plan B9-5.

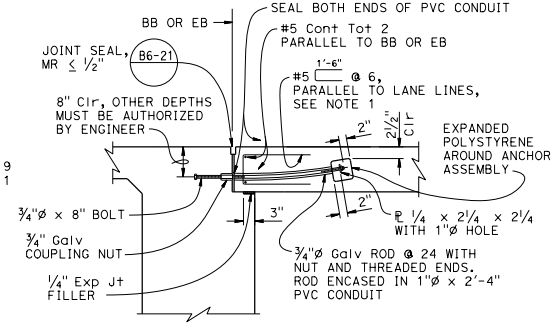


MR ≤ 2"



MR > 2"

SEAT TYPE ABUTMENT B9-5 C



DIAPHRAGM TYPE ABUTMENT

ABUTMENT TIE DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE APPROACH TYPE EQ (10)

NO SCALE

B9-4

1-26-18

Return to Table of Contents

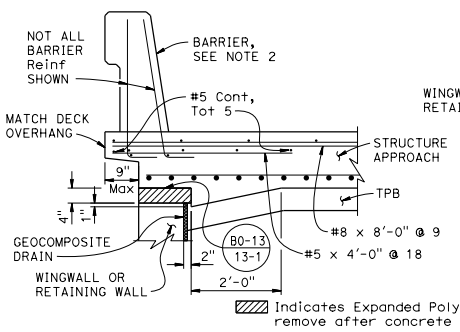
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

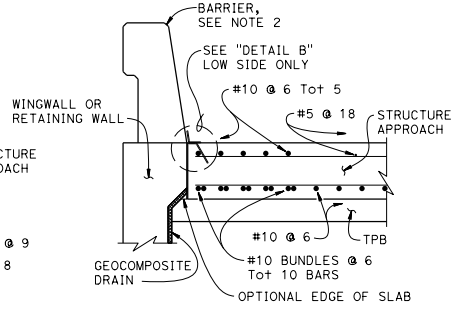
REGISTERED PROFESSIONAL ENGINEER — C.J. Sims — No. C46471 — Exp. 6-30-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



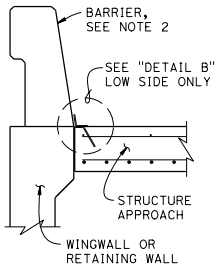
DETAIL X-1

TYPE E-1



DETAIL X-2

TYPE E-2



DETAIL X-2

TYPE R (10) & EQ

DESIGN NOTES

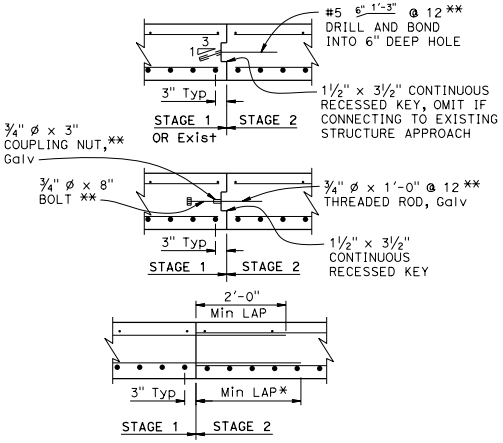
DESIGN: AASHTO LRFD Bridge Design Specifications, 2012 Edition with Caltrans Amendments, preface dated January 2014

LIMIT STATES: Service I, Strength I & II, Extreme II and Fatigue I (γ_{FAT} = 1.0)

DEAD LOAD: Includes 35 psf for future wearing surface

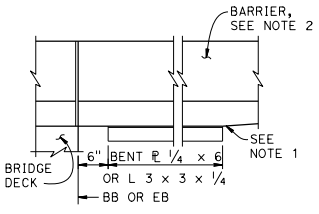
LIVE LOAD: HL93 and permit design load
Equivalent strip width method: W_1 = 12 ft
Slab span: L_1 = 24.5 ft (30 ft Approach Slab)
Slab span: L_1 = 7.83 ft (10 ft Approach Slab)

REINFORCED CONCRETE:
f_y = 60 ksi
f'_c = 3.6 ksi
n = 8

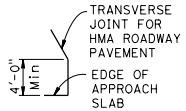


DETAIL X-3

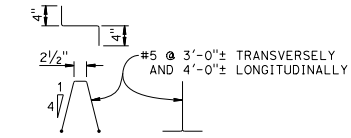
LONGITUDINAL CONSTRUCTION JOINT ALTERNATIVES



EDGE ANGLE PLAN

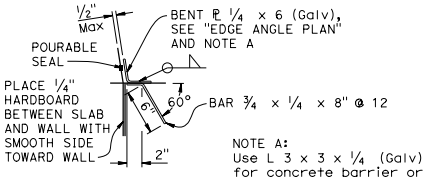


DETAIL A



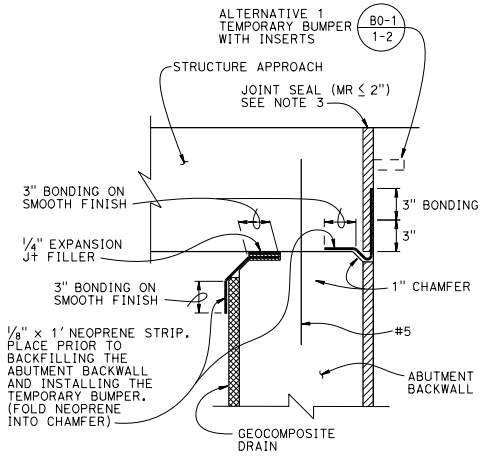
DETAIL X-4

BAR CHAIR DETAIL



NOTE A:
Use L 3 x 3 x ¼ (Galv) for concrete barrier or curb with vertical face.

DETAIL B



DETAIL C

LEGEND:

* Min lap splice for bottom Reinf in Freeze-Thaw Area shall be 3'-6".

** Threaded Rods and Dowels in Freeze-Thaw Area shall be stainless steel.

NOTES:

1. End the plate or edge angle at beginning of barrier transition, end of wingwall or end of structure approach as applicable.
2. Solid concrete barrier shown, details similar for all concrete and standard post-beam barriers.
3. Joint protection details shown for MR ≤ 2". Details similar when joint seal assembly is required.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE APPROACH SLAB DETAILS

NO SCALE

B9-5

1-26-18

Return to Table of Contents

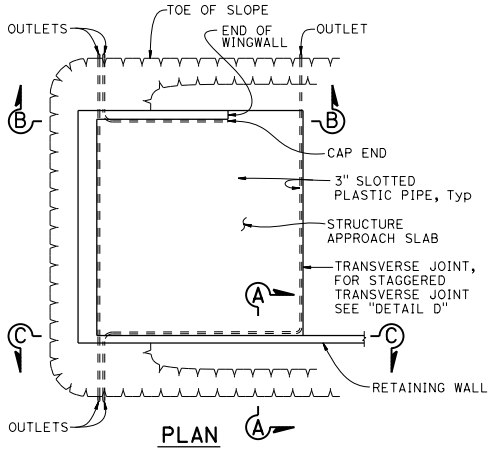
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

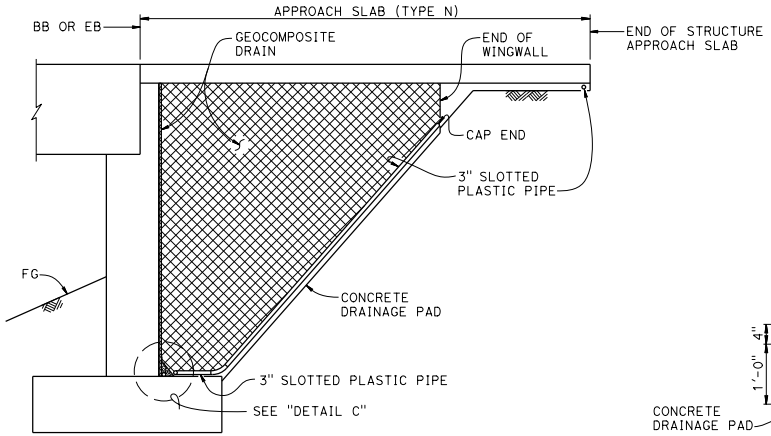
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
C.J. Sims
No. C46471
Exp. 6-30-19
CIVIL
STATE OF CALIFORNIA

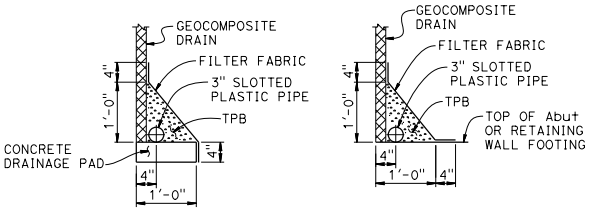
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

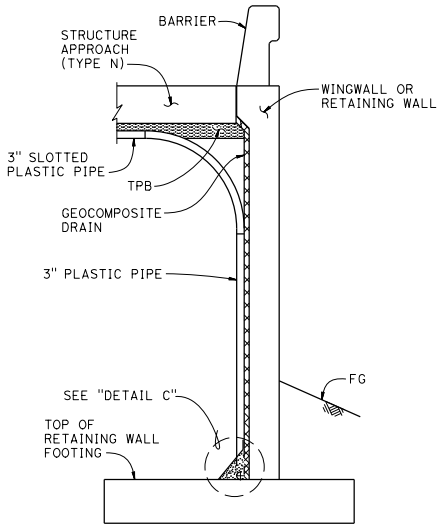


SECTION B-B

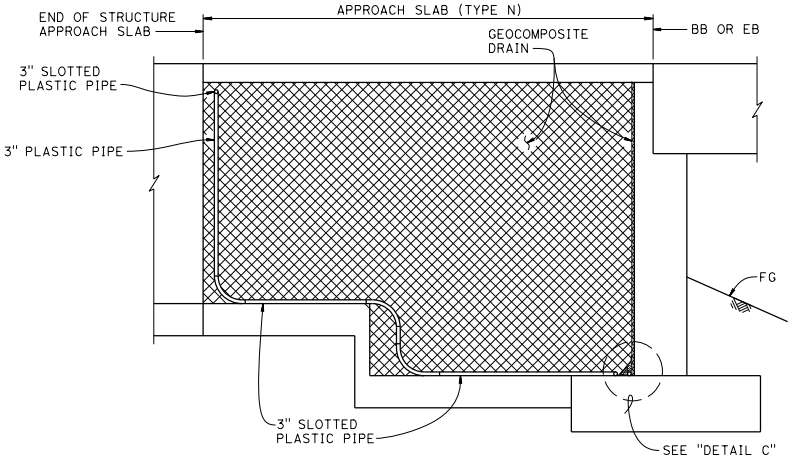


DRAINAGE PAD FOOTING

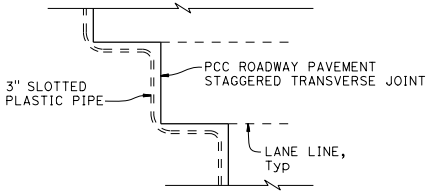
DETAIL C



SECTION A-A



SECTION C-C



DETAIL D

NOTES:

1. All bends in plastic pipe must have 3'-0" minimum radius. Plastic pipe used for bends is not required to be slotted.
2. For Approach Slab (Type N) details, refer to Standard Plan B9-1.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURE APPROACH DRAINAGE DETAILS

NO SCALE

B9-6

1-26-18

2018 STANDARD PLAN B9-6

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

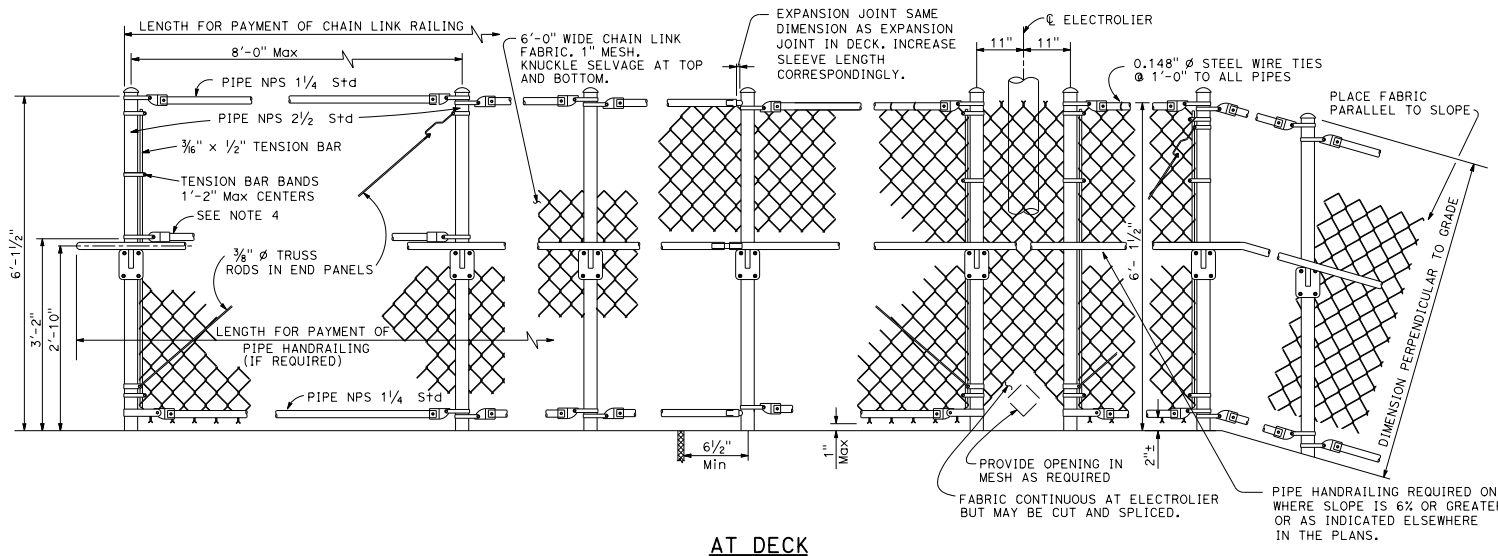
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



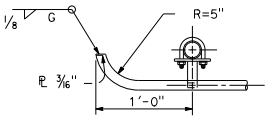
END POST

INTERMEDIATE POSTS

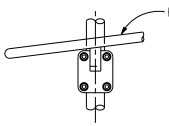
AT DECK EXPANSION JOINTS

AT ELECTROLIER

ON SLOPES

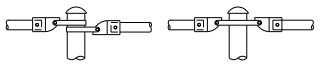


PLAN

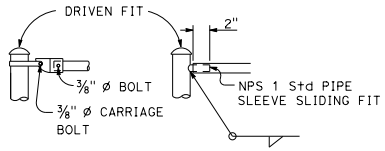


ELEVATION

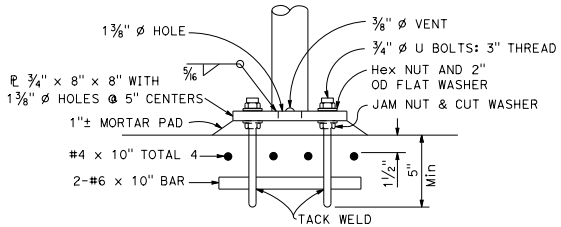
PIPE HANDRAILING AT END



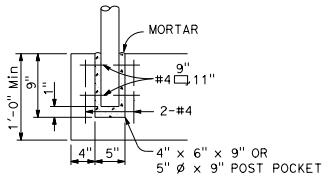
ALTERNATIVE DETAILS



TYPICAL CONNECTION DETAILS

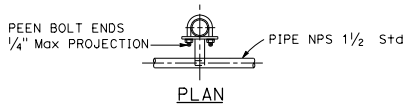


ANCHORAGE DETAIL

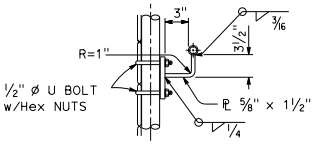


ALTERNATIVE ANCHORAGE DETAIL

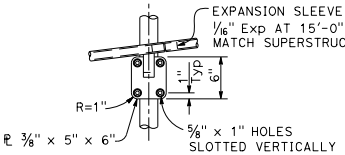
May be used when thickness of concrete is 1'-0" or more.



PLAN



SIDE VIEW



ELEVATION

PIPE HANDRAILING BRACKET

NOTES:

1. Peen all bolt threads.
2. Railing shall conform to horizontal and vertical alignment. Posts shall be vertical. Top and bottom pipes shall be bent if radius is 148'-0" or less; may be on 8'-0" chords if radius is over 148'-0".
3. When railing is on slope, 6'-0" chain link fabric shall be placed parallel to slope.
4. Additional pipe NPS 1¼ Std required when radius is less than 150'-0".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CHAIN LINK RAILING

NO SCALE

B11-7

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

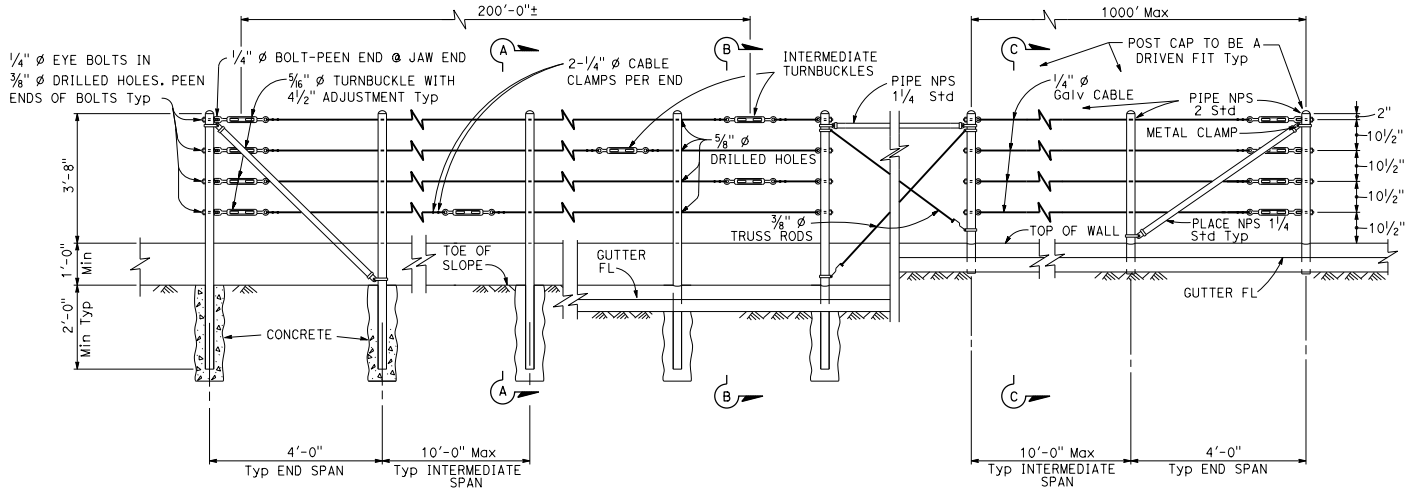
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

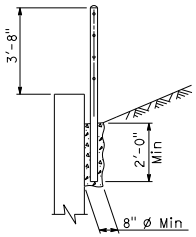


EXISTING WALL (WITHOUT GUTTER)
Existing

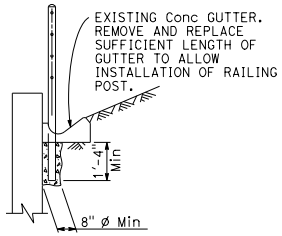
RETAINING WALL (WITH GUTTER)
Existing

RETAINING WALL (WITH GUTTER)
New construction

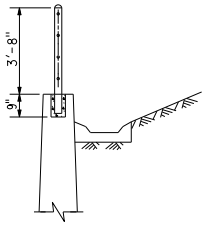
ELEVATION



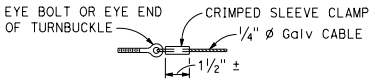
SECTION A-A
Existing



SECTION B-B
Existing



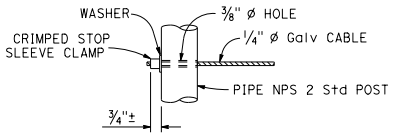
SECTION C-C
New construction



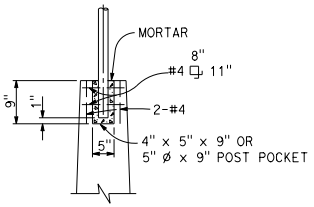
ALTERNATIVE CABLE CONNECTION

NOTES:

1. Maximum distance between turnbuckles shall be 200'-0"±.
2. Intermediate turnbuckles to be placed in adjacent spans.
3. Cable shall not be spliced between intermediate turnbuckles and end posts.
4. Posts to be vertical.
5. Alignment of holes in posts may vary to conform to slope of top of retaining wall.
6. The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
7. Line posts shall be braced horizontally and trussed diagonally in both directions at intervals not to exceed 1000'.
8. Post pockets to be centered in top of wall.
9. Typical end spans, braced in both directions, shall be constructed at changes in line where the angle of deflection is 15° or more.



ALTERNATIVE DEAD END ANCHORAGE



POST POCKET

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CABLE RAILING

NO SCALE

B11-47

1-26-18

2018 STANDARD PLAN B11-47

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

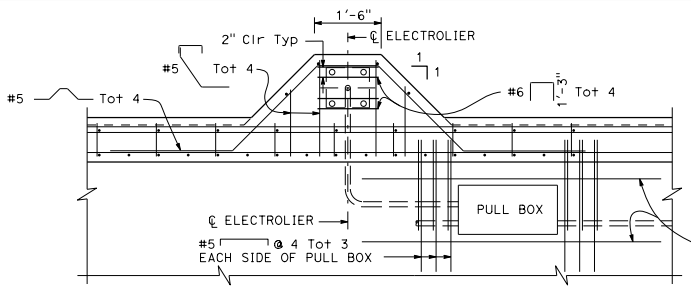
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

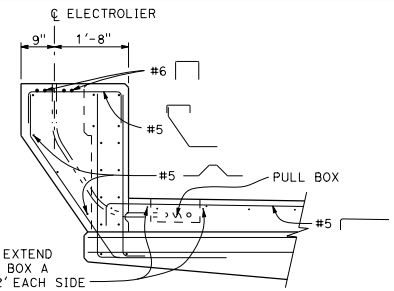
Tiliat Satter
No. C42892
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

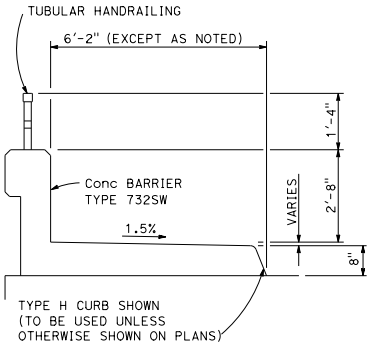
ELECTROLIER PEDESTAL DETAILS



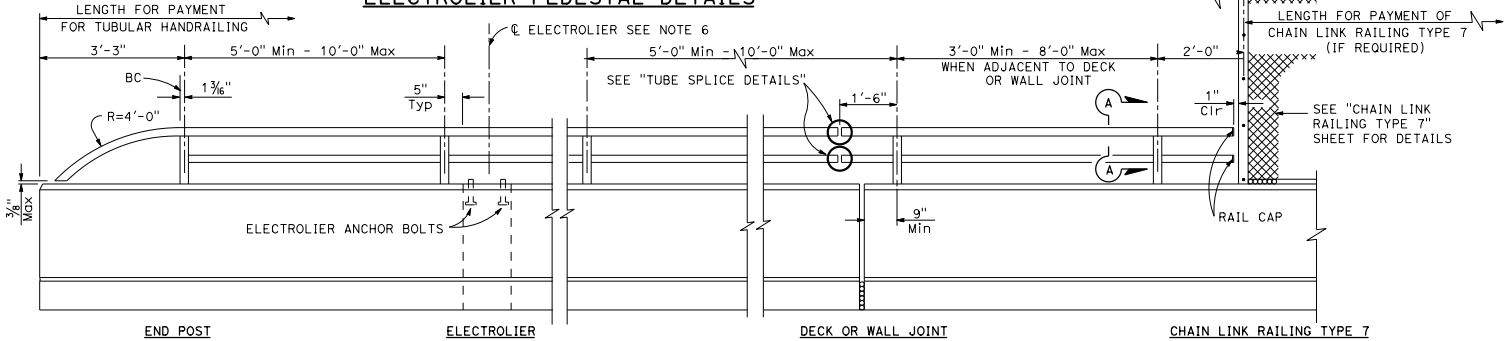
PLAN



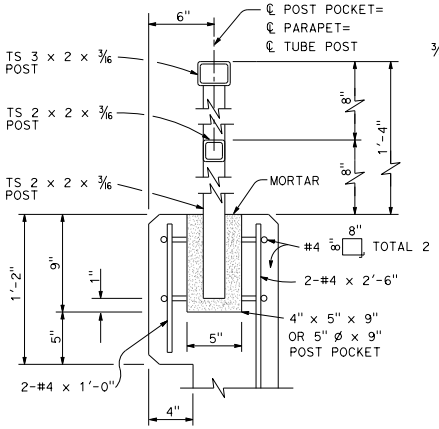
SECTION B-B



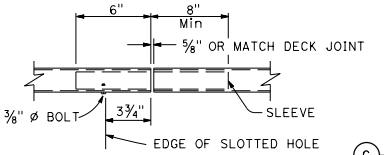
TYPICAL SECTION



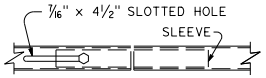
RAIL CAP
TS 3" x 2" x 0.1875" similar



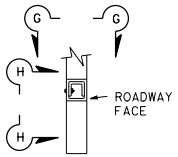
POST ANCHORAGE DETAILS



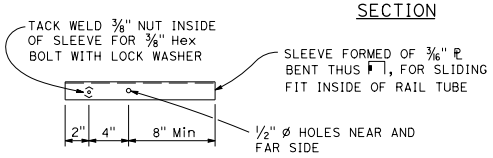
VIEW G-G



VIEW H-H



SECTION

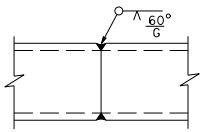


SLEEVE

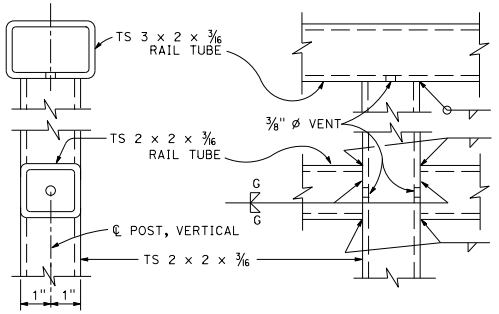
TUBE SPLICE DETAILS
TS 3 x 2 x 3/16 similar

NOTES:
3/8" Nut tack welded to sleeve may be replaced by drilled and tapped hole in sleeve.

ELEVATION



TUBE-WELDED SPLICE



SECTION A-A ELEVATION

RAIL CONNECTION DETAILS

NOTES:

1. Post shall be normal to railing.
2. Rail tubes shall be shop bent or fabricated to fit horizontal curve when radius is less than 950'.
3. Tube splices shall be located in the tubes spanning deck or wall joints. Increase joint width in tubes to match expansion joint width and increase sleeve length correspondingly.
4. Top rail tube shall be continuous over not less than two posts except a short post spacing is permitted near deck or wall joints, electroliers, or other rail discontinuities as noted.
5. For details and reinforcement not shown see Standard Plan B11-54.
6. For electrolier mounting details, see Standard Plans ES-6A and ES-6B.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TUBULAR HANDRAILING

NO SCALE

B11-51

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

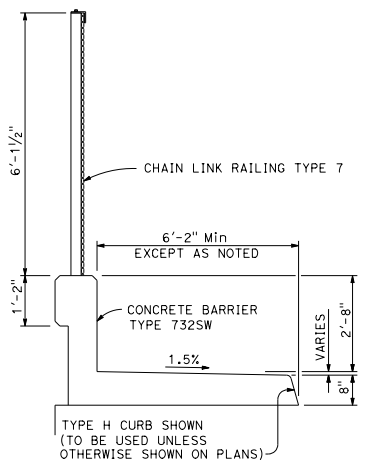
REGISTERED CIVIL ENGINEER

May 31, 2018

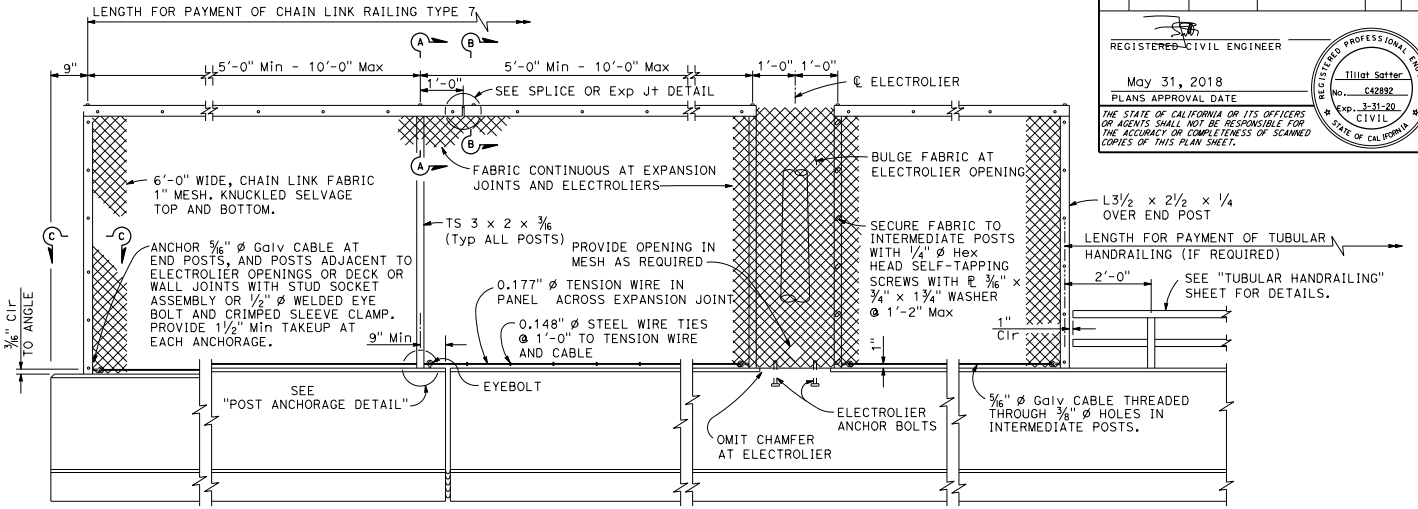
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

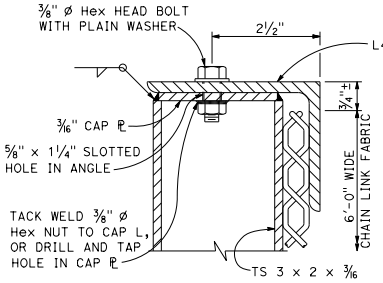
REGISTERED PROFESSIONAL ENGINEER — Elliot Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



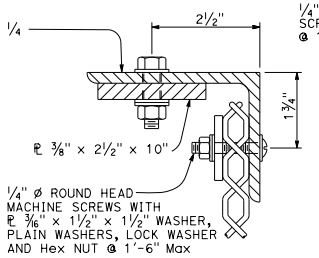
TYPICAL SECTION



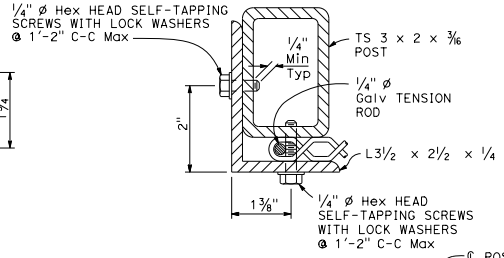
ELEVATION



SECTION A-A



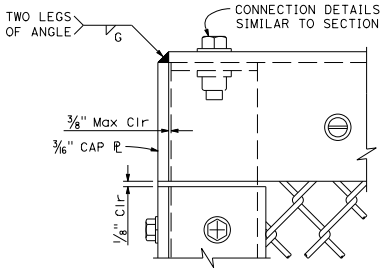
SECTION B-B



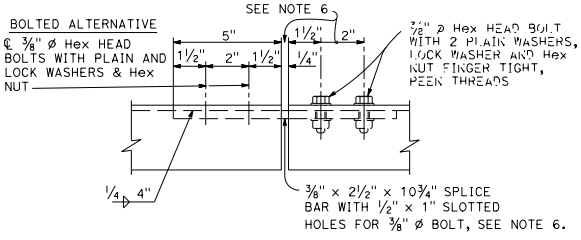
SECTION C-C

NOTES:

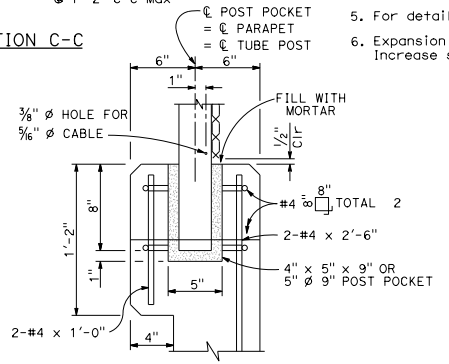
1. Posts shall be vertical.
2. Railing shall conform to horizontal and vertical alignment. When railing is placed on a curved horizontal alignment with radius of 148'-0" or less, thread the 5/16" Ø cable through 3/8" Ø welded eye rods embedded 4" into the top of the concrete parapet and equally spaced to limit the midordinate distance between the 5/16" Ø cable and the curve to 1" maximum. Horizontal angle shall be bent to conform to horizontal alignment if radius is 148'-0" or less and may be on 10'-0" chords if radius is over 148'-0"
3. Horizontal angle shall be continuous over not less than two intermediate posts, except that a shorter length is permitted at expansion joints, electroliers and other rail discontinuities.
4. When rail is on slope, place fabric parallel to slope.
5. For details and reinforcement not shown see Standatd Plan B11-54.
6. Expansion joint same dimension as expansion joint in deck or wall. Increase slotted hole length and splice bar length correspondingly.



END POST ELEVATION



SPLICE OR EXPANSION JOINT DETAIL



POST ANCHORAGE DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

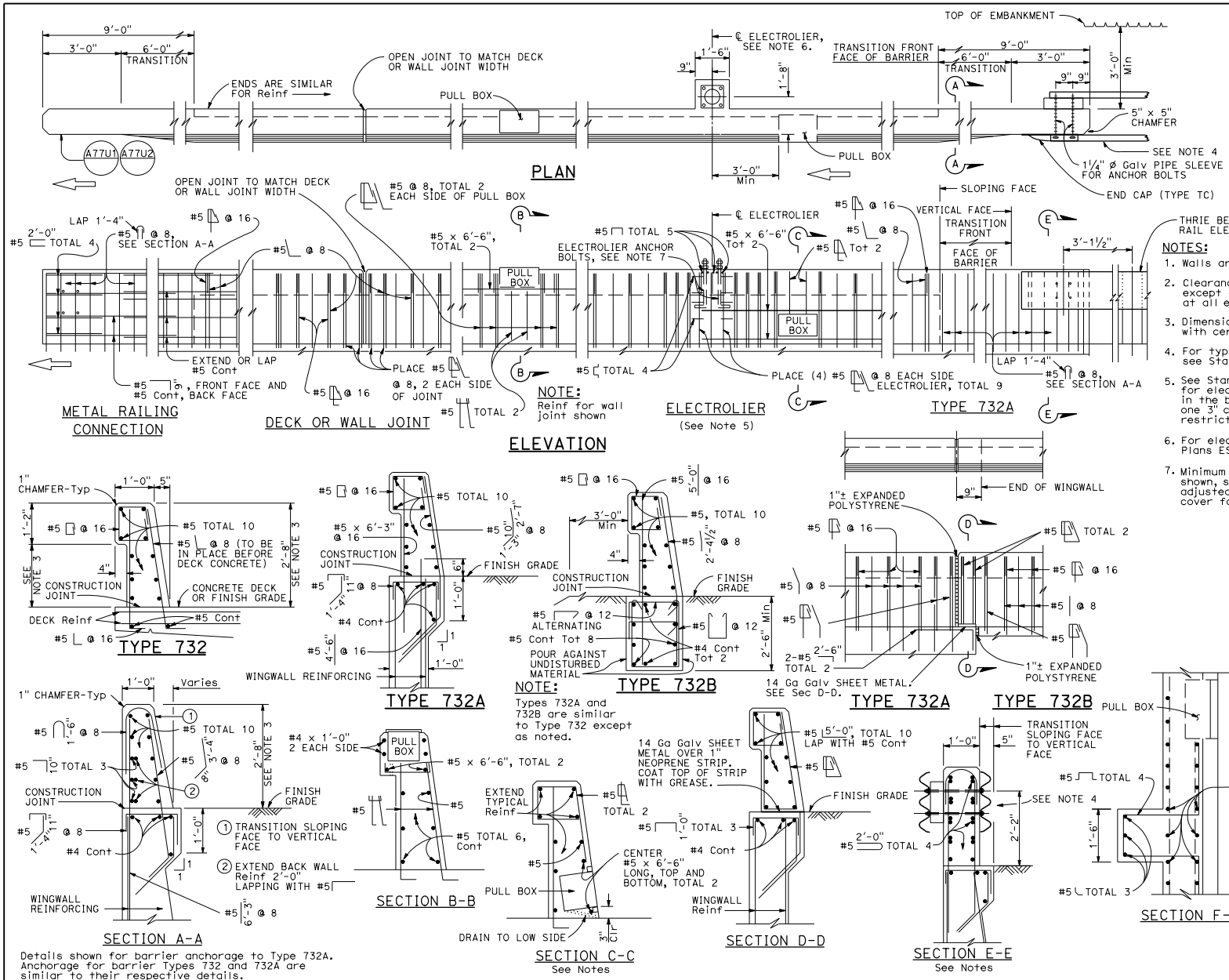
CHAIN LINK RAILING TYPE 7

NO SCALE

B11-52

1-26-18

Return to Table of Contents



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

NOTES:

1. Walls are to be backfilled before barrier is placed.
2. Clearance to reinforcing steel in barrier to be 1", except as noted. Longitudinal reinforcement to stop at all expansion joints.
3. Dimensions may vary with roadway cross slope and with certain thickness of surfacing. See Project Plans.
4. For typical metal railing connection details not shown, see Standard Plans A77U1 and A77U2.
5. See Standard Plans ES-9A, ES-9B, ES-9C, ES-9D and ES-9E for electrical details. The maximum number of conduits in the barrier is limited to two 2" conduits along with one 3" conduit. When a 3" conduit is used, it is restricted to the base of the barrier.
6. For electrolier mounting details, See Standard Plans ES-6A and ES-6B.
7. Minimum concrete edge distance, to the reinforcing shown, shall be maintained. Edge distance may be adjusted to accommodate increase in concrete cover for architectual treatment.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 732

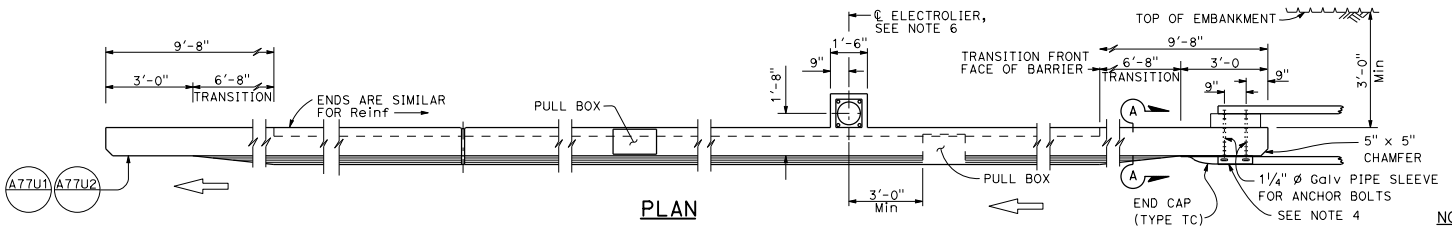
NO SCALE

B11-55

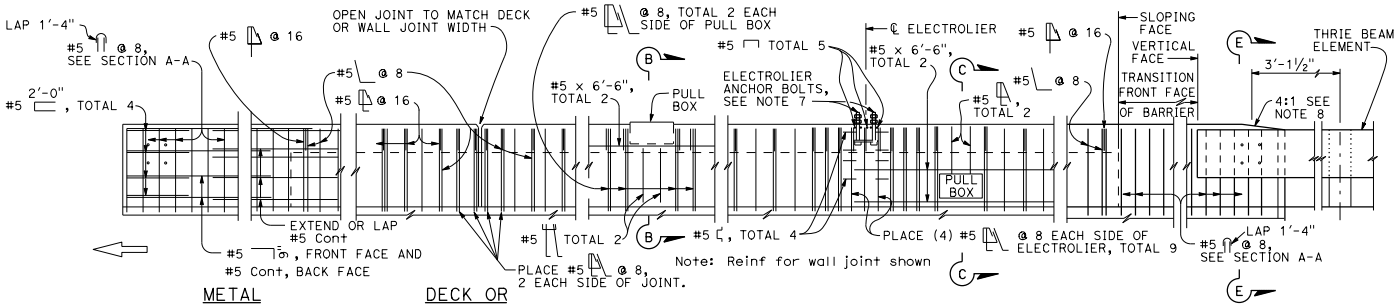
2018 STANDARD PLAN B11-55

1-26-18

Return to Table of Contents

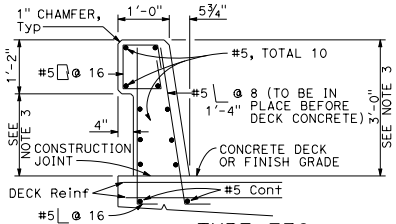


PLAN

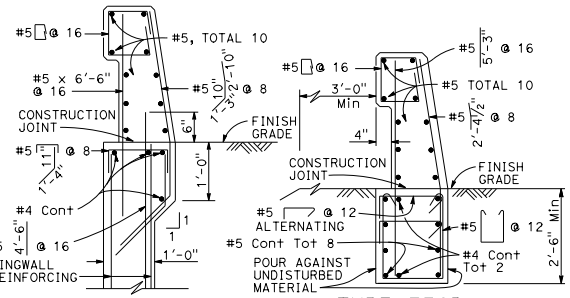


METAL RAILING CONNECTION | DECK OR WALL JOINT | ELECTROLIER (See Note F) | TYPE 736A

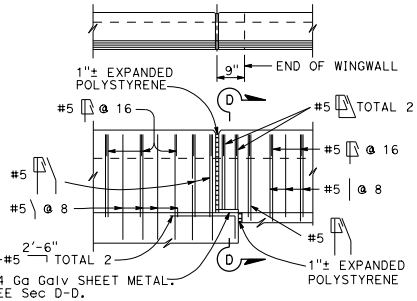
ELEVATION



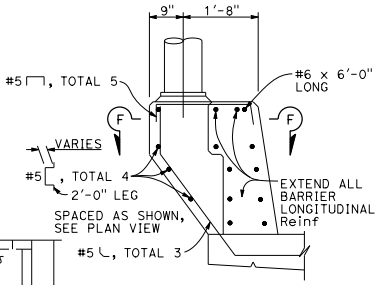
TYPE 736



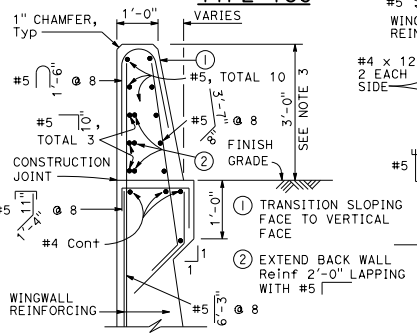
TYPE 736A | TYPE 736B



TYPE 736A | TYPE 736B

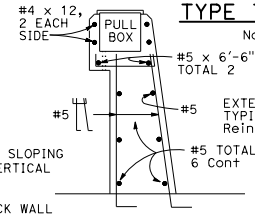


PEDESTAL ELEVATION



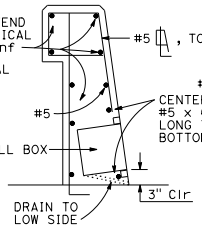
SECTION A-A

Details shown for barrier anchorage to Type 736A. Anchorgae for barrier Types 736 and 736B are similar to their respective details.



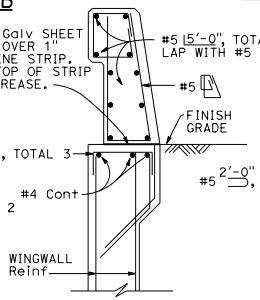
SECTION B-B

Note: Types 736A & 736B are similar to Type 736 except as noted

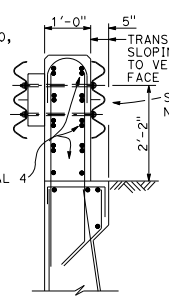


SECTION C-C

See Notes

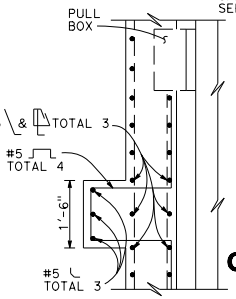


SECTION D-D



SECTION E-E

See Notes



SECTION F-F

NOTES:

1. Walls are to be backfilled before barrier is placed.
2. Clearance to reinforcing steel in barrier to be 1", except as noted. Longitudinal reinforcement to stop at all expansion joints.
3. Dimensions may vary with roadway cross slope and with certain thickness of surfacing. See Project Plans.
4. For typical metal railing connection details not shown, see Standard Plans A77U1 and A77U2.
5. See Standard Plans ES-9A, ES-9B, ES-9C, ES-9D and ES-9E for electrical details. The maximum number of conduits in the barrier is limited to two 2" conduits along with one 3" conduit. When a 3" conduit is used, it is restricted to the base of the barrier.
6. For electrolier mounting details, See Standard Plans ES-6A and ES-6B.
7. Minimum concrete edge distance, to the reinforcing shown, shall be maintained. Edge distance may be adjusted to accommodate increase in concrete cover for architectual treatment.
8. Taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam rail element.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 736

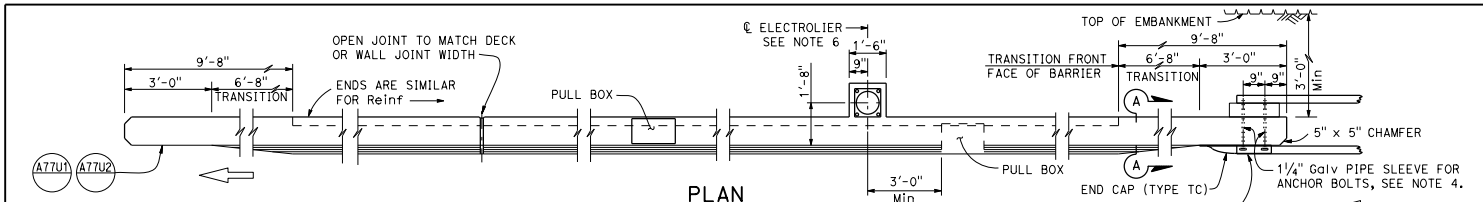
NO SCALE

B11-56

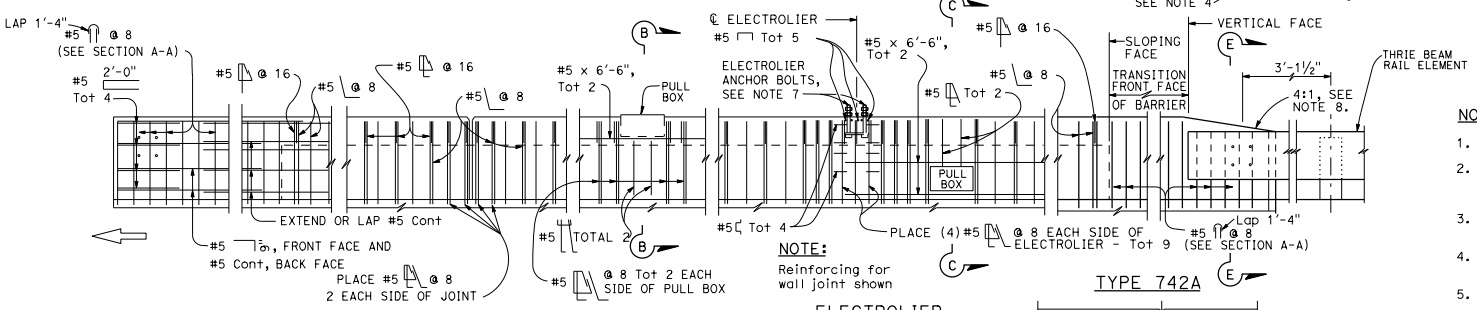
1-26-18

2018 STANDARD PLAN B11-56

Return to Table of Contents



PLAN



METAL RAILING CONNECTION

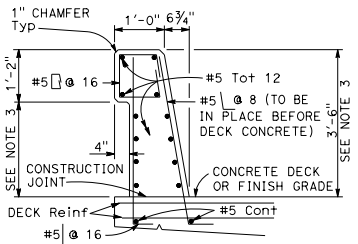
DECK OR WALL JOINT

ELEVATION

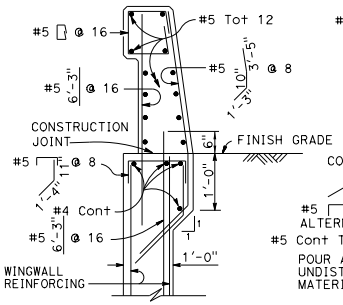
NOTE:
Reinforcing for wall joint shown

ELECTROLIER
(See Note 5)

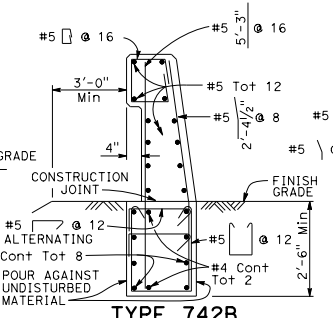
TYPE 742A



TYPE 742

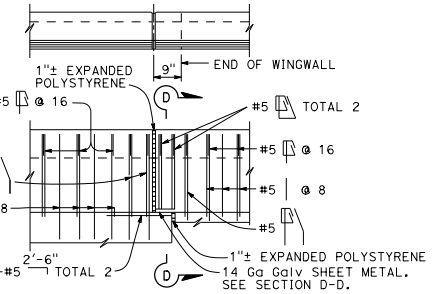


TYPE 742A

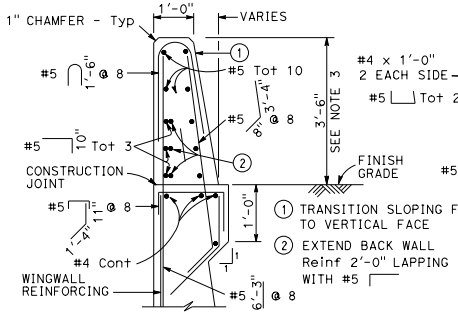


TYPE 742B

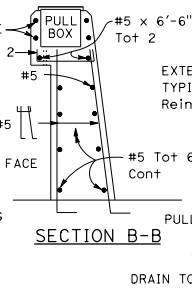
NOTE:
Types 742A & 742B are similar to Type 742 except as noted



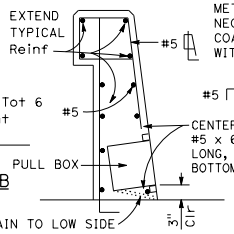
TYPE 742A TYPE 742B



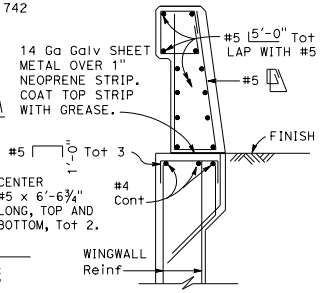
SECTION A-A



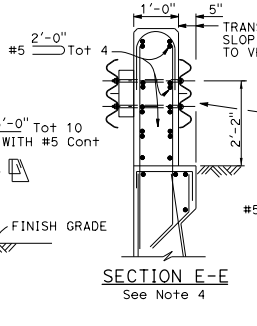
SECTION B-B



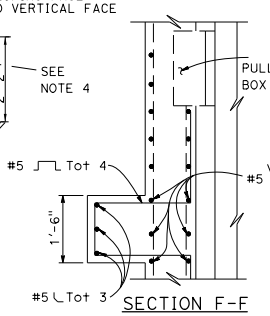
SECTION C-C
See Notes



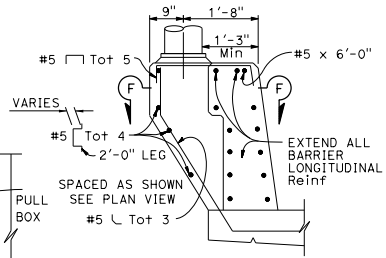
SECTION D-D



SECTION E-E
See Note 4



SECTION F-F



PEDESTAL ELEVATION

Details shown for barrier anchorage to Type 742A. Anchorage for barrier Types 742 and 742A are similar to their respective details.

NOTES:

1. Walls are to be backfilled before barrier is placed.
2. Clearance to reinforcing steel in barrier to be 1", except as noted. Longitudinal reinforcement to stop at all expansion joints.
3. Dimensions may vary with roadway cross slope and with certain thickness of surfacing. See Project Plans.
4. For typical metal railing connection details not shown, see Standard Plans A77U1 and A77U2.
5. See Standard Plans ES-9A, ES-9B, ES-9C, ES-9D and ES-9E for electrical details. The maximum number of conduits in the barrier is limited to two 2" conduits along with one 3" conduit. When a 3" conduit is used, it is restricted to the base of the barrier.
6. For electrolier mounting details, See Standard Plans ES-6A and ES-6B.
7. Minimum concrete edge distance, to the reinforcing shown, shall be maintained. Edge distance may be adjusted to accommodate increase in concrete cover for architectural treatment.
8. Taper the top of the end of the bridge railing at 4:1 to match the top elevation of the thrie beam rail element.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Tiliat Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 742

NO SCALE

B11-57

1-26-18

2018 STANDARD PLAN B11-57

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

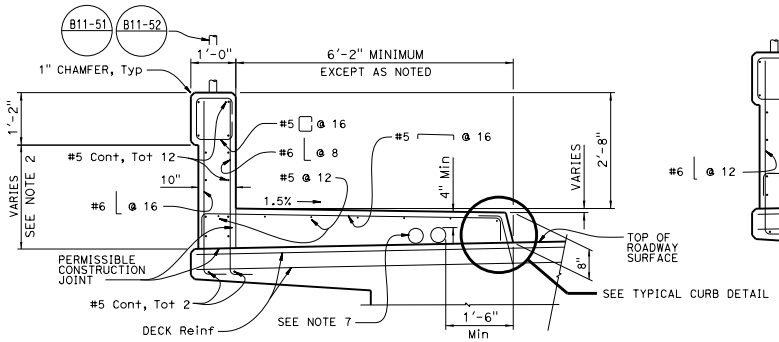
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

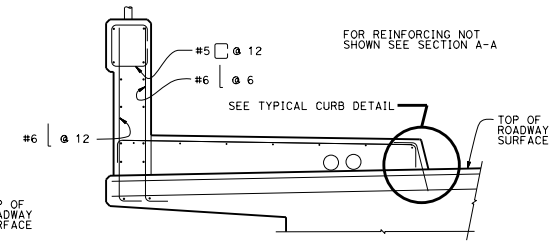
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tillat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



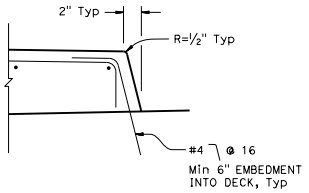
SECTION A-A

TYPICAL SECTION ON DECK

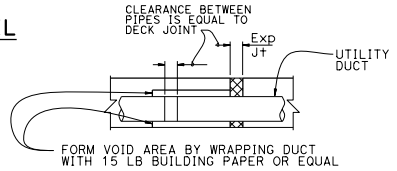


SECTION B-B

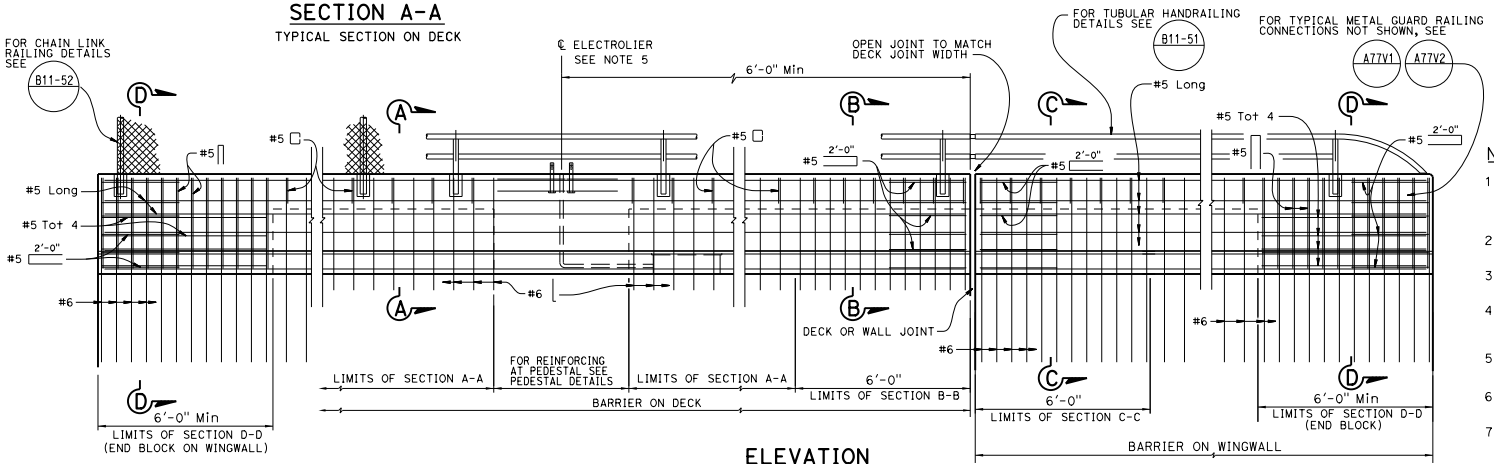
TYPICAL SECTION AT JOINTS



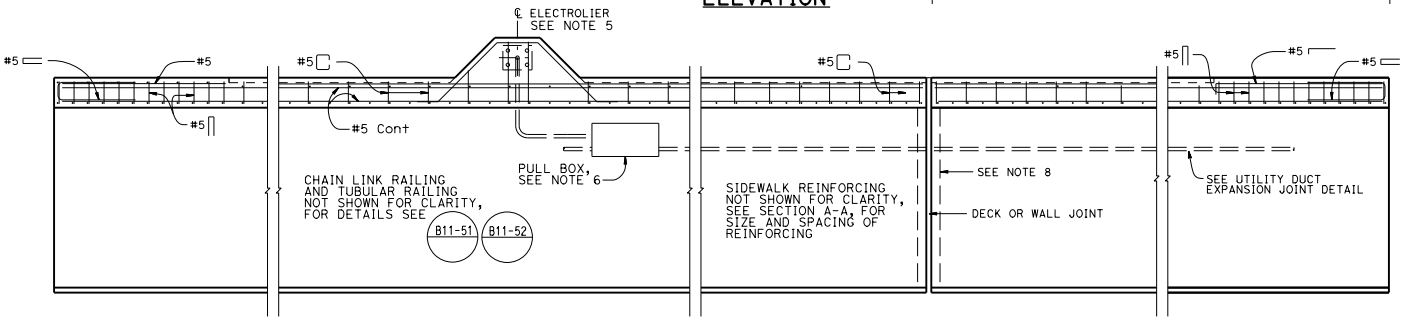
TYPICAL CURB DETAIL



UTILITY DUCT EXPANSION JOINT



ELEVATION



PLAN

NOTES:

1. This barrier is to be used only for posted speeds of 45 MPH or less. For speeds greater than 45 MPH, pedestrians must be protected by a separation traffic barrier.
2. Dimensions will vary with cross slope and surfacing thickness. See Project Plans.
3. Walls must be backfilled before curb and parapet is placed.
4. Clearance to reinforcing steel in curb and railing is 2" except as noted. Longitudinal reinforcement to stop at all expansion joints.
5. See Project Plans for electrolier locations and pull box type.
6. For electrical details, see Standard Plans ES-9A, ES-9B, ES-9C, ES-9D, and ES-9E.
7. A minimum of two - 4" round openings for future utilities. A maximum six - 4" round openings for a 6'-2" sidewalk. One - 4" round opening can be added for each additional 1'-0" of sidewalk width. Utility opening must be a minimum of 6" from face of barrier parapet. Openings are to be sealed at ends and extended 8" minimum past end of sidewalk if not used. Duct forms are to be tied down. For exact number and placement of utility openings see other details. Minimum 2" clear between conduits.
8. See Project Plans for "Joint Armor For Pedestrian Walkways" details.
9. Tubular hand railing and chain link railing continuous at pedestal.
10. For details and reinforcement not shown, see Standard Plan B11-59.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 732SW (SHEET 1 OF 2)

NO SCALE

B11-58

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

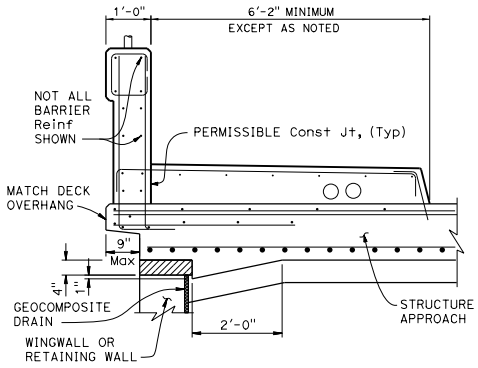
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

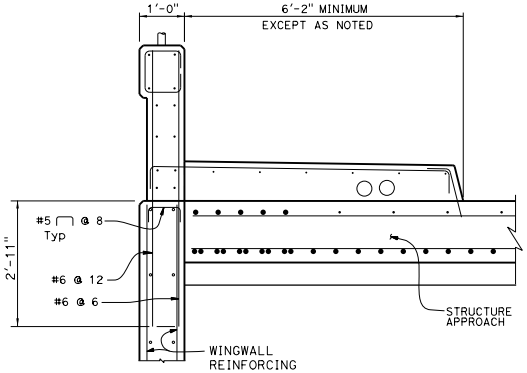
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

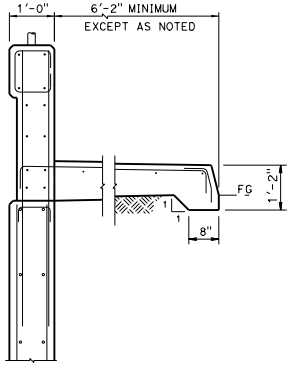


TYPE E-1 (B9-5)

WITH STRUCTURE APPROACH



TYPE E-2 (B9-5)



WITHOUT STRUCTURE APPROACH

LEGEND:

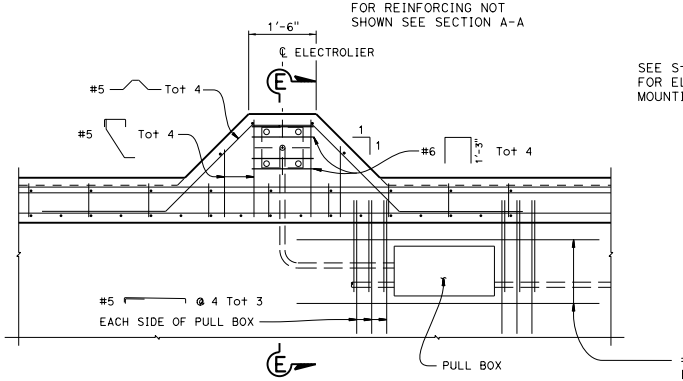
Indicates Expanded Polystyrene, remove after concrete is placed.

NOTE:

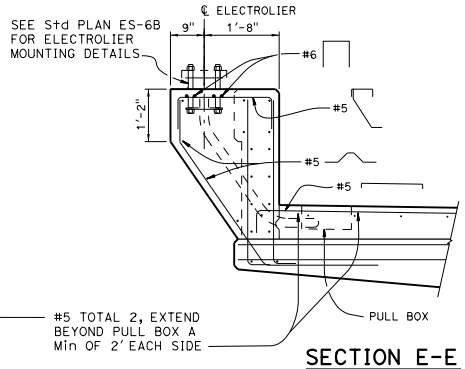
1. For details not shown, see Standard Plan B11-58.

SECTION C-C

For details not shown see SECTION B-B

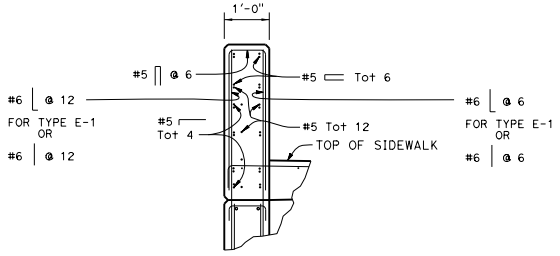


PEDESTAL PLAN



SECTION E-E

PEDESTAL DETAILS



NOTE:

FOR SIDEWALK, STRUCTURE APPROACH, WINGWALL OR RETAINING WALL SEE SECTION C-C

SECTION D-D

END BLOCK

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 732SW (SHEET 2 OF 2)

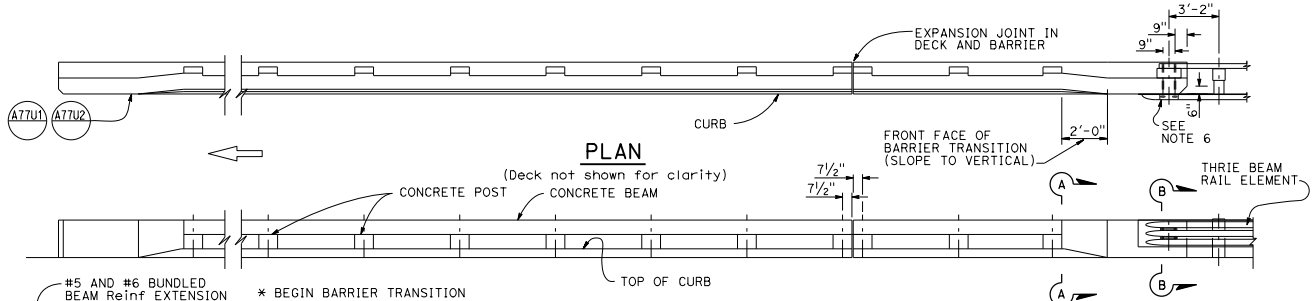
NO SCALE

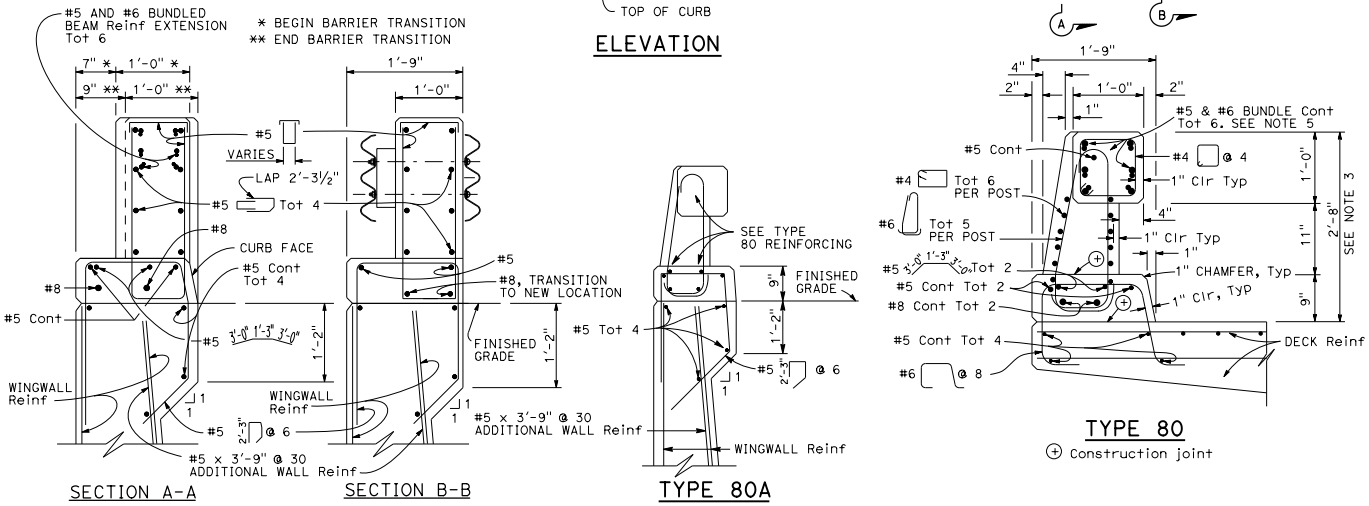
B11-59

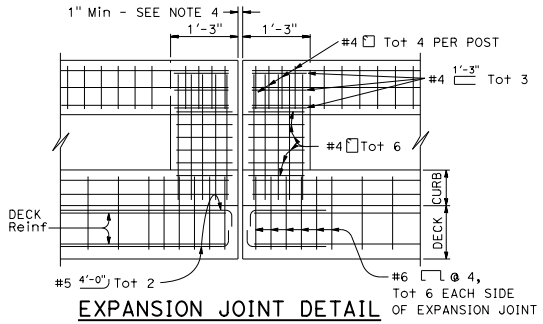
1-26-18

2018 STANDARD PLAN B11-59

Return to Table of Contents

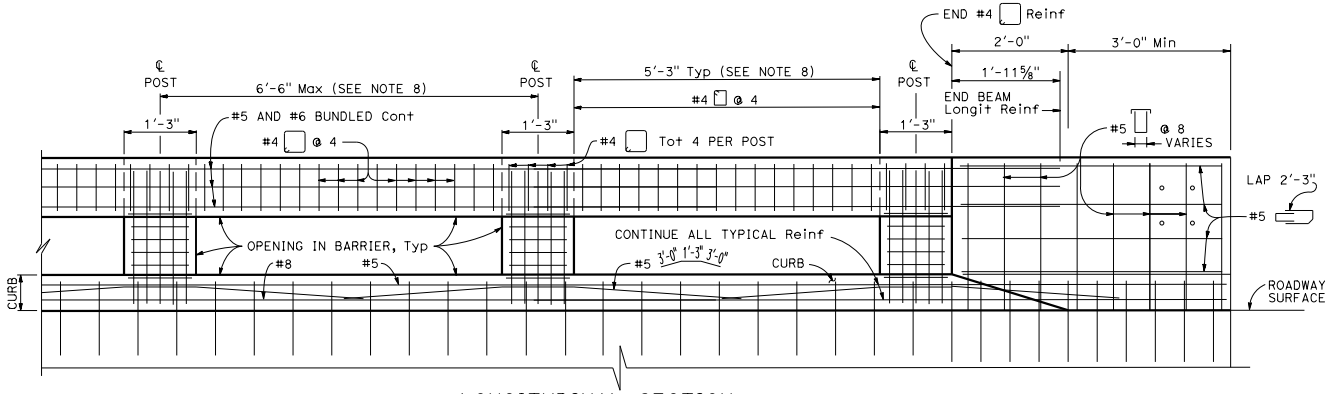






NOTES:

1. Walls are to be backfilled before the barrier is placed.
2. Longitudinal reinforcing steel to stop at all expansion joints.
3. The front face dimensions are to be constant above the finish roadway profile, but the overall height will vary with certain thicknesses of surfacing and roadway slopes.
4. Expansion joint to match deck joint.
5. No lap splicing allowed on the longitudinal rail reinforcing. Splicing shall be staggered.
6. For typical metal railing connection details not shown, see Standard Plans A77U1 and A77U2.
7. Chain link railing is not allowed on Type 80 Barriers.
8. Post to be spaced equally, typically 6'-6" spacing. Post spacing may be reduced where location of hinges or expansion joints or the length of wingwalls will not accommodate the 6'-6" spacing. Maximum see-through availability is to be strived for, where 6'-6" post spacing can not be achieved.



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 80 (SHEET 1 OF 2)

NO SCALE

B11-60

1-26-18

2018 STANDARD PLAN B11-60

Return to Table of Contents

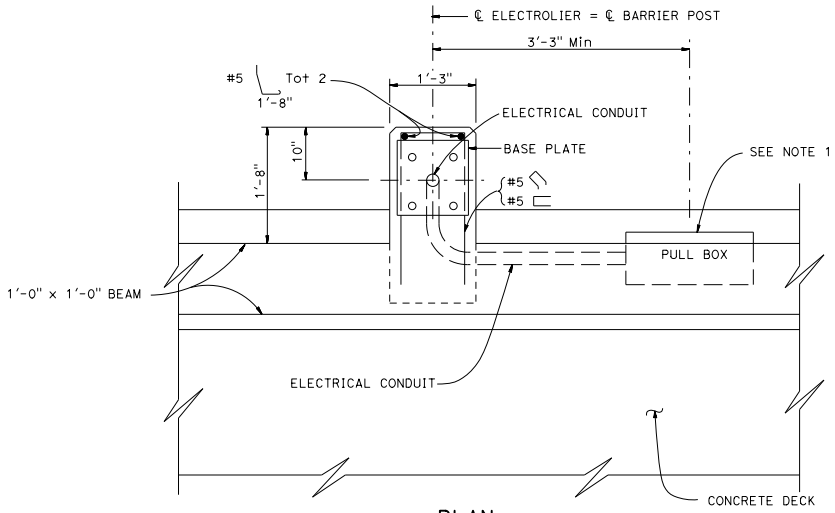
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

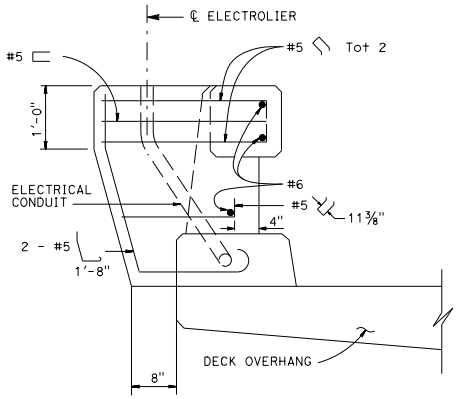
Tiligt Satter
No. C42892
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

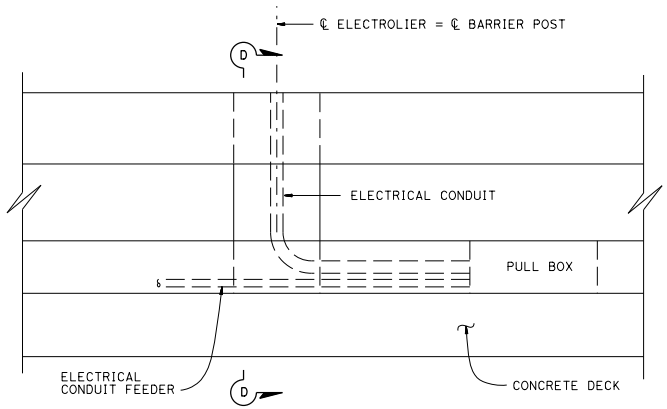


PLAN

Bend #5 and #8 Reinf in curb as required to clear pull box.



SECTION D-D



ELEVATION

BARRIER MODIFICATION FOR ELECTROLIER

See Note 4

ELECTROLIER NOTES:

1. See Project Plans for electrolier and pull box locations.
2. For electrical details, see Standard Plans ES-9A, ES-9B, ES-9C, ES-9D, and ES-9E.
3. This barrier is designed to accommodate only two 1½" electrical conduit for electroliers on the structure. Any transporting of larger conduit is restricted to within the structure.
4. Only the additional reinforcing for the electrolier pedestal is shown. For other typical reinforcing for Type 80 Barrier, see Standard Plan B11-60.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 80 (SHEET 2 of 2)

NO SCALE

B11-61

1-26-18

2018 STANDARD PLAN B11-61

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

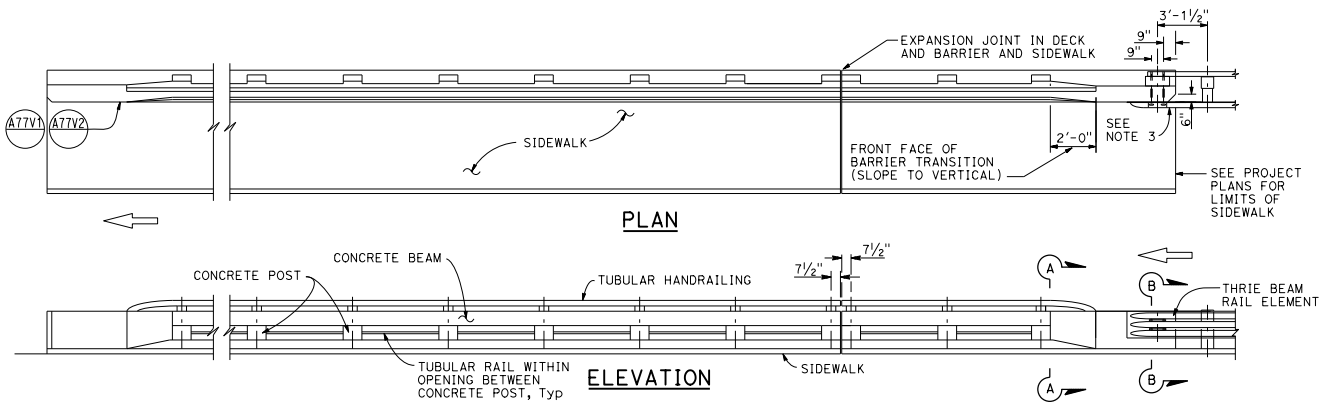
REGISTERED CIVIL ENGINEER

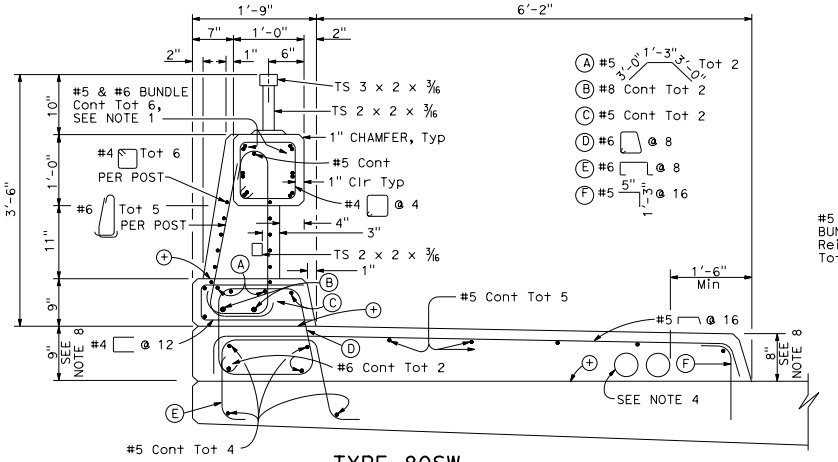
May 31, 2018

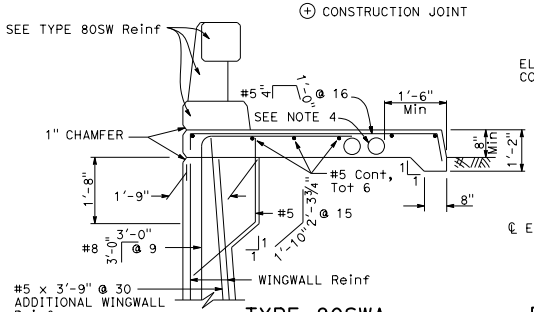
PLANS APPROVAL DATE

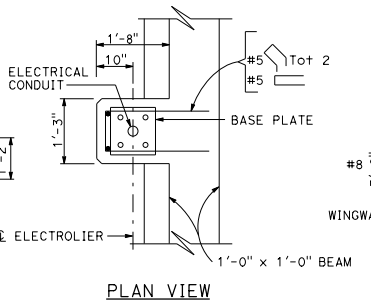
REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

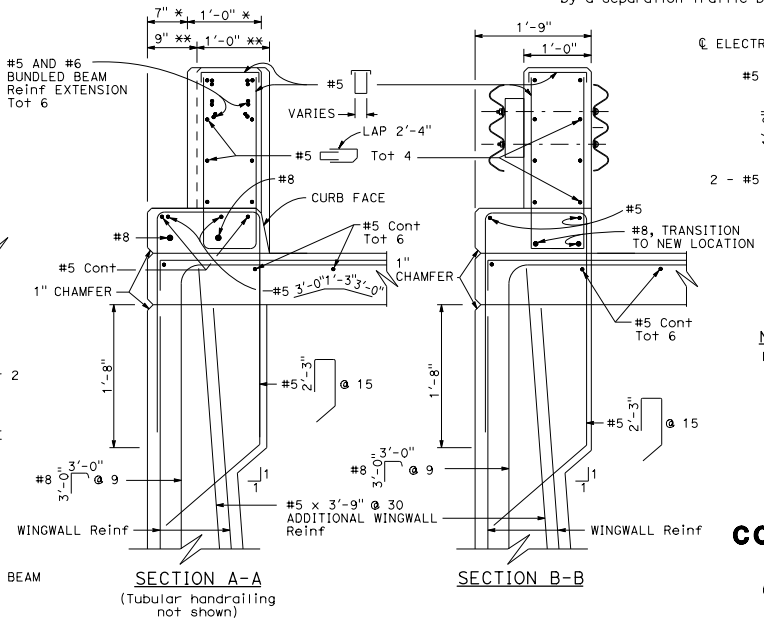
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





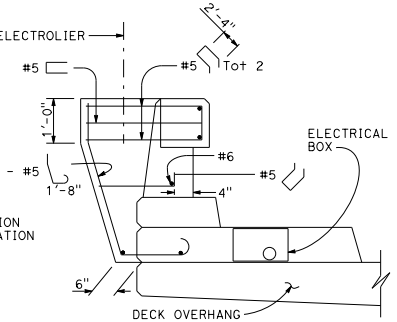






NOTES:

1. No lap splicing allowed on the longitudinal rail reinforcing. Splicing shall be staggered.
2. For electrical details, see Standard Plans ES-9A, ES-9B, ES-9C, ES-9D and ES-9E. See Project Plans for electrical layout.
3. For typical metal railing connection details not shown, see Standard Plans A77V1 and A77V2.
4. A maximum of five - 4" and a minimum of two - 4" round openings for future utilities. Openings are to be sealed at ends and extended 8" minimum past end of sidewalk if not used. Duct forms are to be tied down. Minimum of 6" from face of rail to utility opening. See Standard Plan B14-3 for minimum spacing between conduits and for conduit details at joints.
5. Chain link railing is not allowed on Type 80SW Barrier.
6. Walls are to be backfilled before railing is placed.
7. Terminate all longitudinal curb, sidewalk, and deck reinforcement in standard 90° hooks.
8. Dimensions will vary with cross slope and with certain thickness of surfacing.
9. Expansion joint to match deck joint, see Standard Plan B11-63 for expansion joint details.
10. This barrier is to be used only for speeds of 45 MPH or less. For speeds greater than 45 MPH, pedestrians should be protected by a separation traffic barrier.



NOTE:
Pedestal design for 1'-0" base plate.

BARRIER MODIFICATION FOR ELECTROLIER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 80SW (SHEET 1 OF 3)

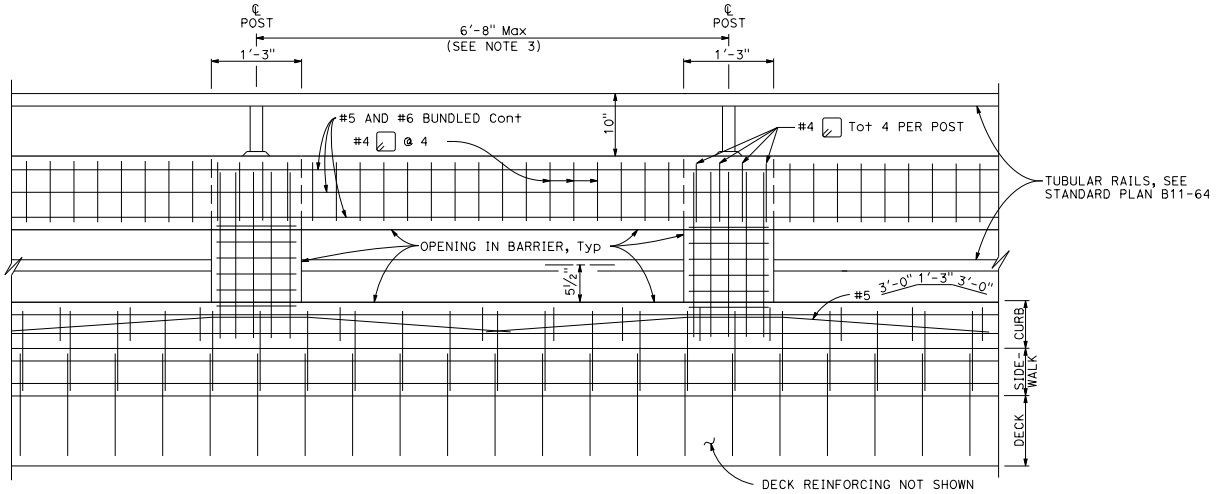
NO SCALE

B11-62

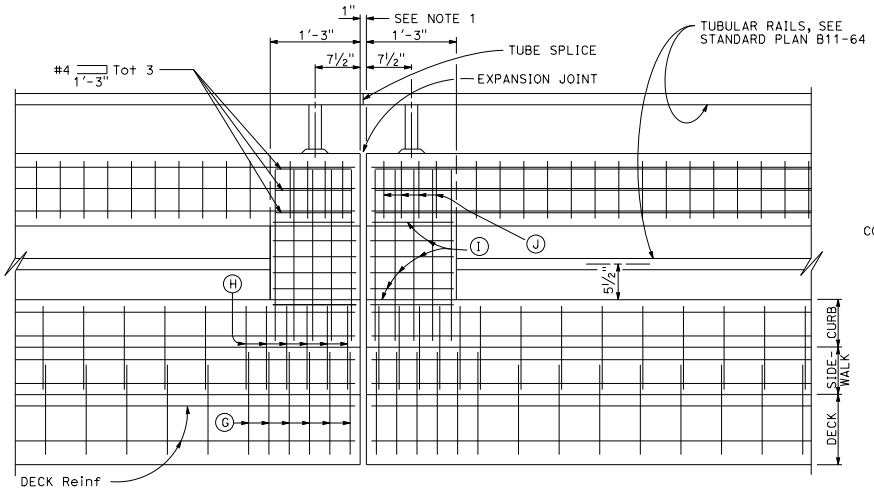
2018 STANDARD PLAN B11-62

1-26-18

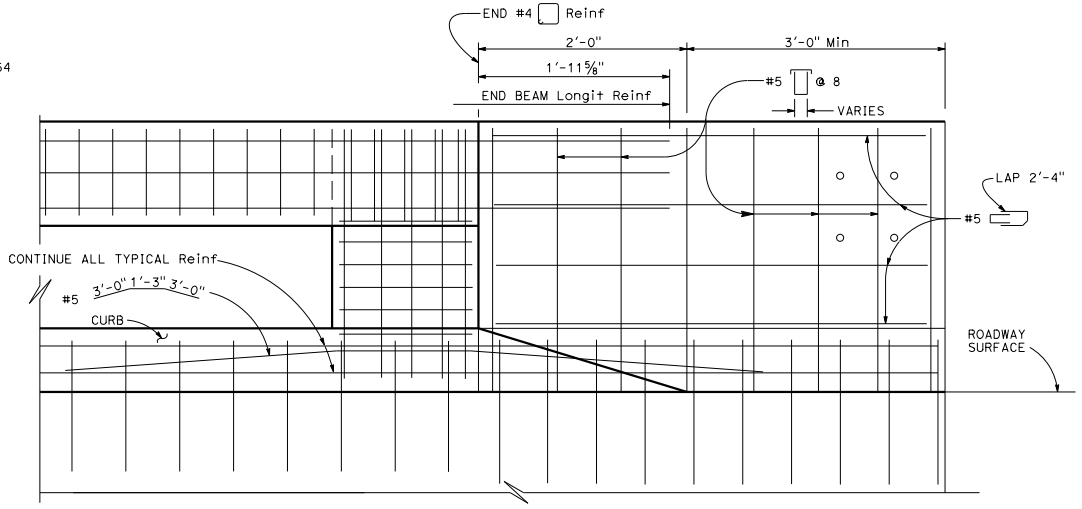
Return to Table of Contents



LONGITUDINAL SECTION



EXPANSION JOINT DETAIL



END SECTION
(Handrailing not shown)

NOTES:

1. Expansion joint to match deck joint.
2. Continue Ⓐ, Ⓑ, Ⓒ, and #4 longitudinal reinforcing. See Type 80SW typical section on Standard Plan B11-62.
3. Post to be spaced equally, typically 6'-8" spacing. Post spacing may be reduced where location of hinges or expansion joints or the length of wingwalls will not accommodate the 6'-8" spacing. Maximum see-through availability is to be strived for, where 6'-8" post spacing can not be achieved.

Ⓖ #6 Tot 6 @ 4 each side of expansion joint

Ⓗ #6 Tot 6 @ 4 each side of expansion joint

Ⓘ #4 Tot 6 per post

Ⓙ #4 Tot 4 per post

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Tiligt Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 80SW (SHEET 2 OF 3)

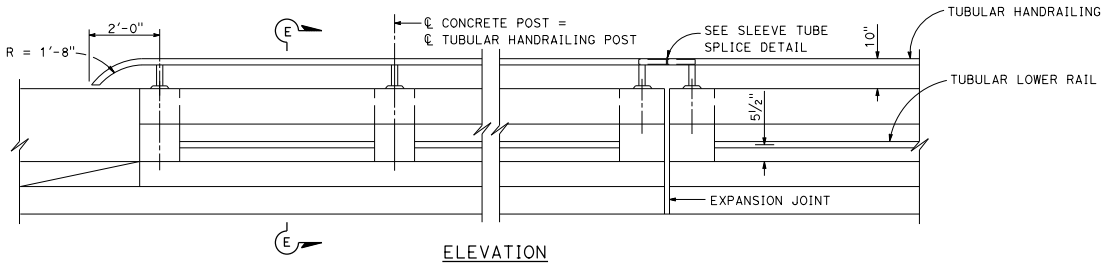
NO SCALE

B11-63

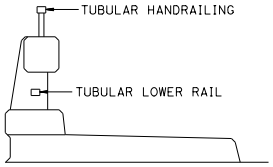
1-26-18

2018 STANDARD PLAN B11-63

Return to Table of Contents



ELEVATION



SECTION E-E

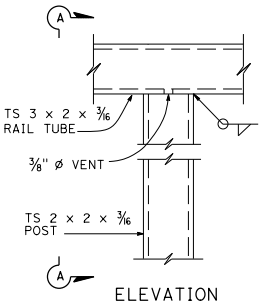
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

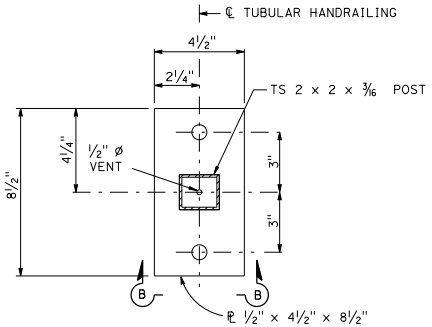
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Tiliat Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

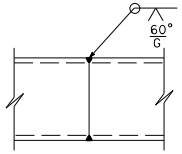


ELEVATION

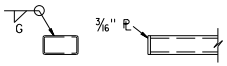


PLAN

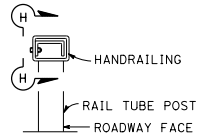
This plate detail is restricted to Tubular Handrailing (TS 2 x 2 x 3/16 post)



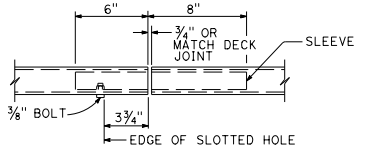
TUBE - WELDED SPLICE



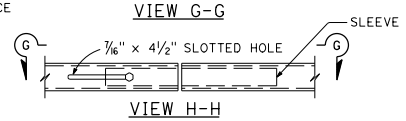
RAIL CAP



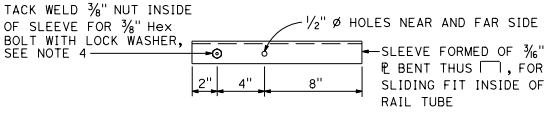
ELEVATION



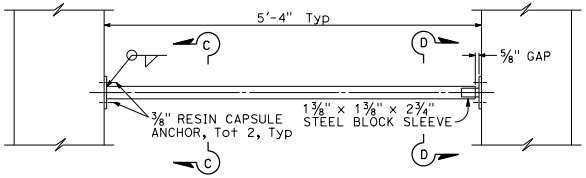
VIEW G-G



VIEW H-H



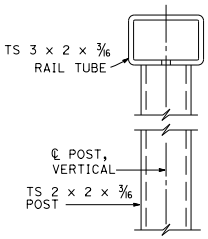
SLEEVE TUBE
SPLICE DETAIL



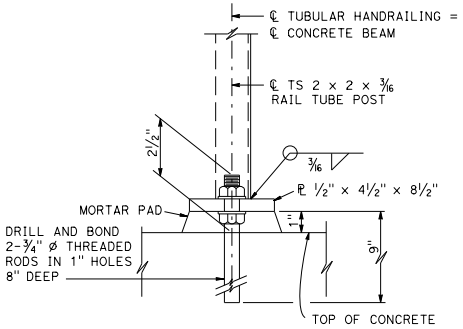
LOWER RAIL DETAIL

NOTES:

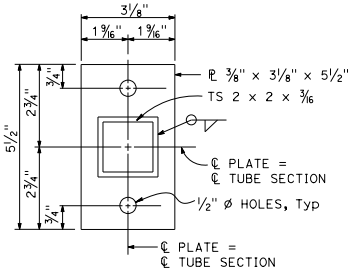
1. Posts shall be normal to railing.
2. Tube splices shall be located in the tubes spanning deck or wall joints. Increase joint width in tubes to match expansion joint width and increase sleeve length accordingly.
3. Top rail tube shall be continuous over not less than two posts except a short length is permitted near deck or wall joints, electroliers, or other rail discontinuities.
4. 3/8" nut tack welded to sleeve may be replaced by drilled and tapped hole in sleeve.



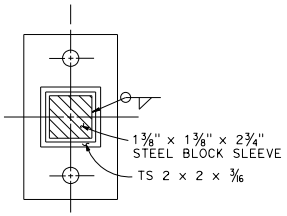
SECTION A-A



ELEVATION
SECTION B-B



SECTION C-C



SECTION D-D

See Section C-C for details not shown

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER TYPE 80SW (SHEET 3 OF 3)

NO SCALE

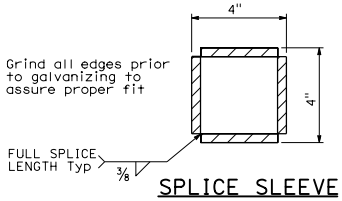
TUBULAR RAILING CONNECTION DETAILS

B11-64

1-26-18

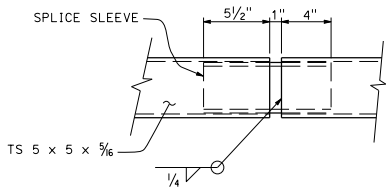
2018 STANDARD PLAN B11-64

Return to Table of Contents



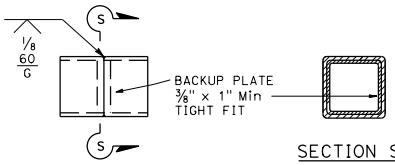
SPLICE SLEEVE

Make from 3/8" plates Splice to fit freely inside TS 5 x 5 x 5/16

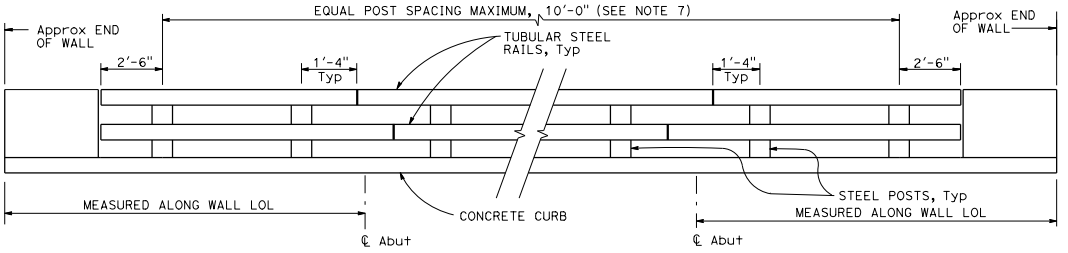


EXPANSION JOINT

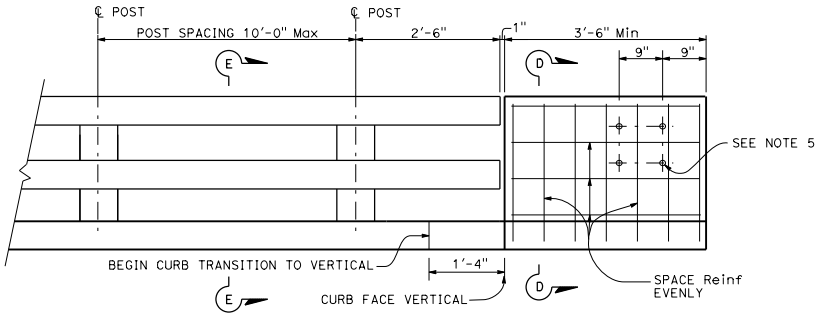
See Note 4



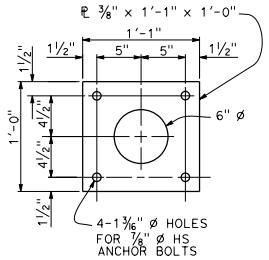
ALTERNATE TUBE WELDED SPLICE



BRIDGE RAILING ELEVATION

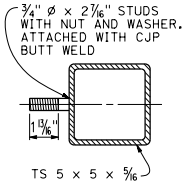


END OF RAILING ELEVATION



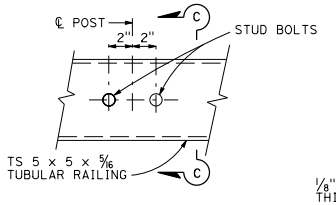
SECTION B-B

POST ANCHOR BOLT PLATE



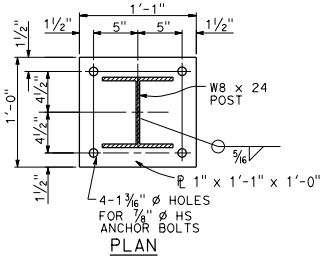
SECTION C-C

STUD BOLT

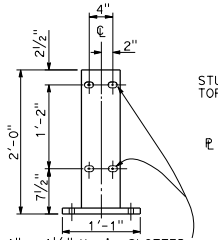


STUD BOLT LOCATION DETAIL

(Backside view of railing)

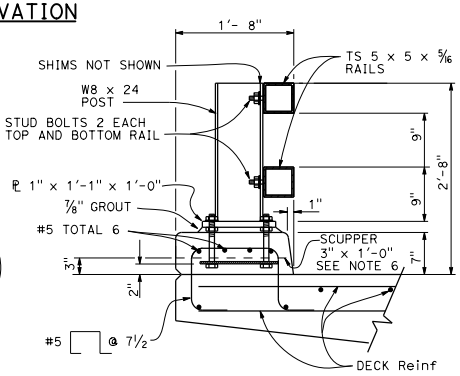


POST BASE PLATE PLAN

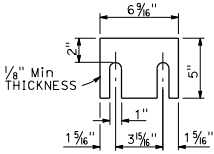


BRIDGE POST

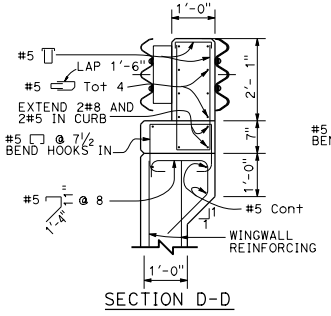
(Front view)



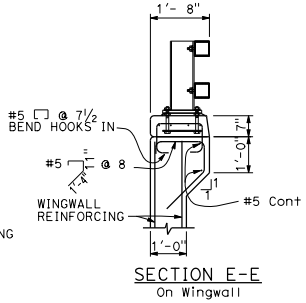
TYPICAL SECTION



RAILING SHIM DETAIL

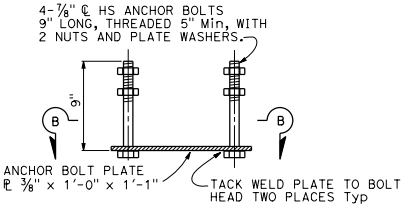


SECTION D-D



SECTION E-E

On Wingwall



POST ANCHOR BOLT DETAILS

GENERAL NOTES:

1. Post shall be normal to railing.
2. All exposed corners shall be ground smooth.
3. Tubing shall be continuous over not less than 3 intermediate posts.
4. Expansion joints in rail tubes shall match deck expansion joints.
5. For typical metal railing connection details not shown, see Standard Plans A77U1 and A77U2.
6. If required, place scuppers midway between rail posts near centerline spans. Adjust reinforcing spacing to clear openings.
7. Post spacing and/or end block length to be adjusted to fit bridge length or approach slab.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-30 BRIDGE RAIL

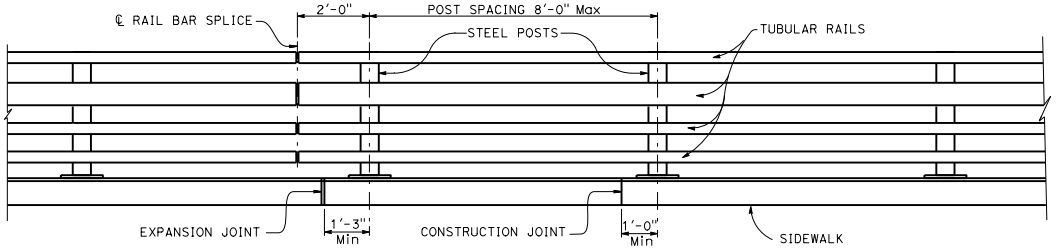
NO SCALE

B11-65

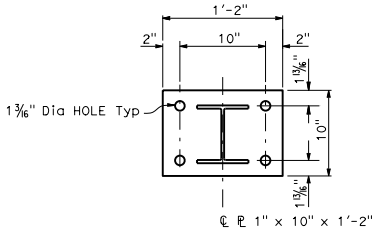
1-26-18

2018 STANDARD PLAN B11-65

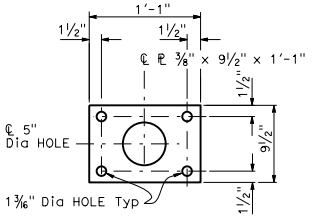
Return to Table of Contents



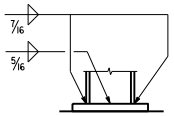
BRIDGE RAILING ELEVATION



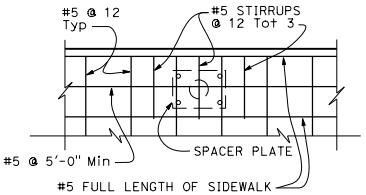
POST BASE PLATE PLAN



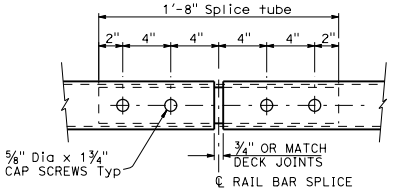
SPACER PLATE PLAN



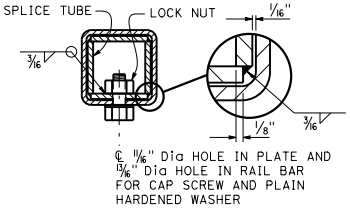
POST BASE WELD DETAIL



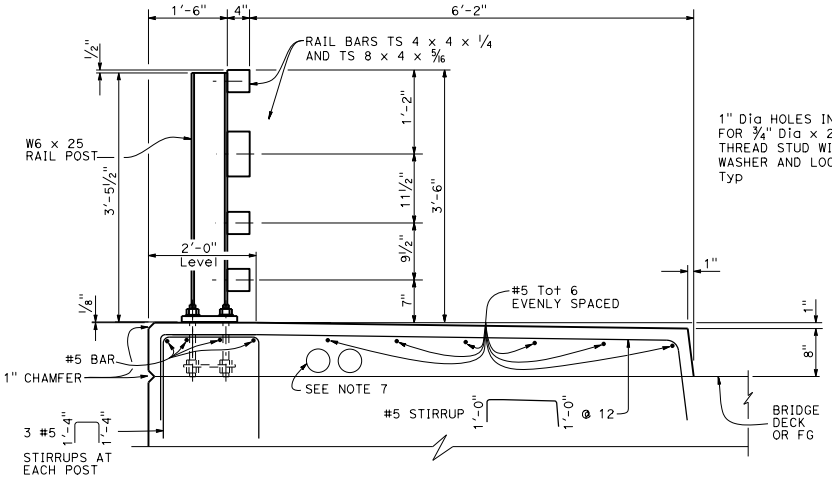
SIDEWALK REINFORCING PLAN



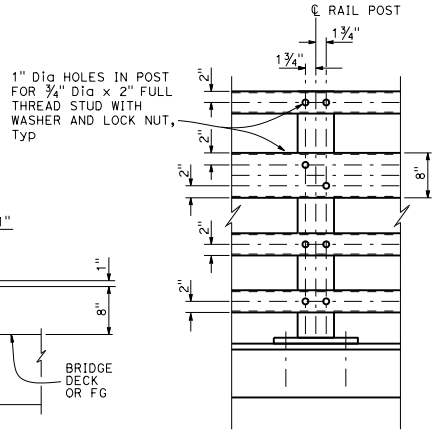
BOTTOM VIEW
RAIL BAR SPLICE DETAIL



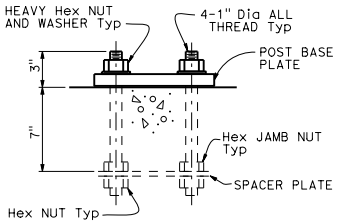
RAIL BAR
SPLICE SECTION



TYPICAL SECTION



ELEVATION



RAIL POST
ANCHORAGE

NOTES:

1. All exposed cuts or sheared edges shall be rounded and free of burrs.
2. Rail posts shall be set normal to grade.
3. Lengths of rail bar shall be attached to a minimun of two rail posts.
4. Rail post anchoring nuts shall be tightened to a snug fit and given additional 1/8 turn.
5. Holes in posts for rail bar attachment may be field drilled. Holes shall be coated with an approved zinc-rich paint prior to erection.
6. This barrier is to be used only for speeds of 45 mph or less. For speeds greater than 45 mph, pedestrians should be protected by a separation traffic barrier.
7. A maximum of six - 4" and a minimum of two - 4" round openings for future utilities. Openings are to be sealed at ends and extended 8" minimum past end of sidewalk if not used. Duct forms are to be tied down. Round openings are to be a minimum of 1'-6" from face of sidewalk curb and a minimum of 6" from face of rail. See Standard Plan B14-3 for minimum spaces between conduits and for conduit details at joints.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-40 BRIDGE RAIL (SHEET 1 OF 2)

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Tiliat Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

2018 STANDARD PLAN B11-66

B11-66

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

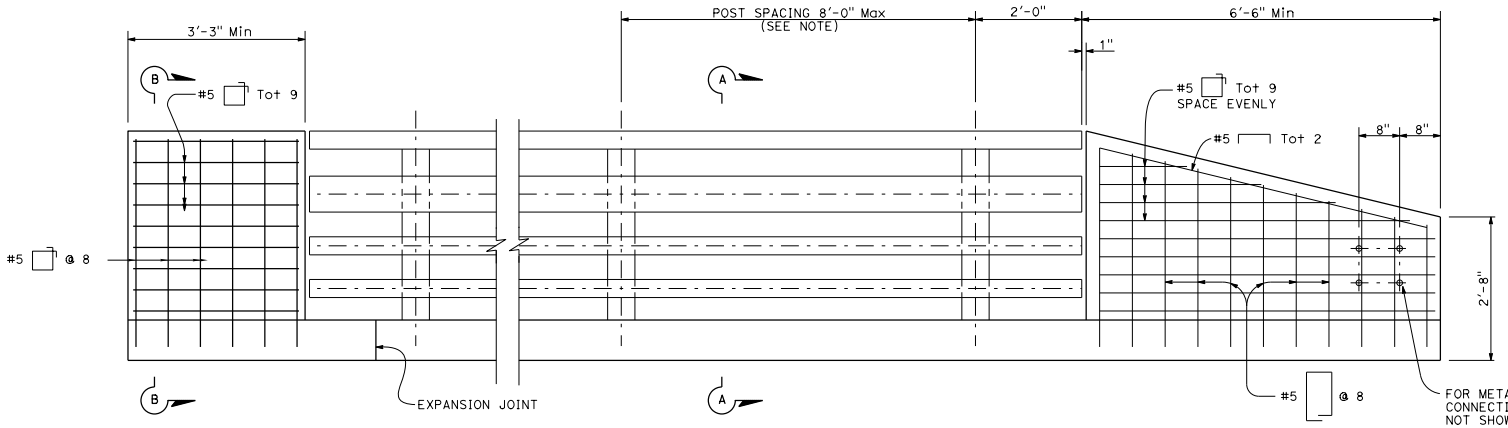
REGISTERED CIVIL ENGINEER

May 31, 2018

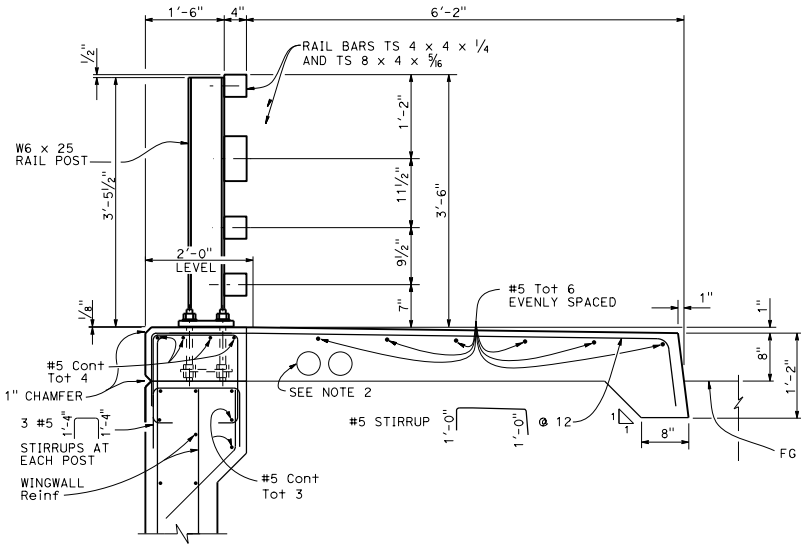
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

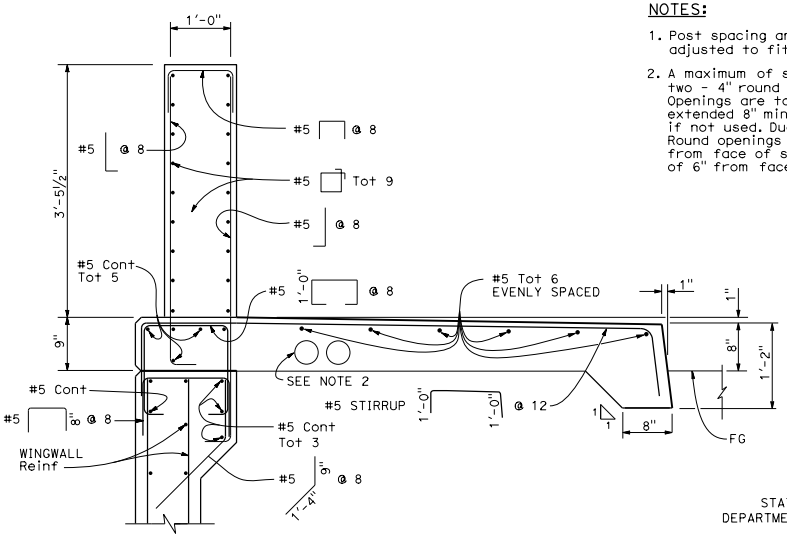


END OF RAILING ELEVATION



SECTION A-A

For details not shown, see Typical Section



SECTION B-B

For details not shown, see Typical Section

NOTES:

1. Post spacing and/or end block length to be adjusted to fit bridge length or wingwall length.
2. A maximum of six - 4" and a minimum of two - 4" round openings for future utilities. Openings are to be sealed at ends and extended 8" minimum past end of sidewalk if not used. Duct forms are to be tied down. Round openings are to be a minimum of 1'-6" from face of sidewalk curb and a minimum of 6" from face of rail.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-40 BRIDGE RAIL (SHEET 2 OF 2)

NO SCALE

B11-67

1-26-18

2018 STANDARD PLAN B11-67

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

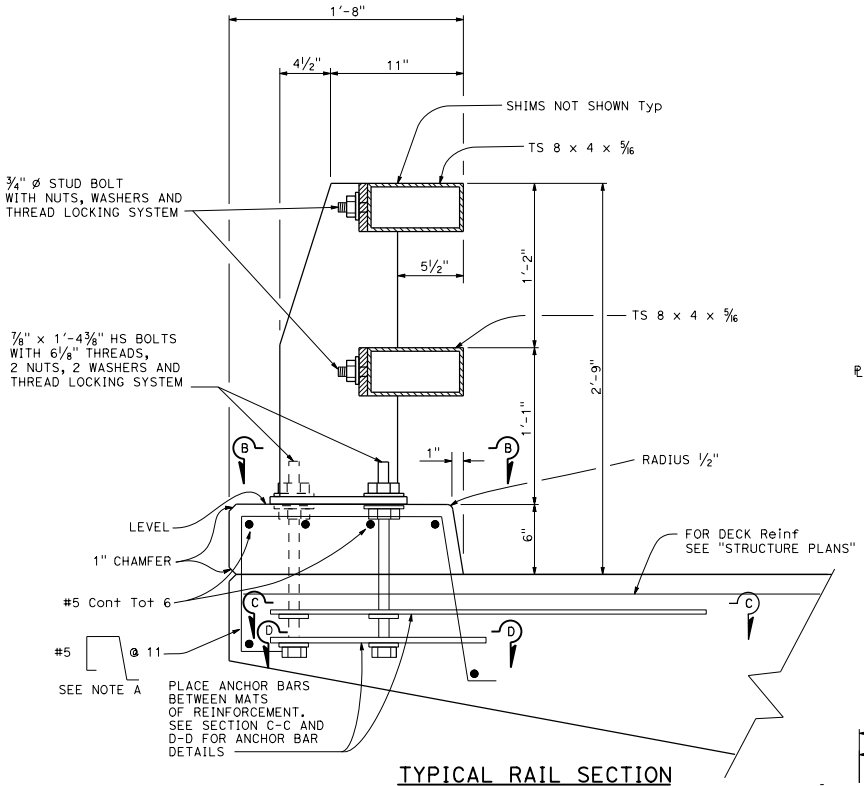
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

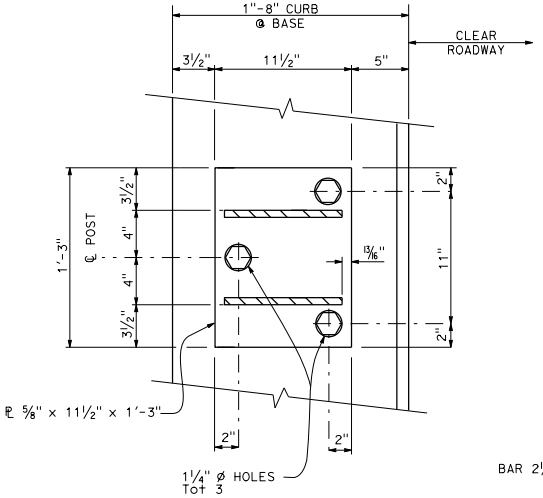
REGISTERED PROFESSIONAL ENGINEER — Tiligt Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



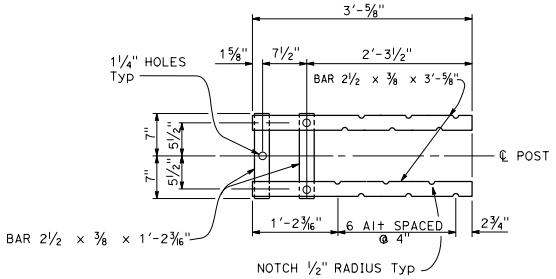
TYPICAL RAIL SECTION

NOTE A

Adjust spacing to clear scupper opening by 2" if applicable.

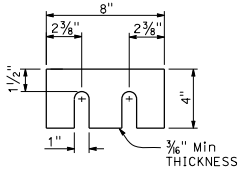


SECTION B-B

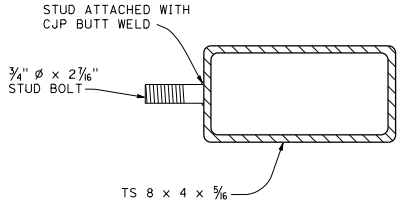


SECTION C-C

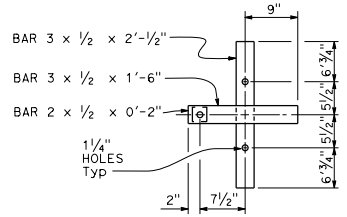
Top Anchorage



SHIMS REQUIRED FOR TOP AND BOTTOM RAIL



SECTION AT POST



SECTION D-D

Lower Anchorage

STUD BOLT DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-10 BRIDGE RAIL (SHEET 1 OF 3)

NO SCALE

B11-68

2018 STANDARD PLAN B11-68

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

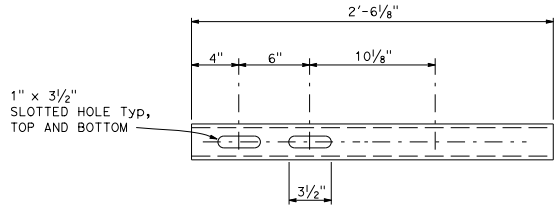
REGISTERED CIVIL ENGINEER

May 31, 2018

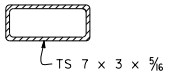
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

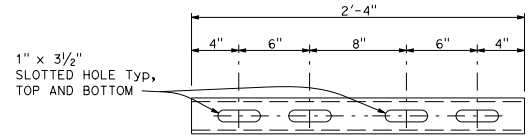
REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



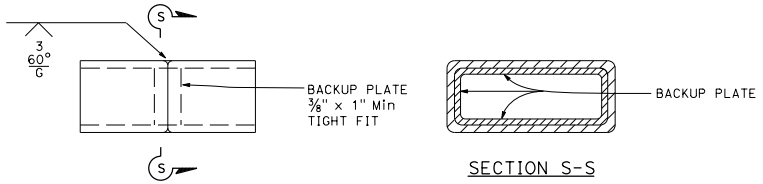
EXPANSION SLEEVE DETAIL



SECTION SLEEVE

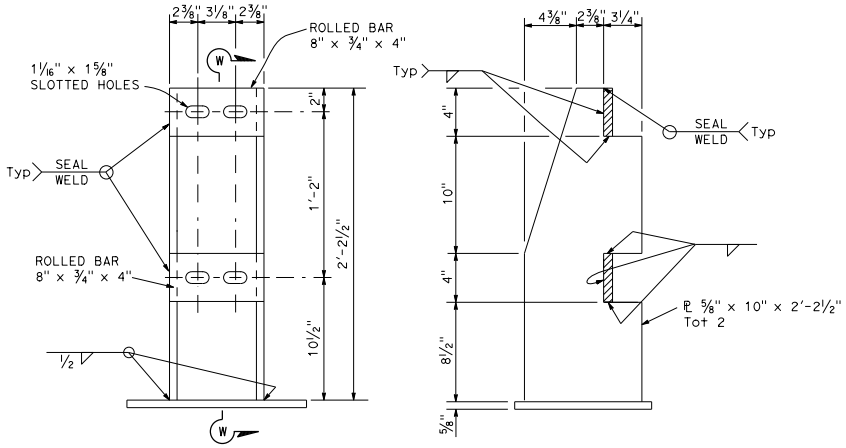


STANDARD SLEEVE DETAIL



SECTION S-S

ALTERNATE TUBE WELDED SPLICE



ELEVATION SECTION W-W

POST DETAIL

GENERAL NOTES:

1. Anchor bolts may be tack welded (shop or field) to anchorage.
2. All rough edges on posts and rails shall be ground smooth.
3. The alternative welded splice may be used in lieu of The Standard Splice.
4. Each rail length shall be continuous over a minimum of two posts.
5. The contractor shall check that the tubular sleeves splices conform to the dimensions indicated to assure proper clearance.
6. Except for expansion splices, not more than one splice shall be permitted per same side of post.
7. See project plans for approach guard railing details.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-10 BRIDGE RAIL (SHEET 2 OF 3)

NO SCALE

B11-69

2018 STANDARD PLAN B11-69

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

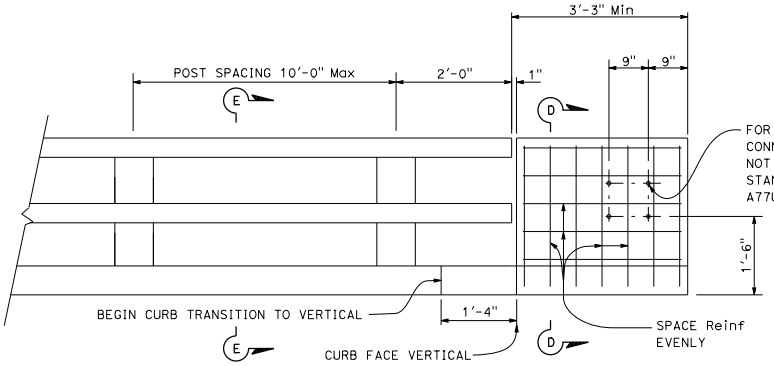
REGISTERED CIVIL ENGINEER

May 31, 2018

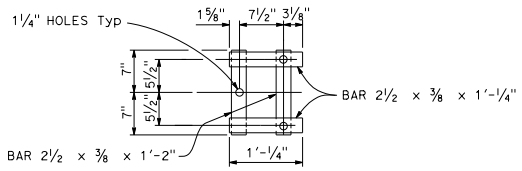
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

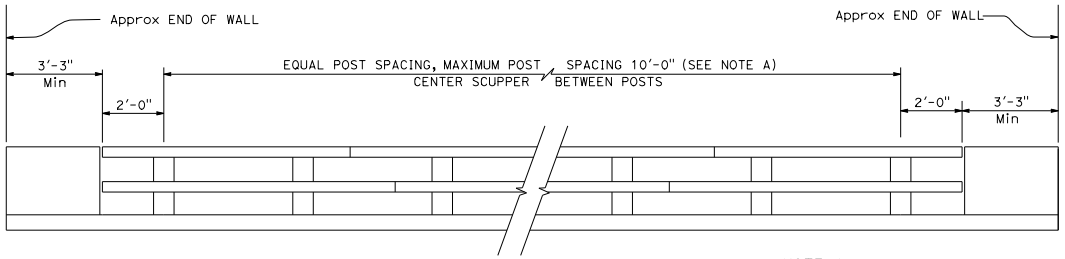
REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



END OF RAILING ELEVATION



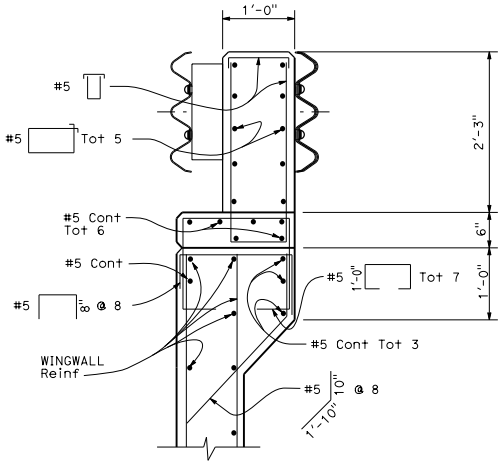
WALL ANCHOR PLATE DETAIL



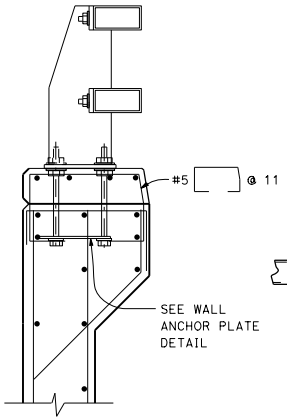
BRIDGE RAILING ELEVATION

NOTE A:

Post spacing and/or block length to be adjusted to fit bridge length or wingwall length.

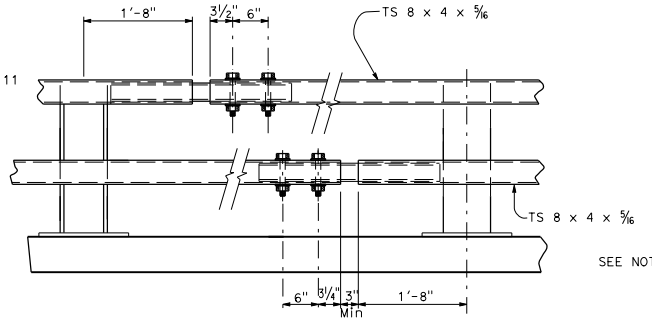


SECTION D-D



SECTION E-E

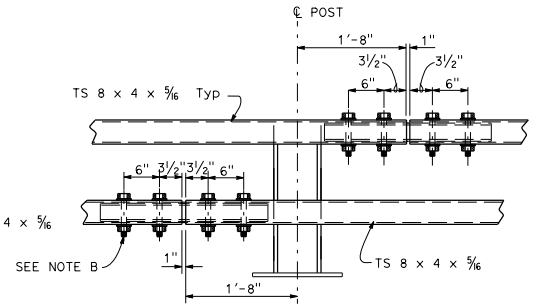
Reinf same as for Section D-D except as noted.



EXPANSION SPLICE

NOTE B:

Use ¾" x x 5⅝"
Hs bolts with washers, fully tensioned.
1" holes in rail Typ



STANDARD SPLICE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-10 BRIDGE RAIL (SHEET 3 OF 3)

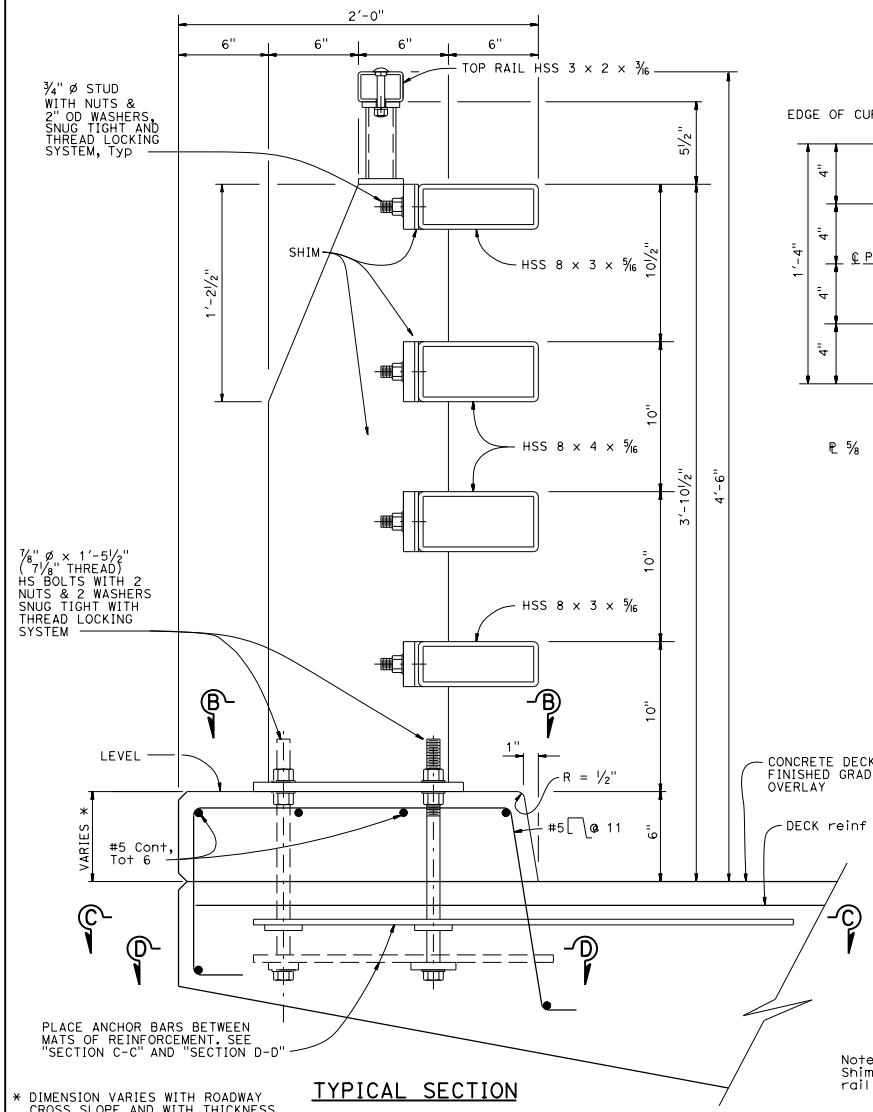
NO SCALE

B11-70

2018 STANDARD PLAN B11-70

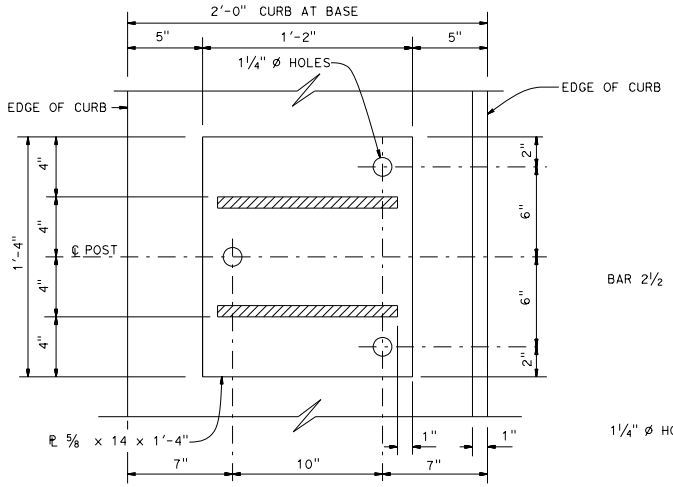
1-26-18

Return to Table of Contents

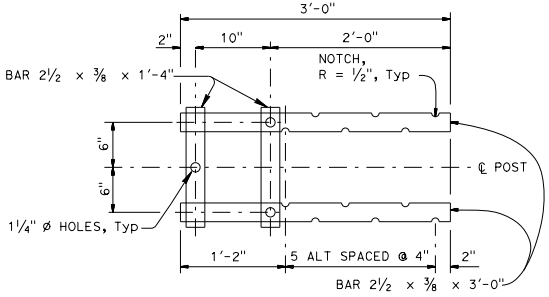


* DIMENSION VARIES WITH ROADWAY CROSS SLOPE AND WITH THICKNESS OF OVERLAY IF APPLICABLE.

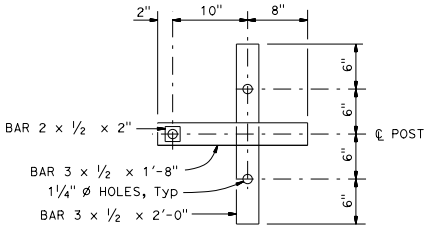
TYPICAL SECTION



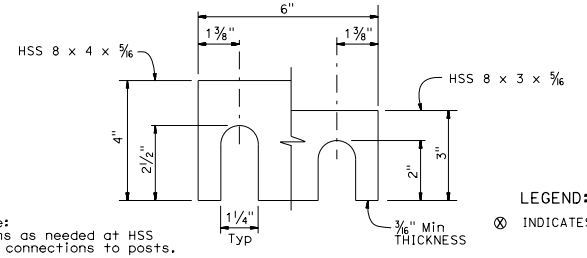
SECTION B-B



SECTION C-C

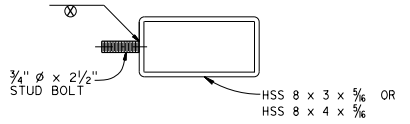


SECTION D-D



Note:
Shims as needed at HSS rail connections to posts.

SHIM DETAIL



RAIL SECTION AT POST

LEGEND:

⊗ INDICATES STUD WELD

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gregory J. Kaderabek
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Gregory J. Kaderabek No. C40814 Exp. 3-31-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-20S BRIDGE RAIL (SHEET 1 OF 4)

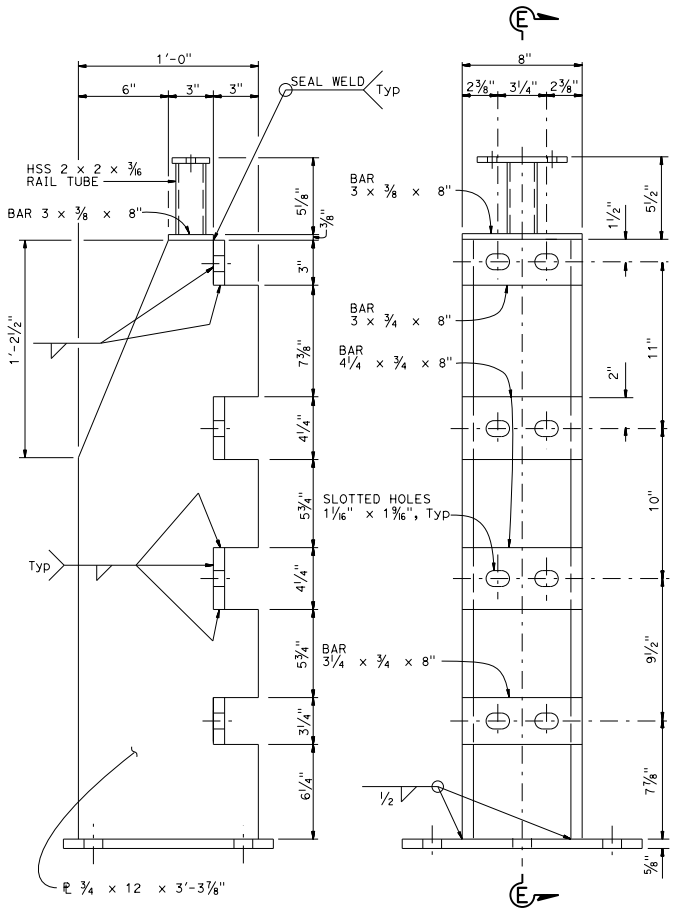
NO SCALE

B11-71

1-26-18

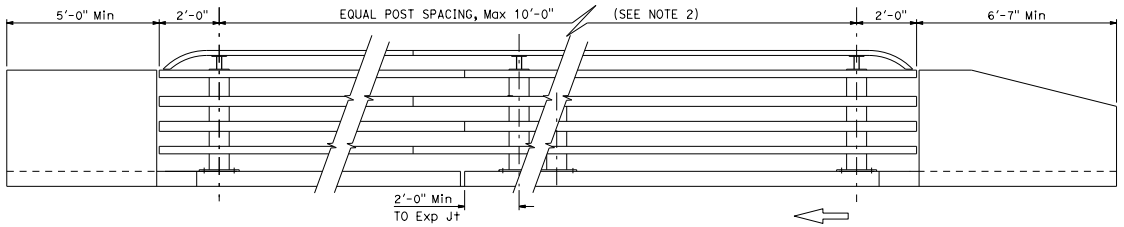
2018 STANDARD PLAN B11-71

Return to Table of Contents



SECTION E-E

ELEVATION



ELEVATION

NOTES:

1. For approach and departure end details, see Standard Plan B11-73.
2. Post spacing and/or block length to be adjusted to fit bridge length or wingwall length.
3. All horizontal members are parallel to longitudinal profile grade of deck.
4. Posts are normal to profile grade of structure.
5. Posts are vertical to the transverse cross section.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Gregory J. Kaderabek
No. C40814
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-20S BRIDGE RAIL (SHEET 2 OF 4)

NO SCALE

B11-72

2018 STANDARD PLAN B11-72

1-26-18

Return to Table of Contents

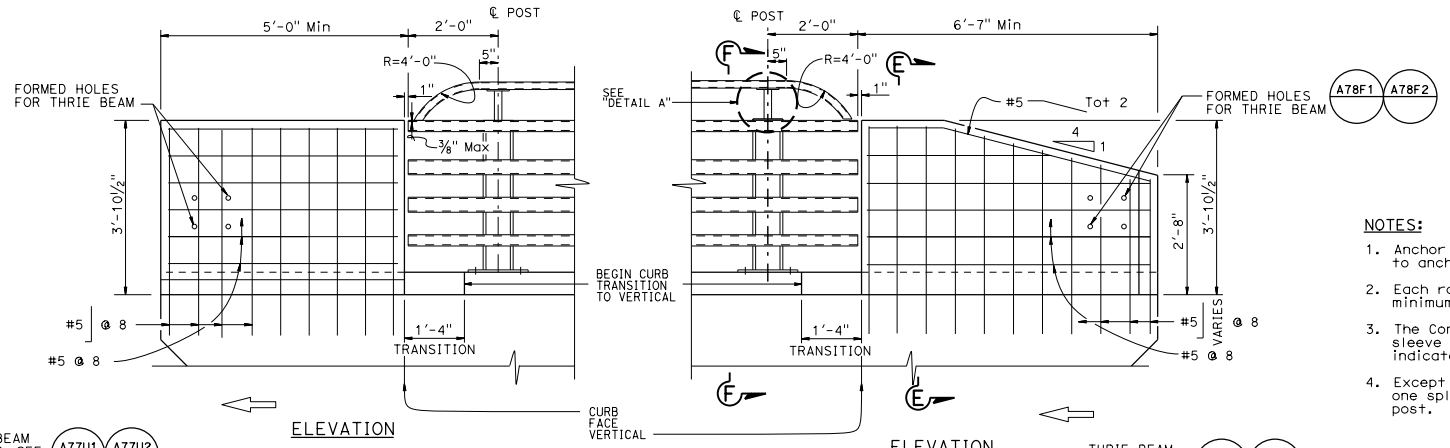
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

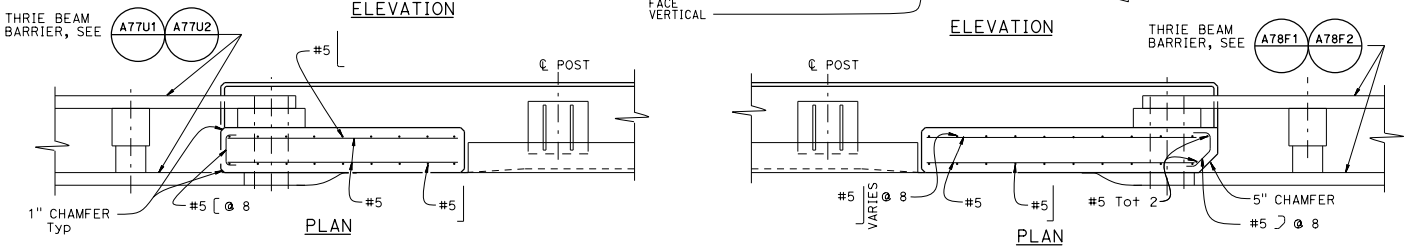
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Gregory J. Kaderabek No. C40814 Exp. 3-31-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

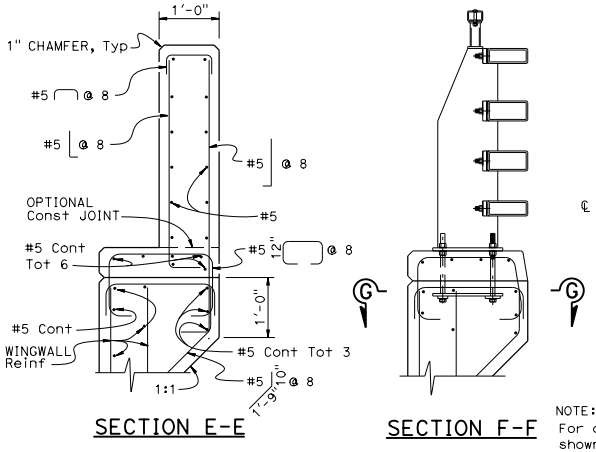
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



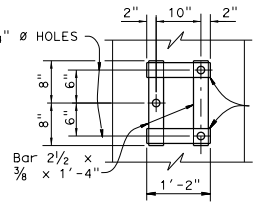


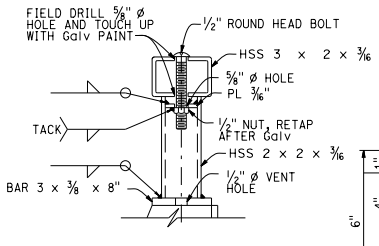
NOTES:

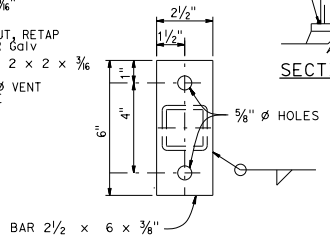
1. Anchor bolts may be tack welded (shop or field) to anchorage.
2. Each rail length must be continuous over a minimum of two posts.
3. The Contractor must check that the tubular sleeve splices conform to the dimensions indicated to assure proper clearance.
4. Except for expansion splices, not more than one splice permitted per same side of post.

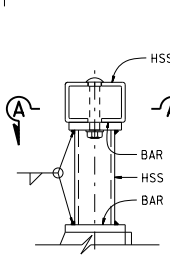


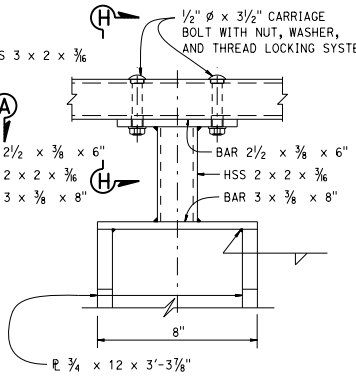
NOTE:
For details not shown, see "SECTION E-E"











RAIL CONNECTION DETAILS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

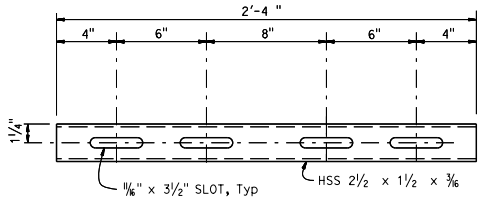
CALIFORNIA ST-20S BRIDGE RAIL (SHEET 3 OF 4)

NO SCALE

B11-73

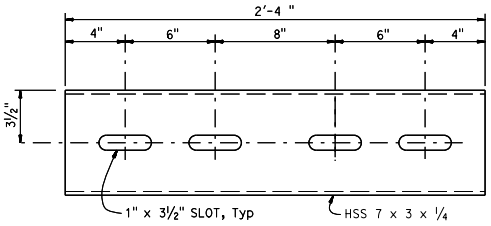
1-26-18

Return to Table of Contents



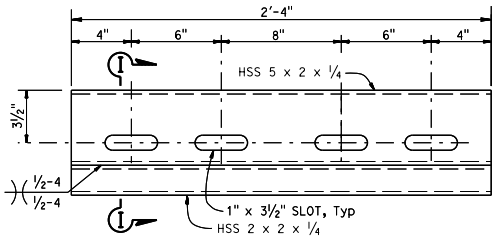
(FOR HSS 3 x 2 x 3/16 RAIL)

STANDARD SLEEVE DETAIL



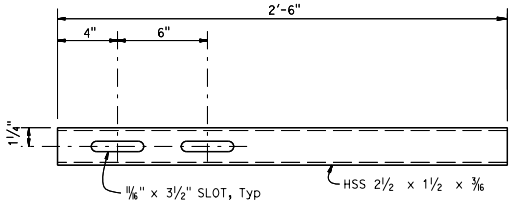
(FOR HSS 8 x 4 x 5/16 RAIL)

STANDARD SLEEVE DETAIL



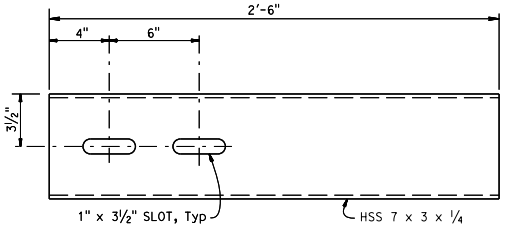
(FOR HSS 8 x 3 x 5/16 RAIL)

STANDARD SLEEVE DETAIL



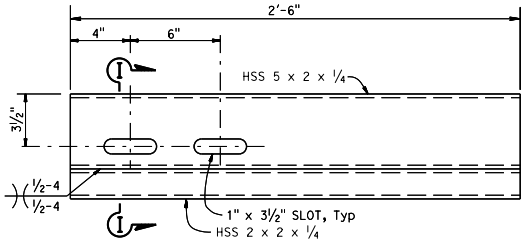
(FOR HSS 3 x 2 x 3/16 RAIL)

EXPANSION SLEEVE DETAIL



(FOR HSS 8 x 4 x 5/16 RAIL)

EXPANSION SLEEVE DETAIL

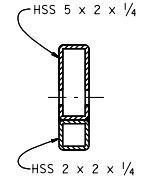


(FOR HSS 8 x 3 x 5/16 RAIL)

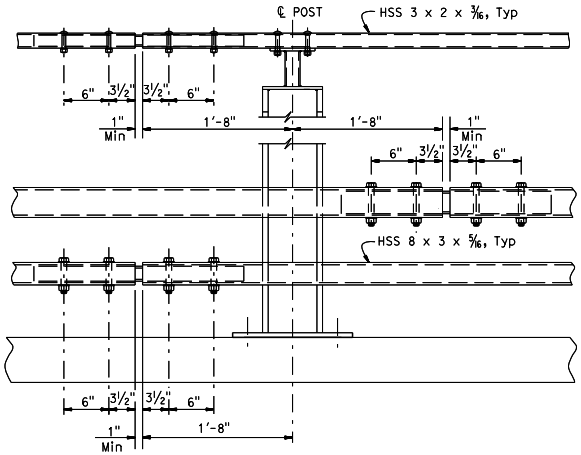
EXPANSION SLEEVE DETAIL

NOTES:

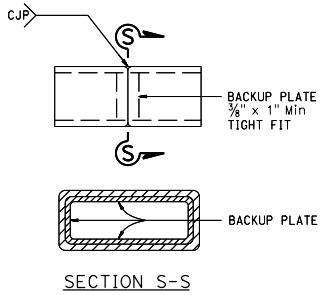
1. HS bolts with nut and washers, snug tightened, and thread locking system.
2. Use ½"ø x 3⅝ (HSS 8 x 2 x 3/16)
   Use ¾"ø x 4⅝ (HSS 8 x 3 x 5/16)
   Use ¾"ø x 5⅝ (HSS 8 x 4 x 5/16)



SECTION I-I

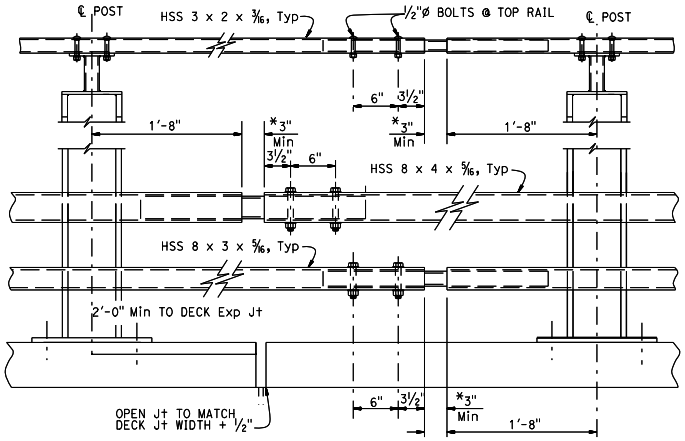


STANDARD SPLICE



SECTION S-S

ALTERNATE TUBE WELDED SPLICE



EXPANSION SPLICE

* MATCH DECK OR WALL JOINT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Gregory J. Kaderabek — No. C40814 — Exp. 3-31-19 CIVIL — STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-20S BRIDGE RAIL (SHEET 4 OF 4)

NO SCALE

B11-74

2018 STANDARD PLAN B11-74

1-26-18

Return to Table of Contents

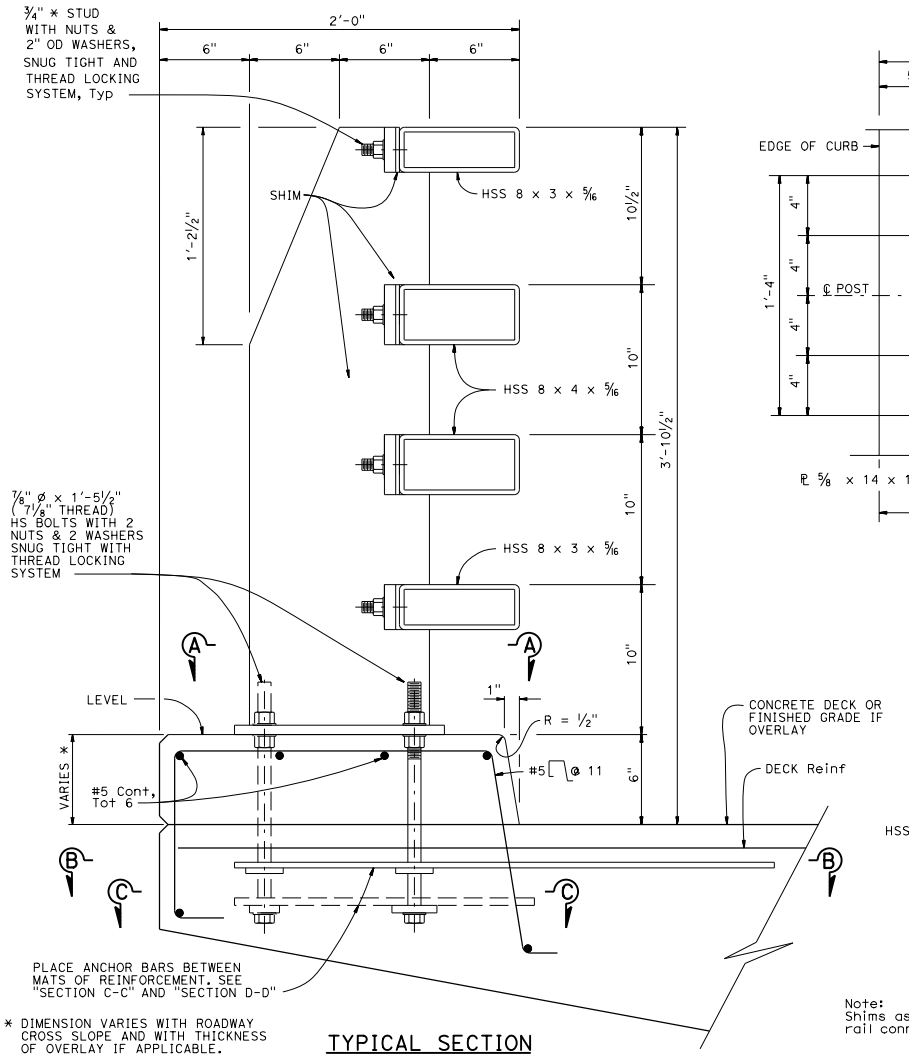
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gregory J. Kaderabek
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

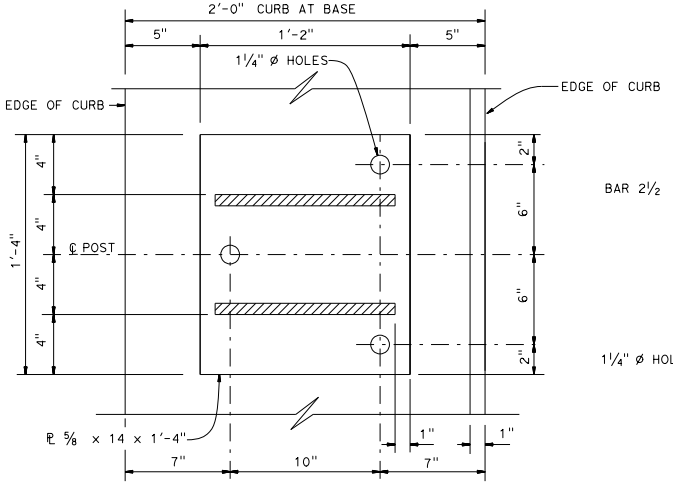
Gregory J. Kaderabek No. C40814 Exp. 3-31-19 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

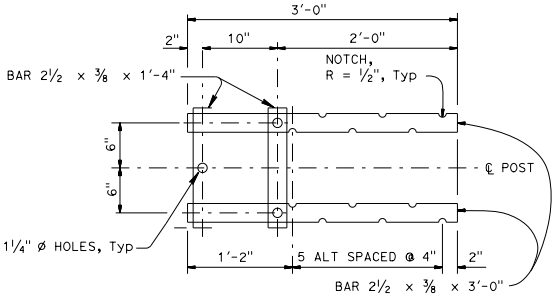


∗ DIMENSION VARIES WITH ROADWAY CROSS SLOPE AND WITH THICKNESS OF OVERLAY IF APPLICABLE.

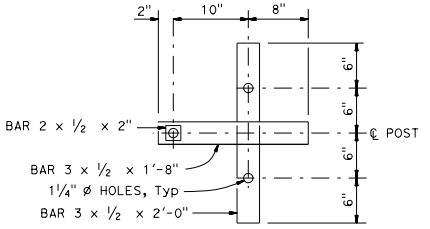
TYPICAL SECTION



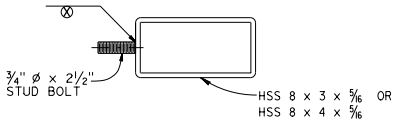
SECTION A-A



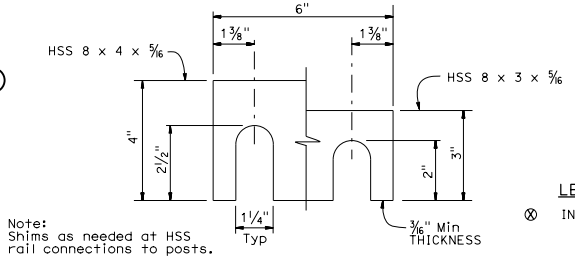
SECTION B-B



SECTION C-C



SECTION AT POST



Note:
Shims as needed at HSS rail connections to posts.

SHIM DETAIL

LEGEND:
⊗ INDICATES STUD WELD

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-70 BRIDGE RAIL (SHEET 1 OF 4)

NO SCALE

B11-75

2018 STANDARD PLAN B11-75

1-29-18

Return to Table of Contents

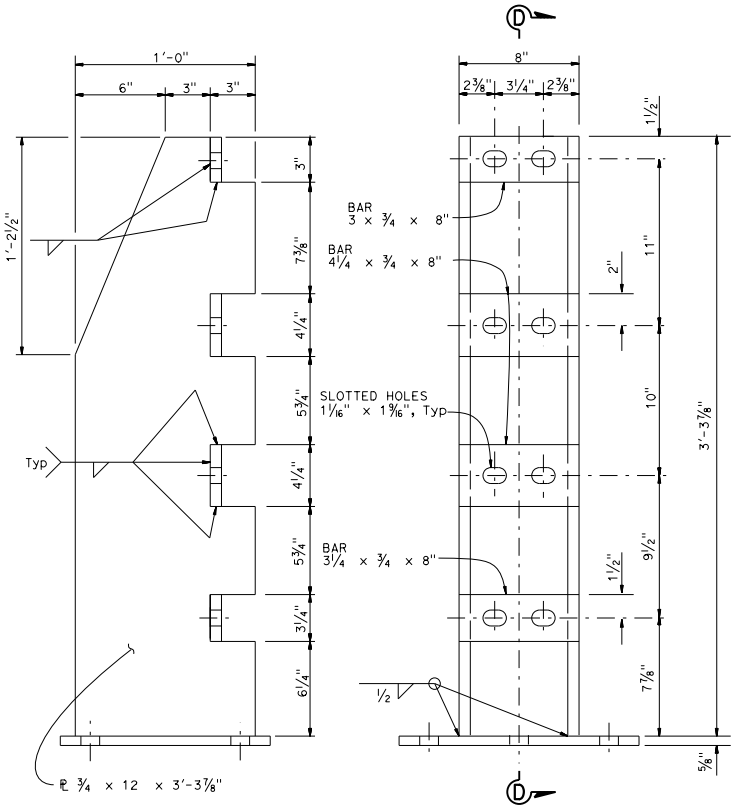
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gregory J. Kaderabek
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

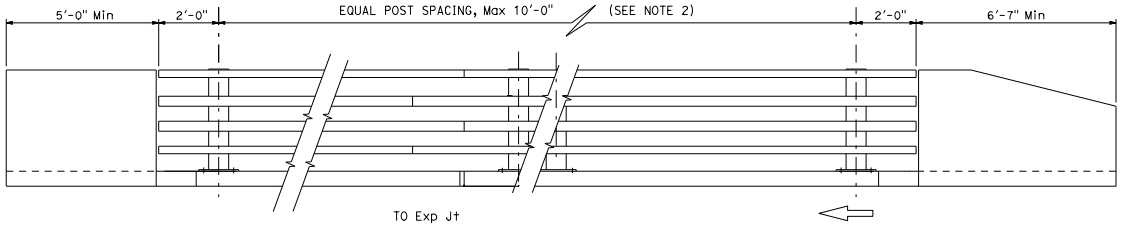
REGISTERED PROFESSIONAL ENGINEER
Gregory J. Kaderabek
No. C40814
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION D-D

ELEVATION



ELEVATION

NOTES:

1. For approach and departure end details, see Standard Plan B11-77.
2. Post spacing and/or block length to be adjusted to fit bridge length or wingwall length.
3. All horizontal members are parallel to longitudinal profile grade of deck.
4. Posts are normal to profile grade of structure.
5. Posts are vertical to the transverse cross section.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-70 BRIDGE RAIL (SHEET 2 OF 4)

NO SCALE

B11-76

1-29-18

2018 STANDARD PLAN B11-76

Return to Table of Contents

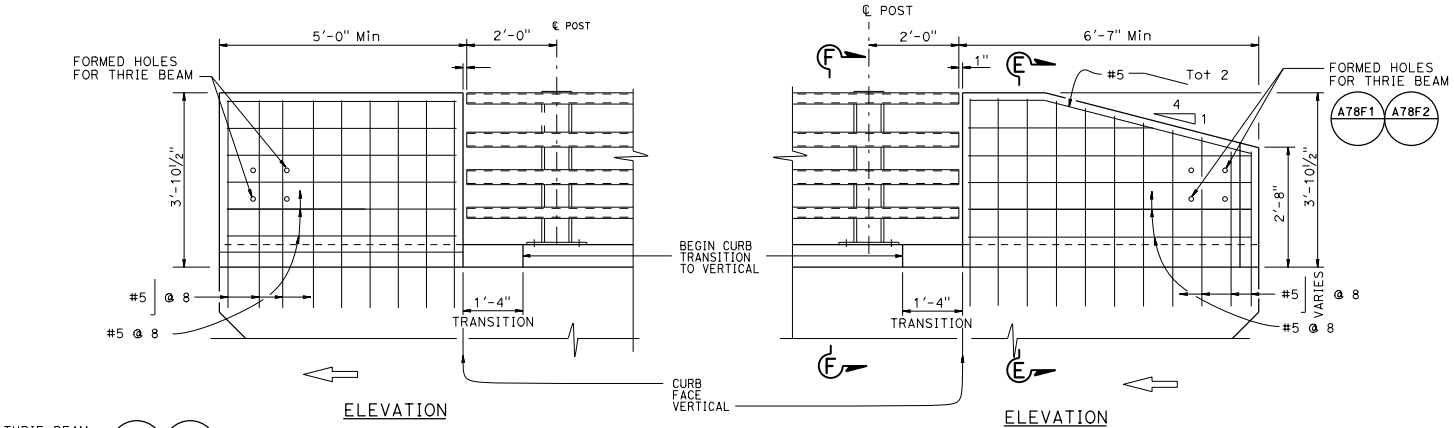
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

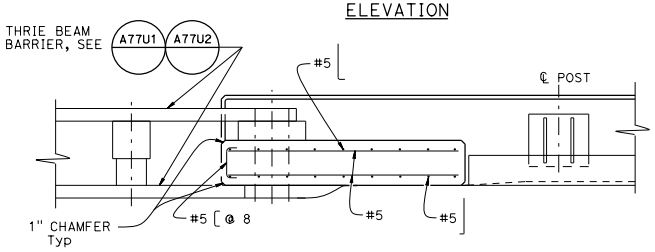
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

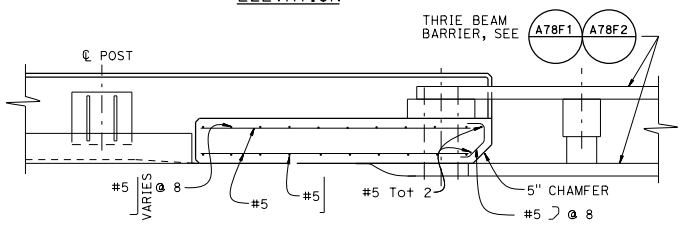
Gregory J. Kaderabek, No. C40814, Exp. 3-31-19, CIVIL, REGISTERED PROFESSIONAL ENGINEER, STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

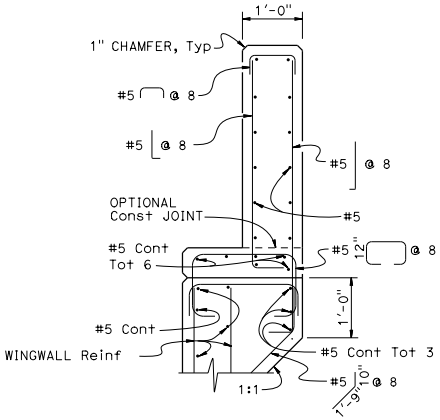




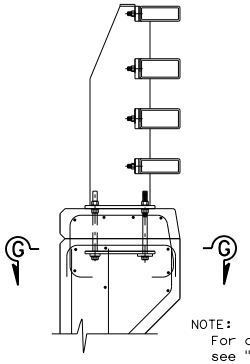
END BLOCK DETAIL



TRANSITION BLOCK DETAIL

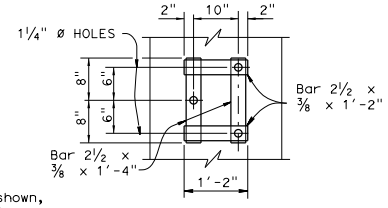


SECTION E-E



NOTE:
For details not shown, see "SECTION E-E"

SECTION F-F



VIEW G-G

NOTES:

1. Anchor bolts may be tack welded (shop or field) to anchorage.
2. Each rail length must be continuous over a minimum of two posts.
3. The Contractor must check that the tubular sleeve splices conform to the dimensions indicated to assure proper clearance.
4. Except for expansion splices, not more than one splice permitted per same side of post.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-70 BRIDGE RAIL (SHEET 3 OF 4)

NO SCALE

B11-77

2018 STANDARD PLAN B11-77

1-29-18

Return to Table of Contents

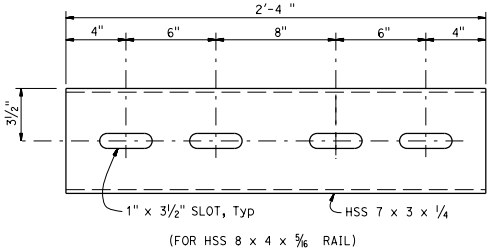
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Gregory J. Kaderabek
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

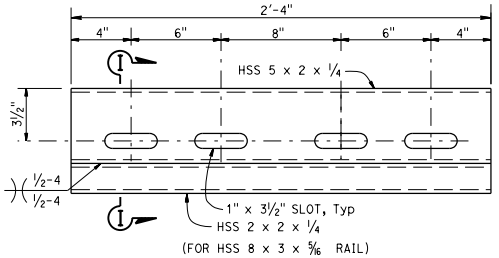
REGISTERED PROFESSIONAL ENGINEER — Gregory J. Kaderabek — No. C40814 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



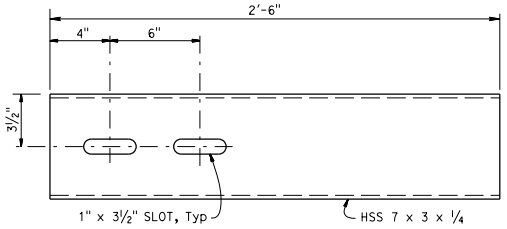
(FOR HSS 8 x 4 x 5/16 RAIL)

STANDARD SLEEVE DETAIL



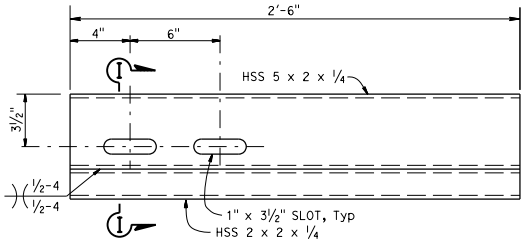
(FOR HSS 8 x 3 x 5/16 RAIL)

STANDARD SLEEVE DETAIL



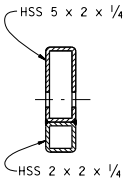
(FOR HSS 8 x 4 x 5/16 RAIL)

EXPANSION SLEEVE DETAIL



(FOR HSS 8 x 3 x 5/16 RAIL)

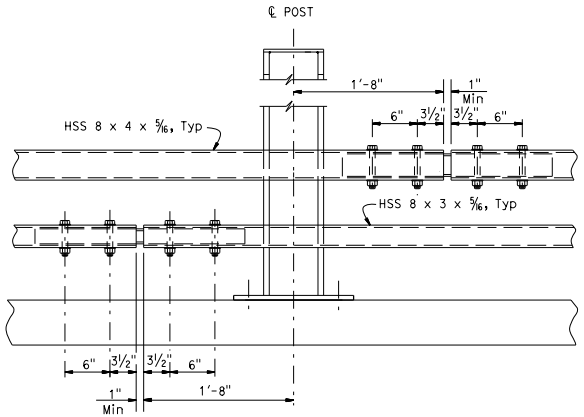
EXPANSION SLEEVE DETAIL



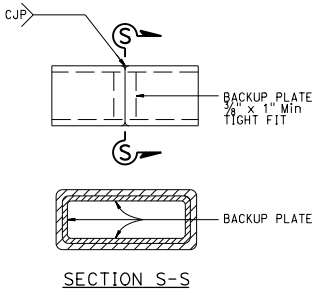
SECTION I-I

NOTES:

1. HS bolts with nut and washers, snug tightened, and thread locking system.
2. Use ¾"Ø x 4 5/16 (HSS 8 x 3 x 5/16)
   Use ¾"Ø x 5 5/16 (HSS 8 x 4 x 5/16)

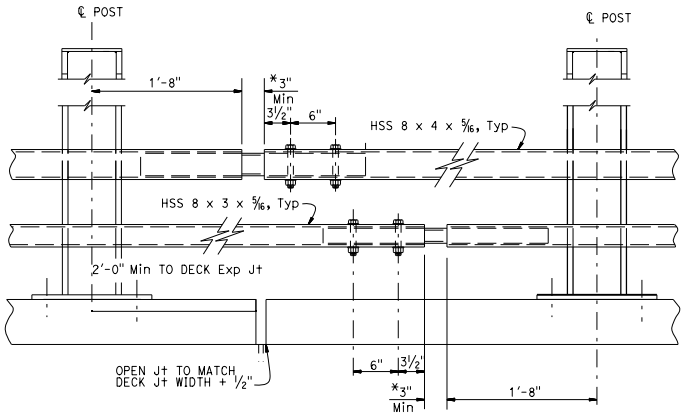


STANDARD SPLICE



SECTION S-S

ALTERNATE TUBE WELDED SPLICE



EXPANSION SPLICE

* MATCH DECK OR WALL JOINT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CALIFORNIA ST-70 BRIDGE RAIL (SHEET 4 OF 4)

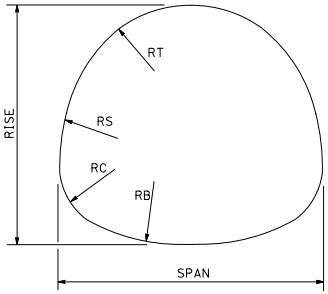
NO SCALE

B11-78

1-29-18

2018 STANDARD PLAN B11-78

Return to Table of Contents



DESIGN NOTES:

Design: AASHTO LRFD Bridge Design Specifications, 4th edition with California Amendments.

Soil: γ = 140 pcf

Reinforced Concrete: f_y = 60 ksi
n = 8
f'_c = 3.6 ksi

Structural Steel Plate: 6" x 2" Annular Corrugations
f_y = 33 ksi
Specified thickness includes galvanization

NOTES:

1. For strutting requirements of structural steel plate vehicular undercrossing during construction, see Standard Plan D88A.
2. Minimum cover from crown to shoulder hinge point = 5'-0".
3. Backfill shall be brought up uniformly on both sides of the structure.
4. Minimum cover for construction loading, see Standard Plan D88.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

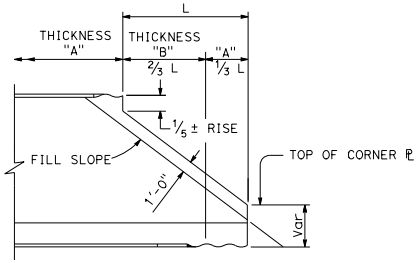
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Carl M. Duan
No. C59976
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

MAXIMUM HEIGHT OF FILL										LAYOUT DATA			
GAGE		12	10	12	10	8	5	3	1				
THICKNESS		0.110"	0.140"	0.110"	0.140"	0.170"	0.218"	0.249"	0.280"				
SPAN	RISE	SOIL PRESSURE 6.0 ksf		FOR SOIL PRESSURES SEE TABLE A						RT	RS	RC	RB
12'-2"	11'-0"	14.0'	14.0'	14.0'	25.0'	31.0'	44.0'	53.0'	58.0'	5'-8"	7'-9"	3'-2"	11'-2"
12'-11"	11'-3"	13.0'	13.0'	13.0'	24.0'	29.0'	42.0'	49.0'	55.0'	6'-1"	7'-11"	3'-2"	12'-0"
13'-2"	11'-11"	13.0'	13.0'	13.0'	23.0'	28.0'	41.0'	48.0'	54.0'	6'-1"	8'-7"	3'-2"	13'-3"
13'-10"	12'-3"	12.0'	12.0'	12.0'	22.0'	27.0'	39.0'	46.0'	51.0'	6'-5"	9'-0"	3'-2"	13'-8"
14'-1"	12'-10"	12.0'	12.0'	12.0'	21.0'	26.0'	38.0'	45.0'	50.0'	6'-5"	9'-7"	3'-2"	15'-2"
14'-6"	13'-6"	11.0'	11.0'	11.0'	20.0'	25.0'	37.0'	44.0'	48.0'	6'-6"	10'-11"	3'-2"	14'-6"
14'-10"	14'-0"	11.0'	11.0'	11.0'	20.0'	24.0'	36.0'	42.0'	47.0'	6'-7"	11'-4"	3'-2"	16'-0"
15'-6"	14'-4"	10.0'	10.0'	10.0'	19.0'	23.0'	34.0'	40.0'	45.0'	7'-0"	11'-6"	3'-2"	16'-9"
15'-9"	15'-1"	10.0'	10.0'	10.0'	18.0'	22.0'	33.0'	40.0'	44.0'	6'-11"	12'-6"	3'-2"	17'-8"
16'-4"	15'-5"	9.0'	9.0'	9.0'	18.0'	22.0'	32.0'	38.0'	42.0'	7'-2"	13'-1"	3'-2"	17'-11"
16'-5"	16'-1"	8.0'	8.0'	8.0'	17.0'	21.0'	31.0'	37.0'	41.0'	7'-4"	13'-2"	3'-2"	22'-7"
16'-9"	16'-3"	8.0'	8.0'	9.0'	17.0'	20.0'	30.0'	36.0'	40.0'	7'-5"	13'-11"	3'-2"	20'-7"
17'-3"	17'-0"	11.0'	11.0'	8.0'	16.0'	20.0'	29.0'	36.0'	39.0'	7'-6"	14'-6"	3'-11"	17'-11"
18'-4"	16'-11"	10.0'	10.0'	6.0'	15.0'	19.0'	28.0'	33.0'	37.0'	8'-3"	13'-1"	3'-11"	20'-9"
19'-2"	17'-2"		9.0'		14.0'	18.0'	26.0'	32.0'	35.0'	8'-9"	13'-0"	3'-11"	22'-0"
19'-6"	17'-7"	*	9.0'	*	14.0'	17.0'	25.0'	31.0'	34.0'	8'-11"	13'-2"	3'-11"	24'-9"
20'-4"	17'-10"		9.0'		13.0'	16.0'	24.0'	29.0'	32.0'	9'-5"	13'-0"	3'-11"	26'-2"

* - Strutting required. See Note 1.

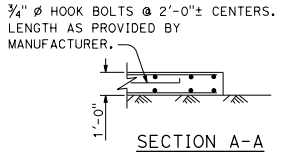


SIDE ELEVATION

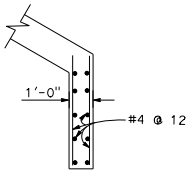
NOTE:
Thickness "B" two thicknesses greater than thickness "A" except for 0.249" and 0.280" thicknesses.

Skew-bevels not permitted with Alternative 1. Cutoff dimensions are approximate only and may be varied by fabricator to suit plate layout.

ALTERNATIVE 1

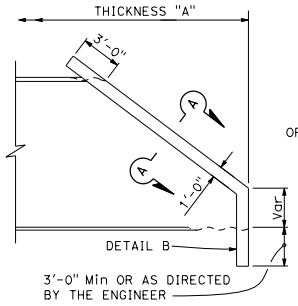


SECTION A-A

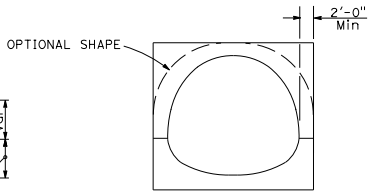


DETAIL B

NOTE:
Reinforce both faces of concrete collar with #4 @ 12 both ways. Maximum skew is 35°.



SIDE ELEVATION



END ELEVATION

ALTERNATIVE 2

END BEVELS

TABLE A						
GAGE	12	10	8	5	3	1
THICKNESS	0.110"	0.140"	0.170"	0.218"	0.249"	0.280"
SPANS	STRENGTH I SOIL PRESSURE (ksf)					
12'-2" TO 16'-9"	6.0	10.0	12.0	17.0	20.0	22.0
17'-3" TO 20'-4"	4.9	8.1	9.7	13.7	16.2	17.8

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING

NO SCALE

B14-1

2018 STANDARD PLAN B14-1

1-29-18

Return to Table of Contents

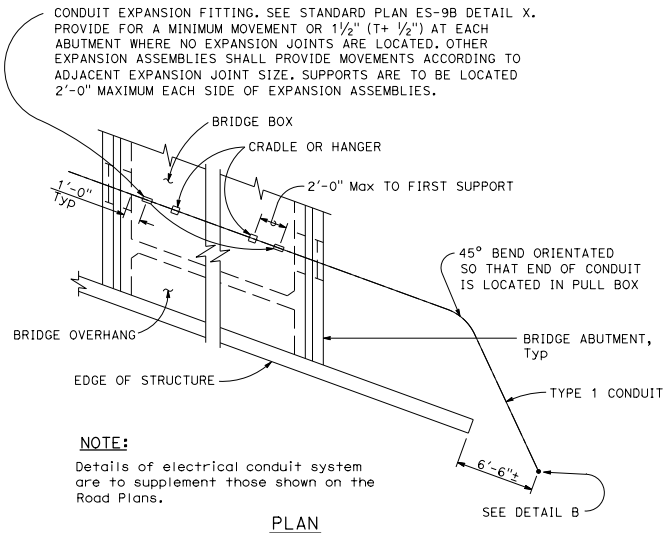
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Jaswinder S Gill
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

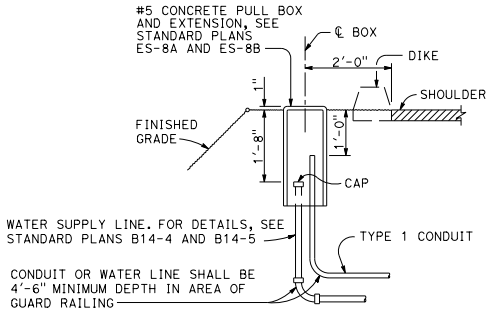
REGISTERED PROFESSIONAL ENGINEER
Jaswinder S. GILL
No. E18551
Exp. 12-31-18
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

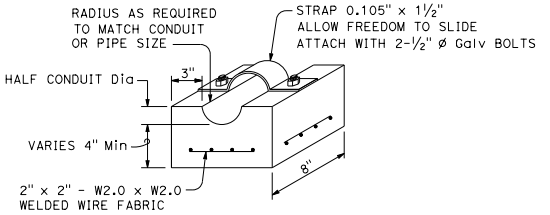


NOTE:
Details of electrical conduit system are to supplement those shown on the Road Plans.

PLAN
COMMUNICATION OR SPRINKLER CONTROL CONDUITS

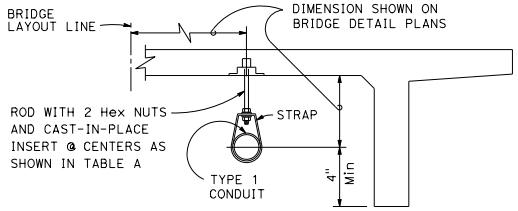


DETAIL B

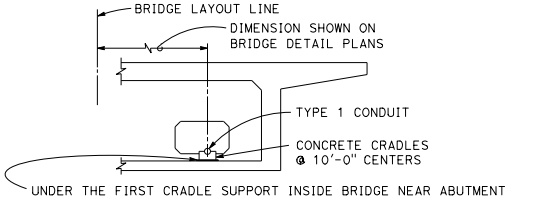


NOTES:
1. Cradles to be precast concrete.
2. Secure all cradles to bottom slab of bridge with epoxy adhesive, except as provided below.

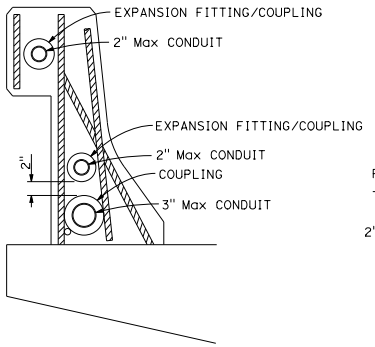
CONCRETE CRADLE



OTHER THAN BOX GIRDER
CONDUIT HANGER SUPPORT DETAILS

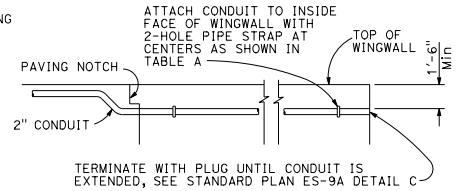


BOX GIRDER
CONDUIT SUPPORT DETAILS

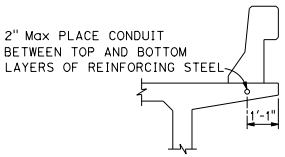


CONDUIT IN BRIDGE RAILING

NOTES:
1. The maximum conduit sizes shown are for a straight run across the bridge without pull boxes.
2. In a bridge railing with lighting standards or pull boxes, reduce size of affected conduits as needed.



CONDUIT IN OVERHANG-WINGWALL DETAIL



CONDUIT IN OVERHANG

CONDUIT LOCATIONS

(For 2" conduit only except as noted)
For location see Bridge Detail plans.

TABLE A

CONDUIT	2½" OR LESS	3"	3½"
ROD	⅜" ø	½" ø	⅝" ø
STRAP	0.090" x 1"	0.090" x 1"	0.105" x 1½"
SUPPORT SPACING	10'-0"	10'-0"	10'-0"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

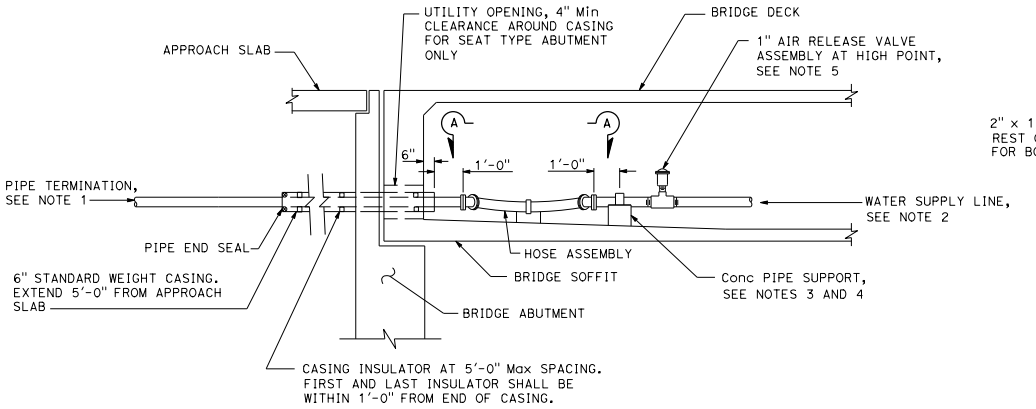
COMMUNICATION AND SPRINKLER CONTROL CONDUITS (CONDUIT LESS THAN 4")

NO SCALE

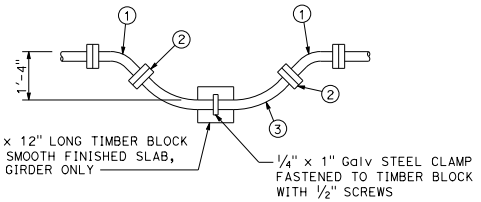
B14-3

1-29-18

Return to Table of Contents



BOX GIRDER INSTALLATION



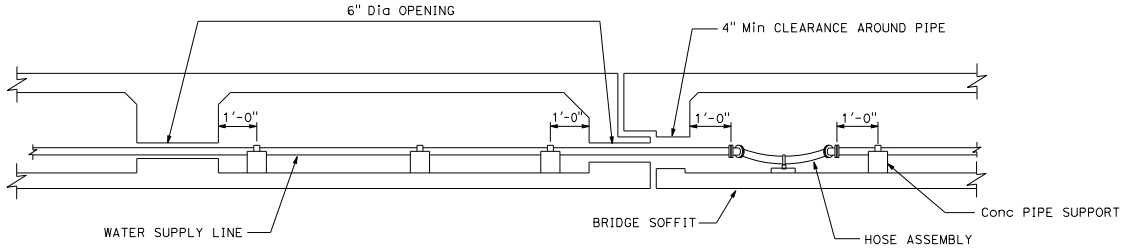
VIEW A-A
HOSE ASSEMBLY

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Terry Marcotte
REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Jerry Marcotte
No. C36844
Exp. 6-30-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



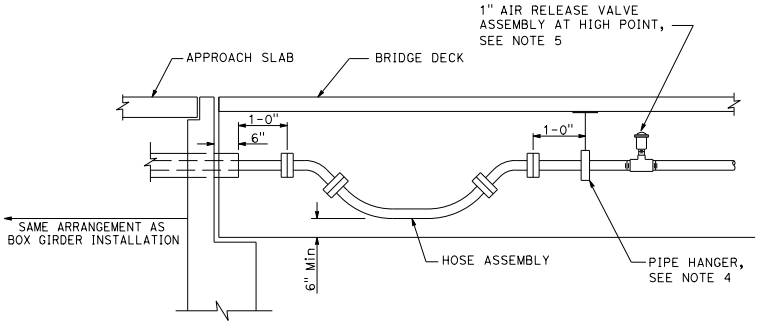
PIPE INSTALLATION AT HINGE
Same for hanger type installation

NUMBERED ITEM

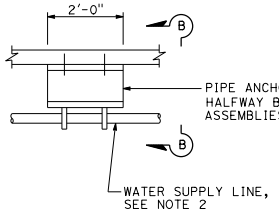
1. 45° flanged elbow with insulated flange connection
2. Flanged hose fitting
3. Hose 6'-6" in length (size shall be same as pipe)

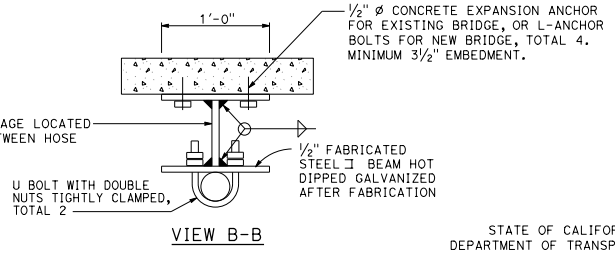
NOTES:

1. Extend pipe 5'-0"+ beyond the edge of shoulder or as shown on bridge plans. Terminate in a pull box as shown on Standard Plan B14-3, Detail B.
2. Water supply line shall be installed parallel to to bridge soffit or deck.
3. For concrete pipe support, pipe shall be tightly clamped at the pipe support located halfway between hose assemblies. At all other supports, pipe clamp shall be shimmed with steel washer plate to provide 1/4" clearance between pipe and clamp.
4. Maximum spacing between pipe hangers or supports shall be 10'-0" unless otherwise detailed on the plans.
5. Install air release valve using threaded tee or pipe saddle.
6. Openings through diaphragm and bent caps shall be 6" diameter unless otherwise detailed on the plans.
7. For details of pipe hanger and concrete pipe support see Standard Plan B14-5.



INSTALLATION FOR OTHER STRUCTURE TYPES





VIEW B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

WATER SUPPLY LINE (BRIDGE) (PIPE SIZES LESS THAN 4")

NO SCALE

B14-4

2018 STANDARD PLAN B14-4

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

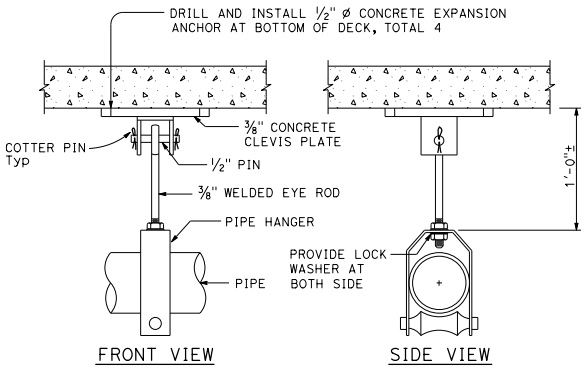
REGISTERED CIVIL ENGINEER

May 31, 2018

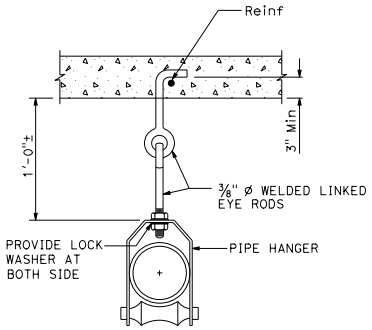
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Jerry Marcotte — No. C36844 — Exp. 6-30-20 — CIVIL — STATE OF CALIFORNIA

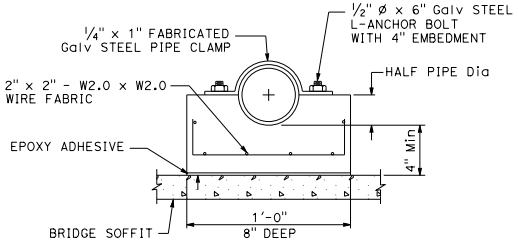


FOR EXISTING BRIDGE

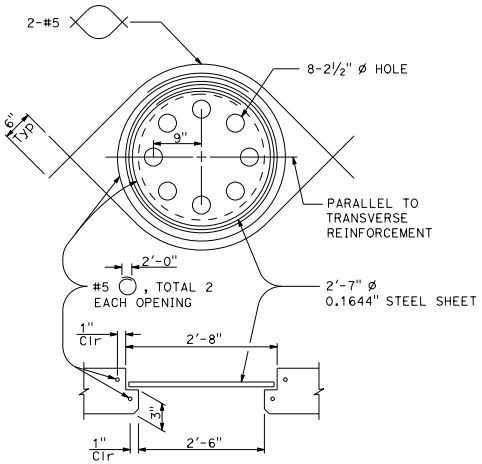


FOR NEW BRIDGE

PIPE HANGER



CONCRETE PIPE SUPPORT



Locate where called for on bridge plans. Adjust reinforcement to clear opening. Plate must be installed before top deck is placed.

SOFFIT ACCESS OPENING

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

WATER SUPPLY LINE (DETAILS) (PIPE SIZES LESS THAN 4")

NO SCALE

B14-5

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

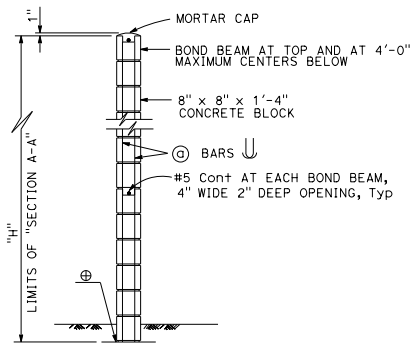
REGISTERED CIVIL ENGINEER

May 31, 2018

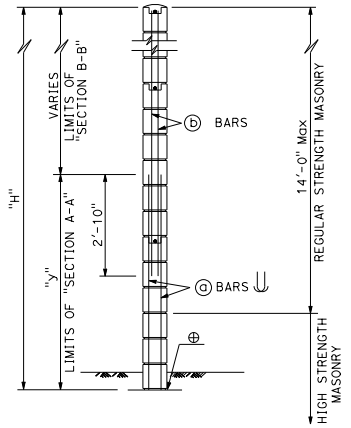
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



H=6'-0" THRU H=10'-0"

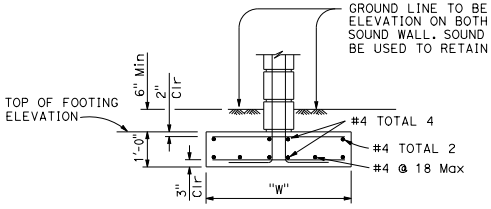


H=12'-0" THRU H=16'-0"

For details not shown, see H=6'-0" thru H=10'-0".

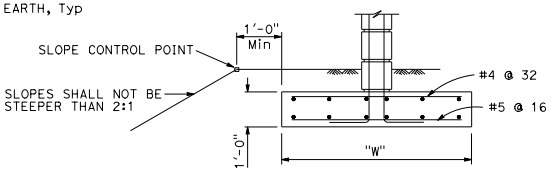
TYPICAL SECTION

⊕ Full mortar bed at bottom of wall



CASE 1

For details not shown, see Case 2. Level ground (*10%) on both sides of the sound wall.



CASE 2

For details not shown, see Case 1. Level ground (*10%) on the traffic side of the sound wall and sloping ground on the opposite side.

SPREAD FOOTING SECTION

TRENCH FOOTING

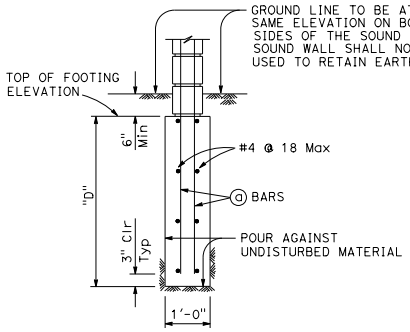
MAXIMUM H	CASE 1			CASE 2		MAXIMUM H
	Ø = 25 Min	Ø = 30 Min	Ø = 35 Min	Ø = 30 Min	Ø = 35 Min	
	D	D	D	D	D	
6'-0"	5'-0"	4'-3"	3'-6"	6'-6"	5'-0"	6'-0"
8'-0"	6'-0"	5'-0"	4'-3"	7'-9"	6'-0"	8'-0"
10'-0"	6'-9"	5'-9"	5'-0"	8'-9"	6'-9"	10'-0"
12'-0"	7'-9"	6'-6"	5'-6"	9'-9"	7'-9"	12'-0"
14'-0"	8'-6"	7'-3"	6'-0"	10'-9"	8'-6"	14'-0"
16'-0"	9'-3"	7'-9"	6'-6"	11'-9"	9'-3"	16'-0"

Case 1 - Level ground (±10%) on both sides of the sound wall.

Case 2 - Level ground (±10%) on traffic side of the sound wall and sloping ground on opposite side.

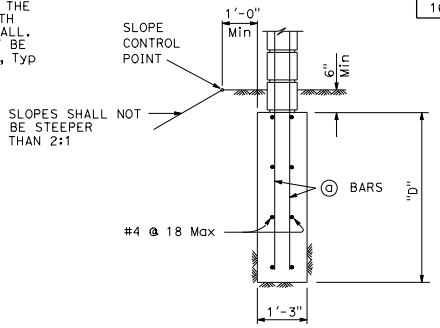
SOUND WALL REINFORCEMENT TABLE

MAXIMUM H	ⓐ BARS @ 1'-4" Max	ⓑ BARS @ 1'-4" Max	"y"	f'm (psi)	COMPRESSIVE STRENGTH OF CMU (psi)	MAXIMUM H
6'-0"	#4	———	———	1500	1900	6'-0"
8'-0"	#4	———	———	1500	1900	8'-0"
10'-0"	#4	———	———	1500	1900	10'-0"
12'-0"	#5	#4	6'-0"	1500	1900	12'-0"
14'-0"	#6	#4	8'-0"	1500	1900	14'-0"
16'-0"	#6	#4	10'-0"	2000	2800	16'-0"



CASE 1

For details not shown, see Case 2. Level ground (±10%) on both sides of the sound wall.



CASE 2

For details not shown, see Case 1. Level ground (±10%) on one side of the sound wall and sloping ground on the opposite side.

TRENCH FOOTING SECTION

SPREAD FOOTING

MAXIMUM H	W
6'-0"	3'-0"
8'-0"	4'-0"
10'-0"	5'-0"
12'-0"	5'-9"
14'-0"	6'-6"
16'-0"	7'-6"

GENERAL NOTES:

1. For type of block and joint finish, see other sheets.
2. When blocks are laid in stacked bond, ladder type, galvanized joint reinforcement shall be provided. A minimum of 2-9 gauge wires continuous at 4'-0" maximum to be used. Locate reinforcement in joints that are at the approximate midpoint between bond and beams.
3. Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.
4. For intermediate wall heights that are between the "H's" given, use the tabular information for the next higher "H".
5. Masonry strengths are listed in the "SOUND WALL REINFORCEMENT TABLE".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON FOOTING DETAILS (1)

NO SCALE

B15-1

2018 STANDARD PLAN B15-1

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

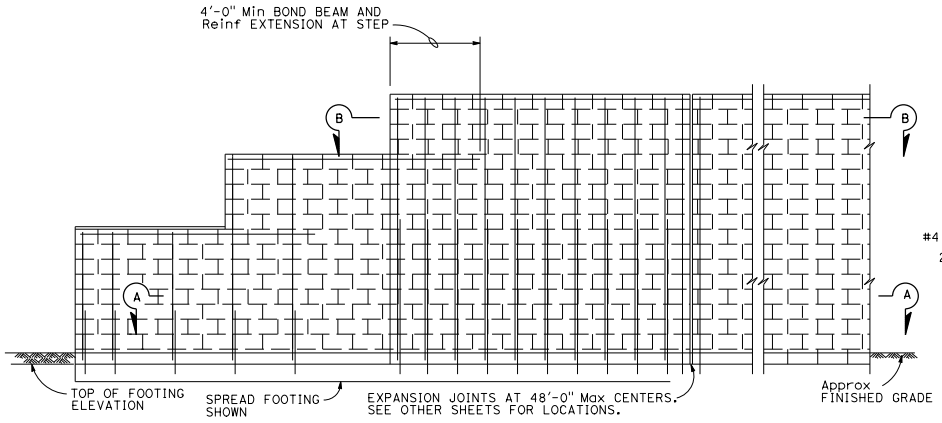
REGISTERED CIVIL ENGINEER

May 31, 2018

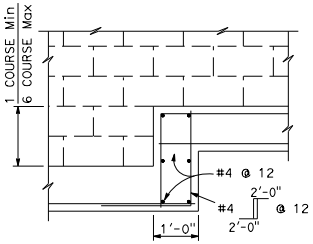
PLANS APPROVAL DATE

Tiligt Satter
No. C42892
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

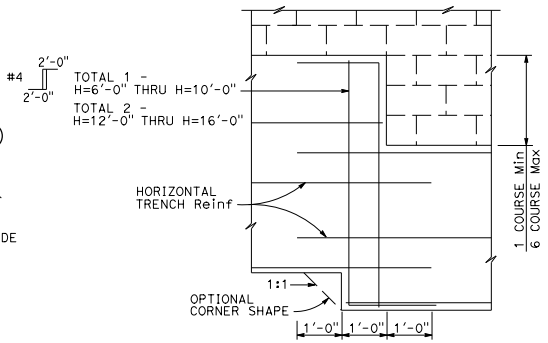
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION

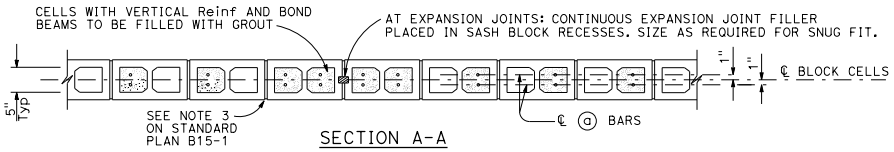


SPREAD FOOTING



TRENCH FOOTING

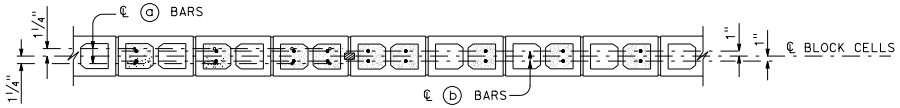
FOOTING STEP DETAILS



SECTION A-A

For details not shown, see other sections.

H=6'-0" THRU H=10'-0"



SECTION A-A SECTION B-B

For details not shown, see other sections.

H=12'-0" THRU H=16'-0"

Note 1: For details not shown, see Standard Plan B15-1

DESIGN NOTES:

DESIGN

Uniform Building Code, 1997 Edition
and the Bridge Design Specifications.

DESIGN WIND LOAD

20 psf

DESIGN SEISMIC LOAD

0.57 Dead load

REINFORCED CONCRETE

f'c = 3.6 ksi
fy = 60 ksi

CONCRETE MASONRY

REGULAR STRENGTH	HIGH STRENGTH	
f'm = 1500 psi	f'm = 2000 psi	f'm = 2500 psi
fb = 495 psi	fb = 660 psi	fb = 830 psi
fs = 24,000 psi	fs = 24,000 psi	fs = 24,000 psi
n = 25.8	n = 19.3	n = 15.5

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL
MASONRY BLOCK ON FOOTING
DETAILS (2)

NO SCALE

B15-2

2018 STANDARD PLAN B15-2

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

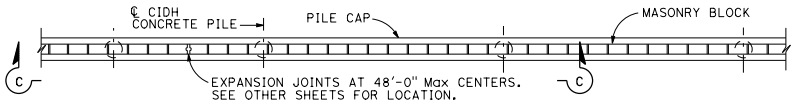
REGISTERED CIVIL ENGINEER

May 31, 2018

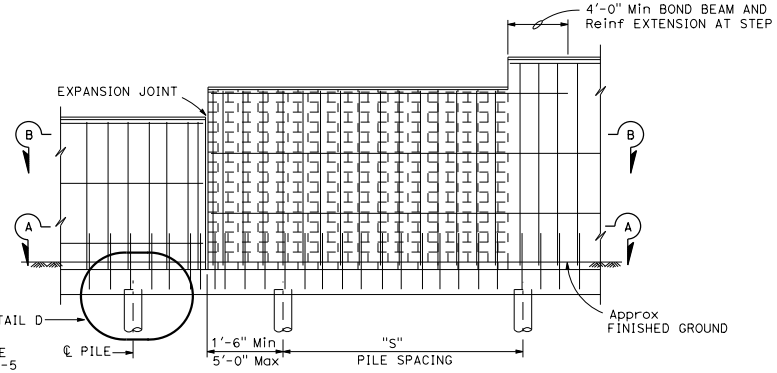
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiligt Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



NOTE:
FOR "DETAIL D", SEE STANDARD PLAN B15-5

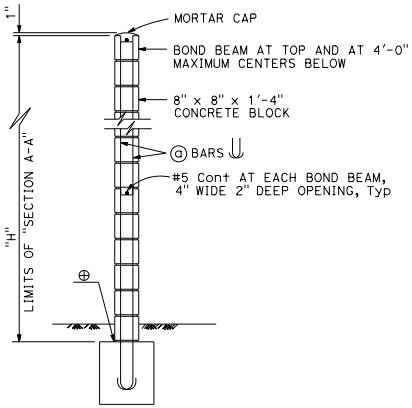
ELEVATION C-C

Note I : For details not shown, see Standard Plans B15-4 and B15-5.

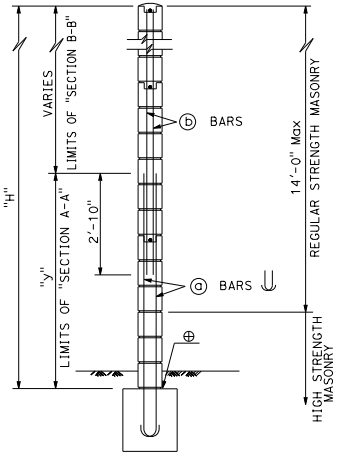
Note II: See Standard Plan B15-9 for other details.

SOUND WALL REINFORCEMENT TABLE

MAXIMUM "H"	ⓐ BARS @ 1'-4" Max	ⓑ BARS @ 1'-4" Max	"Y"	f'm (psi)	COMPRESSIVE STRENGTH OF CMU (psi)	MAXIMUM "H"
6'-0"	#4	——	——	1500	1900	6'-0"
8'-0"	#4	——	——	1500	1900	8'-0"
10'-0"	#4	——	——	1500	1900	10'-0"
12'-0"	#5	#4	6'-0"	1500	1900	12'-0"
14'-0"	#6	#4	8'-0"	1500	1900	14'-0"
16'-0"	#6	#4	10'-0"	2000	2800	16'-0"



H=6'-0" THRU H=10'-0"

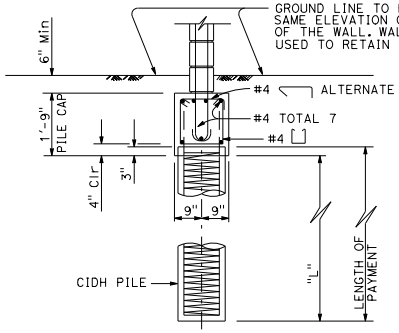


H=12'-0" THRU H=16'-0"

For details not shown, see H=6'-0" thru H=10'-0".

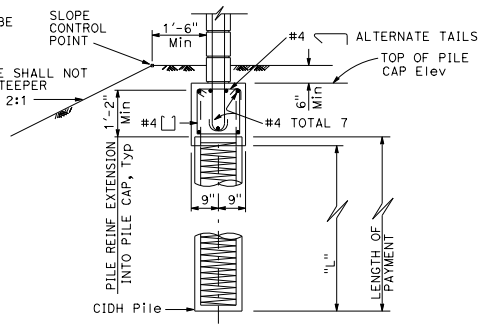
TYPICAL SECTION

⊕ Full mortar bed at bottom of wall.



CASE 1

For details not shown, see Case 2.
Level ground (±10%) on one side of the sound wall.



CASE 2

For details not shown, see Case 1.
Level ground (±10%) on one side of the sound wall and sloping ground on the opposite side.

PILE CAP SECTION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON PILE CAP DETAILS (1)

NO SCALE

B15-3

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

GENERAL NOTES:

1. For type of block and joint finish, see other sheets.
2. When blocks are laid in stacked bond, ladder type, galvanized joint reinforcement shall be provided. A minimum of 2-9 gauge wires continuous at 4'-0" maximum to be used. Locate reinforcement in joints that are at the approximate midpoint between bond beams.
3. Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.
4. For intermediate wall heights that are between the "H's" given, use the tabular information for the next higher "H".
5. Masonry strengths are listed in the "SOUND WALL REINFORCEMENT TABLE". See Standard Plan B15-3.

DESIGN NOTES:

DESIGN

Uniform Building Code, 1997 Edition
and the Bridge Design Specifications.

DESIGN WIND LOAD

20 psf

DESIGN SEISMIC LOAD

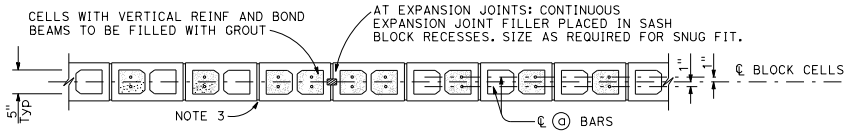
0.57 Dead load

REINFORCED CONCRETE

f'c = 3.6 ksi
fy = 60 ksi

CONCRETE MASONRY

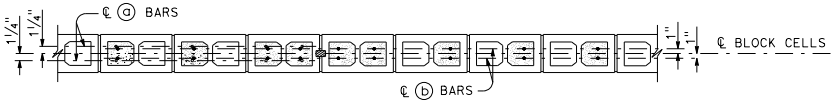
REGULAR STRENGTH	HIGH STRENGTH	
f'm = 1500 psi	f'm = 2000 psi	f'm = 2500 psi
fb = 495 psi	fb = 660 psi	fb = 830 psi
fs = 24,000 psi	fs = 24,000 psi	fs = 24,000 psi
n = 25.8	n = 19.3	n = 15.5



SECTION A-A

For details not shown, see other sections.

H=6'-0" THRU H=10'-0"



SECTION A-A SECTION B-B

For details not shown, see other sections.

H=12'-0" THRU H=16'-0"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL
MASONRY BLOCK ON PILE CAP
DETAILS (2)

NO SCALE

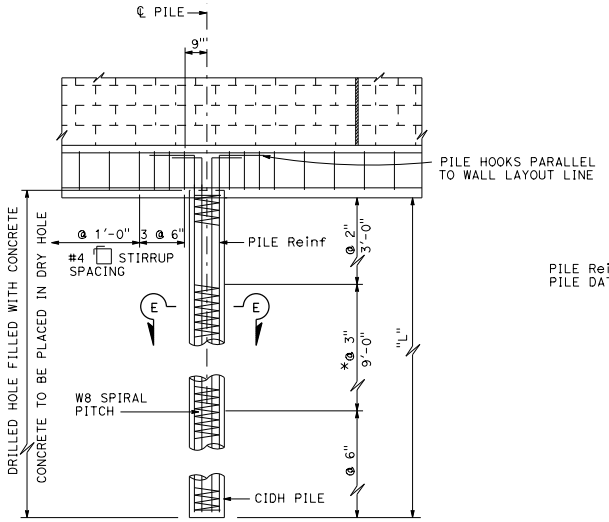
B15-4

2018 STANDARD PLAN B15-4

393

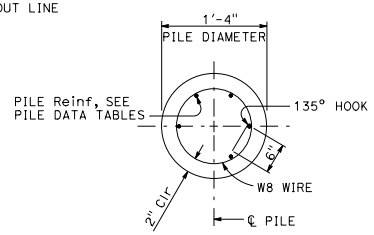
1-29-18

Return to Table of Contents

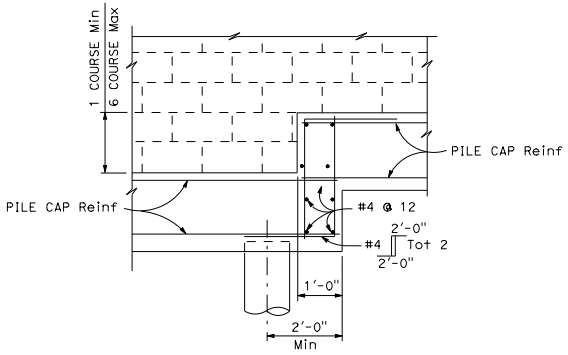


DETAIL D

* @ 2" at option of Contractor



SECTION E-E



PILE CAP STEP DETAIL

NOTE:

1. For details not shown, see Standard Plans B15-3 and B15-4.

CASE 1 - PILE DATA TABLE										
MAXIMUM H	ø = 25 Min			ø = 30 Min			ø = 35 Min			MAXIMUM H
	S	L	PILE Reinf	S	L	PILE Reinf	S	L	PILE Reinf	
6'-0"	16'-0"	7'-0"	#6 Tot 6	16'-0"	5'-6"	#6 Tot 6	16'-0"	4'-6"	#6 Tot 6	6'-0"
8'-0"	16'-0"	8'-6"	#6 Tot 7	16'-0"	7'-0"	#6 Tot 7	16'-0"	5'-6"	#6 Tot 7	8'-0"
10'-0"	16'-0"	10'-0"	#7 Tot 6	16'-0"	8'-0"	#7 Tot 6	16'-0"	6'-6"	#7 Tot 6	10'-0"
12'-0"	15'-0"	11'-6"	#8 Tot 7	16'-0"	9'-6"	#8 Tot 7	16'-0"	7'-6"	#8 Tot 7	12'-0"
14'-0"	13'-0"	11'-6"	#8 Tot 7	14'-0"	10'-0"	#8 Tot 7	14'-0"	8'-0"	#8 Tot 7	14'-0"
16'-0"	12'-0"	12'-0"	#8 Tot 7	13'-0"	10'-6"	#8 Tot 7	13'-0"	8'-6"	#8 Tot 7	16'-0"

Case 1 - Level ground (±10%) on both sides of the sound wall.

CASE 2 - PILE DATA TABLE							
MAXIMUM H	ø = 30 Min			ø = 35 Min			MAXIMUM H
	S	L	PILE Reinf	S	L	PILE Reinf	
6'-0"	16'-0"	11'-6"	#8 Tot 7	16'-0"	8'-6"	#6 Tot 7	6'-0"
8'-0"	16'-0"	14'-0"	#8 Tot 7	16'-0"	10'-6"	#7 Tot 6	8'-0"
10'-0"	15'-0"	16'-0"	#8 Tot 7	16'-0"	12'-0"	#7 Tot 7	10'-0"
12'-0"	12'-0"	16'-0"	#8 Tot 7	15'-0"	13'-6"	#8 Tot 7	12'-0"
14'-0"	10'-0"	16'-0"	#8 Tot 7	12'-0"	13'-6"	#8 Tot 7	14'-0"
16'-0"	8'-0"	16'-0"	#8 Tot 7	11'-0"	14'-0"	#8 Tot 7	16'-0"

Case 2 - Level ground (±10%) on traffic side of the sound wall and sloping ground on opposite side.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiligt Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL
MASONRY BLOCK ON PILE CAP
DETAILS (3)

NO SCALE

B15-5

2018 STANDARD PLAN B15-5

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

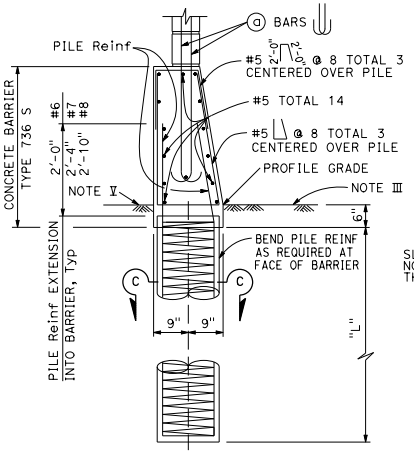
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

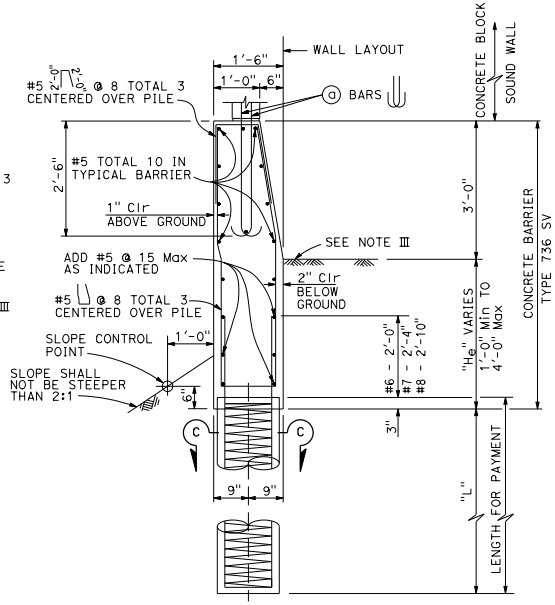
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



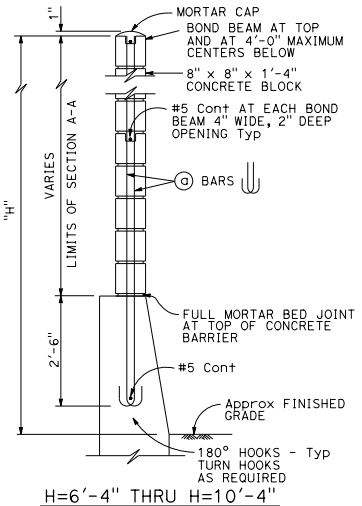
CASE 1

For details not shown, See Case 2.
Level ground ±10% on both sides of barrier.

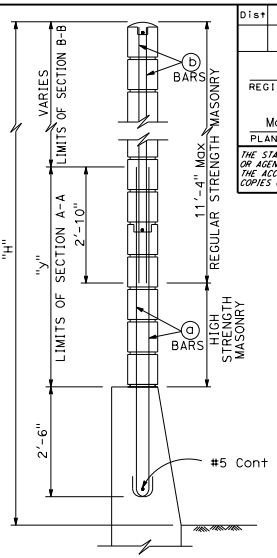


CASE 2

For details not shown, See Case 1.
Level ground ±10% at the traffic side of barrier and sloping ground on the opposite side.



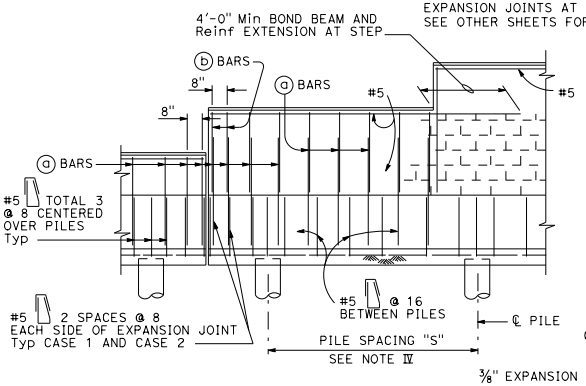
H=6'-4" THRU H=10'-4"



H=12'-4" THRU H=16'-4"

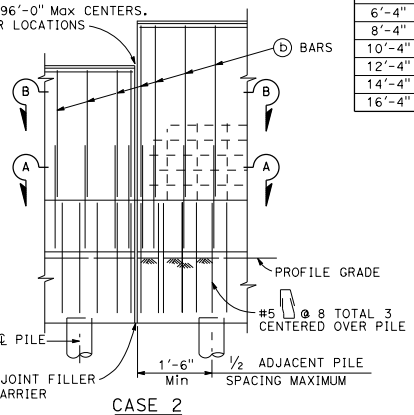
For details not shown, see H=6'-4" thru H=10'-4".

BARRIER SECTIONS



CASE 1

For details not shown, See Case 2.



CASE 2

For details not shown, See Case 1.

PARTIAL ELEVATIONS

TYPICAL SECTIONS

See Standard Plan B15-8 for pile details.

SOUND WALL REINFORCEMENT TABLE

MAXIMUM H	ⓐ BARS @ 1'-4" Max	ⓑ BARS @ 1'-4" Max	"y"	f'm (psi)	COMPRESSIVE STRENGTH OF CMU (psi)	H
6'-4"	#4	---	---	1500	1900	6'-4"
8'-4"	#4	---	---	1500	1900	8'-4"
10'-4"	#4	---	---	1500	1900	10'-4"
12'-4"	#5	#4	5'-0"	1500	1900	12'-4"
14'-4"	#6	#4	7'-0"	1500	1900	14'-4"
16'-4"	#6	#4	9'-0"	2500	3750	16'-4"

NOTES I THROUGH Ⅵ:

Ⅰ. Details shown are primarily to conform design of sound walls to Type 736S and Type 736 SV Concrete Barriers. For sound wall details conforming with barriers see Standard Plans B15-7 and B15-8.

Ⅱ. For details and sections not shown, see Standard Plans B15-7 and B15-8.

Ⅲ. Slope ground at traffic side of barrier to drain. Maximum slope ±10%. See Std Plan B11-56, Note 3.

Ⅳ. Pile spacing may be varied, but shall not exceed the tabular values. See Standard Plan B15-8.

Ⅴ. For Case 1 - ground line to be at the same elevation on both sides of the barrier. Barrier shall not be used to retain earth.

Ⅵ. See Standard Plan B15-9 for other details.

NOTES A THROUGH E:

A. For type of block, type of block bond, and joint finish, see other sheets.

B. When blocks are laid in stacked bond, ladder type, galvanized joint reinforcement shall be provided. A minimum of 2-9 gauge wires continuous at 4'-0" maximum to be used. Locate reinforcement in joints that are at the approximate midpoint between bond beams.

C. Horizontal joints shall be tooled concave or may be weathered. Vertical joints shall be tooled concave or may be raked.

D. For intermediate wall heights (H), or barrier depths (H_e), that are between the values given, use the tabular information for the next higher (H) or (H_e).

E. Masonry strengths are listed in the "SOUND WALL REINFORCEMENT TABLE".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (1)

NO SCALE

B15-6

1-29-18

Return to Table of Contents

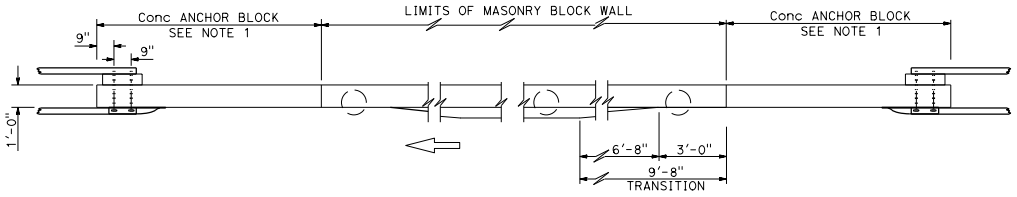
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

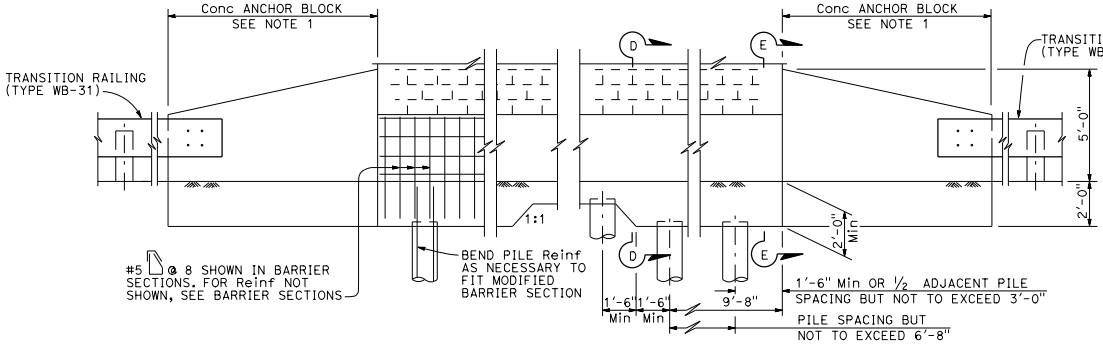
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



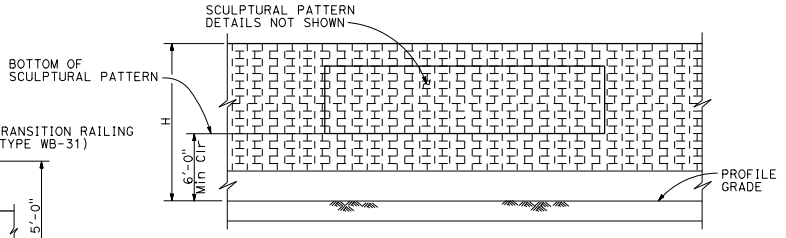
PLAN



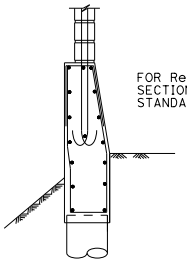
ELEVATION

MIDWEST GUARDRAIL SYSTEM ANCHORAGE

For details not shown, see Standard Plan B11-56.

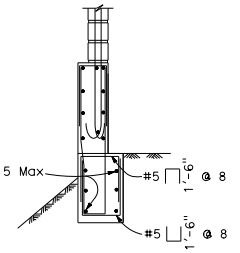


CLEARANCE DETAIL

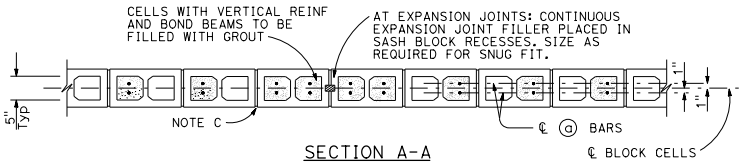


SECTION D-D

FOR Reinf, SEE "BARRIER SECTIONS CASE 2" ON STANDARD PLAN B15-6



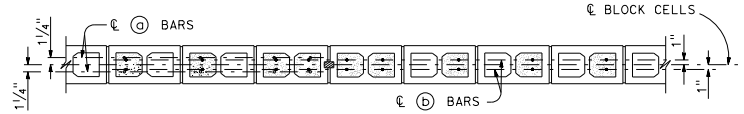
SECTION E-E



SECTION A-A

For details not shown, see other details.

H=6'-4" THRU H=10-4"



SECTION A-A SECTION B-B

For details not shown, see other details.

H=12'-4" THRU H=16'-4"

DESIGN NOTES:

DESIGN

Uniform Building Code, 1997 Edition
and the Bridge Design Specifications.

DESIGN WIND LOAD

27 psf

DESIGN SEISMIC LOAD

0.57 Dead load

REINFORCED CONCRETE

f'c = 3.6 ksi
fy = 60 ksi

CONCRETE MASONRY

REGULAR STRENGTH	HIGH STRENGTH	
f'm = 1500 psi	f'm = 2000 psi	f'm = 2500 psi
fb = 495 psi	fb = 660 psi	fb = 830 psi
fs = 24,000 psi	fs = 24,000 psi	fs = 24,000 psi
n = 25.8	n = 19.3	n = 15.5

NOTE:

1. For Concrete Anchor Block and connection details, see "Connection Detail DD" on Standard Plan A77U3.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (2)

NO SCALE

B15-7

2018 STANDARD PLAN B15-7

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

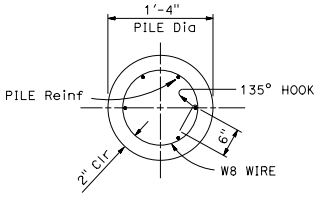
REGISTERED CIVIL ENGINEER

May 31, 2018

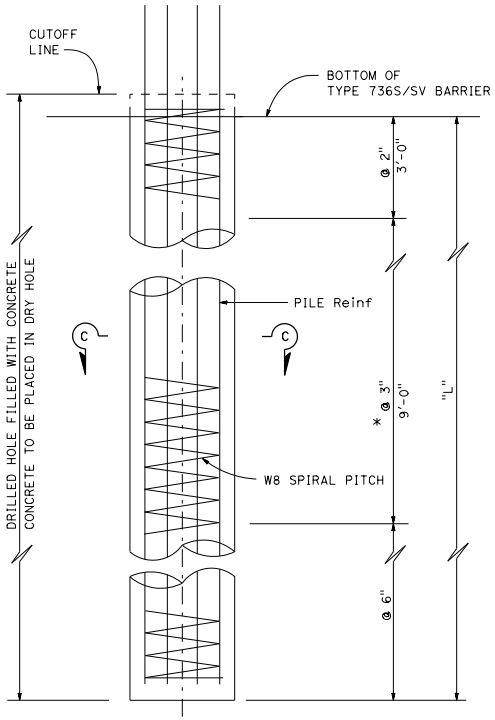
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION C-C



ELEVATION

* @ 2" at option of Contractor.

CASE 1: PILE DATA TABLE

MAXIMUM H	ø = 25 Min S	ø = 25 Min L	ø = 25 Min PILE Reinf	ø = 30 Min S	ø = 30 Min L	ø = 30 Min PILE Reinf	ø = 35 Min S	ø = 35 Min L	ø = 35 Min PILE Reinf	MAXIMUM H
6'-4"	10'-0"	8'-6"	#6 Tot 6	10'-0"	7'-0"	#6 Tot 6	10'-0"	6'-0"	#6 Tot 6	6'-4"
8'-4"	10'-0"	9'-6"	#6 Tot 6	10'-0"	8'-0"	#6 Tot 6	10'-0"	7'-0"	#6 Tot 6	8'-4"
10'-4"	10'-0"	10'-6"	#6 Tot 6	10'-0"	9'-0"	#6 Tot 6	10'-0"	7'-6"	#6 Tot 6	10'-4"
12'-4"	10'-0"	11'-6"	#7 Tot 6	10'-0"	9'-6"	#7 Tot 6	10'-0"	8'-6"	#6 Tot 6	12'-4"
14'-4"	10'-0"	12'-6"	#7 Tot 7	10'-0"	10'-6"	#7 Tot 7	10'-0"	9'-0"	#7 Tot 7	14'-4"
16'-4"	10'-0"	13'-0"	#8 Tot 7	10'-0"	11'-6"	#8 Tot 7	10'-0"	9'-6"	#7 Tot 7	16'-4"

CASE 2: PILE DATA TABLE

H_e	MAXIMUM H	ø = 30 Min S	ø = 30 Min L	ø = 30 Min PILE Reinf	ø = 35 Min S	ø = 35 Min L	ø = 35 Min PILE Reinf	MAXIMUM H
1'-0"	6'-4"	10'-0"	15'-0"	#7 Tot 6	10'-0"	12'-0"	#6 Tot 6	6'-4"
	8'-4"	9'-9"	16'-0'	#7 Tot 6	10'-0"	13'-0"	#7 Tot 6	8'-4"
	10'-4"	8'-0"	16'-0"	#7 Tot 6	10'-0"	14'-0"	#7 Tot 6	10'-4"
	12'-4"	6'-9"	16'-0"	#7 Tot 6	10'-0"	15'-0"	#8 Tot 7	12'-4"
	14'-4"	5'-9"	16'-0"	#7 Tot 6	9'-6"	15'-6'	#8 Tot 7	14'-4"
	16'-4"	5'-0"	16'-0"	#7 Tot 6	8'-9"	16'-0"	#8 Tot 7	16'-4"
2'-0"	6'-4"	8'-3"	16'-0"	#7 Tot 6	10'-0"	13'-6"	#7 Tot 6	6'-4"
	8'-4"	7'-0"	16'-0"	#7 Tot 6	10'-0"	14'-6"	#7 Tot 7	8'-4"
	10'-4"	6'-0"	16'-0"	#7 Tot 6	10'-0"	15'-3'	#8 Tot 7	10'-4"
	12'-4"	5'-3"	16'-0"	#7 Tot 6	9'-9"	16'-0"	#8 Tot 7	12'-4"
	14'-4"	4'-6"	16'-0"	#7 Tot 6	8'-4"	16'-0"	#8 Tot 7	14'-4"
	16'-4"	4'-0"	16'-0"	#7 Tot 6	7'-4"	16'-0"	#8 Tot 7	16'-4"
3'-0"	6'-4"	6'-0"	16'-0"	#7 Tot 6	10'-0"	15'-3"	#8 Tot 7	6'-4"
	8'-4"	5'-3"	16'-0"	#7 Tot 6	10'-0"	16'-0"	#8 Tot 7	8'-4"
	10'-4"	4'-6"	16'-0"	#7 Tot 6	8'-10"	16'-0"	#8 Tot 7	10'-4"
	12'-4"	4'-0"	16'-0"	#7 Tot 6	7'-10"	16'-0"	#8 Tot 7	12'-4"
	14'-4"	3'-6'	16'-0"	#7 Tot 6	6'-10"	16'-0"	#8 Tot 7	14'-4"
	16'-4"	3'-3"	16'-0"	#7 Tot 6	6'-2"	16'-0"	#8 Tot 7	16'-4"
4'-0"	6'-4"	4'-3"	16'-0"	#7 Tot 6	8'-0"	15'-6"	#8 Tot 7	6'-4"
	8'-4"	3'-10"	16'-0"	#7 Tot 6	7'-4"	15'-9"	#8 Tot 7	8'-4"
	10'-4"	3'-6"	16'-0"	#7 Tot 6	6'-10"	16'-0"	#8 Tot 7	10'-4"
	12'-4"	3'-2"	16'-0"	#7 Tot 6	6'-3"	16'-0"	#8 Tot 7	12'-4"
	14'-4"	3'-0"	16'-3"	#7 Tot 6	5'-8"	16'-0"	#8 Tot 7	14'-4"
	16'-4"	2'-10"	16'-6"	#7 Tot 6	5'-0"	16'-0"	#8 Tot 7	16'-4"

NOTE:

1. For details not shown, see Standard Plans B15-6 and B15-7.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

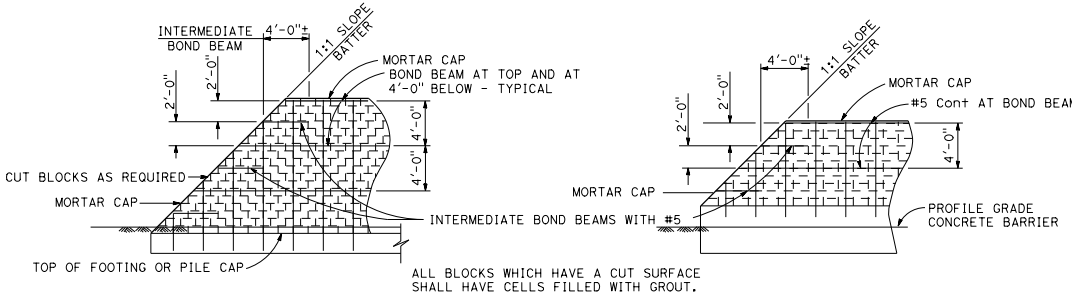
SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER DETAILS (3)

NO SCALE

B15-8

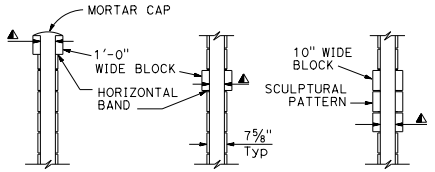
1-29-18

Return to Table of Contents



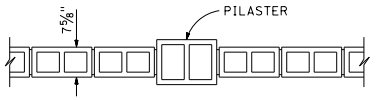
TYPE I

Slope batter shall not be flatter than 1:1.



ARCHITECTURAL ALTERNATIVES

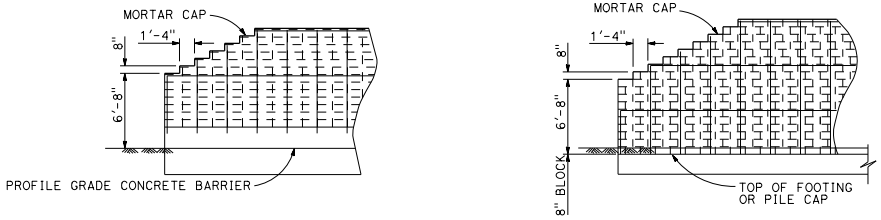
▲ Cell width to match 8" block.



1'-0" WIDE PROJECTING BLOCK

NOTES:

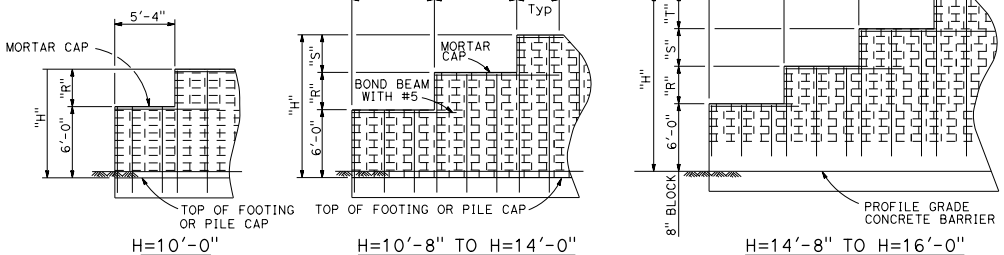
1. 1'-0" wide block not allowed within 6'-0" of profile grade.
2. For structural details, see other sheets.
3. Type Ⅲ not permitted for sound walls with "H" less than 10'-0".
4. The end of the wall details may be used with any of the standard supporting foundations for masonry block. The foundations shown for the different types are for the purpose of illustration only.



TYPE Ⅱ

8" x 8" x 16" BLOCK

H	R	S	T
10'-0"	4'-0"	—	—
10'-8"	2'-8"	2'-0"	—
11'-4"	2'-8"	2'-8"	—
12'-0"	3'-4"	2'-8"	—
12'-8"	3'-4"	3'-4"	—
13'-4"	4'-0"	3'-4"	—
14'-0"	4'-0"	4'-0"	—
14'-8"	3'-4"	2'-8"	2'-8"
15'-4"	3'-4"	3'-4"	2'-8"
16'-0"	3'-4"	3'-4"	3'-4"

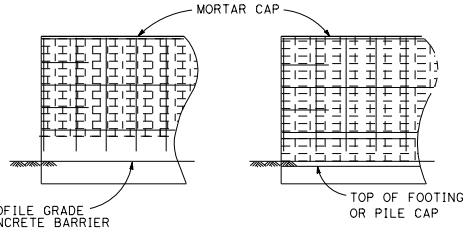


H=10'-0" SINGLE STEP

H=10'-8" TO H=14'-0" 2 STEPS

H=14'-8" TO H=16'-0" 3 STEPS

TYPE Ⅲ



TYPE Ⅳ

END OF WALL DETAILS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

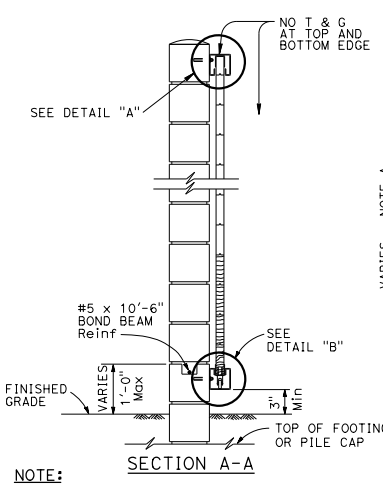
SOUND WALL MASONRY BLOCK MISCELLANEOUS DETAILS

NO SCALE

B15-9

1-29-18

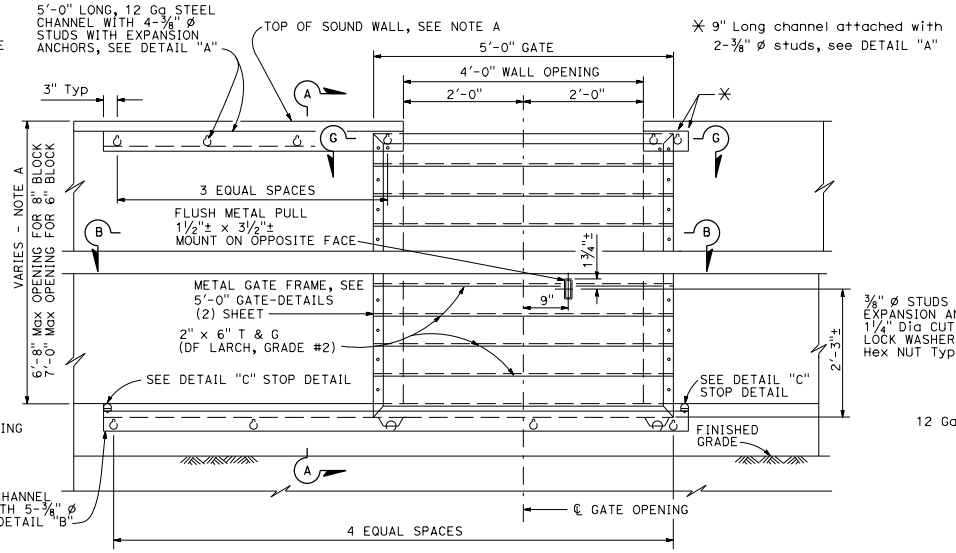
Return to Table of Contents



SECTION A-A

NOTE:

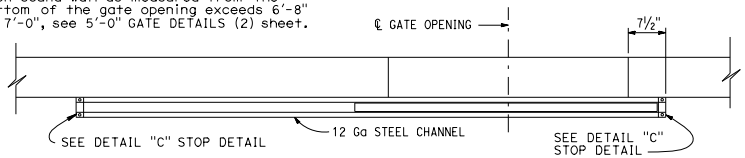
Those blocks upon which the supporting steel channels are mounted shall be smooth faced on the mounting side.



GATE ELEVATION - BACK

NOTE A:

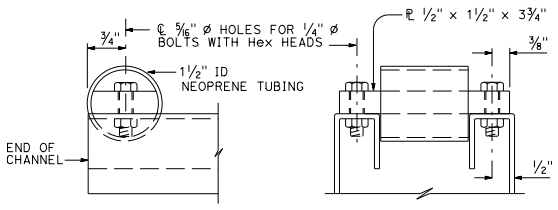
When sound wall as measured from the bottom of the gate opening exceeds 6'-8" or 7'-0", see 5'-0" GATE DETAILS (2) sheet.



SECTION B-B

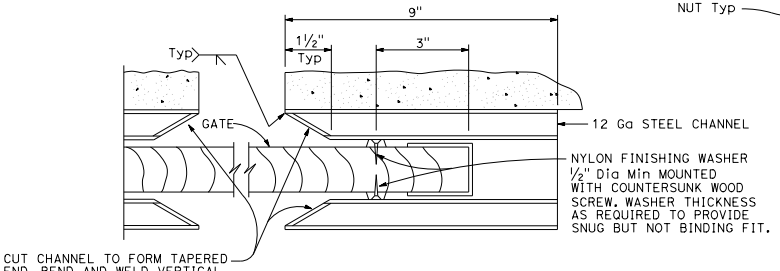
NOTES:

1. Gate mounted on sloping grade shall be oriented to be in closed position when at lower grade point.
2. Two masonry cells adjacent to each side of gate to be reinforced and grouted.



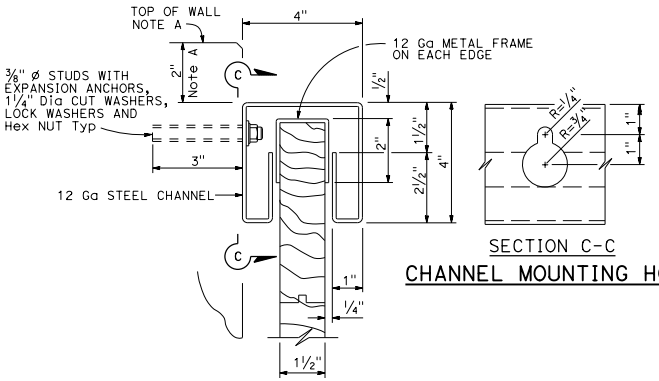
SIDE VIEW END VIEW

DETAIL "C" STOP DETAIL



SECTION G-G

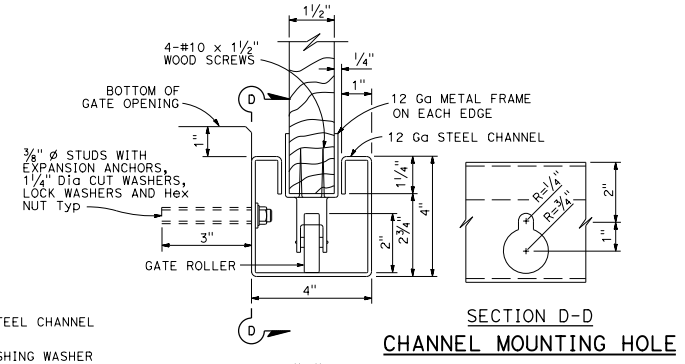
For location of nylon finishing washers, see Standard Plan B15-11.



SECTION C-C

CHANNEL MOUNTING HOLE

DETAIL "A"



SECTION D-D

CHANNEL MOUNTING HOLE

DETAIL "B"

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON FOOTING OR PILE CAP 5'-0" ACCESS GATE DETAILS (1)

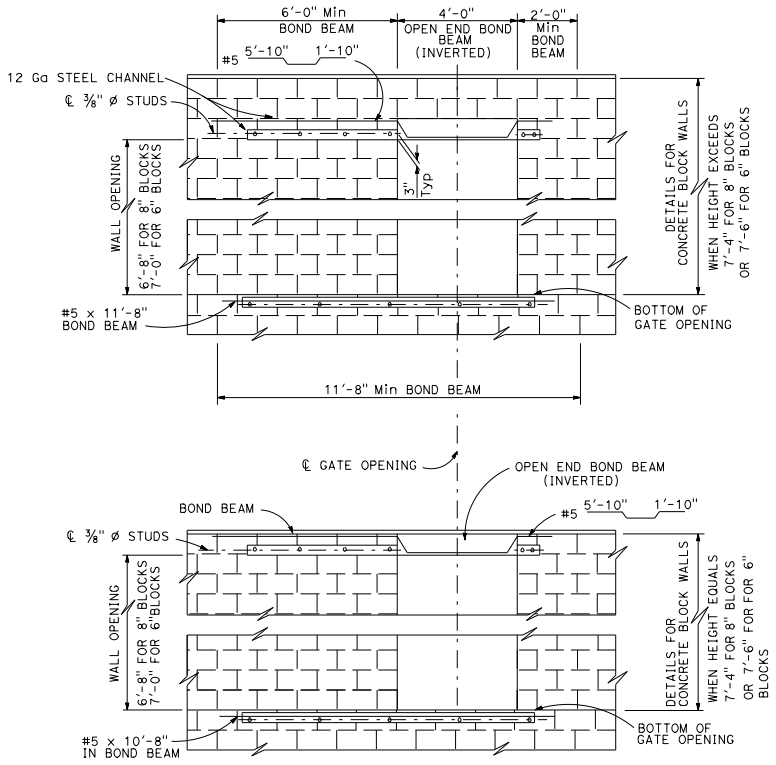
NO SCALE

B15-10

1-29-18

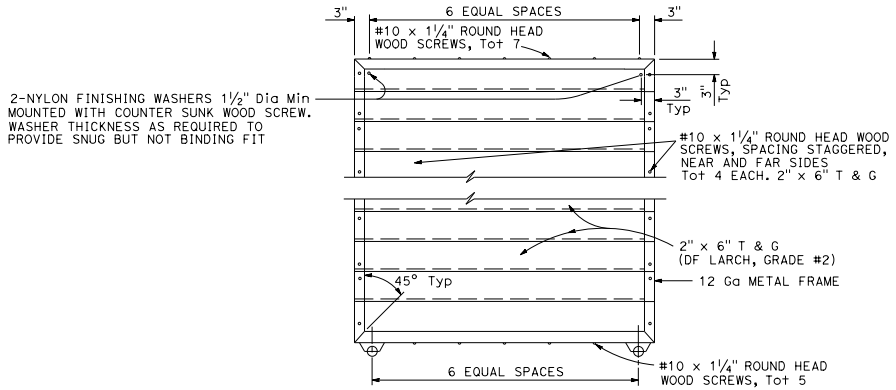
2018 STANDARD PLAN B15-10

Return to Table of Contents



PART ELEVATION (BACK)

For details not shown, see above.



ELEVATION - METAL FRAME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Tiligt Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON FOOTING OR PILE CAP 5'-0" ACCESS GATE DETAILS (2)

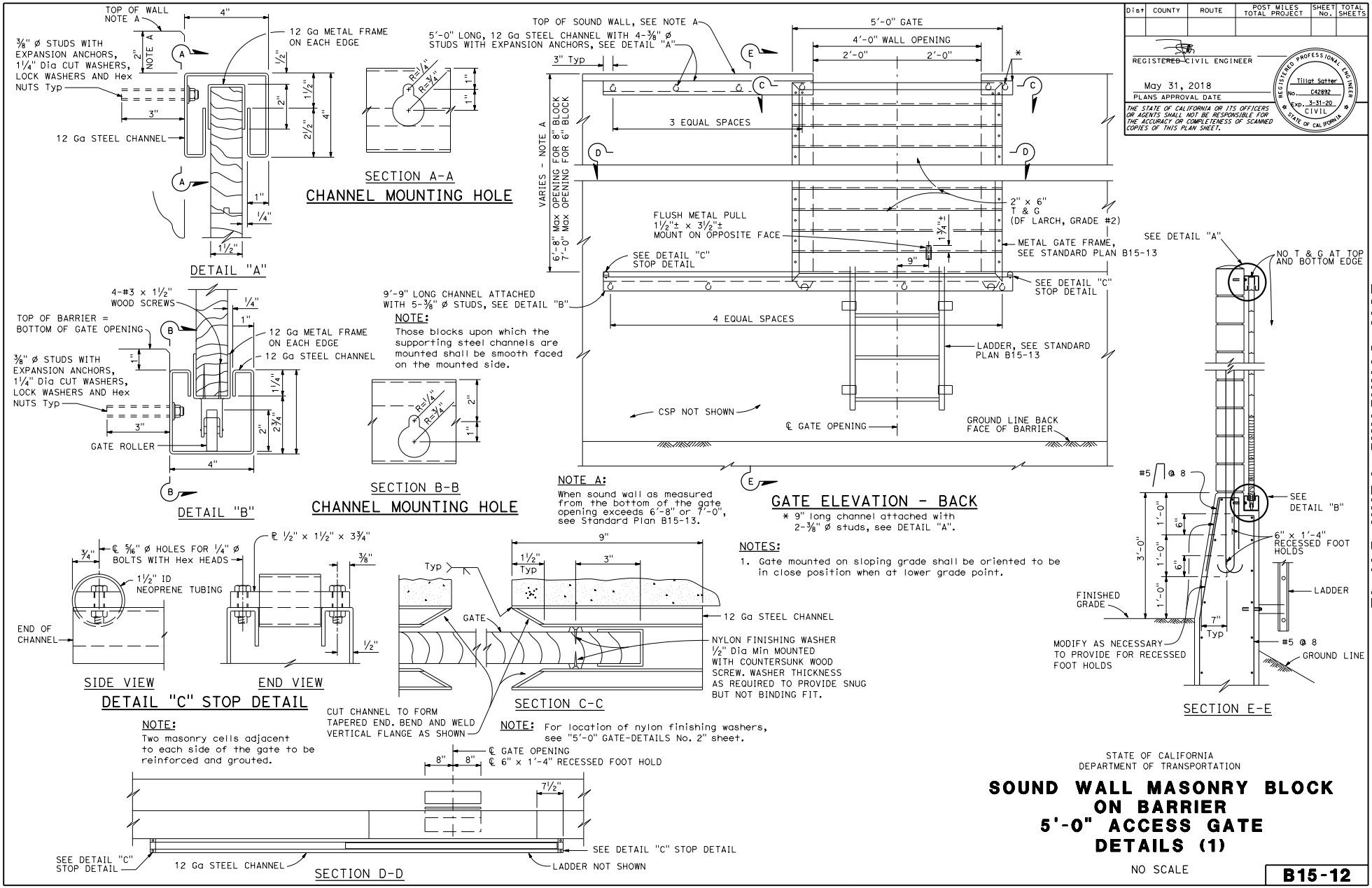
NO SCALE

B15-11

2018 STANDARD PLAN B15-11

1-29-18

Return to Table of Contents



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Tiliat Satter
No. C42892
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON BARRIER 5'-0" ACCESS GATE DETAILS (1)

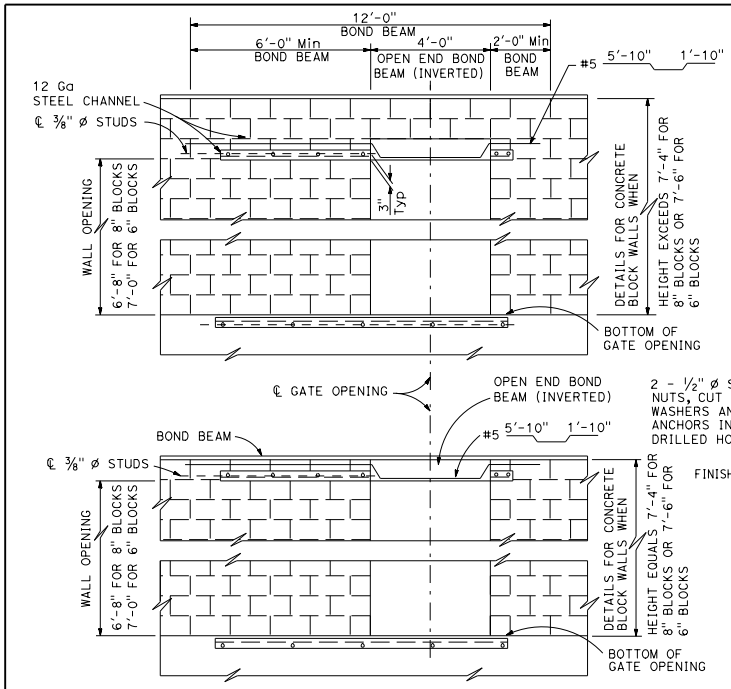
NO SCALE

B15-12

2018 STANDARD PLAN B15-12

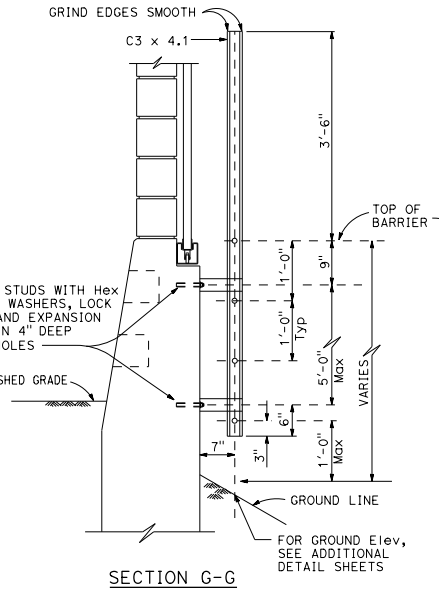
1-29-18

Return to Table of Contents

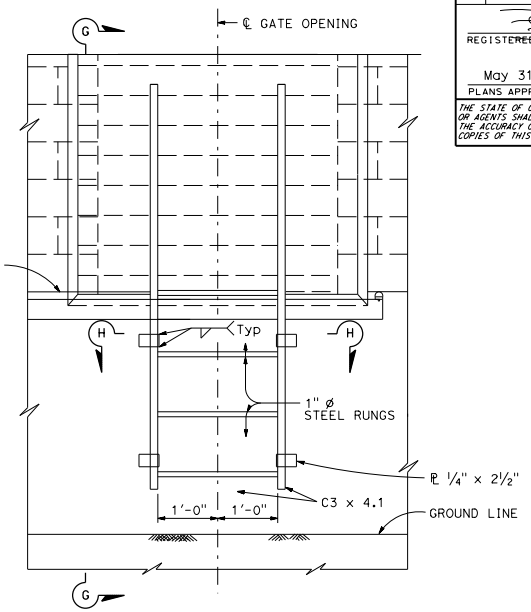


PART ELEVATION (BACK)

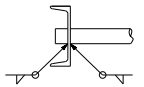
For details not shown, see above.



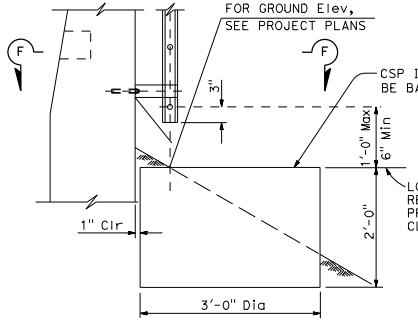
SECTION G-G



ELEVATION (BACK)



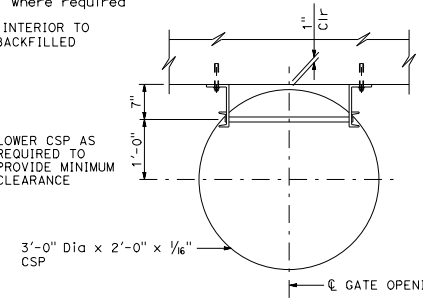
DETAIL "A"



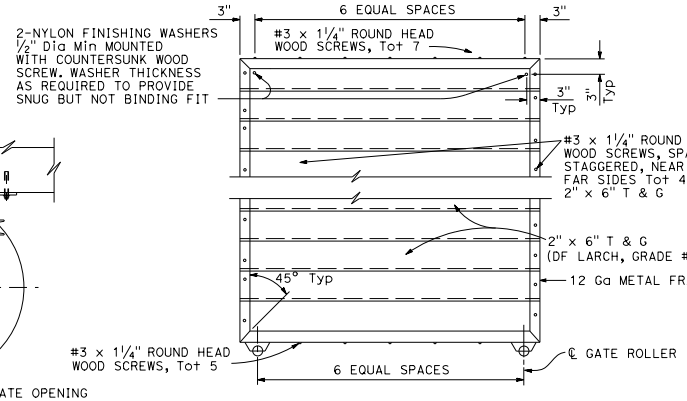
CORRUGATED STEEL PIPE LANDING DETAILS

NOTE:

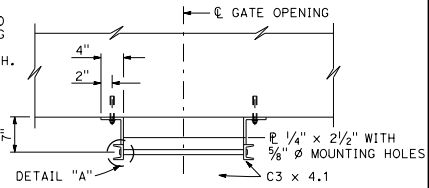
CSP landing required when slope of ground behind barrier is steeper than 8:1. See additional detail sheets for location where required



SECTION F-F



ELEVATION - METAL FRAME



SECTION H-H

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON BARRIER 5'-0" ACCESS GATE DETAILS (2)

NO SCALE

B15-13

1-29-18

2018 STANDARD PLAN B15-13

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

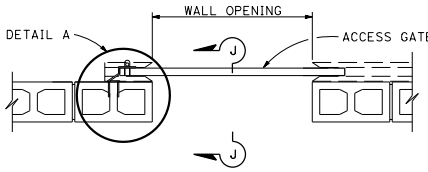
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

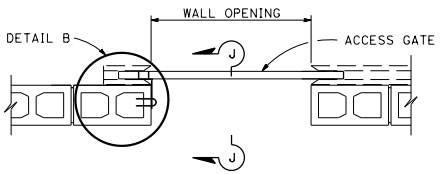
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA



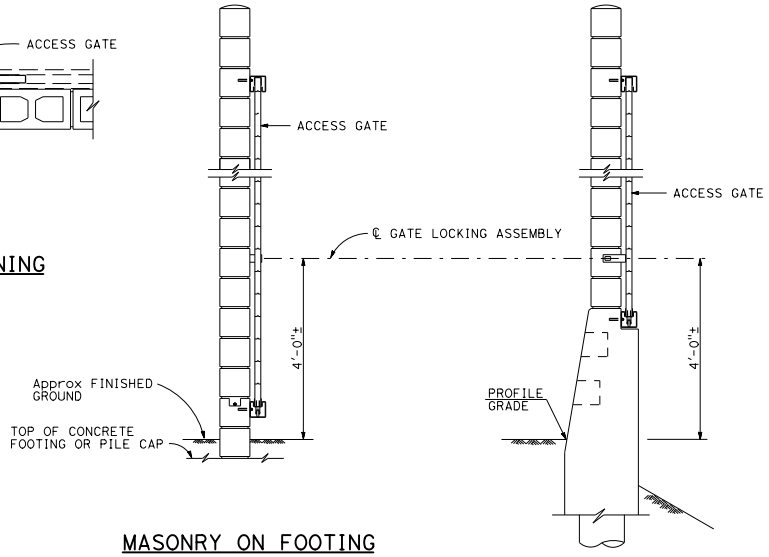
PLAN

LOCK ON
GATE SIDE OF WALL



PLAN

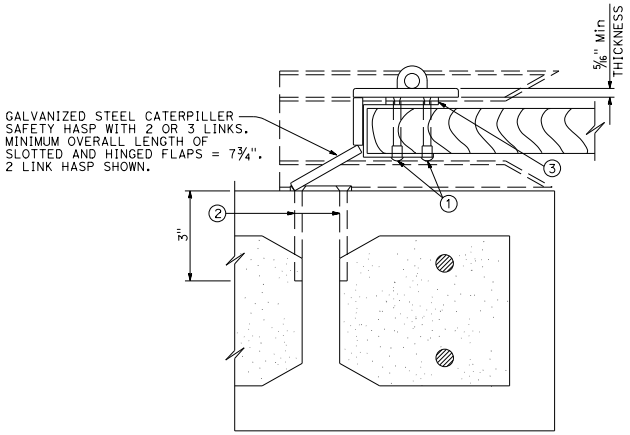
LOCK ON
INSIDE OF WALL OPENING



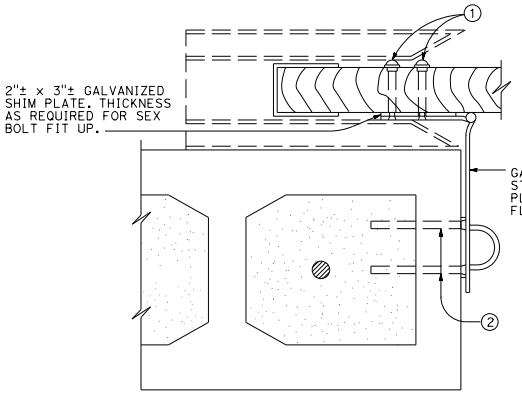
MASONRY ON FOOTING
OR PILE CAP

MASONRY ON BARRIER

SECTION J-J



DETAIL A



DETAIL B

NOTES:

1. Masonry anchors to be installed after the grout in the block cells has attained specified strength.
2. Contractor may submit alternative gate locking assemblies for approval by the Engineer.
3. See other sheets for gate details.

① 4 - SEX BOLTS WITH ¼" - 20 FLAT HEAD CORROSION RESISTANT MACHINE SCREWS.

② 4 - ¼" Ø x 3" LONG FLAT HEAD SLEEVE TYPE CORROSION RESISTANT MASONRY ANCHORS.

③ GALVANIZED SHIM PLATE. SIZE AS REQUIRED TO MATCH HASP STAPLE PLATE±. THICKNESS AS REQUIRED FOR SEX BOLT FIT UP.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

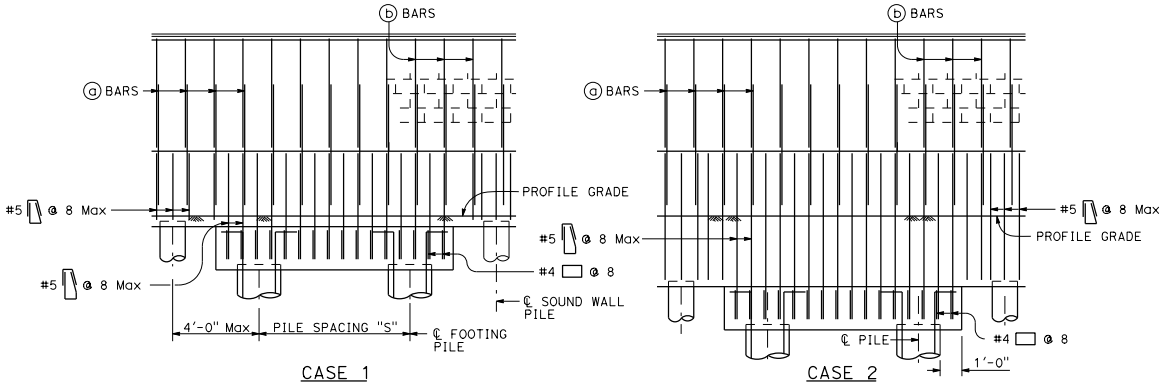
SOUND WALL MASONRY BLOCK ACCESS GATE LOCKING DETAILS

NO SCALE

B15-14

1-29-18

Return to Table of Contents



CASE 1

For details not shown, see Case 2.

CASE 2

For details not shown, see Case 1.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Tiliat Satter — No. C42892 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

DESIGN NOTES:

DESIGN

Uniform Building Code, 1997 Edition
and the Bridge Design Specifications.

DESIGN WIND LOAD

27 psf

DESIGN SEISMIC LOAD

0.57 Dead load

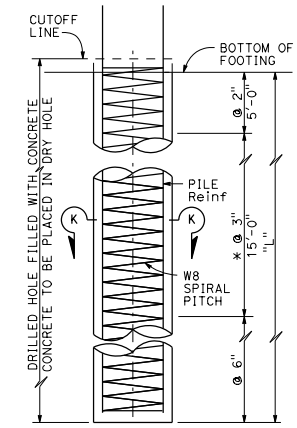
REINFORCED CONCRETE

f'c = 3.6 ksi
fy = 60 ksi

CONCRETE MASONRY

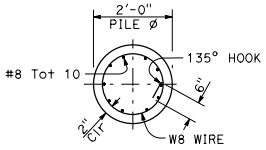
REGULAR STRENGTH	HIGH STRENGTH	
f'm = 1500 psi	f'm = 2000 psi	
fb = 495 psi	fb = 660 psi	fb = 830 psi
fs = 24,000 psi	fs = 24,000 psi	fs = 24,000 psi
n = 25.8	n = 19.3	n = 15.5

PART ELEVATIONS

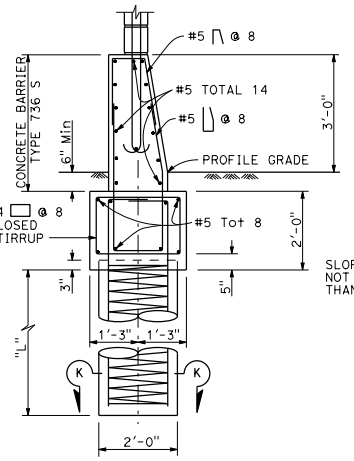


ELEVATION

* @ 2" at option of Contractor.

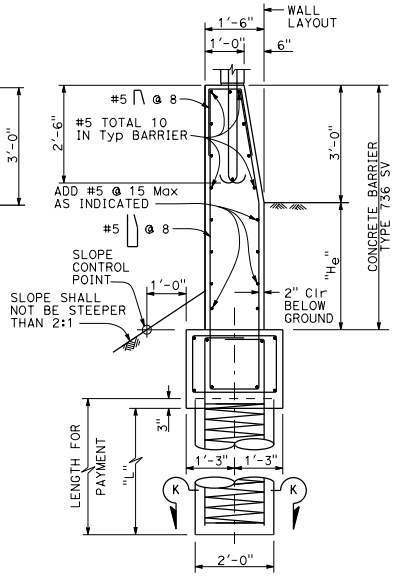


SECTION K-K



CASE 1

Level ground ±10% on both sides of barrier.
For details not shown, see Case 2.



CASE 2

Level ground ±10% at the traffic side of barrier and sloping ground on the opposite side.
For details now shown, see Case 1.

BARRIER SECTIONS

CASE 1 : PILE DATA TABLE

MAXIMUM H	ø = 25		ø = 30		ø = 35		MAXIMUM H
	S	L	S	L	S	L	
6'-4"	16'-0"	8'-6"	16'-0"	7'-6"	16'-0"	6'-0"	6'-4"
8'-4"	16'-0"	9'-6"	16'-0"	8'-0"	16'-0"	7'-0"	8'-4"
10'-4"	16'-0"	10'-6"	16'-0"	9'-0"	16'-0"	7'-6"	10'-4"
12'-4"	16'-0"	11'-6"	16'-0"	10'-0"	16'-0"	8'-6"	12'-4"
14'-4"	16'-0"	12'-6"	16'-0"	11'-0"	16'-0"	9'-0"	14'-4"
16'-4"	16'-0"	13'-6"	16'-0"	11'-6"	16'-0"	10'-0"	16'-4"

CASE 2 : PILE DATA TABLE

H_e	H	ø = 30 Min		ø = 35 Min		H
		S	L	S	L	
1'-0"	6'-4"	16'-0"	15'-6"	16'-0"	12'-0"	6'-4"
	8'-4"	16'-0"	17'-0"	16'-0"	13'-6"	8'-4"
	10'-4"	16'-0"	18'-0"	16'-0"	14'-6"	10'-4"
	12'-4"	16'-0"	19'-6"	16'-0"	15'-6"	12'-4"
	14'-4"	16'-0"	20'-6"	16'-0"	16'-6"	14'-4"
	16'-4"	16'-0"	21'-6"	16'-0"	17'-6"	16'-4"
2'-0"	6'-4"	16'-0"	18'-0"	16'-0"	14'-0"	6'-4"
	8'-4"	16'-0"	19'-0"	16'-0"	15'-0"	8'-4"
	10'-4"	16'-0"	20'-0"	16'-0"	16'-0"	10'-4"
	12'-4"	16'-0"	21'-6"	16'-0"	17'-0"	12'-4"
	14'-4"	16'-0"	22'-6"	16'-0"	18'-0"	14'-4"
	16'-4"	14'-6"	22'-6"	16'-0"	18'-6"	16'-4"
3'-0"	6'-4"	16'-0"	20'-6"	16'-0"	15'-6"	6'-4"
	8'-4"	16'-0"	21'-6"	16'-0"	16'-6"	8'-4"
	10'-4"	15'-6"	22'-0"	16'-0"	17'-6"	10'-4"
	12'-4"	14'-0"	22'-0"	16'-0"	18'-6"	12'-4"
	14'-4"	13'-0"	22'-6"	15'-6"	19'-0"	14'-4"
	16'-4"	12'-0"	22'-6"	14'-0"	19'-0"	16'-4"
4'-0"	6'-4"	13'-0"	21'-0"	16'-0"	17'-6"	6'-4"
	8'-4"	12'-3"	21'-6"	15'-3"	18'-0"	8'-4"
	10'-4"	11'-6"	21'-6"	14'-3"	18'-6"	10'-4"
	12'-4"	10'-9"	22'-0"	13'-3"	18'-6"	12'-4"
	14'-4"	10'-0"	22'-0"	12'-3"	18'-6"	14'-4"
	16'-4"	9'-6"	22'-6"	11'-3"	19'-0"	16'-4"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SOUND WALL MASONRY BLOCK ON TYPE 736S/SV BARRIER ON PILE FOOTING FOR SPANNING UTILITIES

NO SCALE

B15-15

2018 STANDARD PLAN B15-15

1-29-18

Return to Table of Contents

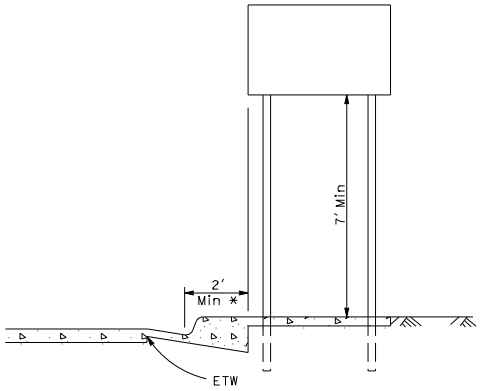
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

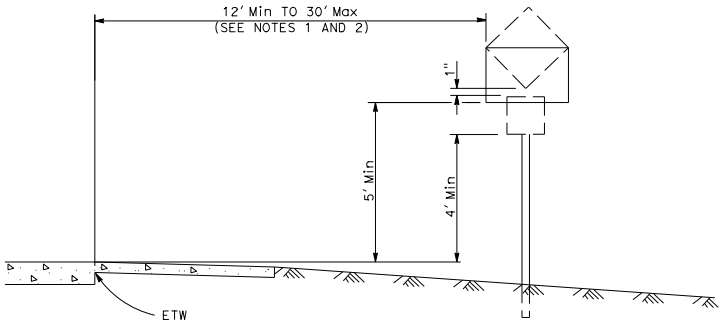
REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



* 1' Min WHERE LATERAL CLEARANCE LIMITED

URBAN LOCATIONS



RURAL LOCATIONS

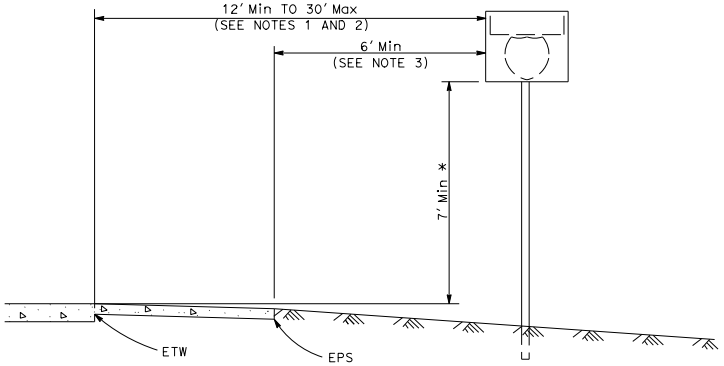
CONVENTIONAL HIGHWAYS AND INTERCHANGE AREAS

NOTES:

1. When clear roadside recovery areas are provided, signs shall be placed as far from the edge of traveled way as possible, up to a maximum of 30'. When possible, they shall be placed in protected locations.
2. Signs in medians shall be placed at midpoint of median up to a maximum distance of 30' from edge of traveled way. When appropriate, signs for opposing directions shall be placed back to back.
3. Does not apply at locations where minimum horizontal distance is not reasonable due to terrain characteristics, steep slopes, roadway features, or when signs are installed on structures or signal or lighting standards.

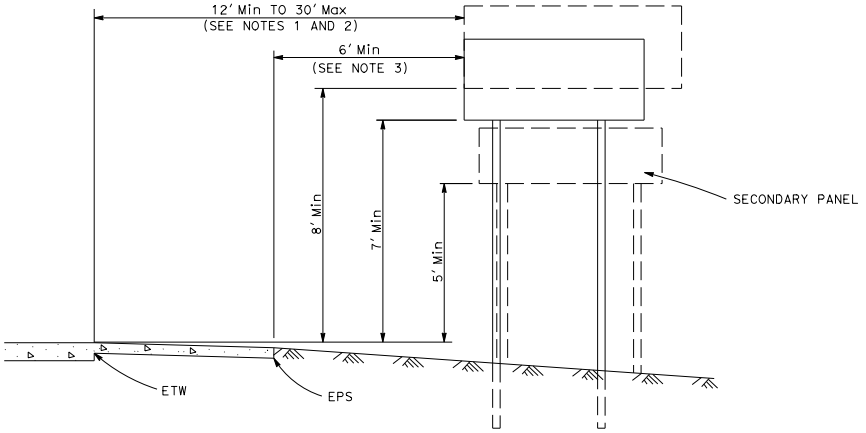
ABBREVIATION:

EPS = Edge of Paved Shoulder



* 5' Min AT 30' FROM ETW

REGULATORY AND WARNING SIGNS
AND ROUTE SHIELDS



GUIDE SIGNS

FREEWAY AND EXPRESSWAY LOCATIONS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

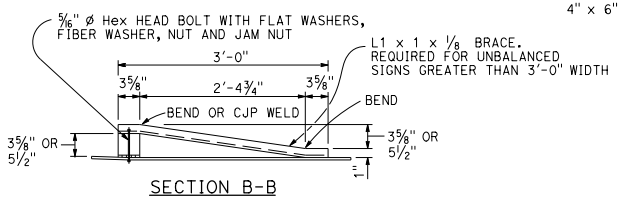
ROADSIDE SIGNS TYPICAL INSTALLATION DETAILS No. 1

NO SCALE

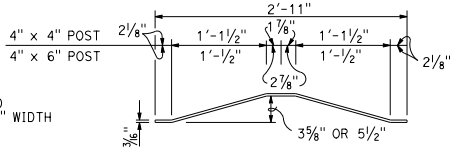
RS1

1-29-18

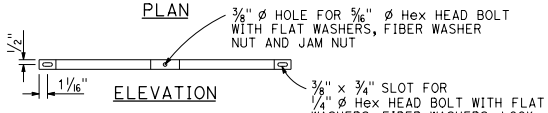
Return to Table of Contents



SECTION B-B



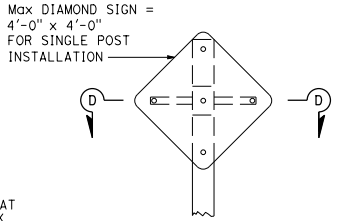
PLAN



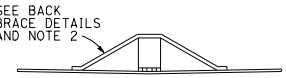
ELEVATION

BACK BRACE DETAILS

See Note 2

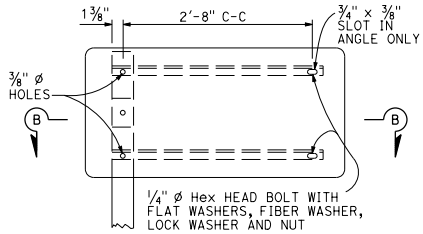


BALANCED

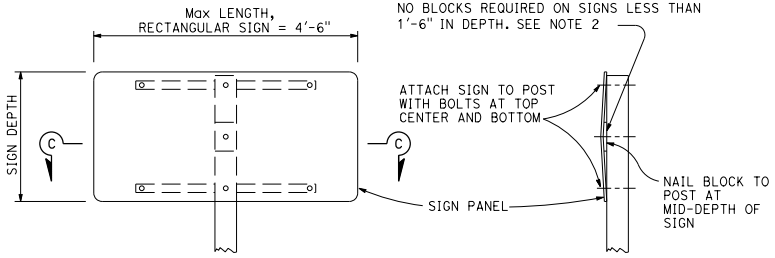


SECTION C-C

SECTION D-D



UNBALANCED

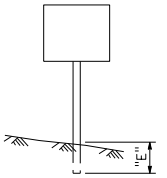


BALANCED

END VIEW

SINGLE POST INSTALLATION

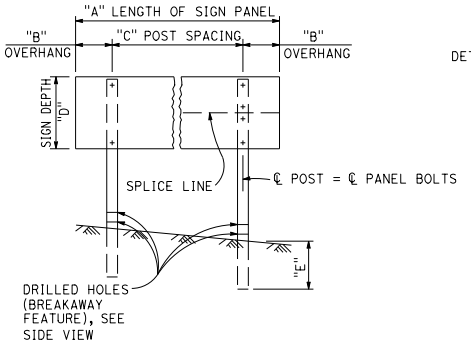
See Note 5 regarding breakaway feature for single post installations.



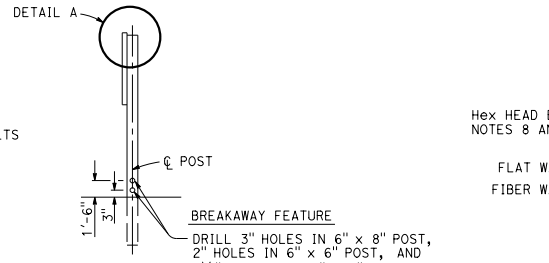
"E" Post Embedment

POST EMBEDMENT	
POST SIZE	"E"
4" x 4"	3.5'
4" x 6"	4.5'
6" x 6"	5.0'
6" x 8"	6.0'

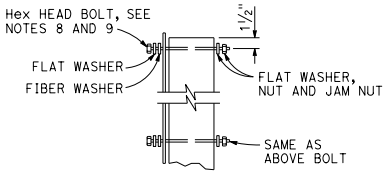
POST SPACING TABLE		
SIGN PANEL LENGTH	SIGN PANEL OVERHANG	POST SPACING
"A"	"B"	"C"
4'-6"	6"	3'-6"
4'-8" TO 5'-6"	7" TO 1'-0"	3'-6"
6'-0" & 6'-6"	1'-0" & 1'-3"	4'-0"
7'-0" & 7'-6"	1'-3" & 1'-6"	4'-6"
8'-0"	1'-6"	5'-0"
8'-6"	1'-8"	5'-2"
9'-0"	1'-10"	5'-4"
9'-6"	1'-11"	5'-8"
10'-0"	2'-0"	6'-0"
10'-6"	2'-0"	6'-6"
11'-0",11'-6",12'-0"	2'-0", 2'-3", 2'-6"	7'-0"
12'-6"	2'-6"	7'-6"
13'-0"	2'-6"	8'-0"
13'-6", 14'-6"	2'-6", 3'-0"	8'-6"
14'-0", 15'-0"	2'-6", 3'-0"	9'-0"
15'-6", 16'-0"	3'-0", 3'-3"	9'-6"
16'-6"	3'-3"	10'-0"
17'-0", 17'-6"	3'-3", 3'-6"	10'-6"
18'-0", 18'-6"	3'-6", 3'-9"	11'-0"
19'-0"	3'-9"	11'-6"
19'-6", 20'-0"	3'-9", 4'-0"	12'-0"
20'-6", 21'-0"	4'-0", 4'-3"	12'-6"
21'-6"	4'-3"	13'-0"
22'-0", 22'-6"	4'-3", 4'-6"	13'-6"
23'-0"	4'-6"	14'-0"
23'-6", 24'-0"	4'-6", 4'-9"	14'-6"



ELEVATION
See Note 7



SIDE VIEW



DETAIL A

TWO POST INSTALLATION

NOTES:

1. Place long dimension of post cross section normal to sign axis. See Section C-C.
2. Balanced single post installations of unframed single sheet aluminum panel signs shall have block spacers if 1'-6" or more in depth and a combination of block spacers and back braces if 1'-6" or more in depth and 2'-10" or more in width. Sign panels less than 1'-6" in depth and 2'-10" or more in width shall have back braces only.
3. For post size see sign layout, format or quantity sheets.
4. Balanced single post installations of Laminated Panel and Framed single sheet panel signs require back braces when 2'-10" or more in length.
5. Breakaway feature for single post installation shall be the same as the breakaway feature shown for the two post installation.
6. Tolerance for diameter of drilled holes in breakaway feature is ±1/8".
7. Bolt hole Layout is dependent on type of panel. Drill holes in post to match panel.
8. 5/16" ø for single sheet aluminum panel signs.
9. 3/8" ø for laminated panel signs or framed single sheet aluminum panel signs.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE SIGNS WOOD POST TYPICAL INSTALLATION DETAILS No. 2

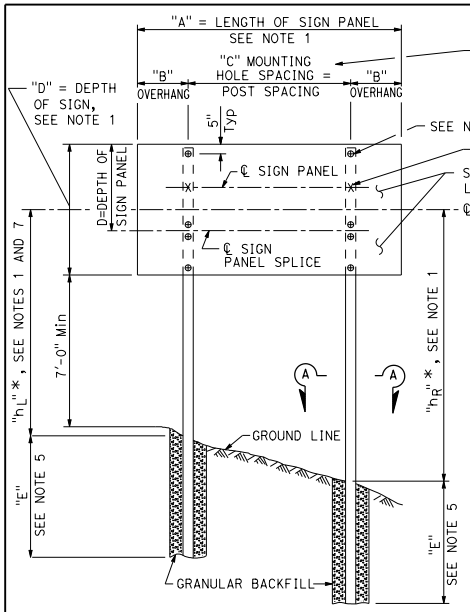
NO SCALE

RS2

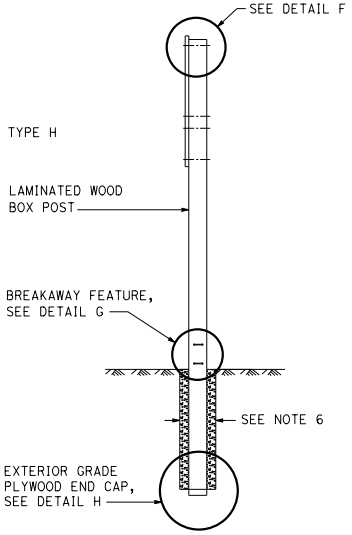
2018 STANDARD PLAN RS2

1-29-18

Return to Table of Contents



ELEVATION



SIDE VIEW

SIGN PANEL LENGTH (SEE NOTE 1)	SIGN PANEL OVERHANG	MOUNTING HOLE SPACING
"A"	"B"	"C"
8'-0"	1'-6"	5'-0"
9'-0"	1'-10"	5'-4"
10'-0"	2'-0"	6'-0"
11'-0"	2'-0"	7'-0"
12'-0"	2'-6"	7'-0"
13'-0"	2'-6"	8'-0"
14'-0"	2'-6"	9'-0"
15'-0"	3'-0"	9'-0"
16'-0"	3'-3"	9'-6"
17'-0"	3'-3"	10'-6"
18'-0"	3'-6"	11'-0"
19'-0"	3'-9"	11'-6"
20'-0"	4'-0"	12'-0"
21'-0"	4'-3"	12'-6"
22'-0"	4'-3"	13'-6"
23'-0"	4'-6"	14'-0"
24'-0"	4'-9"	14'-6"

TABLE 1

"hL" OR "hR" (IN FEET)	TOTAL SIGN AREA SQFT				
	40 TO 90	90+ TO 140	140+ TO 190	190+ TO 240	240+ TO 290
9'-0" TO 13'-0"	6'	6.5'	7.5'	8.5'	9'
13'-0"+ TO 17'-0"	6'	7'	8'	9'	10'
17'-0"+ TO 21'-0"	6'	7.5'	9'	9'	
21'-0"+ TO 26'-0"	7'	8'	9'		

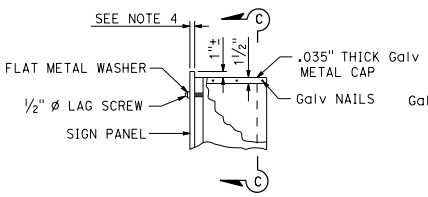
TABLE 2
See Note 8

NOTES:

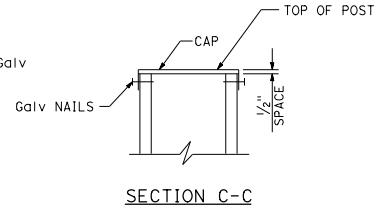
1. See Project Plans for:
   Location of each sign.
   Length of sign panel "A".
   Depth of sign "D".
   Height "h_L" and "h_R" of centerline of sign above ground line at each post.
   Type of post, L and M.
   See Standard Plan RS1 for other details.
2. "⊕" Indicates location of ½" lag screws and existing holes in panels. Lag screws are to be embedded at least 1" into post using 5/16" diameter pilot holes.
3. "x" Indicates location of additional ½" lag screws required when the depth of sign panel (d) and the length of sign panel (A) are as follows:

A	d
17'-0" to 24'-0"	5'-0"
19'-0" to 24'-0"	4'-6"
21'-0" to 24'-0"	4'-0"
24'-0"	3'-6"

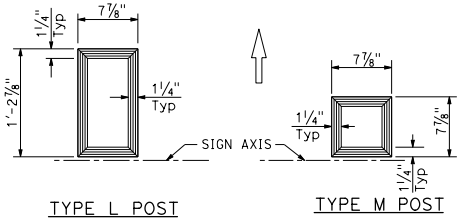
4. Type B laminated sign panels are 1" nominal thick for sign lengths of 15'-0" and less. Panels over 15'-0" in length and Type H laminated sign panels are 2½" nominal thick.
5. Embedment "E" for Type L post shall conform to the requirements in Table 2. Embedment for Type M posts shall be 6'-0" minimum.
6. Diameter of post holes for Type L posts shall be at least 2'-6". Diameter of post holes for Type M posts shall be at least 2'-0".
7. Dimensions shown on project plans are for fabrication. During installation adjust these dimensions to provide A level sign appoximately 7'-0" above roadway shoulder.
8. Minimum post embedment "E" for Type L post.



DETAIL F



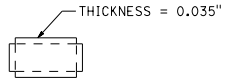
SECTION C-C



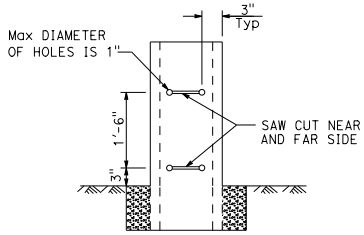
TYPE L POST

TYPE M POST

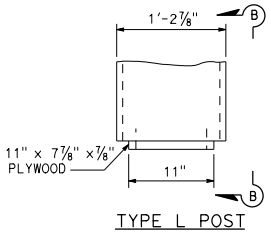
SECTION A-A



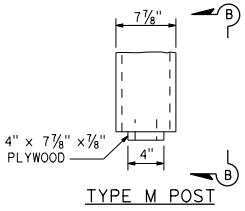
GALV METAL CAP



DETAIL G

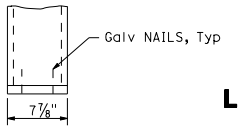


TYPE L POST



TYPE M POST

DETAIL H



SECTION B-B

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE SIGNS
LAMINATED WOOD BOX POST
TYPICAL INSTALLATION
DETAILS No. 3

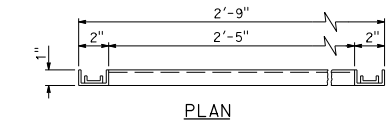
NO SCALE

RS3

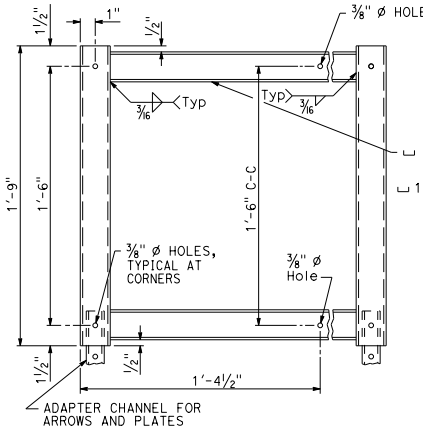
2018 STANDARD PLAN RS3

1-29-18

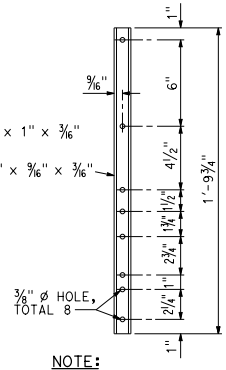
Return to Table of Contents



PLAN



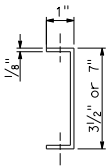
ELEVATION



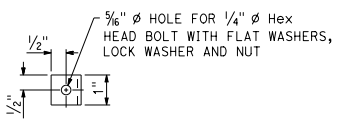
NOTE:
Adapter channel rests inside frame channel when used.

ADAPTER CHANNEL

GALVANIZED STEEL FRAME

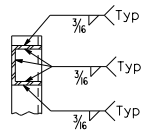


PLAN

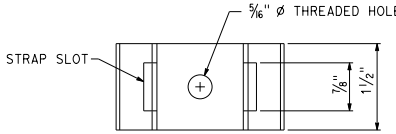


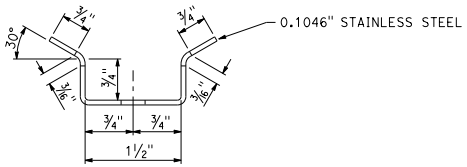
ELEVATION

SPECIAL BRACKET

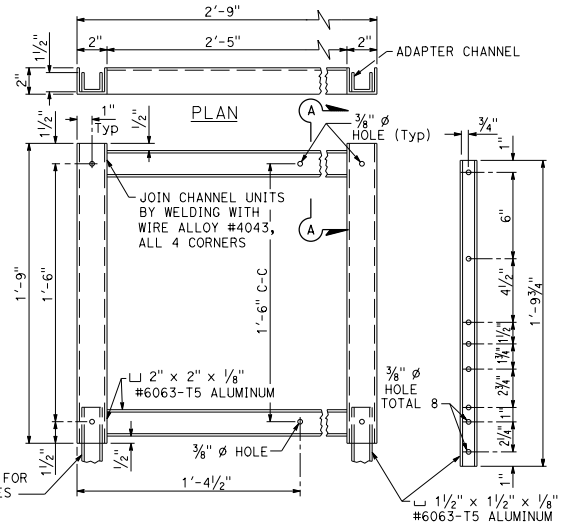


SECTION A-A





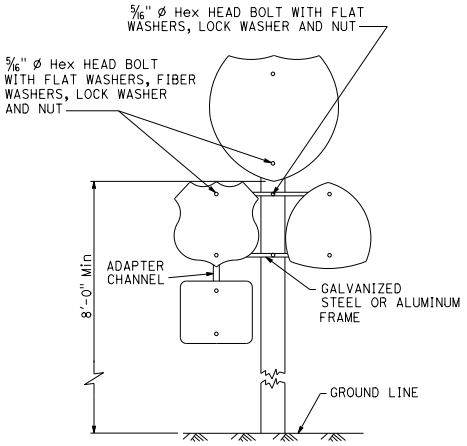
SADDLE BRACKET



ELEVATION

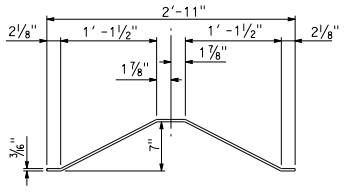
ADAPTER CHANNEL

ALUMINUM FRAME

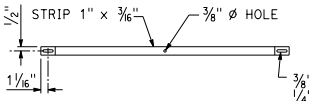


ELEVATION

MULTIPLE SIGN INSTALLATION

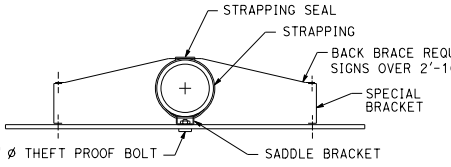


PLAN

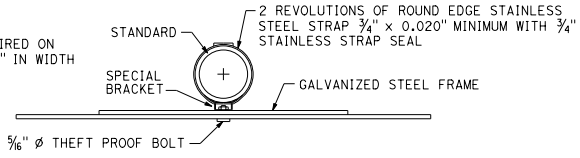


ELEVATION

BACK BRACE DETAILS



SINGLE SIGN



MULTIPLE SIGN

INSTALLATION ON ELECTROLIER, SIGNAL STANDARD OR SIGN STRUCTURE POST

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE SIGNS TYPICAL INSTALLATION DETAILS No. 4

NO SCALE

RS4

1-29-18

Return to Table of Contents

INSTRUCTIONS TO FABRICATOR

PROJECT PLANS SHOW:

1. Sign structure location.
2. Length of structure frame.
3. Panel size and locations on structure.
4. Walkway length for two post signs.
5. Post type and height to bottom of frame.
6. Base plate elevation.
7. Footing elevation or location of pile foundation.
8. Photoelectric unit location if required.

REFER TO THE FOLLOWING STANDARD PLANS FOR DETAILS NOT SHOWN ON PROJECT PLANS:

Sheet No.	SHEET NAME
S1	Overhead Signs-Truss, Instructions and Examples
S2	Overhead Signs-Truss, Single Post Type, Post Types II to IX
S3	Overhead Signs-Truss, Single Post Type, Base Plate and Anchorage Details
S4	Overhead Signs-Truss, Single Post Type, Structural Frame Members Details No. 1
S5	Overhead Signs-Truss, Single Post Type, Structural Frame Members Details No. 2
S6	Overhead Signs-Truss, Gusset Plate Details
S8	Overhead Signs-Truss, Single Post Type, Round Pedestal Pile Foundation
S9	Overhead Signs-Truss, Two Post Type, Post Types I-S through VIII-S
S10	Overhead Signs-Truss, Two Post Type, Base Plate and Anchorage Details
S11	Overhead Signs-Truss, Two Post Type, Structural Frame Members
S12	Overhead Signs-Truss, Structural Frame Details
S13	Overhead Signs-Truss, Frame Juncture Details
S15	Overhead Signs-Truss, Two Post Type, Round Pedestal Pile Foundation
S16	Overhead Signs, Walkway Details No. 1
S17	Overhead Signs, Walkway Details No. 2
S17A	Overhead Signs, Walkway Details No. 3
S18	Overhead Signs, Walkway Safety Railing Details
S19	Overhead Signs-Truss, Sign Mounting Details, Laminated Panel-Type A
S20	Overhead Signs, Steel Frames, Removable Sign Panel Frames
S21	Overhead Signs, Removable Sign Panel Frames, Mounting Details
S22	Overhead Signs-Truss, Removable Sign Panel Frames, 9'-2" and 10'-0" Sign Panels

WALKWAY BRACKETS:

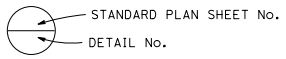
Space all walkway brackets maintaining uniform spacing where possible. Maximum spacing shall not exceed 5'-6".

LIGHTING FIXTURE SUPPORTS:

Where distance from walkway bracket to end of sign panel exceeds 1'-4", extend lighting fixture supports to next walkway bracket. See Example No. 2.

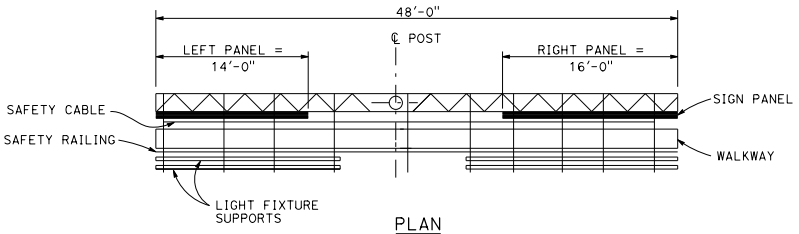
WALKWAY AND SAFETY RAILING:

Walkway to be continuous for entire length of frame for single post signs. For two post signs, see Project Plans. Safety railing to protect entire walkway, but continuous for no more than 11'-0" in one unit.

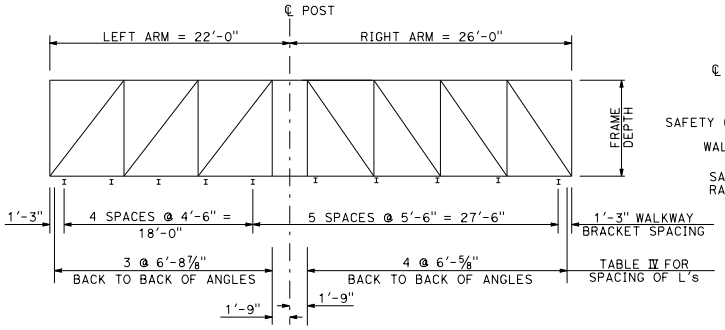


NOTES:

1. Signs are shown and dimensioned looking in the direction of traffic. Double faced signs are shown and dimensioned looking ahead along stationing.
2. Mandatory dimension limit.



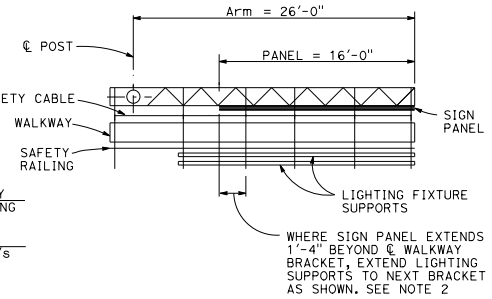
PLAN



ELEVATION

UNBALANCED SINGLE POST TYPE

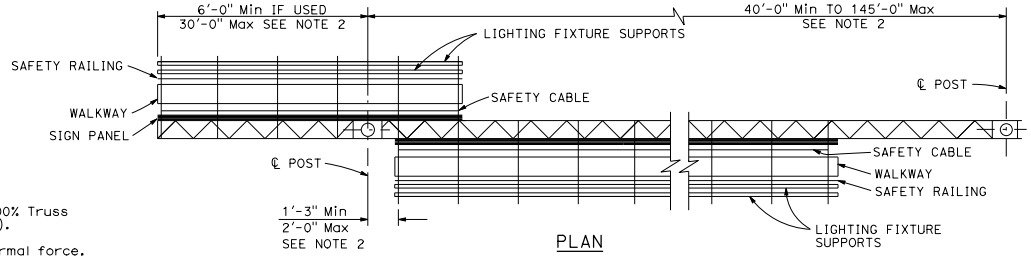
Example No. 1



PLAN

CANTILEVER SINGLE POST TYPE

Example No. 2



PLAN

TWO POST TYPE WITH CANTILEVER (PART DOUBLE-FACED)

Example No. 3

GENERAL NOTES:

LOADING:

WIND LOADING:

Normal to face of sign: 40.3 psf on 100% Truss surface area (i.e. 100% panel coverage).

Transverse to face of sign: 20% of normal force.

WALKWAY LOADING:

Dead load +500 LB concentrated live load.

UNIT STRESSES:

STRUCTURAL STEEL: fy = 36,000 psi
REINFORCED CONCRETE: fy = 60,000 psi
f'c = 3600 psi
FOOTING SOIL PRESSURE: 2.5 ksf (spread footing)

MINIMUM CLEARANCE

Vertical roadway clearance 18'-0" (bottom of walkway system)

WELDING:

All welding continuous unless otherwise noted on the plans.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS INSTRUCTIONS AND EXAMPLES

NO SCALE

S1

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

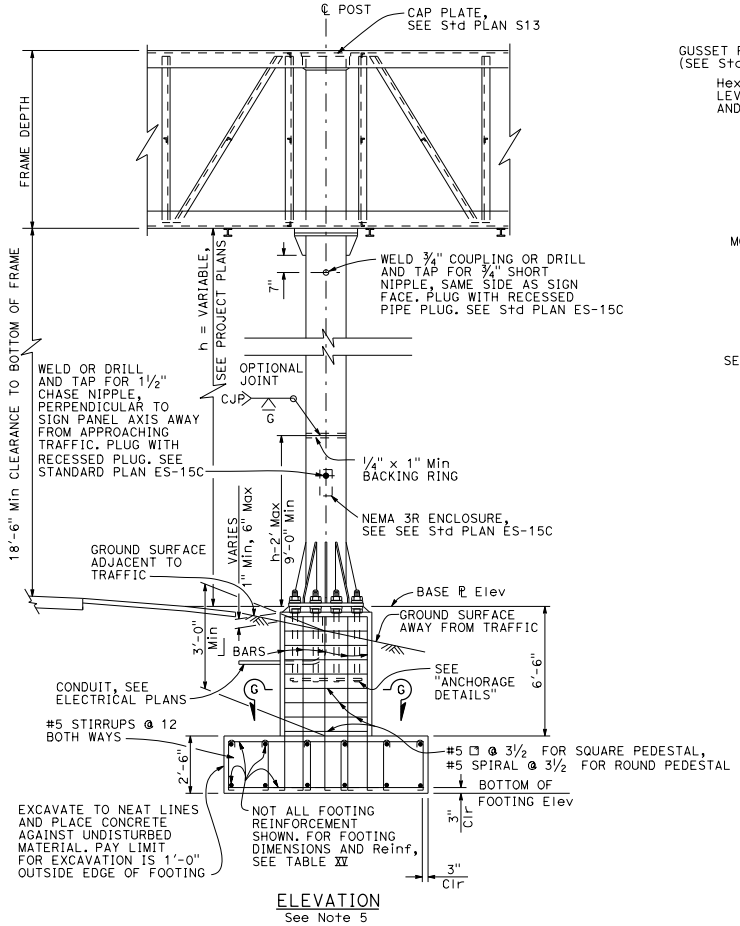
May 31, 2018
PLANS APPROVAL DATE

Juan J. Jauregui No. C63939 Exp. 9-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

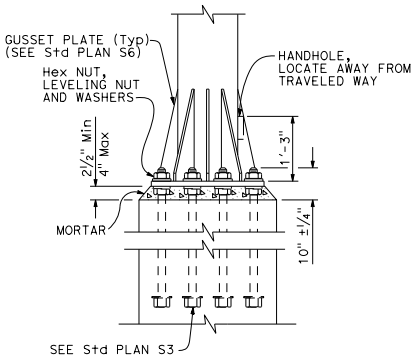
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TABLE XV

POST TYPE	PIPE		CAP PLATE SIZE FOR CHORD L's 5 x 5	CAP PLATE SIZE FOR CHORD L's 6 x 6	ROUND PEDESTAL					SQUARE PEDESTAL						SPREAD FOOTING					
					PEDESTAL SIZE	VERTICAL J-BARS		SPIRAL		PEDESTAL SIZE	VERTICAL J-BARS			HOOP		(SEE NOTE 2)	REINFORCEMENT				
	NPS	THICKNESS			Dia	EQUALLY SPACED TOTAL	BAR SIZE	BAR SIZE	PITCH	SQUARE	EQUALLY SPACED TOTAL	BAR SIZE	# OF BARS EA FACE	BAR SIZE	SPACING		WIDTH		LONGITUDINAL		FOOTING STIRRUPS
																	TOP	BOTTOM	TOP	BOTTOM	
II	14	1/2"	2'-0" x 2'-0" x 1"	2'-2" x 2'-2" x 1"	5'-3"	16	#10	#5	3 1/2"	5'-3"	16	#10	5	#5	3 1/2"	12'-0" x 14'-0" x 2'-6"	14-#6	14-#7	13-#9	13-#9	#5 @ 12
III	16		2'-2" x 2'-2" x 1"	2'-4" x 2'-4" x 1"												12'-0" x 14'-0" x 2'-6"	15-#6	15-#7			
IV	18		2'-4" x 2'-4" x 1"	2'-6" x 2'-6" x 1"												12'-0" x 14'-0" x 2'-6"	15-#6	15-#7			
V	20		2'-6" x 2'-6" x 1"	2'-8" x 2'-8" x 1"												13'-0" x 14'-0" x 2'-6"	15-#6	15-#7	14-#9	14-#9	
VI	24		2'-10" x 2'-10" x 1"	3'-0" x 3'-0" x 1"	5'-9"		#11			5'-9"		#11				13'-0" x 16'-0" x 2'-6"	17-#7	17-#7		14-#11	
VII	24	3/4"														13'-0" x 17'-0" x 2'-6"	18-#7	18-#7			
VIII	24	31/32"														13'-0" x 18'-0" x 2'-6"	19-#7	19-#7			
IX	24	31/32"														13'-0" x 18'-0" x 2'-6"	19-#7	19-#7			

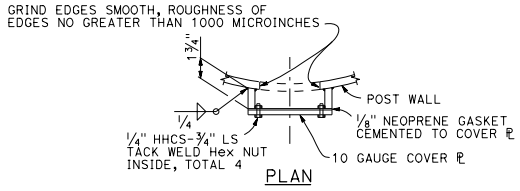


ELEVATION
See Note 5

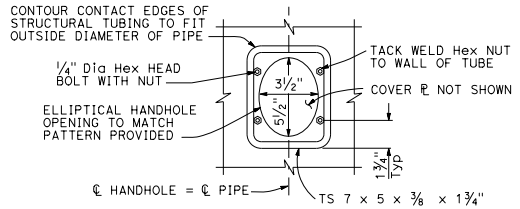


ELEVATION

ANCHORAGE DETAILS



PLAN

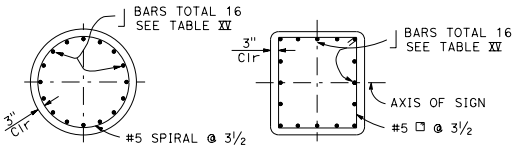


ELEVATION

TYPICAL DETAILS OF HANDHOLE AND COVER

NOTES:

1. For "General Notes", see Standard Plan S1.
2. Longer side of footing (longitudinal) shall be normal to axis of sign.
3. Backfill shall be in place prior to erection of post.
4. Thread upper 10" of anchor bolts and galvanize upper 1'-0".
5. Spread footing with square pedestal foundation shown, use Pile Foundation when shown on the Project Plans. For pile foundation details, see Standard Plan S8.
6. Anchor plates may be retained with hexagon nut or formed head as alternatives to details shown.
7. On single post sign structures, the post shall be raked out of plumb, with the use of the leveling nuts to make the bottom of the sign frame level.
8. At final position of post all top and bottom nuts shall be tightened against base plate.
9. When foundation is located on a steep slope with exposed face of concrete adjacent to traffic, see "Detail C" on Standard Plan S8, as applicable.
10. Slope protection required when indicated on the Project Plans.



SECTION G-G
ROUND PEDESTAL

SECTION G-G
SQUARE PEDESTAL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE POST TYPES II THROUGH IX

NO SCALE

S2

2018 STANDARD PLAN S2

1-26-18

Return to Table of Contents

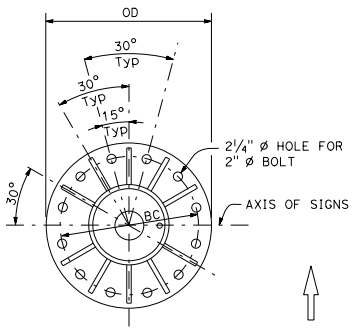
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

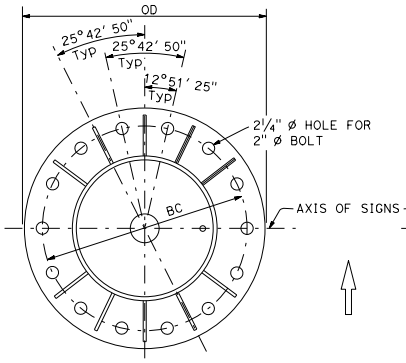
May 31, 2018
PLANS APPROVAL DATE

Juan J. Jauregui No. C63939 Exp. 9-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

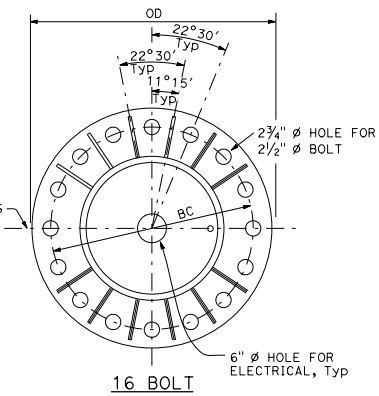
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



12 BOLT



14 BOLT



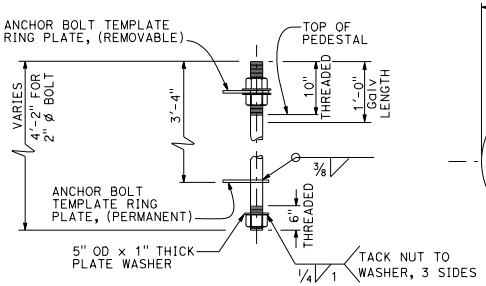
16 BOLT

BASE PLATE DETAILS SINGLE POST TYPE

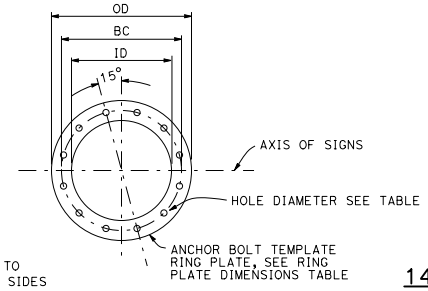
ABBREVIATION:
BC = Bolt Circle Diameter

SINGLE POST TRUSS

POST TYPE No.	PIPE NPS	PIPE THICKNESS	BASE ℙ OD AND THICKNESS	ANCHOR BOLTS BOLT CIRCLE Dia	ANCHOR BOLTS BOLT TOTALS AND Dia OF BOLT
II	14	½"	2'-10" x 2"	2'-0"	12-2"
III	16		2'-10" x 2"	2'-0"	12-2"
IV	18		2'-10" x 2"	2'-0"	12-2"
V	20		3'-5" x 2½"	2'-10"	14-2"
VI	24		3'-6" x 2½"		16-2½"
VII	24	¾"	3'-6" x 2½"		
VIII	24	25/32"	3'-6" x 3½"		
IX	24	31/32"	3'-6" x 3½"		



FOR POST II THRU IV
12 BOLT PATTERN



12 BOLT
ANCHOR BOLT TEMPLATE

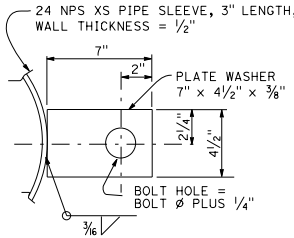
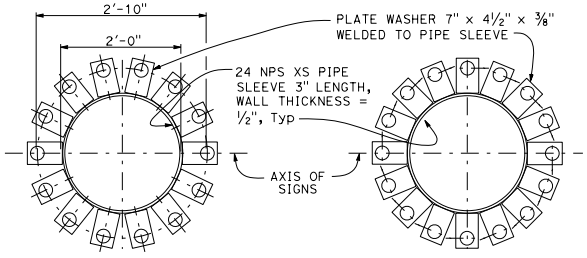


PLATE WASHER DETAIL FOR
14 AND 16 BOLT TEMPLATE PATTERN



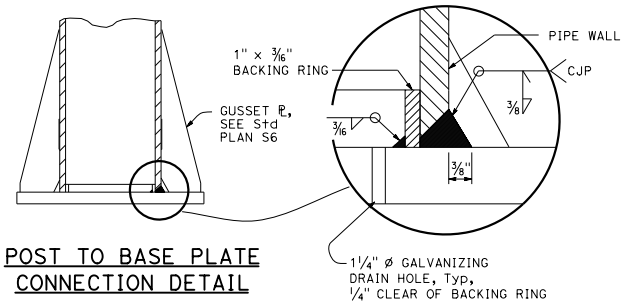
14 BOLT 16 BOLT

ANCHOR BOLT TEMPLATE

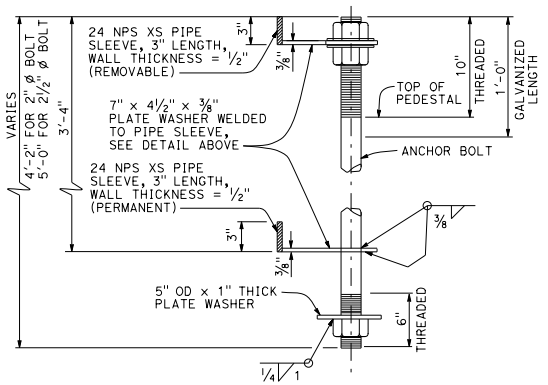
Template to match base plate anchor bolt pattern. (Option: Template similar to ring plate type can be used in lieu of plate washer type).

ANCHOR BOLT TEMPLATE ASSEMBLY

NOTE: One bolt shown only. Other bolts same configuration around ring plate.



POST TO BASE PLATE
CONNECTION DETAIL



ANCHOR BOLT TEMPLATE ASSEMBLY
FOR 14 AND 16 BOLT PATTERN

NOTE: One bolt shown only. Other bolts same configuration around pipe sleeve.

RING PLATE DIMENSIONS

No. OF BOLTS	OD	BC	ID	HOLE Dia	PERMANENT TEMPLATE THICKNESS	TEMPORARY TEMPLATE THICKNESS
12	2'-1"	2'-0"	1'-9"	2⅛" Max	⅝"	½"
14	3'-1"	2'-10"	2'-7"	2⅛" Max	⅝"	½"
16	3'-2"	2'-10"	2'-6"	2⅝" Max	¾"	½"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE BASE PLATE AND ANCHORAGE DETAILS

NO SCALE

S3

1-29-18

Return to Table of Contents

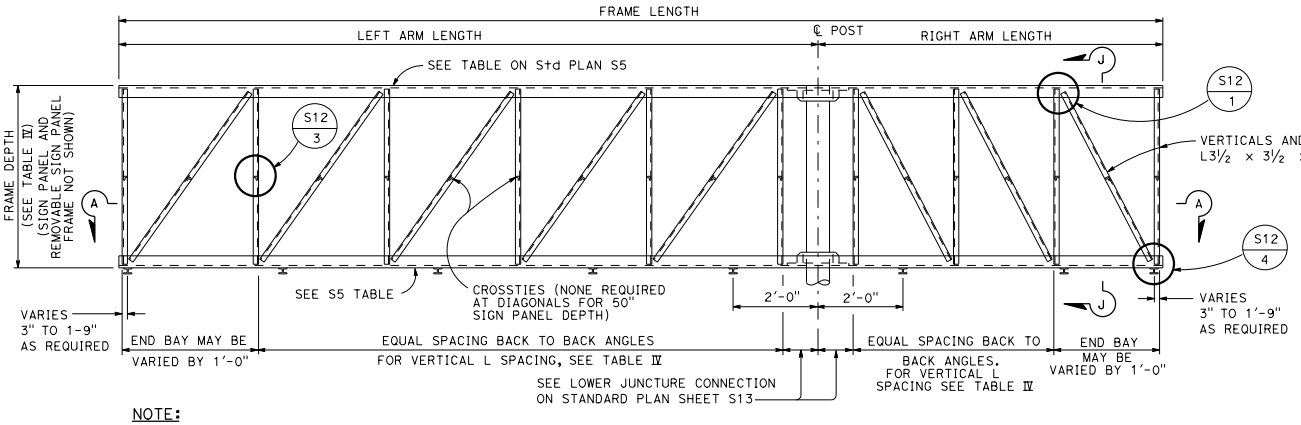
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Juan J. Jauregui No. C63939 Exp. 9-30-18 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



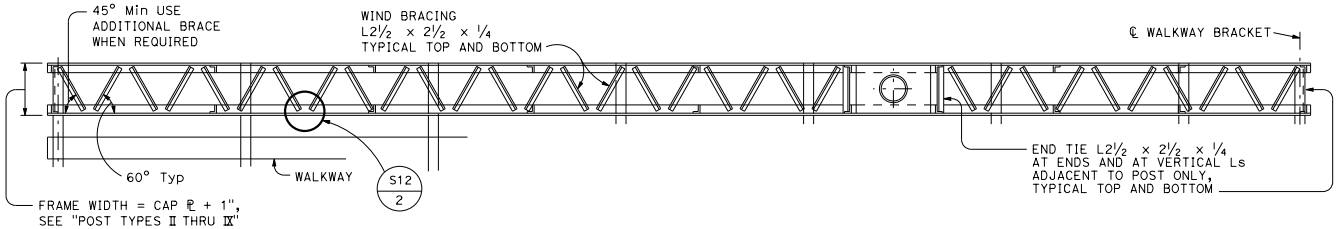
NOTE:

1. Left arm may be shorter, longer or equal to right arm length.

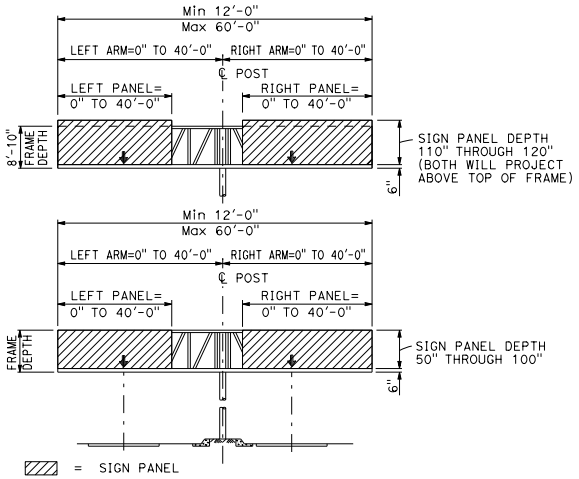
ELEVATION

TABLE IV

SIGN PANEL DEPTH	FRAME DEPTH	MAXIMUM VERTICAL L SPACING	SEE NOTE 6
50"	4'-8"	4'-6"	4'-0"
60"	5'-6"	5'-0"	4'-0"
70"	6'-4"	5'-6"	4'-0"
80"	7'-2"	6'-0"	5'-0"
90"	8'-0"	7'-0"	5'-0"
100"	8'-10"	↓	6'-0"
110"	8'-10"		6'-0"
120"	8'-10"		6'-0"



SECTION A-A

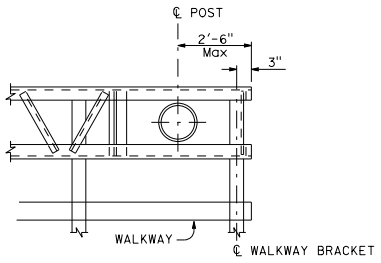


RANGE OF STRUCTURE SIZES

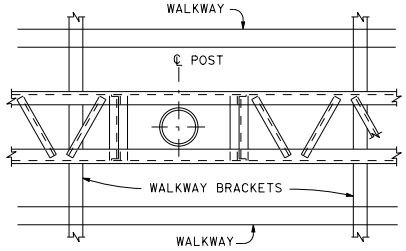
NOTES:

1. For connection of frame to post see S13.
2. For walkway details see S16 and S17.
3. For walkway length see S1.
4. Minimum length of frame = 12'-0".
5. Maximum length of frame = 60'-0".
6. Diagonal not required if arm length is equal to or less than shown in this column see table IV.
7. For Section J-J, See Std Plan S12.

STANDARD PLAN SHEET No.
DETAIL No.



PART PLAN OF CANTILEVER TYPE AT POST



PART PLAN OF DOUBLE FACED TYPE AT POST

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE STRUCTURAL FRAME MEMBERS DETAILS No. 1

NO SCALE

S4

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

SPAN $L_1 + L_2$	50" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	4'-8"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	60" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	5'-6"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	70" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	6'-4"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	80" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	7'-2"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	90" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	8'-0"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	100" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	8'-10"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	110" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	8'-10"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

SPAN $L_1 + L_2$	120" SIGN PANEL DEPTH					
	FRAME DEPTH	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	TOP AND BOTTOM WIND BRACING L's
12'-0"	8'-10"	SEE NOTE	5 x 5 x ½	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
OVER 12'-0" TO 20'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 20'-0" TO 30'-0"	↓	↓	5 x 5 x ½	↓	↓	↓
OVER 30'-0" TO 40'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 40'-0" TO 50'-0"	↓	↓	6 x 6 x ½	↓	↓	↓
OVER 50'-0" TO 60'-0"	↓	↓	6 x 6 x ½	↓	↓	↓

NOTES:

1. Frame width = Pipe Dia plus 2 x shorter L leg plus 1".
2. Frame length L_1= Left arm length.
3. Frame length L_2= right arm length.
4. For full cantilever, short arm used to compute $L_1 + L_2$ on this sheet shall be taken as 2'-6".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE STRUCTURAL FRAME MEMBERS DETAILS No. 2

S5

1-29-18

2018 STANDARD PLAN S5

Return to Table of Contents

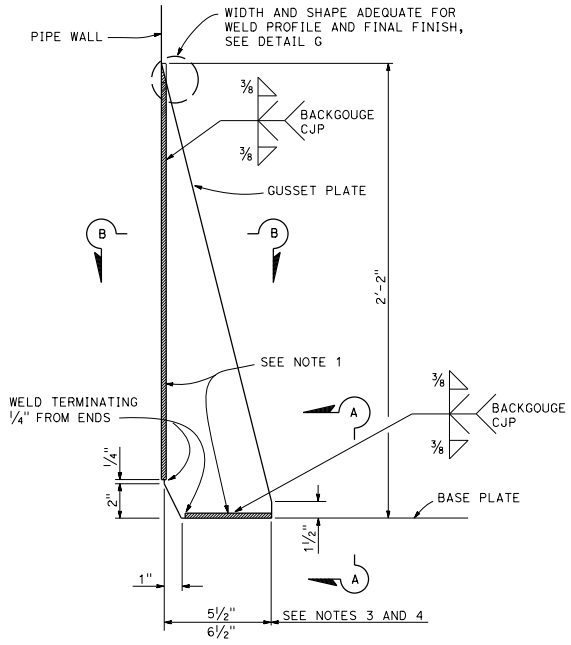
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

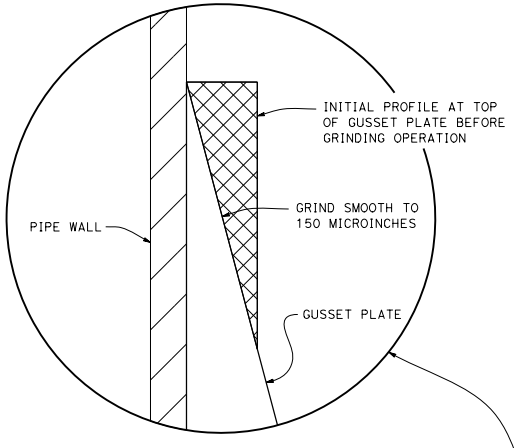
May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

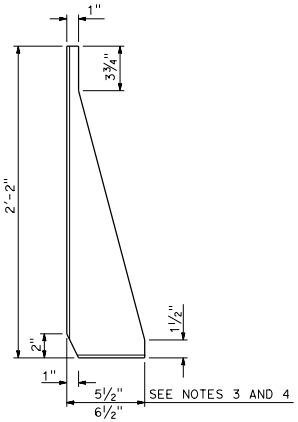
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



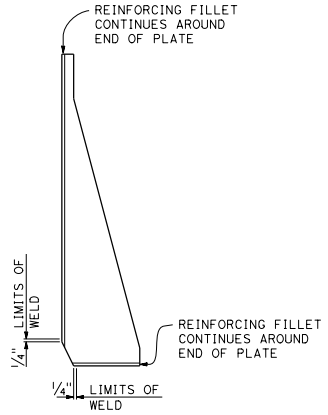
WELD DETAILS



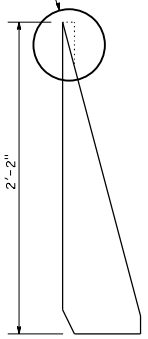
DETAIL G



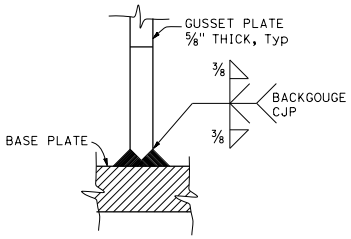
GUSSET PLATE
(Initial Shape)



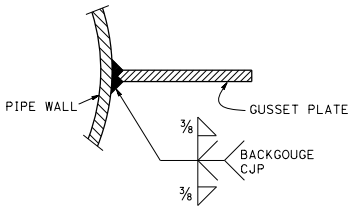
GUSSET PLATE WELDING
(See Weld Details)



GUSSET PLATE GRINDING
(See Detail G)



SECTION A-A



SECTION B-B

NOTES:

1. All gussets to be same height.
2. Provide a smooth transition from gusset plate to tube.
3. 5½" for post Types I-S through V-S.
4. 6½" for post Types VI-S and VII-S, single post trusses and tubular.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS GUSSET PLATE DETAILS

NO SCALE

S6

1-29-18

Return to Table of Contents

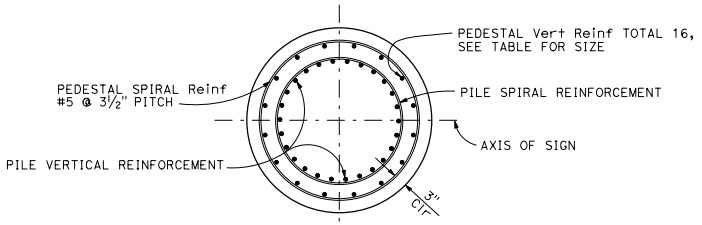
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

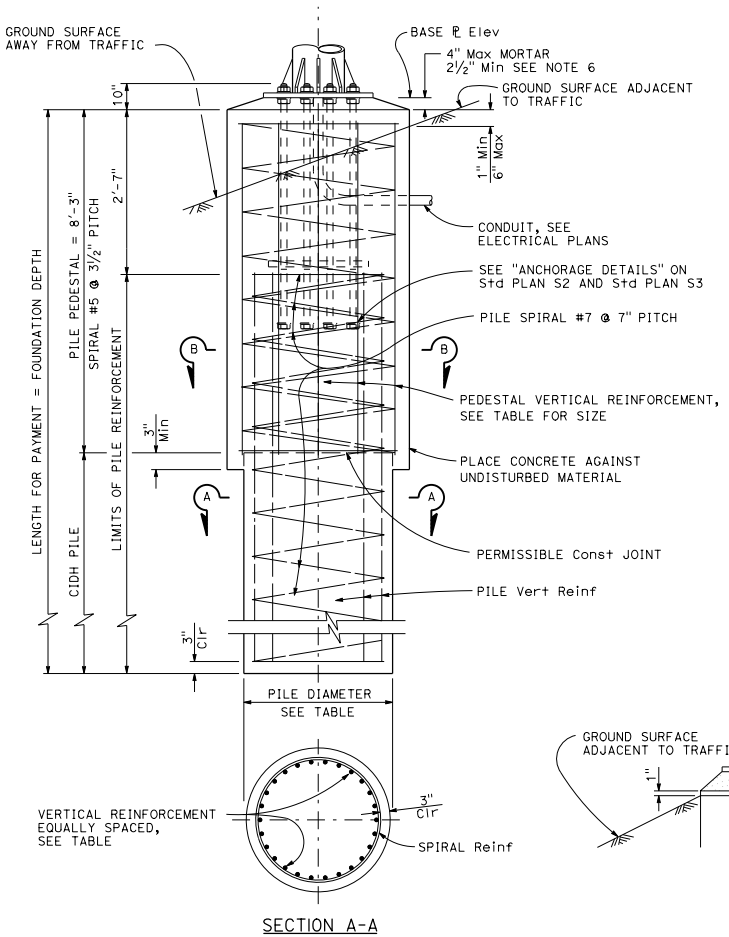
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Juan J. Jauregui
No. C63939
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

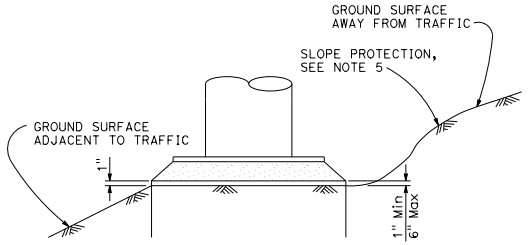
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION B-B



SECTION A-A



DETAIL C

POST TYPE No.	ANCHOR BOLTS			ROUND PILE PEDESTAL					CIDH PILE					FOUNDATION DEPTH **
	BOLT CIRCLE	BOLT TOTAL AND Dia	TOTAL LENGTH	Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	PILE Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	
II	2'-0"	12-2"	4'-2"	5'-3"	16	#10	#5	3½"	4'-6"	26	#10	#5	3½"	14'-9"
III	2'-0"	12-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	16'-0"
IV	2'-0"	12-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	18'-0"
V	2'-10"	14-2"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	19'-0"
VI	↓	16-2½"	5'-0"	5'-9"	↓	#11	↓	↓	5'-0"	28	#11	↓	↓	22'-0"
VII	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	23'-0"
VIII	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	25'-0"
IX	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	25'-0"

** Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

NOTES:

1. For anchor bolt layout, see Standard Plan S3.
2. For "Base ℄ elevation" see Project Plans.
3. Prior to erection of the post, backfill which is equivalent to the surrounding material shall be in place.
4. Pedestal shall be formed 6" minimum below ground surface. Remainder to be placed against undisturbed material.
5. Slope protection required when indicated on the Project Plans.
6. For drain holes and central void in mortar see Standard Plan ES-6B detail N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS SINGLE POST TYPE ROUND PEDESTAL PILE FOUNDATION

NO SCALE

S8

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Juan J. Jauregui
No. C63939
Exp. 9-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

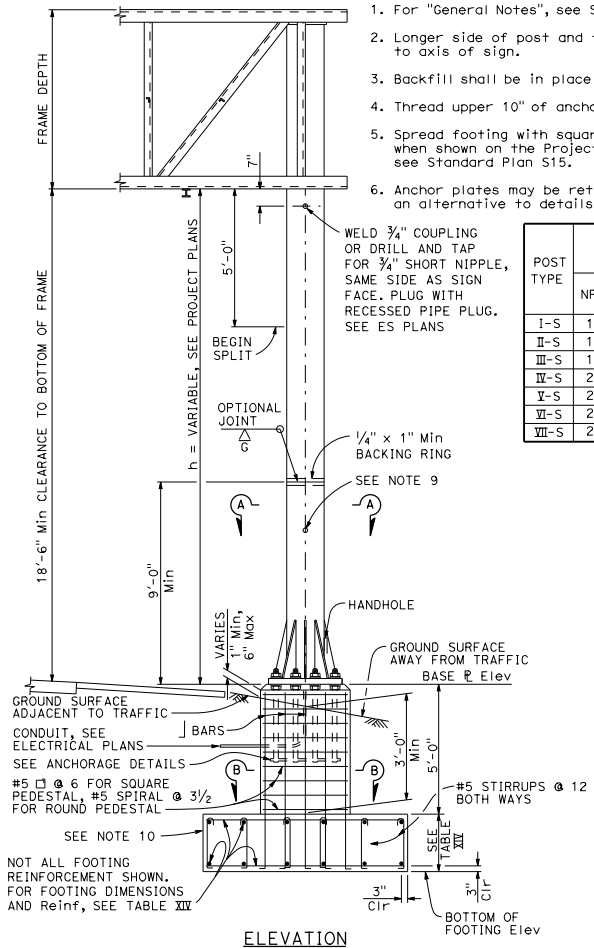
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

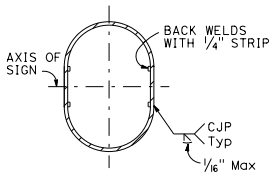
1. For "General Notes", see Standard Plan S1.
2. Longer side of post and footing (longitudinal) shall be normal to axis of sign.
3. Backfill shall be in place prior to erection of post.
4. Thread upper 10" of anchor bolts and galvanize upper 1'-0".
5. Spread footing with square pedestal shown, use pile foundation when shown on the Project Plans. For pile foundation details, see Standard Plan S15.
6. Anchor plates may be retained with Hex nut or formed head as an alternative to details shown.
7. When foundation is located on a steep slope with exposed face of concrete adjacent to traffic, see "Detail C" on Standard Plan S15.
8. Slope protection required when indicated on Project Plans.
9. Weld coupling or drill and tap for 1½"C chase nipple, perpendicular to sign panel axis away from approaching traffic. Plug with recessed pipe plug. See Standard Plan ES-15C.
10. Excavate to neat lines and place concrete against undisturbed material.

TABLE XIV

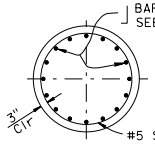
POST TYPE	PIPE			ROUND PEDESTAL					SQUARE PEDESTAL						SPREAD FOOTING					
				PEDESTAL SIZE	VERTICAL ⌟-BARS		SPIRAL		PEDESTAL SIZE	VERTICAL ⌟-BARS			HOOP		(SEE NOTE 2)	REINFORCEMENT				
																WIDTH		LONGITUDINAL		FOOTING STIRRUPS
	NPS	THICKNESS	SPLIT	Dia	EQUALLY SPACED TOTAL	BAR SIZE	BAR SIZE	PITCH	SQUARE	EQUALLY SPACED TOTAL	BAR SIZE	# OF BARS EA FACE	BAR SIZE	SPACING		TOP	BOTTOM	TOP	BOTTOM	
I-S	14	½"	5"	5'-3"	16	#10	#5	3½"	5'-3"	16	#10	5	#5	6"	7'-0" x 13'-0" x 2'-6"	14-#6	14-#7	10-#9	10-#9	#5 @ 12
II-S	16	″	6"	″	″	″	″	″	″	″	″	″	″	″	7'-0" x 13'-0" x 2'-6"	14-#6	14-#7	10-#9	10-#9	″
III-S	18	″	7"	″	″	″	″	″	″	″	″	″	″	″	7'-0" x 13'-0" x 2'-6"	14-#6	14-#7	11-#9	11-#9	″
IV-S	20	″	8"	″	″	″	″	″	″	″	″	″	″	″	8'-0" x 14'-0 x 2'-6"	15-#7	15-#7	12-#9	12-#11	″
V-S	24	″	8"	5'-9"	″	#11	″	″	5'-9"	″	#11	″	″	″	8'-0" x 16'-0" x 3'-0"	17-#7	17-#7	12-#9	12-#11	″
VI-S	24	31/32"	10"	5'-9"	″	#11	″	″	5'-9"	″	#11	″	″	″	9'-0" x 17'-0" x 3'-0"	18-#7	18-#7	12-#9	12-#11	″
VII-S	24	31/32"	10"	5'-9"	″	#11	″	″	5'-9"	″	#11	″	″	″	10'-0 x 18'-0" x 3'-0"	19-#7	19-#7	13-#9	13-#11	″



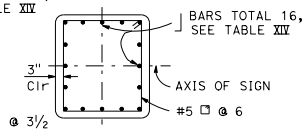
ELEVATION
SEE NOTE 5



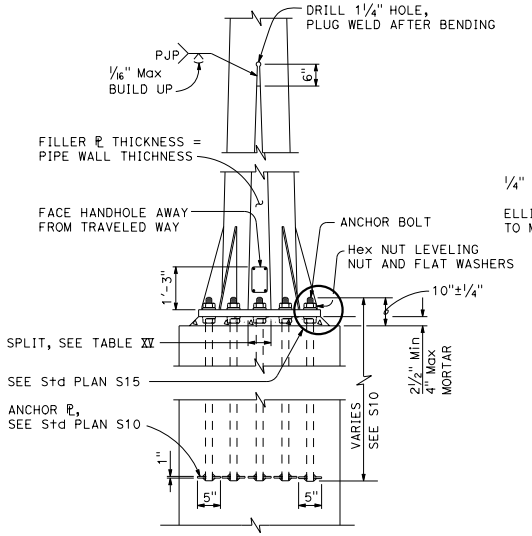
SECTION A-A



SECTION B-B
ROUND PEDESTAL

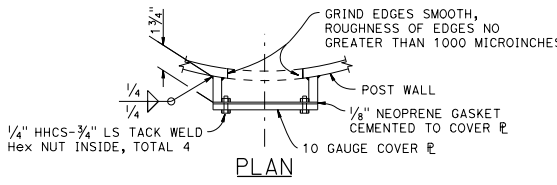


SECTION B-B
SQUARE PEDESTAL

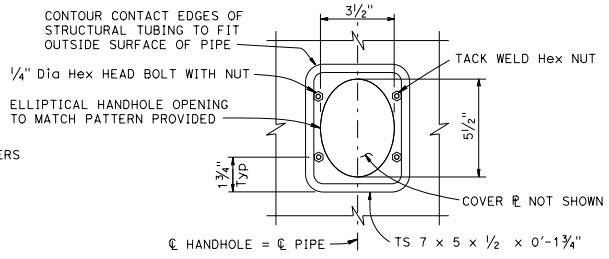


ELEVATION
SIDE VIEW

ANCHORAGE DETAILS



PLAN



ELEVATION

TYPICAL DETAILS OF HANDHOLE AND COVER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS TWO POST TYPE POST TYPES I-S THROUGH VII-S

NO SCALE

S9

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

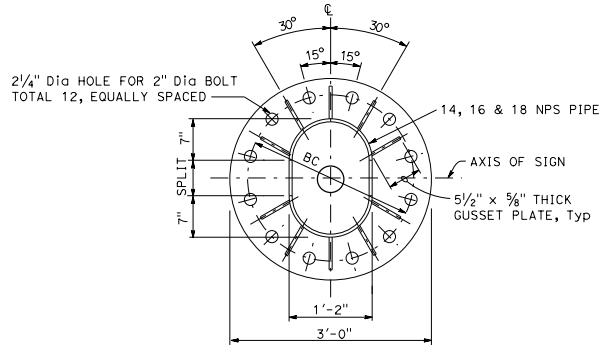
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

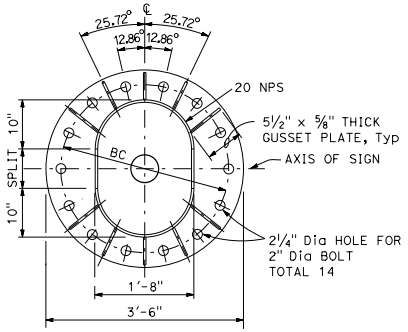
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TWO POST TRUSS

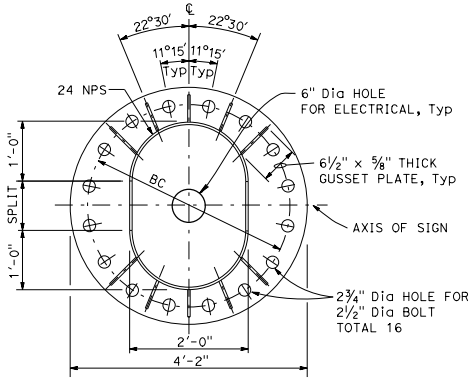
POST TYPE	PIPE			BASE ℄ OD AND THICKNESS	ANCHOR		
	NPS	THICKNESS	SPLIT		BOLT CIRCLE	BOLT TOTALS AND Dia	LENGTH
I-S	14	1/2"	5"	3'-1" x 2"	2'-4"	12-2"	4'-2"
II-S	16	↓	6"	3'-1" x 2"	2'-4"	12-2"	↓
III-S	18	↓	7"	3'-2" x 2"	2'-7"	12-2"	↓
IV-S	20	↓	8"	3'-5" x 2"	2'-10"	14-2"	↓
V-S	24	↓	8"	4'-0" x 2"	3'-2"	16-2 1/2"	5'-0"
VI-S	24	3/32"	10"	4'-3" x 2 1/2"	3'-5"	16-2 1/2"	5'-0"
VII-S	24	3/32"	10"	4'-3" x 2 1/2"	3'-5"	16-2 1/2"	5'-0"



12 BOLTS
Type I-S shown

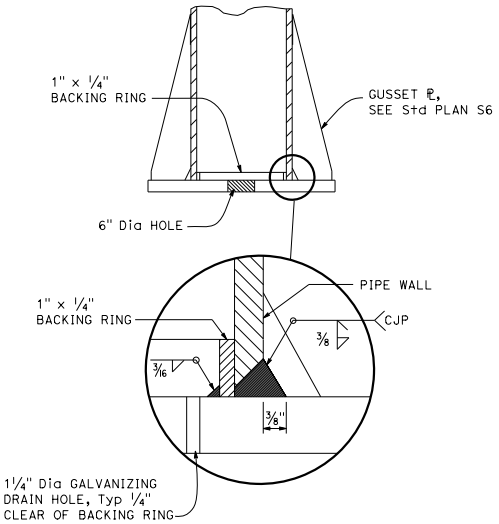


14 BOLTS



16 BOLTS
Type VI-S shown

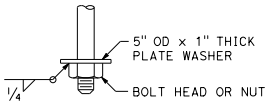
BASE PLATE DETAILS TWO POST TYPE



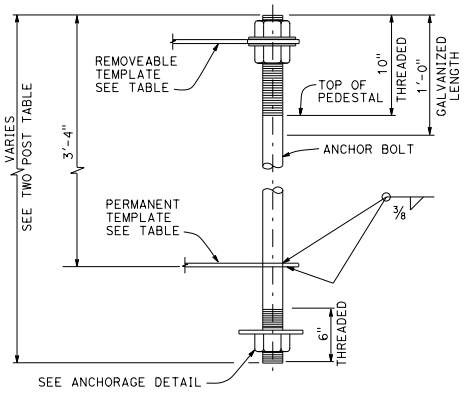
POST TO BASE PLATE CONNECTION DETAIL

TEMPLATE DIMENSIONS

No. OF BOLTS	OD	ID	HOLE Dia	PERMANENT TEMPLATE THICKNESS	TEMPORARY TEMPLATE THICKNESS
12	BC+3"	BC-3"	2 1/8" Max	5/8"	1/2"
14	BC+3"	BC-3"	2 1/8" Max	5/8"	1/2"
16	BC+4"	BC-4"	2 5/8" Max	3/4"	1/2"



ANCHORAGE DETAIL



ANCHOR BOLT TEMPLATE ASSEMBLY

NOTE: One bolt shown only. Other bolts same configuration around pipe sleeve. Template to match base plate anchor bolt pattern.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

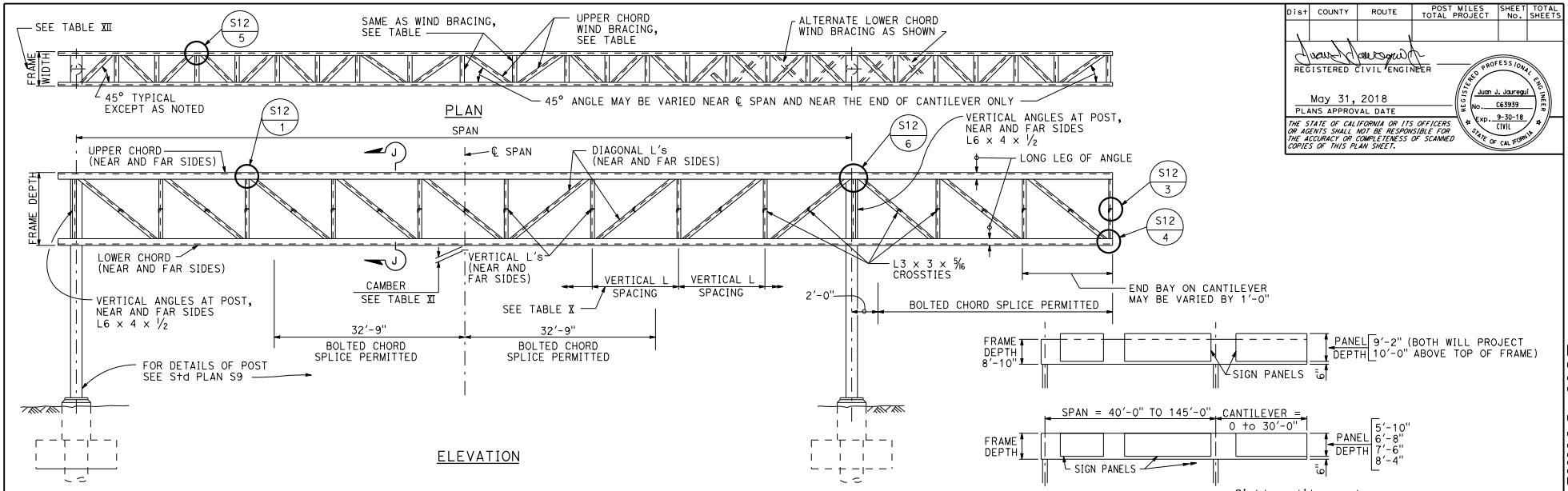
OVERHEAD SIGNS-TRUSS TWO POST TYPE BASE PLATE AND ANCHORAGE DETAILS

NO SCALE

S10

1-29-18

Return to Table of Contents



Right cantilever shown.
Cantilever may be left or right.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

RANGE OF STRUCTURE SIZES

SPAN	70" PANEL DEPTH					80" PANEL DEPTH					90" PANEL DEPTH				
	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	WIND BRACING L's	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	WIND BRACING L's	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	WIND BRACING L's
40'-0"-50'-0"	3'-0"	5 x 3½ x ⅜	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼	3'-0"	5 x 3½ x ⅜	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼	3'-0"	5 x 3½ x ⅜	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
51'-0"-60'-0"		5 x 3½ x ⅜					5 x 3½ x ⅜					5 x 3½ x ⅜			
61'-0"-70'-0"		5 x 3½ x ⅜					5 x 3½ x ⅜					5 x 3½ x ⅜			
71'-0"-80'-0"		6 x 4 x ½					6 x 4 x ½					6 x 4 x ½			
81'-0"-90'-0"		6 x 4 x ½					6 x 4 x ½					6 x 4 x ½			
91'-0"-100'-0"		6 x 4 x ½					6 x 4 x ½					6 x 4 x ½			
101'-0"-110'-0"		8 x 4 x ¾					8 x 4 x ¾					8 x 4 x ¾			3 x 3 x ⅜
111'-0"-120'-0"															
121'-0"-130'-0"											3'-6"				
131'-0"-145'-0"													3½ x 3½ x ⅜	3½ x 3½ x ⅜	

TABLE X

PANEL DEPTH	FRAME DEPTH	Max VERTICAL L SPACING
70"	6'-4"	6'-0"
80"	7'-2"	6'-0"
90"	8'-0"	7'-6"
100"	8'-10"	
110"	8'-10"	
120"	8'-10"	

TABLE XI

CAMBER FOR FABRICATION AT ℄ SPAN	
SPAN	CAMBER
40'-0" TO 50'-0"	1 1/16"
51'-0" TO 100'-0"	2 1/8"
101'-0" TO 145'-0"	3 1/4"

Camber to approximate parabola. Camber of cantilever arm = ½" for arms greater than 10'-0"

SPAN	100" PANEL DEPTH					110" AND 120" PANEL DEPTH				
	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	WIND BRACING L's	FRAME WIDTH	CHORD L's	VERTICAL L's	DIAGONAL L's	WIND BRACING L's
40'-0"-50'-0"	3'-0"	5 x 3½ x ⅜	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼	3'-0"	5 x 3½ x ⅜	3½ x 3½ x 5/16	3½ x 3½ x 5/16	2½ x 2½ x ¼
51'-0"-60'-0"		5 x 3½ x ⅜					5 x 3½ x ⅜			2½ x 2½ x ¼
61'-0"-70'-0"		5 x 3½ x ⅜					5 x 3½ x ⅜			2½ x 2½ x ¼
71'-0"-80'-0"		6 x 4 x ½					6 x 4 x ½			3 x 3 x ⅜
81'-0"-90'-0"		6 x 4 x ½					6 x 4 x ½			
91'-0"-100'-0"		6 x 4 x ½				3'-6"	6 x 4 x ½			
101'-0"-110'-0"	3'-6"	8 x 4 x ¾			3 x 3 x ⅜		8 x 4 x ¾			
111'-0"-120'-0"							8 x 4 x ¾			
121'-0"-130'-0"							8 x 4 x ¾			
131'-0"-145'-0"							8 x 6 x ¾			

TABLE XII

STANDARD PLAN SHEET No.
DETAIL No.

NOTES:

1. Frame widths shown are nominal. These widths may be varied by ¼" to standardize fabrication methods.
2. Walkway brackets not shown. Locate first interior bracket 2'-8" Max from ℄ of post.
3. For Section J-J, See Std Plan S12.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS TWO POST TYPE STRUCTURAL FRAME MEMBERS

NO SCALE

S11

1-29-18

Return to Table of Contents

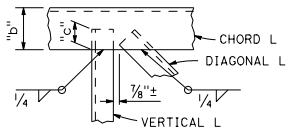
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

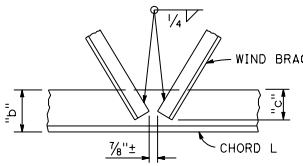
May 31, 2018
PLANS APPROVAL DATE

Juan J. Jauregui
No. C63939
Exp. 9-30-18
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

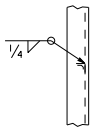


DETAIL ①

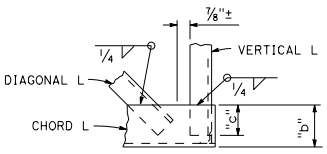


DETAIL ②

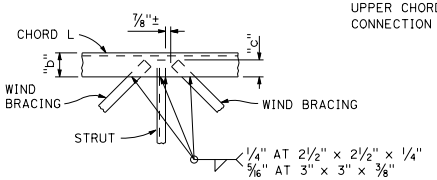
OVERLAP DISTANCES	
"b"	"c"
3½"	2¼"
4"	2¾"
5"	3¼"
6"	4"
8"	5"



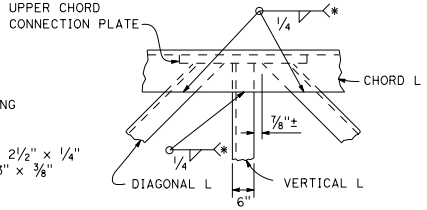
DETAIL ③



DETAIL ④

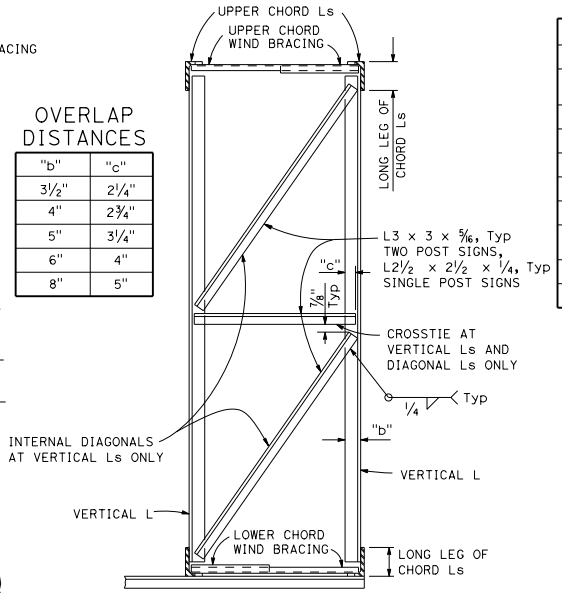


DETAIL ⑤



DETAIL ⑥

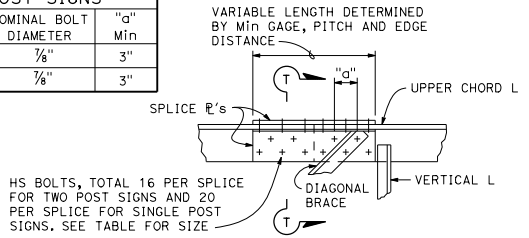
* Welds are to upper chord connection plate and chord angle.



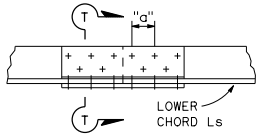
TYPICAL SECTION J-J

NOTE:
Diagonal Ls in plane of truss not shown. Bracing shown is at all vertical Ls of truss.

BOLTED CHORD SPLICE TWO POST SIGNS		
CHORD L	NOMINAL BOLT DIAMETER	"a" Min
5 x 3½ x 3/8	¾"	2½"
6 x 4 x ½	⅞"	3"
8 x 4 x ¾	1¼"	3¾"
8 x 6 x ¾	1¼"	3¾"
SINGLE POST SIGNS		
CHORD L	NOMINAL BOLT DIAMETER	"a" Min
5 x 5 x ½	⅞"	3"
6 x 6 x ½	⅞"	3"



SPLICE WITH DIAGONAL ANGLE



SPLICE WITHOUT DIAGONAL ANGLE
BOLTED CHORD SPLICE

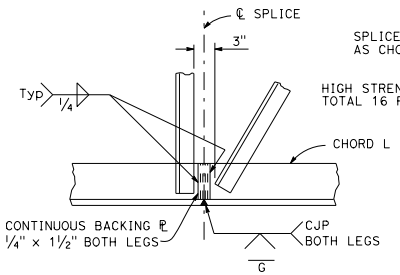
SPLICE NOTES:

Location of Splices:

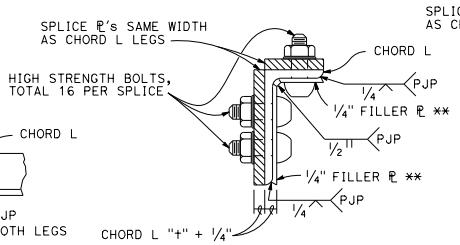
The splice shall be located so as not to interfere with mounting the walkway brackets or the clip angles for the removable sign panel frame. For two post type see also S11.

Filler ℄ :

The plates welded to the angle legs on the inside shall be welded before drilling the bolt holes. The plates shall be the same length as the cover plates. The plates are not necessary on the single post signs if the splice is located over ⅓ of the cantilever length from the post. Alternative splice details may be used if approved by the Engineer.

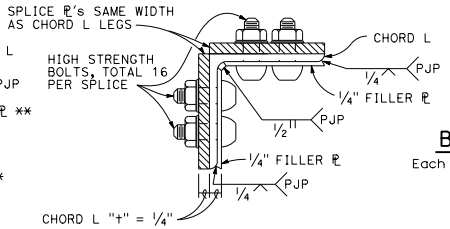


WELDED CHORD SPLICE

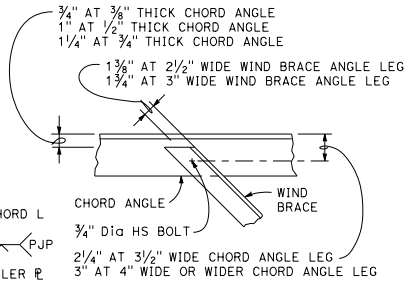


SECTION T-T
TWO POST SIGNS

** 5/16" Filler ℄ at ¾" thick chord angle



SECTION T-T
SINGLE POST SIGNS



BOLTED WIND BRACE DETAIL

Each end of wind brace at bolted chord splice

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

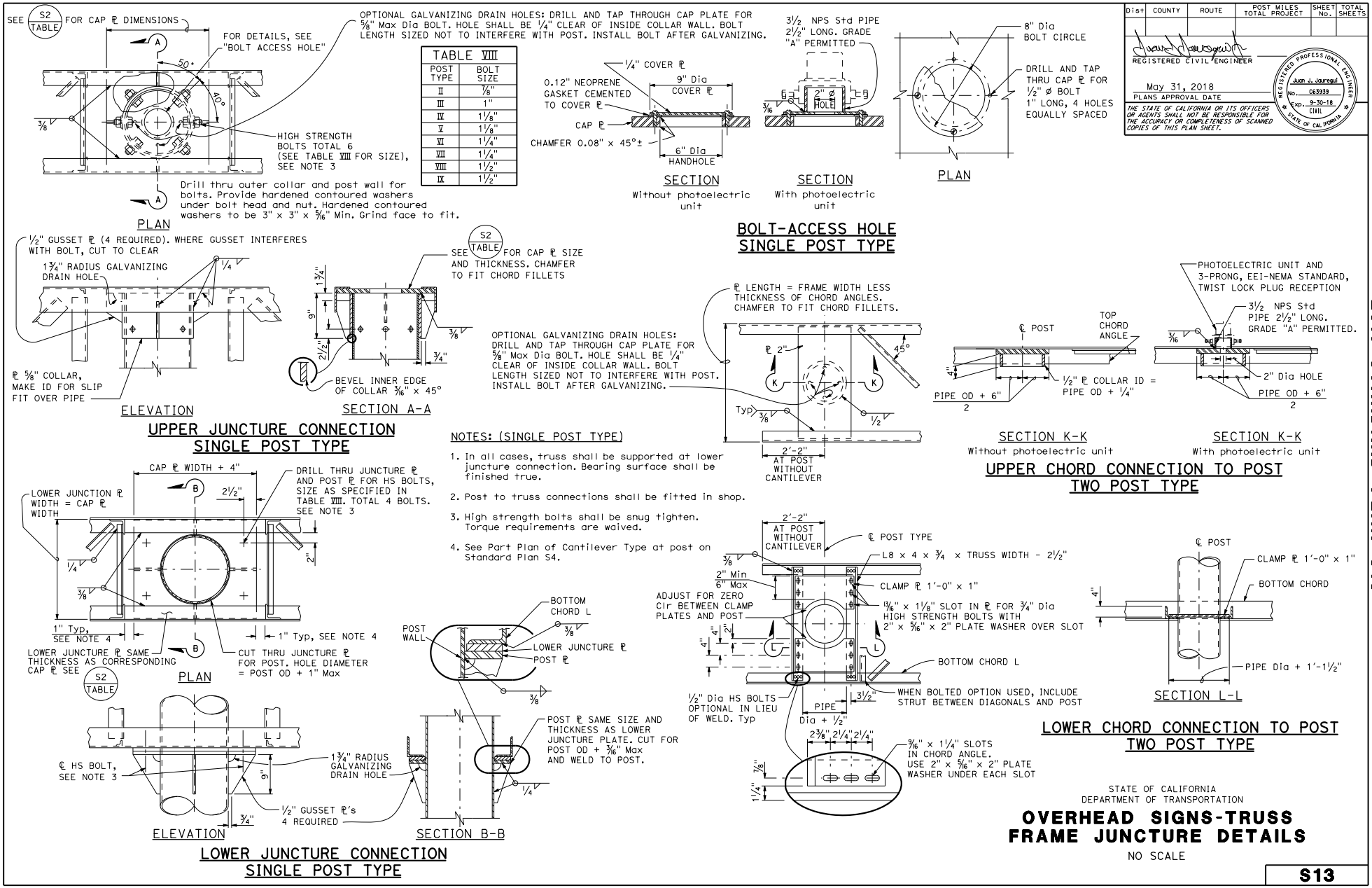
OVERHEAD SIGNS-TRUSS STRUCTURAL FRAME DETAILS

NO SCALE

S12

1-29-18

Return to Table of Contents



1-29-18

Return to Table of Contents

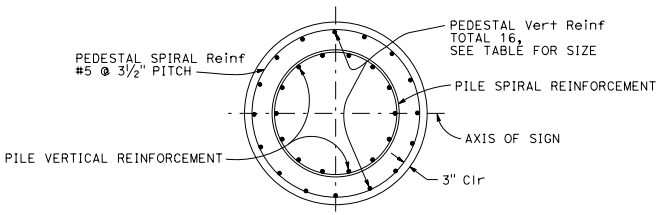
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

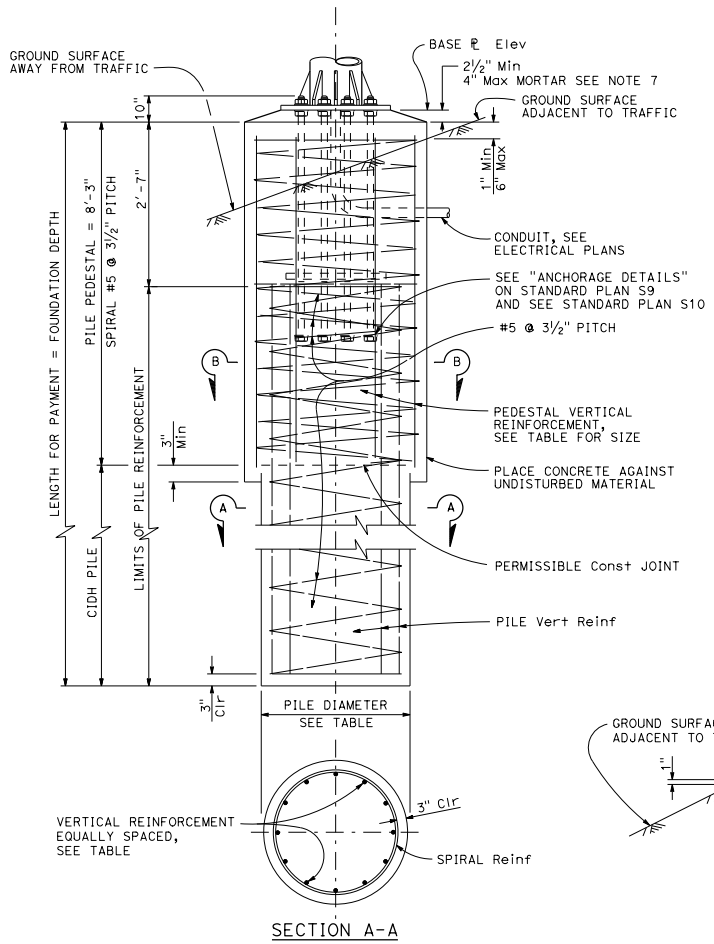
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

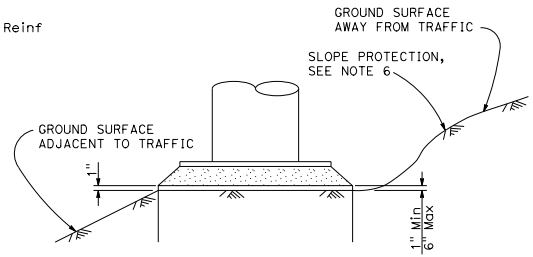
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION B-B



SECTION A-A



DETAIL C

POST TYPE	ANCHOR BOLTS				ROUND PILE PEDESTAL					CIDH PILE					FOUNDATION DEPTH * *
	TOTAL	Dia	BOLT CIRCLE	TOTAL LENGTH	Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	PILE Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	
I-S	12	2"	2'-4"	4'-2"	5'-3"	16	#10	#5	3½"	4'-6"	26	#10	#5	3½"	18'-0"
II-S	12		2'-4"												19'-8"
III-S	12		2'-7"												23'-0"
IV-S	14	↓	2'-10"	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	23'-0"
V-S	16	2½"	3'-2"	5'-0"	5'-9"		#11			5'-0"	28	#11			26'-3"
VI-S	16	2½"	3'-5"	5'-0"	5'-9"		#11			5'-0"	28	#11			27'-10"
VII-S	16	2½"	3'-5"	5'-0"	5'-9"	↓	#11	↓	↓	5'-0"	28	#11	↓	↓	27'-10"

* * Use Foundation Depth shown in table unless otherwise shown on the Project Plans.

NOTES:

1. For anchor bolt layout, see Standard Plan S10.
2. For "Base ℄ elevation" see Project Plans.
3. Longer side of post shall be normal to axis of sign.
4. Prior to erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
5. Pedestal shall be formed 6" Min below ground surface. Remainder to be placed against undisturbed material.
6. Slope protection required when indicated on the Project Plans.
7. For drain holes and central void in mortar see Standard Plan ES-6B detail N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS TWO POST TYPE ROUND PEDESTAL PILE FOUNDATION

NO SCALE

S15

1-29-18

Return to Table of Contents

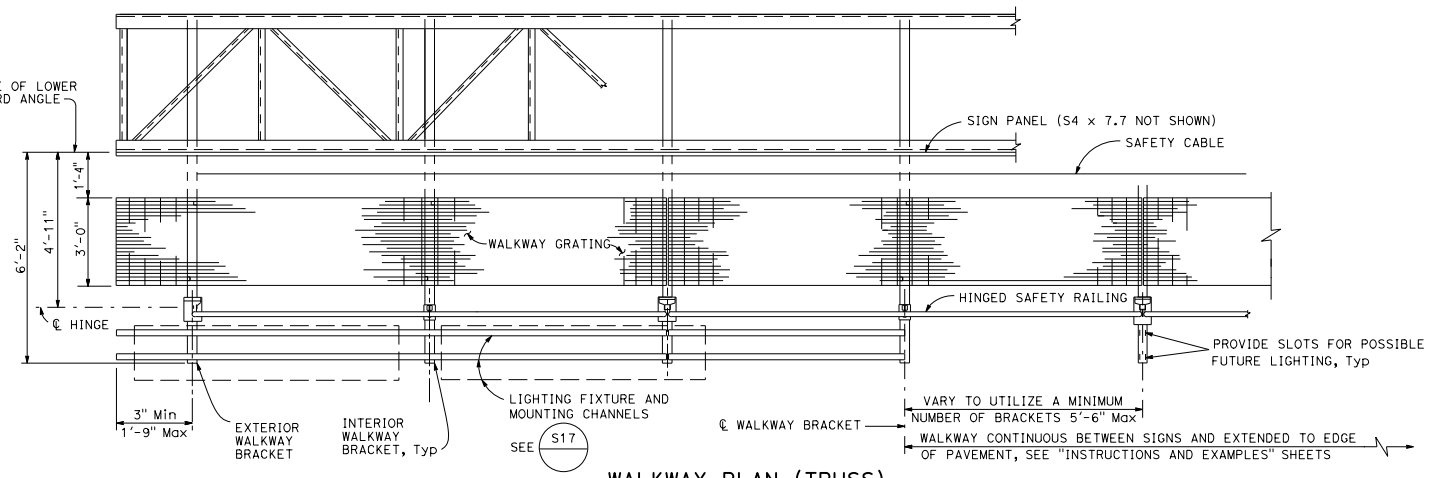
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

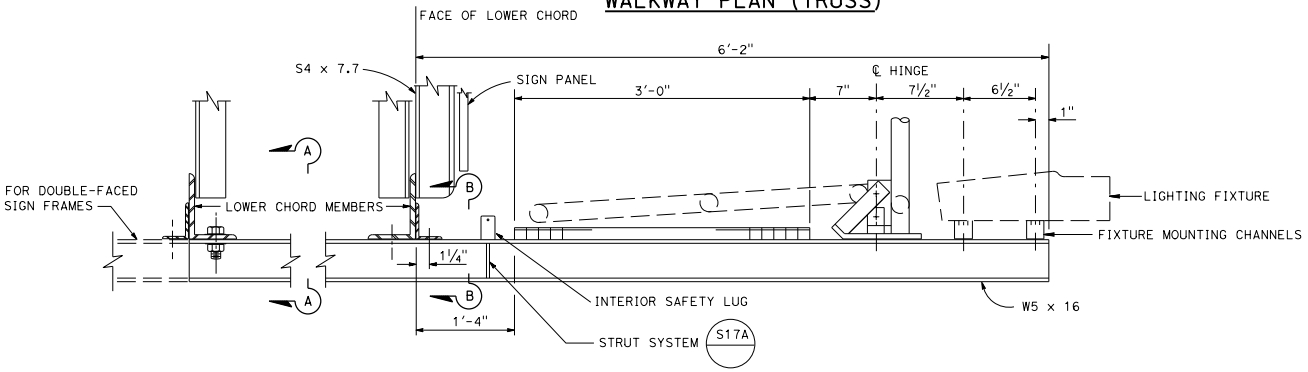
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Juan J. Jauregui
No. C63939
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

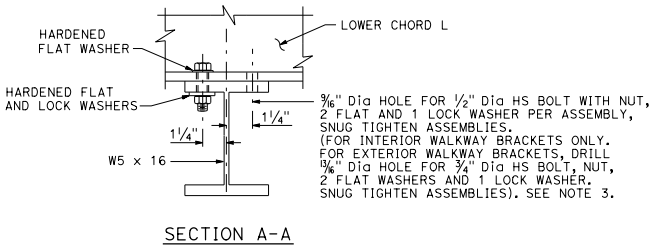


WALKWAY PLAN (TRUSS)

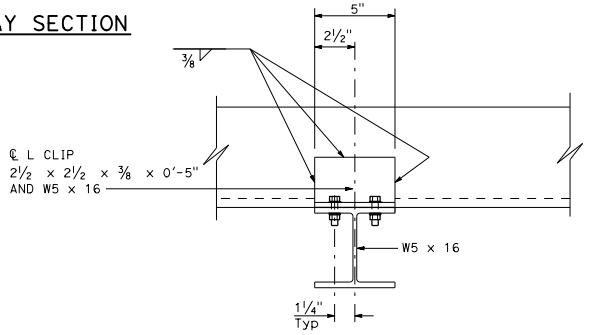


TRUSS

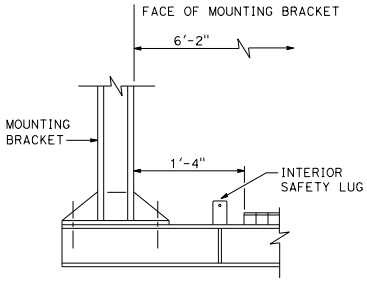
TYPICAL WALKWAY SECTION



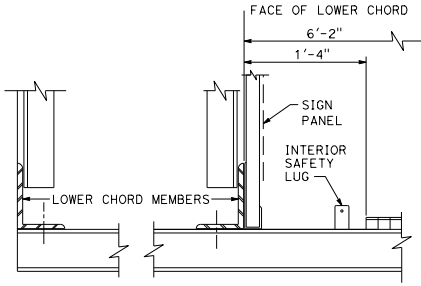
SECTION A-A



SECTION B-B



TUBULAR AND BRIDGE MOUNTED



BOX BEAM CLOSED TRUSS

NOTES:

1. For spacing of lighting fixtures, see Standard Plan ES-15A.
2. For safety lug details, see Standard Plan S17.
3. For double faced sign frames with double walkways, use a total 8 bolt assemblies per bracket.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS
WALKWAY DETAILS No. 1

NO SCALE

S16

2018 STANDARD PLAN S16

1-29-18

Return to Table of Contents

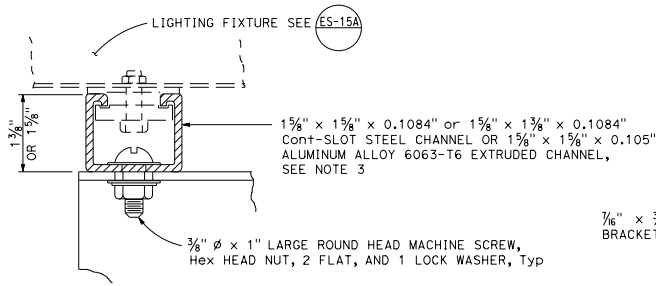
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

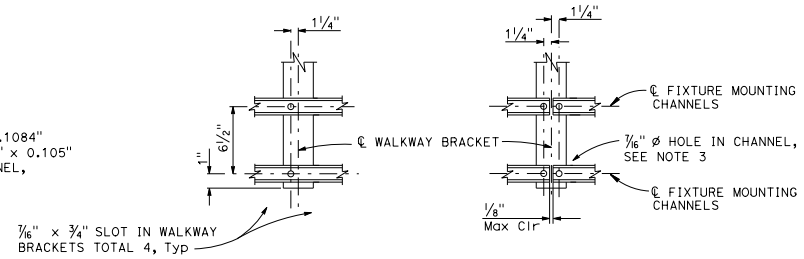
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

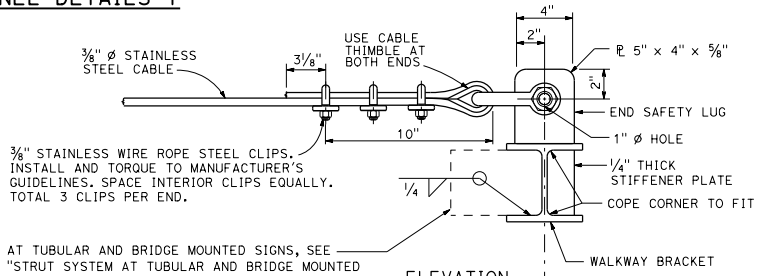


LIGHTING FIXTURE MOUNTING CHANNEL DETAILS 1

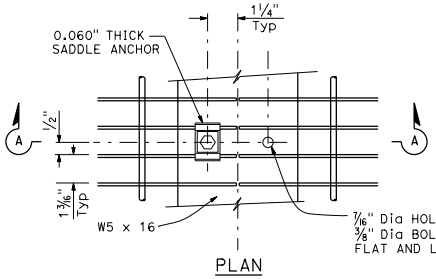


TYPICAL CONNECTION CONNECTION AT SPLICE

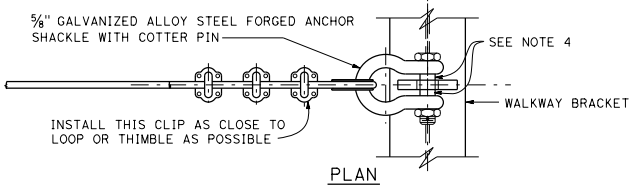
LIGHTING FIXTURE MOUNTING CHANNEL DETAILS 2



ELEVATION



PLAN

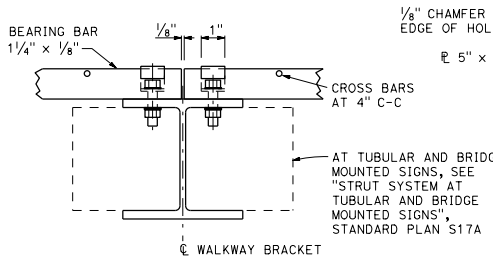


PLAN

END SAFETY CABLE DETAIL

NOTES:

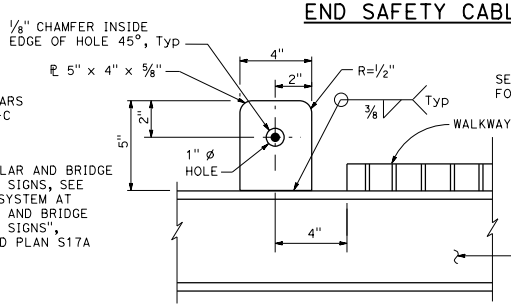
1. Welded type grating shall have 1¼" x ⅛" bearing bars at 1 3/16" centers with ¼" diameter (or equal) cross bars at 4" centers. If mechanical lock grating is used, it shall be equal in strength to the welded type. Alternate hold-down clips may be submitted for approval.
2. Walkway grating and light fixture mounting channels to be continuous (no splices) over as many walkway brackets as practical and consistent with fabrication, ease of handling and assembly.
3. Contractor may substitute 1⅝" x 1⅝" x .1084" cont-slot steel channel with pre-punched slots not larger than 11/32" x 3". Slots shall be at bottom of channel and shall be parallel to channel. Slots shall be spaced not closer than 4" center to center.
4. Place an equal amount of washers on each side to align cable with end lug without restricting shakle bolt rotation or contacting cable.



SECTION A-A

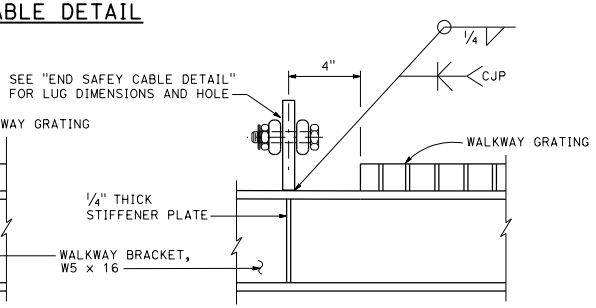
WALKWAY GRATING DETAILS

Shown at splice



INTERIOR SAFETY LUG DETAIL

(At every walkway bracket between exterior walkway brackets)



END SAFETY LUG DETAIL

(At exterior walkway brackets)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS WALKWAY DETAILS No. 2

NO SCALE

S17

1-29-18

Return to Table of Contents

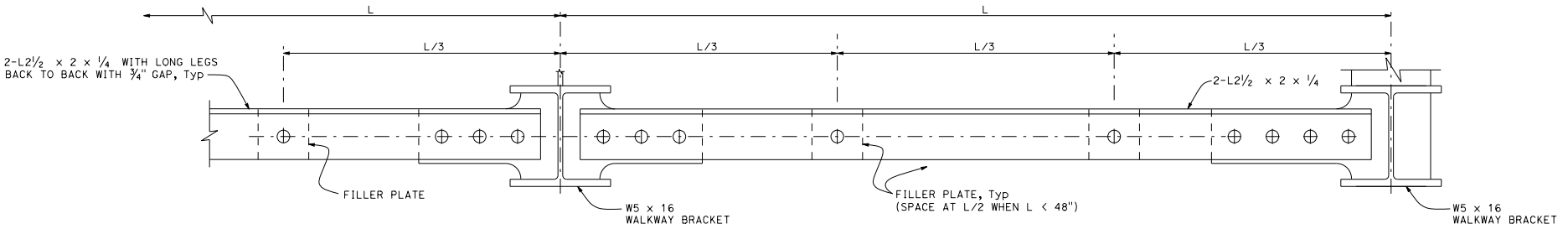
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

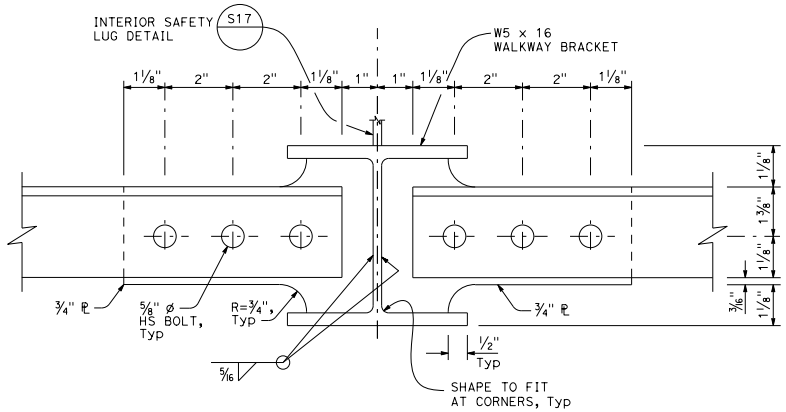
REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

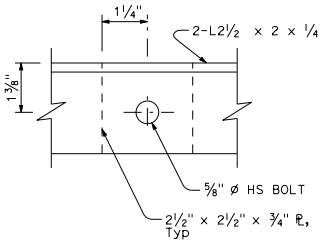


STRUT SYSTEM AT TUBULAR AND BRIDGE MOUNTED SIGNS

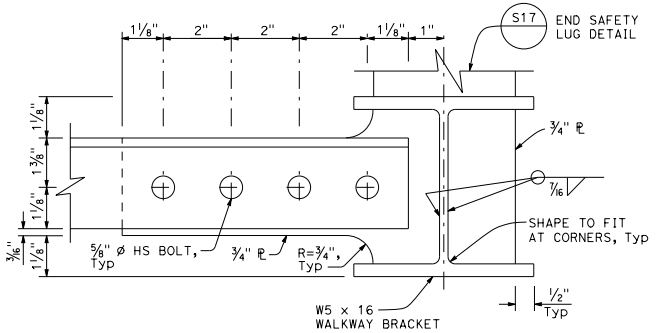
(Continuous between end safety lug locations)



INTERIOR SAFETY LUG LOCATION



FILLER PLATE



END SAFETY LUG LOCATION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

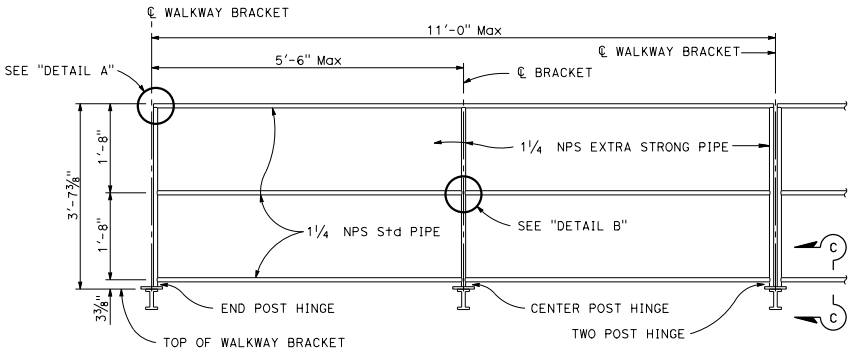
OVERHEAD SIGNS
WALKWAY DETAILS No. 3

NO SCALE

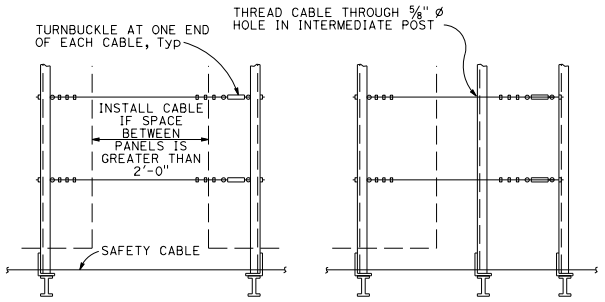
S17A

1-29-18

Return to Table of Contents



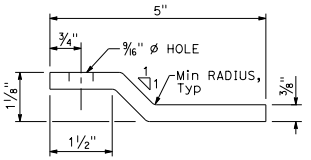
SAFETY RAILING ELEVATION



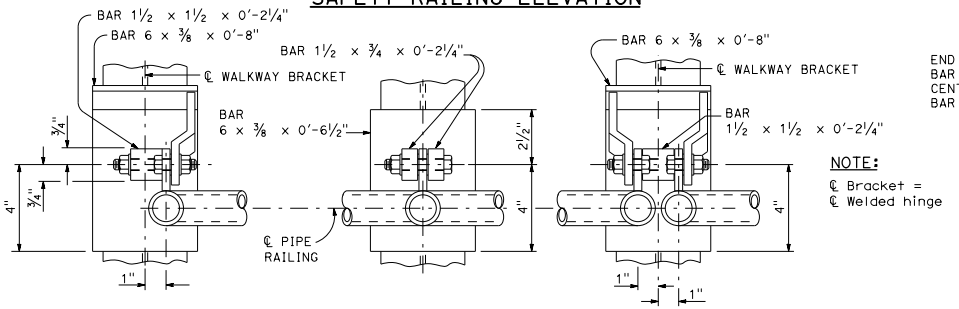
BETWEEN PANELS BEYOND PANELS

UPPER SAFETY CABLE ELEVATION

For tubular structures

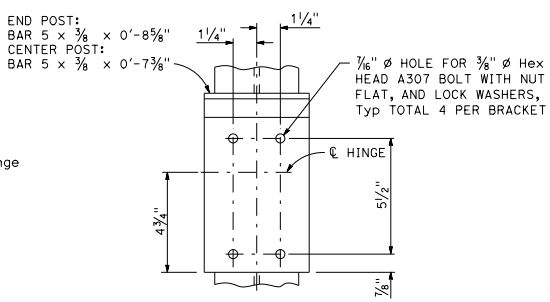


PLAN - KICKER BAR

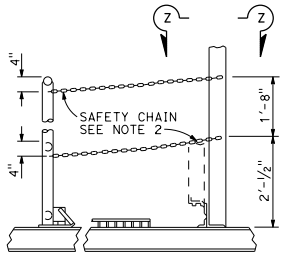


NOTE:
℄ Bracket = ℄ Welded hinge

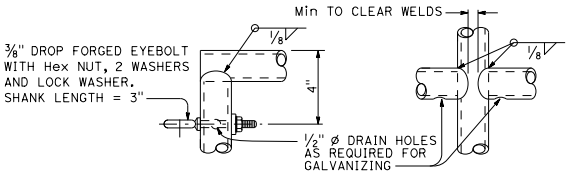
WELDED HINGE - PLAN



TYPICAL BOLTED (ALTERNATIVE) HINGED CONNECTION

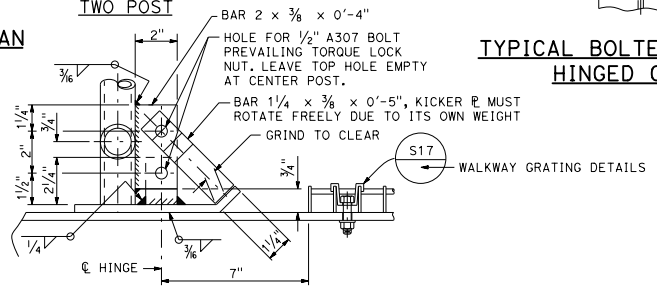


CHAIN ASSEMBLY

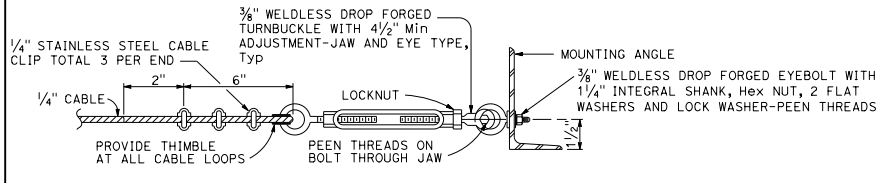


DETAIL A DETAIL B

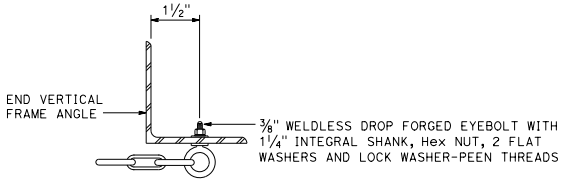
NOTE: Alternative venting methods may be used if approved by the Engineer.



SECTION C-C



TURNBUCKLE DETAILS



VIEW Z-Z

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS WALKWAY SAFETY RAILING DETAILS

NO SCALE

S18

1-29-18

2018 STANDARD PLAN S18

Return to Table of Contents

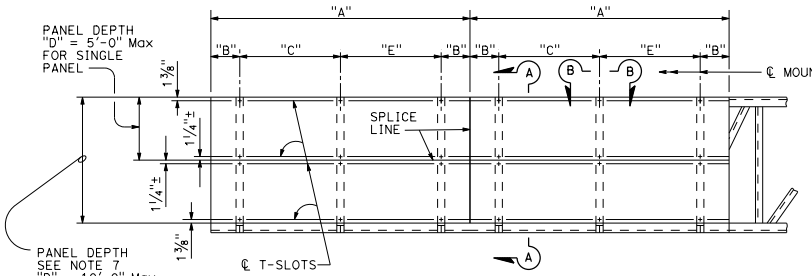
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

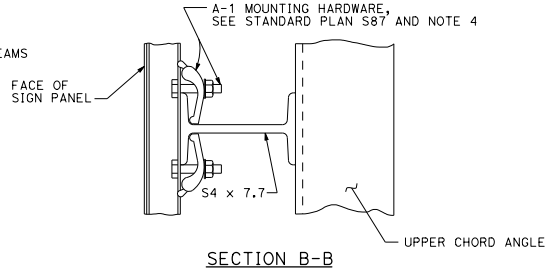
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

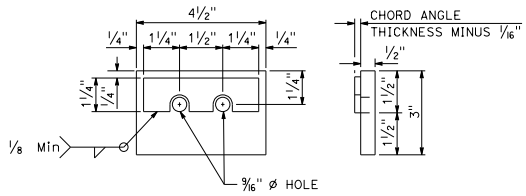
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



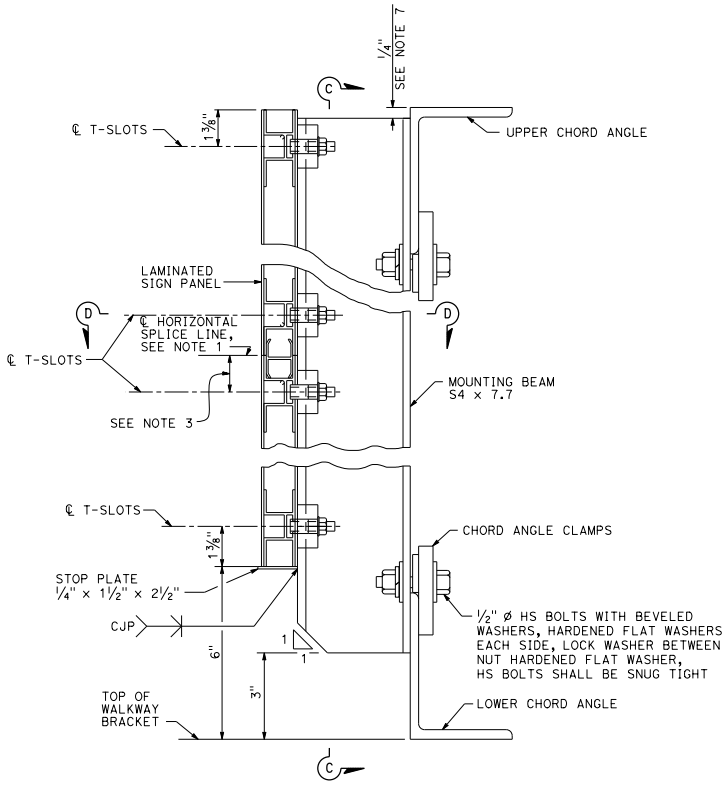
ELEVATION
SIGN



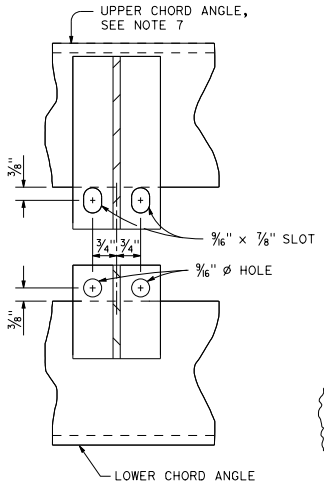
SECTION B-B



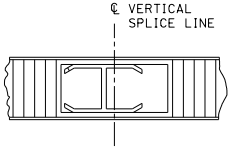
CHORD ANGLE CLAMP



SECTION A-A



SECTION C-C



SECTION D-D

MOUNTING BEAM SPACING TABLE

SIGN PANEL LENGTH *	NUMBER MOUNTING BEAMS	SIGN PANEL OVERHANG	MOUNTING BEAM SPACING	
"A"		"B"	"C"	"E"
5'-0"	2	9"	3'-6"	
6'-0"		1'-0"	4'-0"	
7'-0"		1'-3"	4'-6"	
8'-0"		1'-6"	5'-0"	
9'-0"		1'-10"	5'-6"	
10'-0"		2'-0"	6'-0"	
11'-0"		2'-0"	7'-0"	
12'-0"		2'-6"	7'-0"	
13'-0"		2'-6"	8'-0"	
14'-0"		2'-6"	9'-0"	
15'-0"		3'-0"	9'-0"	
16'-0"	3	6"	7'-6"	7'-6"
17'-0"		1'-0"	7'-6"	7'-6"
18'-0"		1'-0"	8'-0"	8'-0"
19'-0"		1'-0"	8'-6"	8'-6"
20'-0"		1'-6"	8'-6"	8'-6"
21'-0"		1'-6"	9'-0"	9'-0"
22'-0"		2'-0"	9'-0"	9'-0"
23'-0"		2'-6"	9'-0"	9'-0"
24'-0"		3'-0"	9'-0"	9'-0"

* Signs longer than 24'-0" are fabricated and mounted as adjoining single panels. The location of the vertical splice line will be determined by the Engineer.

NOTES:

1. The location of the horizontal splice line is dependent on the Contractor for signs greater than 60" in depth.
2. Mounting bolts and clamps are required on each side of the horizontal splice lines at each support beam.
3. Dimension varies from panel to panel. Average value approximate 1¼".
4. Torque stainless steel sign panel mounting bolts to 100 inch-pounds.
5. Chord angle clamp to be galvanized after fabrication.
6. The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
7. 9'-2" and 10'-0" sign panel along with the mounting beams will project above the top chord truss member 10" and 1'-8" respectively. Attachment details shall be the same.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

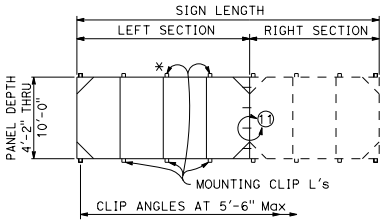
OVERHEAD SIGNS-TRUSS SIGN MOUNTING DETAILS LAMINATED PANEL-TYPE A

NO SCALE

S19

1-29-18

Return to Table of Contents



REMOVABLE FRAME GREATER THAN 20'-0"

* 9'-2" & 10'-0" sign panel frames will project above the topchord of the truss. In these cases the top clips shall be bolted to vertical frame members. See Standard Plan S22 for details.

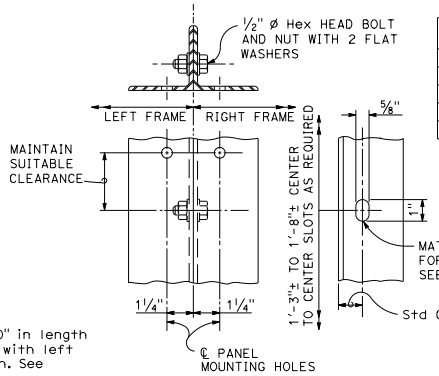
SIGN LENGTH	LEFT SECTION	RIGHT SECTION
22'-0"	12'-0"	10'-0"
24'-0"	12'-0"	12'-0"
26'-0"	12'-0"	14'-0"
28'-0"	16'-0"	12'-0"
30'-0"	16'-0"	14'-0"
32'-0"	16'-0"	16'-0"
34'-0"	16'-0"	18'-0"
36'-0"	20'-0"	16'-0"
38'-0"	20'-0"	18'-0"
40'-0"	20'-0"	20'-0"

NOTES:

Frames for signs greater than 20'-0" in length shall be fabricated in two sections with left section a multiple of 4'-0" in length. See table above.

Sections shall be hoisted into place individually and bolted together as per detail (11) prior to tightening of mounting clip bolts.

Bolting two sections together and hoisting simultaneously will not be permitted.



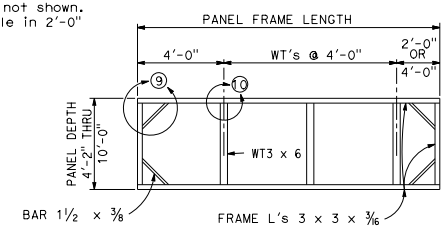
DETAIL (11)

FRAME TO FRAME CONNECTION DETAILS

PANEL DEPTH	No. OF SLOTS
4'-2"	2
5'-10"	3
6'-8" AND 7'-6"	4
8'-4" AND 9'-2"	5
10'-0"	6

NOTES:

Panel mounting holes not shown.
Panel lengths available in 2'-0" increments.

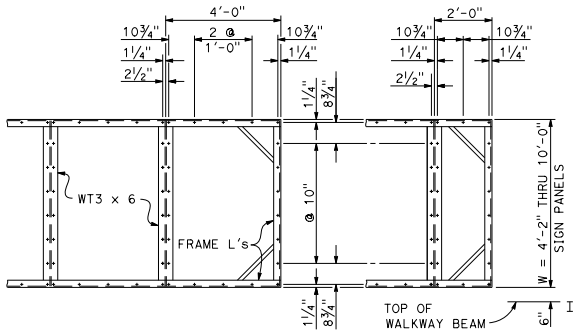


TYPICAL REMOVABLE FRAME

(4'-0" thru 20'-0")

NOTES:

1. Frames shall be all-welded construction.
2. Panel mounting holes shall be drilled by template. Sign panel may be considered as a template.
3. Drilled and tapped holes ¼" may be used where interference due to welds or structural members is encountered.
4. WT3 x 6 shall be flush with faces of frame angles.
5. Mounting clip angles shall be located such as to allow the top and bottom frame angles of the removable sign panel to lie on a straight horizontal line.
6. Holes for mounting removable sign panel frame may be slotted 1" maximum parallel to the axis of the sign.
7. WT3 x 6 may be crimped at ends to join frame angles. Fillet weld all around.

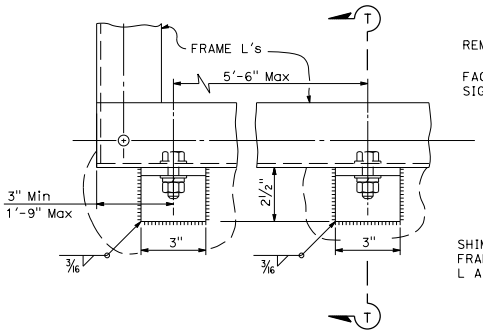


TYPICAL 4'-0" PANEL TYPICAL 2'-0" PANEL

All holes ½" diameter maximum.

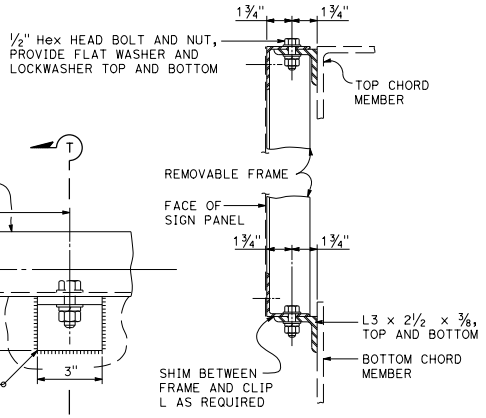
MOUNTING HOLE SPACING SIGN PANEL & FRAME

Hole spacing is for single sheet sign panels.
For Overhead Formed Panels refer to "Removable Sign Panel Frames, Mounting Details" Sheet.

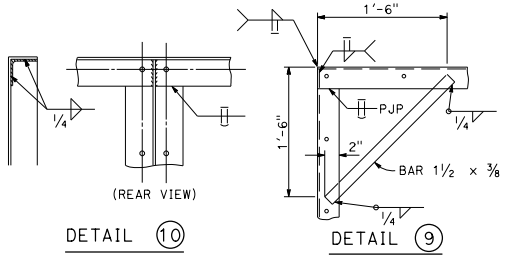


FRAME MOUNTING DETAILS

Details shown apply for sign panel frames ≤ 8'-4" deep. Mounting details for deeper panels shown on Standard Plan S22.



SECTION T-T



TYPICAL FRAME JOINT DETAILS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS
STEEL FRAMES
REMOVABLE SIGN PANEL FRAMES

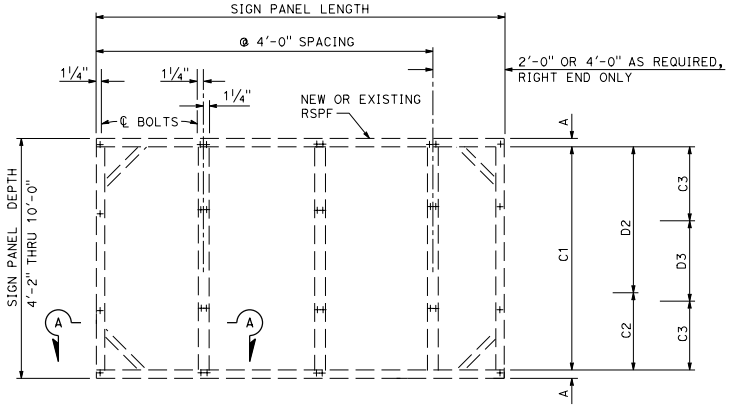
NO SCALE

S20

2018 STANDARD PLAN S20

1-29-18

Return to Table of Contents



ELEVATION VIEW

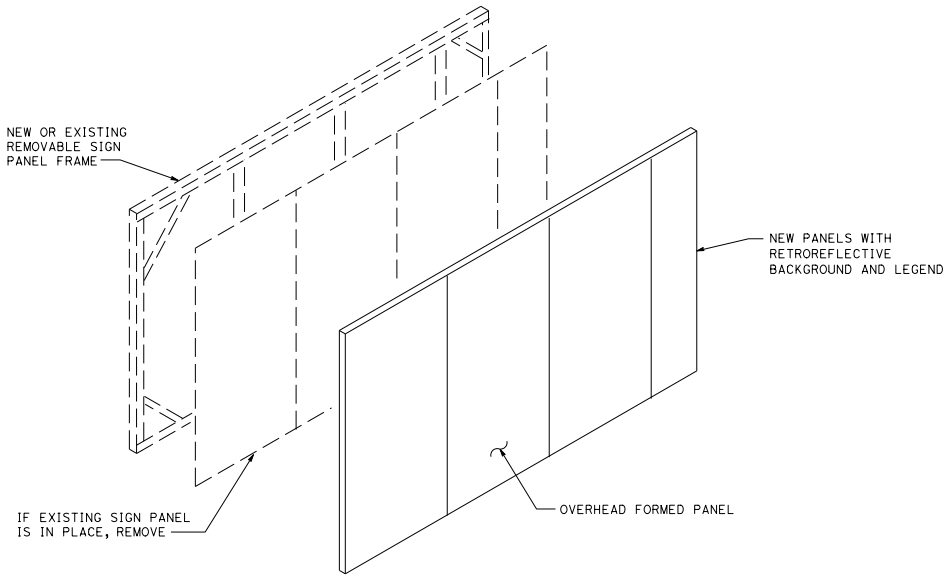
NEW OR EXISTING REMOVABLE SIGN PANEL FRAME MOUNTING HOLE SPACING

MOUNTING BOLT SPACING							
PANEL DEPTH	A	1 SPACE	2 SPACE		3 SPACE		
		C1	C2	D2	C3	D3	C3
50"	1¼"	3'-11½"					
60"			2'-4¾"	2'-4¾"			
70"			1'-6¾"	4'-¾"			
80"			3'-2¾"	3'-2¾"			
90"			3'-2¾"	4'-¾"			
100"			4'-¾"	4'-¾"			
110"					3'-2¾"	2'-6"	3'-2¾"
120"	1¼"				4'-¾"	1'-8"	4'-¾"

TABLE 1

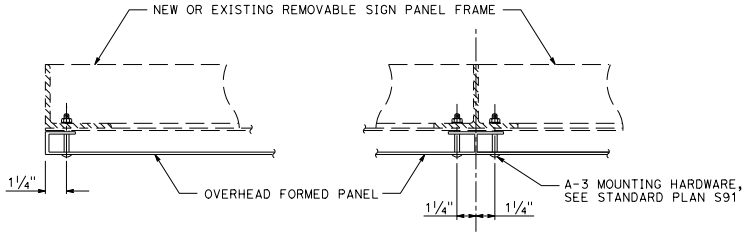
NOTE:

Sign panel mounting holes ½" ø maximum for ⅜" ø bolts.



NOTE:

The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.



CORNER DETAIL

PANEL CONNECTION SECTION A-A

NOTES:

When constructing a new frame:

(1) Refer to Standard Plan Sheet S20 for structural details.

(2) Sign panels shall be considered as a template for drilling holes for mounting bolts.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Juan J. Jauregui — No. C63939 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

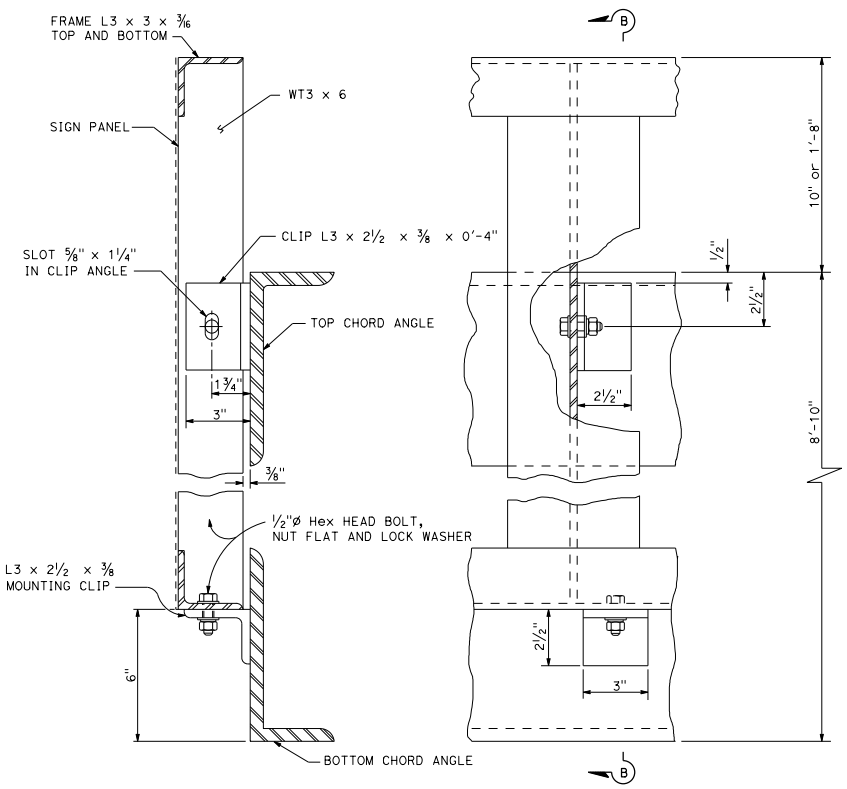
OVERHEAD SIGNS
REMOVABLE SIGN PANEL FRAMES
MOUNTING DETAILS

NO SCALE

S21

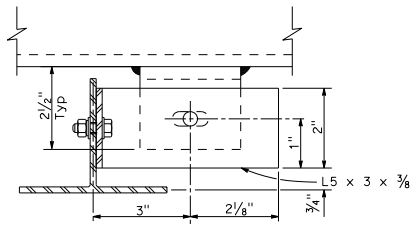
1-29-18

Return to Table of Contents



SECTION B-B ELEVATION VIEW

STEEL REMOVABLE SIGN PANEL FRAMES



BOLTED ALTERNATIVE CONNECTION AT TOP CHORD

For details not shown, see Sections C-C and D-D.

NOTES:

1. For Steel Removable Sign Panel Frame details see Standard Plan S20.
2. Minimum fillet weld is 1/4" for clip angles welded to chord member of truss.
3. Maximum spacing of bottom clip angle is 5'-6".
4. Top clips required for each vertical member of Removable Sign Panel Frame.

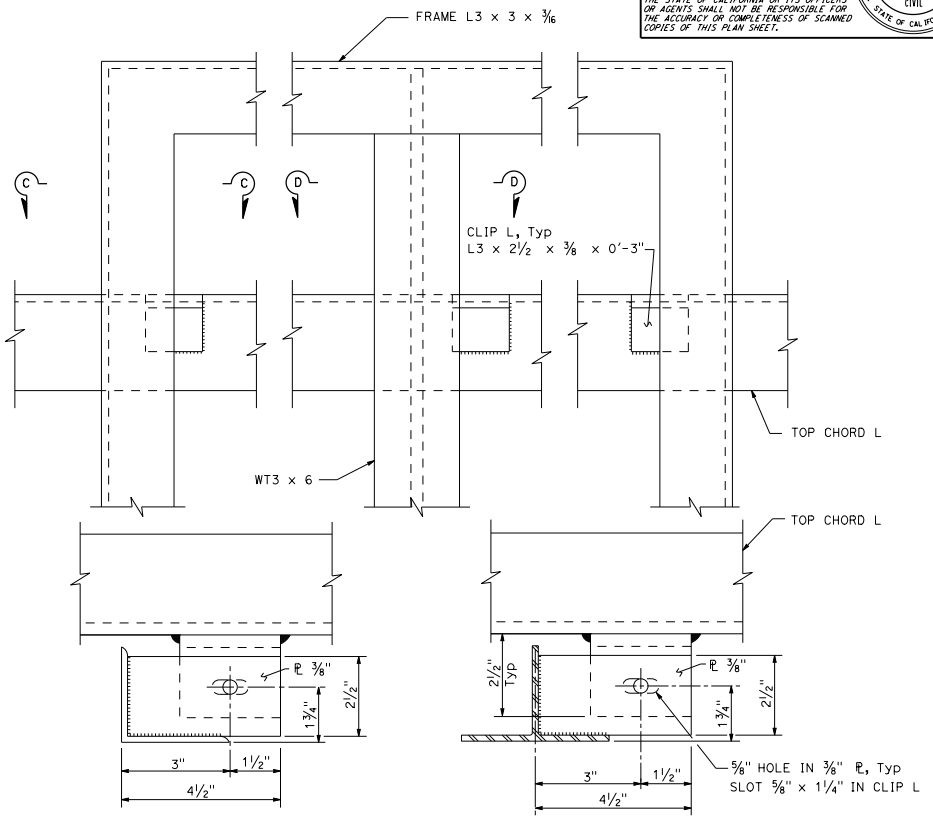
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Juan J. Jauregui
No. C63939
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION C-C SECTION D-D

ALTERNATIVE CONNECTION AT TOP CHORD

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TRUSS REMOVABLE SIGN PANEL FRAMES 110" AND 120" SIGN PANELS

NO SCALE

S22

1-29-18

2018 STANDARD PLAN S22

Return to Table of Contents

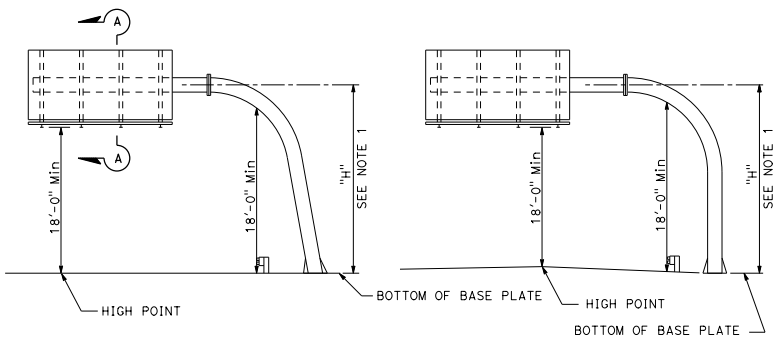
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

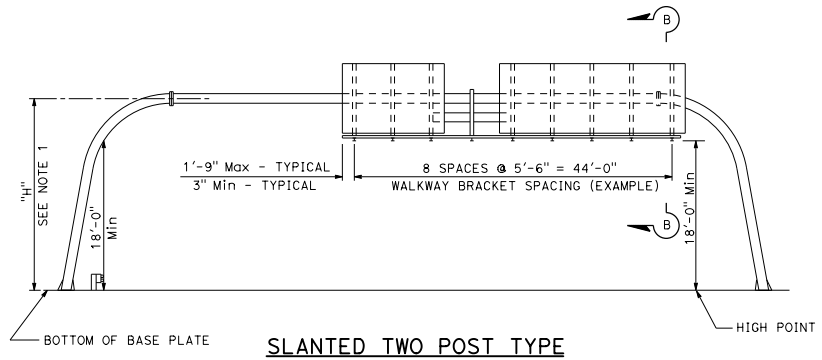
REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

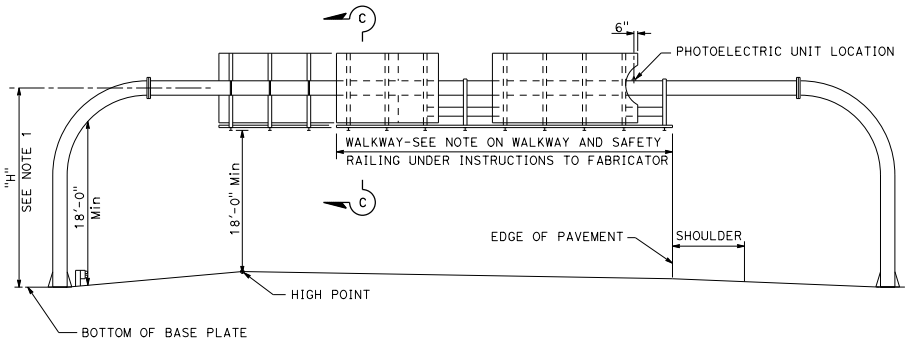


SLANTED SINGLE POST TYPE

VERTICAL SINGLE POST TYPE



SLANTED TWO POST TYPE



VERTICAL TWO POST TYPE

INSTRUCTIONS TO FABRICATOR

Format sheet shows:

1. Sign structure location.
2. Length of structure span.
3. Panel size and location on structure.
4. Post height to bottom of panel or mast arm elevation.
5. Base plate elevation.
6. Photoelectric unit location if required.
7. Walkway location.

WALKWAY BRACKETS:

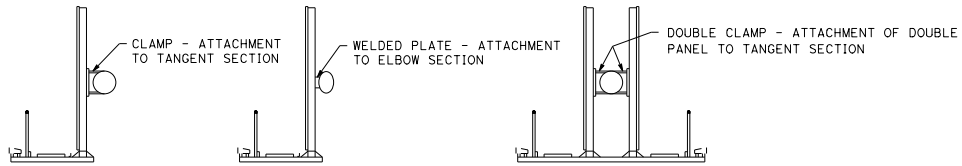
Maintain uniform spacing where possible. Maximum spacing shall not exceed 5'-6" Minimum clear to field splice = 1'-0"±

WALKWAY AND SAFETY RAILING:

Walkway to extend full length of sign area and be continuous between signs. Extend walkway to edge of pavement if required. Safety railing to protect entire walkway.

PHOTOELECTRIC UNIT:

Place behind sign panel nearest right shoulder unless otherwise shown on format sheet.



SECTION A-A SECTION B-B SECTION C-C

NOTES:

1. Maximum post height = 24'-0" + sign panel depth/2.
2. For walkway details, see Standard Plan S16.
3. For safety railing and cable details, see Standard Plans S17 and S18.

GENERAL NOTES:

LOADING:

WIND LOADING:

Normal to face of sign: 40.3 psf on 100% panel coverage.

Transverse to face of sign: 20% of normal force.

WALKWAY LOADING:

Dead load 500 LBS concentrated live load.

UNIT STRESSES:

STRUCTURAL STEEL: fy = 36,000 psi
REINFORCED CONCRETE: fy = 60,000 psi
f'c = 3600 psi
FOOTING SOIL PRESSURE: 2.5 ksf (spread footing)

MINIMUM CLEARANCE

Vertical roadway clearance 18'-0" above roadway and shoulders

WELDING:

All welding continuous unless otherwise noted on the plans.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR INSTRUCTIONS AND EXAMPLES

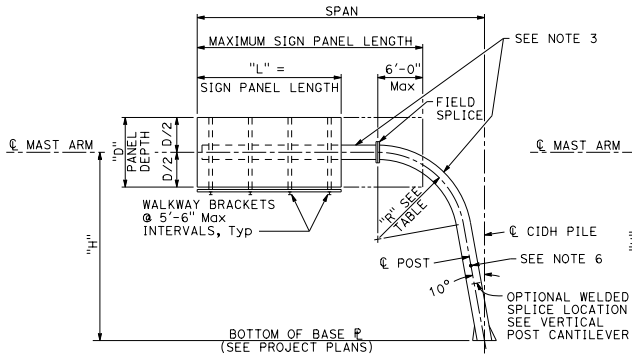
NO SCALE

S30

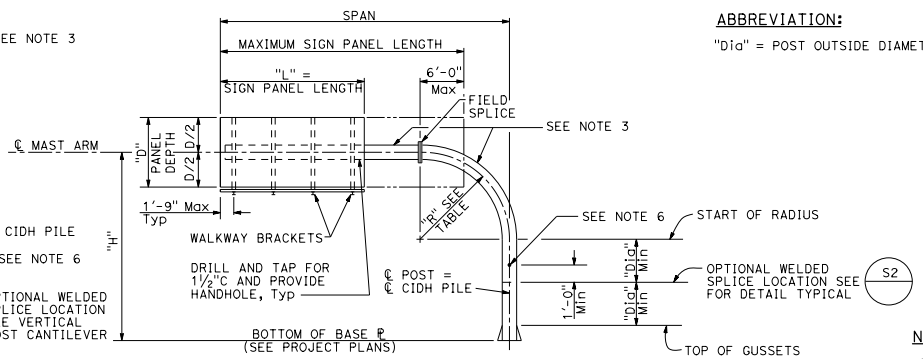
2018 STANDARD PLAN S30

1-29-18

Return to Table of Contents



SLANTED POST CANTILEVER



VERTICAL POST CANTILEVER

ABBREVIATION:

"Dia" = POST OUTSIDE DIAMETER

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — State of California

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

"D" PANEL DEPTH	"H" POST HEIGHT	POST TYPE No. FOR SPANS OF CANTILEVER																		
		38'-0" SPAN Col #	37'-0" SPAN Col #	36'-0" SPAN Col #	35'-0" SPAN Col #	34'-0" SPAN Col #	33'-0" SPAN Col #	32'-0" SPAN Col #	31'-0" SPAN Col #	30'-0" SPAN Col #	29'-0" SPAN Col #	28'-0" SPAN Col #	27'-0" SPAN Col #	26'-0" SPAN Col #	25'-0" SPAN Col #	24'-0" SPAN Col #	23'-0" SPAN Col #	22'-0" SPAN Col #	21'-0" SPAN Col #	20'-0" SPAN Col #
120"	29'-0"	VI	V	V	V	V	V	V	V	IV	IV	IV	IV	IV	III	III	III	III	II	II
	27'-0"	V	V	V	V	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II
	25'-0"	V	V	V	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II
	23'-0"	V	V	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II
	21'-0"	V	V	IV	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II
110"	29'-0"	V	V	V	V	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II
	27'-0"	V	V	V	IV	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II
	25'-0"	V	V	IV	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II
	23'-0"	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II
	21'-0"	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I
100"	29'-0"	V	V	V	V	V	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II
	27'-0"	V	V	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II
	25'-0"	IV	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II
	23'-0"	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I
	21'-0"	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I
90"	29'-0"	V	V	V	V	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II
	27'-0"	IV	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II
	25'-0"	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I
	23'-0"	IV	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I
	21'-0"	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I
80"	29'-0"	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II	I
	27'-0"	IV	IV	IV	IV	IV	IV	III	III	III	III	III	III	II	II	II	II	II	I	I
	25'-0"	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II	I	I	I
	23'-0"	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II	II	I	I	I
	21'-0"	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I
70"	29'-0"	IV	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II	II	I	I
	27'-0"	IV	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I
	25'-0"	IV	IV	IV	IV	III	III	III	III	III	II	II	II	II	II	II	I	I	I	I
	23'-0"	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I
	21'-0"	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I
60"	29'-0"	IV	IV	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I
	27'-0"	IV	IV	IV	IV	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I
	25'-0"	IV	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I
	23'-0"	IV	III	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I
	21'-0"	III	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I	I
50"	29'-0"	IV	III	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I
	27'-0"	IV	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I	I
	25'-0"	III	III	III	III	III	II	II	II	II	II	II	II	I	I	I	I	I	I	I
	23'-0"	III	III	III	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I
	21'-0"	III	III	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	I

NOTES:

1. The maximum sign panel overlap onto the post elbow shall not exceed 6'-0" from the field splice.
2. When several sign panels are to be installed with a space between the panels, the space shall be as small as possible and 2'-0" maximum.
3. All posts between base plate and field splice shall be as scheduled in table. All mast arms are standard pipe.
4. During sign erection the post shall be raked as necessary with the use of leveling nuts to level the sign panel.
5. At final position of post all top and bottom anchor bolt nuts shall be snug tighten against base plate.
6. Drill and tap for 1½"C chase nipple and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-15C.

POST TYPE No.	PIPE		"R" RADIUS
	NPS	THICKNESS	
I	20	½"	12'-0"
II	24	½"	
III	24	⅝"	
IV	30	½"	
V	30	⅝"	
VI	30	¾"	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

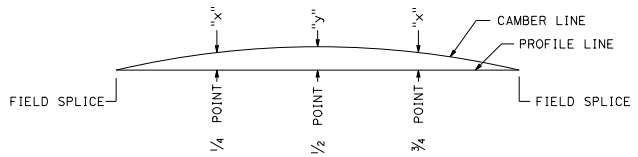
OVERHEAD SIGNS-TUBULAR SINGLE POST TYPE LAYOUT AND PIPE SELECTION

NO SCALE

S31

1-29-18

Return to Table of Contents



CAMBER DIAGRAM

ABBREVIATION:

R = Radius of 90° elbow

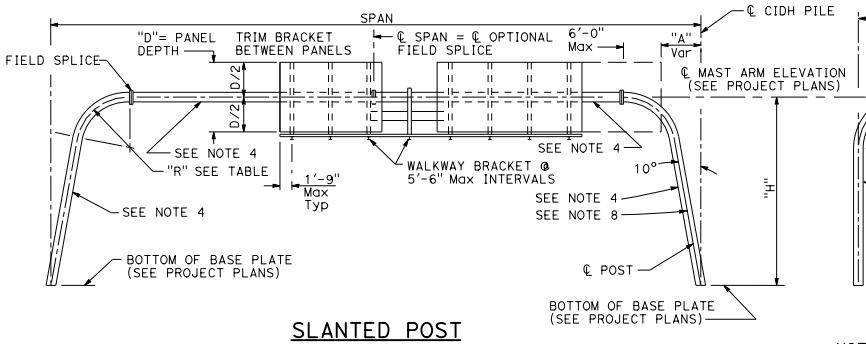
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

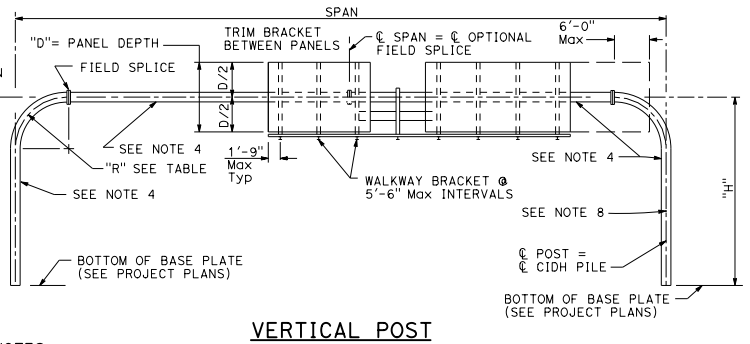
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SLANTED POST



VERTICAL POST

TABLE A

"D" PANEL DEPTH	"H" POST HEIGHT	POST TYPE No. FOR SPAN LENGTH BELOW									
		140'-0" TO 145'-0"	130'-0" TO 139'-0"	120'-0" TO 129'-0"	110'-0" TO 119'-0"	100'-0" TO 109'-0"	90'-0" TO 99'-0"	80'-0" TO 89'-0"	70'-0" TO 79'-0"	60'-0" TO 69'-0"	50'-0" TO 59'-0"
120"	29'-0"	VI	VI	VI	VI	V	V	IV	III	III	II
	27'-0"	VI	VI	VI	V	V	IV	IV	III	II	II
	25'-0"	VI	VI	V	V	IV	IV	III	III	II	II
	23'-0"	VI	V	V	IV	IV	IV	III	II	II	I
	21'-0"	V	V	IV	IV	IV	III	III	II	II	I
110"	29'-0"	VI	VI	VI	V	V	IV	IV	III	II	II
	27'-0"	VI	VI	V	V	IV	IV	III	III	II	II
	25'-0"	V	V	V	IV	IV	IV	III	II	II	I
	23'-0"	V	V	IV	IV	IV	III	III	II	II	I
	21'-0"	V	V	IV	IV	III	III	II	II	II	I
100"	29'-0"	VI	V	V	V	IV	IV	III	III	II	II
	27'-0"	V	V	V	IV	IV	IV	III	II	II	I
	25'-0"	V	V	IV	IV	IV	III	III	II	II	I
	23'-0"	V	IV	IV	IV	III	III	II	II	II	I
	21'-0"	V	IV	IV	III	III	II	II	II	I	I
90"	29'-0"	V	V	V	IV	IV	III	III	II	II	I
	27'-0"	V	V	IV	IV	IV	III	II	II	II	I
	25'-0"	IV	IV	IV	IV	III	III	II	II	I	I
	23'-0"	IV	IV	IV	III	III	II	II	II	I	I
	21'-0"	IV	IV	III	III	II	II	II	I	I	I
80"	29'-0"	V	IV	IV	IV	III	III	II	II	II	I
	27'-0"	IV	IV	IV	III	III	II	II	II	I	I
	25'-0"	IV	IV	IV	III	III	II	II	II	I	I
	23'-0"	IV	IV	III	III	II	II	II	I	I	I
	21'-0"	IV	III	III	II	II	II	I	I	I	I
70"	29'-0"	IV	IV	IV	III	III	II	II	II	I	I
	27'-0"	IV	IV	III	III	II	II	II	I	I	I
	25'-0"	III	III	III	II	II	II	II	I	I	I
	23'-0"	III	III	II	II	II	II	I	I	I	I
	21'-0"	III	III	II	II	II	I	I	I	I	I

NOTES:

1. The maximum sign panel overlap onto elbow shall not exceed 6'-0" from the field splice.
2. When several sign panels are to be installed with spaces between panels, the total sign panel length is the sum of individual sign panel lengths only.
3. For spans ranging from 50'-0" to 145'-0", maximum sign panel coverage is as follows:

   a) For slanted post type: Span - "A" on both sides from ℄ of CIDH Pile.

   b) For vertical post type: Span - 6'-0" on both sides from ℄ of CIDH Pile.
4. All posts between base plate and field plate splice shall be as scheduled in table. All mast arms are standard pipe.
5. Before any portion of sign frame is assembled in its final position, the Contractor shall demonstrate to the Engineer by preassembly or other approved methods that the span length of the frame, with no load condition, is within ±½" of field measured span length between foundations.
6. If sign frames are erected as one unit, they shall be adequately suspended to avoid distortions or changes in span lengths between base plates.
7. At final position of post, all top and bottom anchor bolt nuts shall be snug tighten against base plate.
8. Drill and tap for 1½"C chase nipple and plug with recessed pipe plugs. Place perpendicular to sign panel axis and away from approaching traffic. See Standard Plan ES-15C.
9. Maximum difference between post heights on an individual frame = 5'-0".
10. For standard pipe members (mast arms) with lengths greater than 78'-9", an optional field splice will be permitted at the centerline of span to facilitate hauling operations.
11. For location of optional welded splice in post, see Standard Plan S31.

TABLE B

POST TYPE No.	PIPE		"R" RADIUS
	NPS	THICKNESS	
I	20	½"	12'-0"
II	24	½"	
III	24	⅝"	
IV	30	½"	
V	30	⅝"	
VI	30	¾"	

TABLE C

CAMBER			
POST TYPE No.	SPAN LENGTH	X	Y
II	50'-0" TO 119'-0"	2¼"	3½"
II	120'-0" TO 145'-0"	3¾"	5"
III	50'-0" TO 119'-0"	2¼"	3½"
III	120'-0" TO 145'-0"	3¾"	5"
IV	50'-0" TO 119'-0"	2¼"	3½"
IV	120'-0" TO 145'-0"	3¾"	5"
V	50'-0" TO 119'-0"	2¼"	3½"
V	120'-0" TO 145'-0"	3¾"	5"
VI	50'-0" TO 119'-0"	2¼"	3½"
VI	120'-0" TO 145'-0"	3¾"	5"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR TWO POST TYPE LAYOUT AND PIPE SELECTION

NO SCALE

S32

1-29-18

Return to Table of Contents

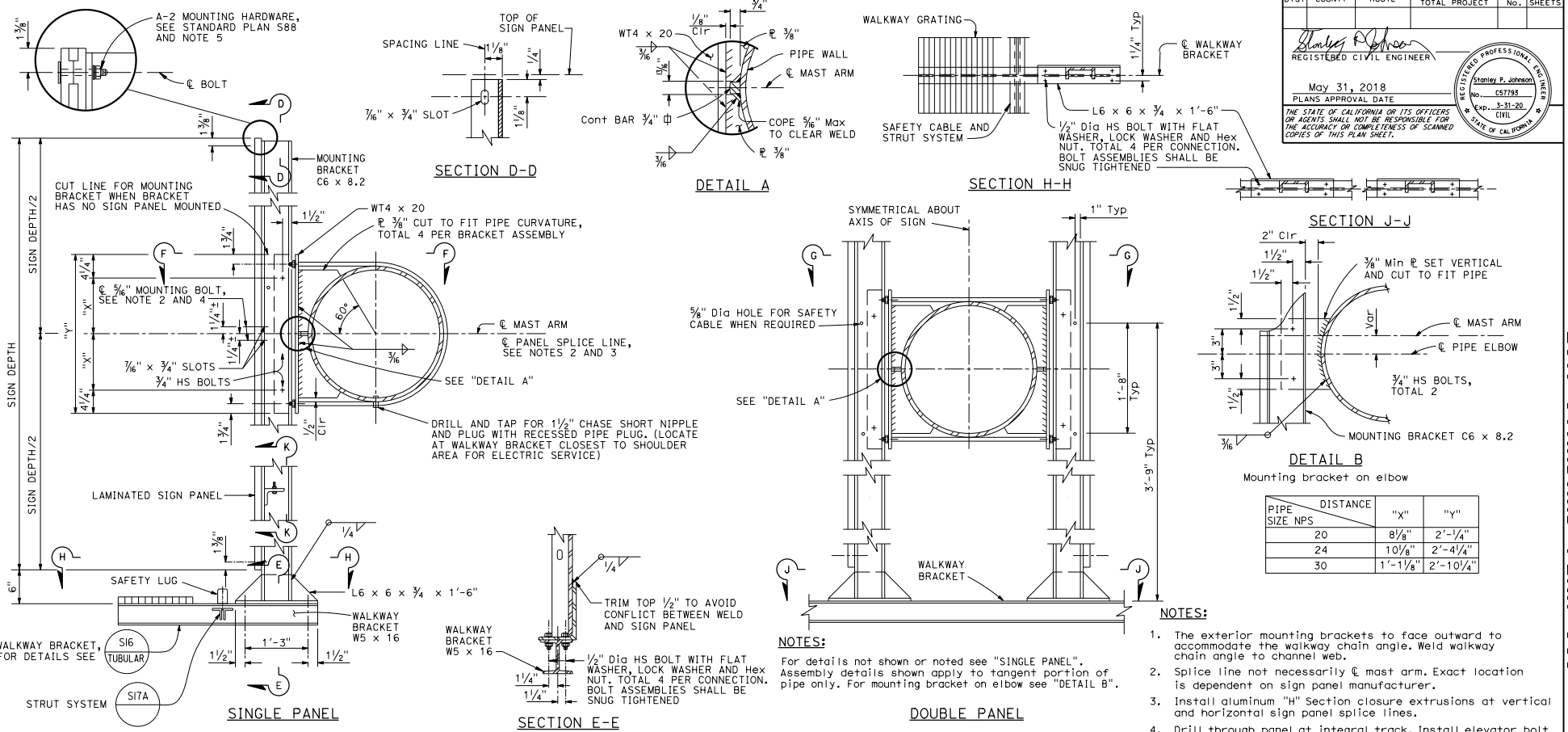
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PIPE SIZE NPS \ DISTANCE	"X"	"Y"
20	8⅛"	2'-¼"
24	10⅛"	2'-4¼"
30	1'-1⅛"	2'-10¼"

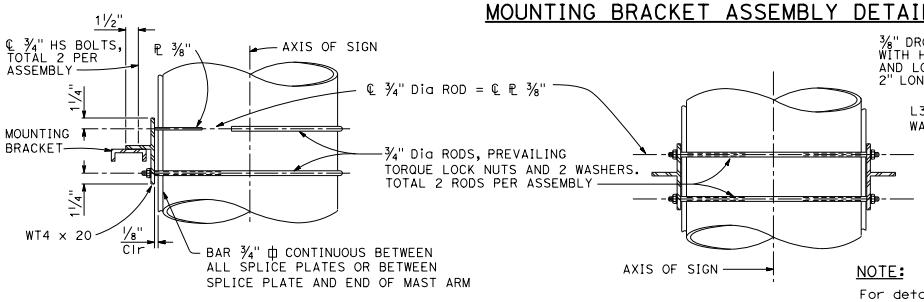
NOTES:

For details not shown or noted see "SINGLE PANEL". Assembly details shown apply to tangent portion of pipe only. For mounting bracket on elbow see "DETAIL B".

NOTES:

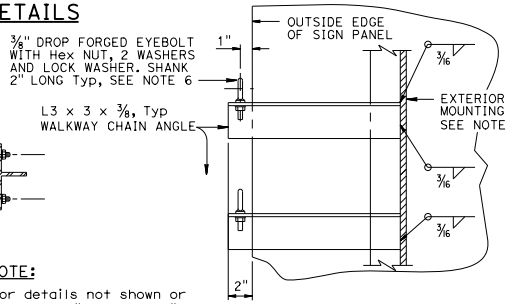
1. The exterior mounting brackets to face outward to accommodate the walkway chain angle. Weld walkway chain angle to channel web.
2. Splice line not necessarily ℄ mast arm. Exact location is dependent on sign panel manufacturer.
3. Install aluminum "H" Section closure extrusions at vertical and horizontal sign panel splice lines.
4. Drill through panel at integral track. Install elevator bolt with interstate green reflective tape. Typical at panel splice.
5. Drill through panel at integral track. Install Type A-2 mounting hardware and attach reflective tape. Typical at border.
6. For walkway chain details, see Standard Plan S18.

MOUNTING BRACKET ASSEMBLY DETAILS



NOTE:

For details not shown or noted see "SECTION F-F".



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR STRUCTURAL FRAME DETAILS No. 1

NO SCALE

S33

1-29-18

Return to Table of Contents

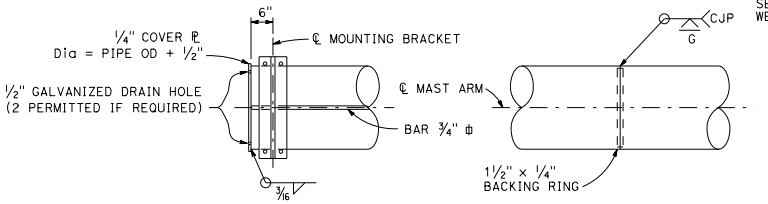
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

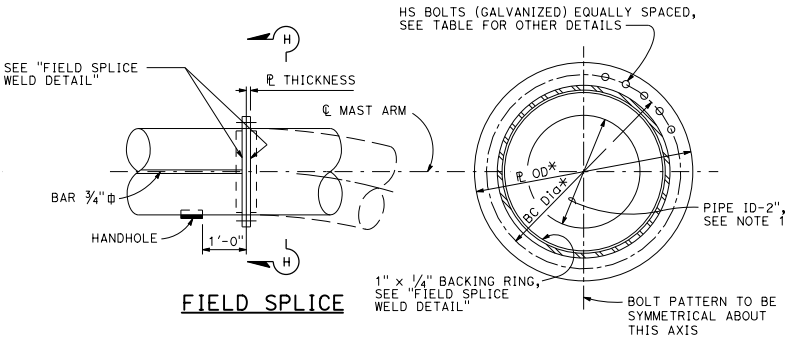
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



MAST ARM END DETAIL
(For "Single Post Type" only)

SHOP SPLICE

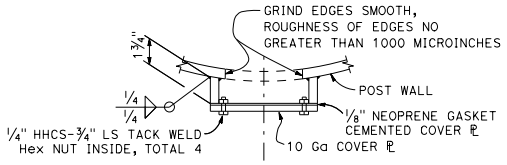


FIELD SPLICE

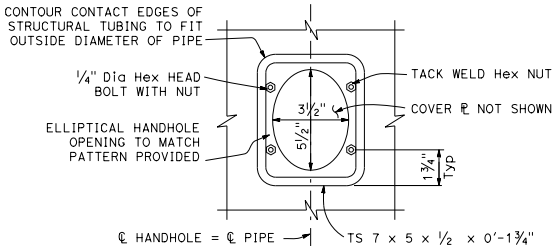
SECTION H-H

ABBREVIATIONS:

BC = Bolt Circle
ID = Inside Diameter of Post Pipe

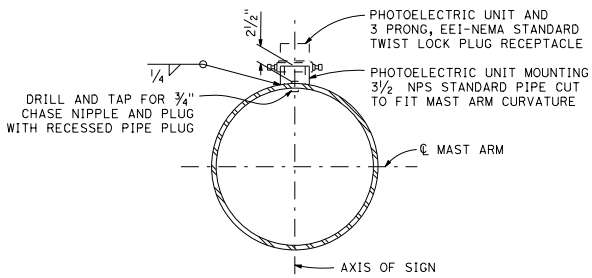


PLAN



ELEVATION

DETAILS OF LOWER HANDHOLE & COVER

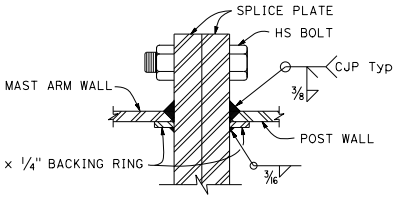


PHOTOELECTRIC UNIT DETAILS
(See "Layout" sheet for location when required)

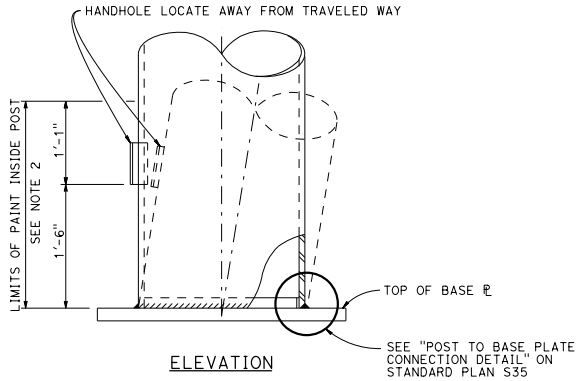
FIELD SPLICE TABLE

PIPE SIZE (NPS)	℄ OD *	℄ THICKNESS	BC Dia *	No. OF HS BOLTS AND BOLT Dia
20	2'-3"	1 3/8"	2'-0"	22-1"
24	2'-7"	1 1/2"	2'-6"	26-1"
30	3'-1"	1 5/8"	2'-10"	34-1"

NOTE:
Design based on capacity of standard pipe.



FIELD SPLICE
WELD DETAIL



ELEVATION

POST BASE
(For base ℄ details, see Standard Plan S35)

NOTES:

1. Place single thin bead of silicone caulking compound around hole before bolting. Caulking not to interfere with friction between plates in bolted area.
2. Prime and paint post interior from base ℄ to 6" above lower handhole unless post is galvanized.
3. Field splice diameters marked "*" may be increased 2" to facilitate bolting.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

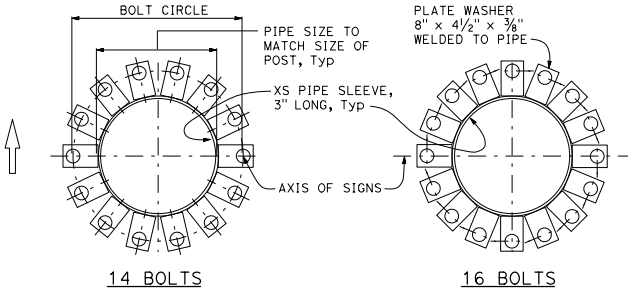
OVERHEAD SIGNS-TUBULAR STRUCTURAL FRAME DETAILS No. 2

NO SCALE

S34

1-29-18

Return to Table of Contents



ANCHOR BOLT TEMPLATE

Template to match base plate anchor bolt pattern
(Option: Template similar to ring plate type can be used in lieu of plate washer type).

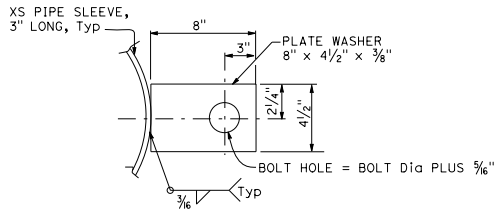
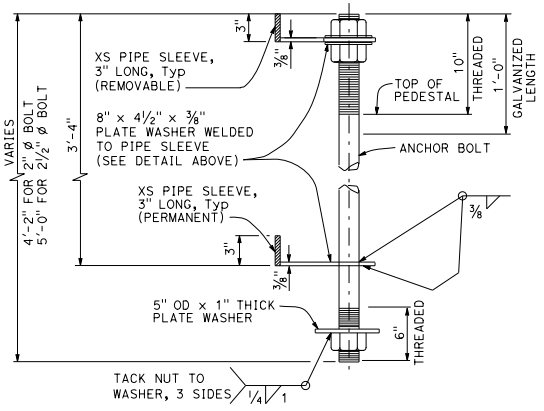


PLATE WASHER DETAIL FOR 14 AND 16 BOLT TEMPLATE PATTERN

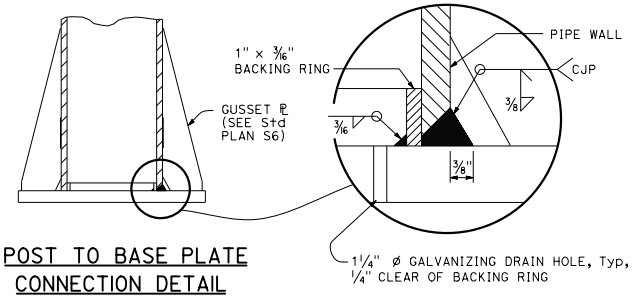


ANCHOR BOLT TEMPLATE ASSEMBLY PLATE WASHER TYPE

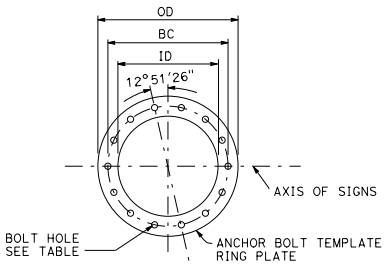
NOTE: One bolt shown only. Other bolts same configuration around pipe sleeve.

SINGLE POST AND TWO POST TUBULAR

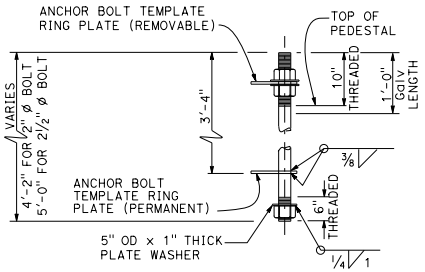
POST TYPE	PIPE		BASE ℄ OD AND THICKNESS	ANCHOR BOLTS	
	NPS	THICKNESS		BOLT CIRCLE Dia	BOLT TOTALS AND Dia OF BOLT
I	20	½"	3'-1" x 2½"	2'-6"	14-2"
II	24	½"	3'-6" x 2½"	2'-10"	14-2½"
III	24	⅝"	3'-6" x 2½"	2'-10"	14-2½"
IV	30	½"	4'-0" x 2½"	3'-4"	16-2½"
V	30	⅝"	4'-0" x 2½"	3'-4"	16-2½"
VI	30	¾"	4'-0" x 3"	3'-4"	16-2½"



POST TO BASE PLATE CONNECTION DETAIL



14 BOLTS
Type I shown



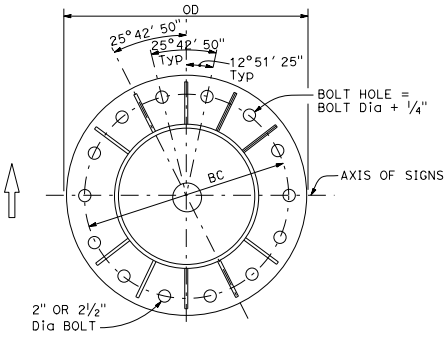
ANCHOR BOLT TEMPLATE RING PLATE TYPE

NOTE: One bolt shown only. Other bolts same configuration around ring plate.

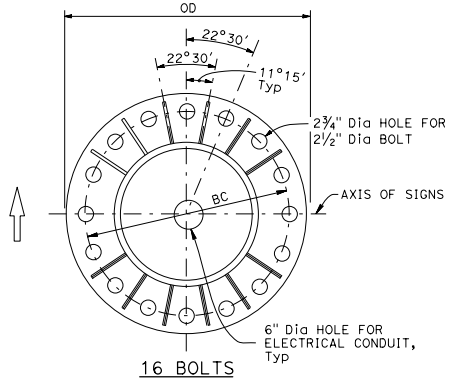
ABBREVIATION:
BC = Bolt Circle Diameter

TEMPLATE DIMENSIONS

TYPE DIMENSIONS	POST TYPE No.		
	I	II TO III	IV TO VI
OD	2'-9"	3'-2"	3'-10"
ID	2'-3"	2'-6"	2'-10"
BC	2'-6"	2'-10"	3'-4"
HOLE Dia	2⅛" Max	2⅝" Max	2⅝" Max
PERMANENT TEMPLATE THICKNESS	⅝"	¾"	¾"
TEMPORARY TEMPLATE THICKNESS	½"	½"	1½"



14 BOLTS



16 BOLTS

BASE PLATE DETAILS SINGLE AND TWO POST TYPE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR SINGLE AND TWO POST TYPE BASE PLATE AND ANCHORAGE DETAILS

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

S35

1-29-18

Return to Table of Contents

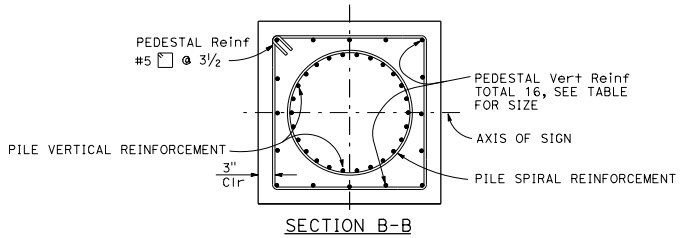
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

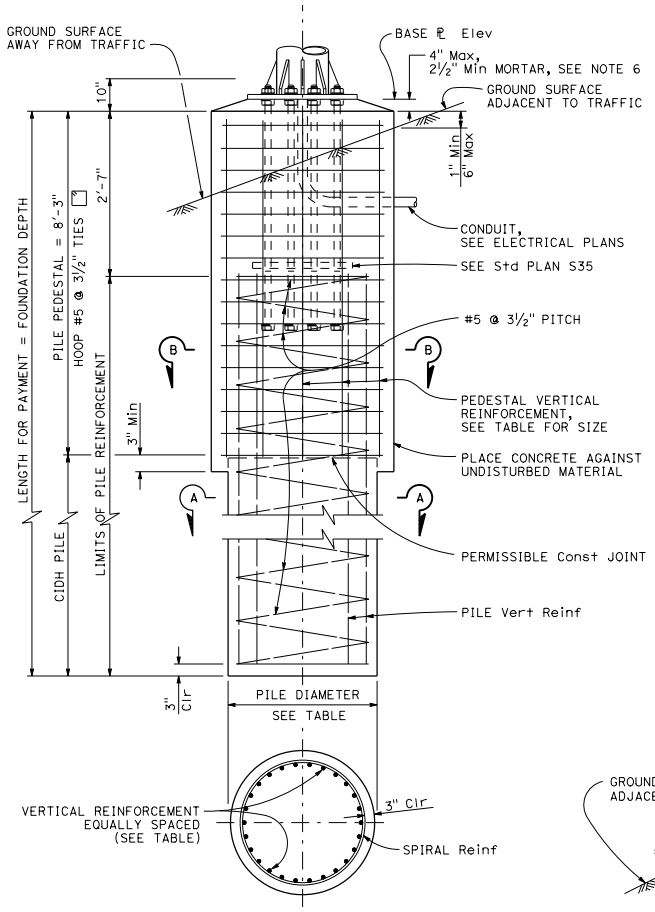
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



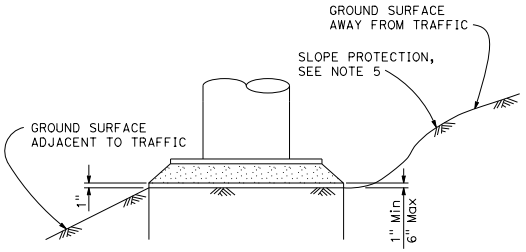
SECTION B-B



SECTION A-A

POST TYPE No.	ANCHOR BOLTS			SQUARE PILE PEDESTAL						CIDH PILE					FOUNDATION DEPTH * *
	BOLT CIRCLE Dia	BOLT TOTAL AND Dia	TOTAL LENGTH	PEDESTAL SQUARE ONE SIDE	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	# OF BARS EACH FACE	HOOP BAR SIZE	HOOP SPACING	PILE Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	
I	2'-6"	14-2"	4'-2"	5'-6"	16	#11	5	#5	3½"	5'-0"	28	#11	#5	3½"	25'-0"
II	2'-10"	14-2½"	5'-0"												25'-0"
III	2'-10"	14-2½"													25'-0"
IV	3'-4"	16-2½"													33'-0"
V	3'-4"	16-2½"													33'-0"
VI	3'-4"	16-2½"													33'-0"

* * Use Foundation Depth shown in table unless otherwise shown on the Project Plans.



DETAIL C

NOTES:

1. For anchor bolt layout, see Standard Plan S35.
2. For "Base ℄ elevation", see Project Plans.
3. Before erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
4. Pedestal shall be formed 6" minimum below ground surface. Remainder to be placed against undisturbed material.
5. Slope protection required when indicated on the Project Plans.
6. For drain holes and central void in mortar, see Standard Plan ES-6B detail N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR SINGLE POST AND TWO POST TYPE SQUARE PEDESTAL PILE FOUNDATION

NO SCALE

S36

1-29-18

Return to Table of Contents

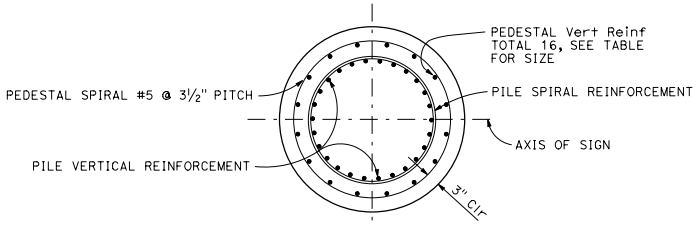
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

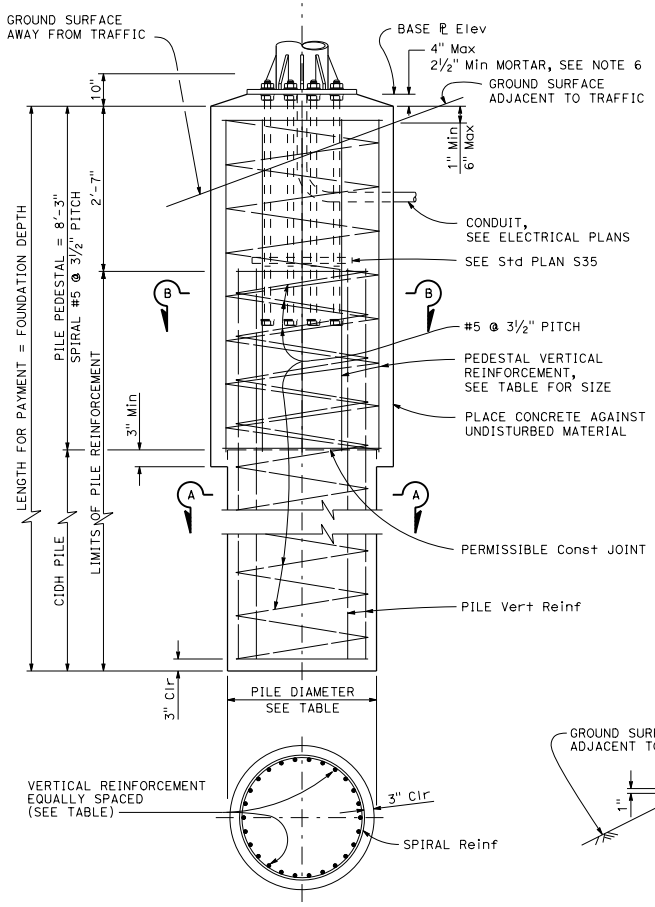
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



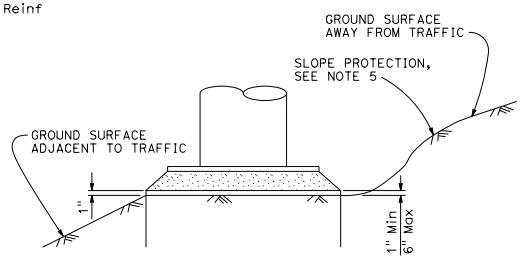
SECTION B-B



SECTION A-A

POST TYPE No.	ANCHOR BOLTS			ROUND PILE PEDESTAL					CIDH PILE					FOUNDATION DEPTH * *
	BOLT CIRCLE Dia	BOLT TOTAL AND Dia	TOTAL LENGTH	Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	PILE Dia	VERTICAL REINFORCING TOTAL	VERTICAL REINFORCING BAR SIZE	SPIRAL BAR SIZE	SPIRAL PITCH	
I	2'-6"	14-2"	4'-2"	5'-6"	16	#11	#5	3½"	5'-0"	28	#11	#5	3½"	25'-0"
II	2'-10"	14-2½"	5'-0"											25'-0"
III	2'-10"	14-2½"												25'-0"
IV	3'-4"	16-2½"												33'-0"
V	3'-4"	16-2½"												33'-0"
VI	3'-4"	16-2½"												33'-0"

* * Use Foundation Depth shown in table unless otherwise shown on the Project Plans.



DETAIL C

NOTES:

1. For anchor bolt layout, see Standard Plan S35.
2. For "Base ℄ elevation", see Project Plans.
3. Before erection of the post, backfill which is equivalent to the surrounding material, shall be in place.
4. Pedestal shall be formed 6" minimum below ground surface. Remainder to be placed against undisturbed material.
5. Slope protection required when indicated on the Project Plans.
6. For drain holes and central void in mortar, see Standard Plan ES-6B detail N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-TUBULAR SINGLE POST AND TWO POST TYPE ROUND PEDESTAL PILE FOUNDATION

NO SCALE

S37

1-29-18

Return to Table of Contents

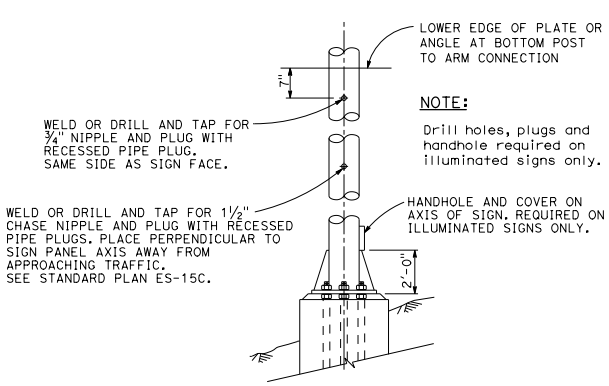
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

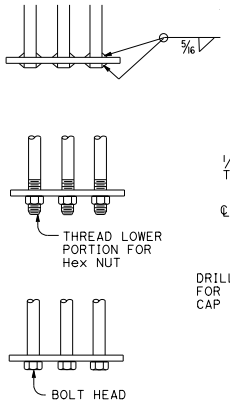
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



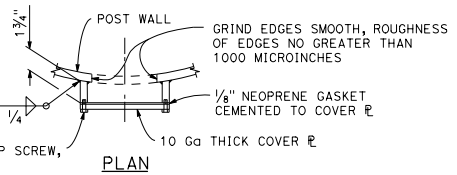
NOTE:

Drill holes, plugs and handhole required on illuminated signs only.

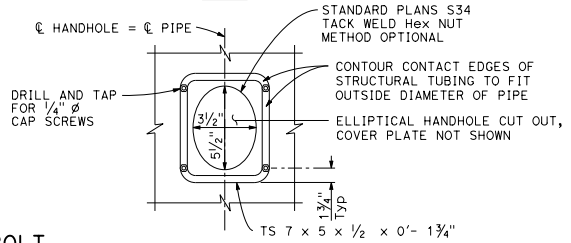
ELEVATION



ALTERNATIVE ANCHOR BOLT BAR CONNECTIONS



PLAN



ELEVATION

TYPICAL DETAILS OF HANDHOLE AND COVER

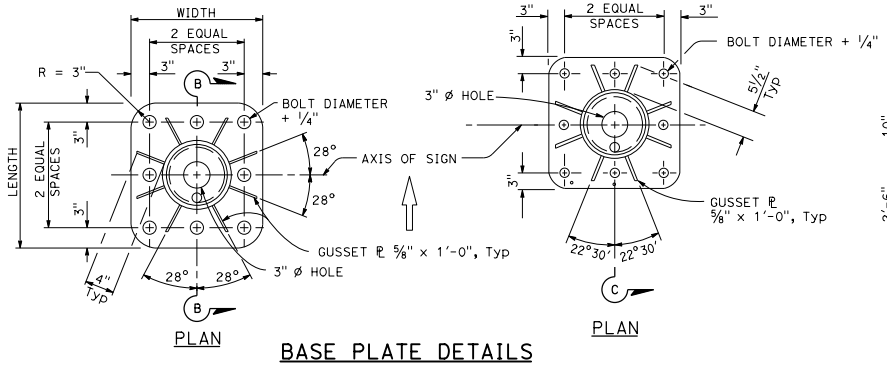
GENERAL NOTES:

DESIGN: 70 mph (fastest mile)

WELDING: All welding continuous unless otherwise noted on the plans. All welding to be done in accordance with the Standard Specifications.

NOTES:

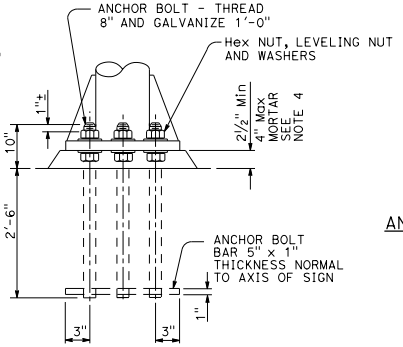
1. Footing shall be placed with long dimensions normal to axis of sign.
2. On single post signs the post shall be raked out of plumb with the use of leveling nuts to make the bottom of the sign panel level.
3. 2½" ø anchor bolts may be substituted for 2¼" ø bolts.
4. For drain holes and central void in mortar, see Standard Plan ES-6B detail N.



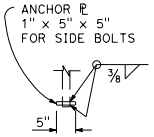
PLAN

PLAN

BASE PLATE DETAILS



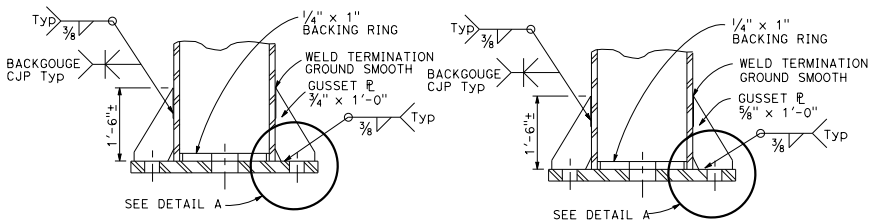
ANCHORAGE BOLT



ANCHORAGE SIDE BOLT
(Axis of Sign)

POST		BASE PLATE	ANCHOR BOLTS	
NPS	"t"		#	BOLT ø
6	9/32"	2" x 1'-9" x 1'-9"	8	2"
6	7/16"			
8	5/16"			
8	½"			
10		2" x 2'-4" x 2'-4"		2¼"
12				
14				
14	¾"			

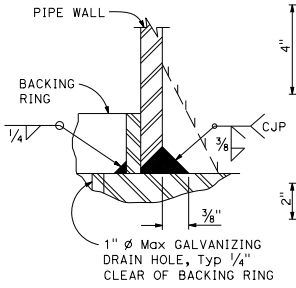
"t" = Wall Thickness



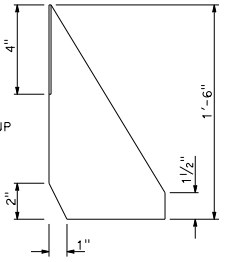
SECTION B-B
6 NPS THRU 8 NPS POSTS

SECTION C-C
10 NPS THRU 14 NPS POSTS

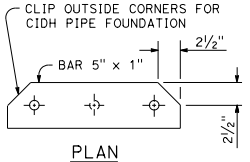
POST TO BASE PLATE CONNECTION DETAILS



DETAIL A



GUSSET DETAIL



PLAN

ANCHOR BOLT BAR DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-LIGHTWEIGHT POST DETAILS

NO SCALE

S48

1-29-18

Return to Table of Contents

POST		PILE FOUNDATION				SPREAD FOOTING				
NPS	"t"	PEDESTAL	PILE Dia	PILE DEPTH	VERTICAL Reinf	PEDESTAL	FOOTING WIDTH x LENGTH	REINFORCEMENT TOP	BOTTOM	L BAR
6	9/32"	2'-10" x 2'-10"	30"	10'-0"	#6	2'-6" x 2'-6"	4'-0" x 6'-0"	#5	#5	#5
6	7/16"			10'-0"	#6		4'-0" x 7'-0"			
8	5/16"			10'-0"	#6		5'-0" x 8'-0"			
8	1/2"			11'-0"	#7		6'-0" x 9'-0"			
10		3'-4" x 3'-4"	36"	13'-0"	#8	3'-0" x 3'-0"	7'-0" x 10'-0"		#8	#8
12				15'-0"	#10		7'-0" x 12'-0"	#6	#8	
14				15'-0"	#10		7'-0" x 13'-0"	#8	#9	
14	3/4"			16'-0"	#10		8'-0" x 14'-0"	#8	#9	

"t" = WALL THICKNESS

NOTES:

1. Backfill shall be in place before erection of post.
2. Slope protection required when indicated on the plans.
3. Pile pedestal shall be formed 6" minimum below ground surface. Remainder to be placed against undisturbed material.

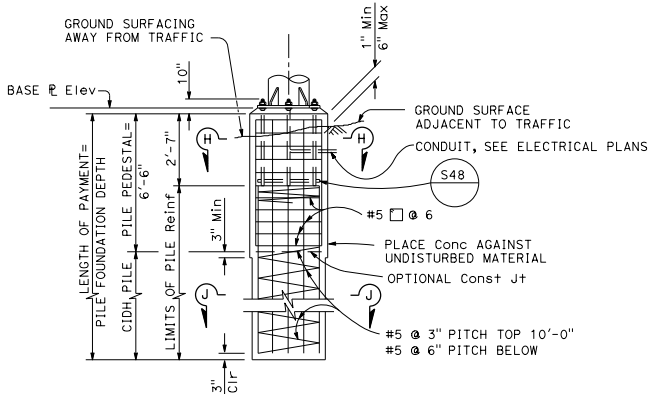
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

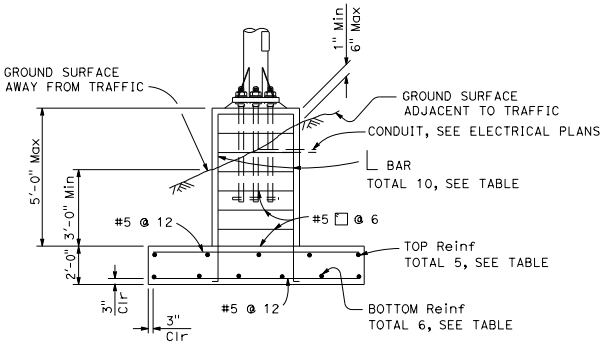
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

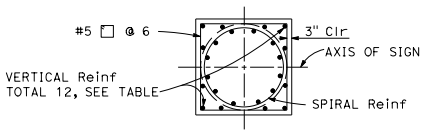
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



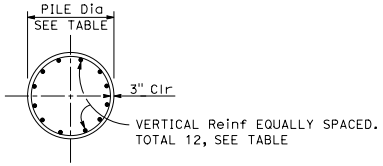
ELEVATION



ELEVATION

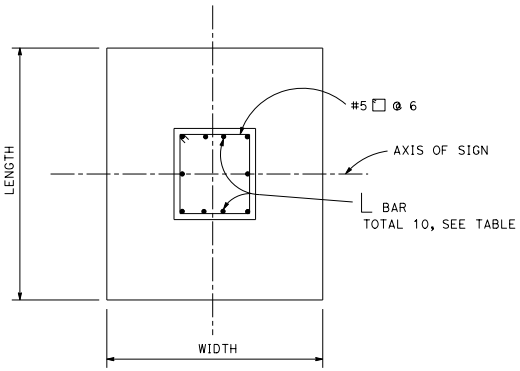


SECTION H-H



SECTION J-J
6 NPS THRU 14 NPS POSTS

PILE FOUNDATION



PLAN

SPREAD FOOTING

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-LIGHTWEIGHT FOUNDATION DETAILS

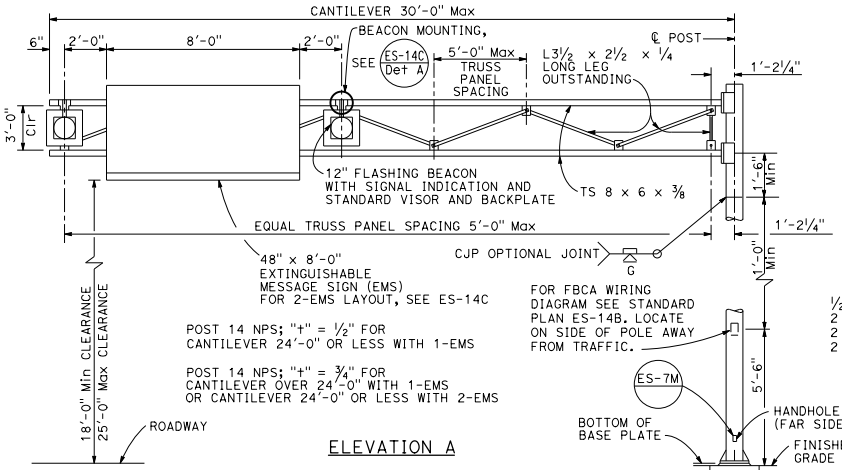
NO SCALE

S49

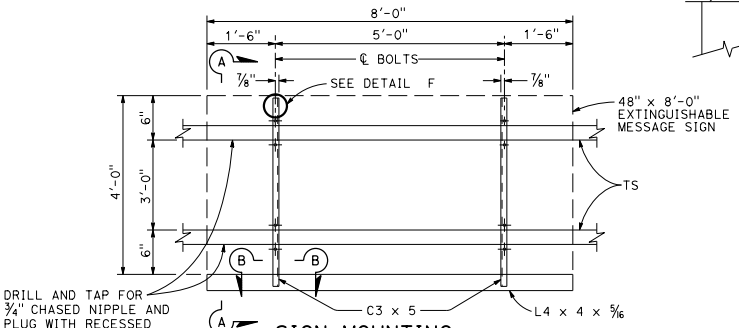
2018 STANDARD PLAN S49

1-29-18

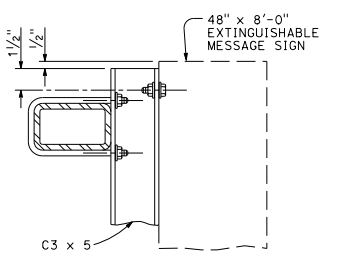
Return to Table of Contents

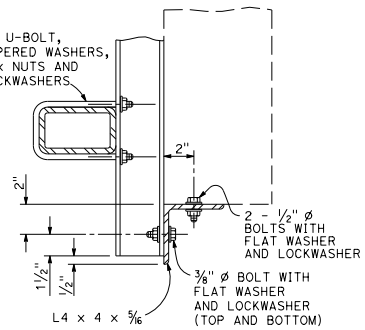


ELEVATION A

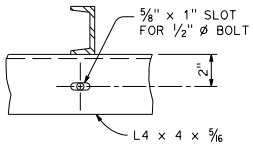


SIGN MOUNTING
DETAIL H

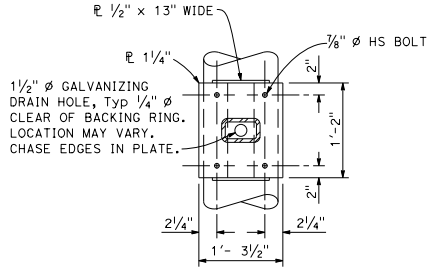




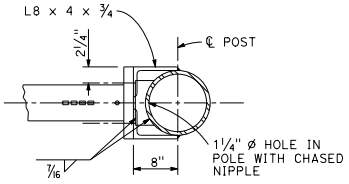
SECTION A-A



SECTION B-B

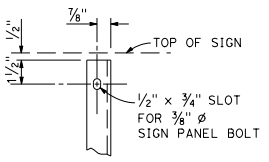


SECTION C-C

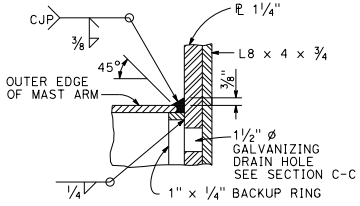


SECTION D-D

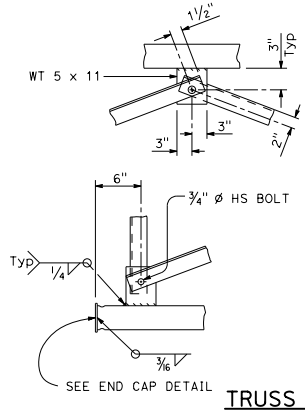
Steel not shown for clarity

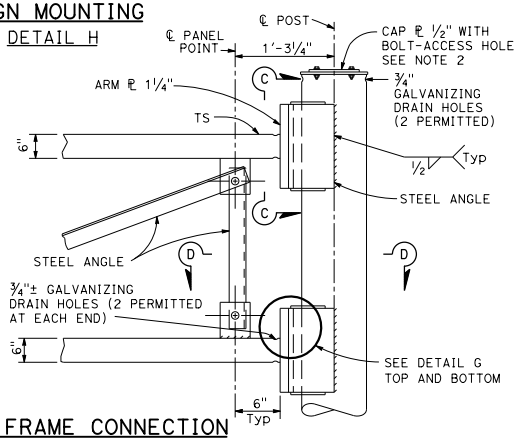


DETAIL F

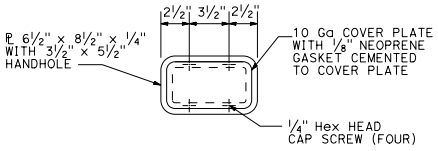


DETAIL G





TRUSS FRAME CONNECTION
DETAIL I



END CAP
DETAIL D

NOTES:

1. For sign structure dimensions, see Project Plans.
2. For Bolt-Access Hole Details, see Standard Plan S13

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGNS-LIGHTWEIGHT EXTINGUISHABLE MESSAGE SIGN AND FLASHING BEACONS

NO SCALE

S50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

1-29-18

Return to Table of Contents

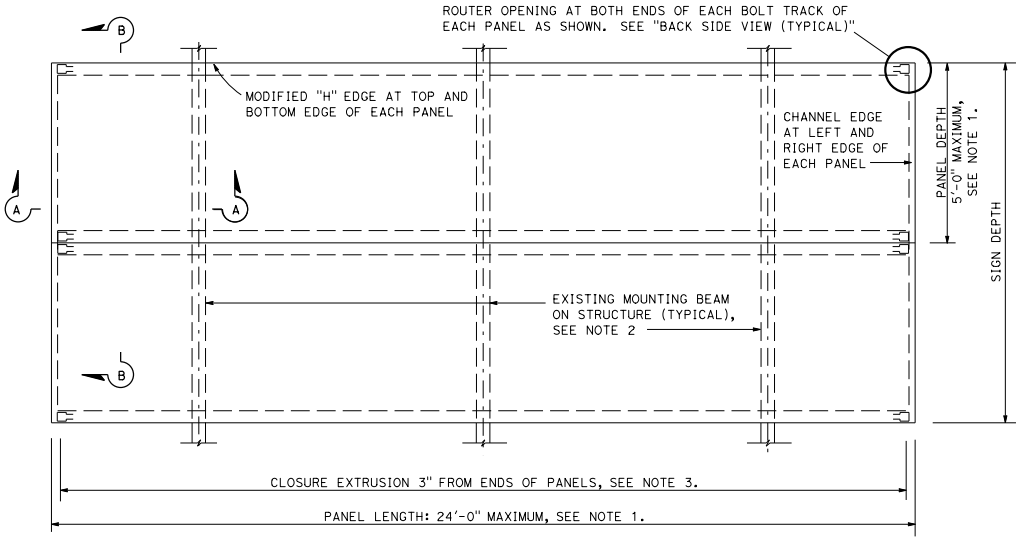
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

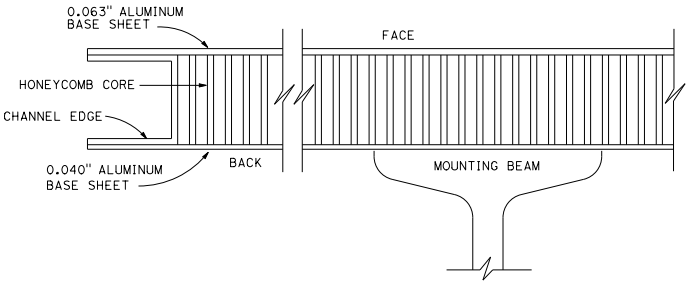
REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

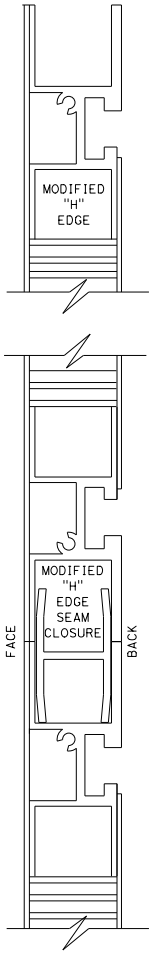


FACE VIEW OF LAMINATED PANEL

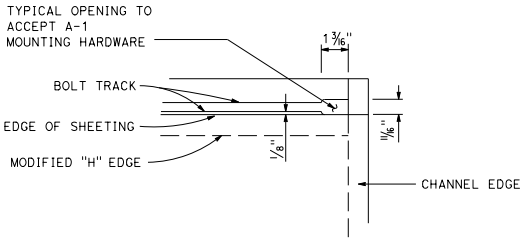
Two panels shown, see Note 7



SECTION A-A



SECTION B-B



BACK SIDE VIEW (TYPICAL)

NOTES:

1. Panel length shall be graduated in increments of 1'-0". Panel depth shall be 1'-8" to 5'-0", graduated in increments of 10".
2. Unless otherwise shown on the plans, refer to applicable Standard Plan for location of structure supports and mounting details.
3. For multiple panel signs, see Standard Plan S85 for seam closure extrusion quantities.
4. See Standard Plan S86 for extrusion details.
5. See Standard Plan S87 for A-1 and Standard Plan S88 for A-2 mounting hardware.
6. All horizontal extrusions shall be continuous.
7. Place three 1/8" Ø weep holes in bottom of each panel. One hole in the center and one hole 3" from each end.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD LAMINATED SIGN SINGLE OR MULTIPLE PANEL (TYPE A, 1" THICK)

NO SCALE

S81

2018 STANDARD PLAN S81

1-29-18

Return to Table of Contents

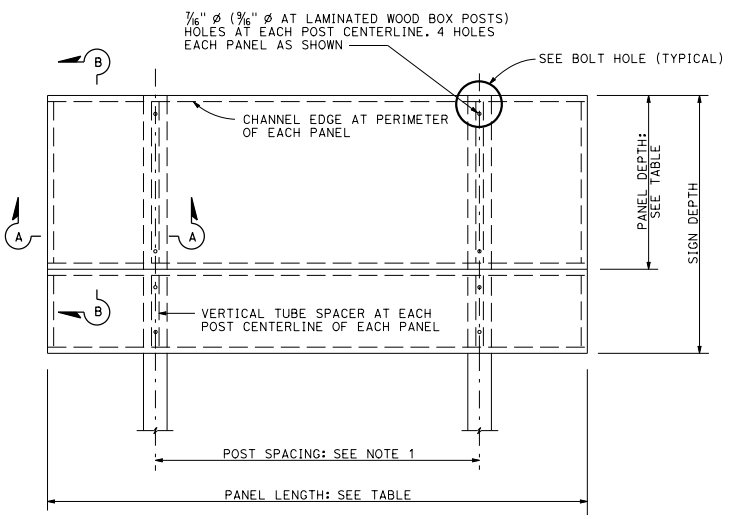
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

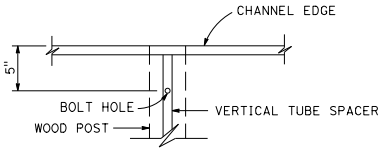
REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FACE VIEW OF LAMINATED PANEL

Two panels shown, see Note 6

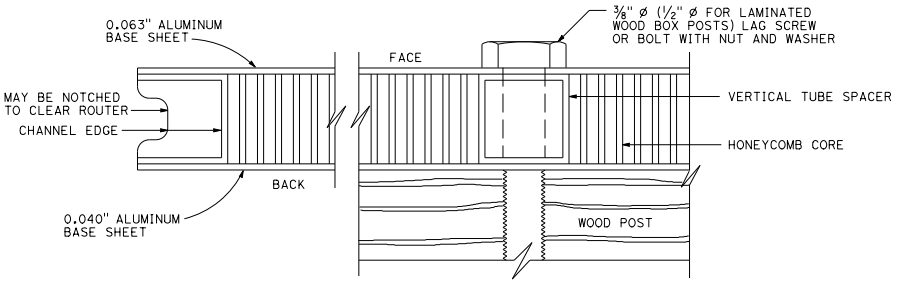


BOLT HOLE (TYPICAL)

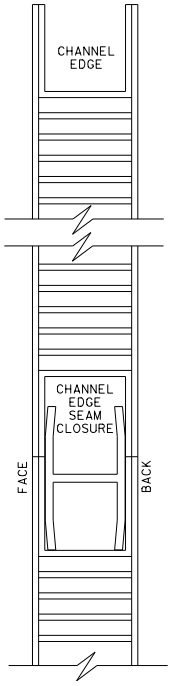
TABLE

TYPE B PANEL 1" THICK	
DEPTH	LENGTH
5'-0"	4'-6" TO 15'-0"
4'-6"	4'-6" TO 15'-0"
4'-0"	4'-6" TO 15'-0"
3'-6"	4'-6" TO 15'-0"
3'-0"	4'-6" TO 15'-0"
2'-6"	4'-6" TO 15'-0"
2'-0"	4'-6" TO 15'-0"
1'-6"	4'-6" TO 15'-0"

See Note 4



SECTION A-A



SECTION B-B

NOTES:

1. See Standard Plan S85 for post spacing table.
2. See Standard Plan S86 for extrusion details.
3. All horizontal extrusions shall be continuous.
4. Depth and length of panel shall be graduated in increments of 6".
5. For multiple panel signs, see Standard Plan S85 for seam closure extrusion quantities.
6. Place three 1/8" ø weep holes in bottom of each panel. One hole in the center and one hole 3" from each end.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE LAMINATED SIGN SINGLE OR MULTIPLE PANEL (TYPE B, 1" THICK)

NO SCALE

S82

2018 STANDARD PLAN S82

1-29-18

Return to Table of Contents

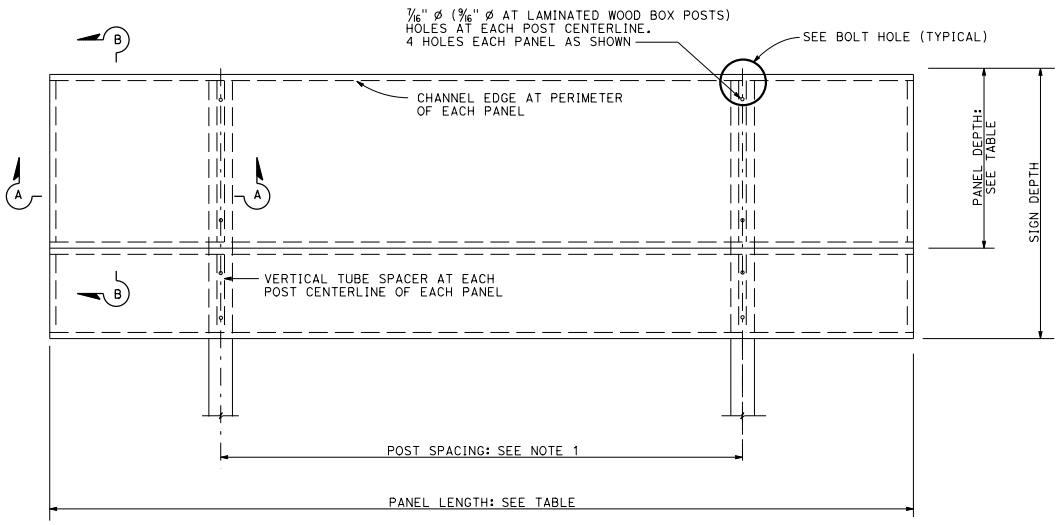
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

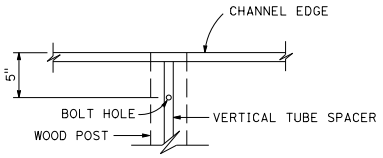
REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FACE VIEW OF LAMINATED PANEL

Two panels shown, see Note 6

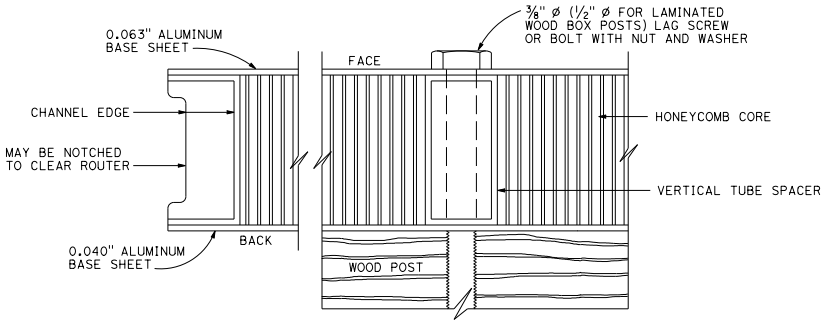


BOLT HOLE (TYPICAL)

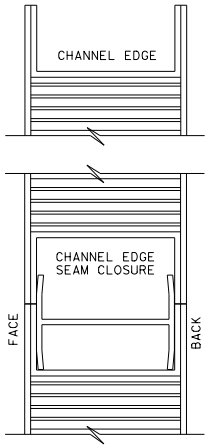
TABLE

TYPE B PANEL 2½" THICK	
DEPTH	LENGTH
5'-0"	15'-6" TO 16'-6"
4'-6"	15'-6" TO 18'-6"
4'-0"	15'-6" TO 20'-6"
3'-6"	15'-6" TO 23'-6"
3'-0"	15'-6" TO 24'-0"
2'-6"	15'-6" TO 24'-0"
2'-0"	15'-6" TO 24'-0"
1'-6"	15'-6" TO 24'-0"

See Note 4



SECTION A-A



SECTION B-B

NOTES:

1. See Standard Plan S85 for post spacing table.
2. See Standard Plan S86 for extrusion details.
3. All horizontal extrusions shall be continuous.
4. Depth and length of panel shall be graduated in increments of 6".
5. For multiple panel signs, see Standard Plan S85 for seam closure extrusion quantities.
6. Place three 1/8" ø weep holes in bottom of each panel. One hole in the center and one hole 3" from each end.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE LAMINATED SIGN SINGLE OR MULTIPLE PANEL (TYPE B, 2½" THICK)

NO SCALE

S83

1-29-18

2018 STANDARD PLAN S83

Return to Table of Contents

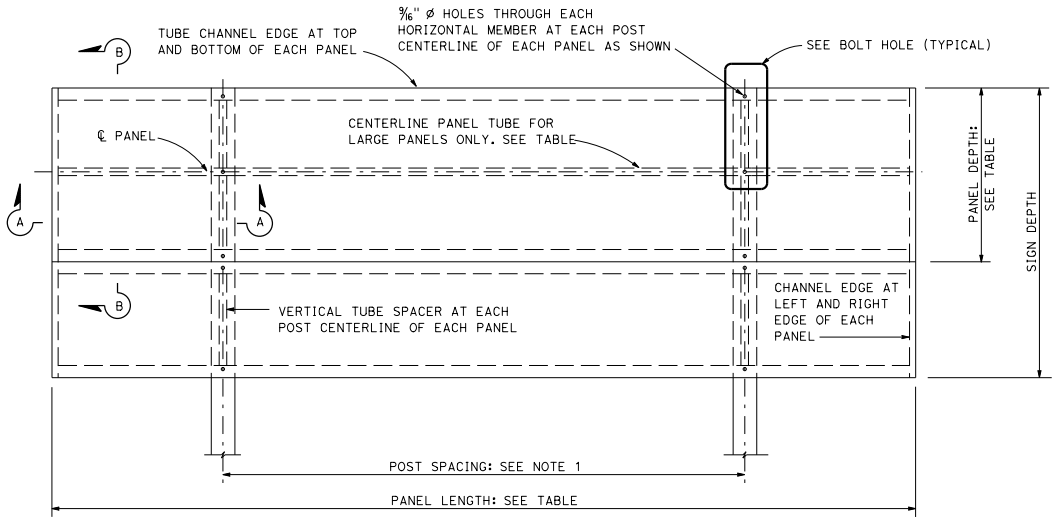
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

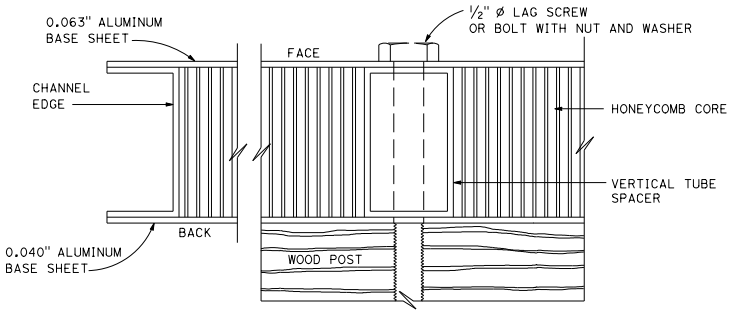
REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

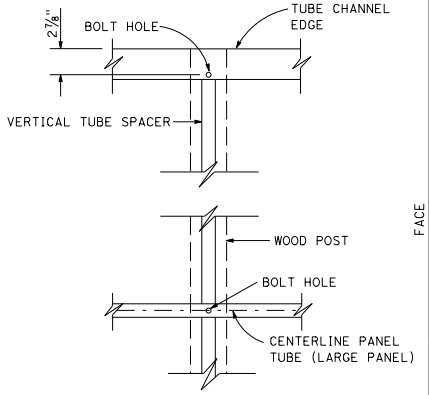


FACE VIEW OF LAMINATED PANEL

Two panels shown, see Note 7

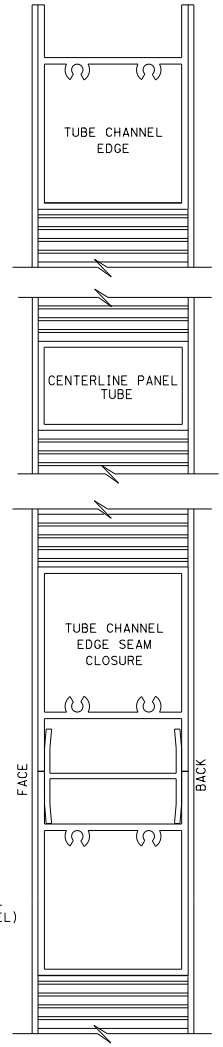


SECTION A-A



BOLT HOLE (TYPICAL)

Large panel shown



SECTION B-B

TABLE A

PANEL DEPTH	PANEL LENGTH
5'-0"	17'-0" TO 24'-0"
4'-6"	19'-0" TO 24'-0"
4'-0"	21'-0" TO 24'-0"
3'-6"	24'-0"

See Notes 4 and 6.

NOTES:

1. See Standard Plan S85 for post spacing table.
2. See Standard Plan S86 for extrusion details.
3. All horizontal extrusions shall be continuous.
4. Depth and length of panel shall be graduated in increments of 6".
5. For multiple panel signs, see Standard Plan S85 for seam closure extrusion quantities.
6. Panels with the dimensions shown in Table A are designated as large panels.
7. Place three 1/8" Ø weep holes in bottom of each panel. One hole in the center and one hole 3" from each end.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE LAMINATED SIGN SINGLE OR MULTIPLE PANEL (TYPE H, 2½" THICK)

NO SCALE

S84

2018 STANDARD PLAN S84

1-29-18

Return to Table of Contents

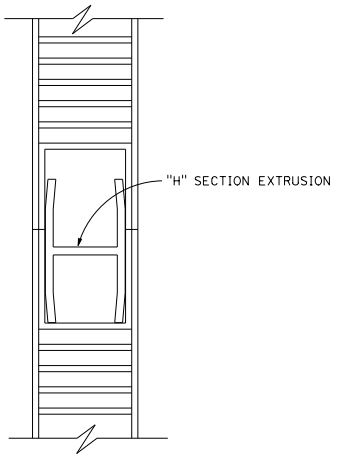
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

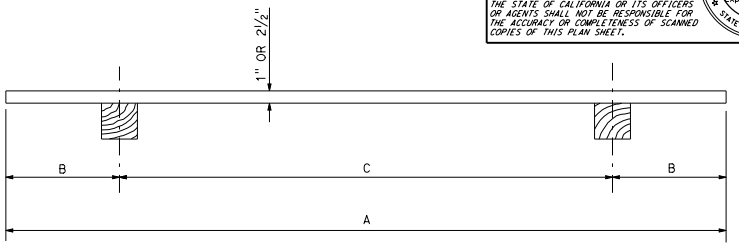


TYPICAL SEAM CLOSURE DETAIL

PANEL LENGTH	CLOSURE LENGTH	NUMBER OF PIECES & LENGTH REQUIRED
3'-6"	3'-0"	One 3'-0"
4'-0"	3'-6"	One 3'-6"
4'-6"	4'-0"	One 4'-0"
5'-0"	4'-6"	One 4'-6"
5'-6"	5'-0"	One 5'-0"
6'-0"	5'-6"	One 5'-6"
6'-6"	6'-0"	Two 3'-0"
7'-0"	6'-6"	One 3'-0", One 3'-6"
7'-6"	7'-0"	Two 3'-6"
8'-0"	7'-6"	One 3'-6", One 4'-0"
8'-6"	8'-0"	Two 4'-0"
9'-0"	8'-6"	One 4'-0", One 4'-6"
9'-6"	9'-0"	Two 4'-6"
10'-0"	9'-6"	One 4'-6", One 5'-0"
10'-6"	10'-0"	Two 5'-0"
11'-0"	10'-6"	One 5'-0", One 5'-6"
11'-6"	11'-0"	Two 5'-6"
12'-0"	11'-6"	Two 4'-0", One 3'-6"
12'-6"	12'-0"	Three 4'-0"
13'-0"	12'-6"	Two 4'-0", One 4'-6"
13'-6"	13'-0"	Two 4'-6"
14'-0"	13'-6"	Three 4'-6", One 4'-0"
14'-6"	14'-0"	Two 4'-6", One 5'-0"
15'-0"	14'-6"	Two 5'-0", One 4'-6"
15'-6"	15'-0"	Three 5'-0"
16'-0"	15'-6"	Two 5'-6", One 4'-6"
16'-6"	16'-0"	Two 5'-6"
17'-0"	16'-6"	Three 5'-6", One 5'-0"
17'-6"	17'-0"	Three 4'-0", One 5'-0"
18'-0"	17'-6"	Three 4'-6", One 4'-0"
18'-6"	18'-0"	Four 4'-6"
19'-0"	18'-6"	Three 4'-6", One 5'-0"
19'-6"	19'-0"	Three 5'-0", One 4'-0"
20'-0"	19'-6"	Three 5'-0", One 4'-6"
20'-6"	20'-0"	Four 5'-0"
21'-0"	20'-6"	Three 5'-6", One 4'-0"
21'-6"	21'-0"	Three 5'-6", One 4'-6"
22'-0"	21'-6"	Three 5'-6", One 5'-0"
22'-6"	22'-0"	Four 5'-6"
23'-0"	22'-6"	Five 4'-6"
23'-6"	23'-0"	Four 4'-6", One 5'-0"
24'-0"	23'-6"	Three 4'-6", Two 5'-0"

"H" sections will be set in 3" from edge of panels to allow for rivet clearance in borders. Standard length in stock: 3'-0", 3'-6", 4'-0", 4'-6", 5'-0" and 5'-6".

SEAM CLOSURE
"H" SECTION EXTRUSION



PLAN VIEW

1" PANEL

LENGTH OF SIGN A	NUMBER OF POSTS	OVERHANG B	POST SPACING C
4'-6"	2	6"	3'-6"
5'-0"	2	9"	3'-6"
5'-6"	2	1'-0"	3'-6"
6'-0"	2	1'-0"	4'-0"
6'-6"	2	1'-3"	4'-0"
7'-0"	2	1'-3"	4'-6"
7'-6"	2	1'-6"	4'-6"
8'-0"	2	1'-6"	5'-0"
8'-6"	2	1'-8"	5'-2"
9'-0"	2	1'-10"	5'-4"
9'-6"	2	1'-11"	5'-8"
10'-0"	2	2'-0"	6'-0"
10'-6"	2	2'-0"	6'-6"
11'-0"	2	2'-0"	7'-0"
11'-6"	2	2'-3"	7'-0"
12'-0"	2	2'-6"	7'-0"
12'-6"	2	2'-6"	7'-6"
13'-0"	2	2'-6"	8'-0"
13'-6"	2	2'-6"	8'-6"
14'-0"	2	2'-6"	9'-0"
14'-6"	2	3'-0"	8'-6"
15'-0"	2	3'-0"	9'-0"

2½" PANEL

LENGTH OF SIGN A	NUMBER OF POSTS	OVERHANG B	POST SPACING C
15'-6"	2	3'-0"	9'-6"
16'-0"	2	3'-3"	9'-6"
16'-6"	2	3'-3"	10'-0"
17'-0"	2	3'-3"	10'-6"
17'-6"	2	3'-6"	10'-6"
18'-0"	2	3'-6"	11'-0"
18'-6"	2	3'-9"	11'-0"
19'-0"	2	3'-9"	11'-6"
19'-6"	2	3'-9"	12'-0"
20'-0"	2	4'-0"	12'-0"
20'-6"	2	4'-0"	12'-6"
21'-0"	2	4'-3"	12'-6"
21'-6"	2	4'-3"	13'-0"
22'-0"	2	4'-3"	13'-6"
22'-6"	2	4'-6"	13'-6"
23'-0"	2	4'-6"	14'-0"
23'-6"	2	4'-6"	14'-6"
24'-0"	2	4'-9"	14'-6"

STANDARD POST SPACING

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SEAM CLOSURE, "H" SECTION EXTRUSION AND POST SPACING TABLES (MULTI-HORIZONTAL LAMINATED PANEL ALUMINUM SIGNS)

NO SCALE

S85

1-29-18

Return to Table of Contents

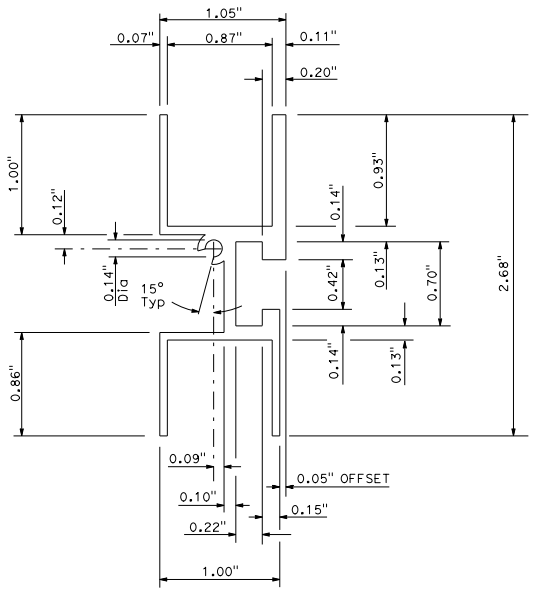
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

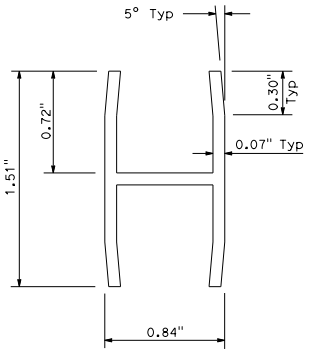
REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

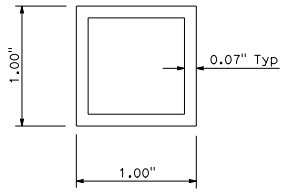


DETAIL No. 1

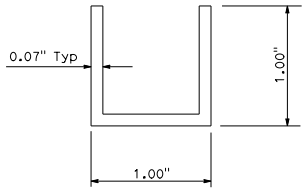
Unless noted, wall thickness is 0.07".



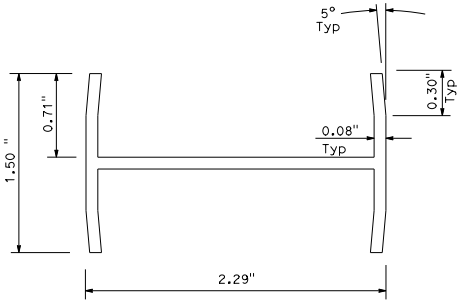
DETAIL No. 2



DETAIL No. 3



DETAIL No. 4

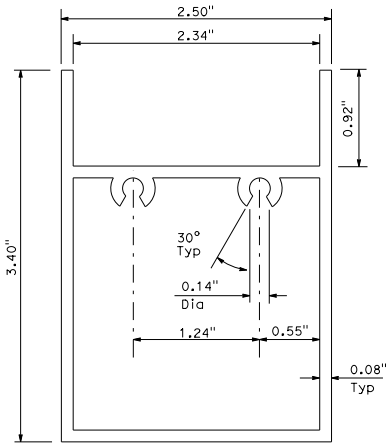


DETAIL No. 5

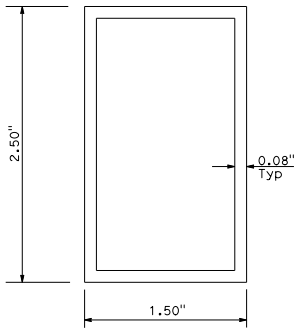
TABLE

EXTRUSION TYPE	1" THICK PANEL		2½" THICK PANEL	
	TYPE A PANEL	TYPE B PANEL	TYPE B PANEL	TYPE H PANEL
CHANNEL EDGE	DETAIL No. 4	DETAIL No. 4	DETAIL No. 9	DETAIL No. 9
TUBE-CHANNEL EDGE	N/A	N/A	N/A	DETAIL No. 6
MODIFIED "H" EDGE	DETAIL No. 1	N/A	N/A	N/A
VERTICAL TUBE SPACER	N/A	DETAIL No. 3	DETAIL No. 8	N/A
VERTICAL TUBE SPACER (LARGE PANEL)	N/A	N/A	N/A	DETAIL No. 7
℄ PANEL TUBE (LARGE PANEL)	N/A	N/A	N/A	DETAIL No. 7
SEAM CLOSURE "H" SECTION	DETAIL No. 2	DETAIL No. 2	DETAIL No. 5	DETAIL No. 5

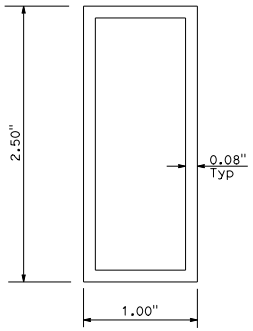
Note: All extrusions shall be aluminum alloy 6063-T6.



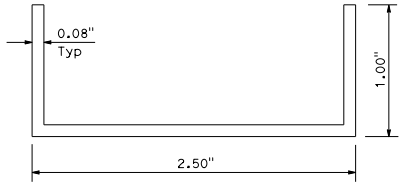
DETAIL No. 6



DETAIL No. 7



DETAIL No. 8



DETAIL No. 9

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

LAMINATED PANEL DETAILS (EXTRUSIONS FOR TYPE A, B AND H PANELS)

NO SCALE

S86

1-29-18

Return to Table of Contents

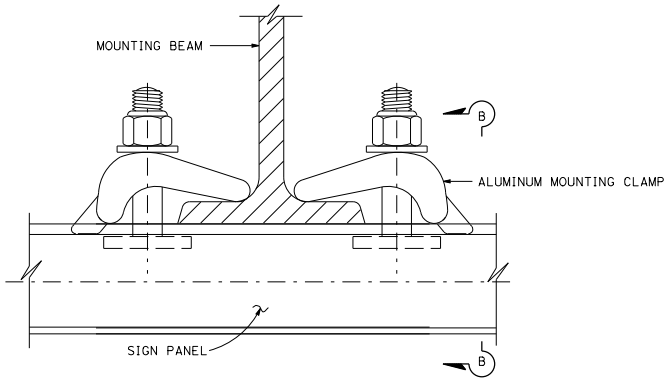
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

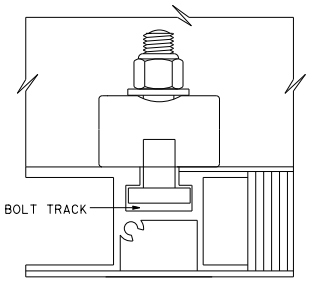
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

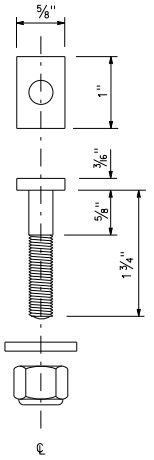
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPICAL ALUMINUM CLAMP MOUNTING



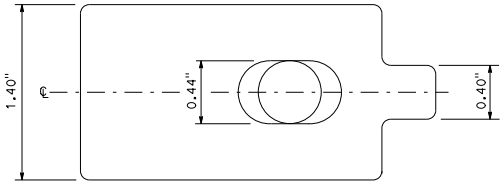
SECTION B-B
TYPICAL BOLTED CONNECTION TO STRUCTURE SUPPORT



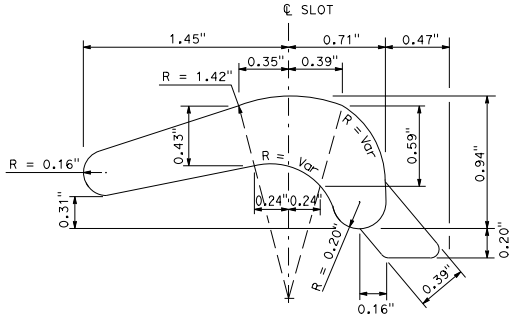
STAINLESS STEEL BOLT

A-1 HARDWARE QUANTITY TABLE

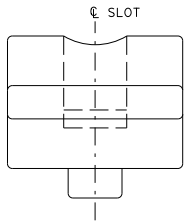
SIGN LENGTH	SIGN DEPTH SEE NOTE 4	UNITS REQUIRED SEE NOTE 3
15'-0" OR LESS	4'-2" - 5'-0"	4
16'-0" - 24'-0"	4'-2" - 5'-0"	6
15'-0" OR LESS	5'-10" - 10'-0"	8
16'-0" - 24'-0"	5'-10" - 10'-0"	12



TOP VIEW



SIDE VIEW



FRONT VIEW

NOTES:

1. Refer to applicable Standard Plan for additional mounting details.
2. Rectangular head bolt, hexagon stop nut, and flat washer shall be 5/8" diameter (18-8) stainless steel.
3. One unit of A-1 hardware shall consist of two sets of these components: clamp, bolt, nut and washer.
4. Signs 9'-2" and 10'-0" in depth may be fabricated in three panel sections to avoid legend from being placed on a horizontal seam. Increase number of units of mounting hardware accordingly.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TYPE A-1 MOUNTING HARDWARE FOR OVERHEAD LAMINATED TYPE A PANEL (TRUSS AND LIGHTWEIGHT SIGN STRUCTURES)

NO SCALE

S87

1-29-18

Return to Table of Contents

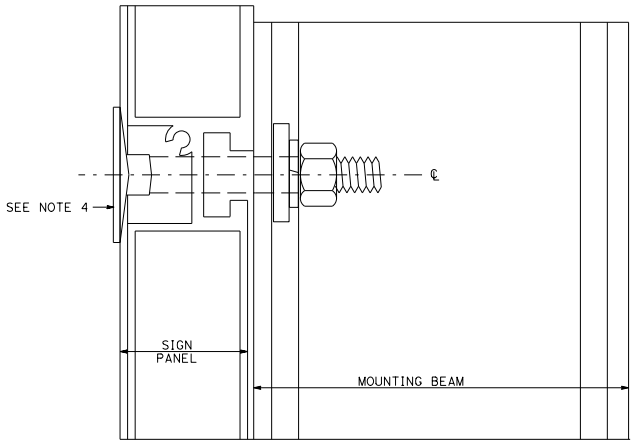
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



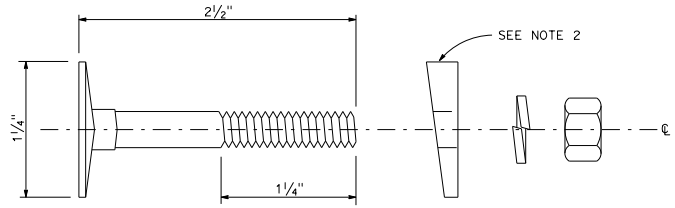
SIDE VIEW

A-2 HARDWARE QUANTITY TABLE
(STANDARD TUBULAR)

SIGN LENGTH	SIGN DEPTH SEE NOTE 6	UNITS REQUIRED SEE NOTE 5
14'-0" OR LESS	4'-2" TO 5'-0"	9
15'-0" TO 20'-0"	4'-2" TO 5'-0"	13
21'-0" TO 24'-0"	4'-2" TO 5'-0"	17
14'-0" OR LESS	5'-10" TO 10'-0"	17
15'-0" TO 20'-0"	5'-10" TO 10'-0"	25
21'-0" TO 24'-0"	5'-10" TO 10'-0"	33

NOTES:

1. Refer to applicable Standard Plan for additional mounting details.
2. Beveled washer for tapered flange only.
3. Elevator head bolt, hexagon nut, and lock washer shall be 5/16" diameter (18-8) stainless steel.
4. Furnish retroflective stick-ons for bolt head in same color as sign. Apply during installation.
5. One unit of A-2 hardware shall consist of one each; bolt nut, lock washer and beveled washer. Quantity listed includes 1 spare unit.
6. Signs 9'-2" and 10'-0" in depth may be fabricated in three panel sections to avoid legend from being placed on a horizontal seam. Increase number of units of mounting hardware accordingly.



MOUNTING HARDWARE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TYPE A-2 MOUNTING HARDWARE FOR OVERHEAD LAMINATED TYPE A PANEL (BRIDGE MOUNTED AND TUBULAR SIGN STRUCTURES)

NO SCALE

S88

1-29-18

Return to Table of Contents

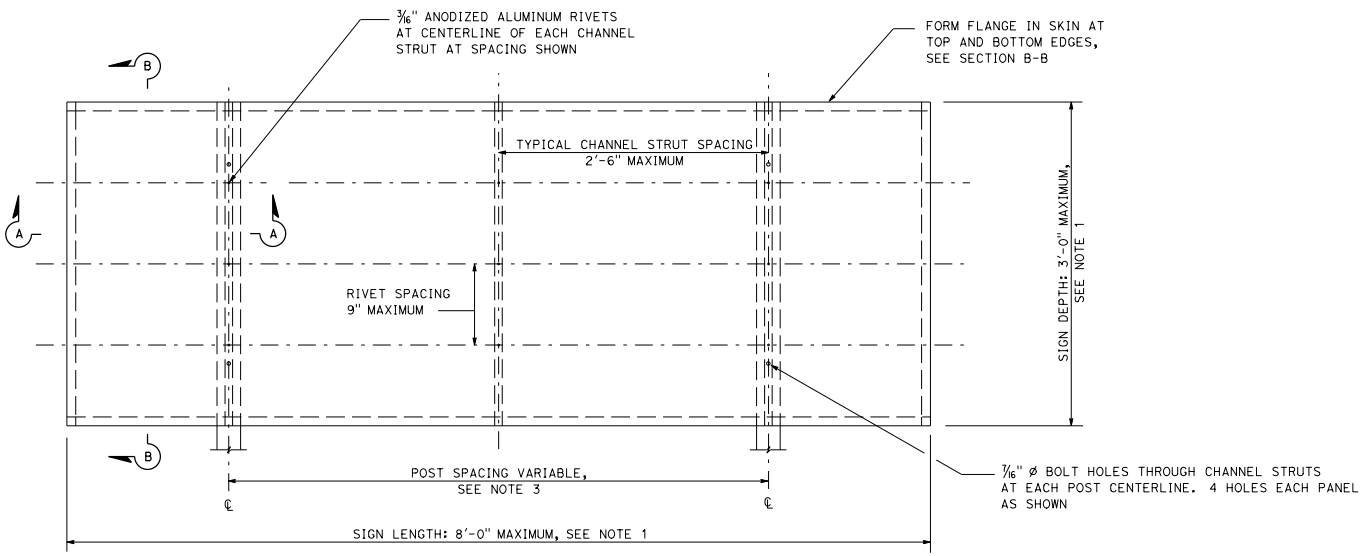
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

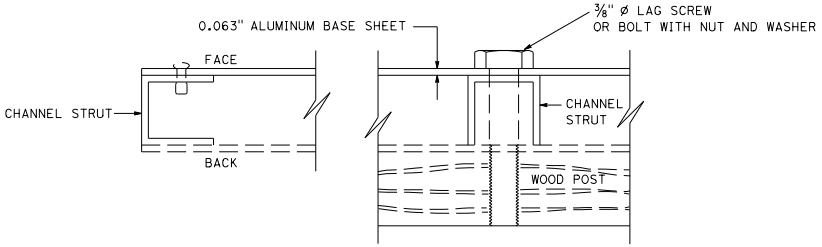
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

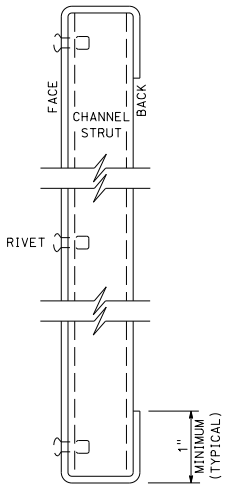
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FACE VIEW OF FORMED PANEL



SECTION A-A



SECTION B-B

NOTES:

1. Sign size to be graduated in 6" increments, both vertically and horizontally. Area of sign not to exceed 20 square feet.
2. Channel strut extrusions shall be 1" x 1" x 1/16" aluminum alloy 6063-T6.
3. See Standard Plan RS2 for post spacing and mounting details.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE SIGN-FORMED SINGLE SHEET ALUMINUM PANEL

NO SCALE

S89

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

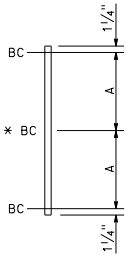
Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

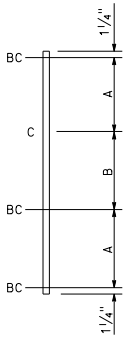
REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

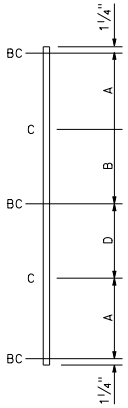
PANEL DEPTH	DIMENSION "A"	DIMENSION "B"	DIMENSION "D"	TOTAL No. OF CHANNELS PER PANEL
4'-2"	1'-11¾"			3
5'-0"	2'-4¾"			3
5'-10"	1'-6¾"	2'-6"		4
6'-8"	1'-6¾"	1'-8"		5
7'-6"	1'-6¾"	2'-6"	1'-8"	5
8'-4"	1'-6¾"	2'-6"		5
9'-2"	1'-6¾"	1'-8"	2'-6"	6
10'-0"	1'-6¾"	2'-6"	1'-8"	6



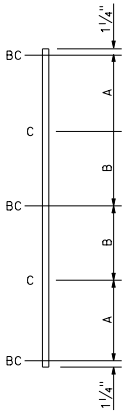
3 CHANNELS FOR 4'-2" AND 5'-0" DEPTH



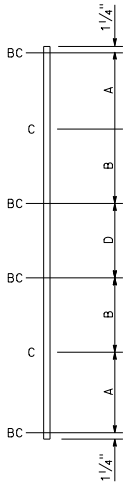
4 CHANNELS FOR 5'-10" DEPTH



5 CHANNELS FOR 7'-6" DEPTH



5 CHANNELS FOR 6'-8" AND 8'-4" DEPTH



6 CHANNELS FOR 9'-2" AND 10'-0" DEPTH

LEGEND:

"C" INDICATES LOCATION OF CHANNEL.

"BC" INDICATED LOCATION OF BOLT AND CHANNEL.

* THIS BOLT MAY BE OMITTED WHEN DEPTH IS 4'-2".

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

CHANNEL AND BOLT HOLE LOCATION FOR OVERHEAD FORMED SIGN PANEL

NO SCALE

S90

1-29-18

2018 STANDARD PLAN S90

Return to Table of Contents

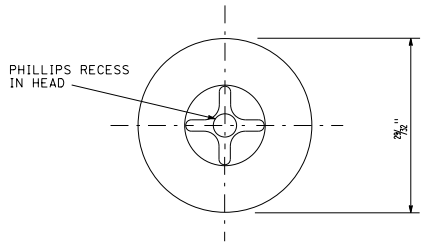
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

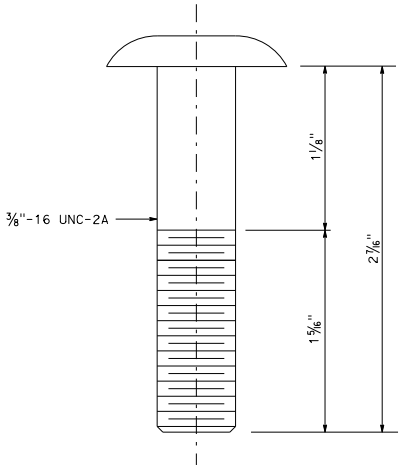
REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

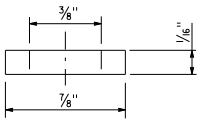
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TRUSS HEAD BOLT

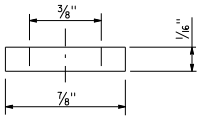
2024 Aluminum alloy per QQ-A-430 or ASTM B316
Anodize interstate green per MIL-A-8625





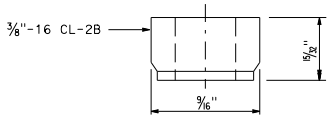
WASHER

Fiber/Nylon



WASHER

2024 Aluminum alloy
Clear anodize per MIL-A-8625



LOCKNUT WITH NYLON INSERT

6061-T6 or 2011-T3 Aluminum alloy or equivalent
Anodize per MIL-A-8625
Maximum torque - 60 in-lbs

MOUNTING HARDWARE QUANTITY CHART

SIGN LENGTH	SIGN DEPTH	NUMBER OF UNITS REQUIRED
8'-0"	4'-2"	8
10'-0" TO 12'-0"	4'-2"	12
14'-0" TO 16'-0"	4'-2"	16
18'-0" TO 20'-0"	4'-2"	20
22'-0" TO 24'-0"	4'-2"	24
26'-0" TO 28'-0"	4'-2"	28
30'-0" TO 32'-0"	4'-2"	32
34'-0" TO 36'-0"	4'-2"	36
38'-0" TO 40'-0"	4'-2"	40
42'-0" TO 44'-0"	4'-2"	44
46'-0" TO 48'-0"	4'-2"	48
8'-0"	5'-0" TO 8'-4"	12
10'-0" TO 12'-0"	5'-0" TO 8'-4"	18
14'-0" TO 16'-0"	5'-0" TO 8'-4"	24
18'-0" TO 20'-0"	5'-0" TO 8'-4"	30
22'-0" TO 24'-0"	5'-0" TO 8'-4"	36
26'-0" TO 28'-0"	5'-0" TO 8'-4"	42
30'-0" TO 32'-0"	5'-0" TO 8'-4"	48
34'-0" TO 36'-0"	5'-0" TO 8'-4"	54
38'-0" TO 40'-0"	5'-0" TO 8'-4"	60
42'-0" TO 44'-0"	5'-0" TO 8'-4"	66
46'-0" TO 48'-0"	5'-0" TO 8'-4"	72
8'-0"	9'-2" TO 10'-0"	16
10'-0" TO 12'-0"	9'-2" TO 10'-0"	24
14'-0" TO 16'-0"	9'-2" TO 10'-0"	32
18'-0" TO 20'-0"	9'-2" TO 10'-0"	40
22'-0" TO 24'-0"	9'-2" TO 10'-0"	48
26'-0" TO 28'-0"	9'-2" TO 10'-0"	56
30'-0" TO 32'-0"	9'-2" TO 10'-0"	64
34'-0" TO 36'-0"	9'-2" TO 10'-0"	72
38'-0" TO 40'-0"	9'-2" TO 10'-0"	80
42'-0" TO 44'-0"	9'-2" TO 10'-0"	88
46'-0" TO 48'-0"	9'-2" TO 10'-0"	96

Unit - 1 Truss head bolt, 1 Nylon insert locknut, 1 washer (Fiber/Nylon), 1 washer (Aluminum)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

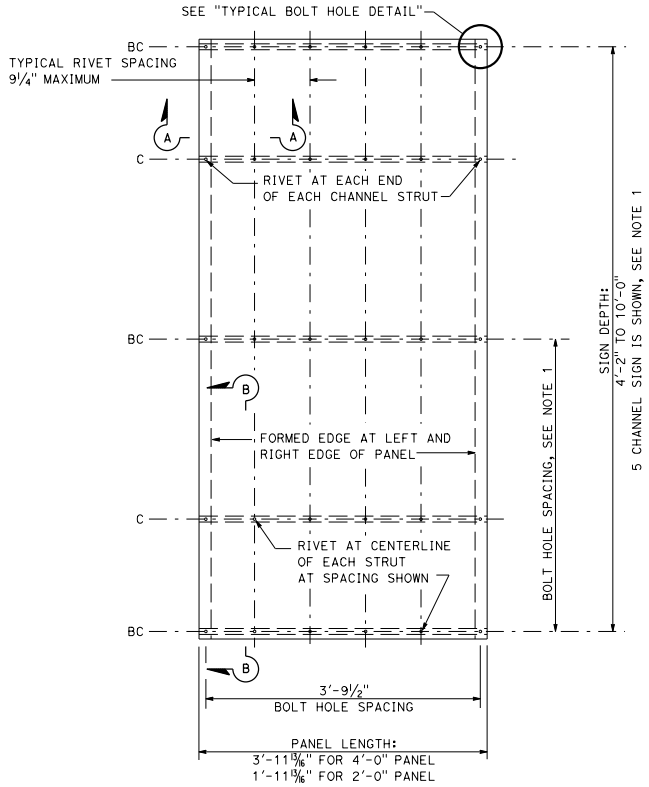
OVERHEAD SIGN
FORMED SIGN PANEL
TYPE A-3 MOUNTING HARDWARE

NO SCALE

S91

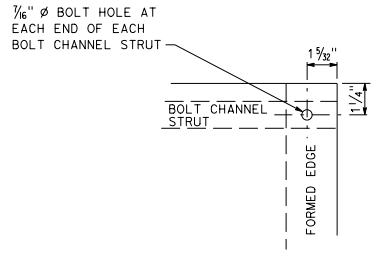
1-29-18

Return to Table of Contents



FACE VIEW OF FORMED PANEL

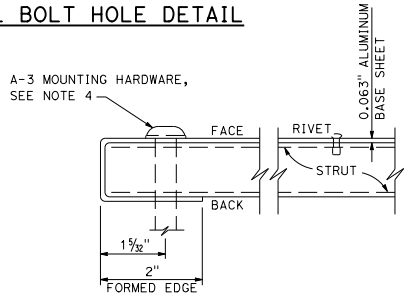
Single panel shown



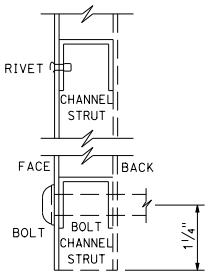
TYPICAL BOLT HOLE DETAIL

ABBREVIATIONS:

BC = Centerline of Bolt Channel Strut
C = Centerline of Channel Strut



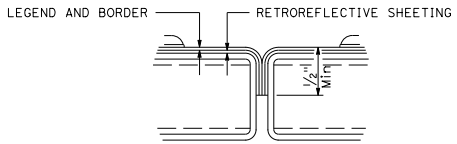
SECTION A-A



SECTION B-B

NOTES:

1. See Standard Plan S90 for location and configuration of struts.
2. Bolt channel and channel extrusions shall be 1" x 1" x 1/16" aluminum alloy 6063-T6..
3. See Standard Plan S21 for mounting details.
4. See Standard Plan S91 for A-3 mounting hardware.



RETROREFLECTIVE SHEETING OVERLAP ON INTERIOR EDGES

Two panels shown

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN FORMED SIGN PANEL

NO SCALE

S92

1-29-18

Return to Table of Contents

CHANNEL SIZES

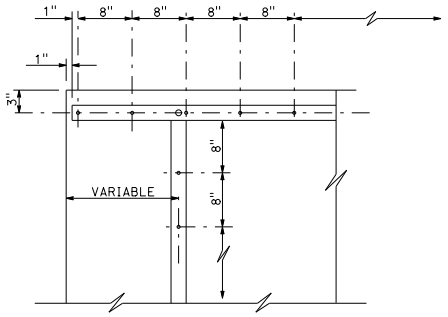
SIGN LENGTH	SIGN DEPTH	PANEL THICKNESS	No. OF HORIZONTAL MEMBERS	No. OF VERTICAL MEMBERS	Horiz MEMBER TYPE	Vert MEMBER TYPE
UP TO 3'-11"		0.063"	NO FRAME REQUIRED			
4'-0" TO 4'-7"		0.080"	NO FRAME REQUIRED			
4'-8" TO 5'-10"	1'-0" TO 2'-0"	0.063"	2		A	
	2'-1" TO 3'-0"	0.063"	2	2	A	A
	3'-1" TO 4'-0"	0.063"	2	3	A	A
	4'-1" TO 8'-0"	0.063"	3	3	B	A
6'-0" TO 6'-6"	1'-0" TO 2'-0"	0.063"	2		A	
	2'-1" TO 3'-0"	0.063"	2	2	A	A
	3'-1" TO 4'-0"	0.063"	2	3	A	A
	4'-1" TO 6'-0"	0.063"	3	3	B	B
	6'-1" TO 8'-0"	0.063"	3	3	C	C
6'-8" TO 7'-6"	1'-6" TO 4'-0"	0.080"	2	3	B	B
	4'-1" TO 6'-0"	0.080"	3	3	B	B
	6'-1" TO 8'-0"	0.080"	3	3	C	C
7'-8" TO 8'-6"	1'-6" TO 4'-0"	0.080"	2	3	B	B
	4'-1" TO 8'-0"	0.080"	3	3	C	C
8'-8" TO 9'-6"	1'-6" TO 4'-0"	0.080"	2	3	B	B
	4'-1" TO 8'-0"	0.080"	3	3	C	C
9'-8" TO 11'-0"	1'-6" TO 4'-0"	0.080"	2	3	C	C
	4'-1" TO 8'-0"	0.080"	3	3	C	C
	8'-1" TO 11'-0"	0.080"	4	3	C	C

NOTES:

1. Type A - 1¼" x 1¼" x ⅛" Channel to be aluminum alloy 6063-T5.
2. Type B - 2⅜" x 1¼" x 3/16" Channel to be aluminum alloy 6063-T6.
3. Type C - 2" x 2"x ¼" Channel to be aluminum alloy 6063-T6.
4. 1¾" x 1½" x ⅛" Rectangular tubing aluminum alloy 6063-T6 may be substituted for Types B and C, but more than one type of framing material used on one sign is unacceptable.
5. For rectangular tubing, weld all around and grind beads flush where weld contacts sign panel.

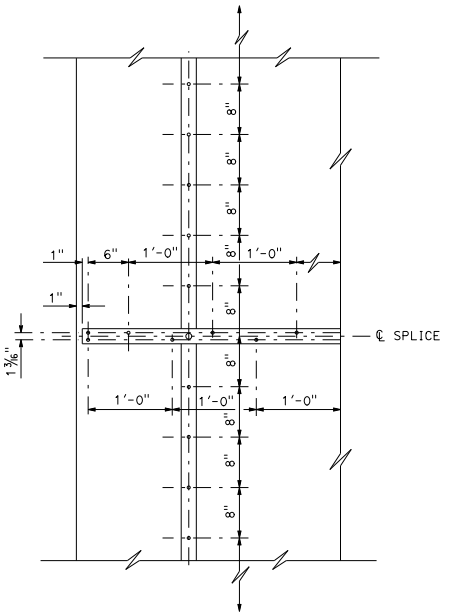
POST SPACING

SIGN LENGTH	CENTERLINE SPACING
4'-8" TO 5'-8"	3'-6"
5'-10" TO 6'-8"	4'-0"
6'-10" TO 7'-8"	4'-6"
7'-10" TO 8'-2"	5'-0"
8'-4" TO 8'-8"	5'-2"
8'-10" TO 9'-2"	5'-4"
9'-4" TO 9'-8"	5'-8"
9'-10" TO 10'-2"	6'-0"
10'-4" TO 10'-10"	6'-6"
10'-11" TO 11'-0"	7'-0"



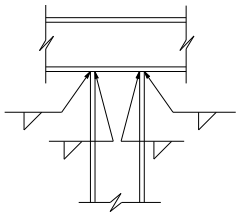
TYPICAL RIVET

DETAIL A

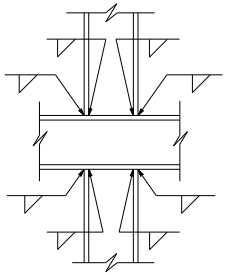


RIVET AT SPLICE

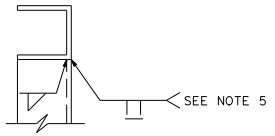
DETAIL B



TOP VIEW

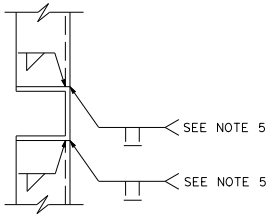


TOP VIEW



SIDE VIEW

WELD DETAIL No. 1



SIDE VIEW

WELD DETAIL No. 2

TYPICAL WELD DETAILS

Dist | COUNTY | ROUTE | POST MILES TOTAL PROJECT | SHEET No. | TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

FRAMING DETAILS FOR FRAMED SINGLE SHEET ALUMINUM SIGNS, RECTANGULAR SHAPE

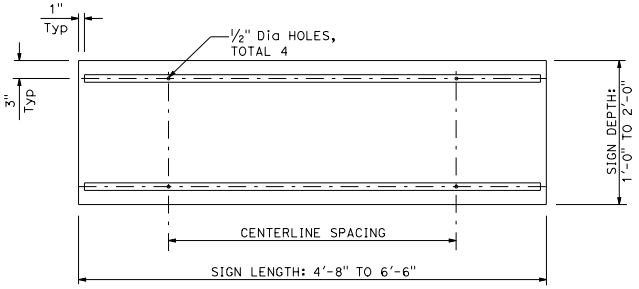
NO SCALE

S93

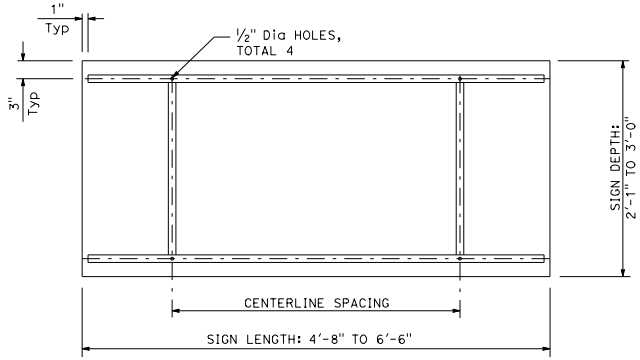
2018 STANDARD PLAN S93

1-29-18

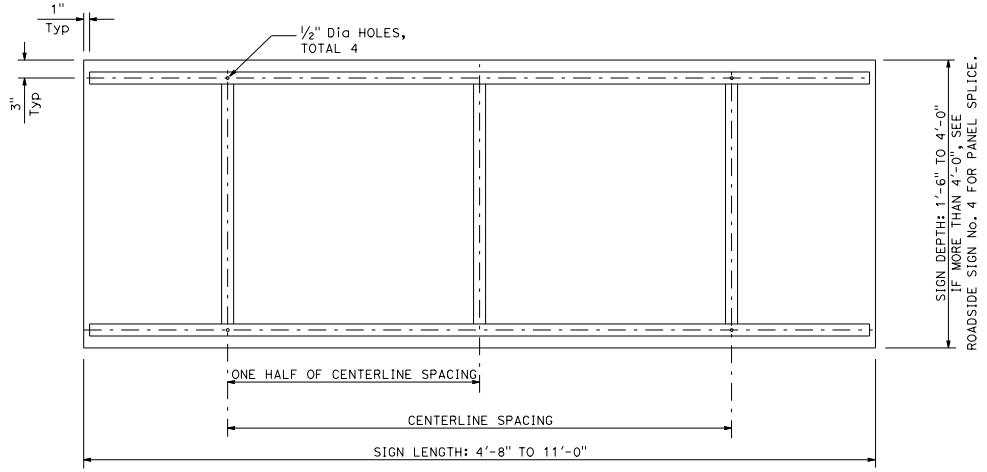
Return to Table of Contents



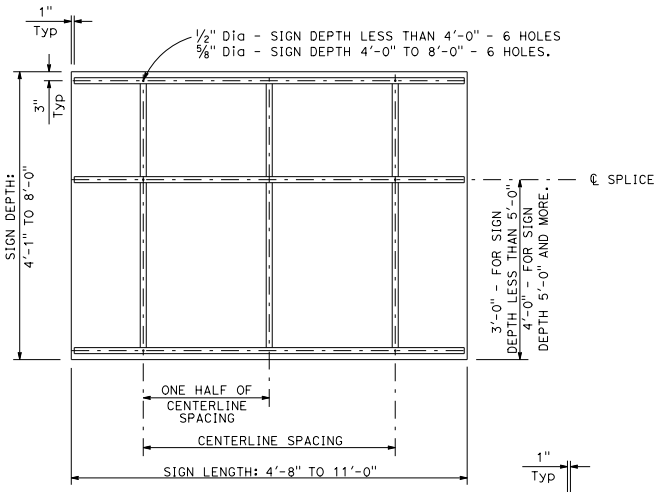
ROADSIDE SIGN DETAIL No. 1



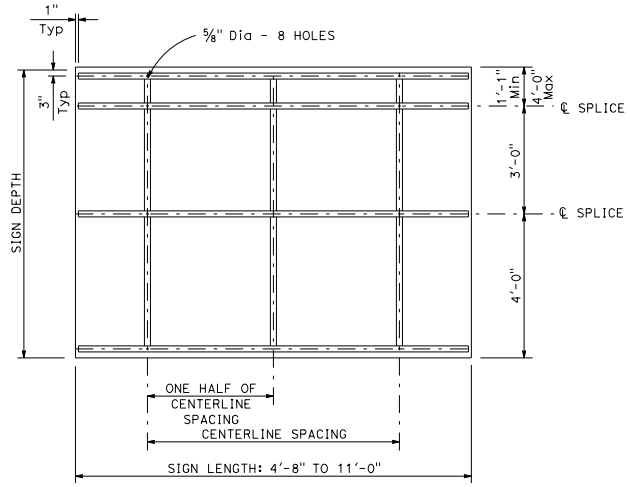
ROADSIDE SIGN DETAIL No. 2



ROADSIDE SIGN DETAIL No. 3



ROADSIDE SIGN DETAIL No. 4



ROADSIDE SIGN DETAIL No. 5

NOTES:

1. See Standard Plan S93 for framing details.
2. All members welded at joints as shown on Standard Plan S93.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Donald E. Howe — No. C46402 — Exp. 3-31-19 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ROADSIDE FRAMED SINGLE SHEET ALUMINUM SIGNS, RECTANGULAR SHAPE

NO SCALE

S94

1-29-18

Return to Table of Contents

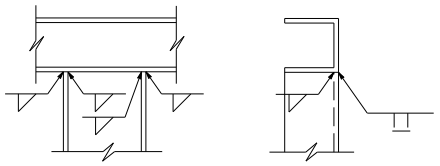
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Donald E. Howe
REGISTERED CIVIL ENGINEER

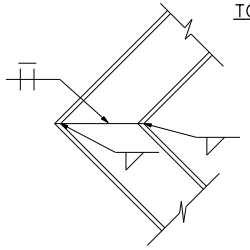
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Donald E. Howe
No. C46402
Exp. 3-31-19
CIVIL
STATE OF CALIFORNIA

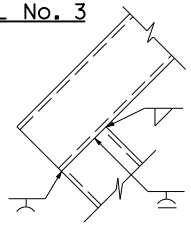
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



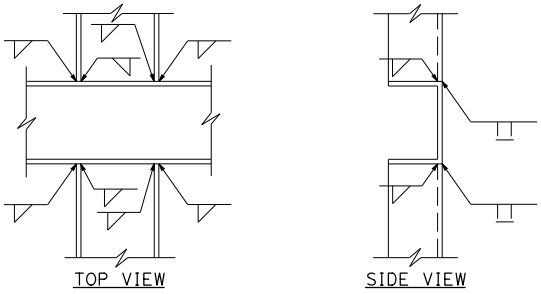
WELD DETAIL No. 3



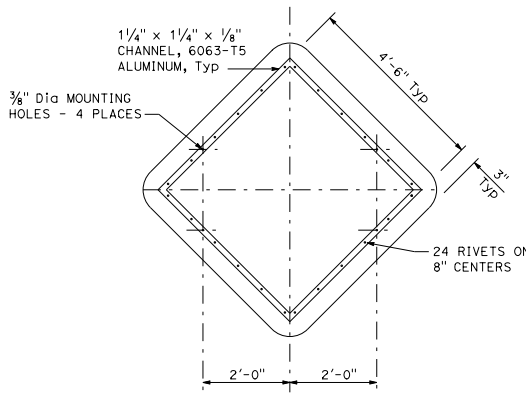
WELD DETAIL No. 4



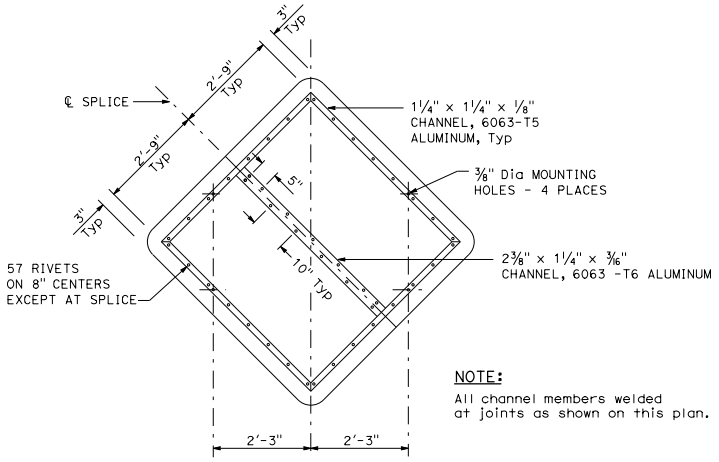
ALTERNATE WELD DETAIL No. 4A
Weld all around outside



WELD DETAIL No. 5
TYPICAL WELD DETAILS

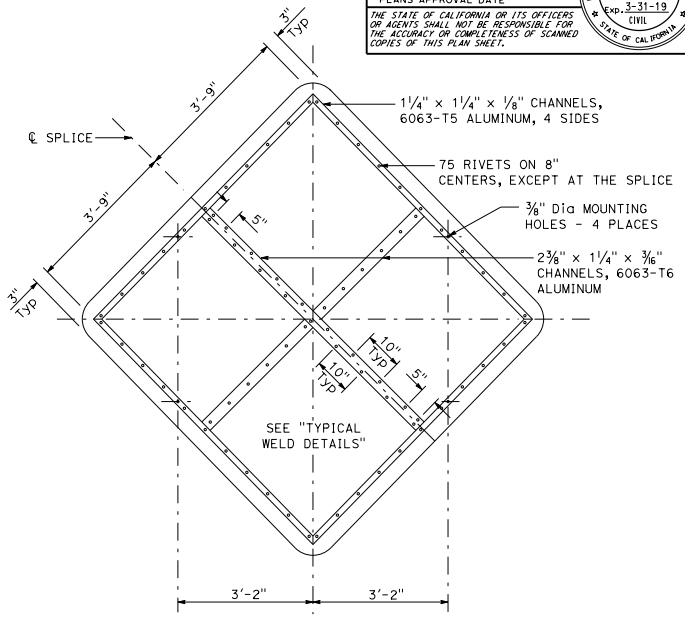


ROADSIDE SIGN DETAIL No. 6
Framing detail for
5'-0" x 5'-0" diamond



ROADSIDE SIGN DETAIL No. 7
Framing detail for 6'-0" x 6'-0" diamond.
Made from 2 - 3'-0" x 6'-0" panels, spliced
and braced by channels as shown.

NOTE:
All channel members welded
at joints as shown on this plan.



ROADSIDE SIGN DETAIL No. 8
Framing detail for 8'-0" x 8'-0" diamond.
Made from 2 - 4'-0" x 8'-0" panels, spliced
and braced by channels as shown.

CHANNEL SIZES

SIGN SIZE	PANEL THICKNESS	FRAME TYPE
4'-0" x 4'-0"	0.063"	NO FRAME REQUIRED
4'-0" x 4'-0"	0.080"	NO FRAME REQUIRED
5'-0" x 5'-0"	0.080"	SEE ROADSIDE SIGN No. 6
6'-0" x 6'-0"	0.080"	SEE ROADSIDE SIGN No. 7
8'-0" x 8'-0"	0.080"	SEE ROADSIDE SIGN No. 8

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

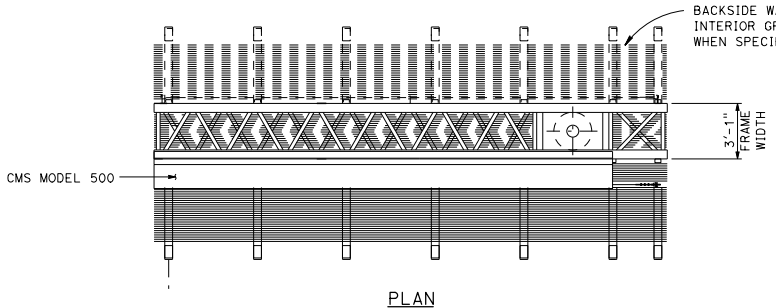
ROADSIDE SINGLE SHEET ALUMINUM SIGNS, DIAMOND SHAPE

NO SCALE

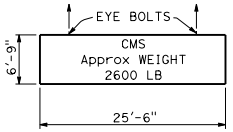
S95

1-29-18

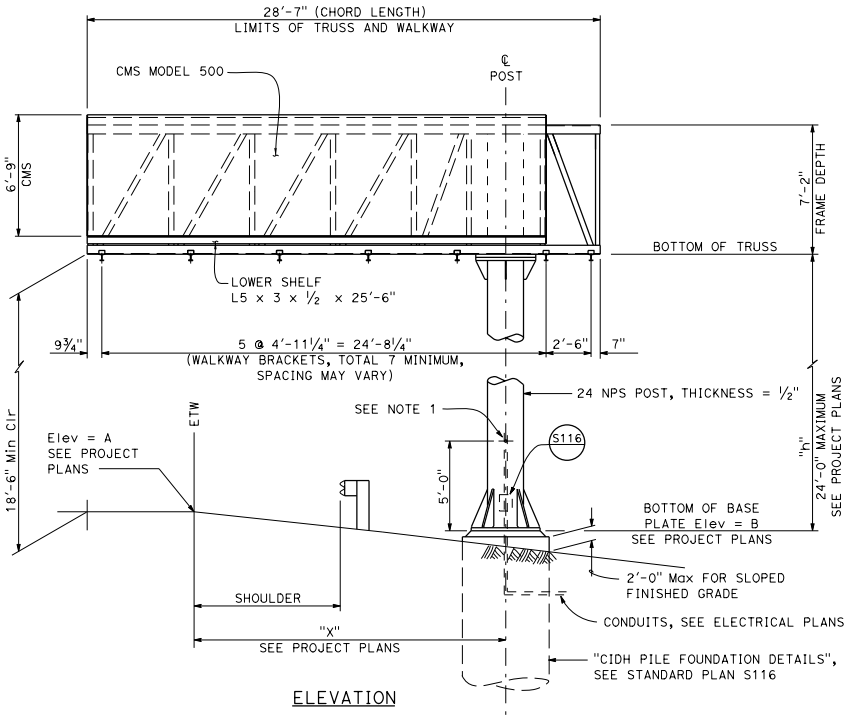
Return to Table of Contents



PLAN



LIFTING DIAGRAM



ELEVATION

GENERAL NOTES:

LOADING:

WIND LOADING:

100 mph (3-second gust)

Normal to face of sign: 40 psf on 100% panel coverage.

Transverse to face of sign: 20% of normal force.

WALKWAY LOADING:

Dead load +500 LBS concentrated live load.

UNIT STRESSES:

STRUCTURAL STEEL: fy = 36000 psi
REINFORCED CONCRETE: fy = 60000 psi
f'c = 3600 psi
FOOTING SOIL PRESSURE: 2.50 ksf (spread footing)

MINIMUM CLEARANCE

Vertical roadway clearance 18'-0" above roadway and shoulders

WELDING:

All welding continuous unless otherwise noted on the plans.

NOTES:

1. Drill and tap for 2½" recessed pipe plug, See Standard Plan ES-15C.
2. For location and elevation of sign structure see Project Plans.
3. Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
4. At final position of post, top and bottom nuts shall be tightened against base plate.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE LAYOUT UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S101

2018 STANDARD PLAN S101

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

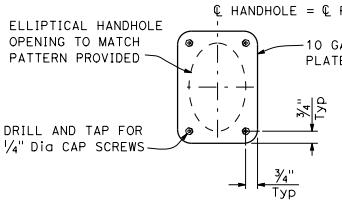
REGISTERED CIVIL ENGINEER

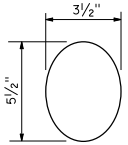
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

GRIND EDGES SMOOTH, ROUGHNESS OF EDGES NO GREATER THAN 1000 MICROINCHES



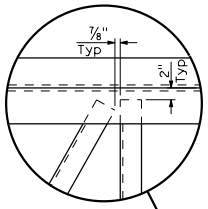


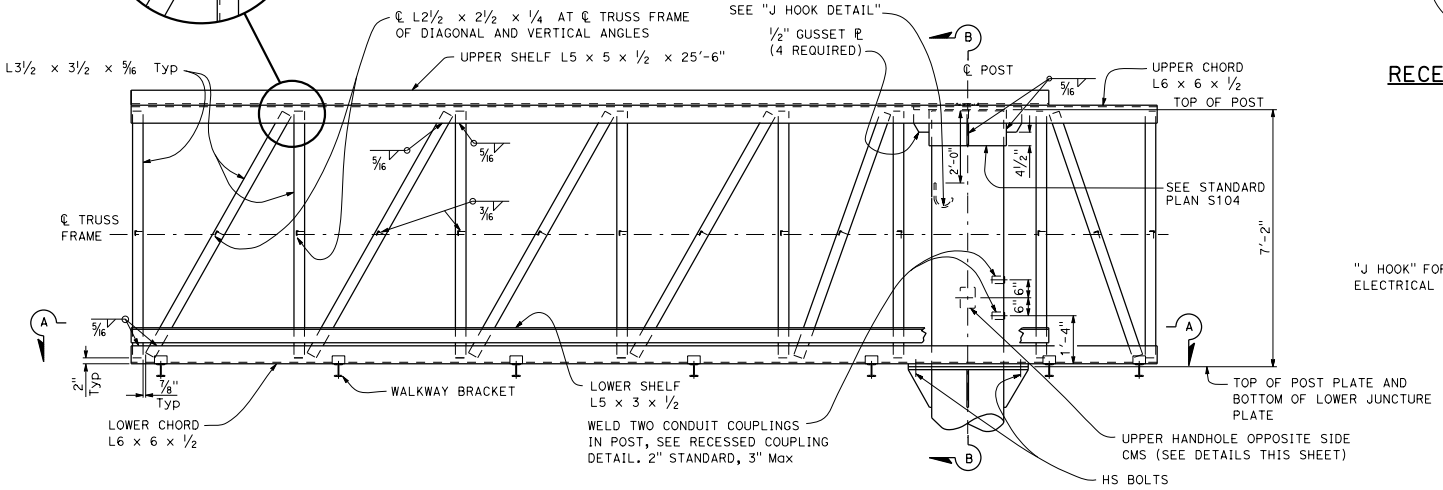
PATTERN OF ELLIPTICAL HANDHOLE CUT OUT

PLAN

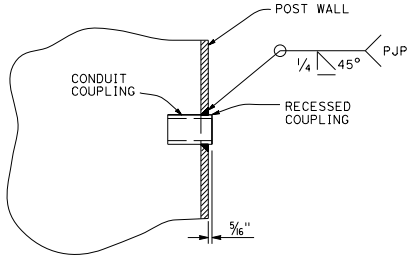
ELEVATION

UPPER HANDHOLE AND COVER DETAILS

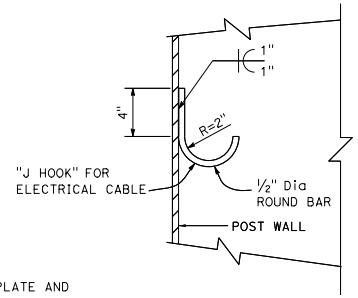




FRAME ELEVATION
See Note 1



RECESSED COUPLING DETAIL



J HOOK DETAIL

NOTES:

1. Walkways and safety anchorages not shown for clarity.
2. For Section B-B details, see Standard Plan S104.
3. For Section A-A details, including vertical angle spacing, see Standard Plan S104.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE STRUCTURAL FRAME DETAILS UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S102

1-29-18

Return to Table of Contents

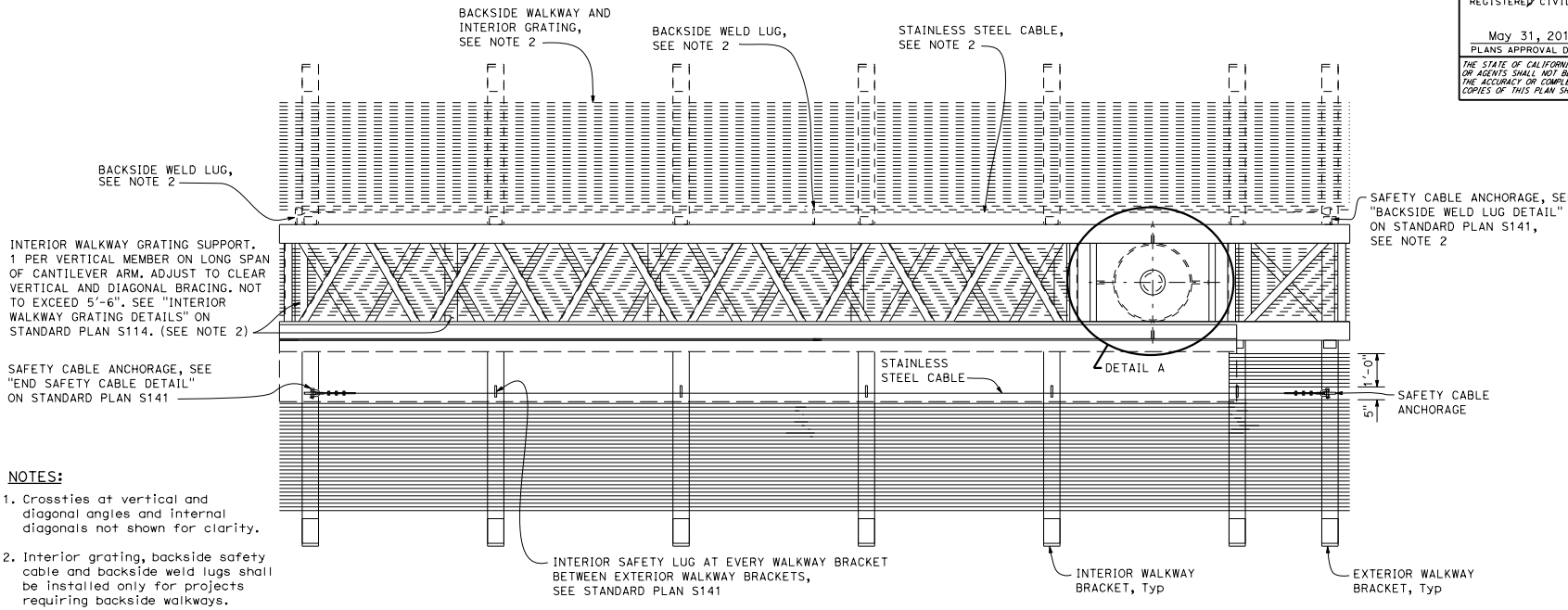
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

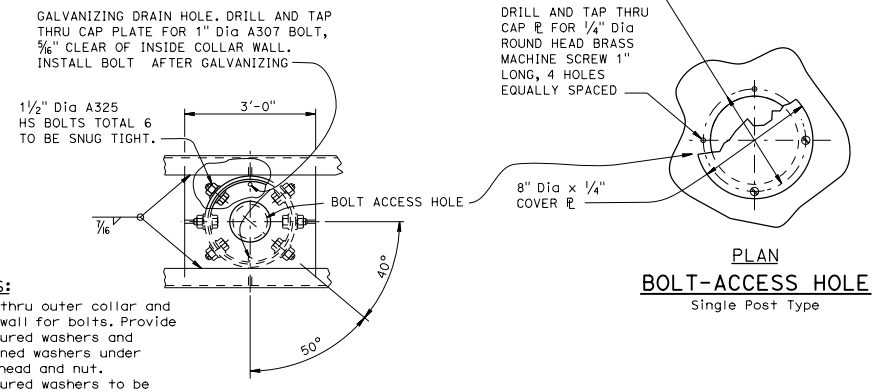
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

NOTES:

1. Crossties at vertical and diagonal angles and internal diagonals not shown for clarity.
2. Interior grating, backside safety cable and backside weld lugs shall be installed only for projects requiring backside walkways.



NOTES:

Drill thru outer collar and post wall for bolts. Provide contoured washers and hardened washers under bolt head and nut. Contoured washers to be 3" x 3" x 5/16" minimum. Grind face to fit.

DETAIL A

PLAN

BOLT-ACCESS HOLE

Single Post Type

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE PLAN AND UPPER BOLT DETAILS UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S103

1-29-18

2018 STANDARD PLAN S103

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

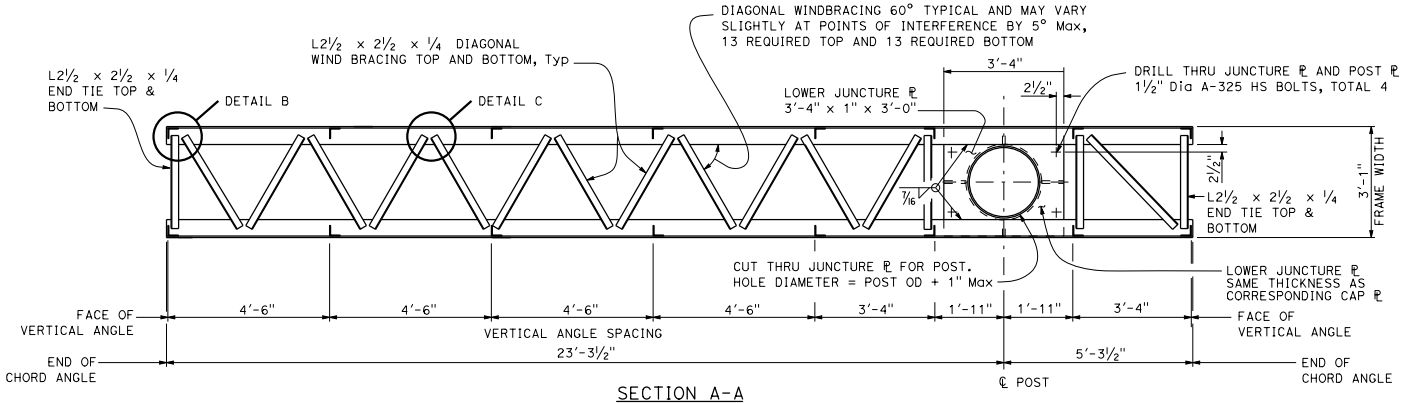
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

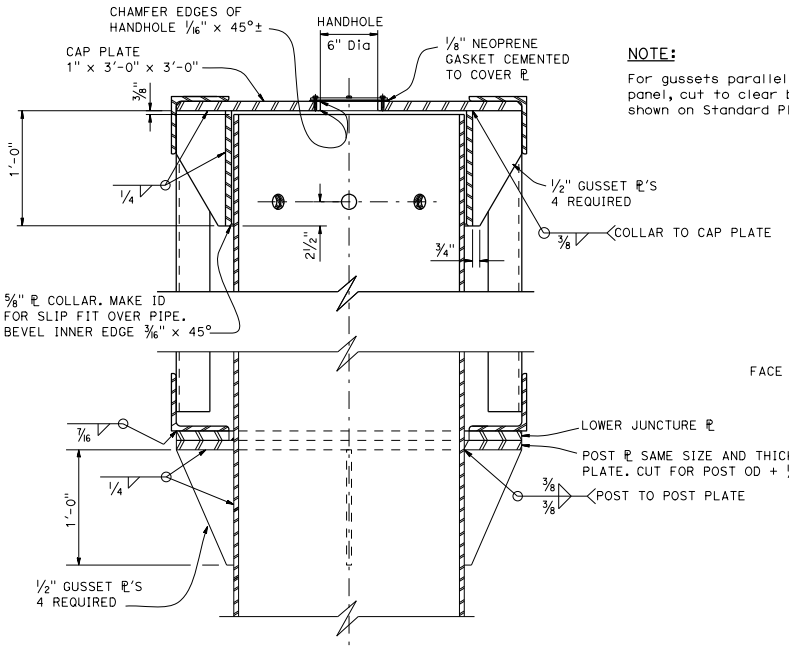
REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA



SECTION A-A

LOWER JUNCTURE CONNECTION

See Standard Plan S102

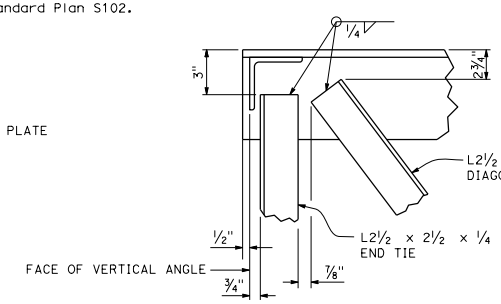


SECTION B-B

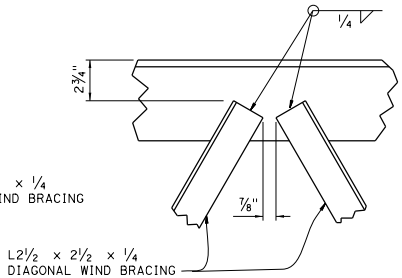
See Standard Plan S10

NOTE:

For gussets parallel to the sign panel, cut to clear bolts as shown on Standard Plan S102.



DETAIL B



DETAIL C

NOTES:

1. In all cases truss shall be supported at lower juncture connection.
2. Post to truss connections shall be fitted in shop.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE FRAME JUNCTURE DETAILS UNBALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S104

2018 STANDARD PLAN S104

1-29-18

Return to Table of Contents

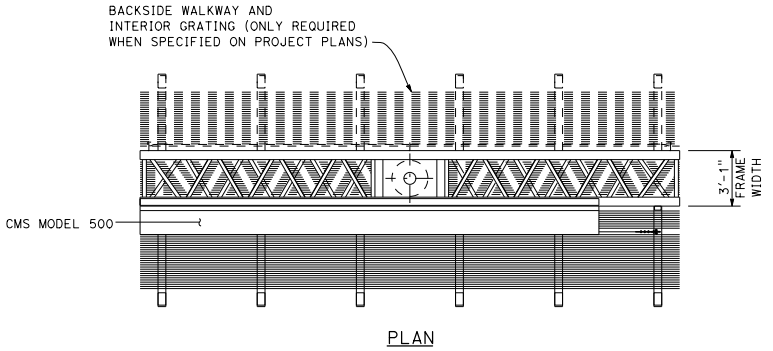
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

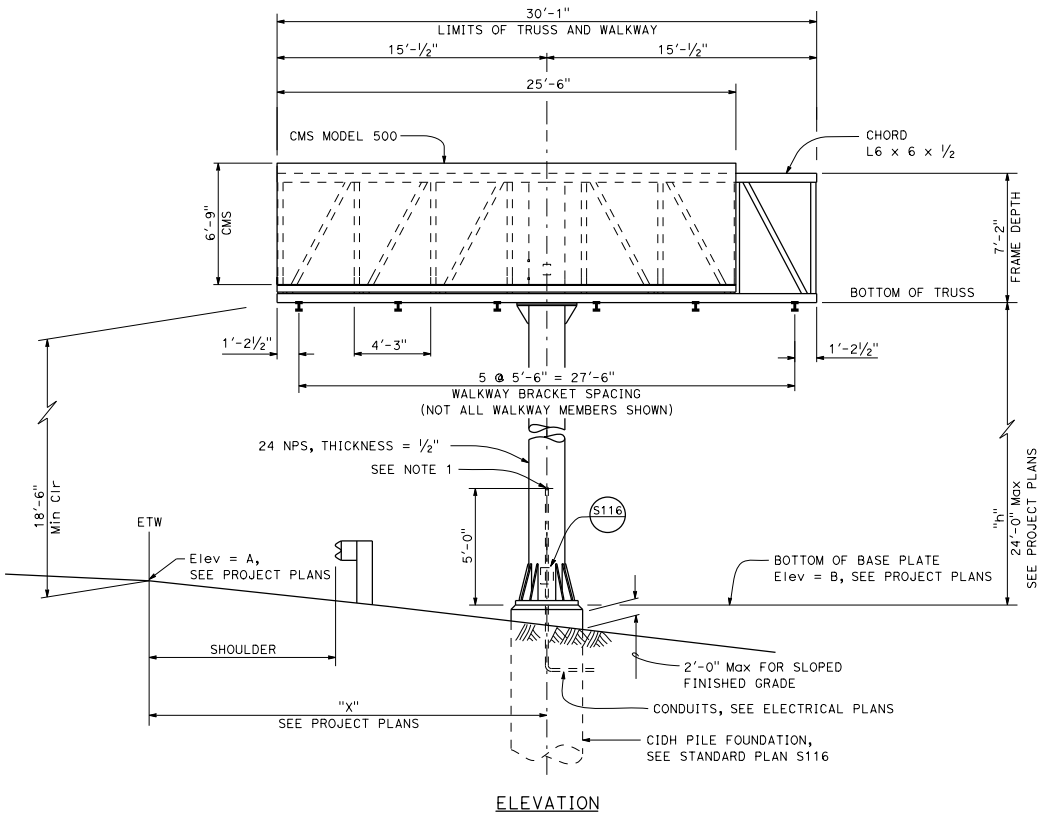
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

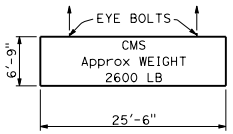
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



ELEVATION



LIFTING DIAGRAM

NOTES:

1. Drill and tap for 2½" recessed pipe plug.
2. For location and elevation of sign structure, see Project Plans.
3. Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
4. At final position of post, top and bottom nuts shall be tightened against base plate.
5. For "General Notes", see Standard Plan S101.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE LAYOUT BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S105

1-29-18

Return to Table of Contents

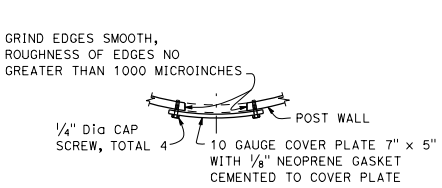
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

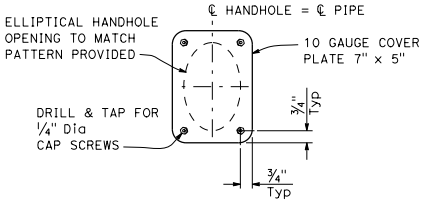
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

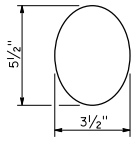


PLAN

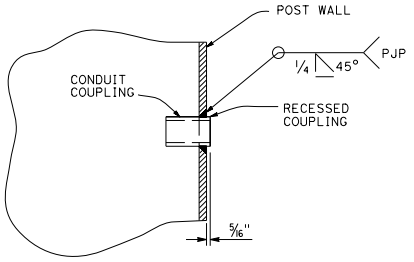


ELEVATION

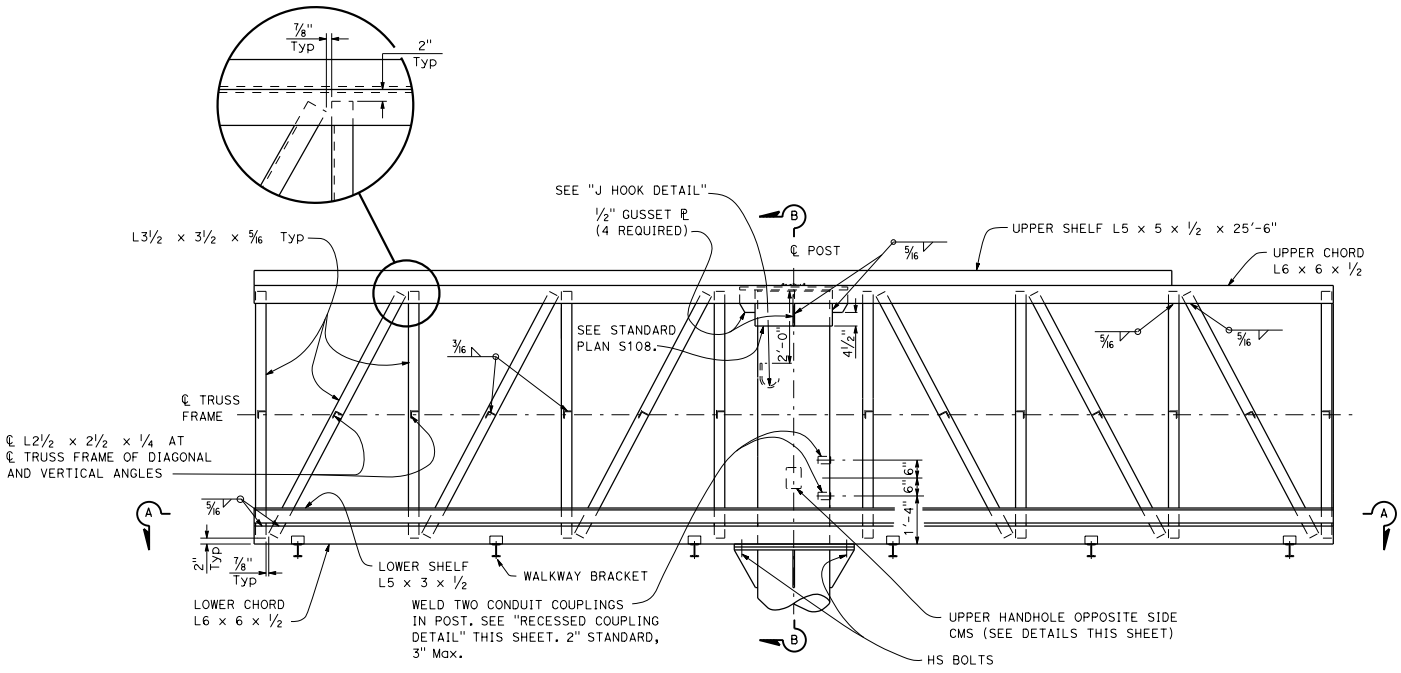
UPPER HANDHOLE AND COVER DETAILS



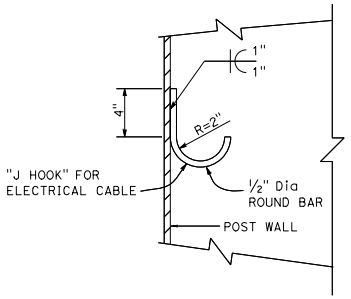
PATTERN OF ELLIPTICAL HANDHOLE CUT OUT



RECESSED COUPLING DETAIL



FRAME ELEVATION
See Note 1



J HOOK DETAIL

NOTES:

1. Walkways and safety anchorages not shown for clarity.
2. For Section B-B details, see Standard Plan S108.
3. For Section A-A details, including vertical angle spacing, see Standard Plan S108.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS
SINGLE POST TYPE
STRUCTURAL FRAME DETAILS
BALANCED BUTTERFLY
CHANGEABLE MESSAGE SIGNS
MODEL 500

NO SCALE

S106

1-29-18

2018 STANDARD PLAN S106

Return to Table of Contents

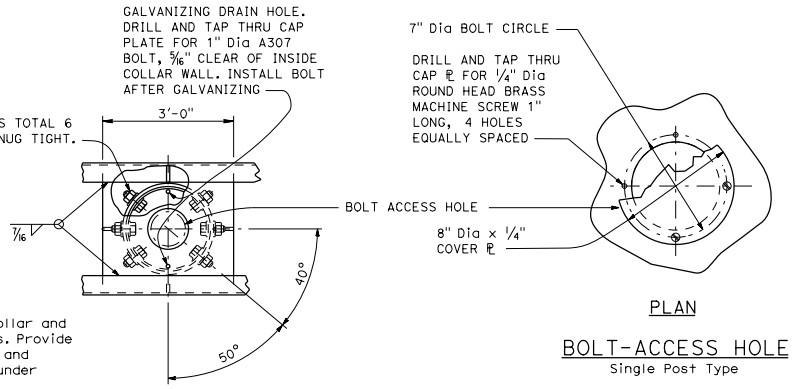
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



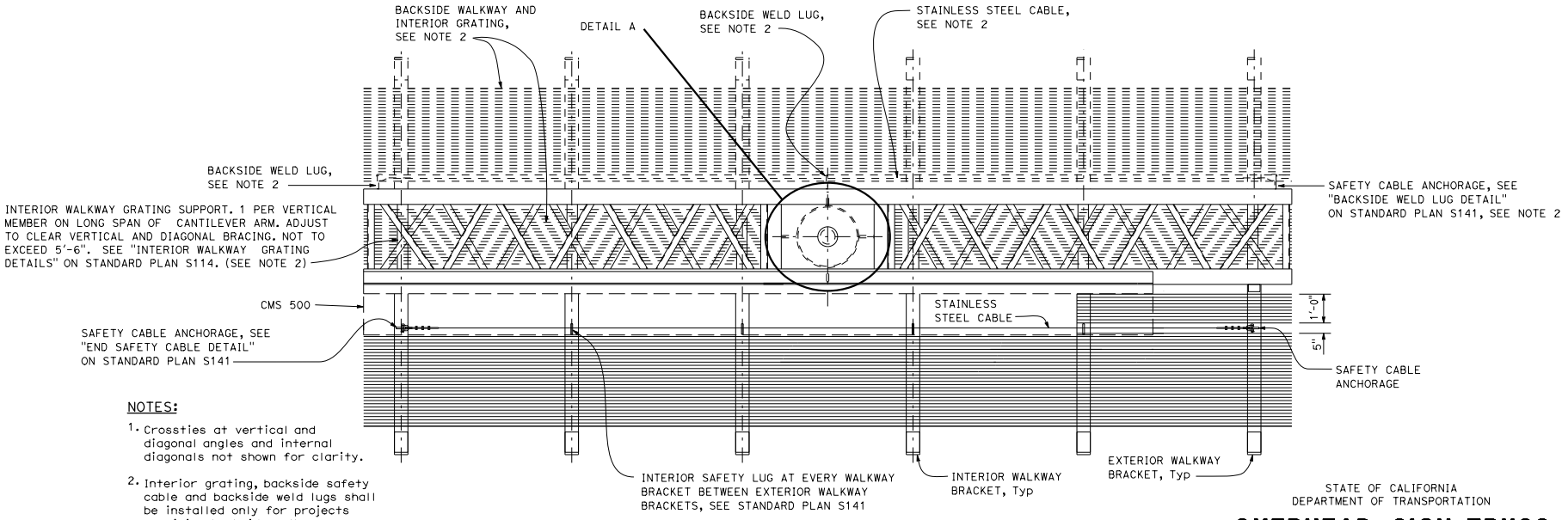
PLAN

DETAIL A

NOTE:

Drill thru outer collar and post wall for bolts. Provide contoured washers and hardened washers under bolt head and nut. Contoured washers to be 3" x 3" x 5/16" Min. Grind face to fit.

BOLT-ACCESS HOLE
Single Post Type



NOTES:

1. Crossties at vertical and diagonal angles and internal diagonals not shown for clarity.
2. Interior grating, backside safety cable and backside weld lugs shall be installed only for projects requiring backside walkways.

PLAN

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

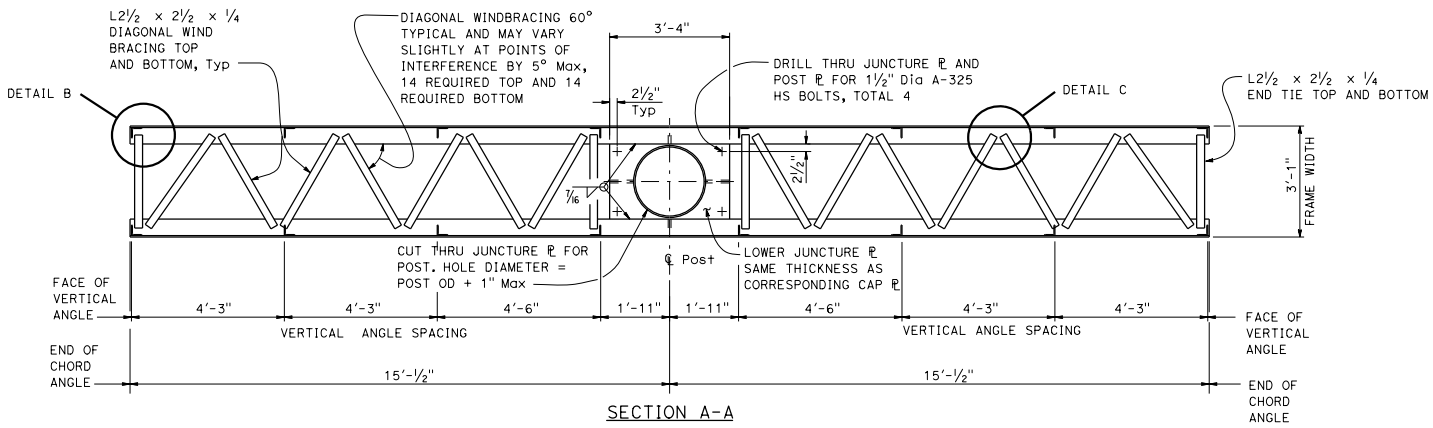
OVERHEAD SIGN-TRUSS
SINGLE POST TYPE
PLAN AND UPPER BOLT DETAILS
BALANCED BUTTERFLY
CHANGEABLE MESSAGE SIGNS
MODEL 500

NO SCALE

S107

1-29-18

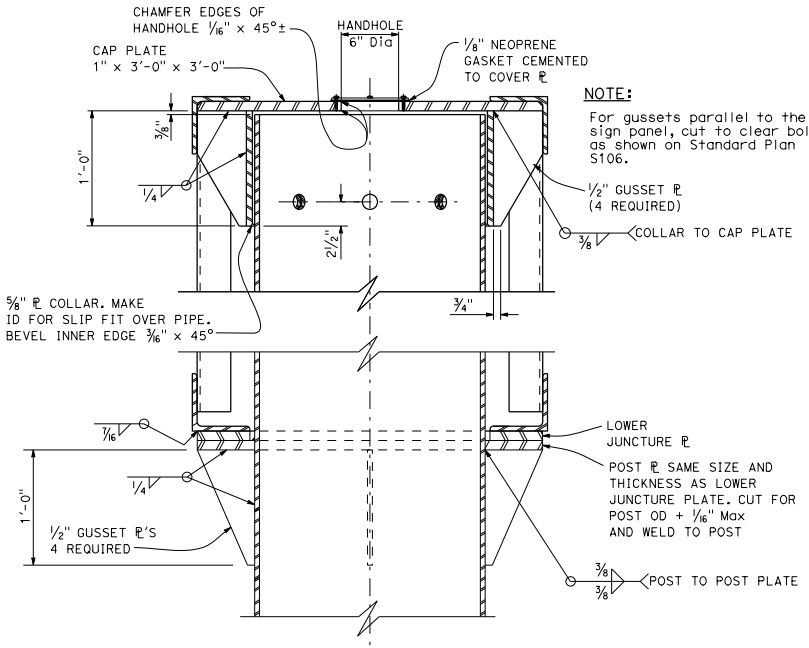
Return to Table of Contents



SECTION A-A

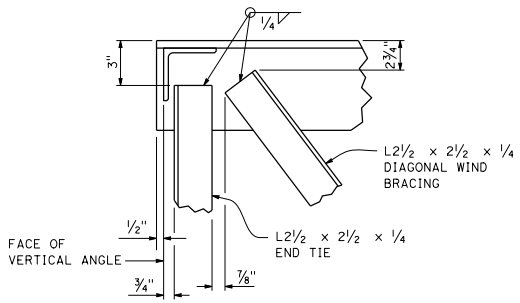
LOWER JUNCTURE CONNECTION

See Standard Plan S106

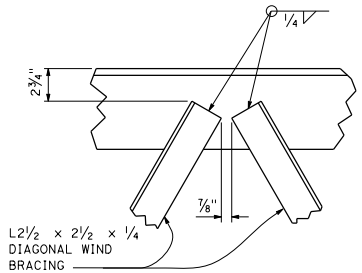


SECTION B-B

See Standard Plan S106



DETAIL B



DETAIL C

NOTES:

1. In all cases, truss shall be supported at lower juncture connection.
2. Post to truss connections shall be fitted in shop.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE FRAME JUNCTURE DETAILS BALANCED BUTTERFLY CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S108

2018 STANDARD PLAN S108

1-29-18

Return to Table of Contents

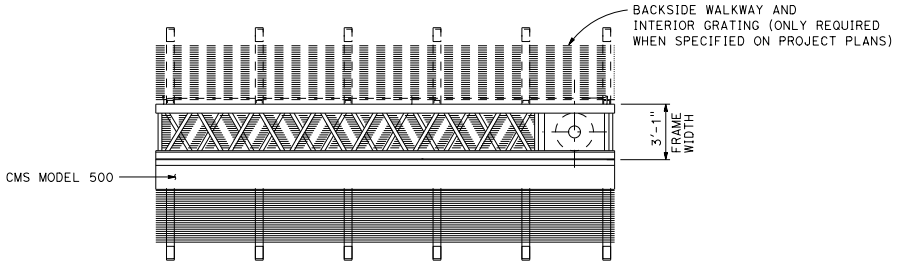
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

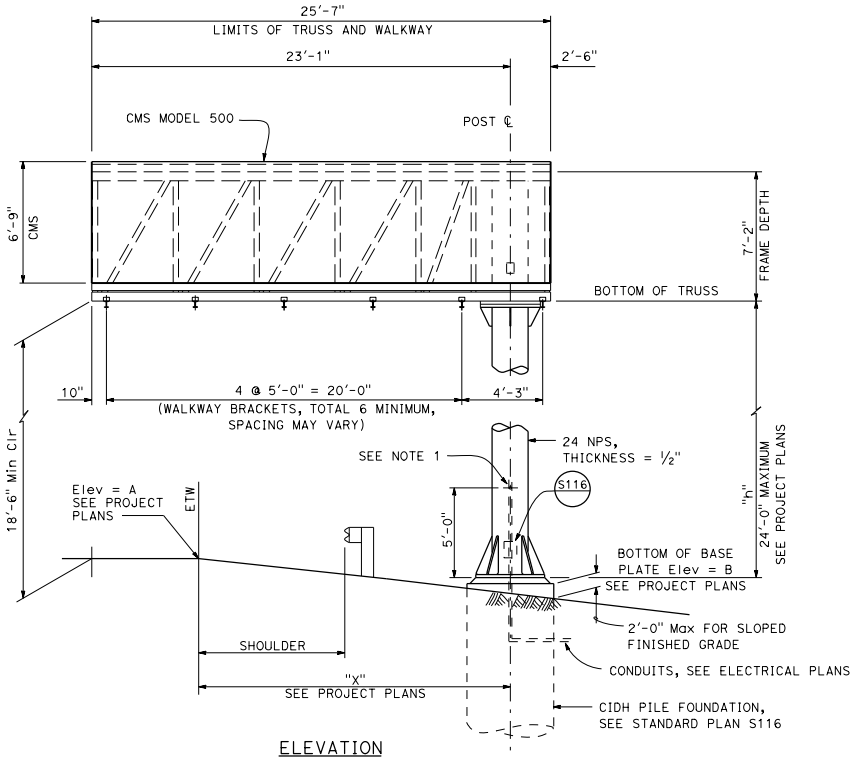
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

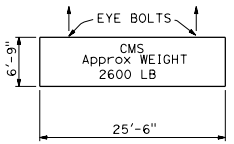
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN



ELEVATION



LIFTING DIAGRAM

NOTES:

1. Drill and tap for 2½" recessed pipe plug.
2. For location and elevation of sign structure see Project Plans.
3. Sign support post shall be raked out of plumb with leveling nuts to make the bottom of the sign frame level.
4. At final position of post, top and bottom nuts shall be tightened against base plate.
5. For "General Notes", see Standard Plan S101.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE LAYOUT FULL CANTILEVER CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S109

2018 STANDARD PLAN S109

1-29-18

Return to Table of Contents

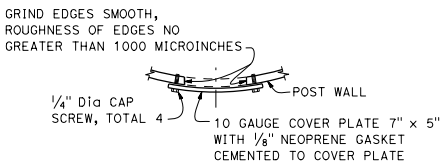
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

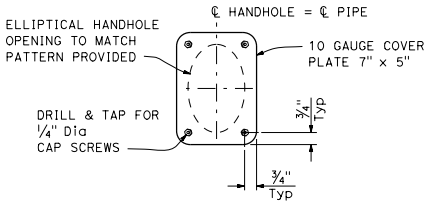
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

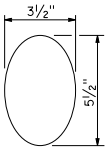
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

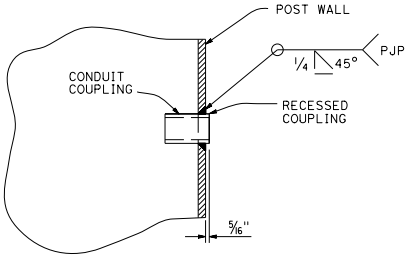


ELEVATION

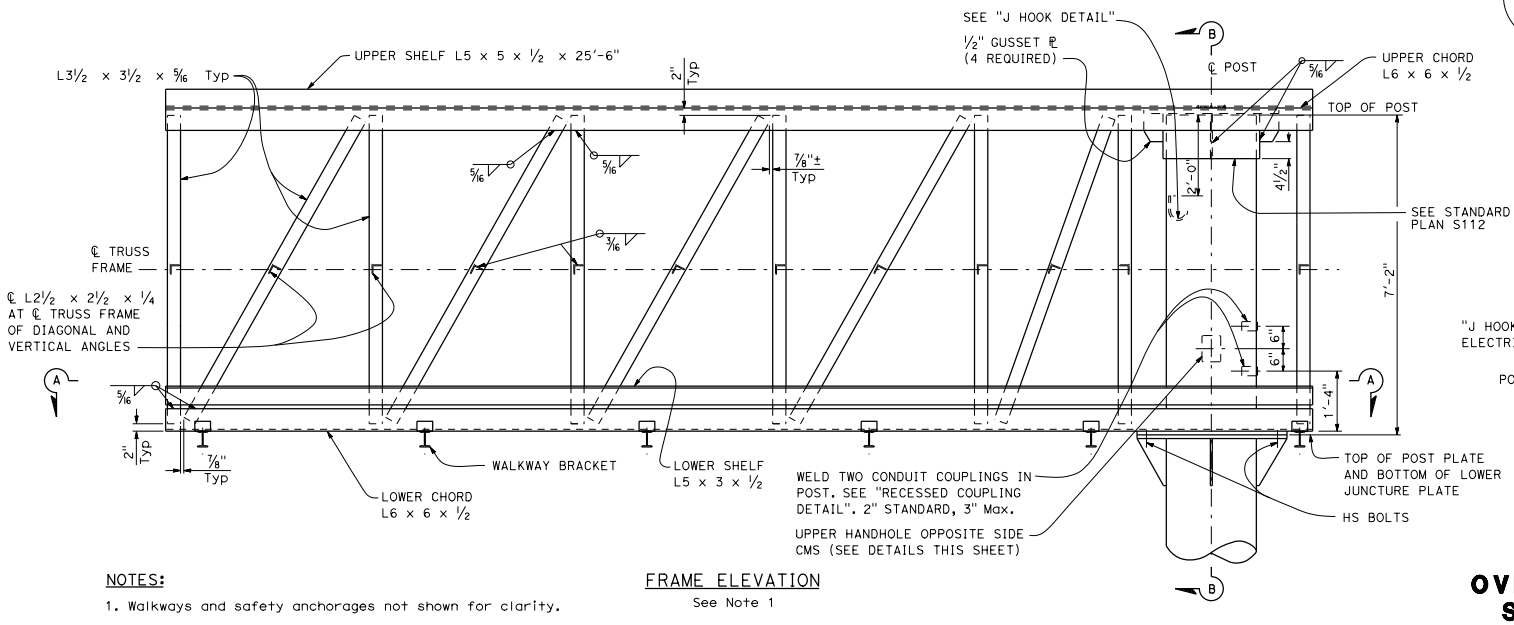


PATTERN OF ELLIPTICAL HANDHOLE CUT OUT

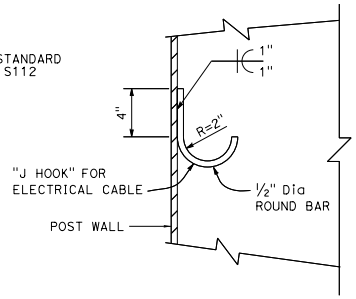
UPPER HANDHOLE AND COVER DETAILS



RECESSED COUPLING DETAIL



FRAME ELEVATION
See Note 1



J HOOK DETAIL

NOTES:

1. Walkways and safety anchorages not shown for clarity.
2. For Section B-B details, see Standard Plan S112.
3. For Section A-A details, including vertical angle spacing, see Standard Plan S112.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE STRUCTURAL FRAME DETAILS FULL CANTILEVER CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S110

1-29-18

Return to Table of Contents

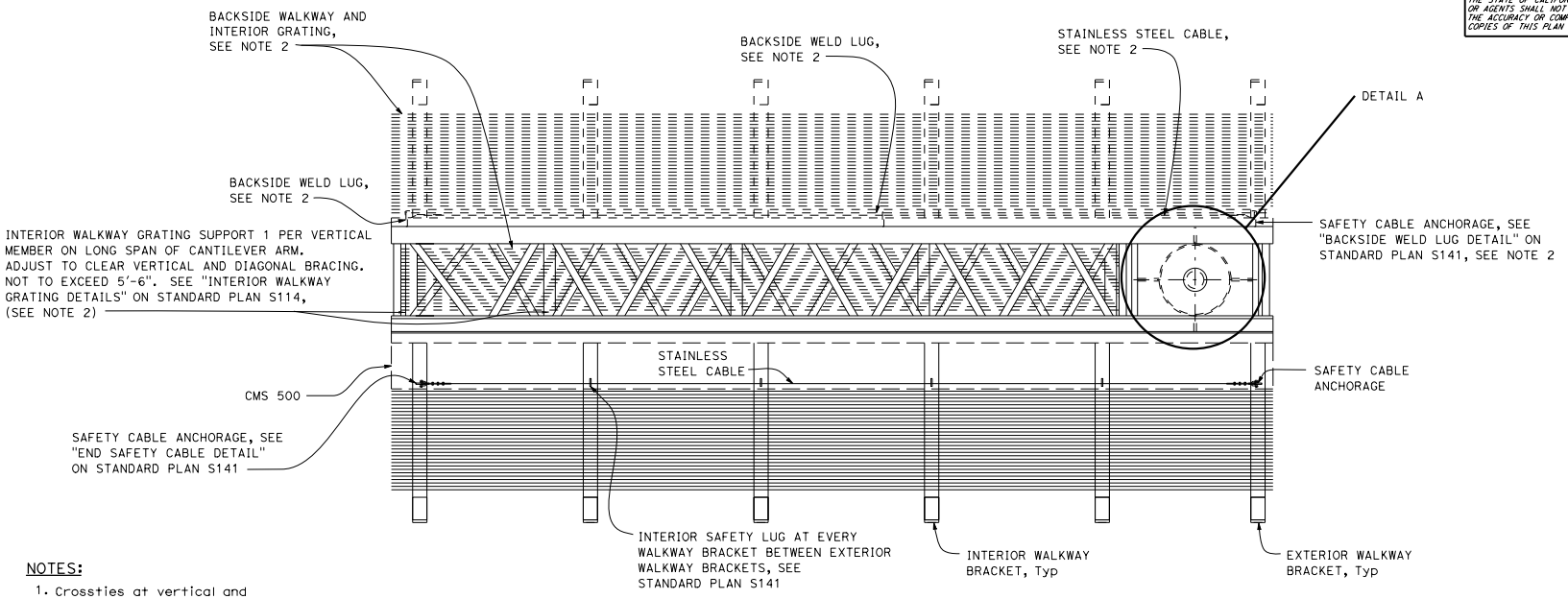
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

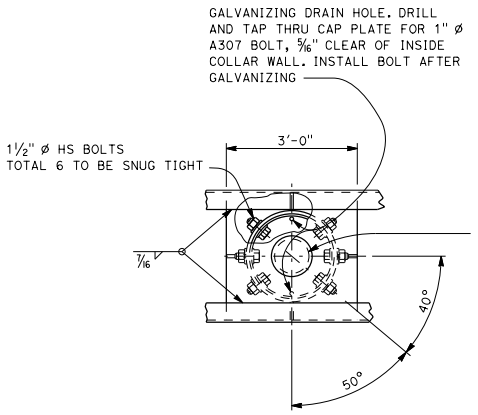
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PLAN

NOTES:

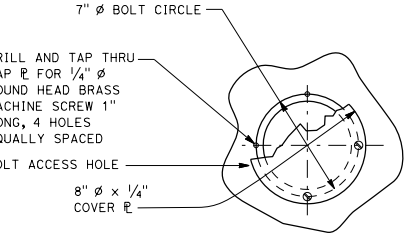
1. Crossties at vertical and diagonal angles and internal diagonals not shown for clarity.
2. Interior grating, backside safety cable and backside weld lugs shall be installed only for projects requiring backside walkways.



DETAIL A

NOTE:

Drill thru outer collar and post wall for bolts. Provide contoured washers and hardened washers under bolt head and nut. Contoured washers to be 3" x 3" x 5/16" Min Grind face to fit.



PLAN

BOLT-ACCESS HOLE
Single Post Type

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE PLAN AND UPPER BOLT DETAILS FULL CANTILEVER CHANGEABLE MESSAGE SIGNS MODEL 500

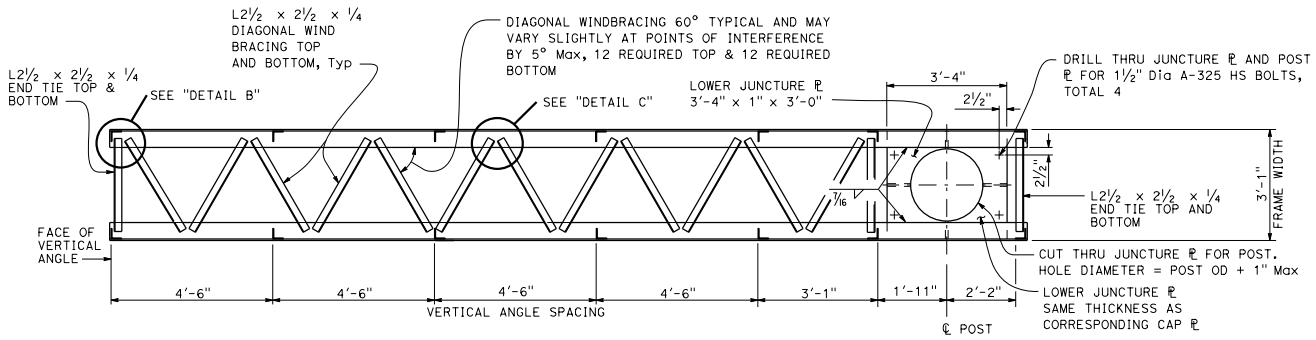
NO SCALE

S111

1-29-18

2018 STANDARD PLAN S111

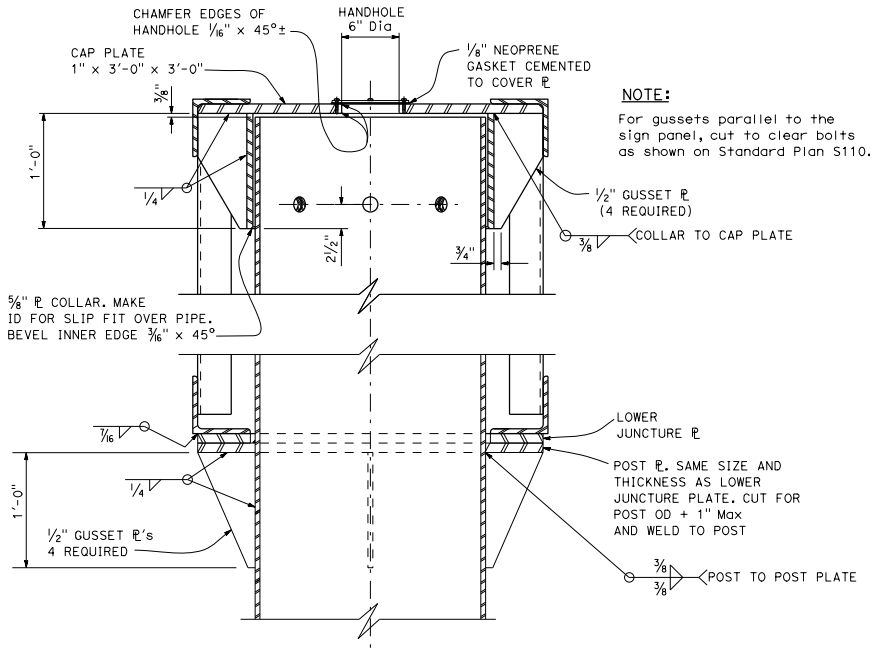
Return to Table of Contents



SECTION A-A

LOWER JUNCTURE CONNECTION

See Standard Plan S110

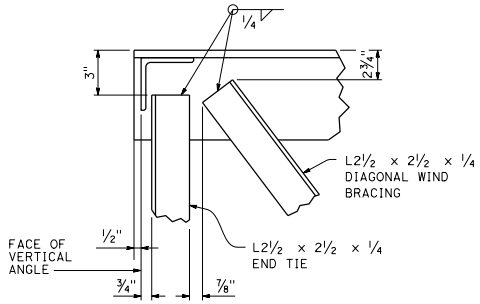


SECTION B-B

See Standard Plan S110

NOTE:

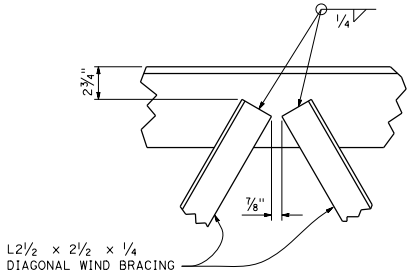
For gussets parallel to the sign panel, cut to clear bolts as shown on Standard Plan S110.



DETAIL B

NOTES:

1. In all cases truss shall be supported at lower juncture connection.
2. Post to truss connections shall be fitted in shop.



DETAIL C

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

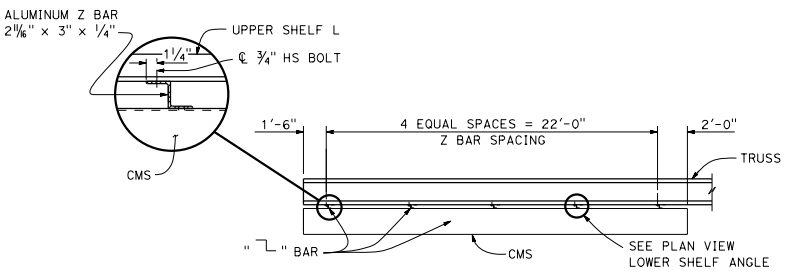
OVERHEAD SIGN-TRUSS SINGLE POST TYPE FRAME JUNCTURE DETAILS FULL CANTILEVER CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S112

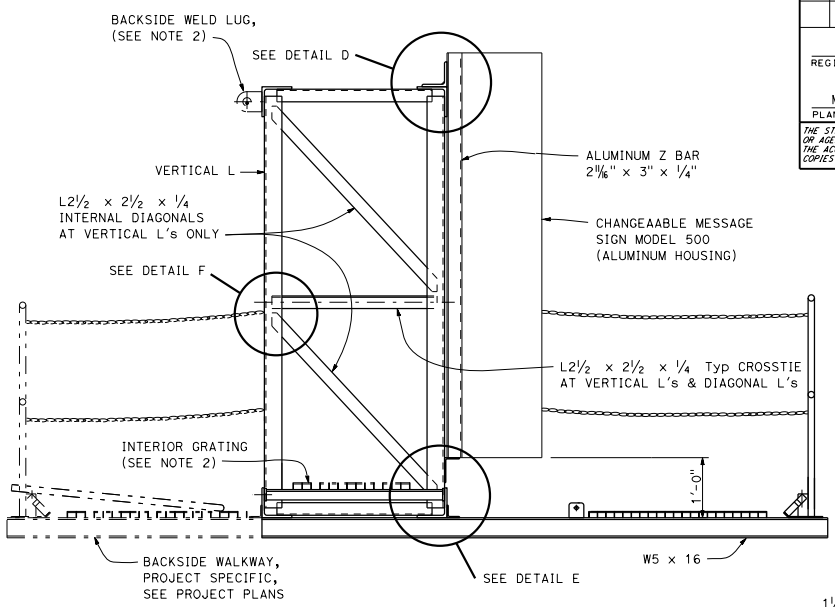
1-29-18

Return to Table of Contents



ALUMINUM Z BAR SPACING

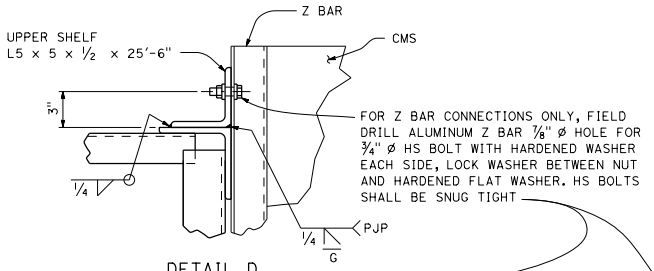
NOTE:
Contractor shall verify Z bar spacing prior to drilling holes in shelf angle.



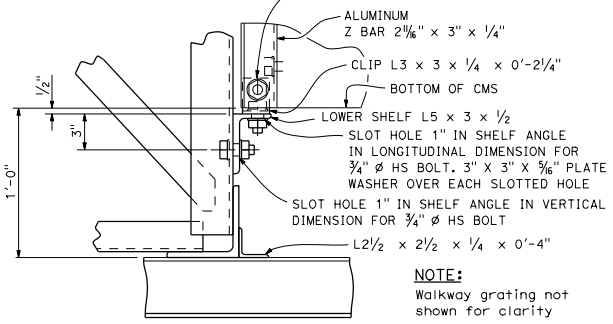
TYPICAL SECTION FRAME

NOTES:

1. Diagonal angles in plane of truss not shown. Bracing shown is at all vertical angles of truss.
2. Interior grating and backside weld lugs shall be installed only for projects requiring backside walkways.

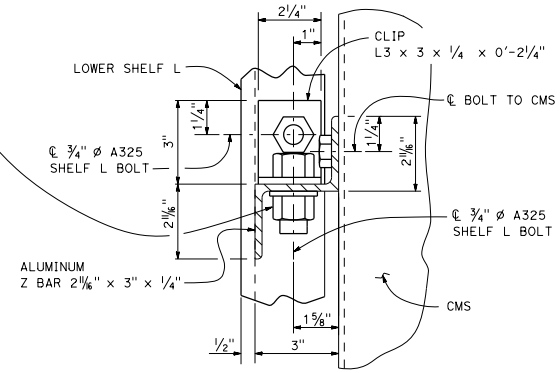


DETAIL D

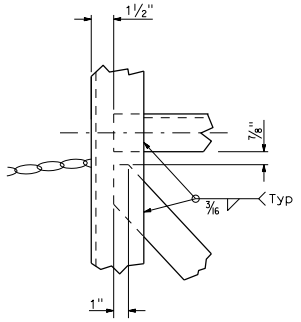


NOTE:
Walkway grating not shown for clarity

DETAIL E



PLAN VIEW Z BAR AT LOWER SHELF ANGLE



DETAIL F

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE MOUNTING DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

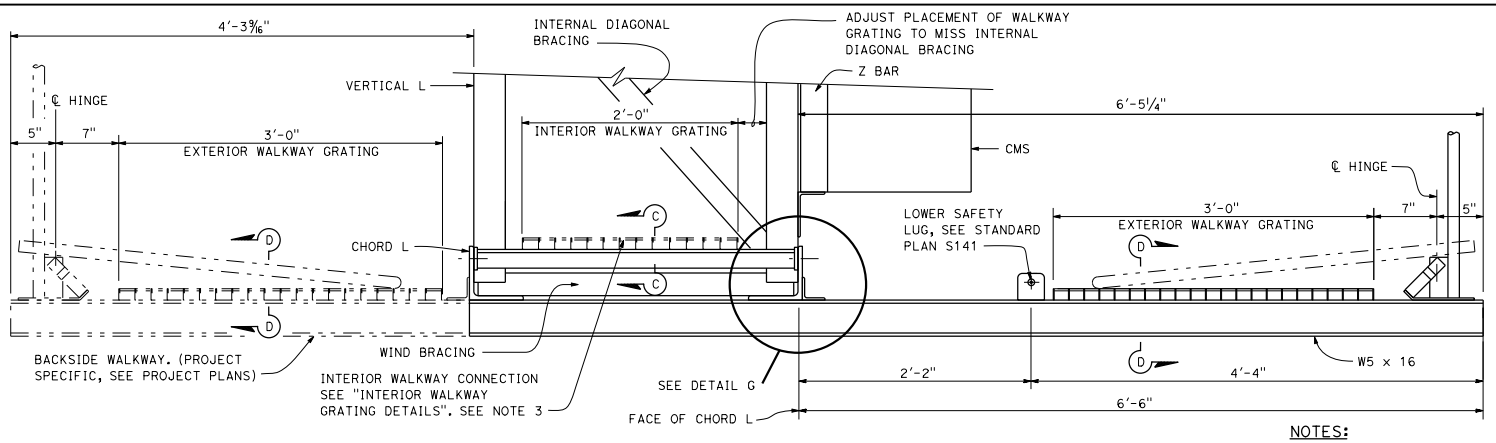
REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

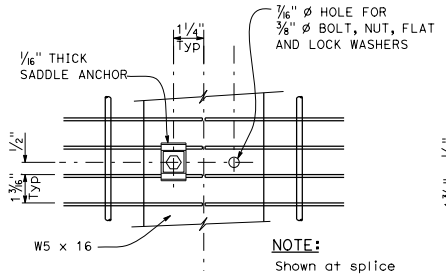
S113

1-29-18

Return to Table of Contents

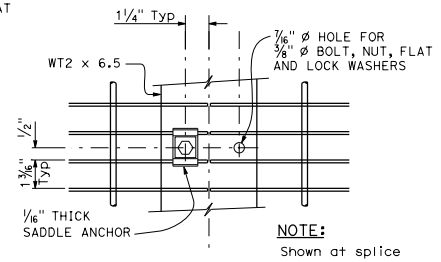


TYPICAL WALKWAY SECTION



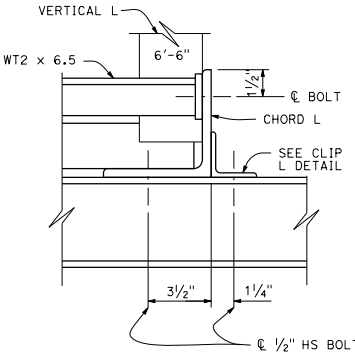
PLAN

EXTERIOR WALKWAY GRATING DETAILS



PLAN

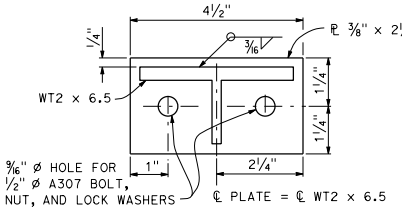
INTERIOR WALKWAY GRATING DETAILS



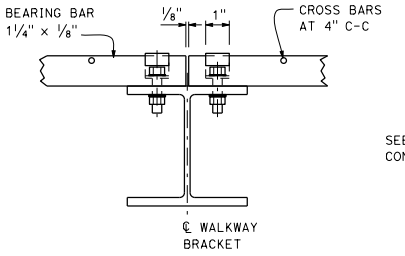
DETAIL G

NOTES:

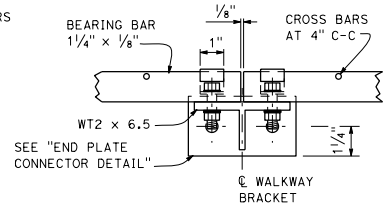
1. Welded type grating shall have 1 1/4″ x 1/8″ bearing bars at 1 3/16″ centers with 1/4″ diameter (or equal) cross bars at 4″ centers. If mechanical lock grating is used, it shall be equal in strength to the welded type. Alternate hold-down clips may be submitted for approval.
2. Walkway grating to be continuous (no splices) over as many walkway brackets as practical and consistent with fabrication, ease of handling and assembly.
3. Interior grating shall be installed for project requiring backside walkways.



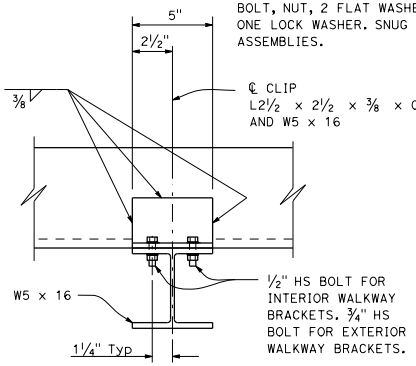
END PLATE CONNECTOR DETAIL



SECTION D-D



SECTION C-C



CLIP L DETAIL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Andrew A. Bui — No. C63560 — Exp. 9-30-18 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE WALKWAY DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500

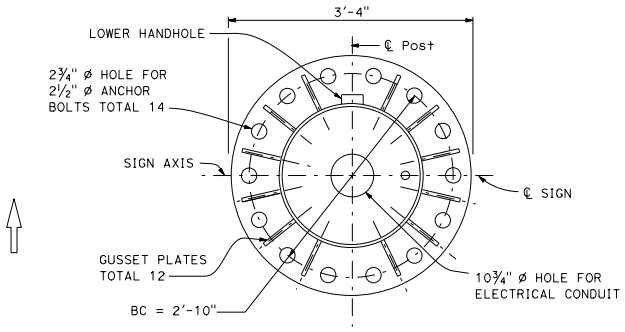
NO SCALE

S114

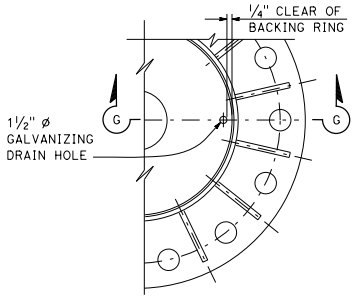
2018 STANDARD PLAN S114

1-29-18

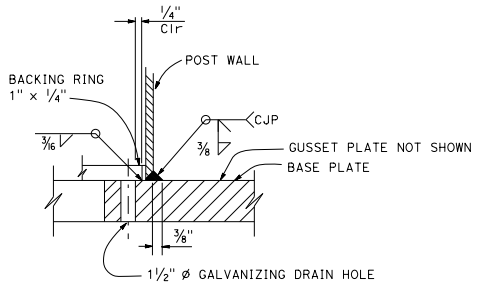
Return to Table of Contents



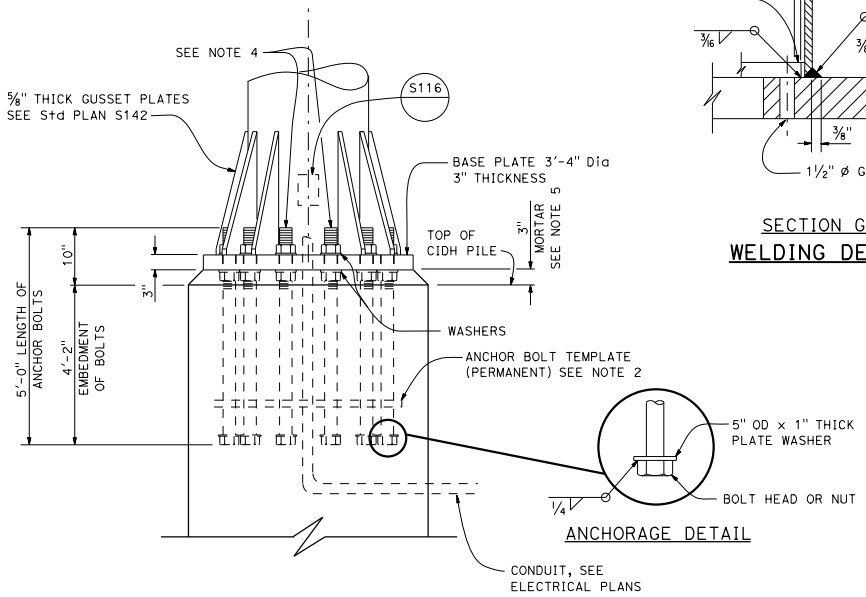
14 BOLTS
BASE PLATE DETAILS



GALVANIZING HOLE LAYOUT

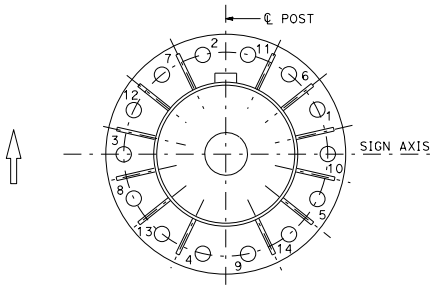


SECTION G-G
WELDING DETAIL



ANCHORAGE DETAIL

ELEVATION



TIGHTENING SEQUENCE

NOTES:

1. Thread upper 10" and galvanize upper 1'-0" of the anchor bolts.
2. Provide anchor bolt templates during installation of anchor bolts. Templates to match base plate anchor bolts pattern. See Standard Plans S3 for typical use of templates. OD = 3'-2', ID = 2'-6", hole = 2⅝" Max. Permanent template thick = ¾", tempporary template thick = ½"
3. Following initial tightening. Upper nuts shall be brought to a snug tight condition. This can be obtained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Snug tightening shall progress systematically according to the tightening sequence as shown. Upper nuts and washers to have full even bearing on base plate.
4. 2½" ø Anchor bolts with nut, leveling nut, 2 flat washers, and plate washer per bolt. Leveling nuts and washers to be adjusted for full even bearing on base plate prior to final tightening of upper nuts. (See Note 3).
5. For drain holes and central void in mortar see Standard Plan ES-6B detail N.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

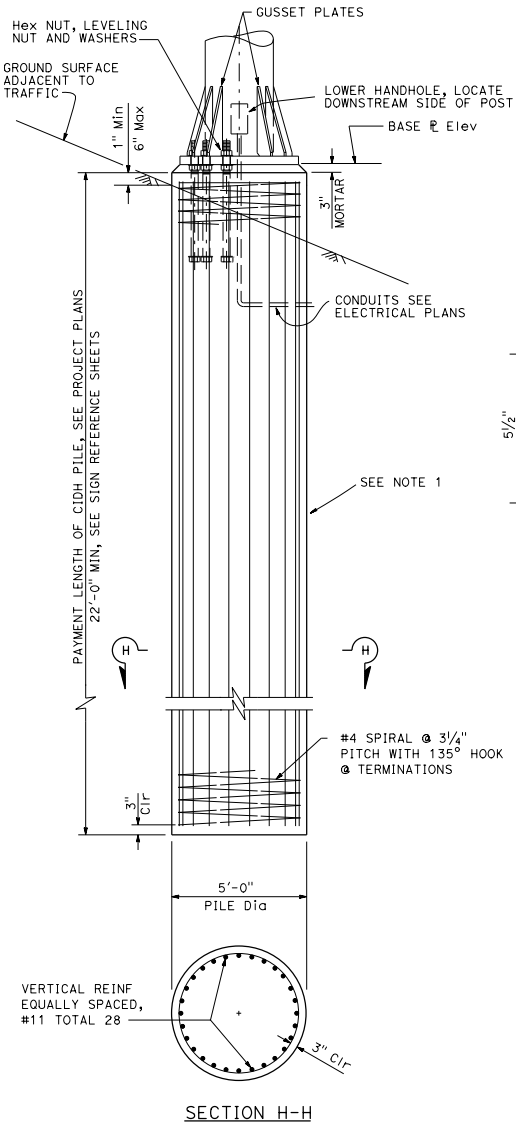
OVERHEAD SIGN-TRUSS SINGLE POST TYPE ANCHORAGE AND BASE PLATE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S115

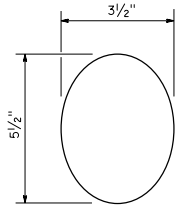
1-29-18

Return to Table of Contents

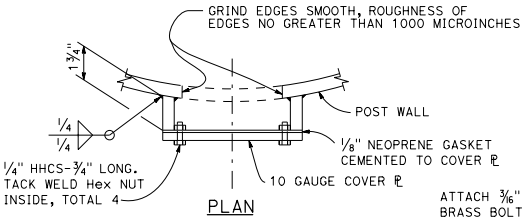


SECTION H-H

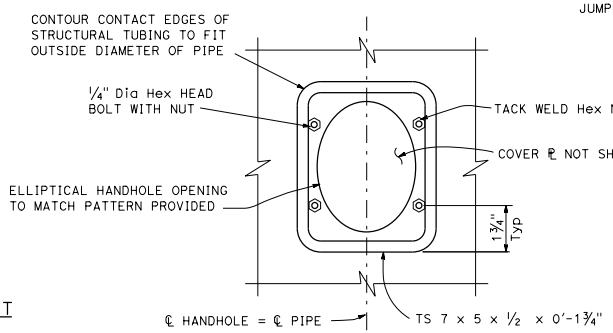
CIDH PILE FOUNDATION DETAILS



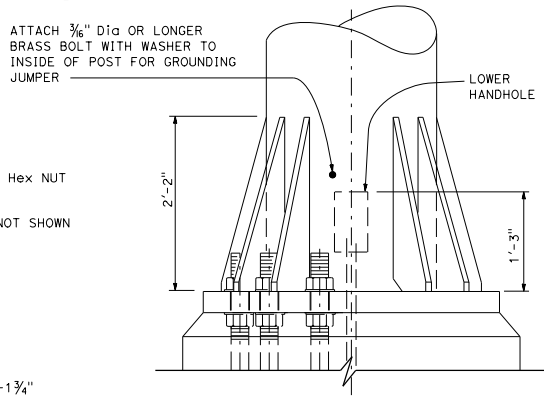
PATTERN OF ELLIPTICAL HANDHOLE CUT OUT



PLAN

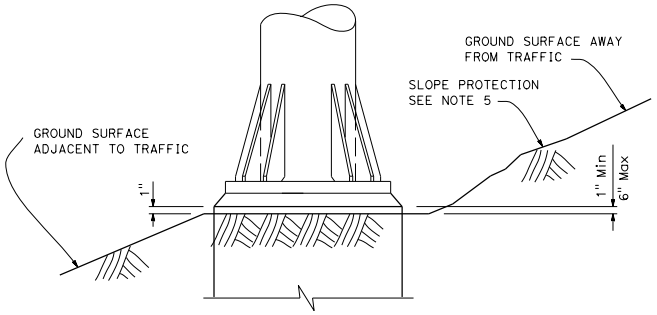


ELEVATION



POST BASE ELEVATION

LOWER HANDHOLE AND COVER DETAILS



DETAIL C

NOTES:

1. Pile shall be placed against undisturbed material.
2. Primer and paint post interior from base plate to 6" above lower handhole-unless post is galvanized.
3. On single post sign structures, the post shall be raked out of plumb, with the use of leveling nuts to make the bottom of the sign frame level.
4. When foundation is located on a steep slope with exposed face of concrete adjacent to traffic, see "DETAIL C".
5. Slope protection required when indicated on Project Plans.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Andrew A. Bui
No. C63560
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

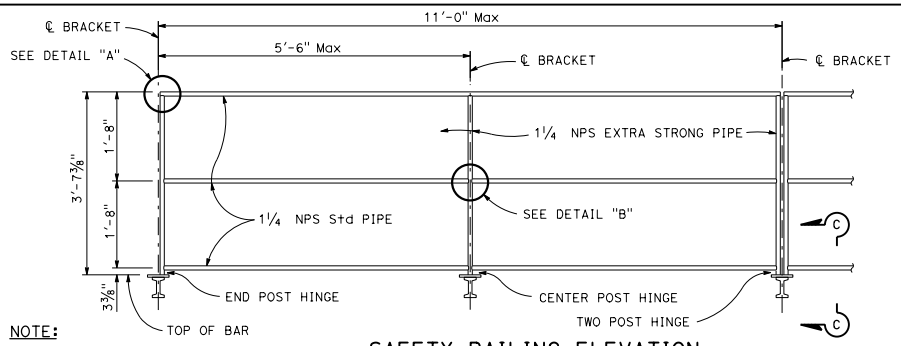
OVERHEAD SIGN-TRUSS SINGLE POST TYPE FOUNDATION AND MISCELLANEOUS DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500

NO SCALE

S116

1-29-18

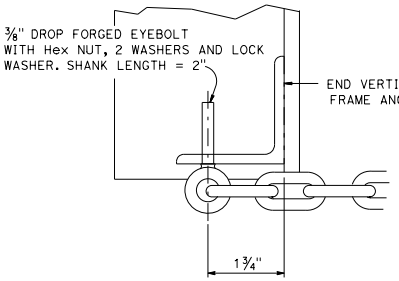
Return to Table of Contents



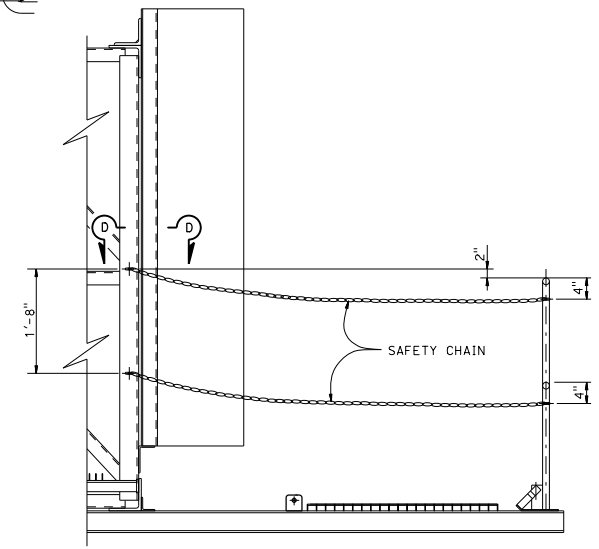
NOTE:
Chain assembly behind
(see detail this page)

SAFETY RAILING ELEVATION

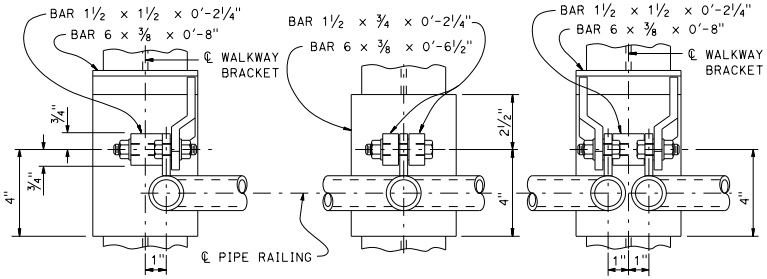
NOTE:
See Standard Plans
S101 and S105 and S109
for walkway bracket spacing.



SECTION D-D

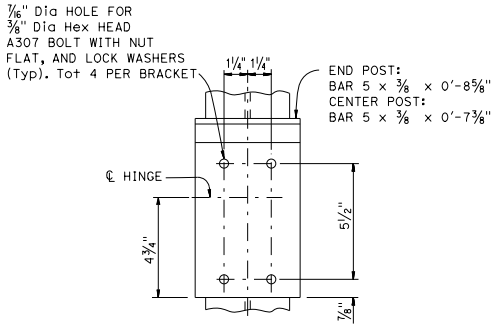


CHAIN ASSEMBLY

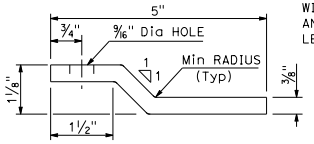


END POST CENTER POST TWO POST

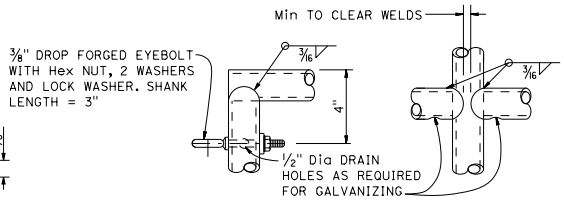
WELDED HINGE - PLAN



TYPICAL BOLTED (ALTERNATIVE) HINGED CONNECTION

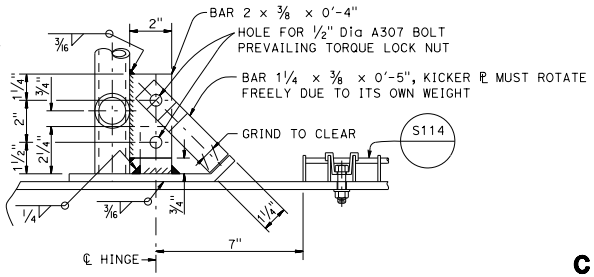


PLAN - KICKER BAR



DETAIL "A" DETAIL "B"

NOTE:
Alternative venting methods may be
used if approved by the Engineer.



SECTION C-C ELEVATION VIEW

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE WALKWAY SAFETY RAILING DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500 AND 510

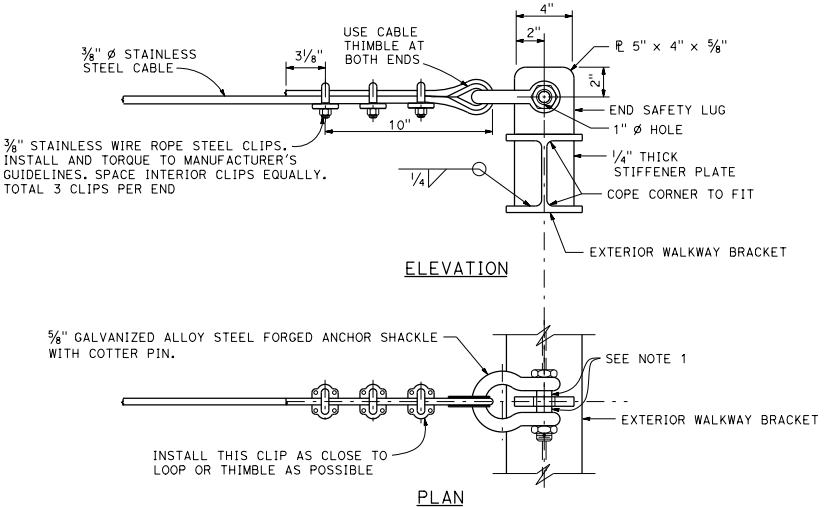
NO SCALE

S140

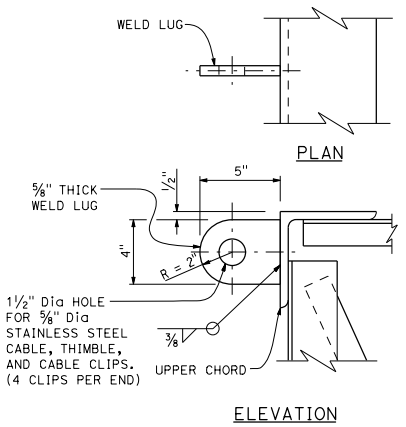
2018 STANDARD PLAN S140

1-29-18

Return to Table of Contents



END SAFETY CABLE DETAIL

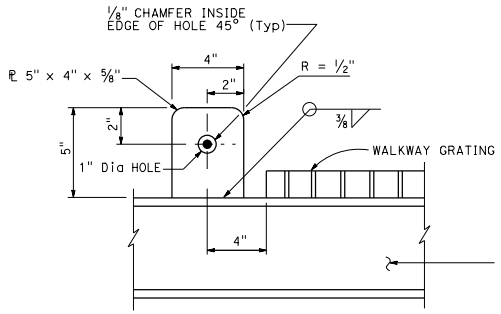


BACKSIDE WELD LUG DETAIL

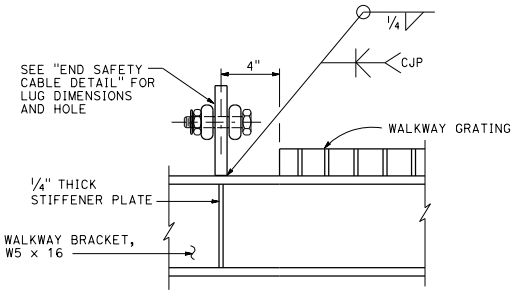
NOTE: Backside weld lug shall be installed only for projects requiring backside walkways.

NOTES:

1. Place an equal amount of washers on each side to align cable with end lug without restricting shakle bolt rotation or contacting cable.
2. For walkway grating details, see Standard Plan S114.



INTERIOR SAFETY LUG DETAIL



END SAFETY LUG DETAIL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE SAFETY CABLE ANCHORAGE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500 AND 510

NO SCALE

S141

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

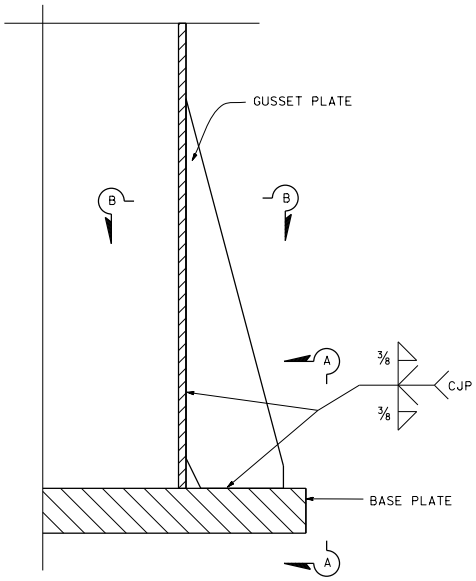
NOTES:

1. All gussets to be same height.
2. Provide a smooth transition from gusset plate to tube.

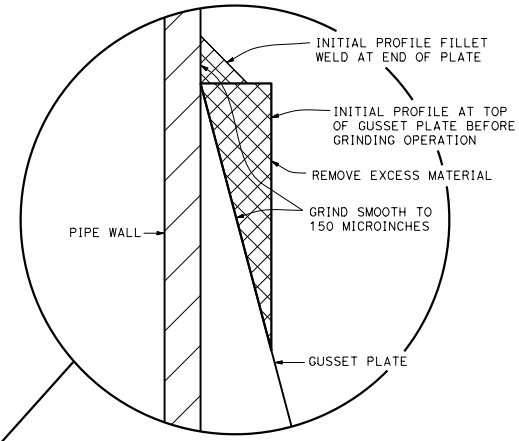
LEGEND:

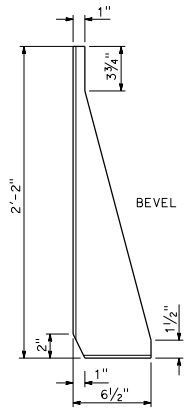
NEW

REMOVAL



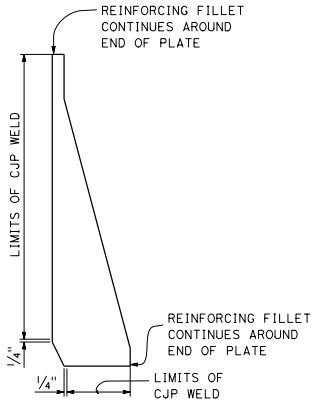
WELD DETAILS





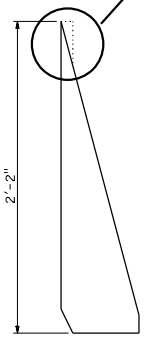
GUSSET PLATE

(Initial Shape)

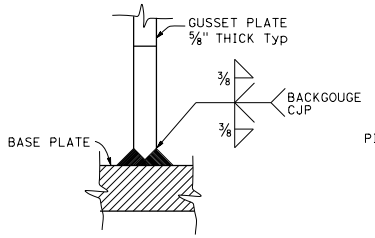


GUSSET PLATE WELDING

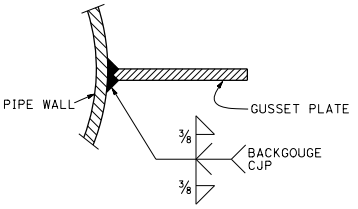
(See Weld Details)



GUSSET PLATE GRINDING



SECTION A-A



SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN-TRUSS SINGLE POST TYPE GUSSET PLATE DETAILS CHANGEABLE MESSAGE SIGNS MODEL 500 AND 510

NO SCALE

S142

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

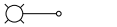
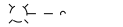
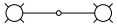
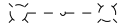
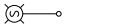
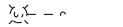
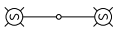
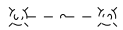
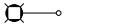
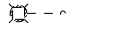
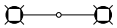
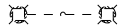
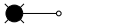
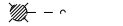
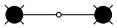
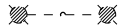
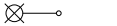
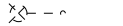
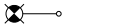
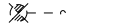
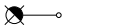
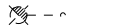
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND:

AB	ABANDON. IF APPLIED TO CONDUIT, REMOVE CONDUCTORS
BC	INSTALL PULL BOX IN EXISTING CONDUIT RUN
BP	PEDESTRIAN BARRICADE, TYPE AS INDICATED ON PLAN
CB	INSTALL CONDUIT INTO EXISTING PULL BOX
CC	CONNECT NEW AND EXISTING CONDUIT. REMOVE EXISTING CONDUCTORS AND INSTALL CONDUCTORS AS INDICATED
CF	CONDUIT TO REMAIN FOR FUTURE USE. REMOVE CONDUCTORS. INSTALL PULL TAPE
DH	DETECTOR HANDHOLE
FA	FOUNDATION TO BE ABANDONED
IS	INSTALL SIGN ON SIGNAL MAST ARM
NS	NO SLIP BASE ON STANDARD
PEC	PHOTOELECTRIC CONTROL
PEU	PHOTOELECTRIC UNIT
RC	EQUIPMENT OR MATERIAL TO BE REMOVED AND BECOME THE PROPERTY OF THE CONTRACTOR
RE	REMOVE ELECTROLIER, FUSES AND BALLAST. TAPE ENDS OF CONDUCTORS
RL	RELOCATE EQUIPMENT
RR	REMOVE AND REUSE EQUIPMENT
RS	REMOVE AND SALVAGE EQUIPMENT
SC	SPLICE NEW TO EXISTING CONDUCTORS
SD	SERVICE DISCONNECT
TSP	TELEPHONE SERVICE POINT

STANDARD ELECTROLIER

NEW	EXISTING	STANDARD TYPE
		15
		15D
		15 STRUCTURE
		15D STRUCTURE
		21
		21D
		21 STRUCTURE
		21D STRUCTURE
		30
		31
		32

MISCELLANEOUS ELECTROLIERS

NEW	EXISTING	
		LUMINAIRE ON WOOD POLE
		NON-STANDARD ELECTROLIER (SEE PROJECT LEGEND)
		CITY ELECTROLIER
		ELECTROLIER FOUNDATION (FUTURE INSTALLATION)

NOTES:

1. LED luminaires shall be Roadway 2 when installed on Type 21, 21D, 30, 31 and 32 Standards, unless otherwise specified. LED luminaires shall be Roadway 1 when installed on other type standards or poles, unless otherwise specified.

SOFFIT AND WALL-MOUNTED LUMINAIRES

PENDANT SOFFIT LUMINAIRE, 70 W HPS UNLESS OTHERWISE SPECIFIED

FLUSH-MOUNTED SOFFIT LUMINAIRE, 70 W HPS UNLESS OTHERWISE SPECIFIED

WALL-MOUNTED LUMINAIRE, 70 W HPS UNLESS OTHERWISE SPECIFIED

EXISTING SOFFIT OR WALL-MOUNTED LUMINAIRE TO REMAIN UNMODIFIED

EXISTING SOFFIT OR WALL-MOUNTED LUMINAIRE TO BE MODIFIED AS SPECIFIED

NOTE:

Arrow indicates "street side" of luminaire.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LEGEND)

NO SCALE

ES-1A

2018 STANDARD PLAN ES-1A

1-29-18

Return to Table of Contents

CONDUIT

NEW	EXISTING	
		LIGHTING CONDUIT, UNLESS OTHERWISE INDICATED OR NOTED
		TRAFFIC SIGNAL CONDUIT
C	c	COMMUNICATION CONDUIT
T	t	TELEPHONE CONDUIT
F	f	FIRE ALARM CONDUIT
FO	fo	FIBER OPTIC CONDUIT
		CONDUIT TERMINATION
R	r	CONDUIT RISER ATTACHED TO THE STRUCTURE OR SERVICE POLE

SERVICE EQUIPMENT

NEW	EXISTING	
OH	oh	OVERHEAD LINES
U	U	WOOD POLE, "U" INDICATES UTILITY OWNED
		POLE GUY WITH ANCHOR
		UTILITY TRANSFORMER - GROUND MOUNTED
III	III	SERVICE EQUIPMENT ENCLOSURE TYPE. DOOR INDICATES FRONT OF ENCLOSURE
T	T	TELEPHONE DEMARCATION CABINET

POLE-MOUNTED SERVICE DESIGNATION

TYPE H SERVICE, 28'-10" — TYPE OF INSTALLATION AND POLE HEIGHT ABOVE GRADE

FLASHING BEACON

NEW	EXISTING	
R	R	FLASHING BEACON (ONE VEHICLE SIGNAL HEAD WITH BACKPLATE AND VISOR) "R" INDICATES RED INDICATION, "Y" INDICATES YELLOW INDICATION
Y Y	Y Y	FLASHING BEACON WITH TYPE 15-FBS STANDARD AND A SIGN.
R R	R R	FLASHING BEACON WITH TYPES 9, 9A OR 9B SIGN UNLESS OTHERWISE SPECIFIED OR INDICATED

SIGNAL EQUIPMENT

NEW	EXISTING	
		PEDESTRIAN SIGNAL HEAD
		PUSH BUTTON ASSEMBLY POST
		PEDESTRIAN BARRICADE
		VEHICLE SIGNAL HEAD (WITH BACKPLATE)
		VEHICLE SIGNAL HEAD WITH ANGLE VISOR
PV	PV	MODIFICATIONS OF BASIC SYMBOL: "L" INDICATES ALL NON-ARROW SECTIONS LOUVERED "LG" INDICATES LOUVERED GREEN SECTION ONLY "PV" INDICATES ALL 12" SECTIONS PROGRAMMED VISIBILITY "8" INDICATES ALL 8" SECTIONS (ONLY WHEN SPECIFIED)
		VEHICLE SIGNAL HEAD CONSISTING OF RED, YELLOW AND GREEN LEFT ARROW SECTIONS
		VEHICLE SIGNAL HEAD CONSISTING OF RED AND YELLOW SECTIONS WITH AN UP GREEN ARROW SECTION
		VEHICLE SIGNAL HEAD (5 SECTION) CONSISTING OF RED, YELLOW AND GREEN SECTIONS WITH YELLOW AND GREEN RIGHT ARROW SECTIONS
		TYPE 15TS STANDARD WITH VEHICLE SIGNAL HEAD AND LUMINAIRE
		TYPE 21TS STANDARD WITH VEHICLE SIGNAL HEAD AND LUMINAIRE
		STANDARD WITH LUMINAIRE AND SIGNAL MAST ARMS AND ATTACHED VEHICLE SIGNAL HEADS
		TYPE 1 STANDARD WITH ATTACHED VEHICLE SIGNAL HEADS
		STANDARD WITH A SIGNAL MAST ARM, ATTACHED VEHICLE SIGNAL HEADS AND INTERNALLY ILLUMINATED STREET NAME SIGN
		CONTROLLER ASSEMBLY. DOOR INDICATES FRONT OF CABINET

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — ELECTRICAL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

SIGNAL EQUIPMENT Cont

NEW	EXISTING	
		GUARD POST
		TYPE 1 STANDARD WITH RAMP METERING SIGN
		OPTICAL DETECTOR FOR THE EMERGENCY VEHICLE DETECTION

NOTES:

1. All signal sections shall be 12" unless shown otherwise.
2. Signal heads shall be provided with backplates unless shown otherwise.

ILLUMINATED OVERHEAD SIGN

NEW	EXISTING	
		SINGLE POST, SINGLE ILLUMINATED SIGN, BALANCED BUTTERFLY
		SINGLE POST, DOUBLE ILLUMINATED SIGN, BALANCED BUTTERFLY
		SINGLE POST, SINGLE ILLUMINATED SIGN, FULL CANTILEVER
		DOUBLE POST, SINGLE ILLUMINATED SIGN
		SINGLE ILLUMINATED SIGN MOUNTED ON STRUCTURE
		DOUBLE POST, SINGLE ILLUMINATED SIGN WITH ELECTROLIER

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LEGEND)

NO SCALE

ES-1B

1-29-18

2018 STANDARD PLAN ES-1B

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

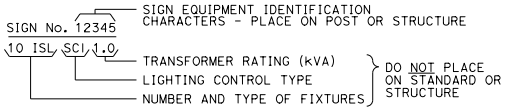
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

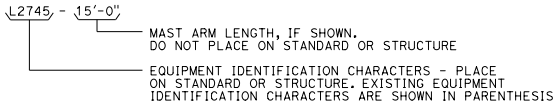
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

EQUIPMENT IDENTIFICATION

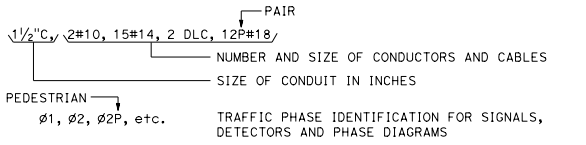
ILLUMINATED SIGN IDENTIFICATION:



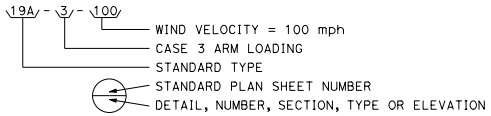
ELECTROLIER OR EQUIPMENT IDENTIFICATION:



CONDUIT AND CONDUCTOR IDENTIFICATION:



SIGNAL AND LIGHTING STANDARD (TYPICAL DESIGNATION):



MISCELLANEOUS EQUIPMENT

NEW	EXISTING	
CMS	cms	CHANGEABLE MESSAGE SIGN
		CLOSED CIRCUIT TELEVISION CAMERA
		HIGHWAY ADVISORY RADIO POLE AND ANTENNA
EMS	ems	LED EXTINGUISHABLE MESSAGE SIGN
M V	m v	DETECTION DEVICE M = MICROWAVE SENSOR V = VIDEO IMAGE SENSOR

WIRING DIAGRAM LEGEND

	EXTERNAL CONDUCTOR
	CONDUCTOR OR BUS
	TIE POINT
	CONTACTOR COIL
	CONTACTOR, NO CONTACT
	TERMINAL BLOCKS
	CONTACTOR, NC CONTACT
	ENCLOSURE BOND
	GROUNDING ELECTRODE
	CIRCUIT BREAKER
R	RECEPTACLE

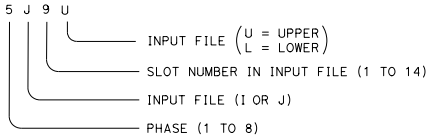
PULL BOXES

NEW	EXISTING	
		PULL BOX, No. 5 UNLESS OTHERWISE INDICATED OR NOTED
3	9A(21)	PULL BOX, ADDITIONAL DESIGNATIONS OR DESCRIPTIONS

3 No. 3½ PULL BOX
5 No. 5 PULL BOX
6 No. 6 PULL BOX
7 No. 7 PULL BOX (CEILING)
8 No. 8 PULL BOX
9 No. 9 PULL BOX (STRUCTURE)
9A No. 9A PULL BOX (STRUCTURE)

(C) COMMUNICATIONS PULL BOX
(E) PULL BOX WITH EXTENSION
(S) SPRINKLER CONTROL PULL BOX
(21) ANCHOR BOLTS AND CONDUIT FOR FUTURE INSTALLATION OF TYPE 21 STANDARD
(T) TRAFFIC PULL BOX
(TR) TAMPER-RESISTANT PULL BOX

VEHICLE DETECTOR DESIGNATION



NEW	EXISTING	
		TYPE A LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
		TYPE B LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
		TYPE C LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
		TYPE D LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
		TYPE E LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
		TYPE Q LOOP DETECTOR. OUTLINE OF SAW CUT SHOWN
DH	dh	DETECTOR HANDHOLE
		MICROWAVE OR VIDEO DETECTION ZONE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LEGEND AND ABBREVIATIONS)

NO SCALE

ES-1C

2018 STANDARD PLAN ES-1C

477

1-29-18

Return to Table of Contents

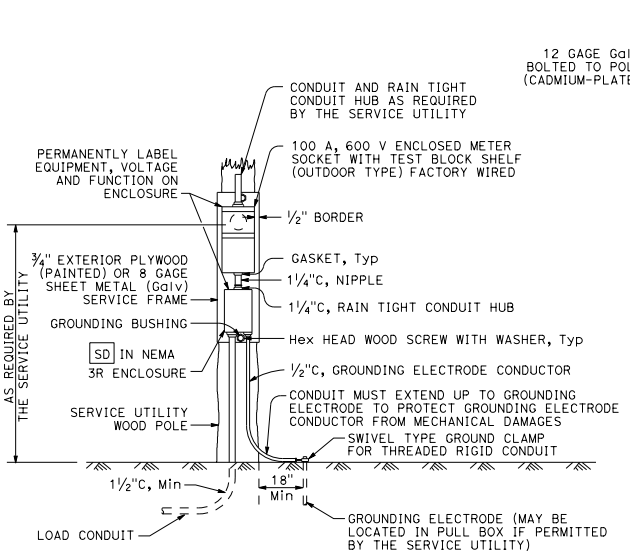
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

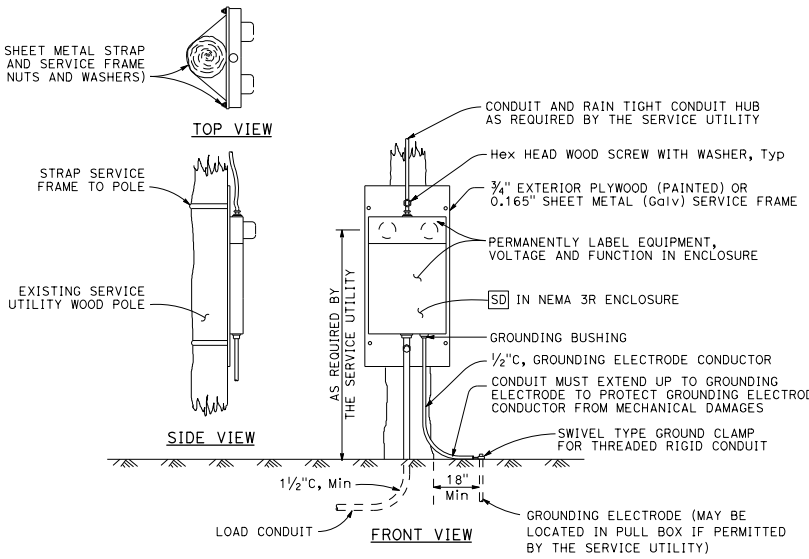
May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — ELECTRICAL — State of California

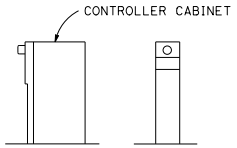
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



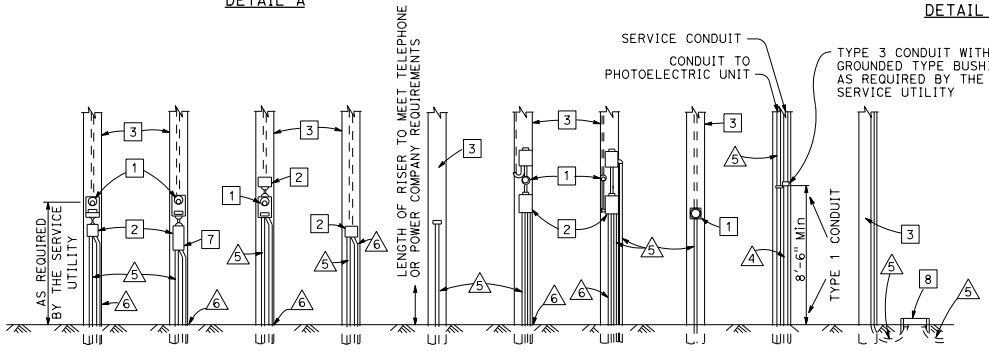
TYPE SCE-1
DETAIL A

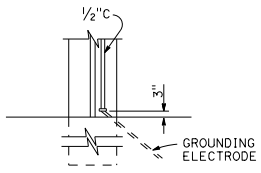


TYPE SCE-2
DETAIL B

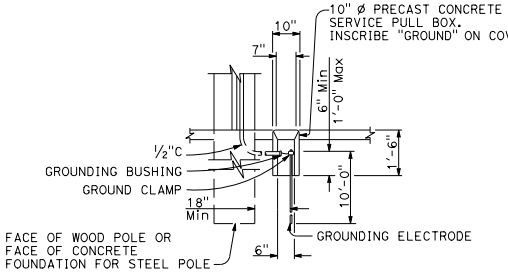


TYPE OF SERVICE (TYPICAL)
DETAIL C
See Notes 1 and 2





TYPE A
See Note 3



TYPE B
See Note 4

SERVICE GROUNDING
DETAIL E

LEGEND:

1. METER SOCKET.
2. SERVICE ENCLOSURE WITH A MINIMUM 60 A RATED MAIN CIRCUIT BREAKER, UNLESS OTHERWISE SHOWN.
3. A. UTILITY OWNED POLE. THE SERVICE UTILITY WILL FURNISH AND INSTALL REQUIRED SERVICE RISER, PEU WITH CONDUCTORS AND OTHER EQUIPMENT AS NEEDED.
   B. STATE OWNED POLE. THE CONTRACTOR SHALL FURNISH AND INSTALL REQUIRED SERVICE RISER AND EQUIPMENT.
4. 2"C, SERVICE CONDUIT MUST HAVE A GROUNDED TYPE BUSHING INSTALLED AT UPPER END OF THE METALLIC POLE RISER CONDUIT. A GROUNDING CONDUCTOR MUST BE ATTACHED TO THE BUSHING, CARRIED THROUGH THE CONDUIT RUN AND ATTACHED TO THE SERVICE EQUIPMENT ENCLOSURE'S GROUNDING ELECTRODE.
5. CONDUIT, LENGTH AND SIZE AS REQUIRED.
6. ½"C, 1#6. SEE DETAIL E.
7. FLASHING BEACON CONTROL ASSEMBLY.
8. SERVICE PULL BOX, No. 5 UNLESS OTHERWISE NOTED, FURNISHED AND INSTALLED BY THE CONTRACTOR. SERVICE UTILITY SHALL DETERMINE THE EXACT LOCATION.

POLE MOUNTED SERVICE INSTALLATIONS
DETAIL D

NOTES:

1. Type II service equipment enclosure mounted on the side of a controller cabinet.
2. Type III complete free-standing service equipment enclosure.
3. Ground clamp and required fittings must be accessible. Conduit must extend to protect grounding electrode conductor from mechanical damage.
4. Use where service utility requires 18" clearance between grounding electrode and the pole or service equipment enclosure. Installation shown is for sidewalk or paved areas. In unpaved areas, omit special service pull box and locate ground clamp above ground or locate ground clamp in nearest pull box.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SERVICE EQUIPMENT)

NO SCALE

ES-2A

1-29-18

Return to Table of Contents

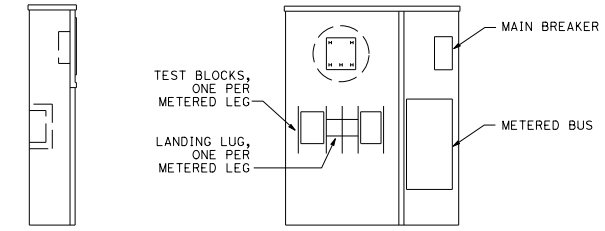
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

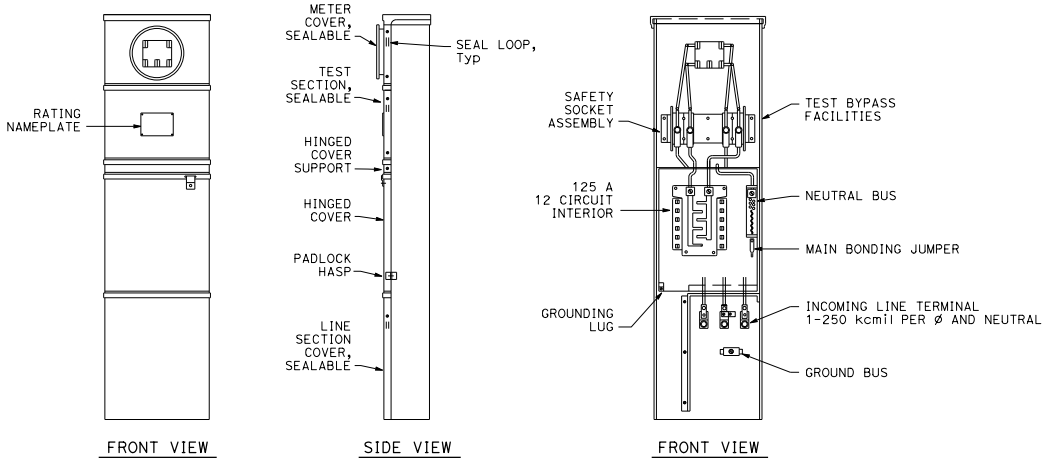
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPE II-A

NOTES:

1. In unpaved areas, a raised portland cement concrete pad of 2'-0" x 4" x width of service equipment enclosure or controller cabinet foundation shall be constructed in front of Type II service equipment enclosure.
2. Circuit breakers may be mounted in the vertical or horizontal position.



(Less covers and dead front panel)
For metered circuits only

TYPE II-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE TYPE II SERIES)

NO SCALE

ES-2B

2018 STANDARD PLAN ES-2B

1-29-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. The plan shows the approximate location of devices within the enclosure. Components may be rearranged, however, the "working" clearances within the service equipment enclosure shall be maintained.

2. In unpaved areas a raised portland cement concrete pad 2'-0" x 4" x width of foundation shall be constructed in front of new service equipment enclosure installation. Pad shall be set to elevation of foundation.

3. Plug-in circuit breakers may be mounted in the vertical or horizontal position. Cable-in/cable-out circuit breakers shall be mounted in the vertical position.

4. Type III-AF and Type III-BF service equipment enclosures shall have the meter viewing windows located on the front side of the service equipment enclosures.

5. Type III-AR and Type III-BR service equipment enclosure shall be similarly constructed as Type III-AF and Type III-BF respectively, except the meter viewing windows shall be located on the back side of the service equipment enclosures.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

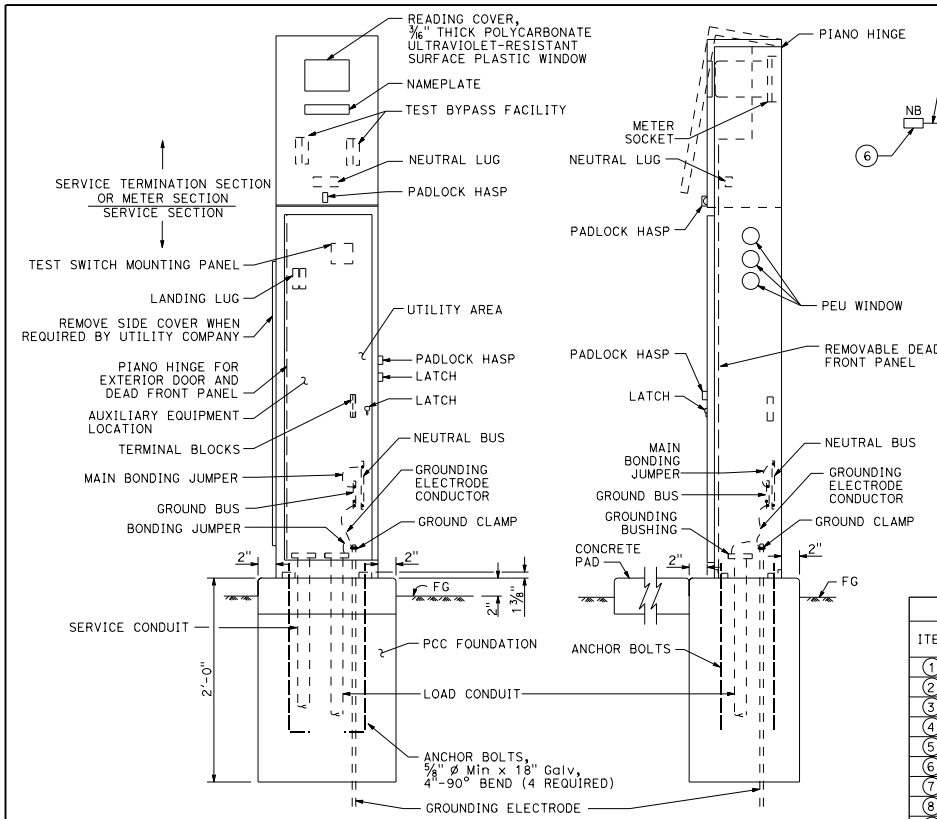
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE NOTES TYPE III SERIES)

NO SCALE

ES-2C

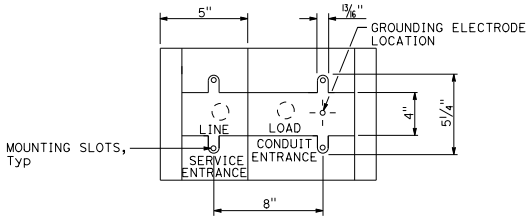
1-29-18

Return to Table of Contents



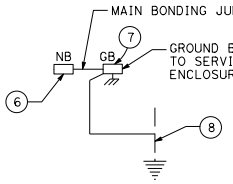
TYPE III-AF SERVICE EQUIPMENT ENCLOSURE (TYPICAL)

DETAIL A

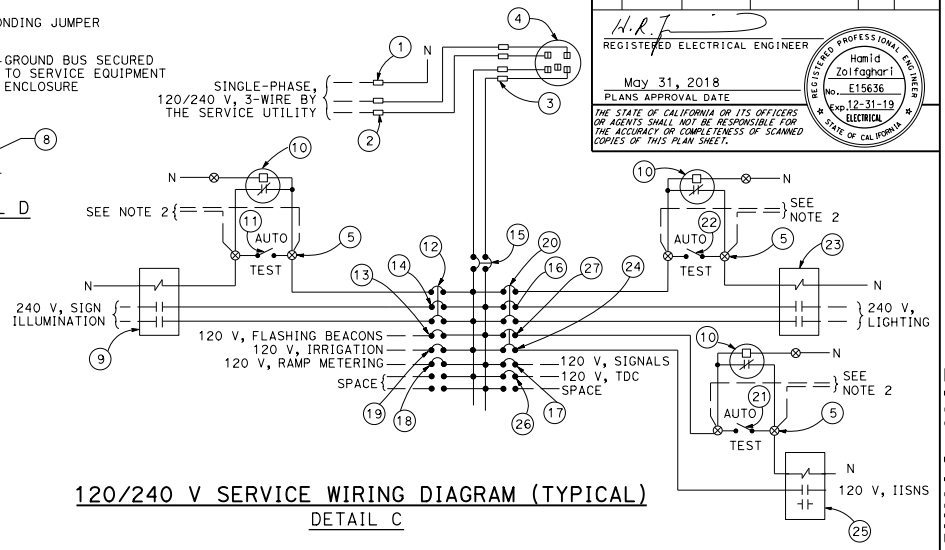


BASE FOR TYPE III-A SERVICE EQUIPMENT ENCLOSURE

DETAIL B



DETAIL D



120/240 V SERVICE WIRING DIAGRAM (TYPICAL)

DETAIL C

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari No. E15636 Exp. 12-31-19 ELECTRICAL

REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TYPE III-A SERVICE EQUIPMENT ENCLOSURE LEGEND (120/240 V)

ITEM	COMPONENT	NAMEPLATE DESCRIPTION	ITEM	COMPONENT	NAMEPLATE DESCRIPTION
(1)	NEUTRAL LUG		(14)	30 A, 240 V, 2P, CB	SIGN ILLUMINATION
(2)	LANDING LUG		(15)	100 A, 240 V, 2P, CB	MAIN BREAKER
(3)	TEST BYPASS FACILITY		(16)	30 A, 240 V, 2P, CB	LIGHTING
(4)	METER SOCKET AND SUPPORT		(17)	50 A, 120 V, 1P, CB	SIGNALS
(5)	TERMINAL BLOCKS		(18)	30 A, 120 V, 1P, CB	RAMP METERING
(6)	NEUTRAL BUS		(19)	20 A, 120 V, 1P, CB	IRRIGATION
(7)	GROUND BUS		(20)	15 A, 120 V, 1P, CB	LIGHTING CONTROL
(8)	GROUNDING ELECTRODE		(21)	15 A, 1P, TEST SWITCH	IISNS TEST SWITCH
(9)	30 A, 2P, NO CONTACTOR	SIGN ILLUMINATION	(22)	15 A, 1P, TEST SWITCH	LIGHTING TEST SWITCH
(10)	PHOTOELECTRIC UNIT (NOTE 4)	PEU	(23)	60 A, 2P, NO CONTACTOR	LIGHTING
(11)	15 A, 1P, TEST SWITCH	SIGN ILLUMINATION TEST SWITCH	(24)	15 A, 120 V, 1P, CB	IISNS
(12)	15 A, 120 V, 1P, CB	SIGN ILLUMINATION CONTROL	(25)	30 A, 2P, NO CONTACTOR	IISNS
(13)	15 A, 120 V, 1P, CB	FLASHING BEACON	(26)	20 A, 120 V, 1P, CB	TELEPHONE DEMARCATION CABINET
			(27)	15 A, 120 V, 1P, CB	IISNS CONTROL

NOTES:

1. Unless otherwise indicated on the plans, service equipment items shall be provided for each service equipment enclosure as shown.
2. Connect to remote test switch mounted on lighting standards, sign post or structure when required.
3. Items (1) and (6) shall be isolated from the service equipment enclosure.
4. Type V photoelectric control shall be used unless otherwise indicated on the plans.
5. Item (12), (20) and (27) shall be ganged operated CB.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

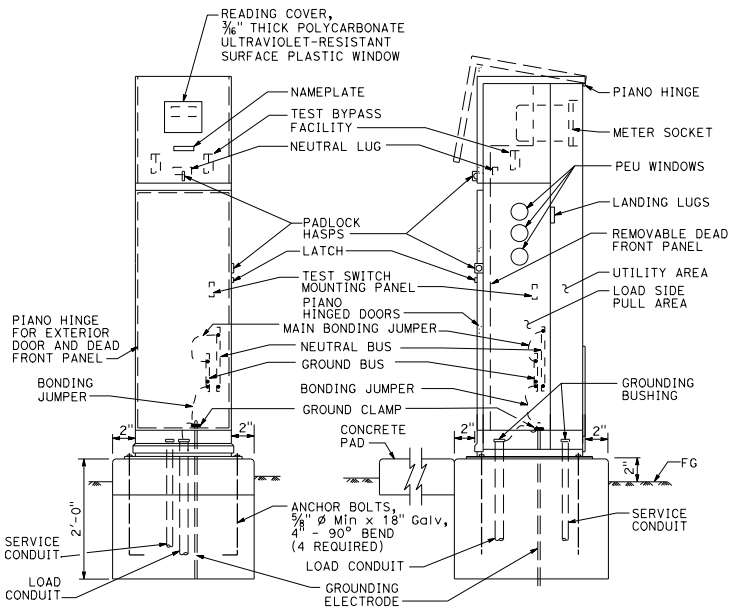
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III-A SERIES)

NO SCALE

ES-2D

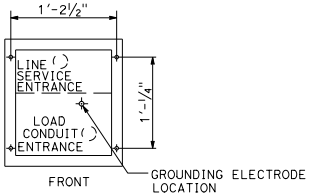
1-29-18

Return to Table of Contents



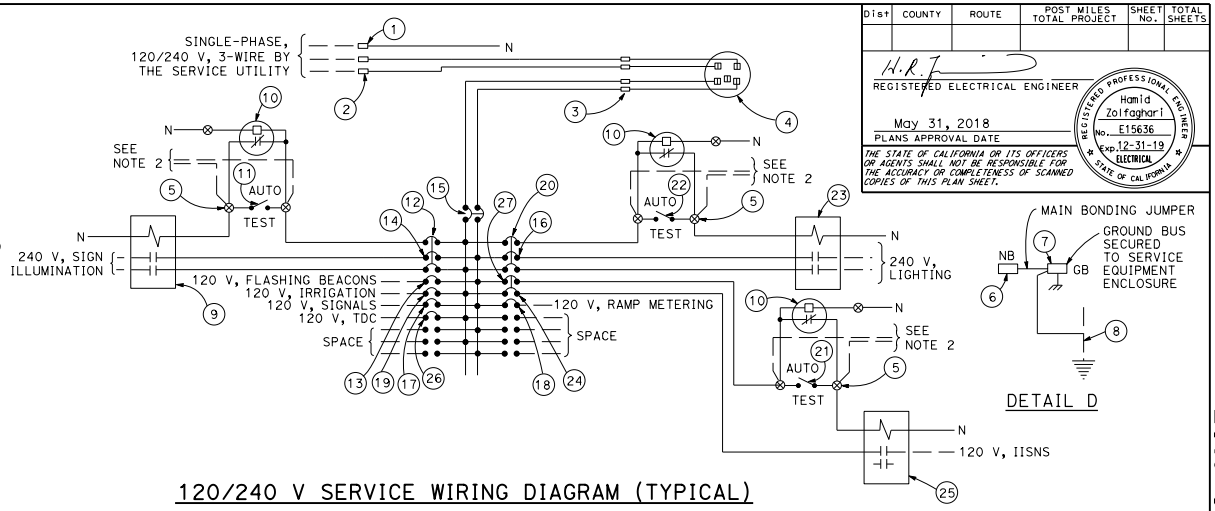
TYPE III-BF SERVICE EQUIPMENT ENCLOSURE (TYPICAL)

DETAIL A



BASE FOR TYPE III-B SERVICE EQUIPMENT ENCLOSURE

DETAIL B



120/240 V SERVICE WIRING DIAGRAM (TYPICAL)

DETAIL C

DETAIL D

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp. 12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TYPE III-B SERVICE EQUIPMENT ENCLOSURE LEGEND (120/240 V)

ITEM	COMPONENT	NAMEPLATE DESCRIPTION	ITEM	COMPONENT	NAMEPLATE DESCRIPTION
(1)	NEUTRAL LUG		(14)	30 A, 240 V, 2P, CB	SIGN ILLUMINATION
(2)	LANDING LUG		(15)	100 A, 240 V, 2P, CB	MAIN BREAKER
(3)	TEST BYPASS FACILITY		(16)	30 A, 240 V, 2P, CB	LIGHTING
(4)	METER SOCKET AND SUPPORT		(17)	50 A, 120 V, 1P, CB	SIGNALS
(5)	TERMINAL BLOCKS		(18)	30 A, 120 V, 1P, CB	RAMP METERING
(6)	NEUTRAL BUS		(19)	20 A, 120 V, 1P, CB	IRRIGATION
(7)	GROUND BUS		(20)	15 A, 120 V, 1P, CB	LIGHTING CONTROL
(8)	GROUNDING ELECTRODE		(21)	15 A, 1P, TEST SWITCH	IISNS TEST SWITCH
(9)	30 A, 2P, NO CONTACTOR	SIGN ILLUMINATION	(22)	15 A, 1P, TEST SWITCH	LIGHTING TEST SWITCH
(10)	PHOTOELECTRIC UNIT (NOTE 4)	PEU	(23)	60 A, 2P, NO CONTACTOR	LIGHTING
(11)	15 A, 1P, TEST SWITCH	SIGN ILLUMINATION TEST SWITCH	(24)	15 A, 120 V, 1P, CB	IISNS
(12)	15 A, 120 V, 1P, CB	SIGN ILLUMINATION CONTROL	(25)	30 A, 2P, NO CONTACTOR	IISNS
(13)	15 A, 120 V, 1P, CB	FLASHING BEACON	(26)	20 A, 120 V, IP, CB	TELEPHONE DEMARCATION CABINET
			(27)	15 A, 120 V, 1P, CB	IISNS CONTROL

NOTES:

1. Unless otherwise indicated on the plans, service equipment items shall be provided for each service equipment enclosure as shown.
2. Connect to remote test switch mounted on lighting standards, sign post or structure when required.
3. Items (1) and (6) shall be isolated from the service equipment enclosure.
4. Type V photoelectric control shall be used unless otherwise indicated on the plans.
5. Item (12), (20) and (27) shall be ganged operated CB.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

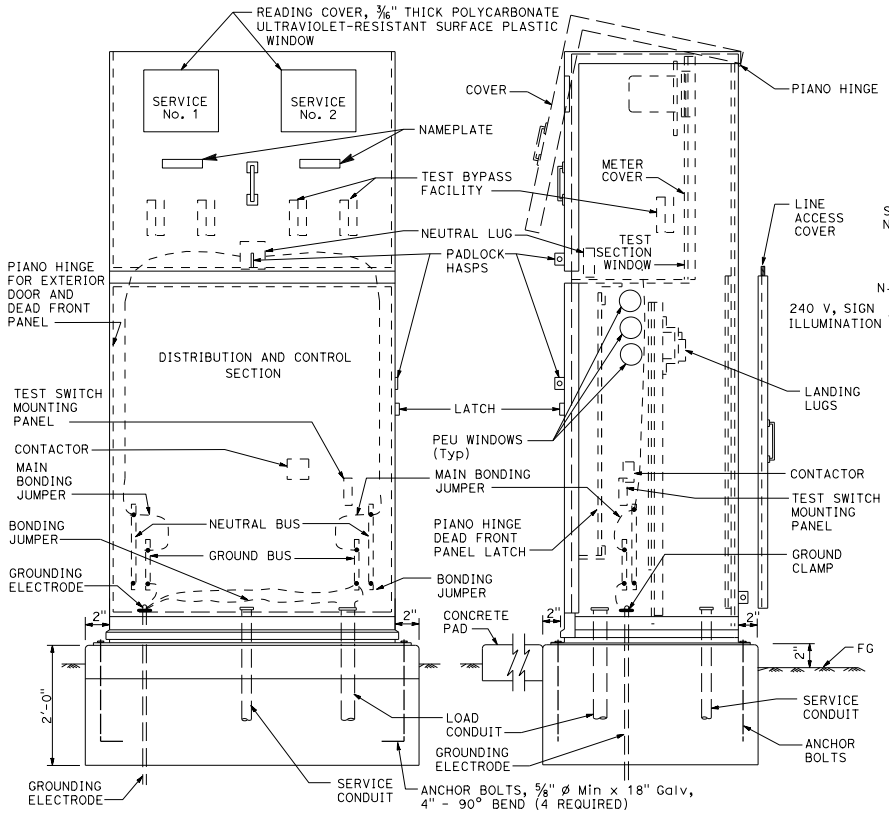
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III-B SERIES)

NO SCALE

ES-2E

1-29-18

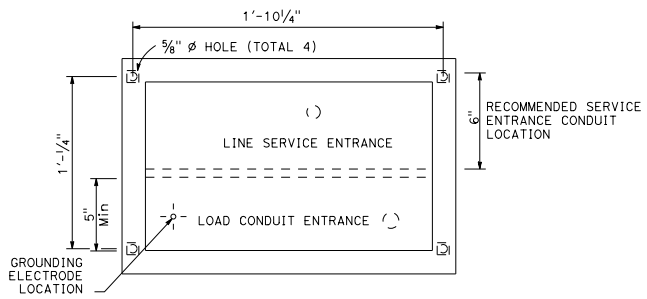
Return to Table of Contents



FRONT VIEW SIDE VIEW

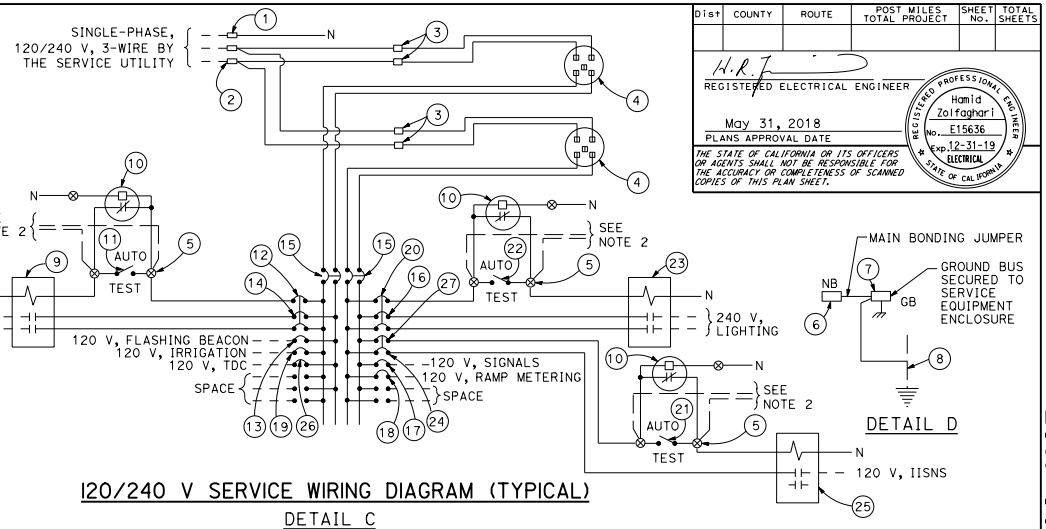
TYPE III-CF SERVICE EQUIPMENT ENCLOSURE (TYPICAL)

DETAIL A



BASE FOR TYPE III-C SERVICE EQUIPMENT ENCLOSURE

DETAIL B



120/240 V SERVICE WIRING DIAGRAM (TYPICAL)

DETAIL C

DETAIL D

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp. 12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

TYPE III-C SERVICE EQUIPMENT ENCLOSURE LEGEND (120/240 V)

ITEM	COMPONENT	NAMEPLATE DESCRIPTION	ITEM	COMPONENT	NAMEPLATE DESCRIPTION
(1)	NEUTRAL LUG		(14)	30 A, 240 V, 2P, CB	SIGN ILLUMINATION
(2)	LANDING LUG		(15)	100 A, 240 V, 2P, CB	MAIN BREAKER
(3)	TEST BYPASS FACILITY		(16)	30 A, 240 V, 2P, CB	LIGHTING
(4)	METER SOCKET AND SUPPORT		(17)	50 A, 120 V, 1P, CB	SIGNALS
(5)	TERMINAL BLOCKS		(18)	30 A, 120 V, 1P, CB	RAMP METERING
(6)	NEUTRAL BUS		(19)	20 A, 120 V, 1P, CB	IRRIGATION
(7)	GROUND BUS		(20)	15 A, 120 V, 1P, CB	LIGHTING CONTROL
(8)	GROUNDING ELECTRODE		(21)	15 A, 1P, TEST SWITCH	IISNS TEST SWITCH
(9)	30 A, 2P, NO CONTACTOR	SIGN ILLUMINATION	(22)	15 A, 1P, TEST SWITCH	LIGHTING TEST SWITCH
(10)	PHOTOELECTRIC UNIT (NOTE 4)	PEU	(23)	60 A, 2P, NO CONTACTOR	LIGHTING
(11)	15 A, 1P, TEST SWITCH	SIGN ILLUMINATION TEST SWITCH	(24)	15 A, 120 V, 1P, CB	IISNS
(12)	15 A, 120 V, 1P, CB	SIGN ILLUMINATION CONTROL	(25)	30 A, 2P, NO CONTACTOR	IISNS
(13)	15 A, 120 V, 1P, CB	FLASHING BEACON	(26)	20 A, 120 V, 1P, CB	TELEPHONE DEMARCATION CABINET
			(27)	15 A, 120 V, 1P, CB	IISNS CONTROL

NOTES:

1. Unless otherwise indicated on the plans, service equipment items shall be provided for each service equipment enclosure as shown.
2. Connect to remote test switch mounted on lighting standards, sign post or structure when required.
3. Items (1) and (6) shall be isolated from the service equipment enclosure.
4. Type II photoelectric control shall be used unless otherwise indicated on the plans.
5. Item (12), (20) and (27) shall be ganged operated CB.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

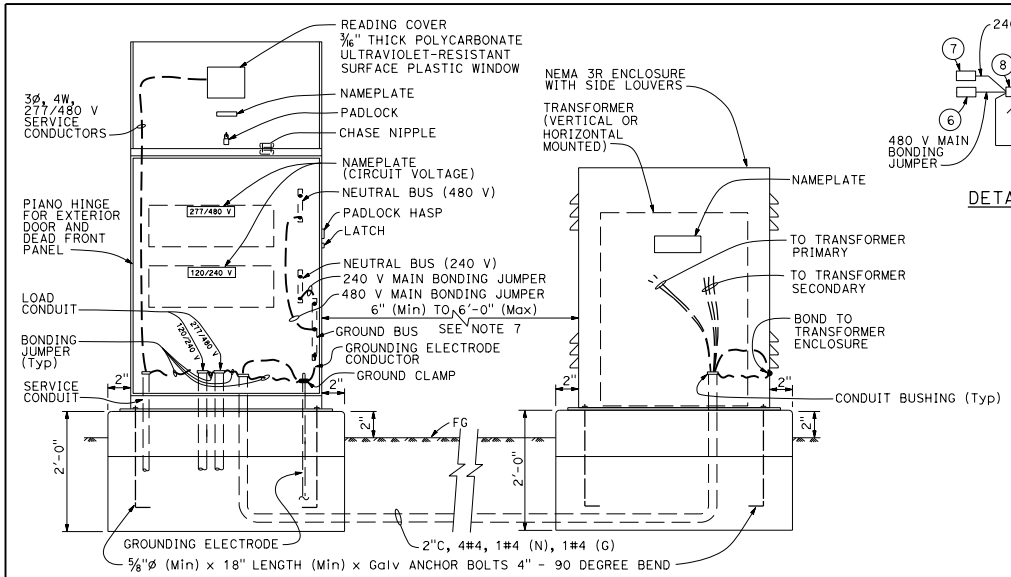
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III-C SERIES)

NO SCALE

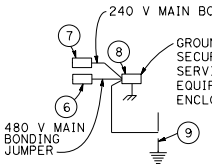
ES-2F

1-29-18

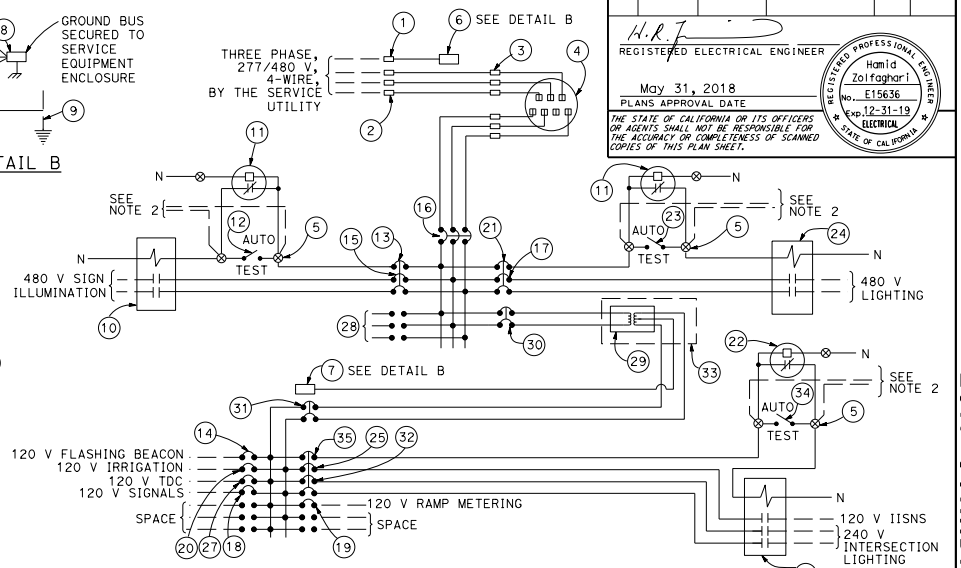
Return to Table of Contents



SIDE INSTALLATION OF TRANSFORMER

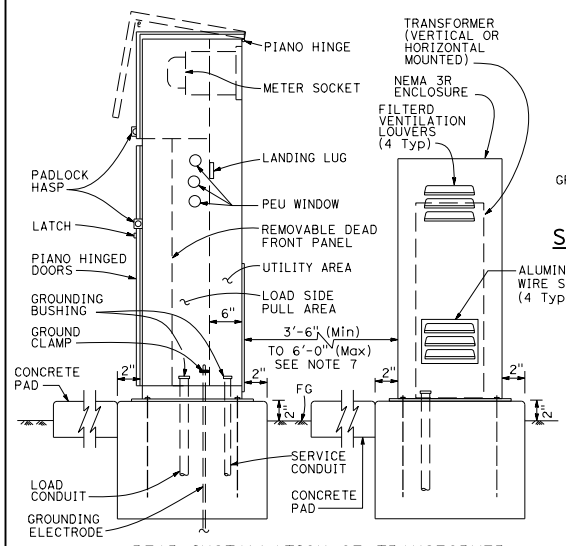


DETAIL B



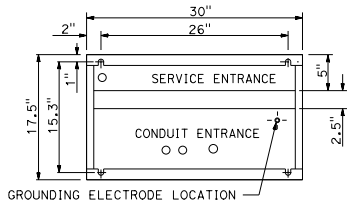
277/480 V SERVICE WIRING DIAGRAM (TYPICAL)

DETAIL C



REAR INSTALLATION OF TRANSFORMER

TYPE III-DF SERVICE EQUIPMENT ENCLOSURE TYPICAL



BASE FOR TYPE III-D SERVICE EQUIPMENT ENCLOSURE

DETAIL A

NOTES:

1. Unless otherwise indicated on the plans, service equipment items shall be provided for each service equipment enclosure as shown.
2. Connect to remote test switch mounted on lighting standards, sign post or structure when required.
3. Items No. (1), (6) and (7) shall be isolated from the service equipment enclosure.
4. Type V photoelectric control shall be used unless otherwise indicated on the plans.
5. Color of insulation of the neutral shall be gray for the 277/480 V system and shall be white for the 120/240 V system.
6. Items (13), (21) and (35) shall be ganged operated CB.
7. The NEMA 3R enclosure shall be located to the side of the service equipment enclosure unless otherwise indicated on the plans.
8. The base dimension for the NEMA 3R enclosure for the transformer shall be as per manufacturer's design.

TYPE III-D SERVICE (277/480 V) EQUIPMENT LEGEND

ITEM No.	COMPONENT	NAMEPLATE DESCRIPTION	ITEM No.	COMPONENT	NAMEPLATE DESCRIPTION
(1)	NEUTRAL LUG		(20)	20 A, 120 V, 1P, CB	IRRIGATION (120 V)
(2)	LANDING LUG		(21)	10 A, 277 V, 1P, CB	LIGHTING CONTROL (277 V)
(3)	TEST BYPASS FACILITY		(22)	PHOTOELECTRIC UNIT (NOTE 4)	PEU (120/240 V)
(4)	METER SOCKET AND SUPPORT		(23)	15 A, 1P, TEST SWITCH	LIGHTING TEST SWITCH (277 V)
(5)	TERMINAL BLOCKS		(24)	30 A, 2P, NO CONTACTOR	LIGHTING (480 V)
(6)	NEUTRAL BUS	NEUTRAL BUS (480 V)	(25)	15 A, 120 V, 1P, CB	IISNS (120 V)
(7)	NEUTRAL BUS	NEUTRAL BUS (240 V)	(26)	30 A, 3P, NO CONTACTOR	INTERSECTION LIGHTING (120 V)
(8)	GROUND BUS		(27)	20 A, 120 V, 1P, CB	TELEPHONE DEMARCATION CABINET (120 V)
(9)	GROUNDING ELECTRODE		(28)	20 A, 480 V, 3P, CB	SPACE
(10)	30 A, 2P, NO CONTACTOR	SIGN ILLUMINATION (480 V)	(29)	15 kVA, 480-120/240 V TRANSFORMER	TRANSFORMER, 15 kVA, 480-240 V
(11)	PHOTOELECTRIC UNIT (NOTE 4)	PEU (277/480 V PEU)	(30)	40 A, 480 V, 2P, CB	TRANSFORMER PRIMARY (480 V)
(12)	15 A, 1P, TEST SWITCH	SIGN ILLUMINATION TEST SWITCH (277 V)	(31)	80 A, 240 V, 2P, CB	TRANSFORMER SECONDARY (240 V)
(13)	10 A, 277 V, 1P, CB	SIGN ILLUMINATION CONTROL (277 V)	(32)	30 A, 240 V, 2P, CB	INTERSECTION LIGHTING (240 V)
(14)	15 A, 120 V, 1P, CB	FLASHING BEACON (120 V)	(33)	NEMA 3R ENCLOSURE WITH LOUVERS	TRANSFORMER, 15 kVA, 480-240 V
(15)	15 A, 480 V, 2P, CB	SIGN ILLUMINATION (480 V)	(34)	15 A, 1P, TEST SWITCH	IISNS AND INTERSECTION LIGHTING TEST SWITCH (120 V)
(16)	100 A, 480 V, 3P, CB	MAIN BREAKER (480 V)	(35)	10 A, 120 V, 1P, CB	IISNS AND INTERSECTION LIGHTING CONTROL (120 V)
(17)	15 A, 480 V, 2P, CB	LIGHTING (480 V)			
(18)	50 A, 120 V, 1P, CB	SIGNAL (120 V)			
(19)	30 A, 120 V, 1P, CB	RAMP METERING (120 V)			

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp.12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

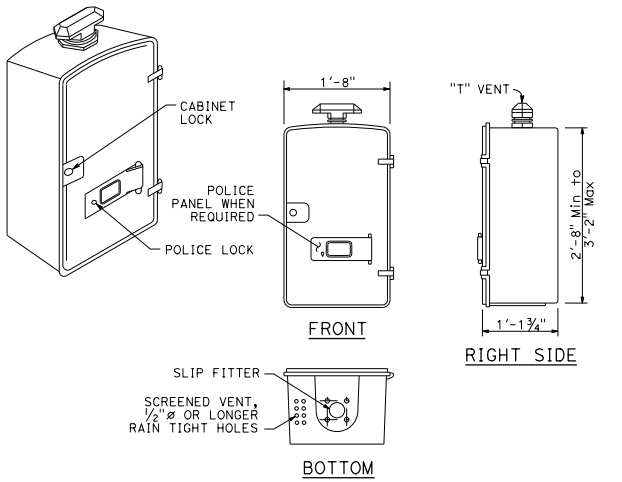
ELECTRICAL SYSTEMS (SERVICE EQUIPMENT ENCLOSURE AND TYPICAL WIRING DIAGRAM, TYPE III-D SERIES)

NO SCALE

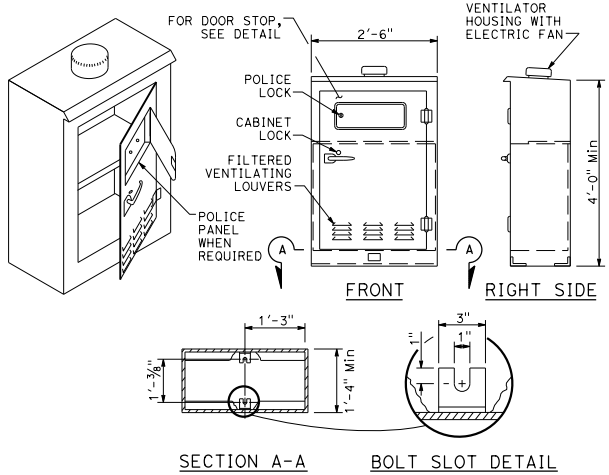
ES-2G

1-30-18

Return to Table of Contents



TYPE G CABINET



TYPE M CABINET

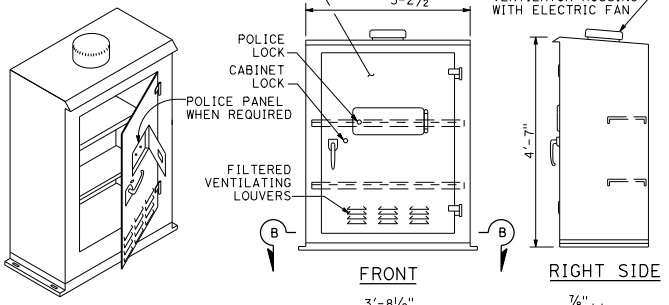
NOTES:

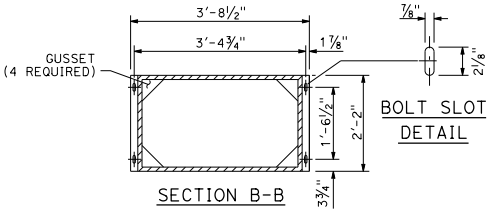
1. Cabinet dimensions are nominal.
2. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

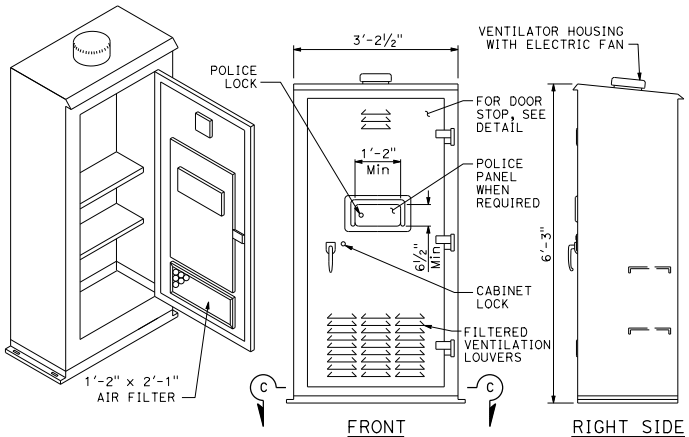
H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Registered Professional Engineer — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — Electrical — State of California

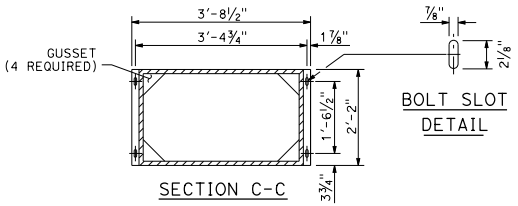
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



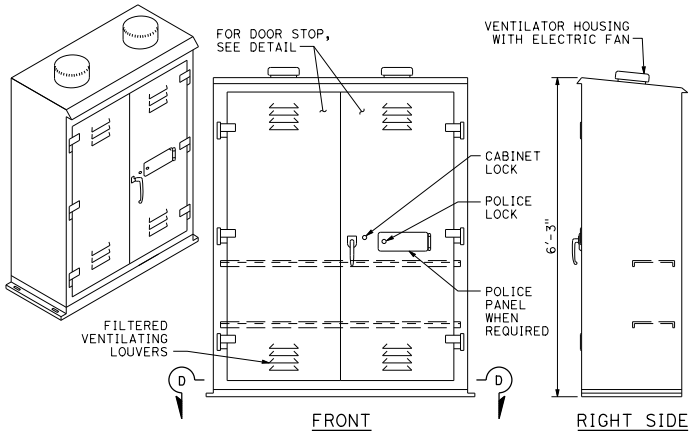


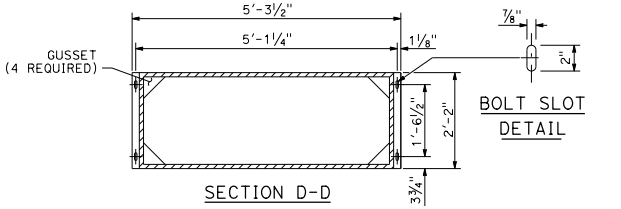
TYPE P CABINET



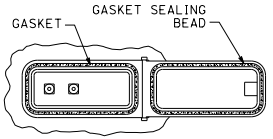


TYPE R CABINET

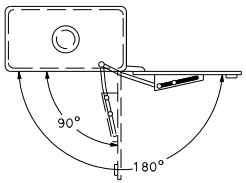




TYPE S CABINET



POLICE PANEL



PLAN VIEW
DOOR STOP DETAIL
(2 POSITIONS)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CONTROLLER CABINET DETAILS)

NO SCALE

ES-3A

2018 STANDARD PLAN ES-3A

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

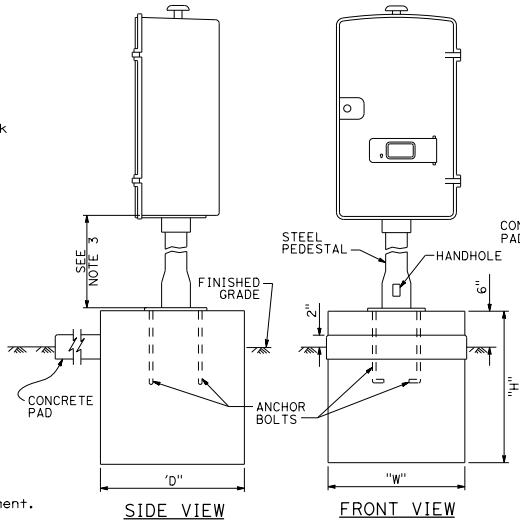
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

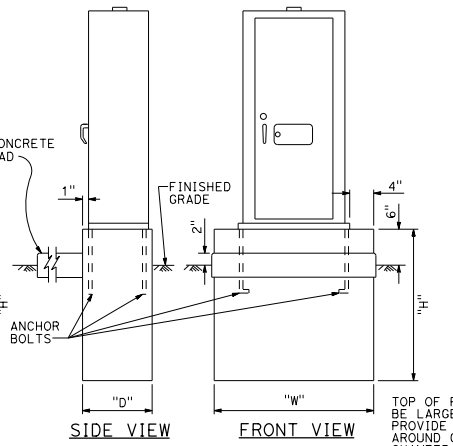
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. Type G, M, P, R, S and Model 336L cabinets shall be installed with the back toward the nearest lane of traffic.
2. In unpaved areas, a raised portland cement concrete pad shall be constructed in front of each controller cabinet. The pad shall be 3'-0" x 3'-0" x 4" for a Type G cabinet and shall be 3'-0" x 4" thick x width of foundation for Type M, P, R, S and Model 336L cabinets.
3. The steel pedestal, base plate, and bolt circle for Type G cabinet shall be the same as that shown for a Type 1-C Standard (see Standard Plan ES-7B). Pedestal shall be 2'-1" to 2'-6" in length. Anchor bolts shall be ¾" Ø x 1'-6" with a 2" - 90° bend. Four bolts required per cabinet.
4. Type G cabinet shall be provided with a slipfitter to permit mounting an 4½" outside diameter pedestal. Slipfitter shall be bolted to bottom of the cabinet.
5. A 1" drain shall be provided through the foundation of a Type M or Model 336L cabinet. Drain pipe shall be screened.
6. Cabinet shelves shall be adjustable for vertical spacing and shall be removable. Type M, P, R and S cabinets shall be provided with a minimum of two shelves.
7. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit safe and easy removal or replacement without removing any other piece of equipment.
8. Where telephone interconnect is required, a minimum of 5" clear vertical space shall be provided inside the cabinet for the equipment.
9. Telephone interconnect conductors shall be enclosed in a ¾"C or larger conduit through the foundation. Type 4 conduit shall be used to separate telephone and power conductors in cabinets or pedestals.
10. Anchor bolts for Type M, P, R, S and Model 336L cabinets shall be ¾" Ø x 1'-6" with a 2" - 90° bend.

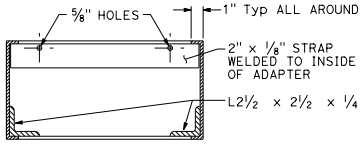


FOUNDATION FOR TYPE G CABINET
DETAIL A

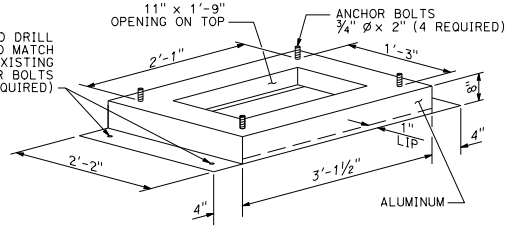


FOUNDATION FOR TYPE P, R AND S CABINETS
DETAIL B

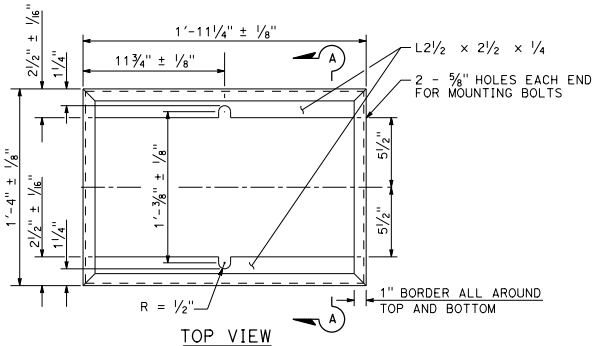
CABINET TYPE	FOUNDATION		
	"W"	"H"	"D"
G	2'-0"	3'-6"	2'-0"
M	3'-2"	2'-6"	1'-6"
P	4'-4½"	1'-6"	2'-4"
R	4'-2"	1'-6"	2'-4"
S	5'-11½"	1'-6"	2'-4"



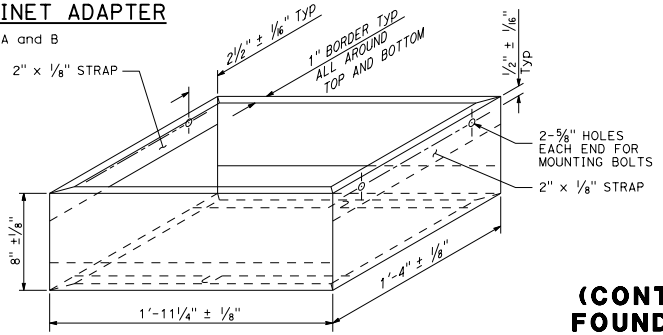
SECTION A-A



TYPE PR CABINET ADAPTER
See Notes A and B

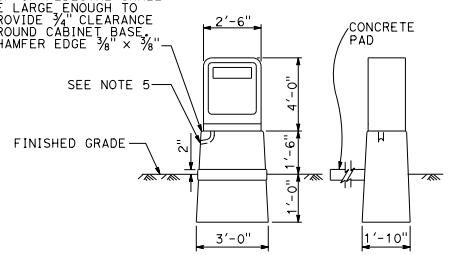


TOP VIEW



TYPE M CABINET ADAPTER
See Notes A, C, and D

TOP OF PEDESTAL SHALL BE LARGE ENOUGH TO PROVIDE ¾" CLEARANCE AROUND CABINET BASE. CHAMFER EDGE ⅜" x ⅜"



PEDESTAL FOUNDATION FOR TYPE M OR MODEL 336L CABINET
DETAIL C

NOTES:

A. Material: 0.188" thickness aluminum plate.
B. Adapter for Type P or Type R cabinet foundation.
C. Adapter for Type M cabinet foundation.
D. Mounting bolts shall be ⅜"ø minimum size.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CONTROLLER CABINET ADAPTER, FOUNDATIONS, AND PAD DETAILS)

NO SCALE

ES-3B

1-30-18

Return to Table of Contents

NOTES:

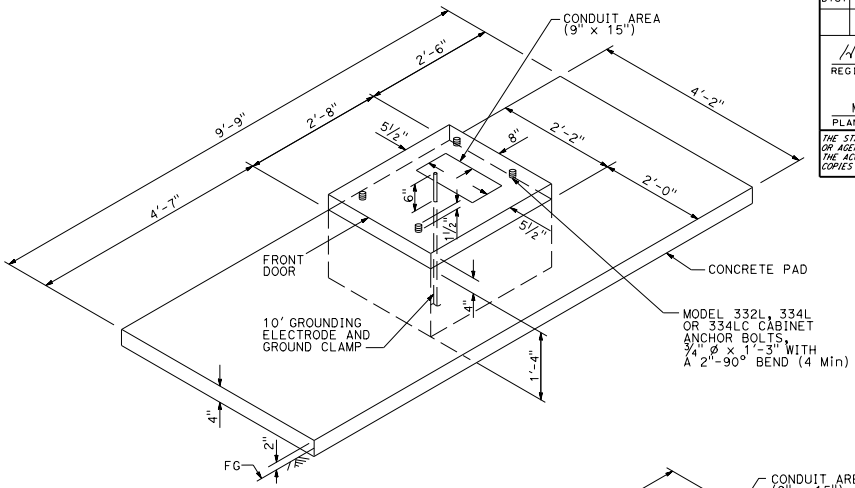
1. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit safe and easy removal or replacement without removing any other piece of equipment.
2. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.
3. Where telephone interconnect is required, a minimum of 5" clear vertical space shall be provided inside the cabinet for the equipment.
4. Telephone interconnect conductors shall be enclosed in a ¾"C or larger conduit through the foundation. Type 4 conduit shall be used to separate telephone and power conductors in cabinets.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

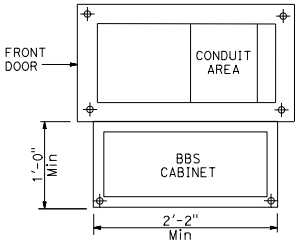
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



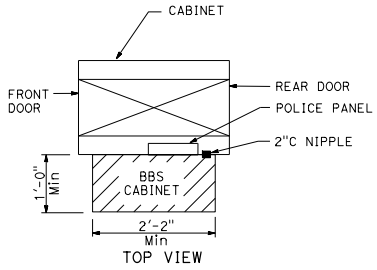
FOUNDATION AND PAD DETAIL

Model 332L, 334L and 334LC

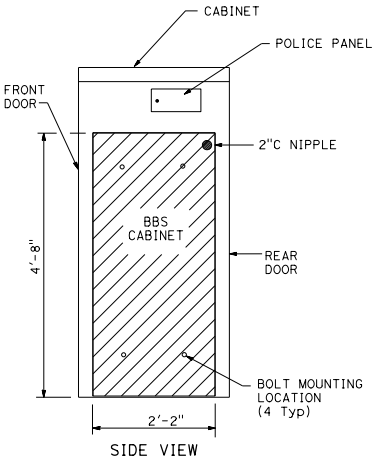


BASE PLAN FOR BBS MOUNTED TO THE MODEL 332L CABINET

(FOR DIMENSIONS AND DETAILS NOT SHOWN, SEE CABINET HOUSING DETAILS OF THE TRANSPORTATION ELECTRICAL EQUIPMENT SPECIFICATION (TEES))

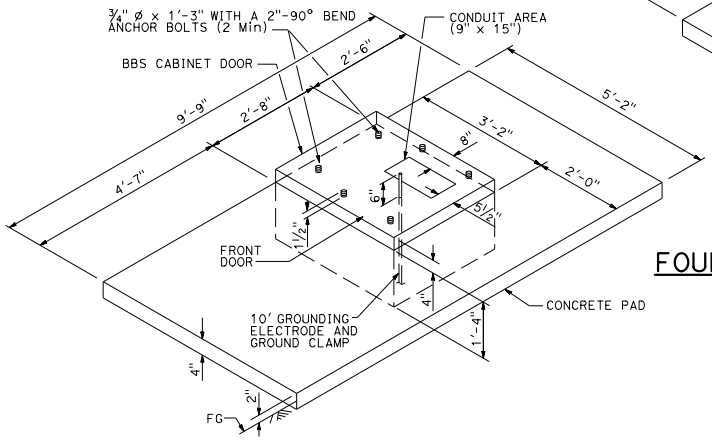


TOP VIEW



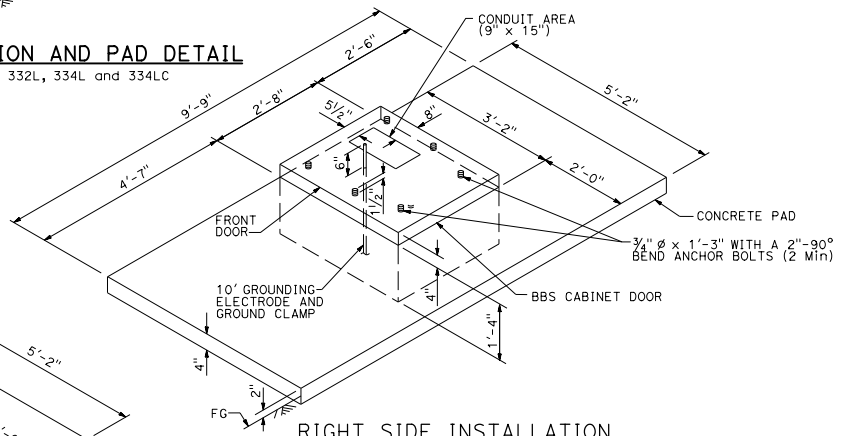
SIDE VIEW

BBS CABINET MOUNTED TO THE MODEL 332L CABINET



LEFT SIDE INSTALLATION

DETAIL A



RIGHT SIDE INSTALLATION

DETAIL B

MODIFIED MODEL 332L CABINET FOUNDATION DETAIL FOR BATTERY BACKUP SYSTEM

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CONTROLLER CABINET FOUNDATION AND PAD DETAILS)

NO SCALE

ES-3C

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

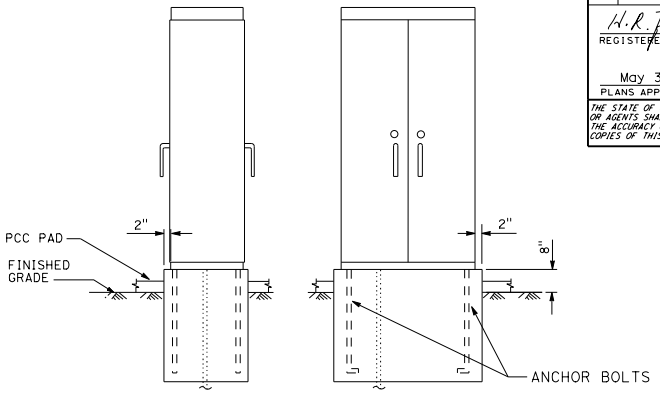
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

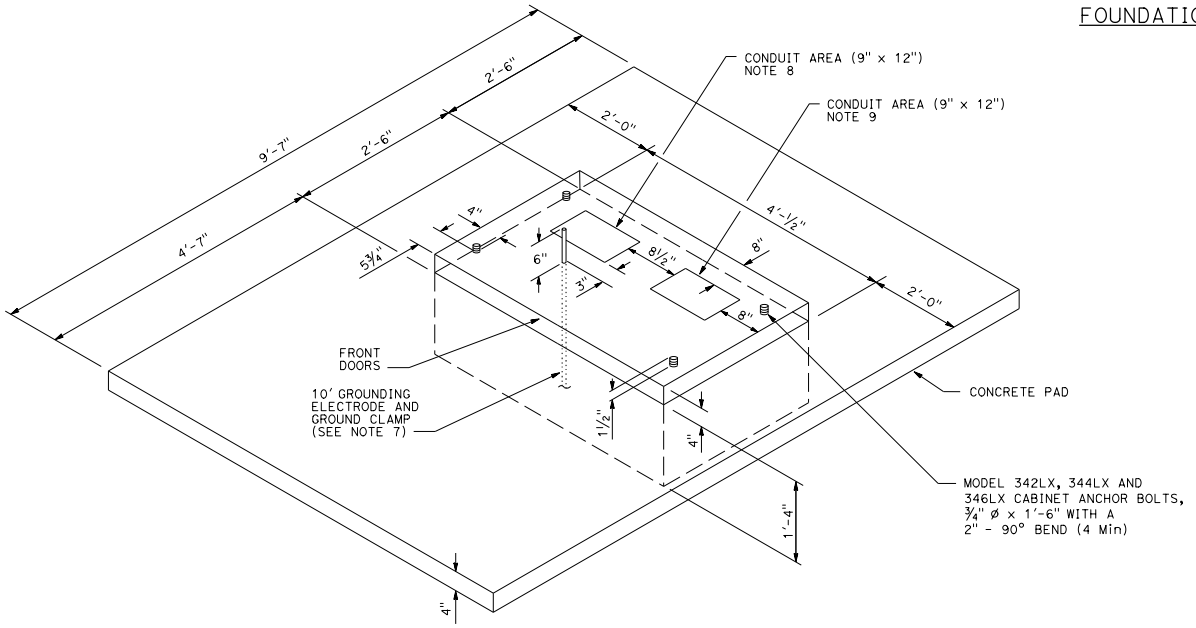
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

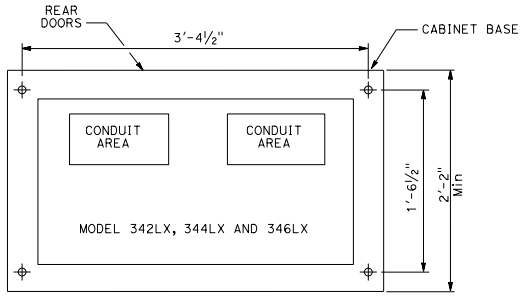
1. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit safe and easy removal or replacement without removing any other piece of equipment.
2. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.
3. Where telephone interconnect is required, a minimum of 5" clear vertical space shall be provided inside the cabinet for the equipment.
4. Telephone interconnect conductors shall be enclosed in a ¾"C or larger conduit through the foundation. Type 4 conduit shall be used to separate telephone and power conductors in cabinets.
5. Dimensions are nominal.
6. For Model 342LX, 344LX and 346LX cabinets details, see "Transportation Electrical Equipment Specifications".
7. Grounding electrode shall be placed 3 inches in front of the service conduit area.
8. Conduit area, to 120 V Service.
9. Conduit area for the controller side of cabinet.



FOUNDATION FOR TYPE LX CABINET
DETAIL A



FOUNDATION AND PAD DETAIL
Model 342LX, 344LX and 346LX
DETAIL B



BASE PLAN FOR THE MODEL
342LX, 344LX AND 346LX CABINET

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS
(CONTROLLER CABINET FOUNDATION AND PAD DETAILS)

NO SCALE

ES-3C1

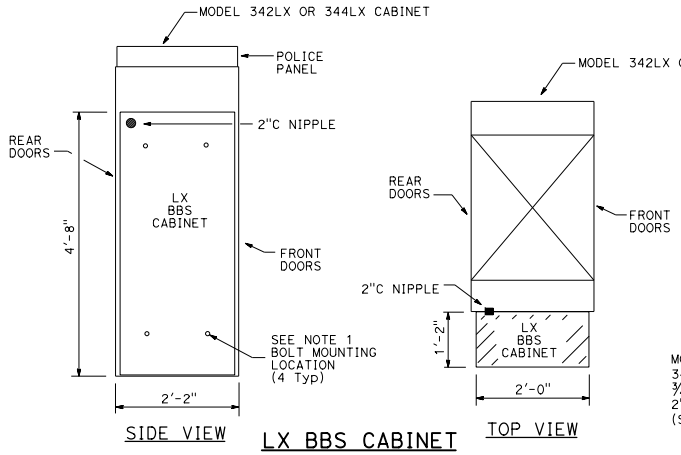
1-30-18

Return to Table of Contents

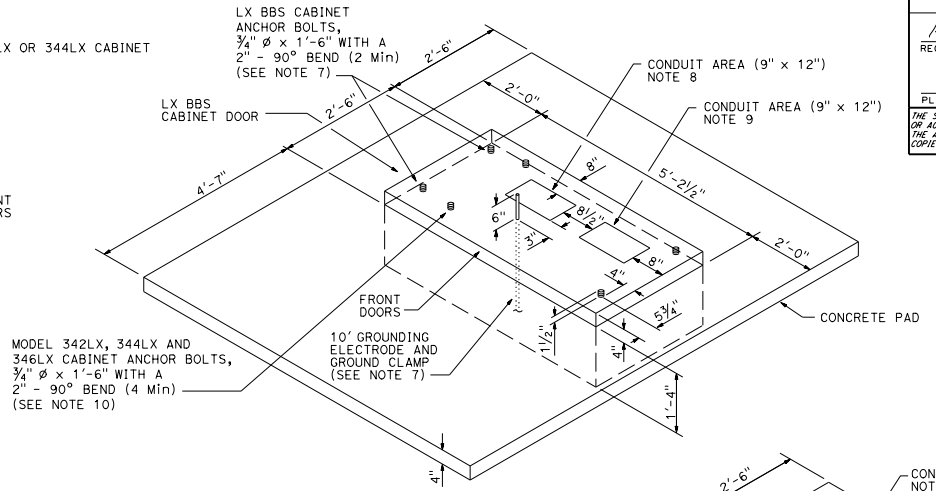
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

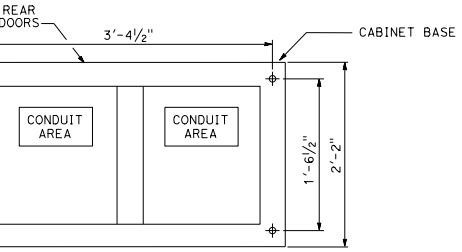
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA



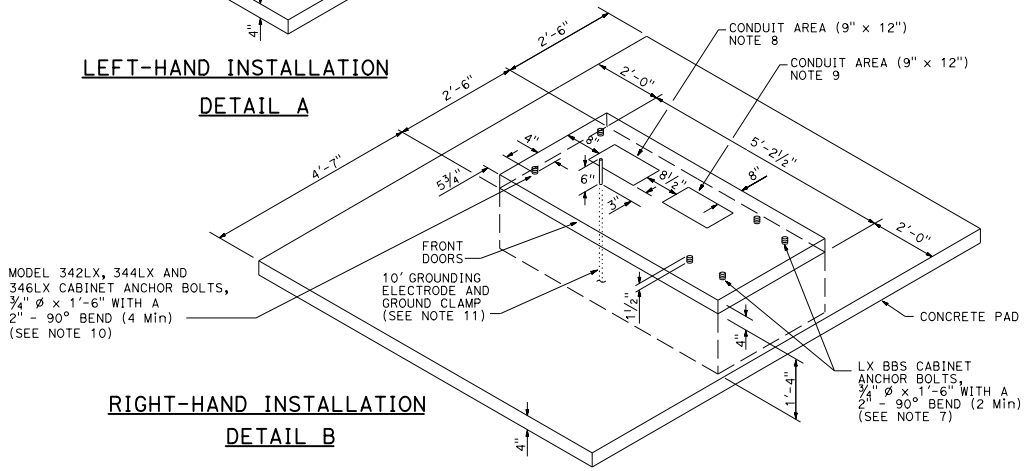
LX BBS CABINET MOUNTED TO THE MODEL 342LX OR 344LX CABINET



LEFT-HAND INSTALLATION DETAIL A



BASE PLAN FOR MODEL 342LX OR 344LX CABINET



RIGHT-HAND INSTALLATION DETAIL B

MODIFIED MODEL 342LX OR 344LX CABINET FOUNDATION DETAIL FOR BATTERY BACKUP SYSTEM

NOTES:

1. Controller units, plug-mounted equipment, shelf-mounted equipment and wall-mounted equipment shall be located to permit safe and easy removal or replacement without removing any other piece of equipment.
2. Cabinet fan may be installed at an alternate location near the top of the cabinet when approved by the Engineer.
3. Where telephone interconnect is required, a minimum of 5" clear vertical space shall be provided inside the cabinet for the equipment.
4. Telephone interconnect conductors shall be enclosed in a ¾"C or larger conduit through the foundation. Type 4 conduit shall be used to separate telephone and power conductors in cabinets.
5. The LX BBS cabinet shall be mounted to the model 342LX or 344LX cabinet with four 18-8 stainless steel hex head, fully-threaded, ⅜"-16 x 1" bolts; two washers per bolt, designed for ⅜" bolts and are 18-8 stainless steel, 1" outside diameter, round, and flat; and one K-Lock nut per bolt that is 18-8 stainless steel and a hex-nut.
6. All dimensions are nominal.
7. The dimensions of the BBS cabinet shall be verified prior to constructing the foundation of the Std model 342LX or 344LX cabinet foundation.
8. Conduit area, to 120 V Service.
9. Conduit area for the controller side of cabinet.
10. For Type LX cabinets details, see "Transportation Electrical Equipment Specifications".
11. Grounding electrode shall be placed 3 inches in front of the service conduit area.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

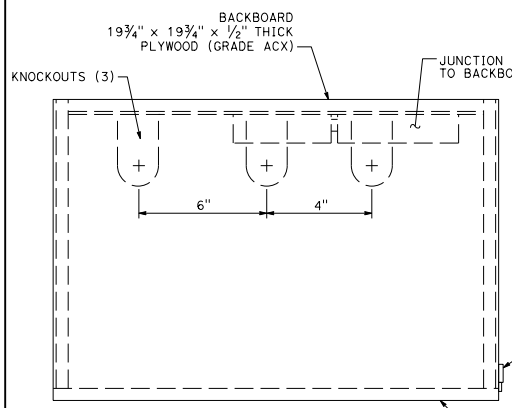
ELECTRICAL SYSTEMS (CONTROLLER CABINET FOUNDATION DETAILS)

NO SCALE

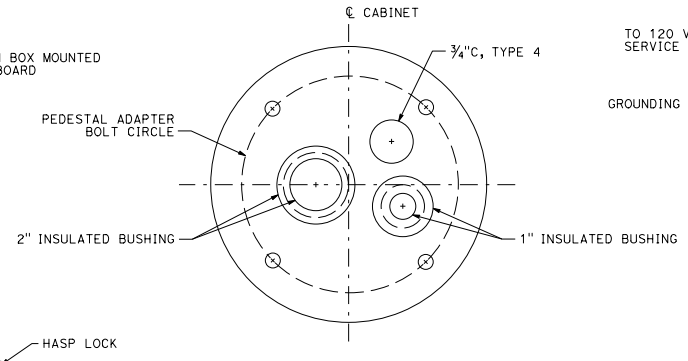
ES-3C2

1-30-18

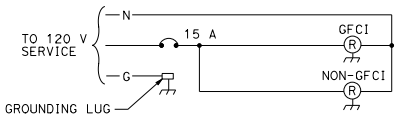
Return to Table of Contents



TOP
DETAIL C



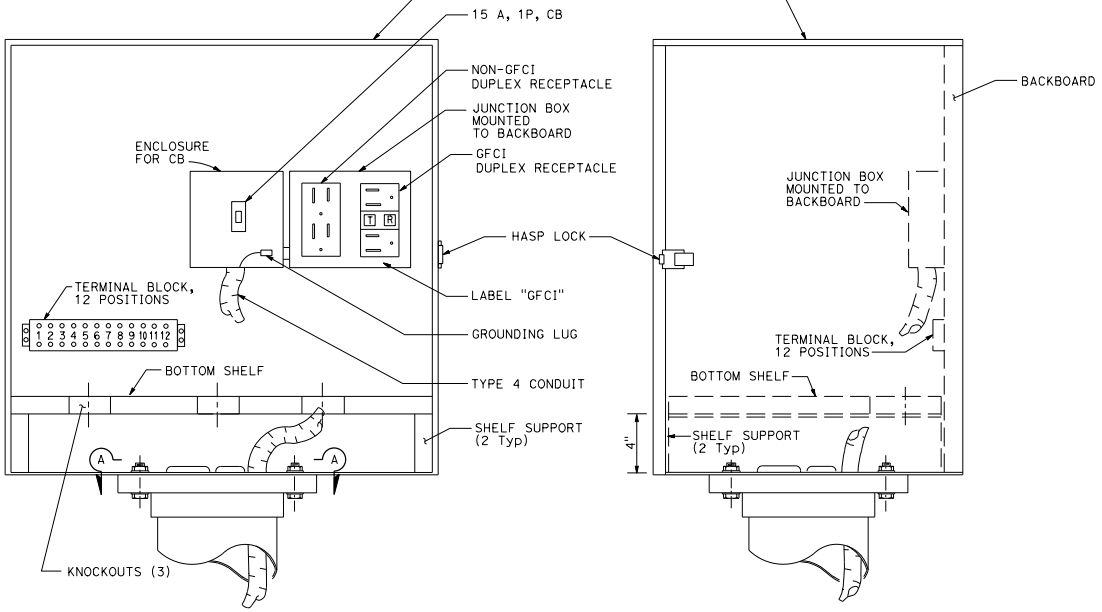
SECTION A-A



WIRING DIAGRAM
DETAIL D

NOTES:

1. Dimensions are nominal.
2. The steel pedestal, base plate, and bolt circle for the telephone demarcation cabinet shall be the same as that shown for a Type 1-C Standard. The steel pedestal shall be 2'-1" to 2'-6" in length. Anchor bolts shall be ¾" ø x 1'-6" with a 2" - 90° bend. Four bolts required per cabinet.
3. Telephone interconnect conductors shall be enclosed in a ¾"C or larger conduit through the foundation. Type 4 conduit shall be used to separate telephone and power conductors in the cabinet and pedestal.
4. Mount cabinet on Type G cabinet pedestal and foundation (see Std Plan ES-3B).



FRONT
DETAIL A

RIGHT SIDE
DETAIL B

FASTENER SCHEDULE

BACKBOARD	4 - ¾" (LENGTH) WOOD SCREWS
2 SHELF SUPPORTS	4 - ¾" (LENGTH) WOOD SCREWS
JUNCTION BOX	4 - ½" (LENGTH) WOOD SCREWS
TERMINAL BLOCK	4 - ¾" (LENGTH) WOOD SCREWS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp.12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE A)

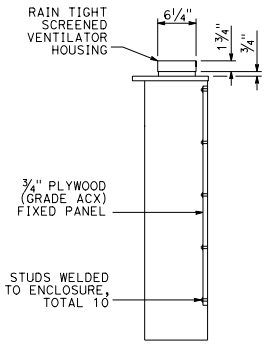
NO SCALE

ES-3D

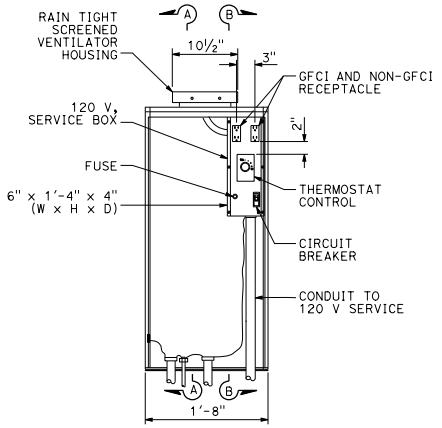
1-30-18

2018 STANDARD PLAN ES-3D

Return to Table of Contents

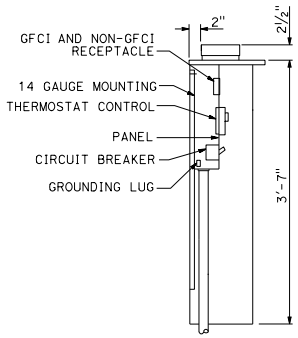


SECTION A-A



FRONT VIEW

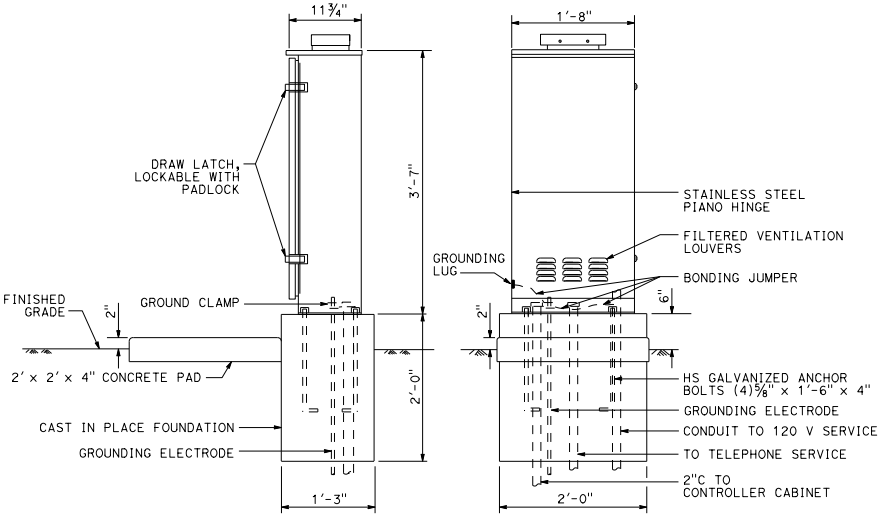
INTERIOR
DETAIL A



SECTION B-B

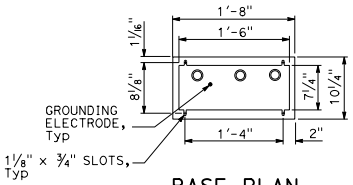
NOTE:

1. Dimensions are nominal.

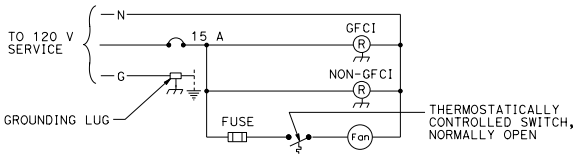


SIDE VIEW FRONT VIEW

EXTERIOR
DETAIL B



BASE PLAN
DETAIL C



WIRING DIAGRAM
DETAIL D

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE B)

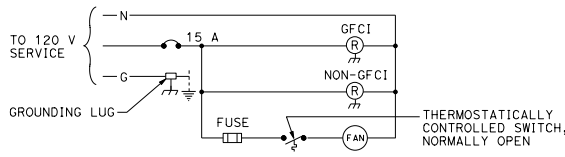
NO SCALE

ES-3E

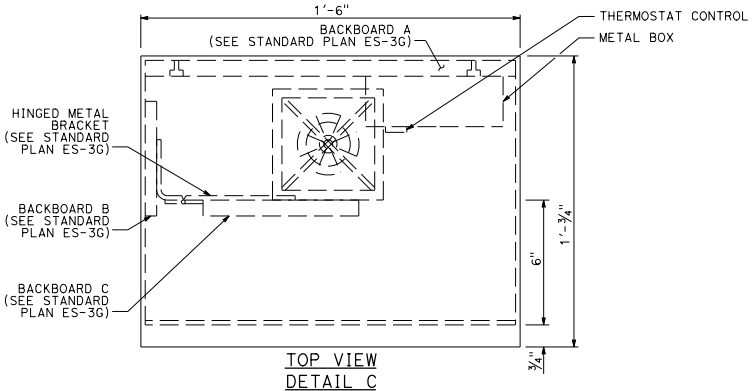
1-30-18

2018 STANDARD PLAN ES-3E

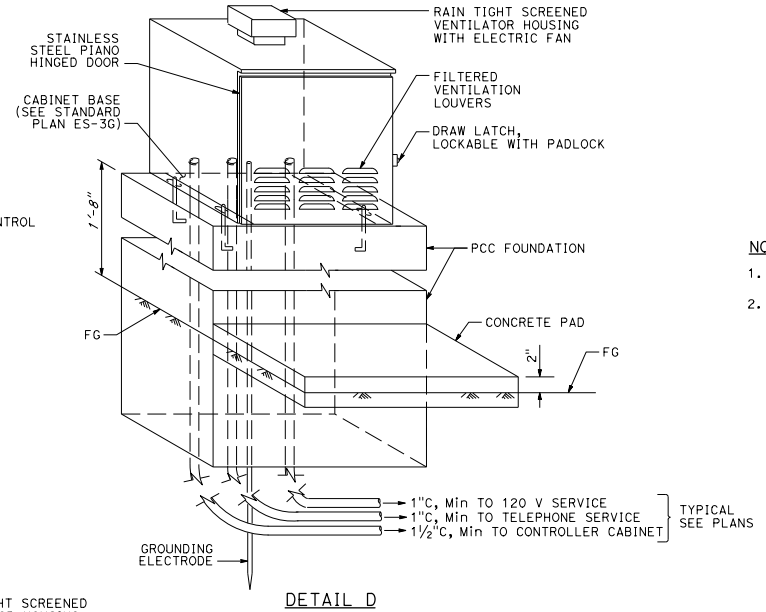
Return to Table of Contents



WIRING DIAGRAM
DETAIL F



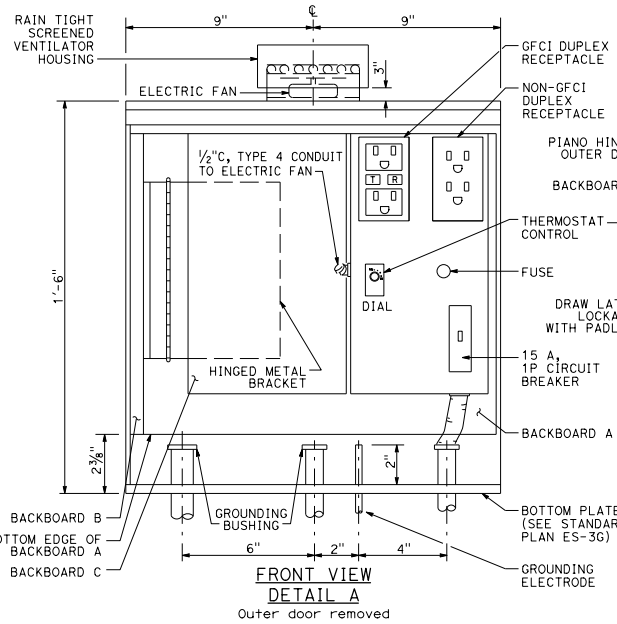
TOP VIEW
DETAIL C



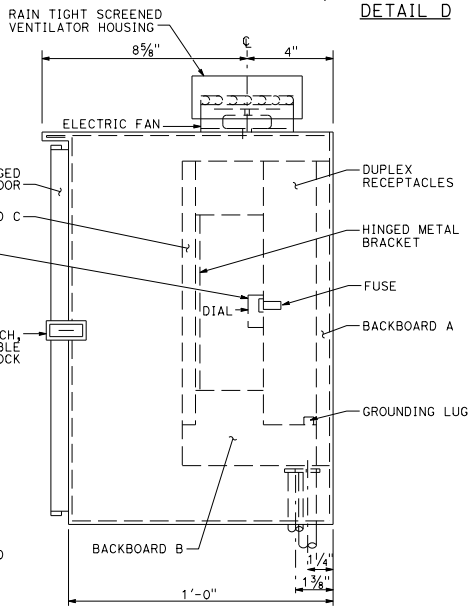
DETAIL D

NOTES:

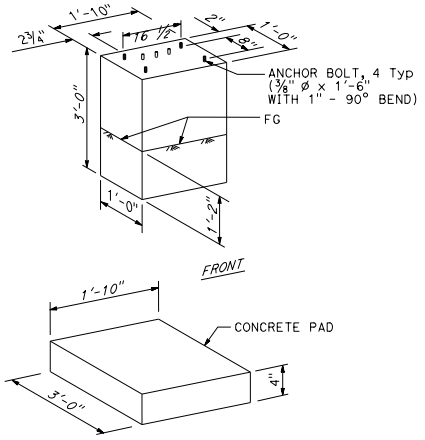
1. Dimensions are nominal.
2. Hardware for fastening of mounting boards:
   a. Fasten backboard A and backboard B to telephone demarcation cabinet with ⅜" Ø x ¾" stainless steel carriage bolts (8 required).
   b. Fasten hinged metal bracket to backboard B and backboard C to hinged metal bracket with number No. 10 x ¾" wood screws (9 required).



FRONT VIEW
DETAIL A
Outer door removed



SIDE VIEW
DETAIL B



CONCRETE PAD
FOUNDATION AND PAD DETAILS
DETAIL E

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp.12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE C)

NO SCALE

ES-3F

1-30-18

2018 STANDARD PLAN ES-3F

Return to Table of Contents

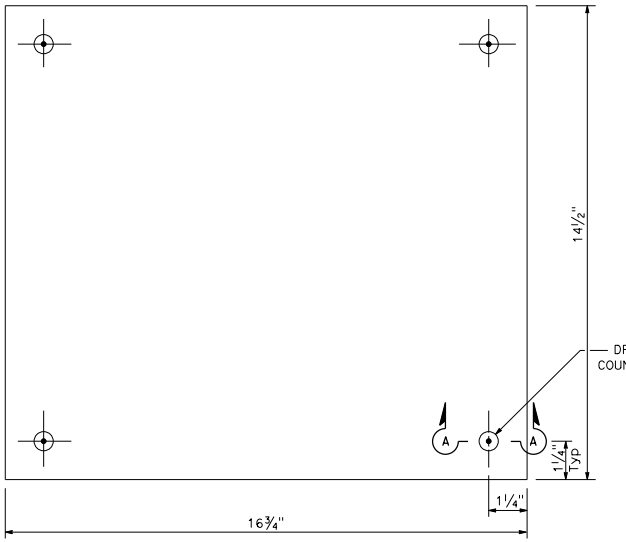
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

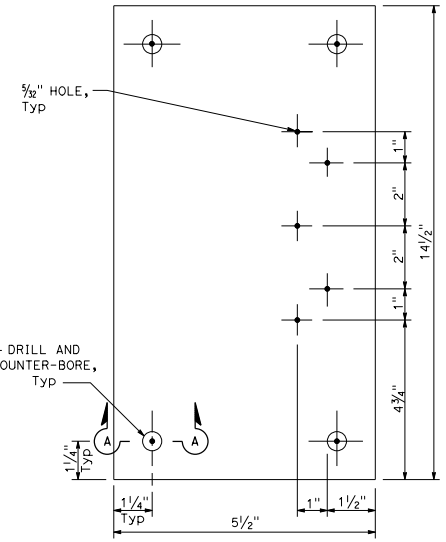
May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

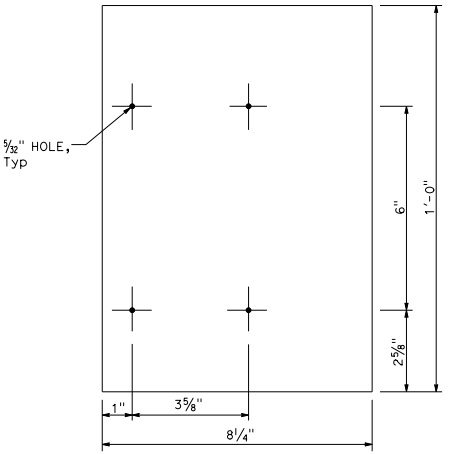
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



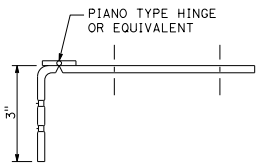
BACKBOARD A
DETAIL A

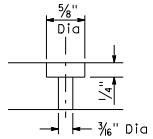


BACKBOARD B
DETAIL B

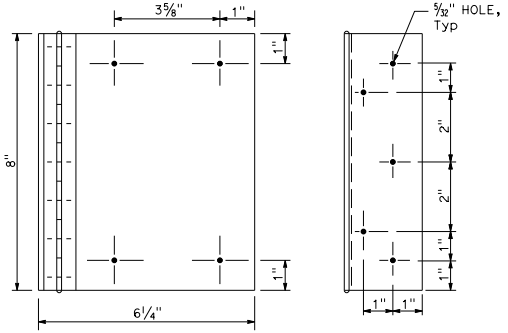


BACKBOARD C
DETAIL C

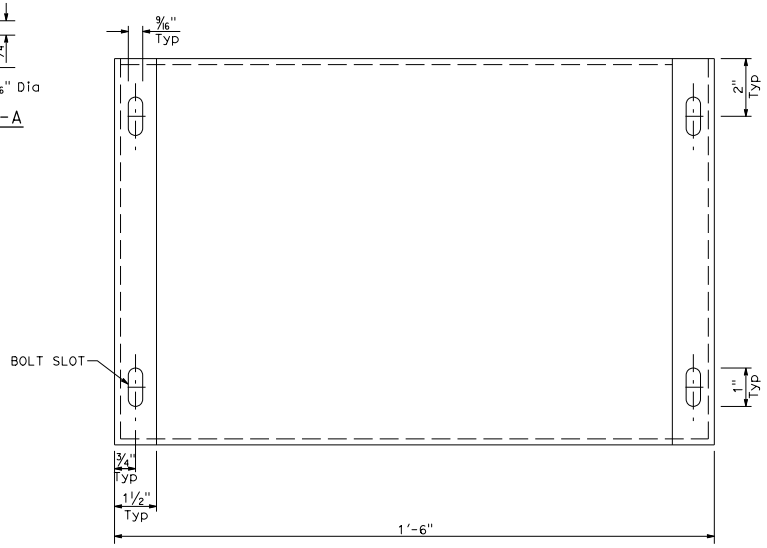




SECTION A-A



HINGED METAL BRACKET
DETAIL D



CABINET BASE
DETAIL E

NOTE:

1. Base mounting frame shall be constructed with 0.134" galvanized steel.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (TELEPHONE DEMARCATION CABINET, TYPE C DETAILS)

NO SCALE

ES-3G

1-30-18

2018 STANDARD PLAN ES-3G

Return to Table of Contents

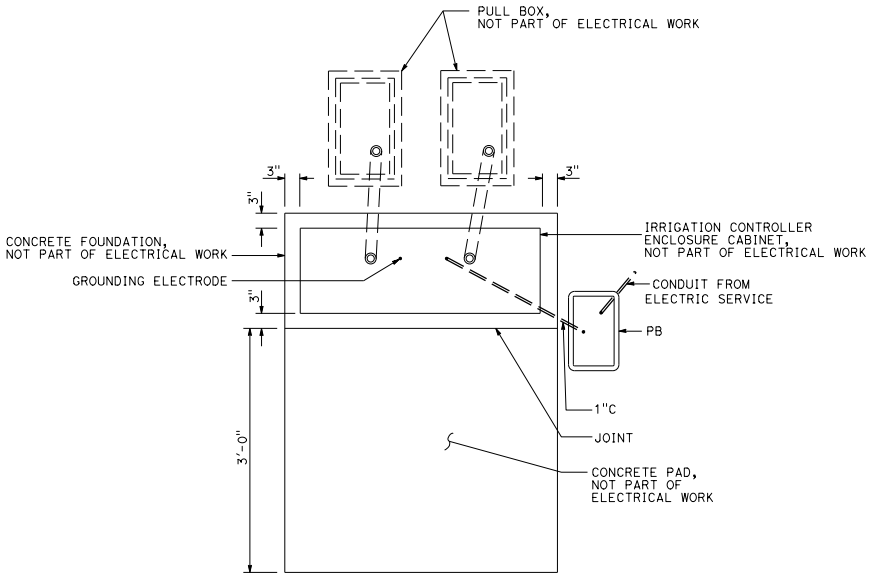
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — Electrical — State of California

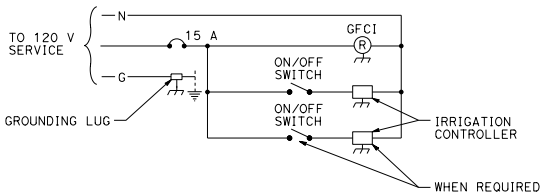
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A

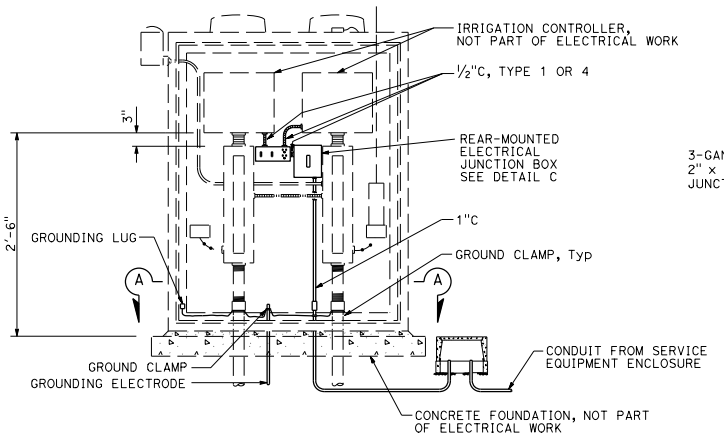
NOTES:

1. See Standard Plan H10 for other details.
2. Underground electrical work done prior to foundation installation.



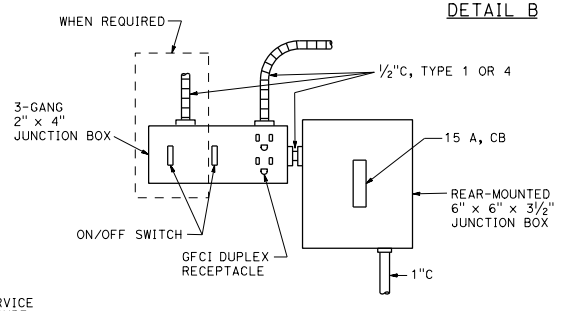
IRRIGATION CONTROLLER ENCLOSURE CABINET WIRING DIAGRAM (Typ)

DETAIL B



ELEVATION

DETAIL A



ELECTRICAL JUNCTION BOX LAYOUT

DETAIL C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (IRRIGATION CONTROLLER ENCLOSURE CABINET)

NO SCALE

ES-3H

2018 STANDARD PLAN ES-3H

1-30-18

Return to Table of Contents

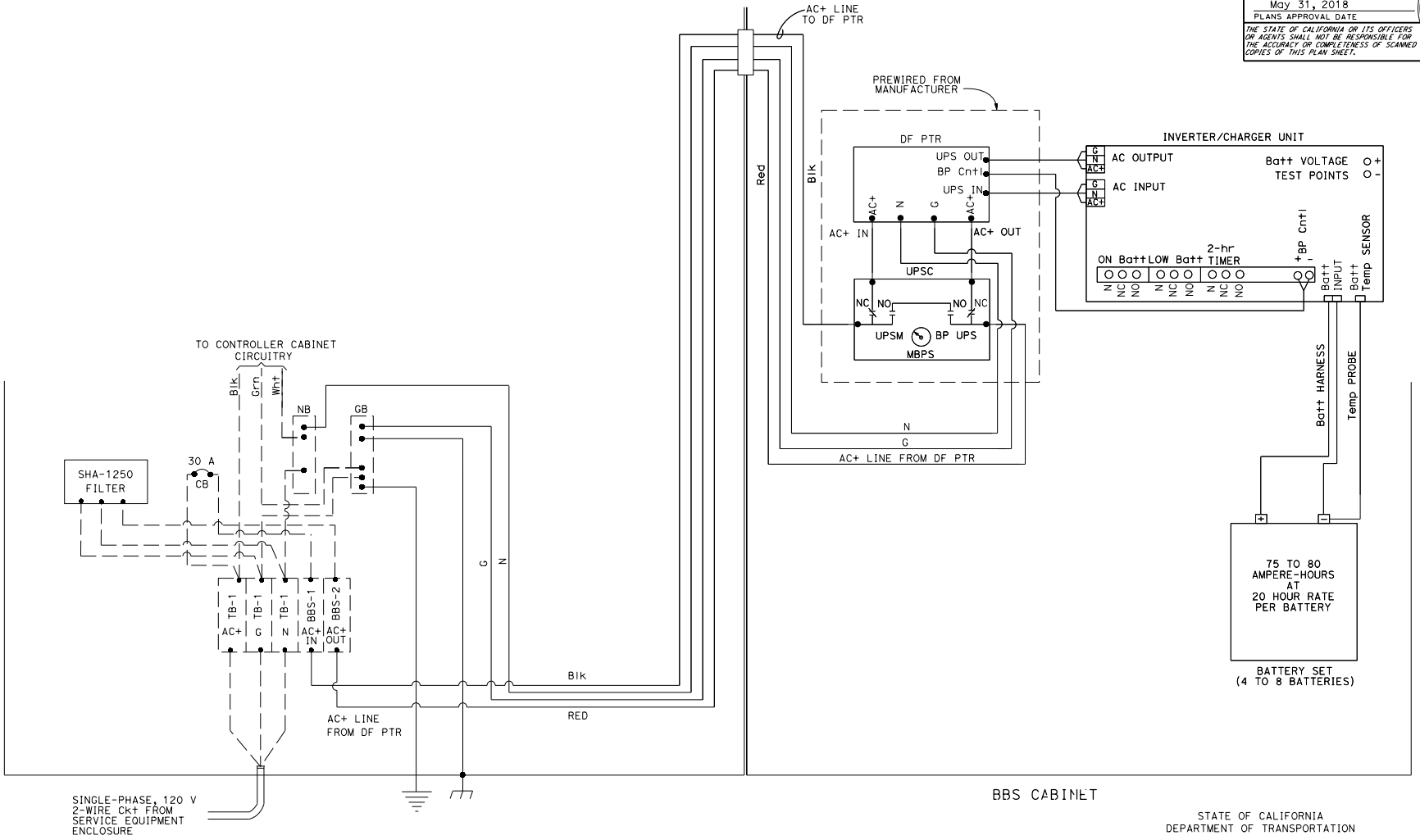
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM, WITH BYPASS CONTROL LINE)

NO SCALE

ES-3I

1-30-18

Return to Table of Contents

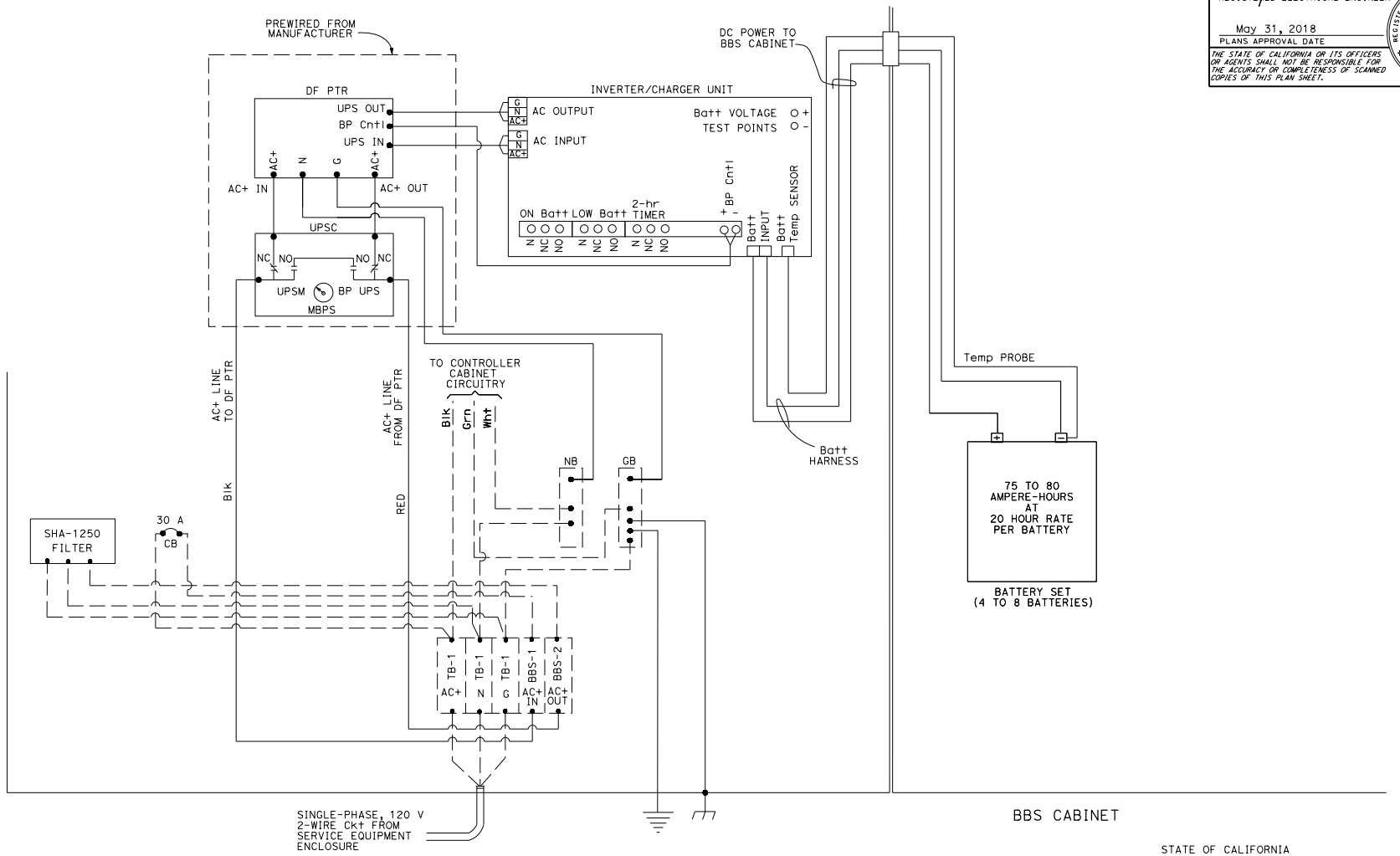
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM, WITH BYPASS CONTROL LINE)

NO SCALE

ES-3J

1-30-18

Return to Table of Contents

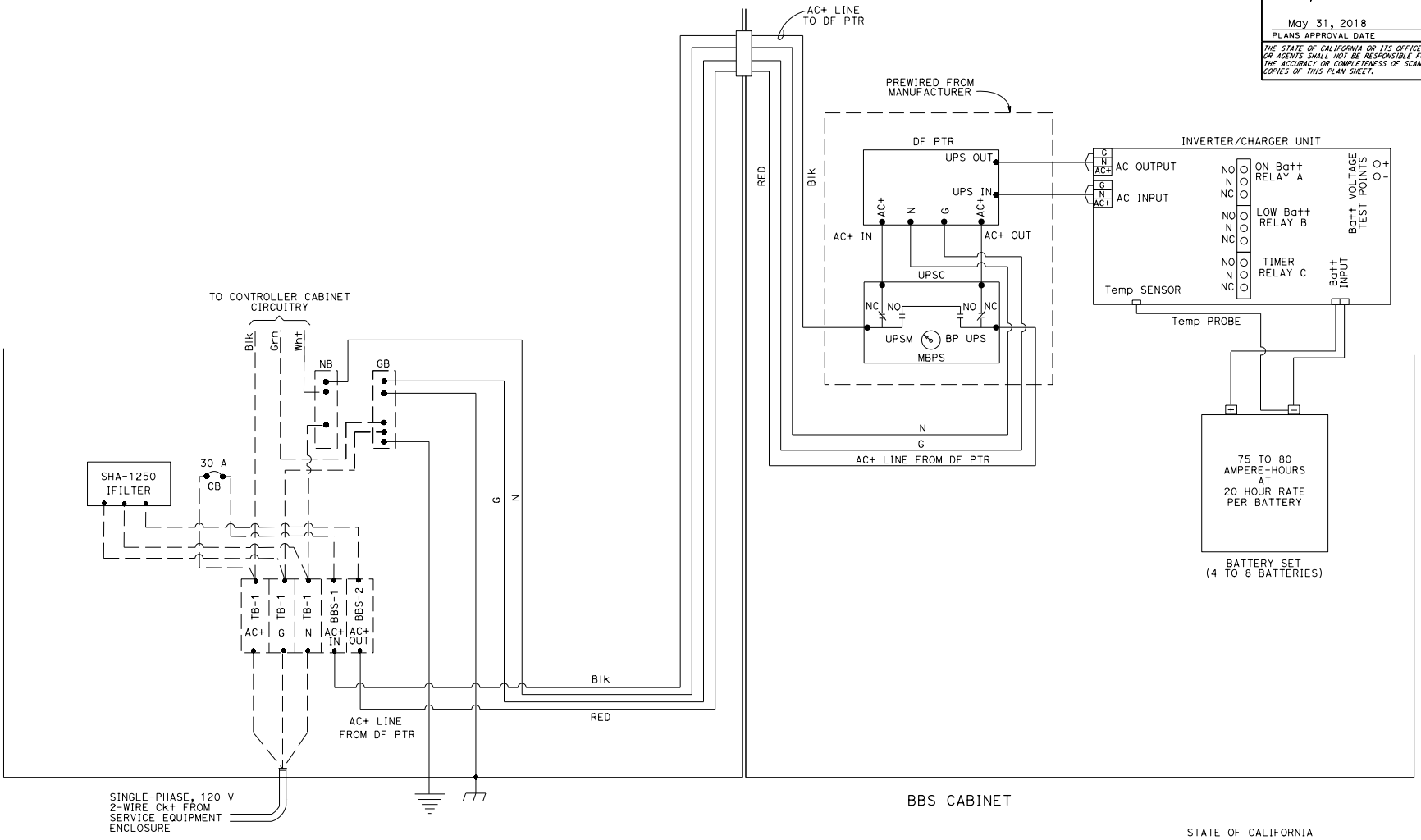
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

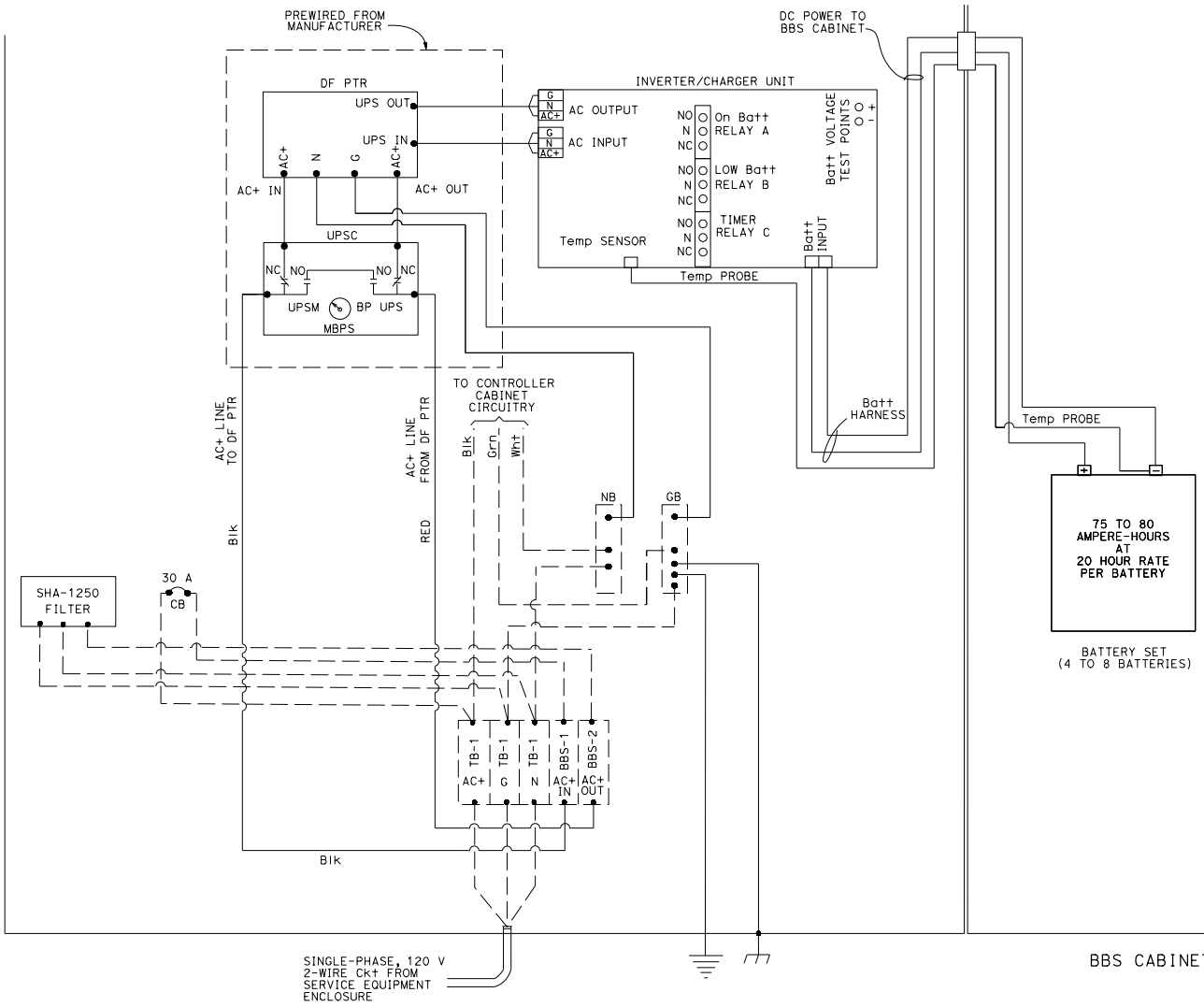
ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM, WITHOUT BYPASS CONTROL LINE)

NO SCALE

ES-3K

1-30-18

Return to Table of Contents



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ELECTRONICS ASSEMBLY CONNECTION DIAGRAM, WITHOUT BYPASS CONTROL LINE)

NO SCALE

ES-3L

1-30-18

2018 STANDARD PLAN ES-3L

Return to Table of Contents

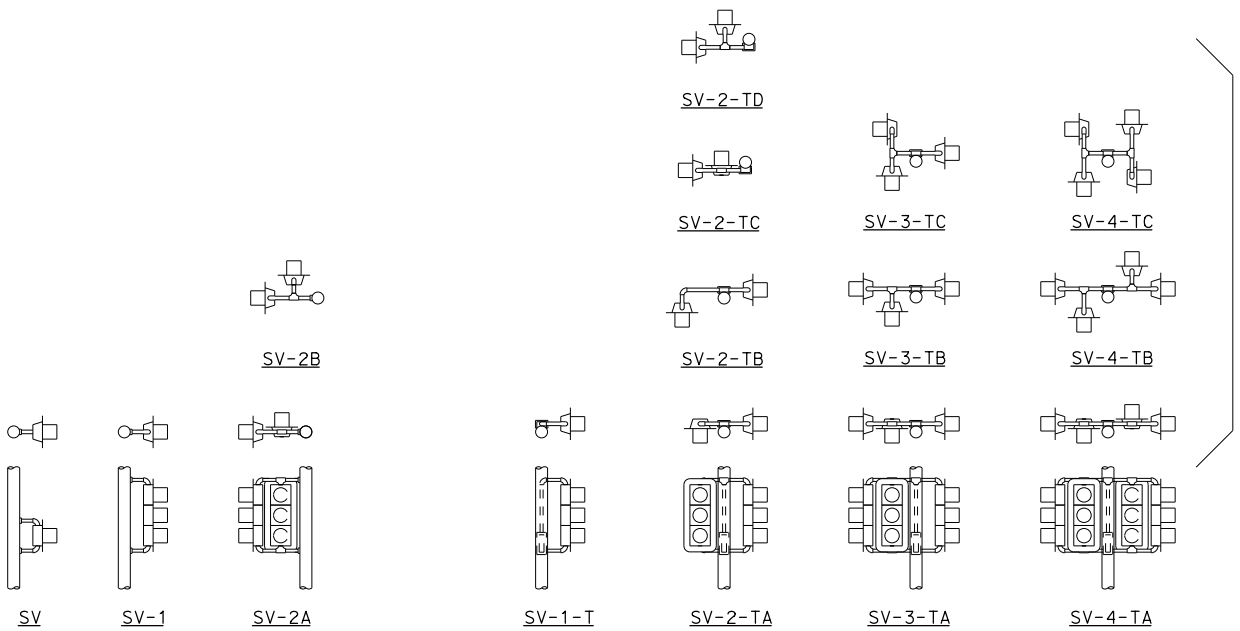
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



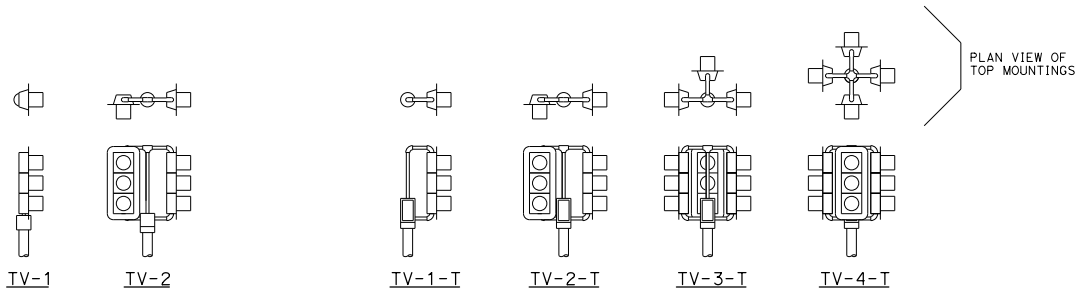
SIDE MOUNTINGS

ABBREVIATIONS:

SV	SIDE MOUNTED SIGNAL HEADS
T	TERMINAL COMPARTMENT
TV	TOP MOUNTED SIGNAL HEADS
1, 2, 3, 4	NUMBER OF SIGNAL FACES (3 - SECTION, UNLESS OTHERWISE INDICATED)
A, B, C, D	CONFIGURATION OF SIGNALS

NOTES:

1. Mountings shall be oriented to provide maximum horizontal clearance to adjacent roadway.
2. Bracket arms shall be long enough to permit proper alignment of signals and backplate installation.
3. See Standard Plans ES-4D and ES-4E for attachment fitting details.



TOP MOUNTINGS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL HEADS AND MOUNTINGS)

NO SCALE

ES-4A

2018 STANDARD PLAN ES-4A

1-30-18

Return to Table of Contents

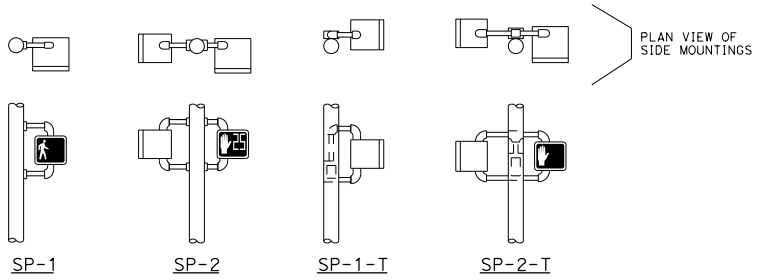
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
State of California

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



PEDESTRIAN SIGNAL HEAD MOUNTINGS
DETAIL A

PERSON WALKING INTERVAL FLASHING UPRAISED HAND INTERVAL STEADY UPRAISED HAND INTERVAL

LED COUNTDOWN PEDESTRIAN SIGNAL FACE MODULE
DETAIL B

NOTES:

1. Mounting shall be oriented to provide maximum horizontal clearance to adjacent roadway.
2. Bracket arms shall be long enough to permit proper alignment of signals.
3. See Standard Plan ES-4D for attachment fittings details.

ABBREVIATIONS:

1, 2	NUMBER OF SIGNAL FACES
SP	SIDE MOUNTED PEDESTRIAN SIGNAL
T	TERMINAL COMPARTMENT
TP	TOP MOUNTED PEDESTRIAN SIGNAL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (PEDESTRIAN SIGNAL HEADS)

NO SCALE

ES-4B

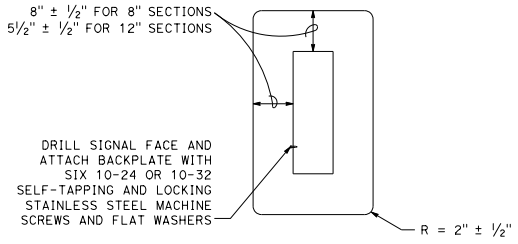
2018 STANDARD PLAN ES-4B

500

1-30-18

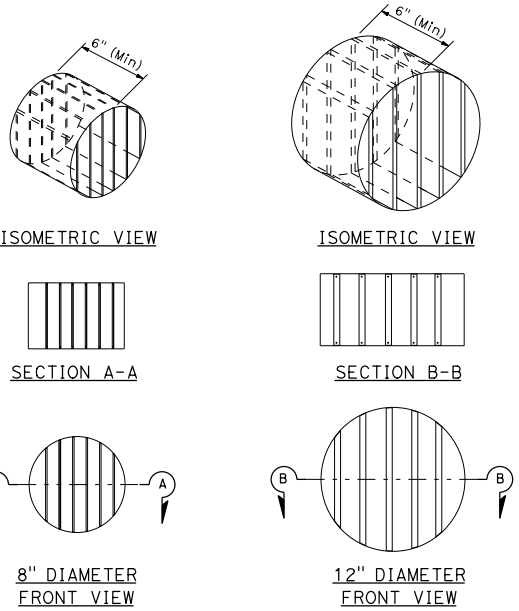
Return to Table of Contents

VISORS



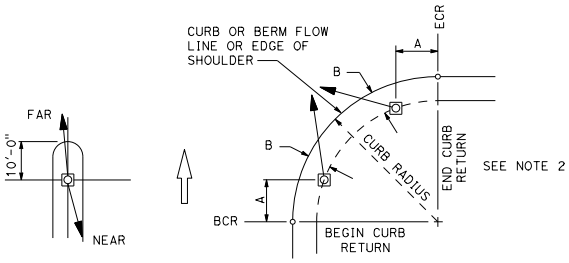
8" AND 12" SECTIONS

BACKPLATE



DIRECTIONAL LOUVER

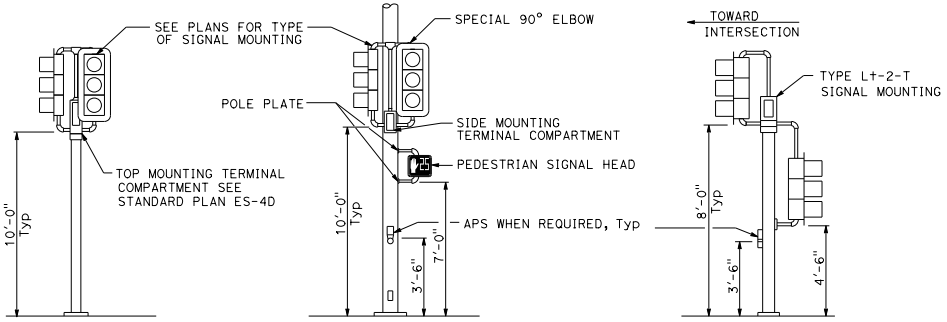
Directional louvers shall be oriented and secured in place with one plated brass machine screw and nut.



NOTES:

1. Typical signal pole placement unless dimensioned on plans.
2. For A and B dimensions, see Pole Schedule.

SIGNAL STANDARD PLACEMENT DIMENSIONS AND EQUIPMENT LOCATIONS

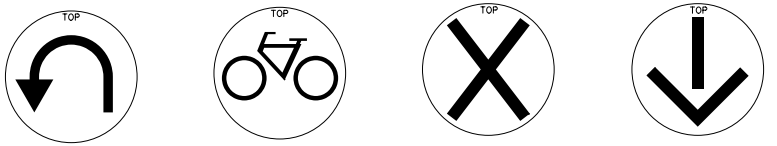


TOP MOUNTED SIGNALS (TV)
Type 1-A, 1-B, 1-C and 1-D standard as indicated on the plans

SIDE MOUNTED SIGNALS (SV AND SP)
Normally used on standards with luminaire or signal mast arm

LEFT TURN LANE SIGNAL
Type 1-A, 1-B, 1-C and 1-D standard as indicated on plans

TYPICAL SIGNAL HEAD INSTALLATIONS



U-TURN | BICYCLE | LANE CONTROL | LANE CONTROL

SIGNAL FACES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL HEADS AND MOUNTINGS)

NO SCALE

ES-4C

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

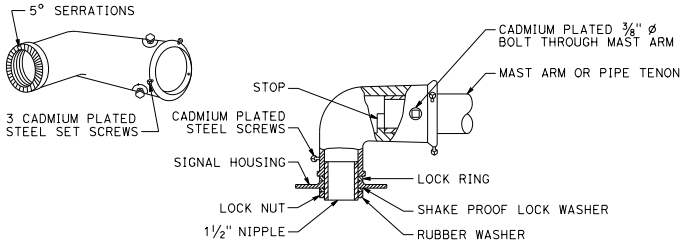
2018 STANDARD PLAN ES-4C

1-30-18

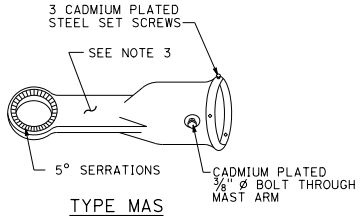
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

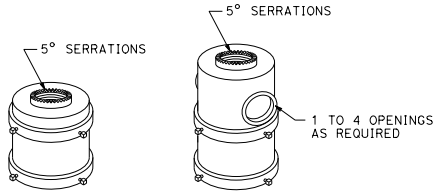
H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp.12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPE MAT
MAST ARM MOUNTING
For 2 NPS pipe, see Note 1.



TYPE MAS
MAST ARM MOUNTING
For 2 NPS pipe, see Note 1.

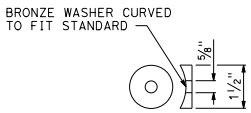


TOP MOUNTINGS
For 4 NPS pipe, see Note 2.

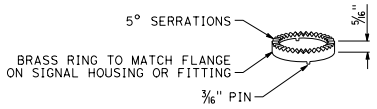
SIGNAL SLIP FITTERS

NOTES:

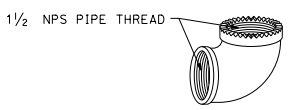
1. After mast arm signal has been plumbed and secured, drill 7/16" hole through mast arm tenon in line with slip fitter hole. Place a cadmium plated ⅜" ø galvanized bolt with washer under bolt head through hole and secure with washer, nut, and locknut. Seal openings between mast arm mountings and mast arm with mastic.
2. Threaded top mounted slip fitter openings shall be 1½ NPS. Serrations in fittings shall match those on bottom of signal heads or in lock ring. Top opening shall be offset when backplate is used.
3. Wireway shall have a cross section area of 0.95 square inch minimum. Minimum width of ½".



DETAIL C

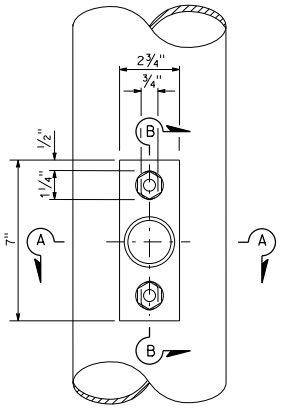


LOCK RING
Use where locking ring is not integral With signal housing or fitting.

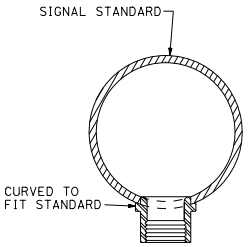


SPECIAL 90° ELBOW
One for each signal head, except those With special slip fitter mounting

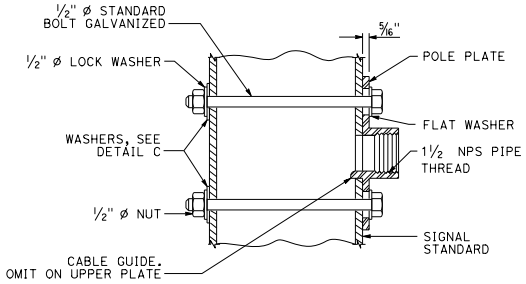
MISCELLANEOUS MOUNTING HARDWARE



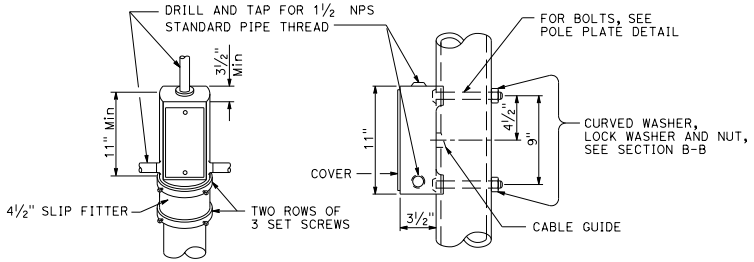
TOP VIEW



SECTION A-A



SECTION B-B



TOP MOUNTING SIDE MOUNTING

TERMINAL COMPARTMENT

POLE PLATE FOR SIDE MOUNTED SIGNAL HEAD WITHOUT TERMINAL COMPARTMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL HEAD MOUNTING)

NO SCALE

ES-4D

1-30-18

Return to Table of Contents

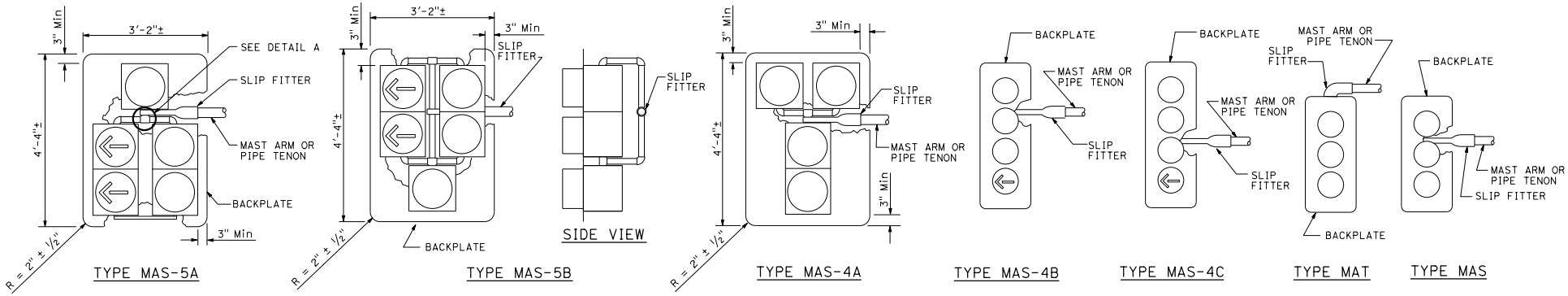
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

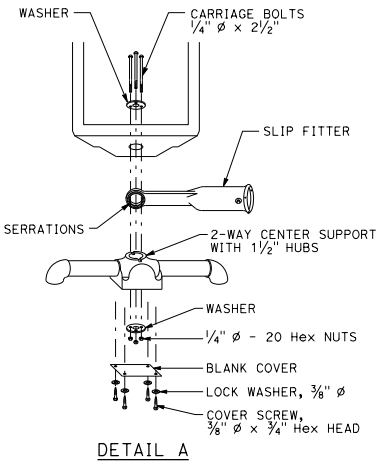
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

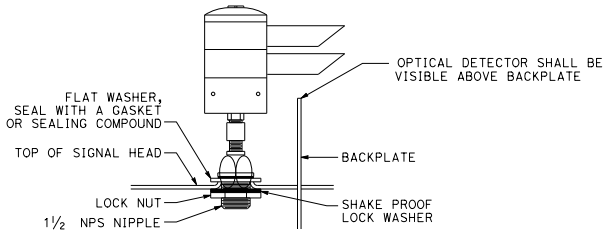
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



MAST ARM MOUNTINGS

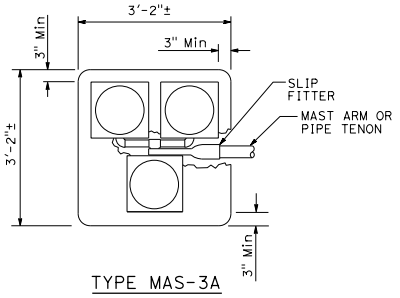


DETAIL A



OPTICAL DETECTOR MOUNTING FOR EMERGENCY VEHICLE DETECTION

DETAIL B



TYPE MAS-3A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL HEADS AND OPTICAL DETECTOR MOUNTING)

NO SCALE

ES-4E

1-30-18

2018 STANDARD PLAN ES-4E

Return to Table of Contents

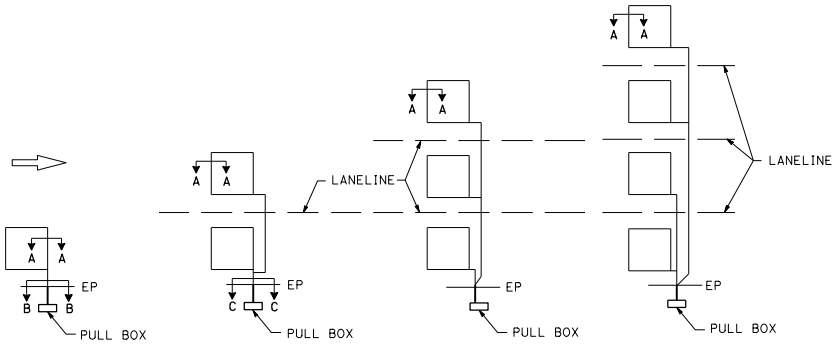
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

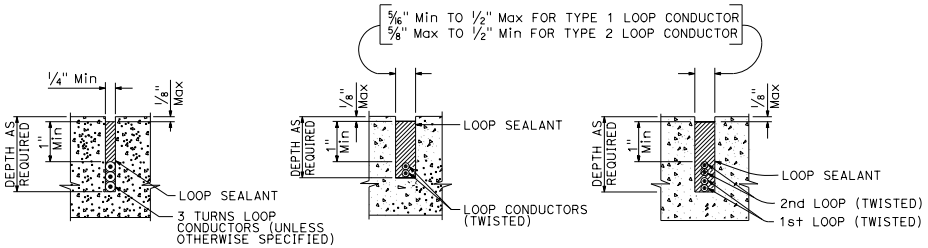
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



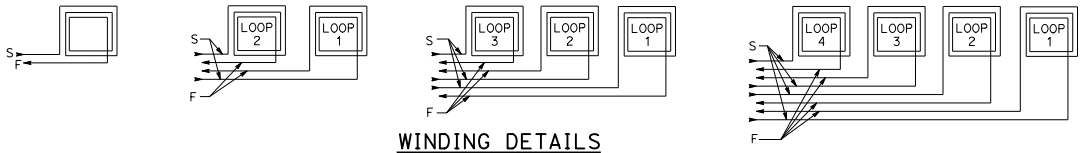
SAW CUT DETAILS

Type A loop detector configurations illustrated



SECTION A-A SECTION B-B SECTION C-C

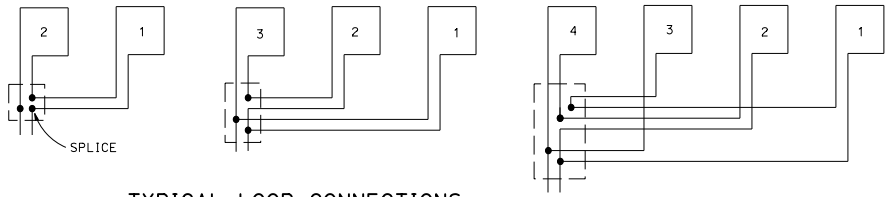
SLOT DETAILS - TYPE 1 AND TYPE 2 LOOP CONDUCTOR



WINDING DETAILS

ABBREVIATIONS:

S - START
F - FINISH



TYPICAL LOOP CONNECTIONS

Dashed lines represent the pull box

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LOOP DETECTORS)

NO SCALE

ES-5A

1-30-18

2018 STANDARD PLAN ES-5A

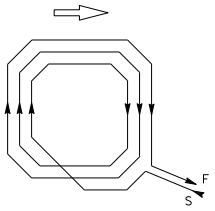
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

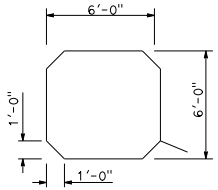
H.R.J
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

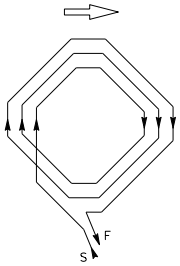


WINDING DETAIL

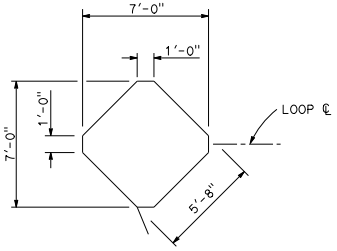


SAW CUT DETAIL

TYPE A LOOP DETECTOR CONFIGURATION

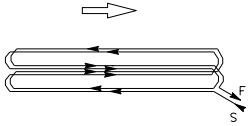


WINDING DETAIL

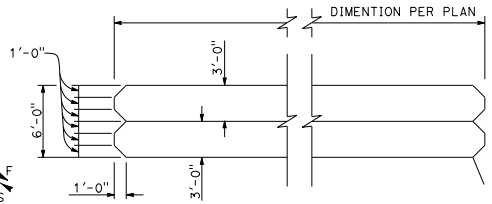


SAW CUT DETAIL

TYPE B LOOP DETECTOR CONFIGURATION

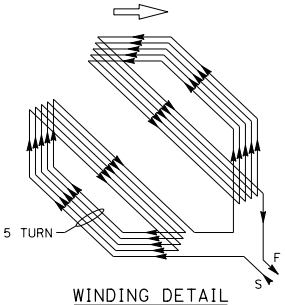


WINDING DETAIL

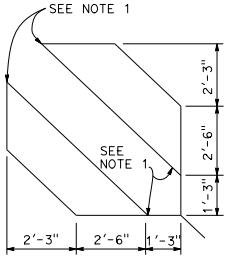


SAW CUT DETAIL

TYPE C LOOP DETECTOR CONFIGURATION

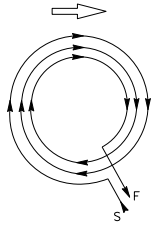


WINDING DETAIL

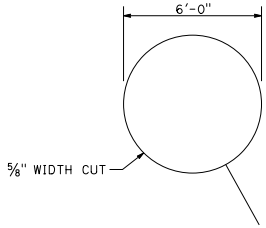


SAW CUT DETAIL

TYPE D LOOP DETECTOR CONFIGURATION

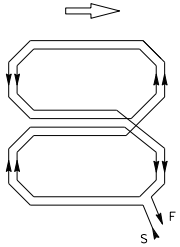


WINDING DETAIL

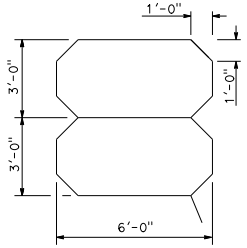


SAW CUT DETAIL

TYPE E LOOP DETECTOR CONFIGURATION



WINDING DETAIL

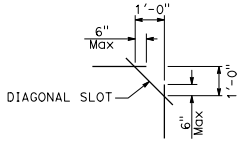


SAW CUT DETAIL

TYPE Q LOOP DETECTOR CONFIGURATION

NOTES:

1. Round corners of acute angle saw cuts to prevent damage to conductors.
2. Typical distance separating loops from edge to edge is 10' for Type A, B, D, and E installation in single lane.
3. Use Type D loops for limit line detection and bicycle lanes.



PLAN VIEW OF DIAGONAL SLOT AT CORNERS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (DETECTORS)

NO SCALE

ES-5B

1-30-18

2018 STANDARD PLAN ES-5B

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

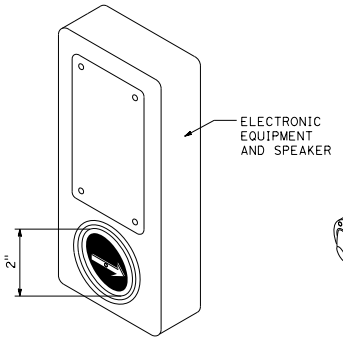
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

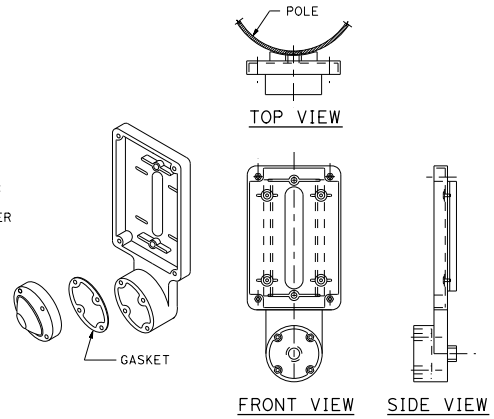
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

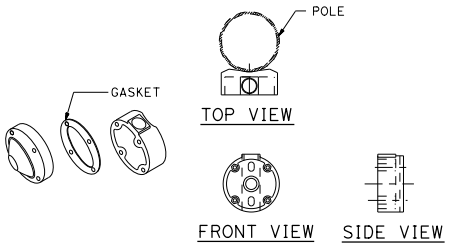
1. Back casting shape to fit curvature of pole.
2. Provide cover fitting for top of post, when PBA is mounted on push button assembly post.
3. Install push button on crosswalk side of standard.
4. Use R10 series regulatory signs and plaques for pedestrian and bicycle facilities.



ACCESSIBLE PEDESTRIAN SIGNAL
DETAIL A



TYPE B PUSH BUTTON ASSEMBLY
DETAIL B



TYPE C PUSH BUTTON ASSEMBLY
DETAIL C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

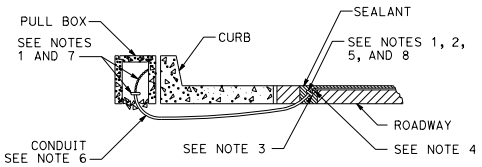
ELECTRICAL SYSTEMS (ACCESSIBLE PEDESTRIAN SIGNAL AND PUSH BUTTON ASSEMBLIES)

NO SCALE

ES-5C

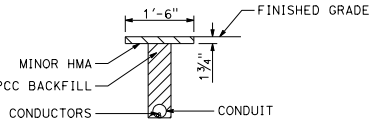
1-30-18

Return to Table of Contents

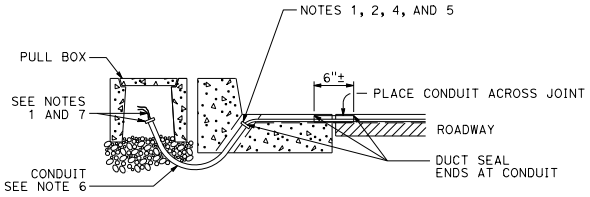


TYPE A

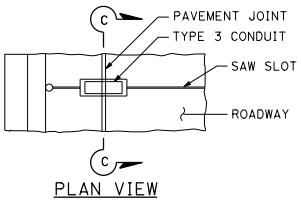
CURB TERMINATION DETAIL



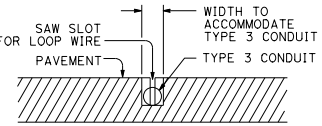
"T" TRENCH DETAIL T



CROSS SECTION



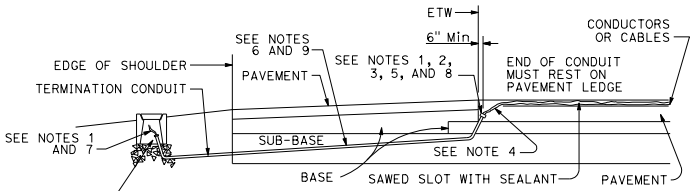
PLAN VIEW



SECTION C-C

TYPE B

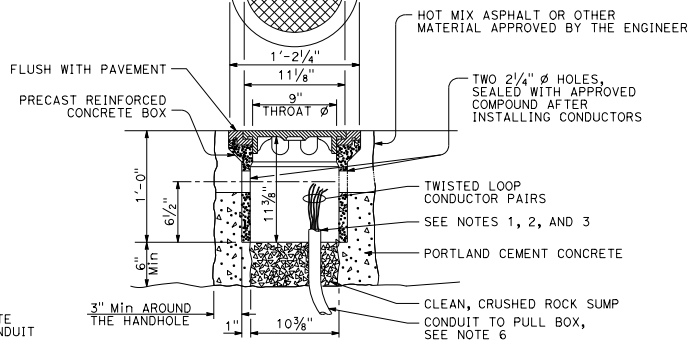
CURB TERMINATION DETAIL



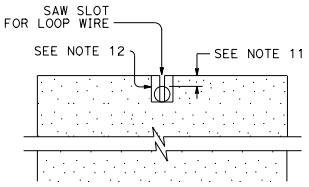
CROSS SECTION

PLAN VIEW

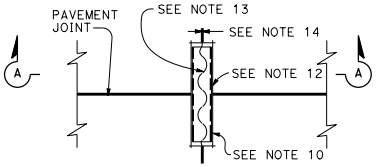
SHOULDER TERMINATION DETAILS



DETECTOR HANDHOLE DETAIL

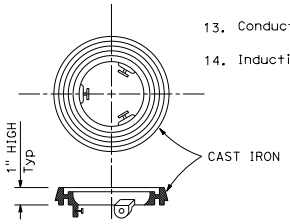


SECTION A-A



PLAN VIEW

TYPICAL LOOP LEAD-IN DETAIL AT PAVEMENT JOINT



LOCKING GRADE RING

NOTES:

1. Bushing shall be used at end of conduit.
2. Tape detector conductors or cables 3" each side of bushings.
3. Install duct seal compound to each end of termination conduit before installing sealant.
4. Round all sharp edges where detector conductors or cables have to pass.
5. End of conduit shall be 3⅛" below roadway surface.
6.

Conduit size	Loop conductors
1"C minimum	1 to 2 pairs
1½"C minimum	3 to 4 pairs
2"C minimum	5 or more pairs

7. Splice detector conductors or cables to detector lead-in-cable.
8. Location of detector handhole when shown on plans.
9. When the shoulder and traveled way are paved with the same material and there is no joint between them, the conduit shall extend only 2'-0" into the shoulder pavement.
10. ¾"C, Type 3 conduit 6" long minimum, plug both ends with duct compound to keep out sealant.
11. ½" Minimum between top of conduit and pavement surface.
12. Sawcut shall not exceed 1" in width and ⅛" longer than conduit to be installed.
13. Conductors with ½" minimum slack inside conduit.
14. Inductive loop detector saw slot.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — ELECTRICAL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CURB AND SHOULDER TERMINATION, TRENCH, AND HANDHOLE DETAILS)

NO SCALE

ES-5D

2018 STANDARD PLAN ES-5D

507

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

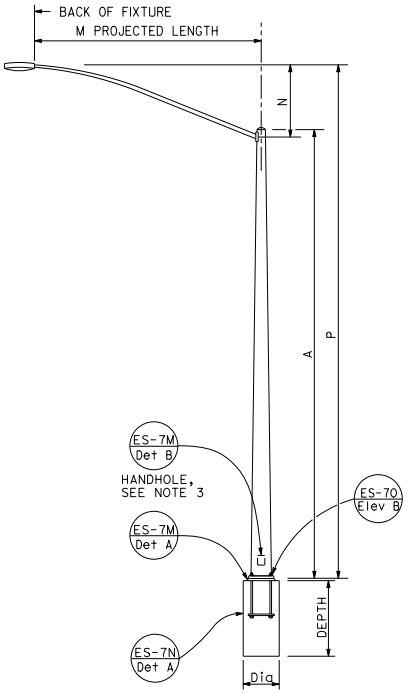
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

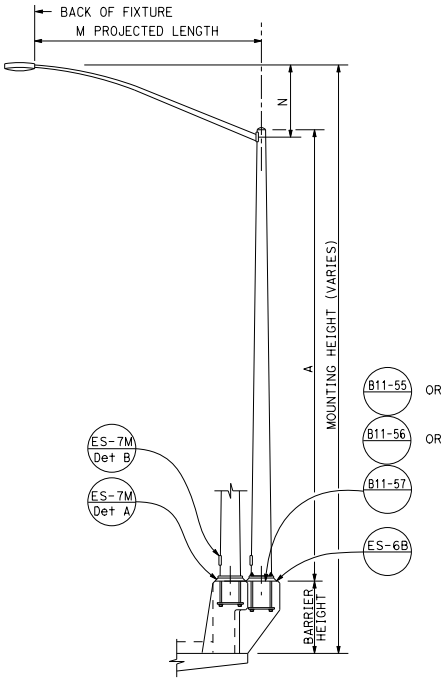
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



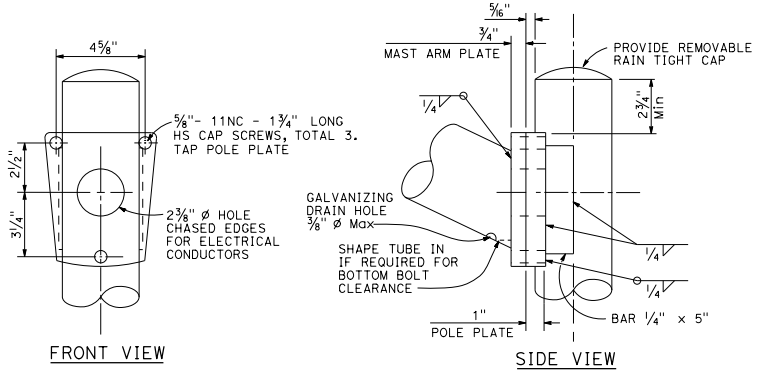
TYPE 15 AND TYPE 21

ELEVATION A



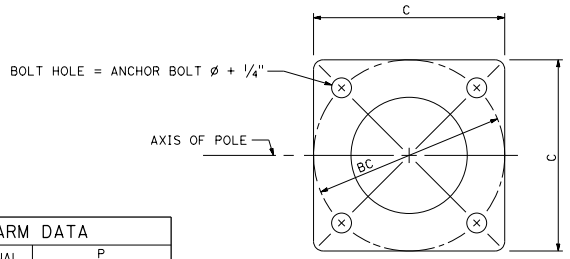
TYPE 15 AND TYPE 21 BARRIER RAIL MOUNTED

ELEVATION B



LUMINAIRE MAST ARM CONNECTION

DETAIL R



BASE PLATE

DETAIL A

POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH PILE FOUNDATION	
	A HEIGHT	Min OD BASE	Min OD TOP	WALL THICKNESS	C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	Dia	DEPTH
15	30'-0"	8"	3 11/16"	0.1196"	1'-0"	1'-0"	1½"	1" Ø x 36" *	2'-6"	6'-0"
21	35'-0"	8⅝"	3⅜"	0.1793"			2"	1¼" Ø x 36" *		7'-0"

* FOR BARRIER RAIL BOLTS, SEE STANDARD PLAN ES-6B.

LUMINAIRE MAST ARM DATA					
M PROJECTED LENGTH	N RISE	Min OD AT POLE	NOMINAL THICKNESS	P TYPE 15	P TYPE 21
6'-0"	2'-0"±	3¼"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3½"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3⅜"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4¼"		34'-3"±	39'-3"±

NOTES:

1. ☐ Indicates mast arm length to be used unless otherwise noted on the plans.
2. For Type 15-SB, use Type 15 standard with Type 30 slip base plate details, see Standard Plan ES-6F.
3. Handhole shall be located on the downstream side of traffic.
4. For additional notes and details, see Standard Plans ES-7M and ES-7N.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 15 AND 21)

NO SCALE

ES-6A

1-30-18

Return to Table of Contents

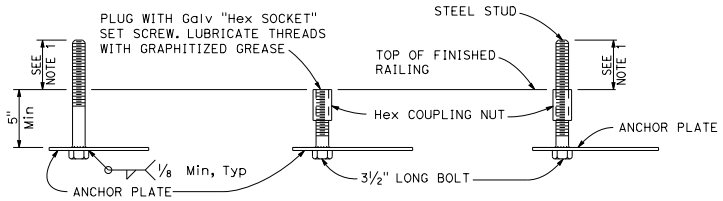
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



FOR IMMEDIATE INSTALLATION
DETAIL B-1

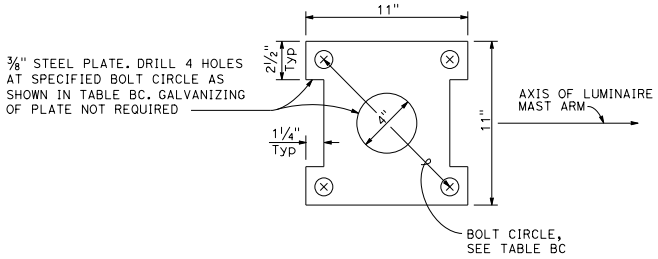
FOR FUTURE INSTALLATION WITH PLUG
DETAIL B-2

FOR INSTALLATION ON FUTURE ANCHORAGE WITH STUD
DETAIL B-3

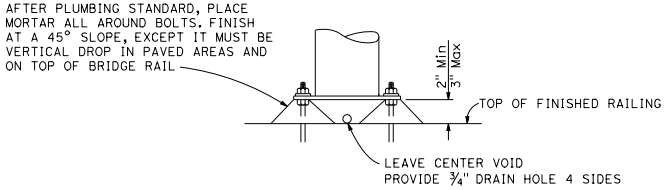
ELECTROLIER ANCHORAGES
DETAIL B

NOTES:

1. Anchor bolt or stud length shall be such that thread extends ½" maximum above nut on level base plate after grouting. See Detail N.
2. Electrolier anchor bolts shall be held in position for pouring by means of anchor plates and suitable templates. Deviation from the true position, vertical and height shall not exceed 1/16".
3. See railing sheets for reinforcement and structural details at electroliers and pull boxes.



ANCHOR PLATE
DETAIL A



GROUTING AT ELECTROLIER
DETAIL N

TABLE BC				
TYPE	BC = BOLT CIRCLE	ANCHOR BOLT DIAMETER	COUPLING NUT BASIC LENGTH	SET SCREW LENGTH DETAIL B-2
15	1'-0"	1"	3"	1½"
21		1¼"	3¾"	1⅞"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ELECTROLIER ANCHORAGE AND GROUTING FOR TYPE 15 AND TYPE 21 BARRIER RAIL MOUNTED)

NO SCALE

ES-6B

2018 STANDARD PLAN ES-6B

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

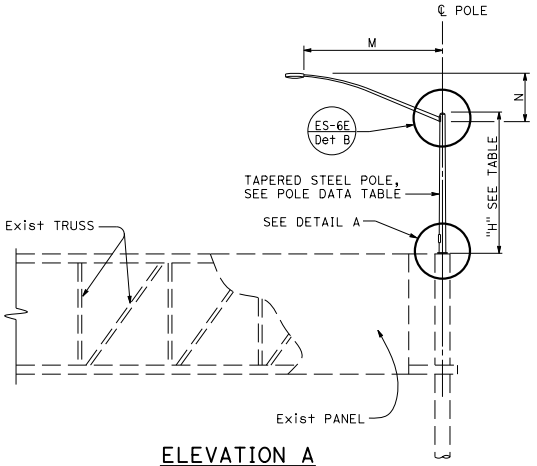
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LUMINAIRE MAST ARM DATA			
M PROJECTED LENGTH	N RISE	Min OD AT POLE	NOMINAL THICKNESS
15'-0"	4'-9"±	4½"	0.1196"
20'-0"	2'-6"±	5"	0.1793"

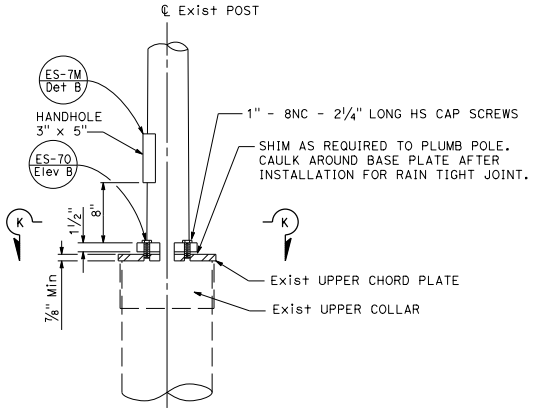
POLE DATA				
POLE EXTENSION TYPE	HEIGHT "H"	Min OD		THICKNESS
		BASE	TOP	
5	5'-0"	6½"	5 11/16"	0.1793"
10	10'-0"	7¼"		

NOTES:

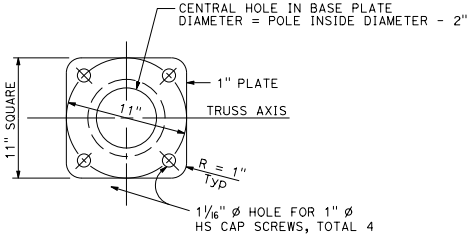
1. The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.
2. Bolt hole locations may vary at the discretion of the Engineer.
3. For Wind Loading see Standard Plans ES-7M.
4. See Std Plan S13.
5. Materials (Structural Steel):
   a. fy = 55,000 psi tapered steel tube (pole)
   b. fy = 50,000 psi unless otherwise noted



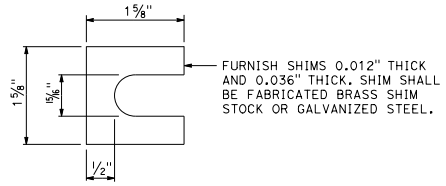
ELEVATION A



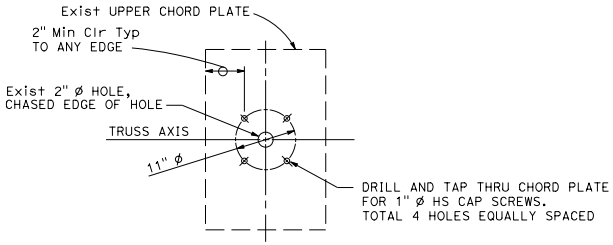
DETAIL A



SECTION K-K



SHIM DETAIL
DETAIL B



UPPER CHORD PLATE
DETAIL C
See Note 4

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 5 AND 10, OVERHEAD SIGN MOUNTED)

NO SCALE

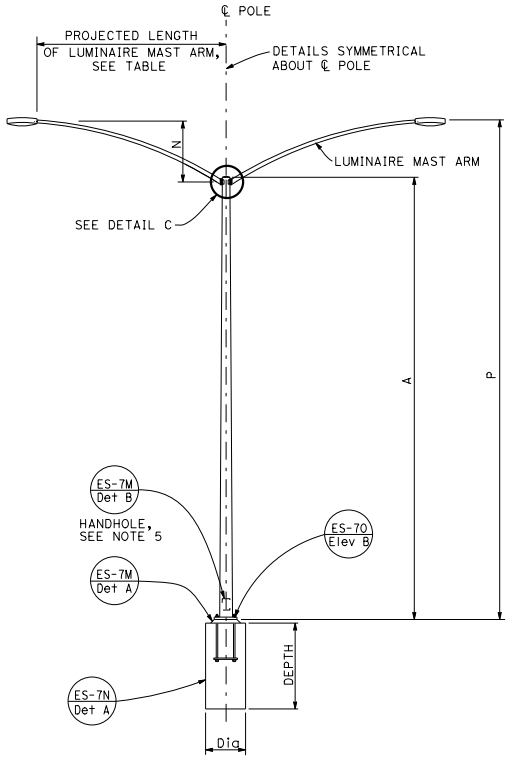
ES-6C

2018 STANDARD PLAN ES-6C

510

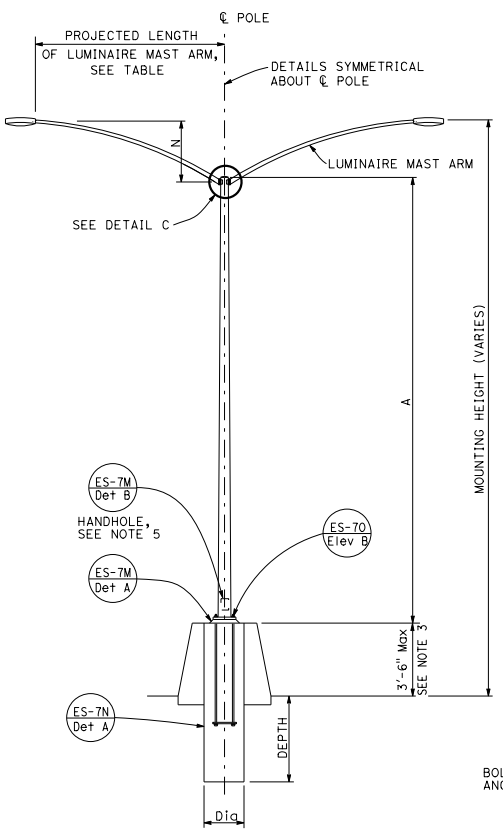
1-30-18

Return to Table of Contents



TYPE 15D AND TYPE 21D

ELEVATION A



TYPE 15D AND TYPE 21D

MEDIAN BARRIER MOUNTED

ELEVATION B

NOTES:

1. [ ] Indicates mast arm length to be used unless otherwise noted on the plans.
2. For additional notes and details, see Standard Plans ES-7M and ES-7N.
3. See Concrete Barrier Details Type 60MF and 60MSF.
4. For locations with one arm, plug unused cap screw holes and chased outlet with galvanized cap screws and knockout plug.
5. Handhole shall be located perpendicular to the luminaire mast arm and as directed by the Engineer.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

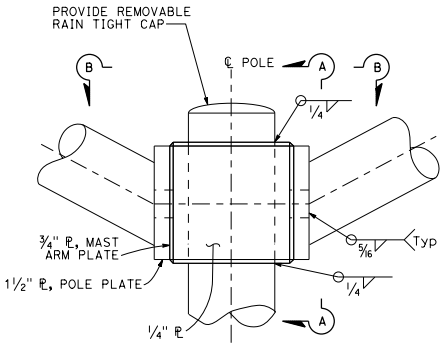
REGISTERED CIVIL ENGINEER

May 31, 2018

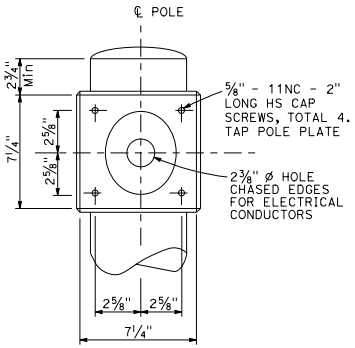
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

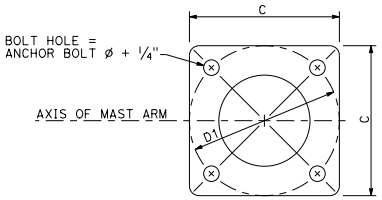
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



DETAIL C

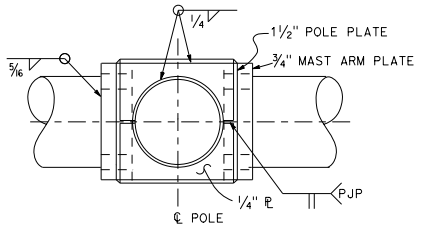


SECTION A-A



BASE PLATE

DETAIL B



SECTION B-B

POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH PILE FOUNDATION	
	A HEIGHT	Min OD BASE	Min OD TOP	Min THICKNESS	C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	Dia	DEPTH
15D	30'-0"	8"	3 11/16"	0.1793"	1'-0"	1'-0"	1 1/2"	1 1/4" ø x 42"	2'-6"	7'-0"
21D	35'-0"	8 5/8"								

LUMINAIRE MAST ARM DATA					
PROJECTED LENGTH	N RISE	Min OD AT POLE	NOMINAL THICKNESS	P TYPE 15D	P TYPE 21D
6'-0"	2'-0"±	3 1/4"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3 1/2"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3 7/8"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 15D AND 21D, DOUBLE LUMINAIRE MAST ARM)

NO SCALE

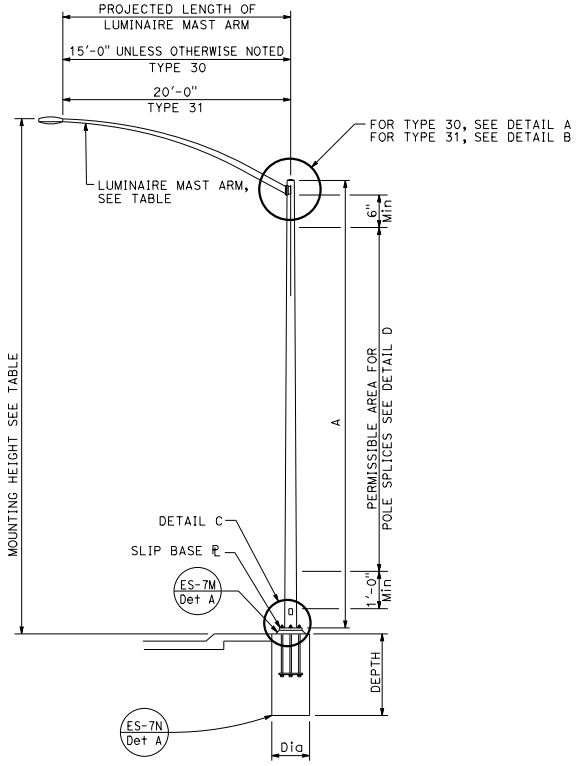
ES-6D

1-30-18

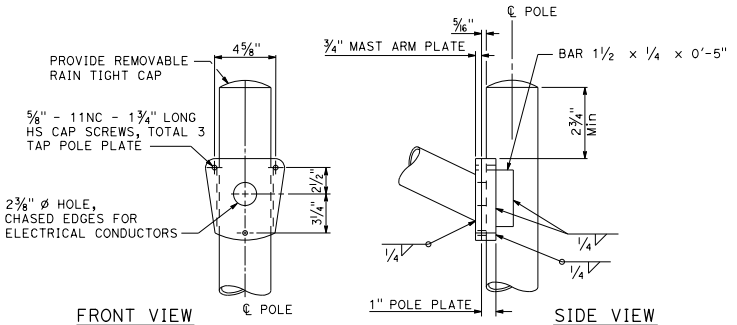
Return to Table of Contents

LUMINAIRE MAST ARM DATA			
PROJECTED LENGTH	THICKNESS	MINIMUM OD AT POLE	MOUNTING HEIGHT
* 6'-0"	0.1196"	3¼"	36'-9"±
* 8'-0"		3½"	37'-3"±
* 10'-0"		3⅞"	38'-0"±
* 12'-0"			39'-0"±
* 15'-0"		4¼"	39'-6"±
** 20'-0"	0.1793"	5"	37'-0"±

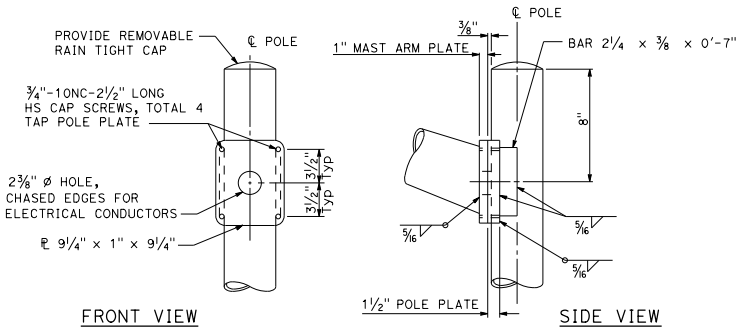
* TYPE 30
** TYPE 31



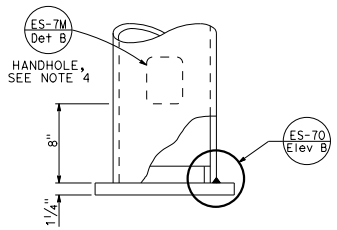
ELEVATION A



TYPE 30
DETAIL A



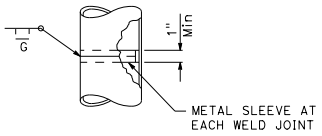
TYPE 31
DETAIL B



DETAIL C

NOTES:

1. For slip base plate details, see Standard Plan ES-6F.
2. For Type 30 fixed base use Type 15 base plate and foundation shown on Standard Plan ES-6A. Use 1¼" Dia x 3'-6" anchor bolts.
3. For Type 31 fixed base use Type 32 base plate, anchor bolts and foundation on Standard Plan ES-6G.
4. Handhole shall be located on the downstream side of traffic.
5. For additional notes and details, see Standard Plans ES-7M and ES-7N.



POLE SPLICE
DETAIL D

POLE TYPE	POLE DATA				CIDH PILE FOUNDATION	
	A HEIGHT	Min OD BASE	Min OD TOP	Min THICKNESS	Dia	DEPTH
30	35'-0"	8¾"	3⅛"	0.1196"	2'-6"	7'-0"
31		10¾"	5⅛"	0.1793"	3'-0"	8'-0"

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPES 30 AND 31)

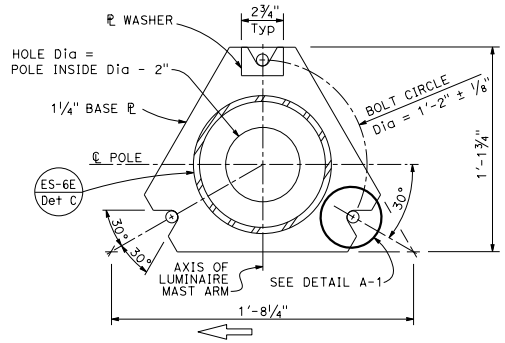
NO SCALE

ES-6E

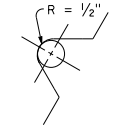
1-30-18

2018 STANDARD PLAN ES-6E

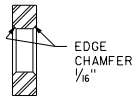
Return to Table of Contents



BASE PLATE
DETAIL A



DETAIL A-1



SECTION A-A

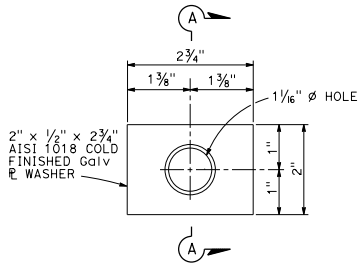
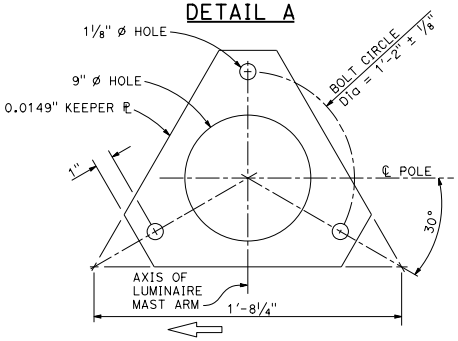
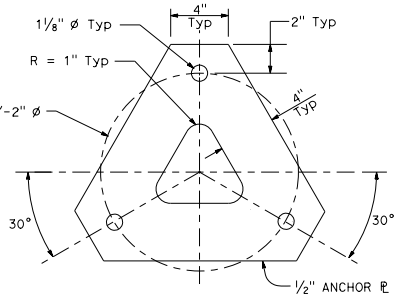


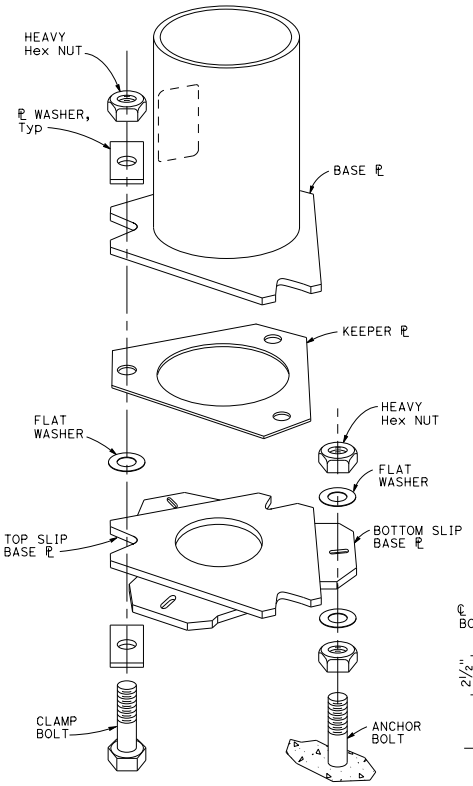
PLATE WASHER
DETAIL D



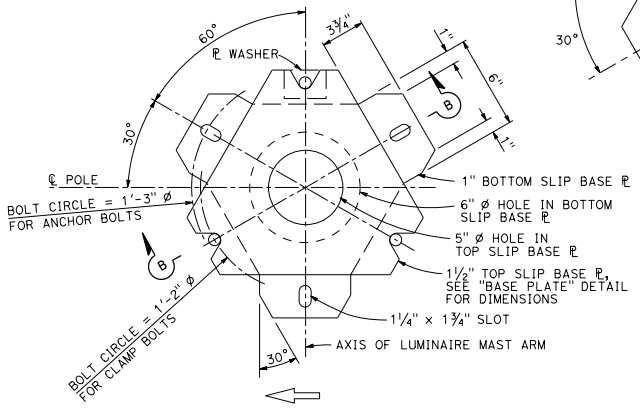
KEEPER PLATE
DETAIL B



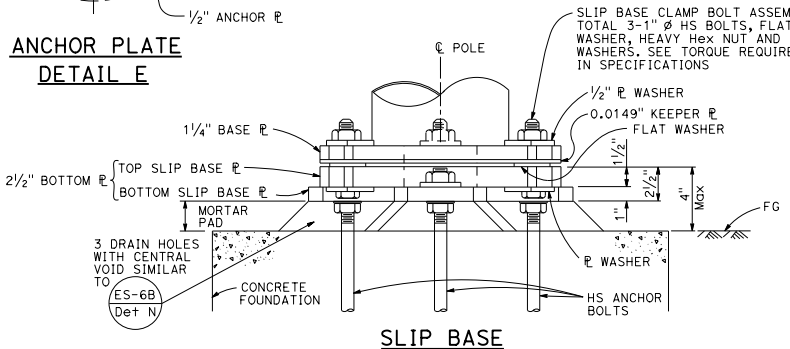
ANCHOR PLATE
DETAIL E



SLIP BASE DETAIL
DETAIL F



BOTTOM PLATE
DETAIL C



SLIP BASE
ELEVATION A

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

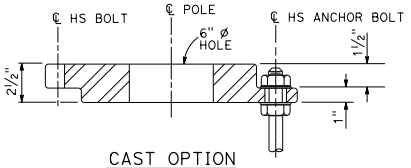
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

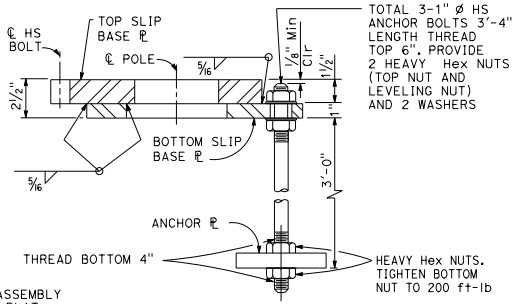
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. 1" ø HS anchor bolts. For clamp bolts, see specifications.
2. Conduit shall not protrude more than 2" above top of foundation.
3. Handhole shall be located on the downstream side of traffic.
4. For Type 30 fixed base and for Type 31 fixed base, see Notes 2 and 3 on Standard Plan ES-6E.



CAST OPTION



WELDED OPTION

SECTION B-B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, SLIP BASE PLATE)

NO SCALE

ES-6F

2018 STANDARD PLAN ES-6F

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

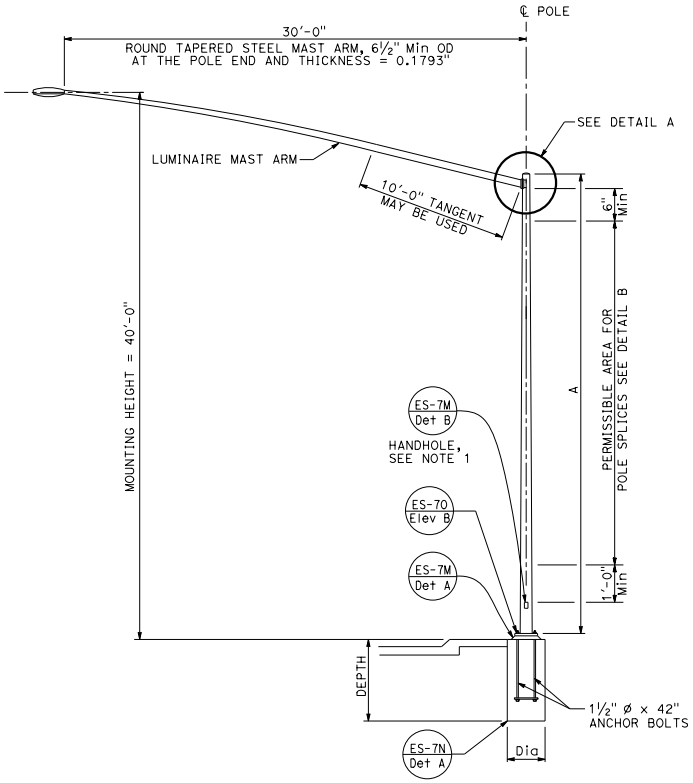
REGISTERED CIVIL ENGINEER

May 31, 2018

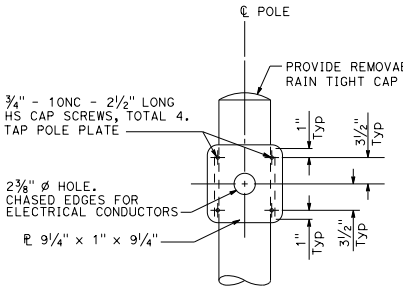
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

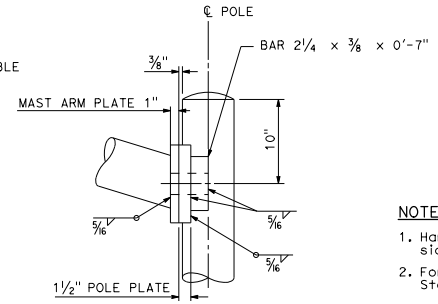
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION A



FRONT VIEW

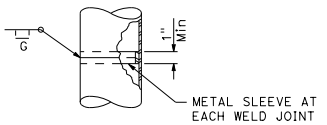


SIDE VIEW

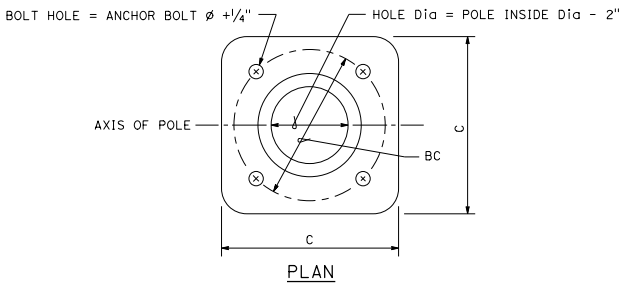
DETAIL A

NOTES:

1. Handhole shall be located on the downstream side of traffic.
2. For additional notes and details, see Standard Plans ES-7M and ES-7N.



POLE SPLICE
DETAIL B



PLAN

BASE PLATE DETAIL
DETAIL C

POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH PILE FOUNDATION	
	A	Min OD		Min	C	BC = BOLT	THICKNESS	ANCHOR BOLT		
	HEIGHT	BASE	TOP	THICKNESS		CIRCLE		SIZE	Dia	DEPTH
32	35'-0"	10¾"	5¹¹⁄₁₆"	0.1793"	1'-5"	1'-3"	2"	1½" ø x 42"	3'-0"	8'-0"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING STANDARD, TYPE 32)

NO SCALE

ES-6G

1-30-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

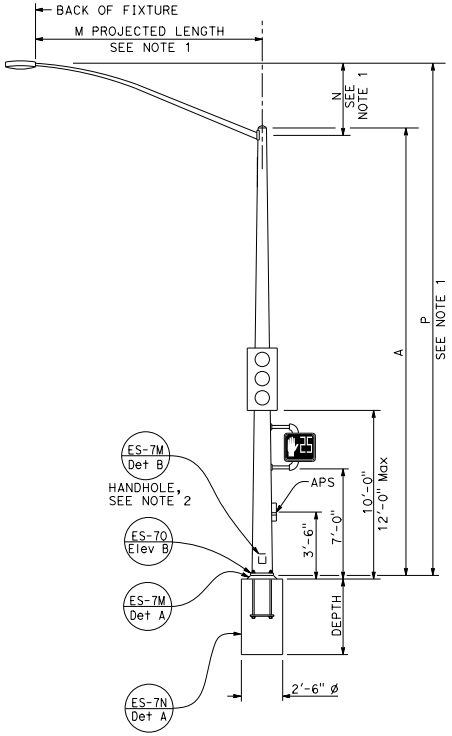
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

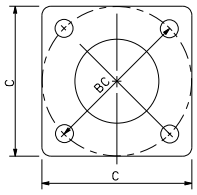
1. For additional notes, details and data for Type 15TS and Type 21TS Standards, see Standard Plan ES-6A.
2. Handhole shall be located on the downstream side of traffic.



TYPE 15TS AND 21TS STANDARD

ELEVATION A

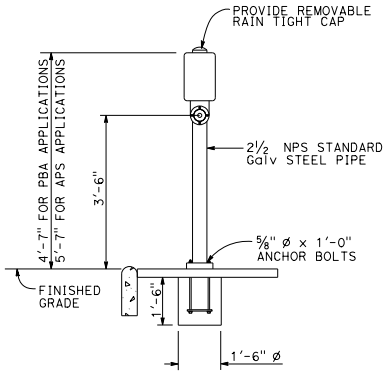
(See Note 1)



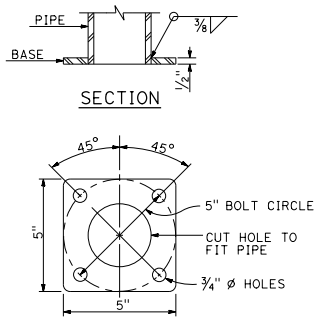
BASE PLATE

TYPE 15TS AND 21TS

DETAIL A

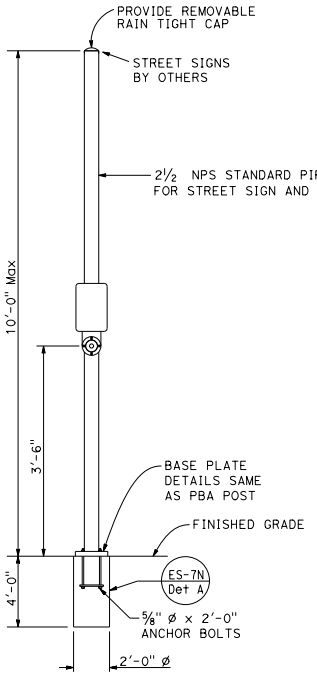


ELEVATION



BASE PLATE

PBA POST



COMBINED STREET SIGN

PUSH BUTTON ASSEMBLY POST

DETAIL C

PUSH BUTTON ASSEMBLY POST

DETAIL B

POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH
	A HEIGHT	Min OD BASE	Min OD TOP	WALL THICKNESS	C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	DEPTH
15TS	30'-0"	8"	3 11/16"	0.1793"	1'-1½"	1'-0"	2"	1½" ø x 42"	7'-6"
21TS	35'-0"	9 3/8"	3 3/16"		1'-3"	1'-2"			8'-6"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, TYPE TS, AND PUSH BUTTON ASSEMBLY POST)

NO SCALE

ES-7A

1-30-18

2018 STANDARD PLAN ES-7A

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

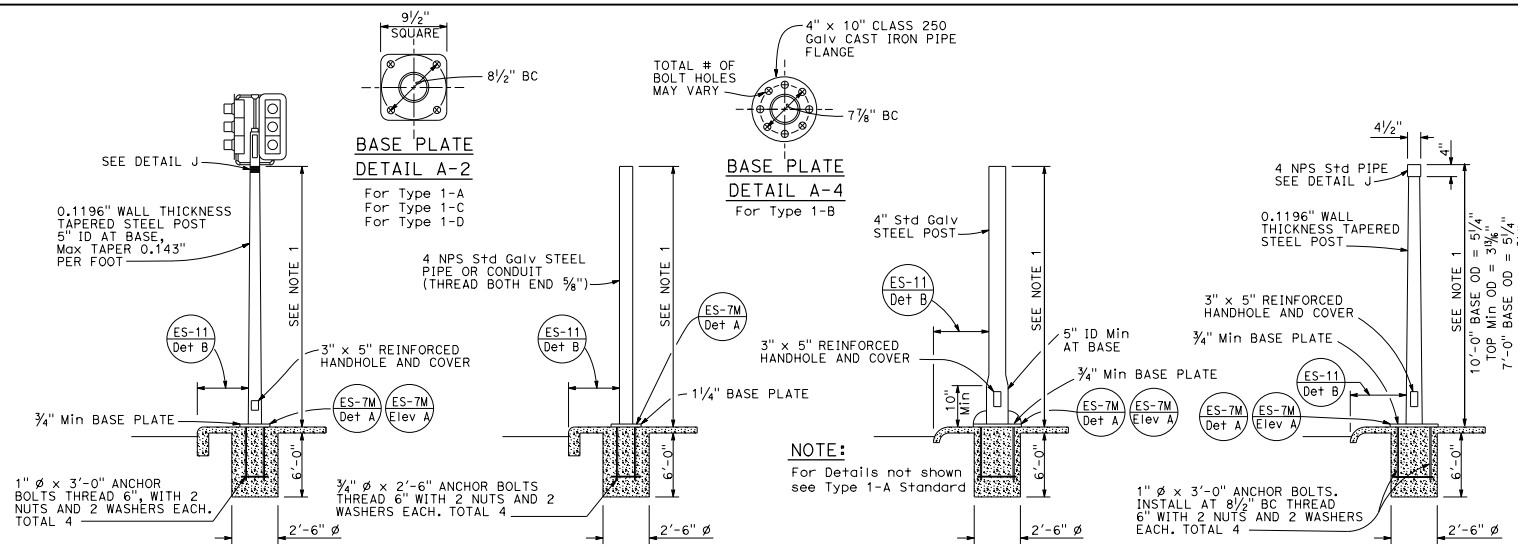
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

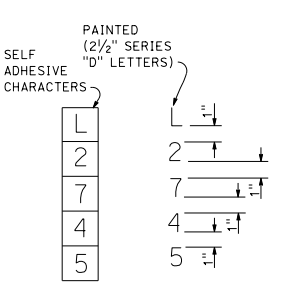
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



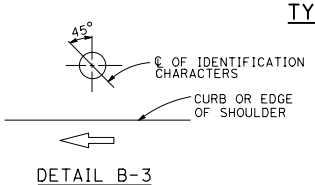
TYPE 1 SIGNAL STANDARDS
DETAIL A

NOTES:

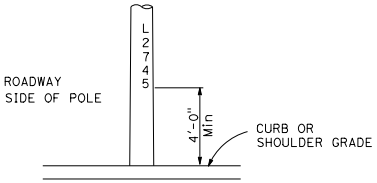
1. Standards shall be 10'-0" ± 2" for vehicle signals and 7'-0" ± 2" for pedestrian signals unless shorter pole is noted on project plans.
2. Top of standards shall be 4½" OD.
3. Conduits shall extend 2" maximum above finished surface of foundation and for Types 1-A, 1-C and 1-D shall be sloped toward handhole.
4. Anchor bolts shall be bonded to conduit or grounding conductor.
5. For additional notes and details, see Standard Plans ES-7M and ES-7N.
6. Pour foundation concrete against undisturbed soil.
7. For standards with handhole, locate in the downstream side of traffic.
8. Coupling nuts to be used only when shown or specified on project plans.



IDENTIFICATION CHARACTER DETAIL
DETAIL B-1

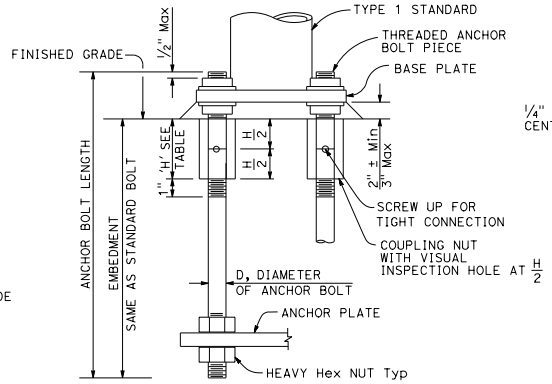


DETAIL B-3

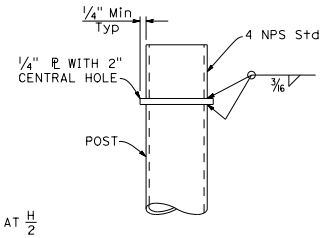


TYPICAL IDENTIFICATION CHARACTER FORMAT
DETAIL B-2

LOCATION OF EQUIPMENT IDENTIFICATION CHARACTERS ON STANDARDS AND POSTS
DETAIL B



ANCHOR BOLTS WITH SLEEVE NUTS
DETAIL C
(See Note 8)



DETAIL J

COUPLING NUT TABLE	
BOLT DIAMETER	NUT TABLE THICKNESS 'H'
¾"	2¼"
1"	3"

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, TYPE 1 AND EQUIPMENT IDENTIFICATION CHARACTERS)

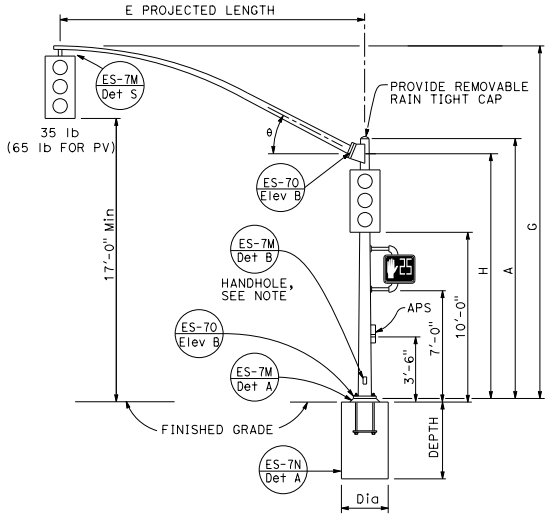
NO SCALE

ES-7B

1-30-18

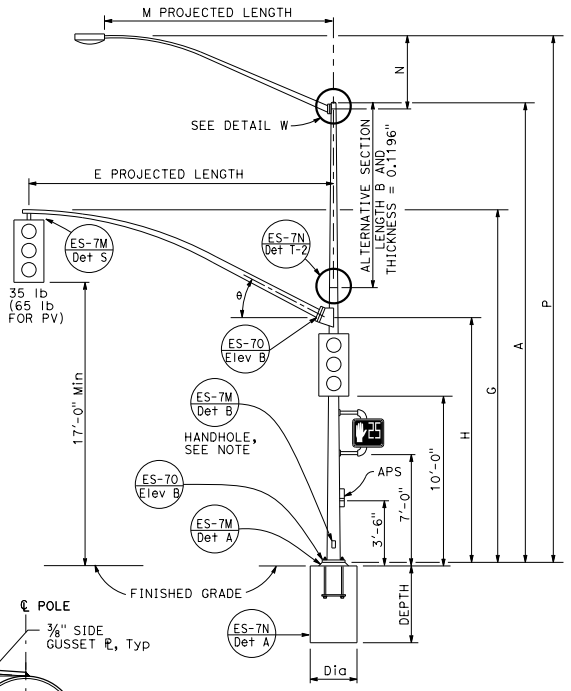
2018 STANDARD PLAN ES-7B

Return to Table of Contents



TYPE 16-1-100, 18-1-100

ELEVATION A



TYPE 19-1-100, 19A-1-100

ELEVATION B

NOTES:

1. Handhole shall be located on the downstream side of traffic.
2. Δ = Luminaire mast arm skew -90° or +90° default 0°

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

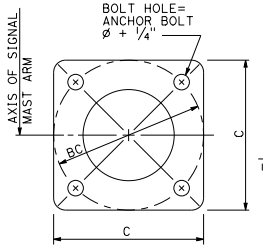
REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

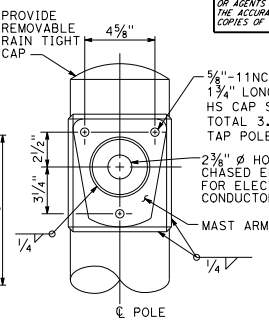
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

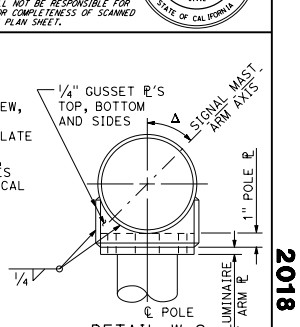


DETAIL D

BASE PLATE



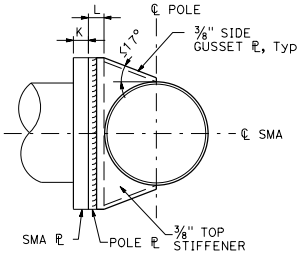
DETAIL W-1



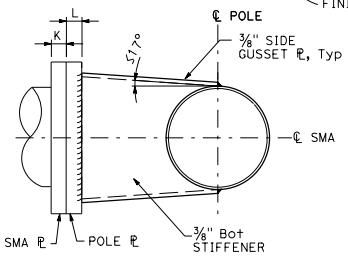
DETAIL W-2

LUMINAIRE MAST ARM CONNECTION

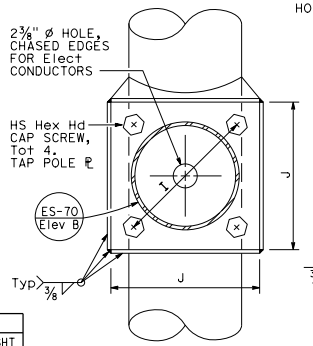
DETAIL W



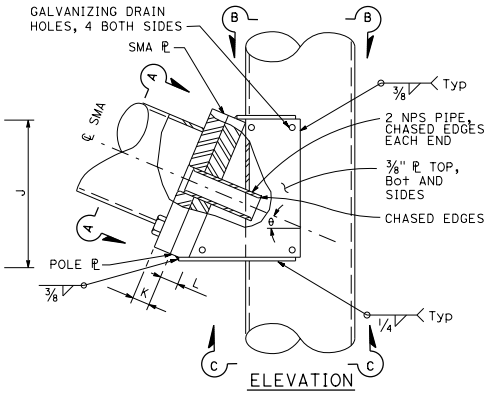
SECTION B-B



SECTION C-C



SECTION A-A



ELEVATION

SIGNAL MAST ARM CONNECTION

DETAIL A

SIGNAL MAST ARM DATA										
E PROJECTED LENGTH	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM ℄ THICKNESS	L POLE ℄ THICKNESS	θ
15'-0"	21'-8"±	17'-6"	7 3/8"	0.1793"	12"	1 1/4"-7NC-3"	1'-0"	1 1/4"	1 1/2"	23°
20'-0"			8"				1'-1"			
25'-0"	22'-8"±	16'-0"	9"							
30'-0"	23'-0"±		10"							

LUMINAIRE MAST ARM DATA					
M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30'-0" POLE	P MOUNTING HEIGHT 35'-0" POLE
6'-0"	2'-0"±	3 1/4"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3 1/2"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3 7/8"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4 1/4"		34'-3"±	39'-3"±

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA A HEIGHT	Min OD BASE	Min OD TOP	THICKNESS	ALTERNATIVE SECTION B LENGTH	ALTERNATIVE SECTION BOTTOM	ALTERNATIVE SECTION TOP	BASE PLATE DATA C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION Dia	CIDH PILE FOUNDATION DEPTH
16-1-100	1	100	18'-6"	12"	9 3/8"	0.2391" OR 0.25"	None			1'-6"	1'-4"	2"	1 3/4"Ø x 42"	NONE	15'-0", [20'-0"]	3'-0"	9'-0"
18-1-100			17'-0"				None							NONE			
19-1-100			30'-0"	14"	9 3/4"		10'-0"	11 7/8"	9 3/4"	1'-10"	1'-8"	2 1/2"	2"Ø x 42"	6'-15' [12'-0"]	25'-0", [30'-0"]	3'-6"	10'-0"
19A-1-100			35'-0"		9"		15'-0"		9"					6'-15' [15'-0"]			

[ ] INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 1 SIGNAL MAST ARM LOADING, WIND VELOCITY = 100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 30')

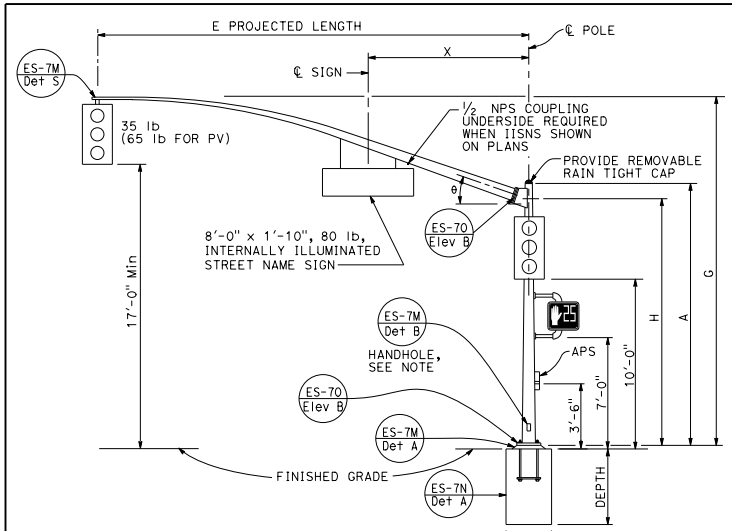
NO SCALE

ES-7C

1-30-18

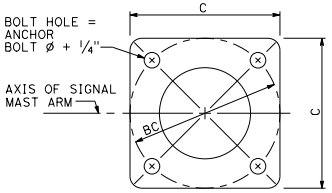
2018 STANDARD PLAN ES-7C

Return to Table of Contents



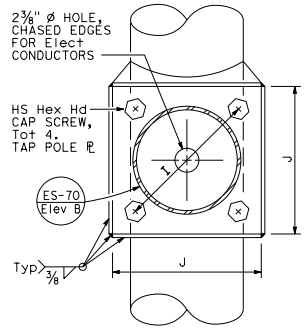
TYPE 16-2-100, 18-2-100

ELEVATION A

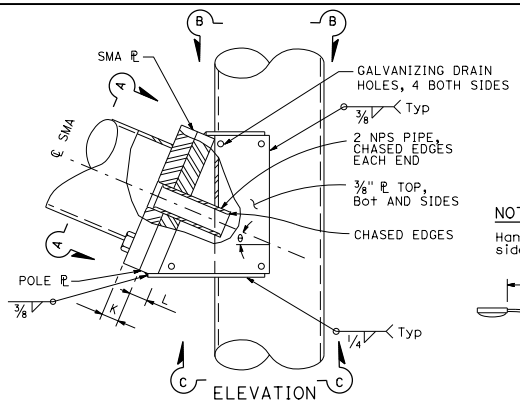


BASE PLATE

DETAIL B



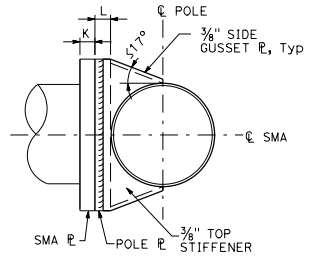
SECTION A-A



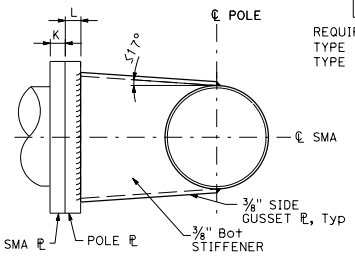
ELEVATION

SIGNAL MAST ARM CONNECTION

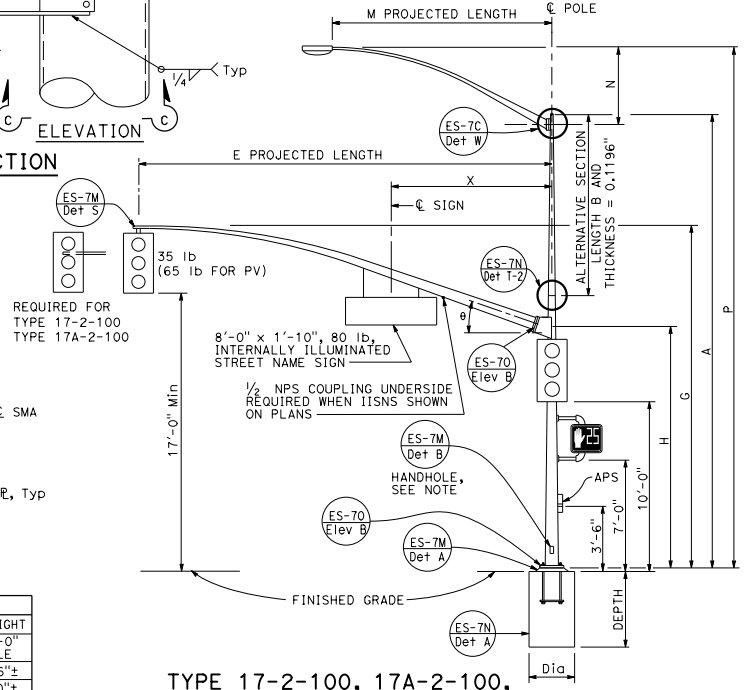
DETAIL A



SECTION B-B



SECTION C-C



TYPE 17-2-100, 17A-2-100, 19-2-100, 19A-2-100

ELEVATION B

NOTE:

Handhole shall be located on the downstream side of traffic.

SIGNAL MAST ARM DATA											
E PROJECTED LENGTH	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM ℄ THICKNESS	L POLE ℄ THICKNESS	θ	X Max
15′-0"	21′-8"±	17′-6"	7⅜"	0.1793"	12"	1¼"-7NC-3"	1′-1"	1¼"	1½"	23°	10′-6"
20′-0"	21′-8"±		8"								
25′-0"	22′-8"±	16′-0"	9"				1′-3"				
30′-0"	23′-0"±		10"	0.2391"							

LUMINAIRE MAST ARM DATA					
M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30′-0" POLE	P MOUNTING HEIGHT 35′-0" POLE
6′-0"	2′-0"±	3¼"	0.1196"	31′-6"±	36′-6"±
8′-0"	2′-6"±	3½"		32′-0"±	37′-0"±
10′-0"	3′-3"±	3⅞"		32′-9"±	37′-9"±
12′-0"	4′-3"±			33′-9"±	38′-9"±
15′-0"	4′-9"±	4¼"		34′-3"±	39′-3"±

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA						BASE PLATE DATA				LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION	
			A HEIGHT	Min OD BASE	Min OD TOP	THICKNESS	ALTERNATIVE SECTION B LENGTH	ALTERNATIVE SECTION BOTTOM	ALTERNATIVE SECTION TOP	C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE			Dia	DEPTH
16-2-100	2	100	18′-6"	14"	11⅜"	0.2391" OR 0.25"				1′-10"	1′-8"	2½"	2"ø x 42"	NONE	15′-0", 20′-0"	3′-6"	10′-0"
17-2-100			30′-0"		9¾"		10′-0"	11⅛"	9¾"					6′-15′ 12′-0"			
17A-2-100			35′-0"		9"		15′-0"		9"					6′-15′ 15′-0"			
18-2-100			17′-0"		11⅝"									None	25′-0", 30′-0"		
19-2-100			30′-0"		9¾"		10′-0"	11⅛"	9¾"					6′-15′ 12′-0"			
19A-2-100			35′-0"	16"	11"		15′-0"	13⅜"	11"	1′-11"	1′-9"	3"	2¼"ø x 42"	6′-15′ 15′-0"			12′-0"

▭ INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 2 SIGNAL MAST ARM LOADING, WIND VELOCITY=100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 30')

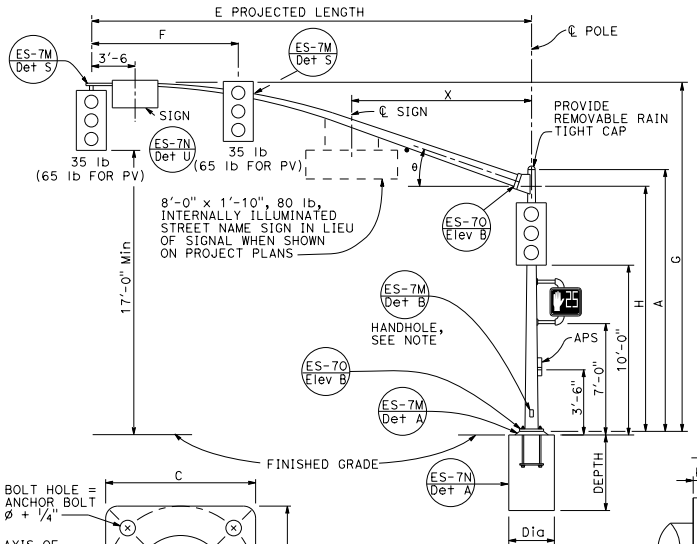
NO SCALE

ES-7D

2018 STANDARD PLAN ES-7D

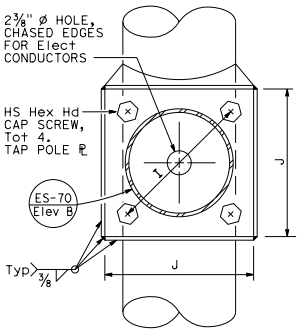
1-30-18

Return to Table of Contents

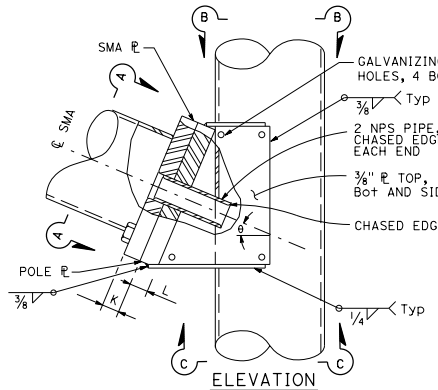


TYPE 16-3-100, 18-3-100, 23-3-100, 27-3-100
ELEVATION A

BASE PLATE
DETAIL B

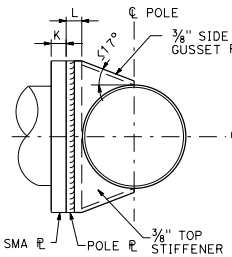


SECTION A-A



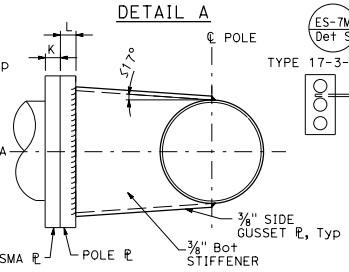
ELEVATION

SIGNAL MAST ARM CONNECTION



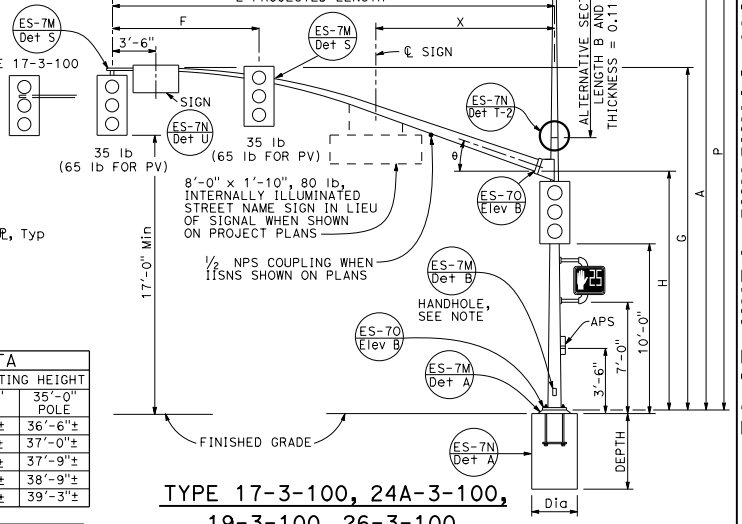
SECTION B-B

DETAIL A



SECTION C-C

NOTE:
Handhole shall be located on the downstream side of traffic.



TYPE 17-3-100, 24A-3-100, 19-3-100, 26-3-100, 19A-3-100, 26A-3-100, 24-3-100
ELEVATION B

SIGNAL MAST ARM DATA

E PROJECTED LENGTH	F Min SPACING	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM ℄ THICKNESS	L POLE ℄ THICKNESS	θ	X Max
15'-0"	8'-0"	21'-8"±	17'-6"	7 3/8"	0.1793"	12"	1 1/4"-7NC-3"	1'-3"	1 1/4"	1 1/2"	23°	-
20'-0"		21'-8"±		7 3/8"								
25'-0"	12'-0"	22'-8"±		7 3/8"								10'-6"
30'-0"				8"								
35'-0"	14'-0"	23'-0"±	16'-0"	8 3/4"	0.2391"	13"			1 1/2"	1 3/4"	21°	
40'-0"	15'-0"			9 3/8"							15°	13'-0"
45'-0"		23'-8"±		10 1/16"				1'-5"				

LUMINAIRE MAST ARM DATA

M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30'-0" POLE	P MOUNTING HEIGHT 35'-0" POLE
6'-0"	2'-0"±	3 1/4"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3 1/2"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3 7/8"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4 1/4"		34'-3"±	39'-3"±

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA A HEIGHT	Min OD BASE	Min OD TOP	THICKNESS	ALTERNATIVE SECTION B LENGTH	ALTERNATIVE SECTION BOTTOM	ALTERNATIVE SECTION TOP	BASE PLATE DATA C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION Dia	CIDH PILE FOUNDATION DEPTH
16-3-100	3	100	18'-6"	16"	13 3/8"	0.2391" OR 0.25"	10'-0"	13 1/8"	11 3/4"	1'-11"	1'-9"	3"	2 1/4" ø x 42"	NONE	15'-0", 20'-0"	3'-6"	12'-0"
17-3-100			30'-0"		11 3/4"									6'-15' 12'-0"			
18-3-100			17'-0"		13 5/8"									NONE	25'-0", 30'-0"		
19-3-100			30'-0"		11 3/4"		10'-0"	13 1/8"	11 3/4"					6'-15' 12'-0"			
19A-3-100			35'-0"		11"	0.3125"	15'-0"		11"					6'-15' 15'-0"			
23-3-100			17'-0"		13 5/8"	0.2391" OR 0.25"								NONE	35'-0"		
24-3-100			30'-0"		11 3/4"	0.3125"	10'-0"	13 1/8"	11 3/4"					6'-15' 12'-0"			
24A-3-100			35'-0"		11"		15'-0"		11"					6'-15' 15'-0"			
26-3-100			30'-0"	18"	13 3/4"		10'-0"	15 1/8"	13 3/4"	2'-1"	1'-11"			6'-15' 12'-0"	40'-0", 45'-0"		13'-0"
26A-3-100			35'-0"		13"		15'-0"		13"					6'-15' 15'-0"			
27-3-100			17'-0"		15 5/8"									NONE			

INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 3 SIGNAL MAST ARM LOADING, WIND VELOCITY=100 MPH AND SIGNAL MAST ARM LENGTHS 15' TO 45')

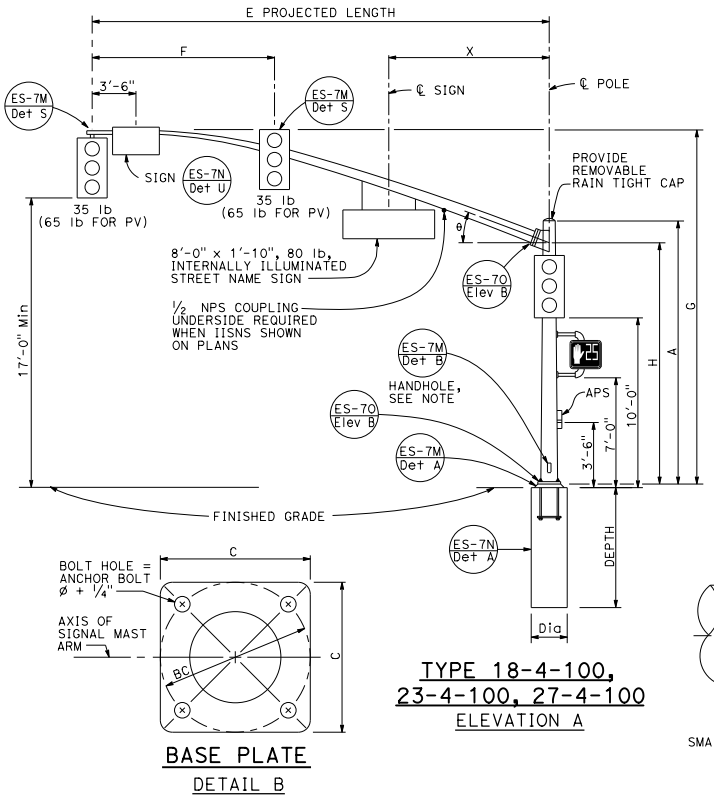
NO SCALE

ES-7E

1-30-18

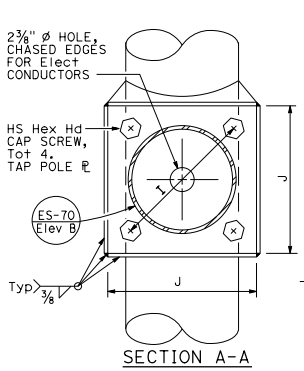
2018 STANDARD PLAN ES-7E

Return to Table of Contents

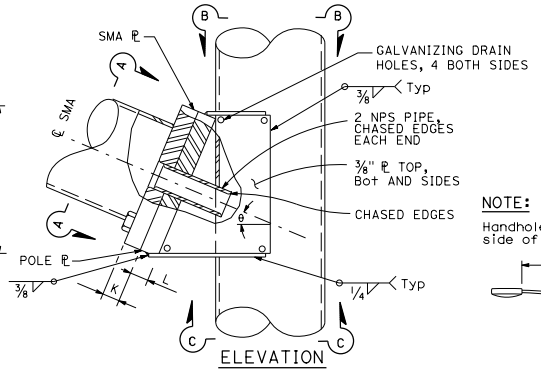


TYPE 18-4-100, 23-4-100, 27-4-100
ELEVATION A

BASE PLATE
DETAIL B

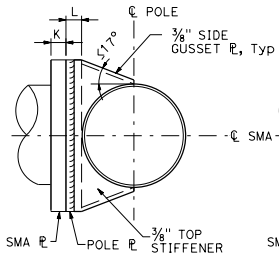


SECTION A-A

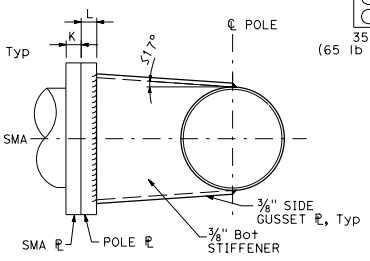


ELEVATION

SIGNAL MAST ARM CONNECTION
DETAIL A

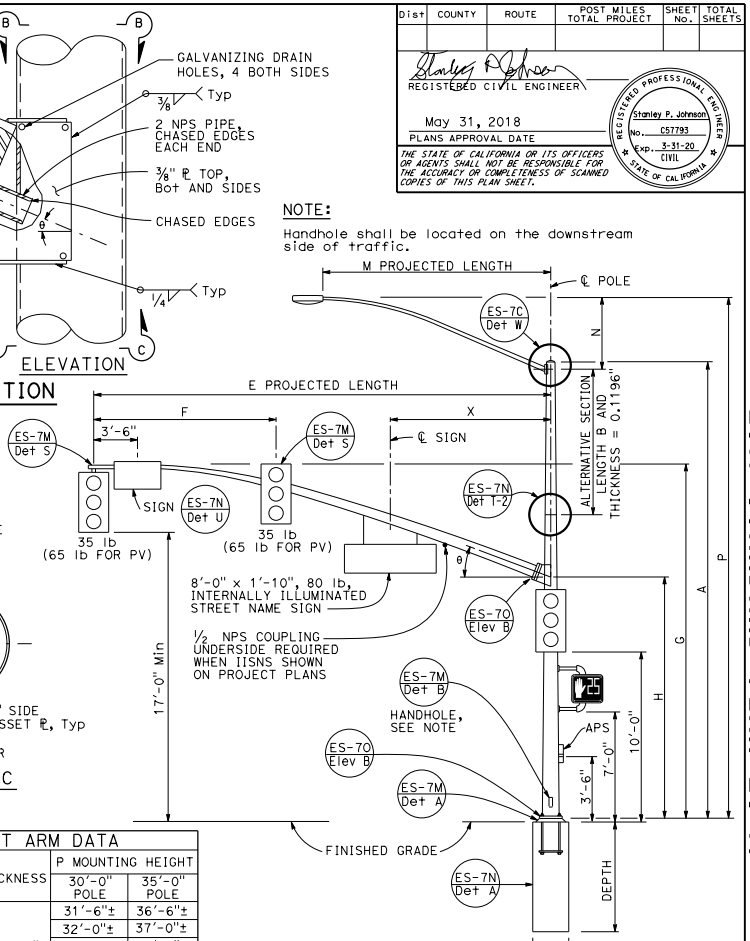


SECTION B-B



SECTION C-C

NOTE:
Handhole shall be located on the downstream side of traffic.



TYPE 19-4-100, 19A-4-100, 24-4-100, 24A-4-100, 26-4-100, 26A-4-100
ELEVATION B

SIGNAL MAST ARM DATA											
E PROJECTED LENGTH	F Min SPACING	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM ℄ THICKNESS	L POLE ℄ THICKNESS	θ	X Max
25'-0"	10'-0"	22'-8"±	16'-0"	7⅜"	0.2391"	12"	1¼"-7NC-3"	1'-3"	1¼"	1½"	23°	10'-6"
30'-0"	12'-0"	23'-0"±		8"								
35'-0"	14'-0"			8⅛"		13½"			1½"	1¾"	21°	
40'-0"	15'-0"			9⅜"							15°	13'-0"
45'-0"		23'-8"±		10¼"				1'-5"				

LUMINAIRE MAST ARM DATA					
M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30'-0" POLE	P MOUNTING HEIGHT 35'-0" POLE
6'-0"	2'-0"±	3¼"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3½"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3⅞"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4¼"		34'-3"±	39'-3"±

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA A HEIGHT	POLE DATA Min OD BASE	POLE DATA Min OD TOP	POLE DATA THICKNESS	POLE DATA ALTERNATIVE SECTION B LENGTH	POLE DATA ALTERNATIVE SECTION BOTTOM	POLE DATA ALTERNATIVE SECTION TOP	BASE PLATE DATA C	BASE PLATE DATA BC = BOLT CIRCLE	BASE PLATE DATA THICKNESS	BASE PLATE DATA ANCHOR BOLT SIZE	LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION Dia	CIDH PILE FOUNDATION DEPTH
18-4-100	4	100	17'-0"	16"	13⅝"	0.2391" OR 0.25"				1'-11"	1'-9"	3"	2¼"ø x 42"	NONE	25'-0", [30'-0"]	3'-6"	12'-0"
19-4-100			30'-0"		11¾"		10'-0"	13⅜"	11¾"					6'-15' [12'-0"]			
19A-4-100			35'-0"		11"		15'-0'	13⅜"	11"					6'-15' [15'-0"]			
23-4-100			17'-0"		13⅝"	0.3125"								NONE	35'-0"		
24-4-100			30'-0"		11¾"		10'-0"	15⅛"	13¾"					6'-15' [12'-0"]			
24A-4-100			35'-0"		11"		15'-0"	13⅛"	11"					6'-15' [15'-0"]			
26-4-100			30'-0"	18"	13¾"		10'-0"	15⅛"	13¾"	2'-1"	1'-11"			6'-15' [12'-0"]	40'-0", [45'-0"]		13'-0"
26A-4-100			35'-0"		13"		15'-0"	15⅛"	13"					6'-15' [15'-0"]			
27-4-100			17'-0"		15⅝"									NONE			

[ ] INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 4 SIGNAL MAST ARM LOADING, WIND VELOCITY=100 MPH AND SIGNAL MAST ARM LENGTHS 25' TO 45')

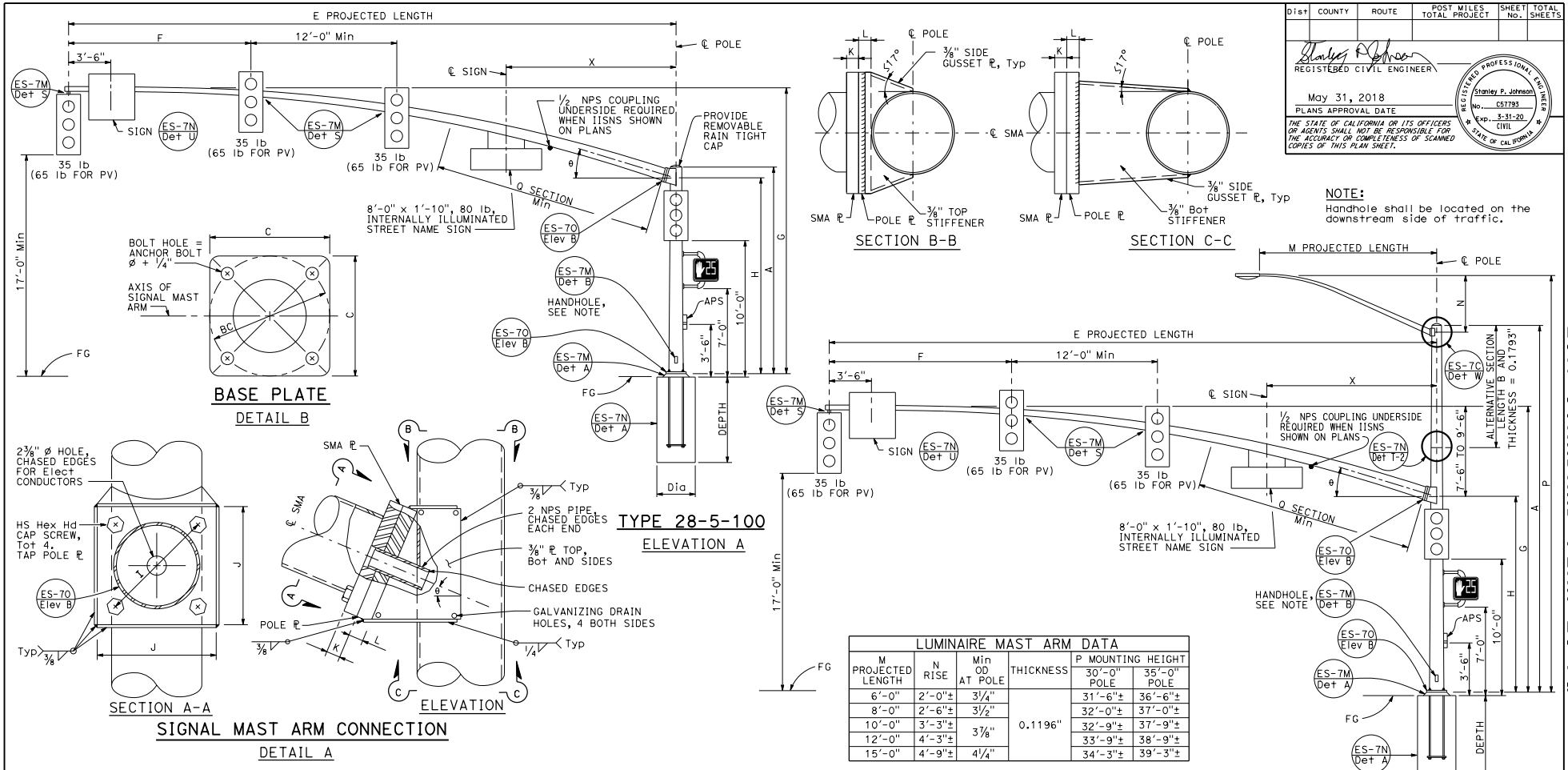
NO SCALE

ES-7F

1-30-18

2018 STANDARD PLAN ES-7F

Return to Table of Contents



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

SIGNAL MAST ARM DATA

E PROJECTED LENGTH	F Min SPACING	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM ℄ THICKNESS	L POLE ℄ THICKNESS	θ	Q SECTION LENGTH	Q SECTION THICKNESS	X Max
50'-0"	15'-0"	23'-7"± TO 25'-7"±	16'-0"	11 7/16"	0.1793"	16"	1½"-6NC-3¼"	1'-9"	1¾"	1¾"	15°	18'-0"	0.2391"	14'-0"
55'-0"				1'-1¼"								23'-0"		

LUMINAIRE MAST ARM DATA

M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30'-0" POLE	P MOUNTING HEIGHT 35'-0" POLE
6'-0"	2'-0"±	3¼"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3½"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3 7/8"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4¼"		34'-3"±	39'-3"±

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA A HEIGHT	Min OD BASE	Min OD TOP	THICKNESS	ALTERNATIVE SECTION B LENGTH	ALTERNATIVE SECTION BOTTOM	ALTERNATIVE SECTION TOP	BASE PLATE DATA C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION Dia	CIDH PILE FOUNDATION DEPTH
28-5-100	5	100	17'-0"	22"	19 5/16"	0.375"	10'-0"	1 9/16"	17¾"	2'-6"	2'-4"	3"	2¼"ø x 42"	NONE	50'-0", [55'-0"]	4'-0"	14'-0"
29-5-100			30'-0"		17¾"									6'-15' [15'-0"]			
29A-5-100			35'-0"		17"		15'-0"		17"								

[ ] INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 5 SIGNAL MAST ARM LOADING, WIND VELOCITY=100 MPH AND SIGNAL MAST ARM LENGTHS 50' TO 55')

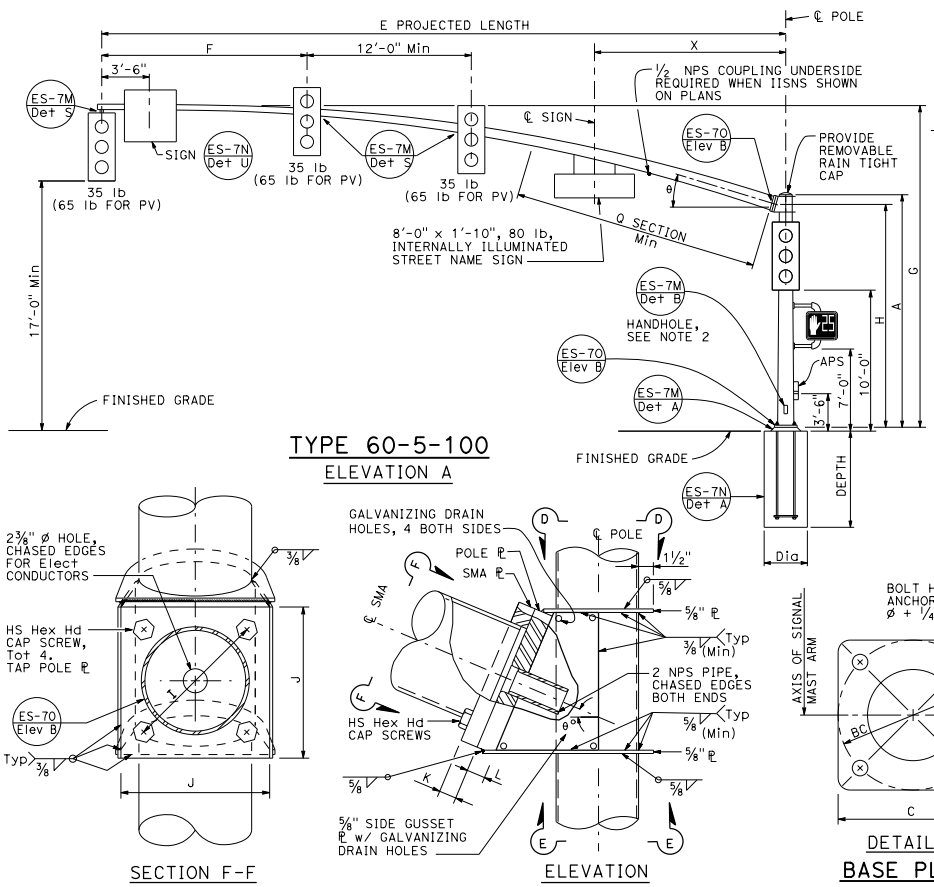
NO SCALE

ES-7G

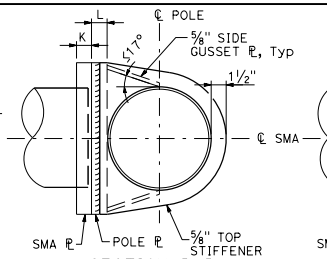
1-30-18

2018 STANDARD PLAN ES-7G

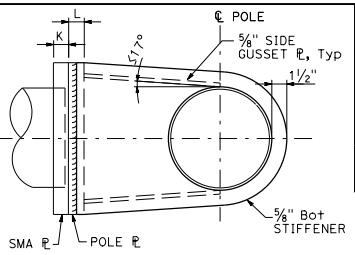
Return to Table of Contents



TYPE 60-5-100
ELEVATION A



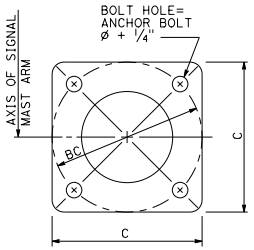
SECTION D-D



SECTION E-E

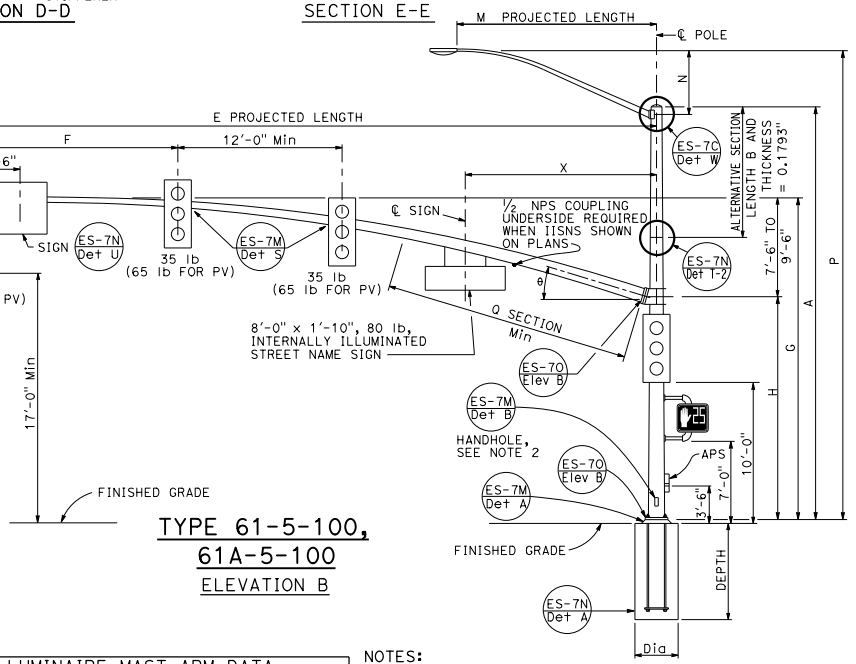
SECTION F-F

ELEVATION



DETAIL B
BASE PLATE

SIGNAL MAST ARM CONNECTION
DETAIL B



TYPE 61-5-100,
61A-5-100
ELEVATION B

SIGNAL MAST ARM DATA

E PROJECTED LENGTH	F Min SPACING	G MOUNTING HEIGHT	H	Min OD AT POLE	THICKNESS	I BOLT CIRCLE	HS CAP SCREWS	J PLATE SIZE	K MAST ARM PL THICKNESS	L POLE PL THICKNESS	θ	Q SECTION LENGTH	Q SECTION THICKNESS	X Max
60'-0"	15'-0"	23'-7" TO 25'-7"	16'-0"	1'-1½"	0.1793"	20"	1½"-6NC-4"	2'-0"	2"	2"	15°	24'-0"	0.2391"	14'-0"
65'-0"					0.2391"							29'-0"	0.3125"	

LUMINAIRE MAST ARM DATA

M PROJECTED LENGTH	N RISE	Min OD AT POLE	THICKNESS	P MOUNTING HEIGHT 30'-0" POLE	P MOUNTING HEIGHT 35'-0" POLE
6'-0"	2'-0"±	3¼"	0.1196"	31'-6"±	36'-6"±
8'-0"	2'-6"±	3½"		32'-0"±	37'-0"±
10'-0"	3'-3"±	3⅞"		32'-9"±	37'-9"±
12'-0"	4'-3"±			33'-9"±	38'-9"±
15'-0"	4'-9"±	4¼"		34'-3"±	39'-3"±

NOTES:
1. The radial separation between the face of the pole and the adjacent insides of the top and bottom gusset plates shall not exceed 3/16". Fillet weld size to be increased by amount of gap.
2. Handhole shall be located on the downstream side of traffic.

POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	POLE DATA A HEIGHT	Min OD BASE	Min OD TOP	THICKNESS	ALTERNATIVE SECTION B LENGTH	ALTERNATIVE SECTION BOTTOM	ALTERNATIVE SECTION TOP	BASE PLATE DATA C	BC = BOLT CIRCLE	THICKNESS	ANCHOR BOLT SIZE	LUMINAIRE MAST ARM	SIGNAL MAST ARM	CIDH PILE FOUNDATION Dia	CIDH PILE FOUNDATION DEPTH
60-5-100	5	100	17'-0"	22"	19⅝"	0.375"				2'-6"	2'-4"	3"	2¼"ø x 42"	NONE	60'-0", 65'-0"	4'-0"	14'-0"
61-5-100			30'-0"	25"	20¾"		10'-0"	22⅛"	20¾"	2'-11"	2'-9"		3"ø x 60"	6'-15' 15'-0"		4'-6"	15'-0"
61A-5-100			35'-0"		20"		15'-0"		20"								

INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, CASE 5 SIGNAL MAST ARM LOADING, WIND VELOCITY=100 MPH AND SIGNAL MAST ARM LENGTHS 60' TO 65')

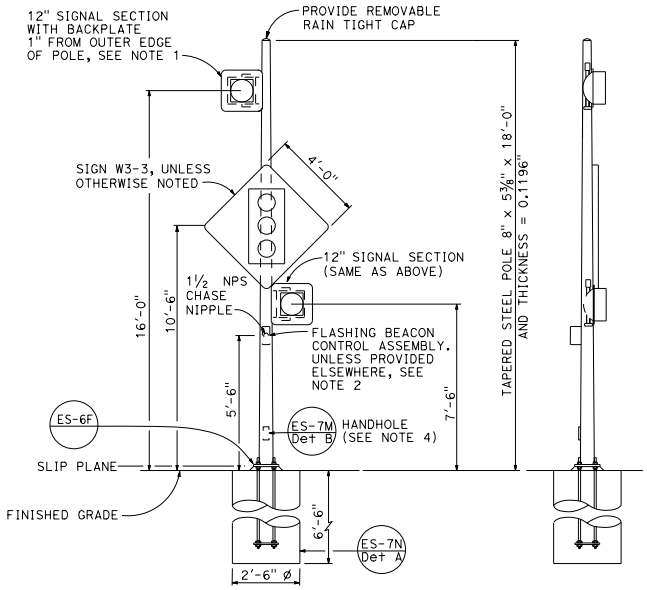
NO SCALE

ES-7H

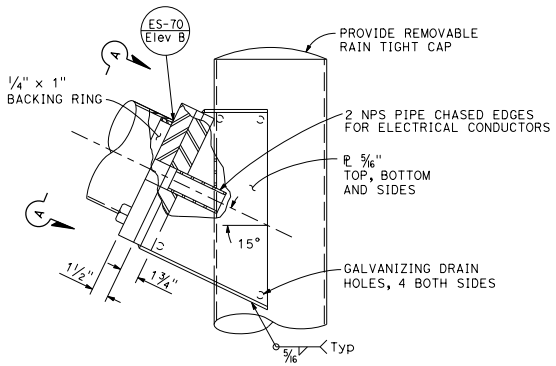
2018 STANDARD PLAN ES-7H

1-30-18

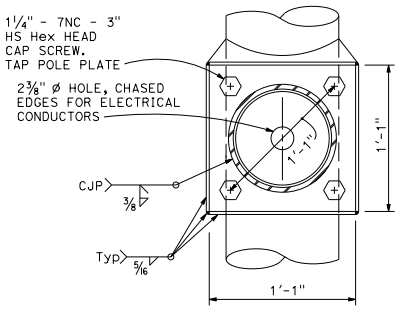
Return to Table of Contents



TYPE 15-FBS
FLASHING BEACON WITH SLIP BASE INSTALLATION
DETAIL A

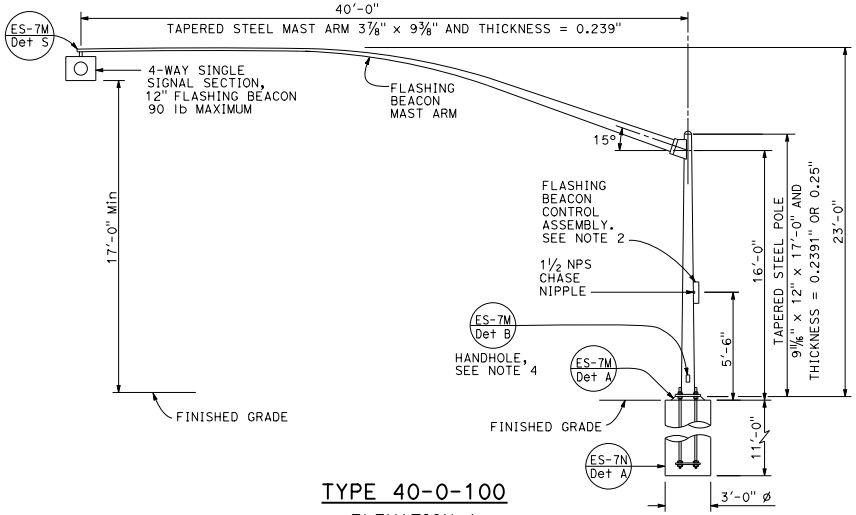


ELEVATION B

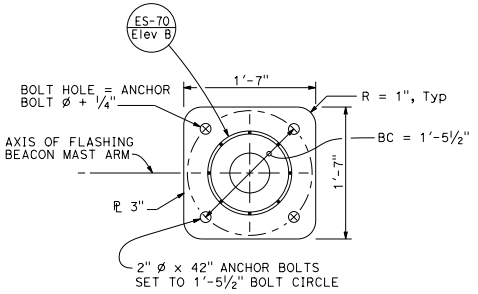


VIEW A-A

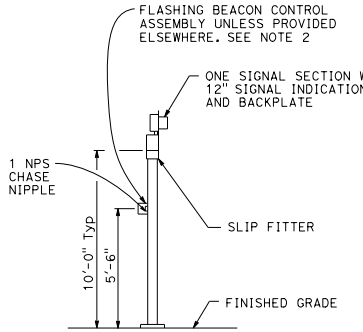
FLASHING BEACON MAST ARM CONNECTION DETAIL
DETAIL B



TYPE 40-0-100
ELEVATION A



BASE PLATE
DETAIL C



TYPE 1-A, 1-B, 1-C, AND 1-D
FLASHING BEACON INSTALLATION
DETAIL D
See Note 5

NOTES:

1. See Standard Plans ES-4A and ES-4D for attachment fitting details.
2. For wiring diagram, see Standard Plan ES-14B.
3. For additional notes and details, see Standard Plans ES-7M and ES-7N.
4. Handhole shall be located on the downstream side of traffic.
5. See project plans for type of standard to be installed.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FLASHING BEACON ON A TYPE 1, TYPE 15-FBS, AND TYPE 40 STANDARD)

NO SCALE

ES-7J

1-30-18

2018 STANDARD PLAN ES-7J

Return to Table of Contents

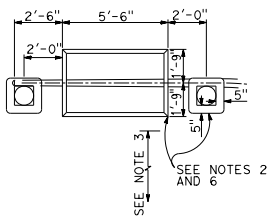
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

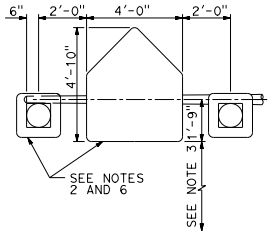
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

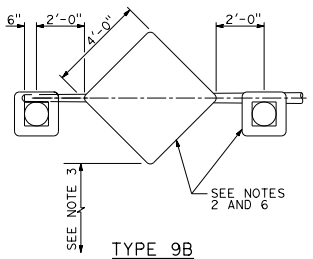
REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA



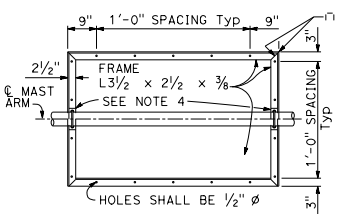
TYPE 9



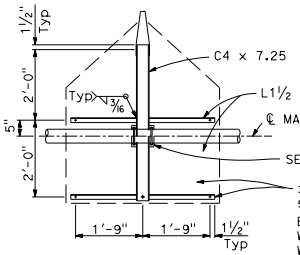
TYPE 9A



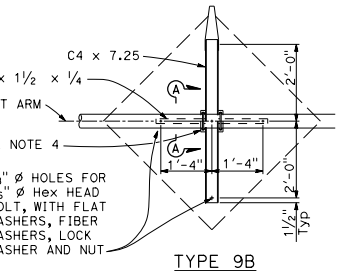
TYPE 9B



TYPE 9

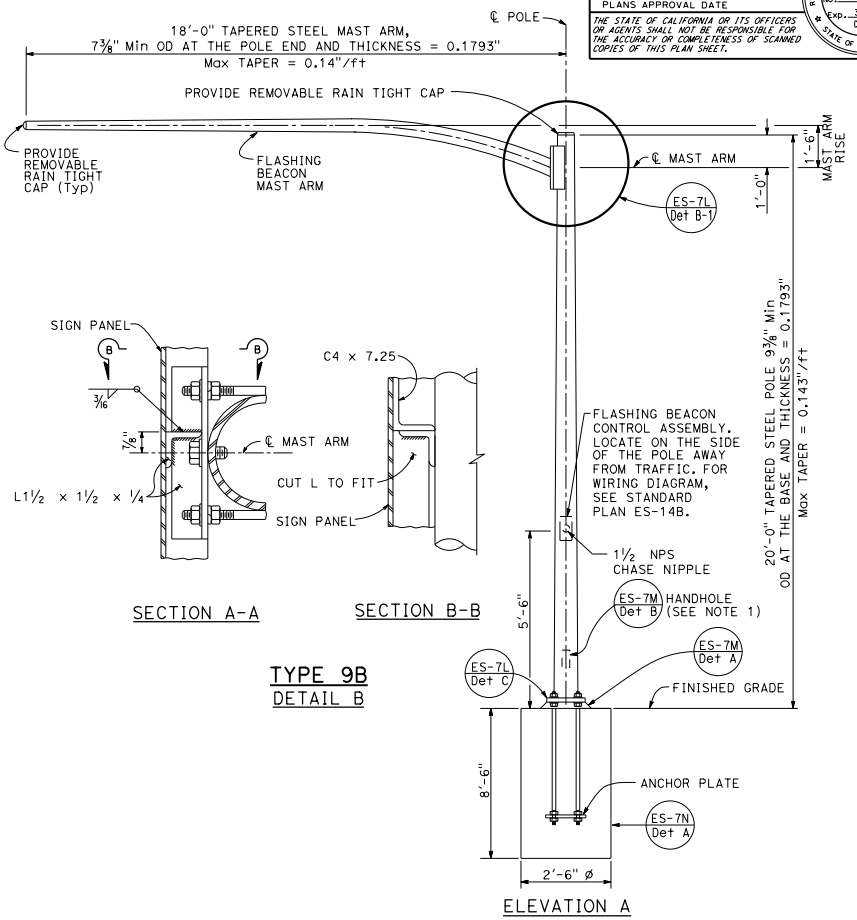


TYPE 9A



TYPE 9B

FRAME DETAILS
DETAIL A



ELEVATION A

TYPE 9B
DETAIL B

NOTES:

1. Handhole shall be located on the downstream side of traffic.
2. Install flashing beacons and sign frame. Flashing beacons shall be MAT mounted on pipe tenon (See Standard Plan ES-7M, Detail S).
3. Vertical clearance shall be 17'-0" minimum between roadway and bottom of signal panel.
4. See Standard Plan ES-7L, Detail B, for sign frame mounting details.
5. For additional notes and details, see Standard Plan ES-7L, Detail B-3.
6. 12" flashing beacon with signal indication, standard visor and 5" x 5" backplate (total 2).

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FLASHING BEACON WITH TYPE 9, 9A AND 9B SIGN)

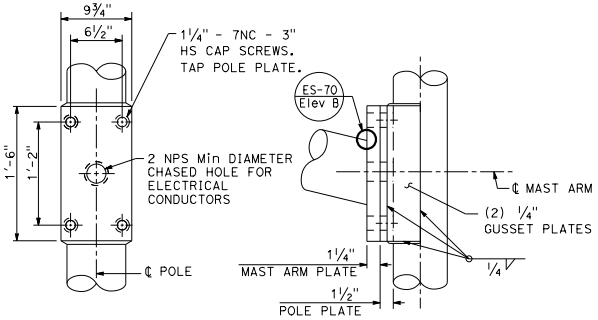
NO SCALE

ES-7K

1-30-18

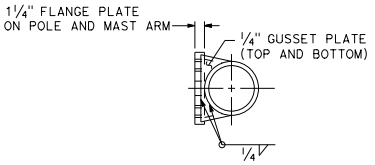
2018 STANDARD PLAN ES-7K

Return to Table of Contents

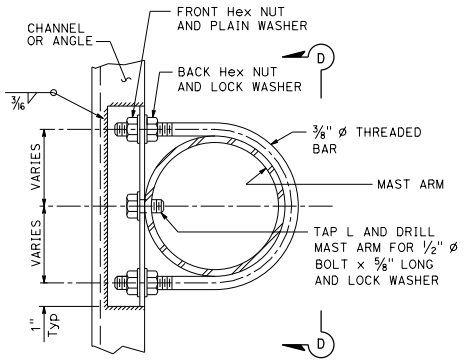


FLASHING BEACON MAST ARM CONNECTION DETAILS

DETAIL B-1



DETAIL B-2



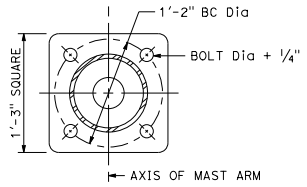
DETAIL B-3

NOTE: Tighten front Hex nuts first, then tighten back Hex nuts.

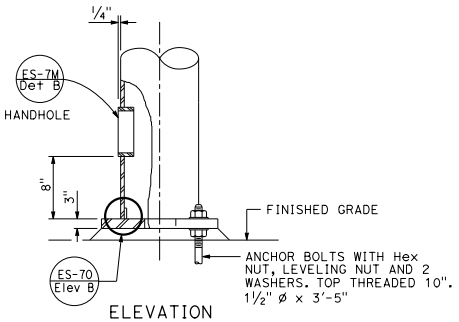
SIGN FRAME MOUNTING DETAILS

All types

DETAIL B



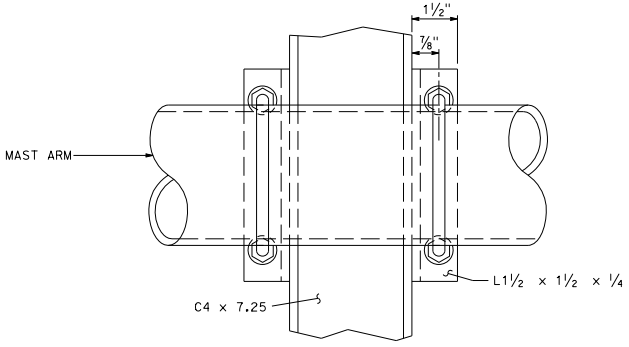
PLAN



ELEVATION

BASE PLATE AND ANCHORAGE DETAIL

DETAIL C



VIEW D-D

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FLASHING BEACON WITH TYPE 9, 9A AND 9B SIGN)

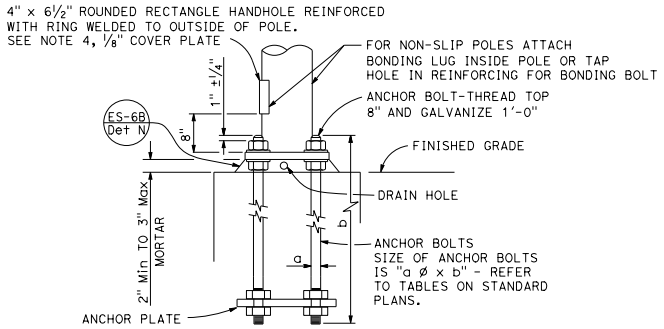
NO SCALE

ES-7L

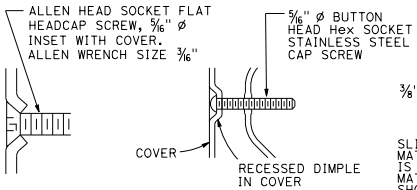
2018 STANDARD PLAN ES-7L

5-21-18

Return to Table of Contents

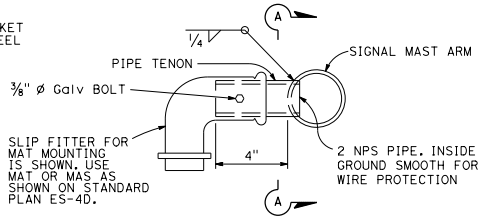


HANDHOLE AND ANCHORAGE
DETAIL A

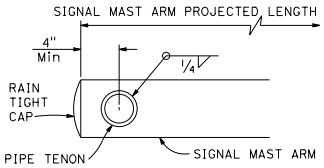


TYPICAL DETAIL
DETAIL B-1

ALTERNATIVE DETAIL
DETAIL B-2

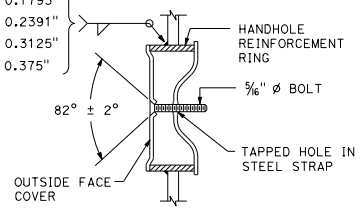


SIDE TENON
DETAIL S-1

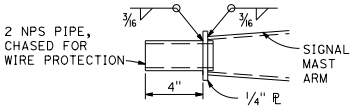


SECTION A-A

WELD SIZE	WALL THICKNESS
⅜"	0.1196"
¼"	0.1793"
5/16"	0.2391"
⅜"	0.3125"
7/16"	0.375"



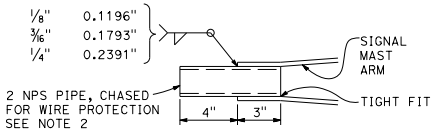
TAMPER RESISTANT HANDHOLE COVER
DETAIL B



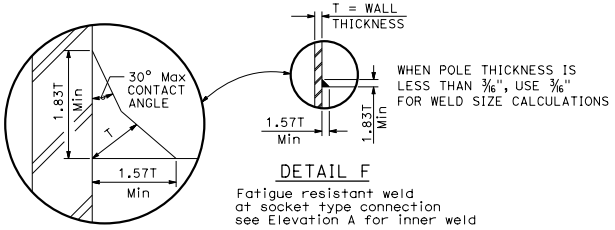
TIP TENON
DETAIL TL
This detail supersedes Detail S when so designated

PIPE TENONS
DETAIL S

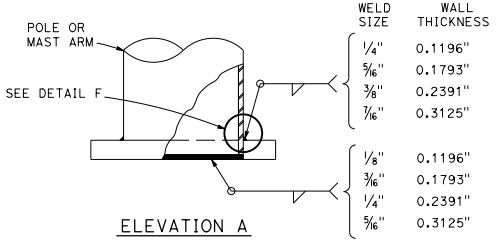
WELD SIZE	WALL THICKNESS
⅛"	0.1196"
⅜"	0.1793"
¼"	0.2391"



TIP TENON
DETAIL TS



DETAIL F
Fatigue resistant weld at socket type connection see Elevation A for inner weld



WELD SIZE	WALL THICKNESS
¼"	0.1196"
5/16"	0.1793"
⅜"	0.2391"
7/16"	0.3125"

⅛"	0.1196"
3/16"	0.1793"
¼"	0.2391"
5/16"	0.3125"

ELEVATION A

IDENTIFICATION NUMBER

1. Attach a stamped metal tag with pole's identification number above the handhole. ¼" high number, minimum.
2. Attach a stamped metal tag with mast arm's identification number to the bottom of the signal mast arm near the pole plate. ¼" high number, minimum.

SAMPLE IDENTIFICATION NUMBER

Type	Load case (Use SL for special load case)	Design wind velocity (mph)	Signal mast arm length (ft)	(Near handhole: Maximum signal mast arm length for pole type Near pole plate: Installed signal mast arm length)	Standard plan year		
26A	- 3 -	100	- 45	- 10	- F	or FB	

Only for poles or mast arms using Detail F

Only for poles or mast arms using ES-7D

NOTES:

1. Provide a Hex nut, leveling nut and 2 washers for each bolt.
2. Luminaire mast arms shall be round, tapered steel tubes, taper of 0.1375" to 0.143-inch per foot with an end section 2⅜" OD for mounting hardware. Extensions of 2 NPS Standard pipe and 7" long may be used at the option of the manufacturer. When low pressure sodium luminaires are required, the extension shall be 1'-3".
3. Signal mast arms shall be round, tapered steel tubes, maximum taper 0.143-inch per foot.
4. Handhole reinforcement ring shall be ¼" x 2" for 0.1196" to 0.2391" thick poles, ⅜" x 2" for 0.3125" to 0.375" thick poles.
5. Handholes shall be located on the downstream side of traffic.
6. Detail F, fatigue resistant weld, is required at socket welded signal mast arm plate and pole base plate.
7. Cap screws shall be tightened by the turn-of-nut method ⅓ turn from a snug tight condition. No washer will be required.
8. Outside diameter, wall thickness, and corresponding section properties of poles and mast arms as shown in the Standard Plans are minimums. Unless otherwise specified, alternative sections shall require approval by the Engineer.
9. Design: AASHTO Standard Specifications for Structural Support for Highway Signs, Luminaires, and Traffic Signals, 6th Edition. Basic Wind Speed = 100 mph (3 seconds gust). Yearly Mean Wind Velocity = 15.6 mph.
10. Materials (Structural steel):
    fy = 55,000 psi (tapered steel tube and anchor bolts)
    fy = 50,000 psi (unless otherwise noted)
11. Materials (Reinforced concrete):
    f'c = 3,625 psi
    fy = 60,000 psi

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL No. 1)

NO SCALE

ES-7M

1-30-18

2018 STANDARD PLAN ES-7M

Return to Table of Contents

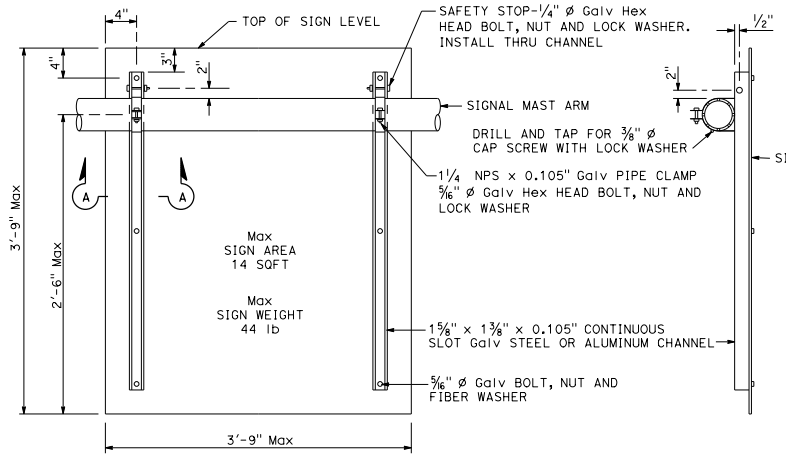
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

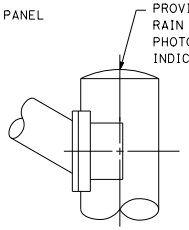
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



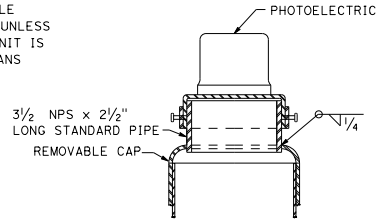
REAR VIEW

SIDE VIEW

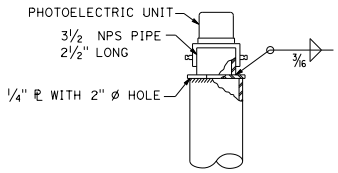
SIGN MOUNTING DETAILS
DETAIL U



STANDARD TOP
DETAIL B-1

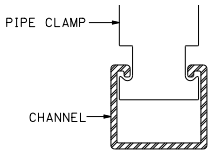


MOUNTING ADAPTER FOR PHOTOELECTRIC UNIT
DETAIL B-2

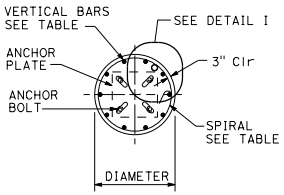


ALTERNATIVE MOUNTING ADAPTER
DETAIL B-3

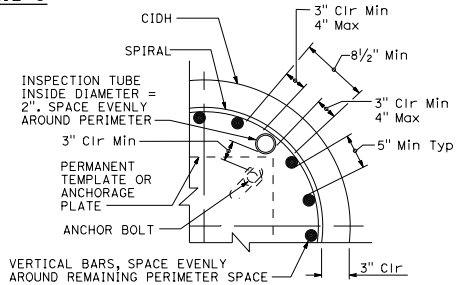
POLE TOP DETAILS
DETAIL B



SECTION A-A



SECTION B-B

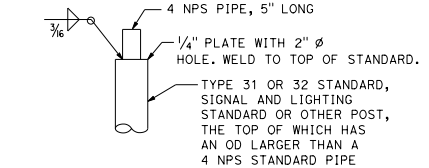


INSPECTION TUBE PLACEMENT
DETAIL I

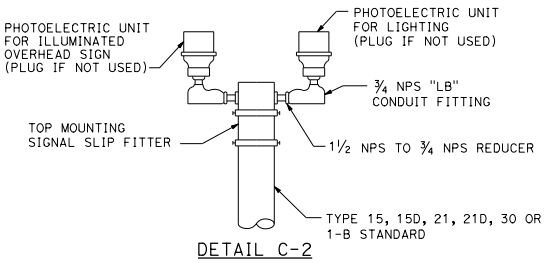
CIDH REINFORCING AND INSPECTION TUBE SCHEDULE

CIDH DIAMETER	VERTICAL BARS	SPIRAL	INSPECTION TUBE
2 ft	8-#5	#4 AT 6	2
2.5 ft	10-#6		4*
3 ft	12-#7	#5 AT 6	
3.5 ft	14-#8		4
4 ft	18-#9	2-#4 AT 7	5
4.5 ft	18-#9	2-#5 AT 7	5
5 ft	22-#10	2-#5 AT 7	6
6 ft	26-#11	2-#6 AT 7	7

* FOR SLIP BASE VERSIONS WITH 3 ANCHOR BOLTS USE 3 INSPECTION TUBES.

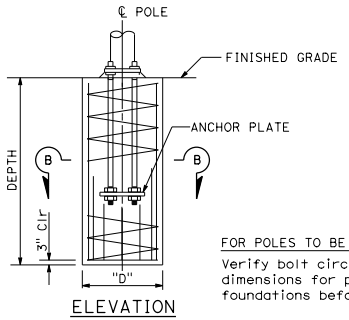


DETAIL C-1



DETAIL C-2

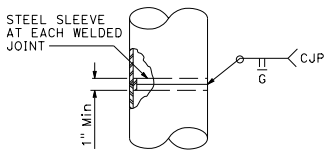
DUAL PHOTOELECTRIC UNIT MOUNTING DETAIL
DETAIL C



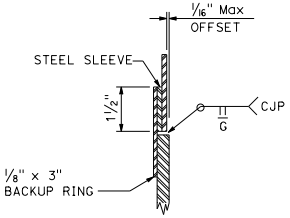
ELEVATION

FOR POLES TO BE INSTALLED ON EXISTING FOUNDATION:
Verify bolt circles, anchor bolt sizes and dependent dimensions for poles to be installed on existing foundations before fabricating the poles.

CAST-IN-DRILLED-HOLE PILE FOUNDATION, REINFORCED PILE
DETAIL A



FOR UNIFORM TUBE THICKNESS
DETAIL T-1



AT TUBE THICKNESS CHANGE
DETAIL T-2

POLE SPLICES
DETAIL T

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL No. 2)

NO SCALE

ES-7N

1-30-18

Return to Table of Contents

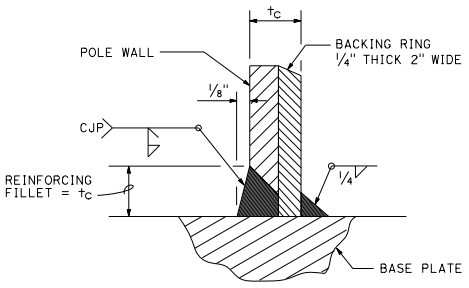
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

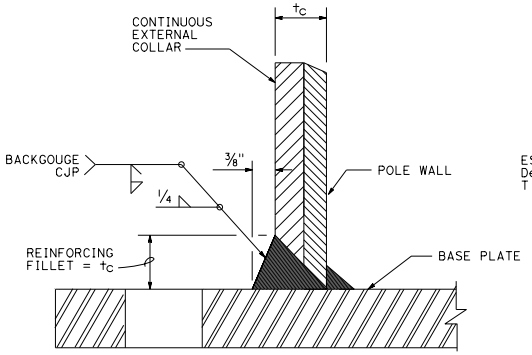
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

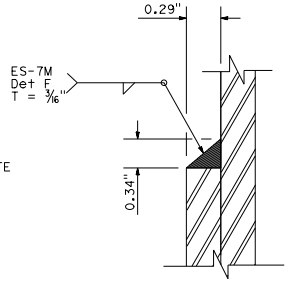
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



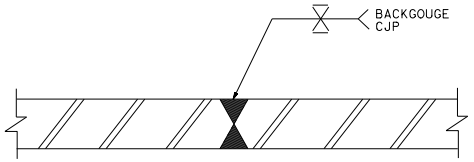
DETAIL B



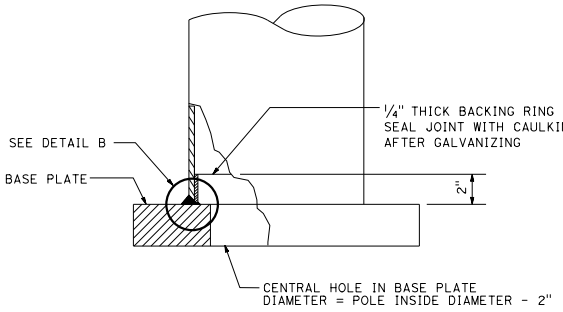
DETAIL C1



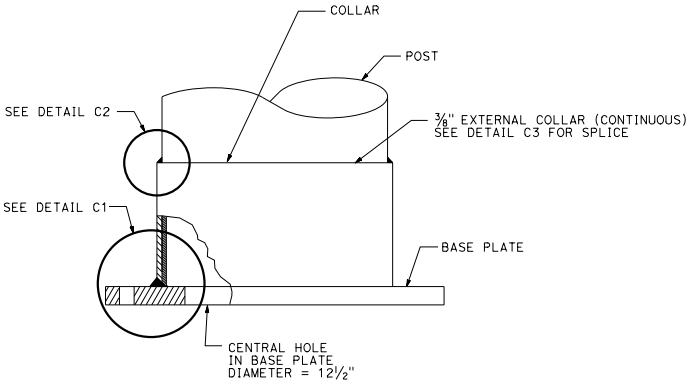
DETAIL C2



DETAIL C3

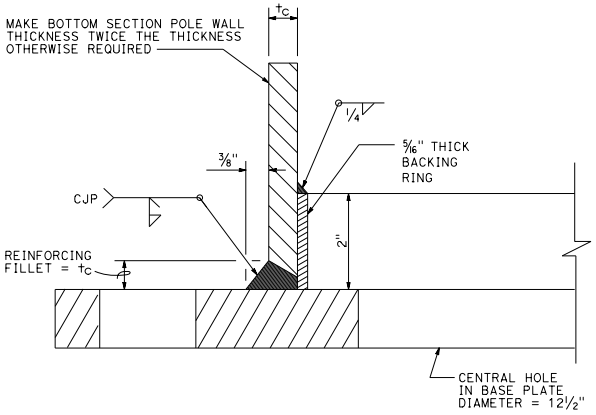


ELEVATION B



ELEVATION C

For alternative base, see Detail C4



DETAIL C4

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

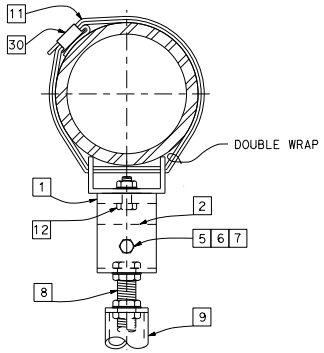
ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARD, DETAIL No. 3)

NO SCALE

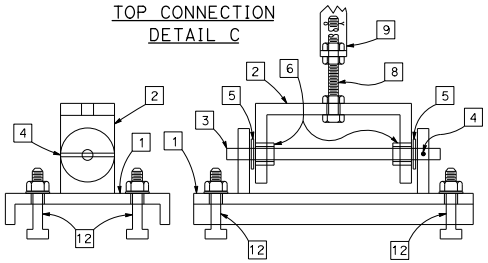
ES-70

1-30-18

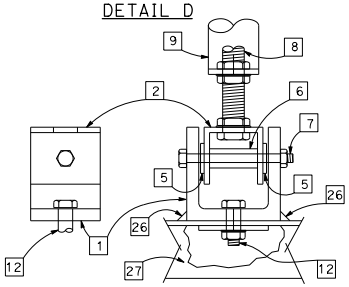
Return to Table of Contents



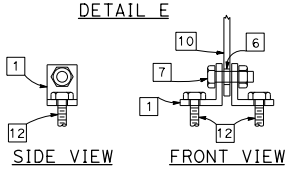
TOP CONNECTION
DETAIL C



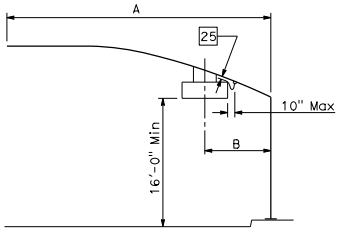
SIDE VIEW FRONT VIEW
TYPE 1 OPTION
DETAIL D



SIDE VIEW FRONT VIEW
TYPE 2 OPTION
DETAIL E



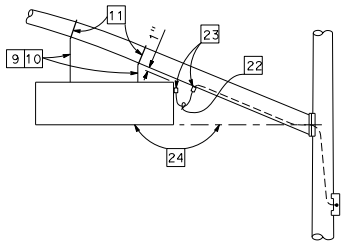
SIDE VIEW FRONT VIEW
TYPE 3 OPTION
MOUNTING ASSEMBLY OPTIONS
DETAIL F



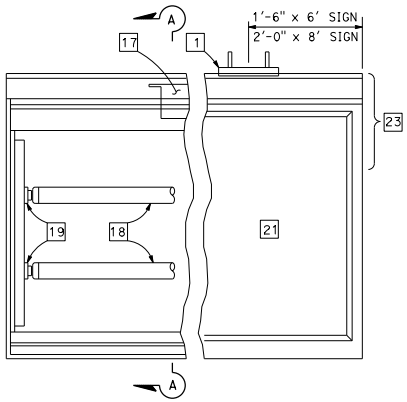
SIGN PLACEMENT
DETAIL G

SIGN PLACEMENT

A	B	
PROJECTED LENGTH	6'-0" SIGN	8'-0" SIGN
20'-0"	7'-10"	8'-10"
25'-0"	9'-2"	10'-2"
30'-0"	9'-6"	10'-6"
35'-0"	10'-6"	11'-6"
40'-0"	12'-6"	13'-6"
45'-0"		
50'-0"		
55'-0"		
60'-0"		
65'-0"		

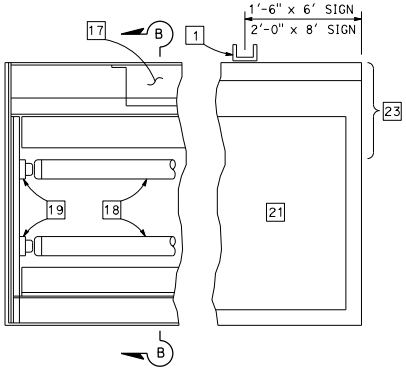


SIGN MOUNTING
DETAIL H



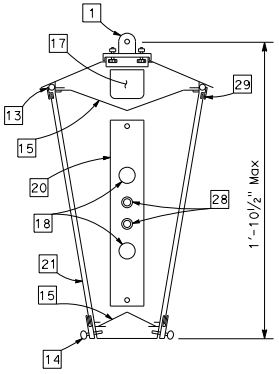
DETAIL A-1

TYPE A SIGN
DETAIL A

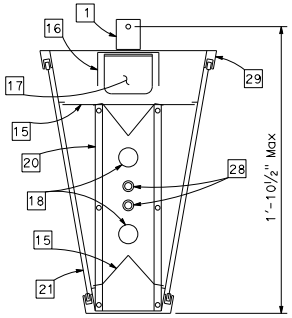


DETAIL B-1

TYPE B SIGN
DETAIL B



SECTION A-A



SECTION B-B

LEGEND:

1. LOWER MOUNTING ASSEMBLY WITH GASKET.
2. UPPER MOUNTING ASSEMBLY.
3. ROD, ½" Ø, STAINLESS STEEL.
4. LOCKING PIN, STEEL.
5. FLAT WASHER, STAINLESS STEEL.
6. BUSHING, BRONZE.
7. BOLT, ¼" Ø STAINLESS STEEL, WITH SELF-LOCKING NUT.
8. BOLT, ½" Ø STAINLESS STEEL, WITH THREE NUTS, AND COTTER KEY. LENGTH AS REQUIRED FOR PROPER MOUNTING OF SIGN.
9. BRACKET, ¼" X 1½" MINIMUM, LENGTH VARIABLE.
10. BRACKET, 2-PIECE ADJUSTABLE. ¼" X 1½" MINIMUM. TWO ½" Ø HEXAGON HEAD BOLTS WITH NUTS AND LOCKWASHERS.
11. ¾" X 0.020" MINIMUM ROUNDED EDGE STAINLESS STEEL STRAP WITH 2" LONG BEND UNDER BUCKLE. IF ATTACHING TO A MULTISIDED SECTION BEND UNDER SECTION SHALL BE LONG ENOUGH TO CONTACT AT LEAST 3 CORNERS.
12. MOUNTING BOLT, ¼" Ø MINIMUM, WITH NUT AND LOCKWASHER, OR SELF-LOCKING NUT AND COTTER KEY.
13. CONTINUOUS HINGE.
14. THUMB SCREW, ⅝" Ø MINIMUM TWO PER SIDE ON 4'-0" CENTERS.
15. REFLECTOR, 0.040" MINIMUM THICKNESS.
16. ALUMINUM STIFFENER.
17. FLUORESCENT BALLAST (2 REQUIRED).
18. LAMP, F72T12CW FOR 6'-0" SIGN
    F96T12CW FOR 8'-0" SIGN
19. LAMP HOLDER.
20. LAMP HOLDER TURRET.
21. SIGN PANEL, 1'-3" MINIMUM HEIGHT. MESSAGE IS SHOWN ELSEWHERE.
22. CORD, 16/3 TYPE SJT. CONTINUOUS FROM SIGN TERMINAL BLOCK TO SIGNAL HEAD MOUNTING TERMINAL COMPARTMENT. FORM A 1'-0" DRIP LOOP BETWEEN SIGN AND SIGNAL MAST ARM.
23. CORD CONNECTOR, 90° ANGLE CONNECTOR AT THE SIGN LOCATED IN UPPER 1/3 OF THE SIGN AND STRAIGHT CONNECTOR AT THE SIGNAL MAST ARM. DRILL AND TAP BOTTOM OF THE SIGNAL MAST ARM.
24. ADJUST FIXTURE LEVEL NO LOWER THAN CENTER OF SIGNAL MAST ARM CONNECTION.
25. APPROXIMATE CLEARANCE, 1".
26. ¼" FILLET WELD, 1¼" LONG.
27. SIGN FRAME.
28. FUSE HOLDER AND FUSE.
29. CLOSE CELL NEOPRENE GASKET (CONTINUOUS).
30. STAINLESS STEEL STRAP BUCKLE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (INTERNALLY ILLUMINATED STREET NAME SIGN)

NO SCALE

ES-7P

1-30-18

2018 STANDARD PLAN ES-7P

Return to Table of Contents

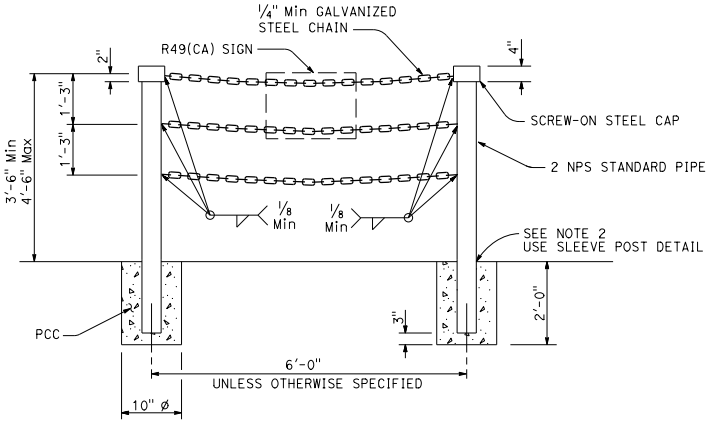
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

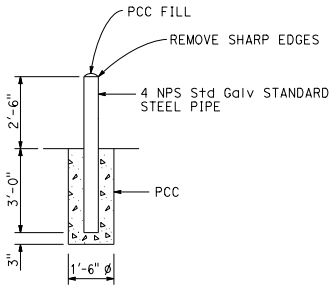
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

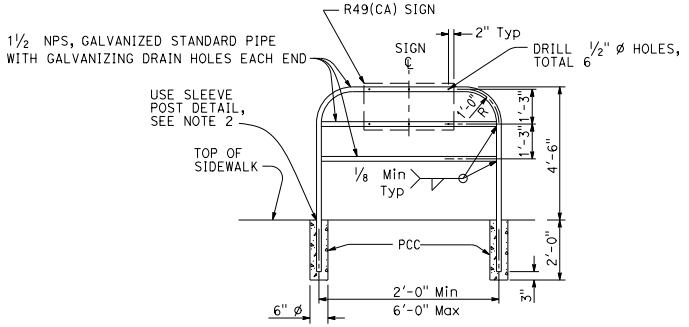
REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA



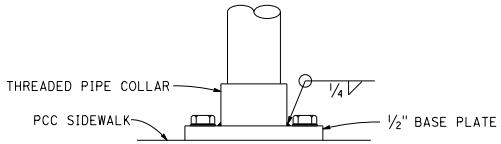
TYPE II
DETAIL A



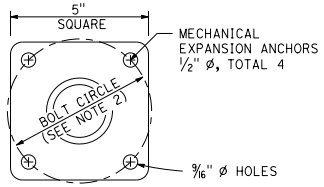
GUARD POST
DETAIL B



TYPE I
DETAIL C

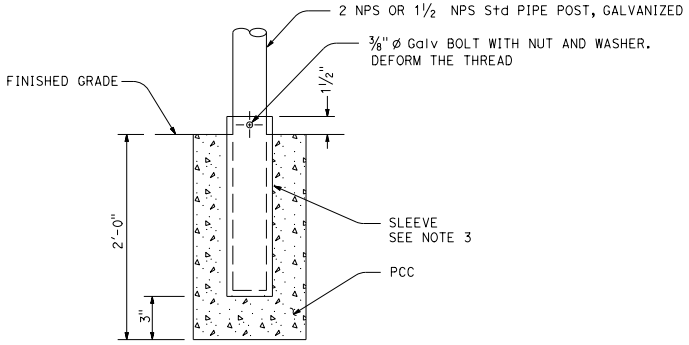


ELEVATION



PLAN

POST ANCHORAGE DETAIL
DETAIL D



SLEEVE POST DETAIL
Use unless otherwise specified or shown on plans
DETAIL E

NOTES:

1. Pipe post to be set 1'-6" back from face of curb unless otherwise specified.
2. Where barricade posts are installed in existing concrete sidewalk, the post may be anchored to the sidewalk as shown in the "Post Anchorage Detail". Bolt circle diameter shall be 4" minimum for Type I barricade and 5" minimum for Type II barricade.
3. Steel sleeve shall be constructed with an inside diameter 1/10" larger than the post's outside diameter. Wall thickness of sleeve shall be same as post or larger.
4. Alternative details may be submitted for approval by the Engineer.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

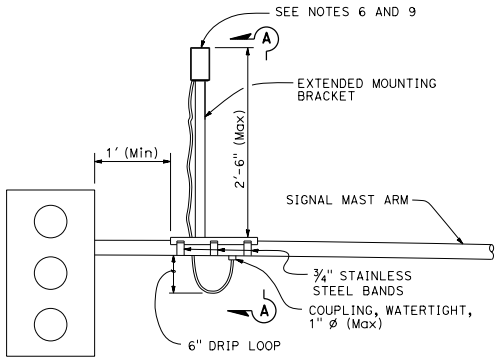
ELECTRICAL SYSTEMS (PEDESTRIAN BARRICADES)

NO SCALE

ES-7Q

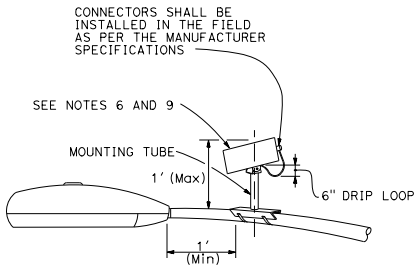
1-30-18

Return to Table of Contents



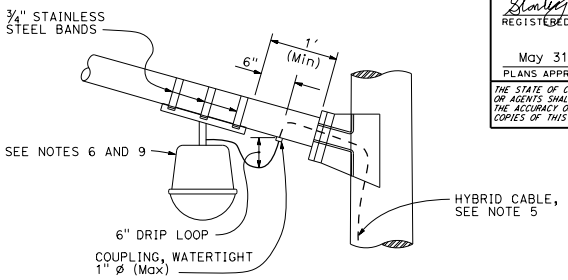
SIGNAL MAST ARM MOUNT

DETAIL A



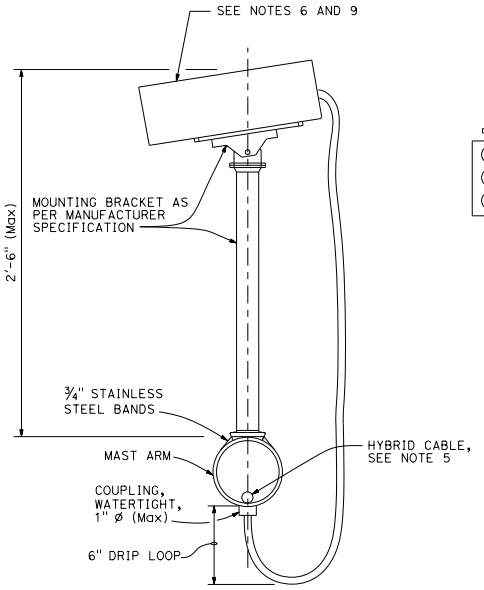
LUMINAIRE MAST ARM MOUNT

DETAIL B

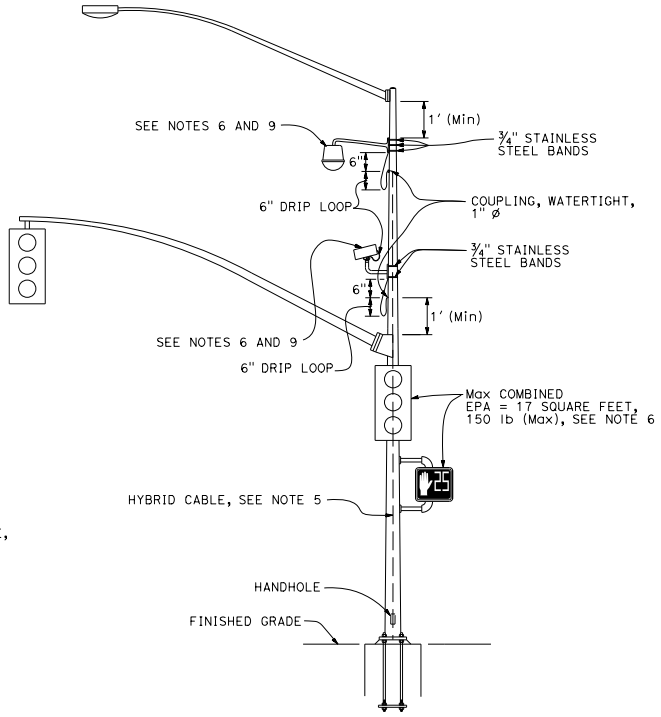


LUMINAIRE MAST ARM MOUNT

DETAIL C



SECTION A-A



SIGNAL POLE MOUNT

DETAIL D

NOTES:

1. Exact mounting location of miscellaneous attachment and bracket shall be approved by the Engineer per manufacturer's recommendation.
2. Location of cable entrances on signal pole shall be a minimum of 1' from any flange or base plate.
3. Hybrid cable entrances on signal pole shall be drilled for weathertight coupling as required.
4. Hybrid cable shall have a drip loop at the entrance into signal pole, luminaire mast arm and signal mast arm.
5. A single hybrid cable shall run continuous and shall not be twisted from the miscellaneous attachment to the controller cabinet. No splices shall be allowed.
6. Use the manufacturer's Effective Projected Area (EPA) for miscellaneous attachment. The maximum EPA for each miscellaneous attachment shall be 1.6 square feet with 10 lb Max.
7. Maximum of two miscellaneous attachments per traffic signal standard.
8. Maximum of one miscellaneous attachment per mast arm.
9. Miscellaneous attachment shall be mounted using clamping devices.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING, MISCELLANEOUS ATTACHMENT)

NO SCALE

ES-7R

1-30-18

Return to Table of Contents

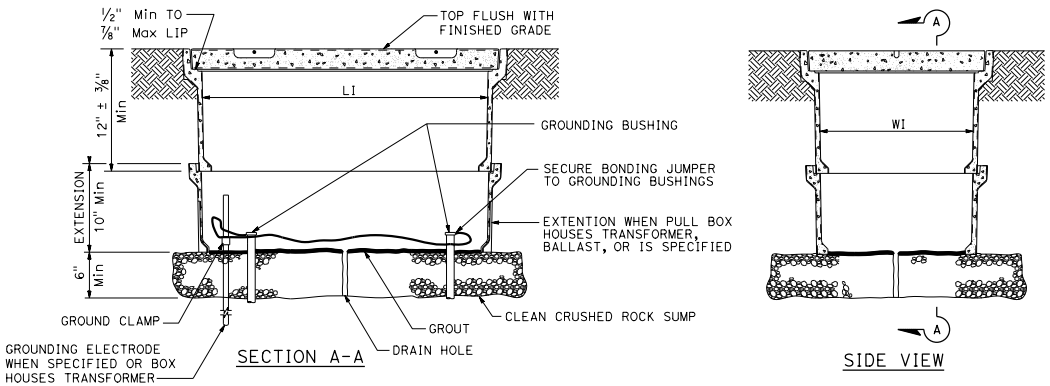
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — ELECTRICAL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

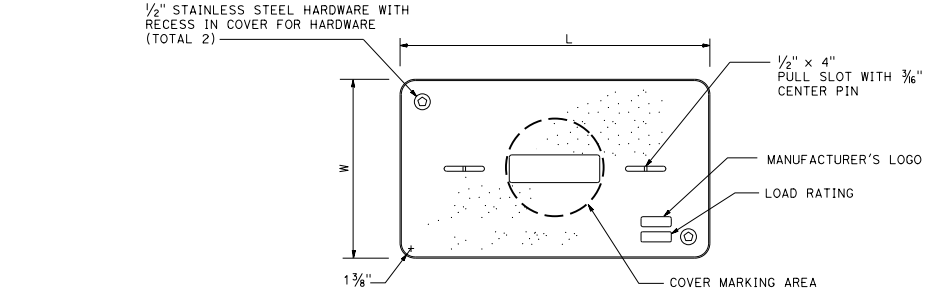


SECTION A-A

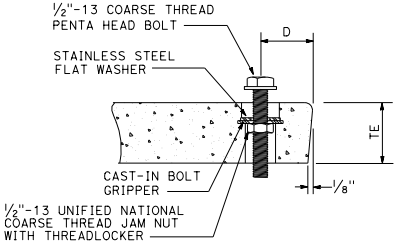
SIDE VIEW

INSTALLATION DETAILS

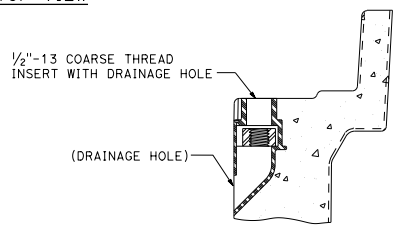
DETAIL A



COVER TOP VIEW



TYPICAL COVER CAPTIVE BOLT
OR SIMILAR



TYPICAL THREADED INSERT
OR SIMILAR

DIMENSION TABLE

PULL BOX	PULL BOX					COVER				
	MINIMUM DEPTH BOX	MINIMUM DEPTH EXTENSION	MINIMUM WEIGHT	LI Min	WI Min	TE	D	L	W	MINIMUM WEIGHT
No. 3½	12"	N/A	40 lb	1' - 3"	9"	1¾"	1¾"	1'-3¼" - 1'-3⅜"	10" - 10⅛"	30 lb
No. 5	12"	10"	55 lb	1' - 8"	11"	2"	1¾"	1'-11¼"	1'-1¾"	60 lb
No. 6	12"	10"	70 lb	2' - 4¼"	1' - 3¼"	2"	2"	2'-6½"	1'-5½"	85 lb

NOTES:

1. The nominal dimensions of the opening in which the cover sets shall be the same as the cover dimensions except the length and width dimensions shall be ⅛" greater.
2. Covers and boxes shall be interchangeable with California standard male and female gages. When interchanged with a standard male or female gage, the top surfaces shall be flush within ⅛". Top outside radius of covers and pull boxes shall have a ⅛" radius.
3. Dimensions for the cover for non-traffic pull box are nominal values.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (NON-TRAFFIC PULL BOX)

NO SCALE

ES-8A

2018 STANDARD PLAN ES-8A

1-30-18

Return to Table of Contents

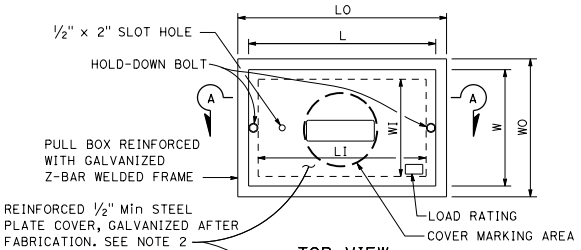
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

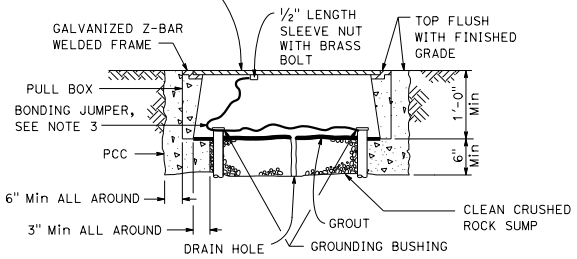
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TOP VIEW



SECTION A-A

No. 3½(T), No. 5(T) AND No. 6(T) TRAFFIC PULL BOX

NOTES:

1. Traffic pull box shall be provided with steel cover and special concrete footing. Steel cover shall have embossed non-skid pattern.
2. Steel reinforcing shall be as regularly used in the standard products of the respective manufacturer.
3. Bonding jumper for metal covers shall be 3' long, minimum.
4. The nominal dimensions of the opening in which the cover sets shall be the same as the cover dimensions except the length and width dimensions shall be ⅛" greater.
5. Covers and boxes shall be interchangeable with California standard male and female gages. When interchanged with a standard male or female gage, the top surfaces shall be flush within ⅛".

DIMENSION TABLE

PULL BOX	PULL BOX						COVER	
	MINIMUM * THICKNESS	MINIMUM DEPTH BOX AND EXTENSION	LO	LI	WO	WI	L **	W **
No. 3½(T)	1½"	1'-0"	1'-10" - 1'-11"	1'-5" - 1'-6½"	1'-3" - 1'-4"	10" - 1'-0"	1'-8" - 1'-8½"	1'-1" - 1'-2"
No. 5(T)	1¾"	1'-0"	2'-5" - 2'-6"	2'-0" - 2'-1"	1'-6" - 1'-7"	1'-1" - 1'-2"	2'-3" - 2'-3½"	1'-4" - 1'-4½"
No. 6(T)	2"	1'-0"	2'-11" - 3'-1"	2'-6" - 2'-7"	1'-10" - 2'-0"	1'-5" - 1'-6"	2'-9" - 2'-9½"	1'-8" - 1'-8½"

* EXCLUDING CONDUIT WEB ** TOP DIMENSION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (TRAFFIC PULL BOX)

NO SCALE

ES-8B

2018 STANDARD PLAN ES-8B

1-30-18

Return to Table of Contents

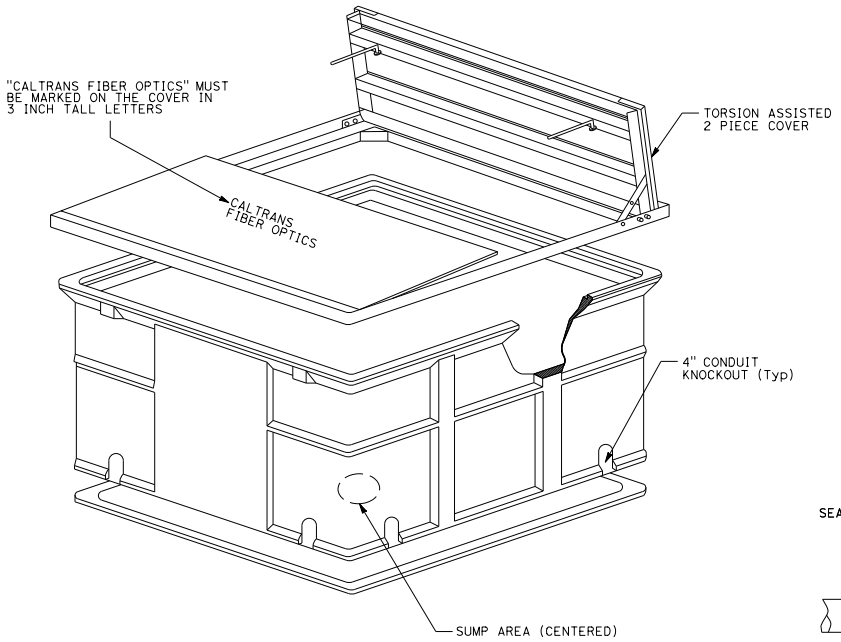
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.Z
REGISTERED ELECTRICAL ENGINEER

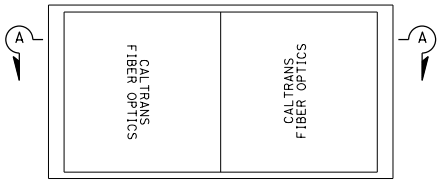
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

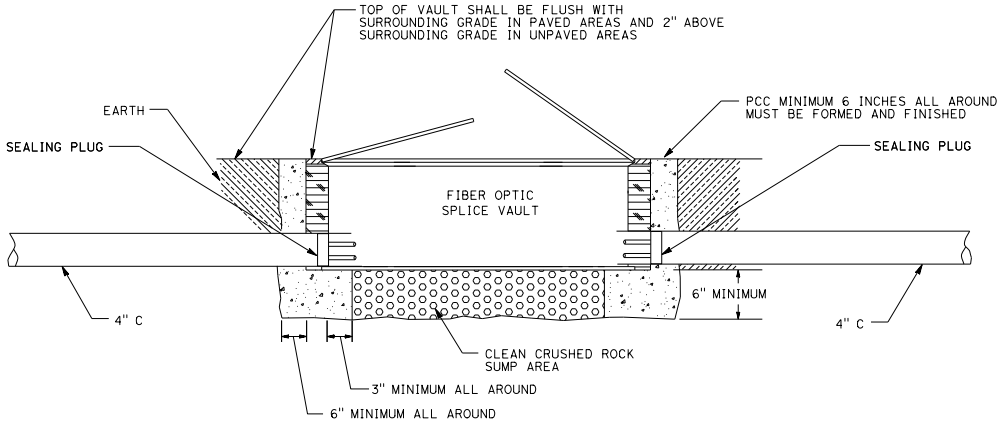
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SPLICE VAULT-ISOMETRIC VIEW



TOP VIEW



SECTION A-A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SPLICE VAULTS)

NO SCALE

ES-8C

1-30-18

Return to Table of Contents

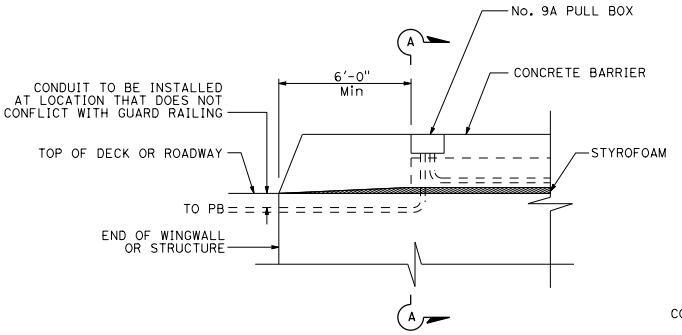
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

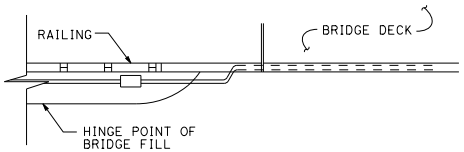
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

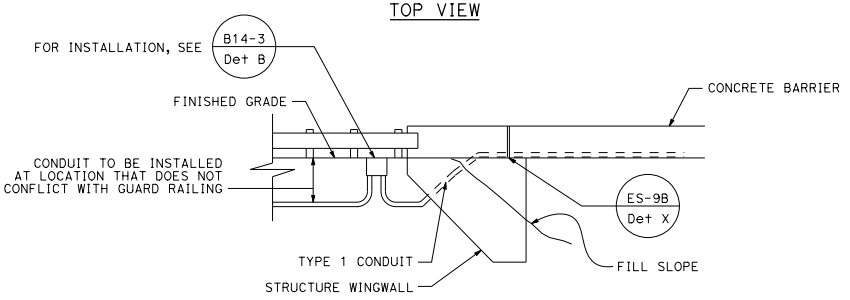
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SIDE VIEW

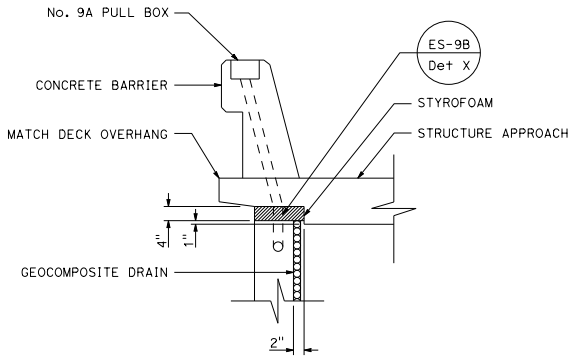


TOP VIEW



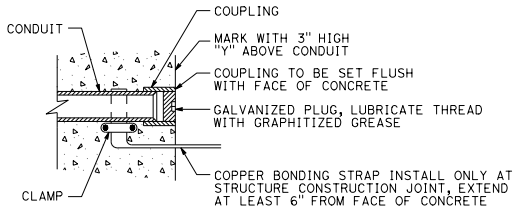
SIDE VIEW

CONDUIT TERMINATION
DETAIL I



SECTION A-A

CONDUIT TERMINATION
DETAIL A



CONDUIT TERMINATION
DETAIL C

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (STRUCTURE PULL BOX INSTALLATIONS)

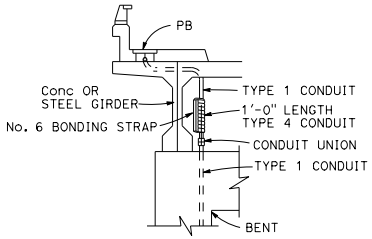
NO SCALE

ES-9A

1-30-18

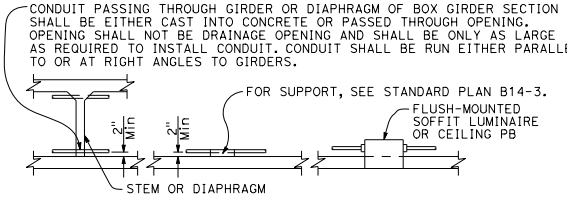
2018 STANDARD PLAN ES-9A

Return to Table of Contents



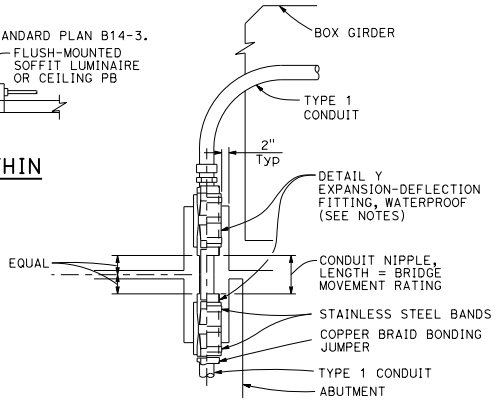
CONDUIT RISER CONNECTION

DETAIL R



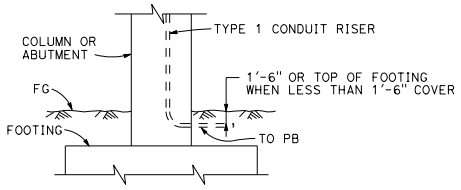
CONDUIT INSTALLATION WITHIN BOX GIRDER SECTIONS

DETAIL S



NOTES:

1. Except for sidewalk joints, a conduit expansion fitting or expansion-deflection fitting shall be installed at each ½" or greater structure joint, hinge or abutment.
2. Fittings or combination of fittings shall be installed to accommodate the movement rating as shown on the structure plans.
3. Fittings shall be installed parallel to superstructure girders.
4. Where lateral movement greater than ¼" may occur, a neoprene sleeve expansion-deflection fitting shall be installed straddling the joint.



LOWER END OF CONDUIT RISER AT COLUMN OR ABUTMENT

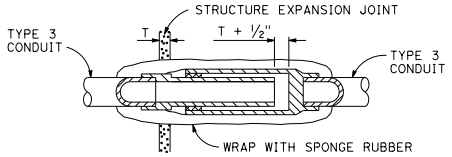
DETAIL T

NOTES:

1. Fitting and pocket required only where movement can occur between girder and abutment.
2. Fill pocket around fitting with resilient waterproof compound.

CONDUIT RISER CONNECTION AT COLUMN, ABUTMENT OR STRUCTURE WING WALL

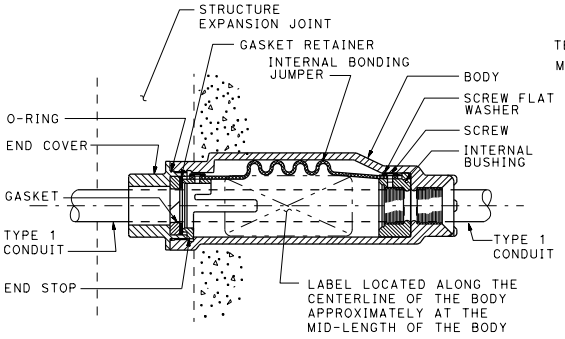
DETAIL U



NON-METALLIC CONDUIT EXPANSION FITTING INSTALLATION DETAIL

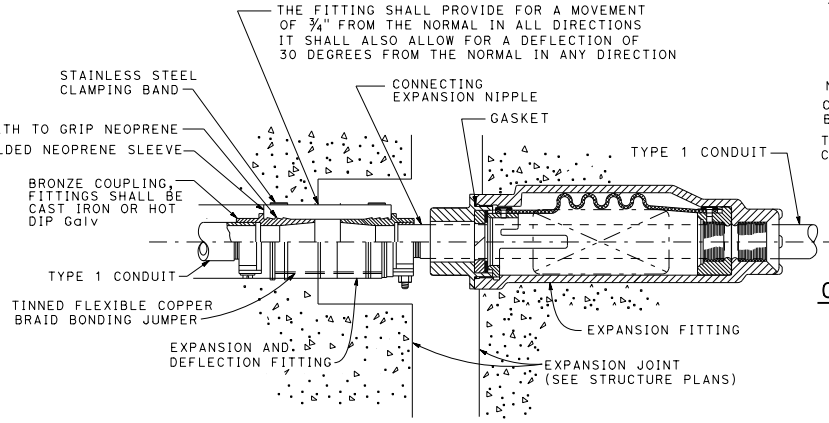
To be used only when shown or specified on Project Plans

DETAIL V



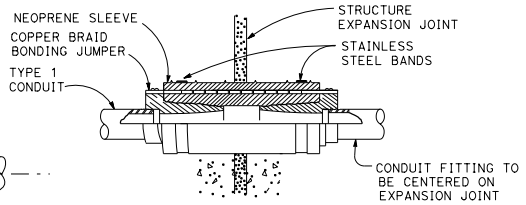
CONDUIT EXPANSION FITTING

DETAIL X



COMBINATION EXPANSION-DEFLECTION FITTINGS METALLIC CONDUIT INSTALLATION

DETAIL XY



CONDUIT EXPANSION-DEFLECTION FITTING

DETAIL Y

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Jaswinder S Gill
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Jaswinder S. Gill — No. E18551 — Exp. 12-31-18 ELECTRICAL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CONDUIT RISER AND EXPANSION FITTING, STRUCTURE INSTALLATIONS)

NO SCALE

ES-9B

1-30-18

Return to Table of Contents

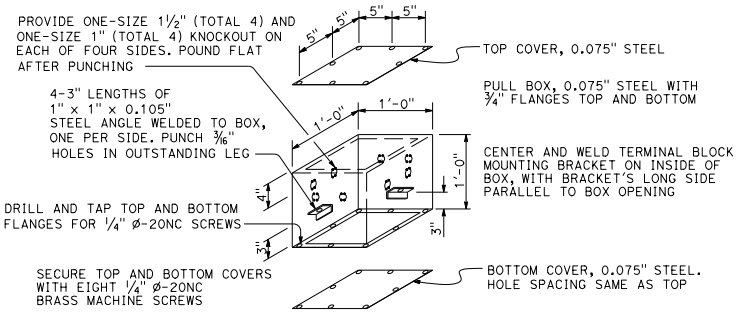
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

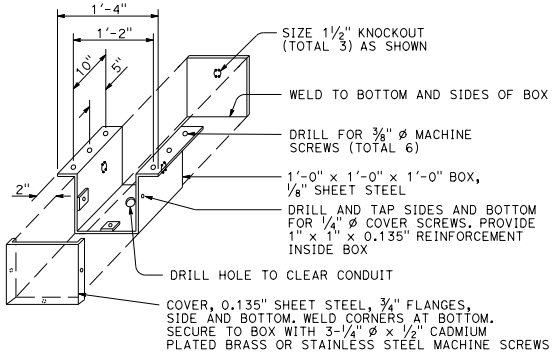
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA



No. 7 PULL BOX (CEILING)

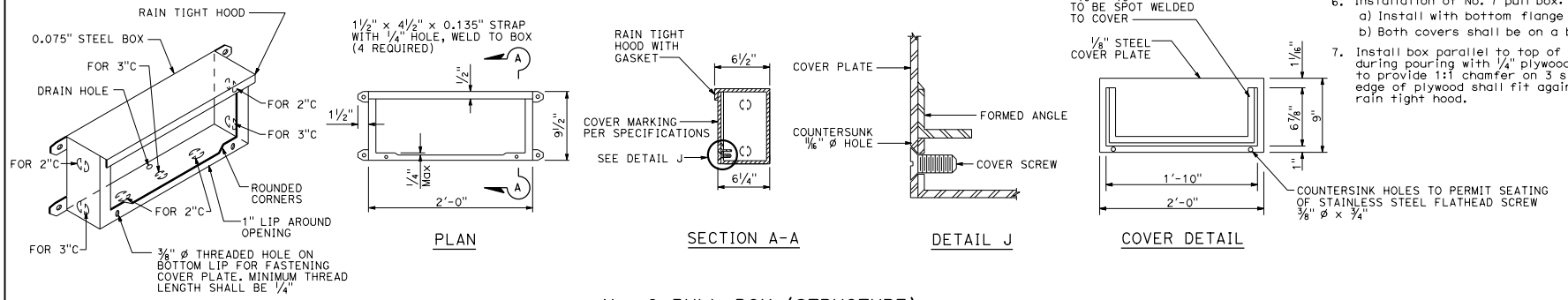
See Note 6



No. 8 PULL BOX

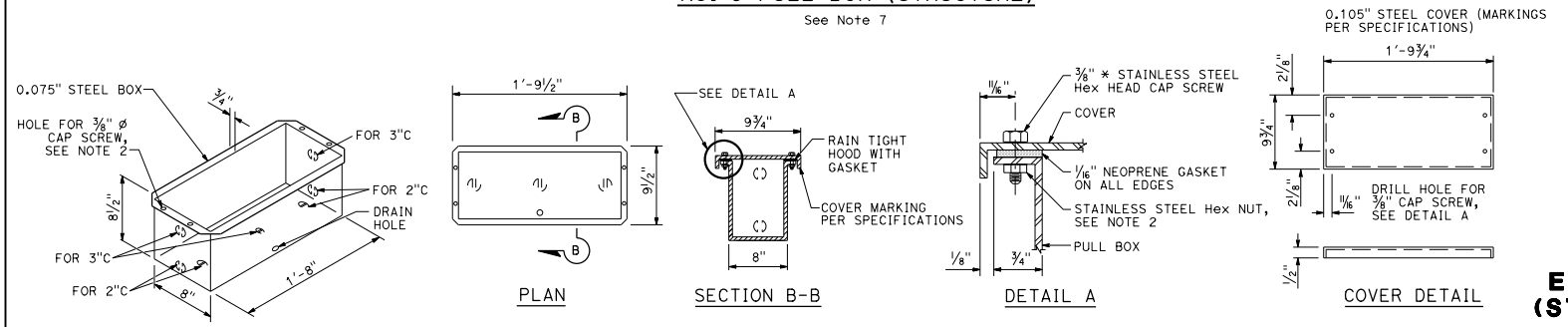
NOTES:

1. Corner joints shall be lapped and secured by spot welding or riveting.
2. Where cap screws are used to attach cover to box, either of the following methods of providing adequate threading may be used:
   a. Tack weld stainless steel Hex nut to bottom of flange (total 4)
   b. Tack weld a ¼" x ⅝" x 8" bar beneath flange (total 2)
3. Pound knockouts flat after punching.
4. Multiple size knockouts (concentric) shall not be permitted.
5. Pull box covers shall be marked as specified.
6. Installation of No. 7 pull box:
   a) Install with bottom flange flush with concrete.
   b) Both covers shall be on a box during pouring.
7. Install box parallel to top of railing. Cover box during pouring with ¼" plywood of sufficient size to provide 1:1 chamfer on 3 sides of cover. Upper edge of plywood shall fit against lower edge of rain tight hood.



No. 9 PULL BOX (STRUCTURE)

See Note 7



No. 9A PULL BOX (STRUCTURE)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (STRUCTURE PULL BOX)

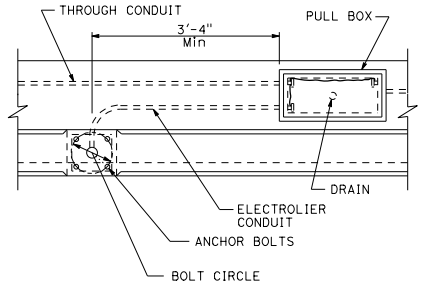
NO SCALE

ES-9C

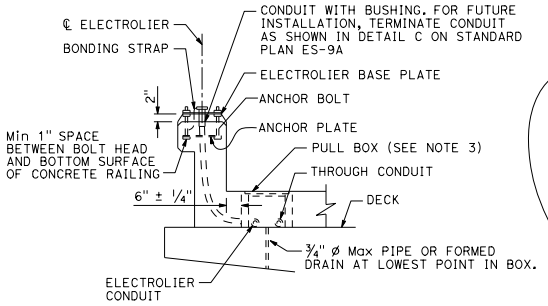
1-26-18

2018 STANDARD PLAN ES-9C

Return to Table of Contents



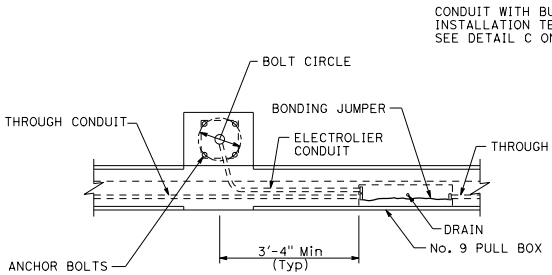
TOP VIEW



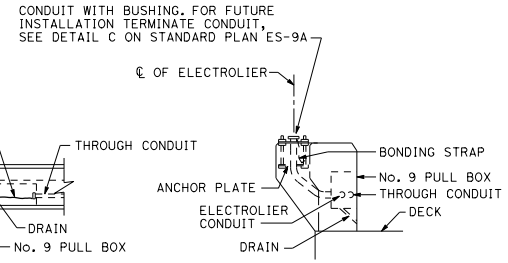
END VIEW

No. 3½, 5, OR 6 PULL BOX INSTALLATION

DETAIL A



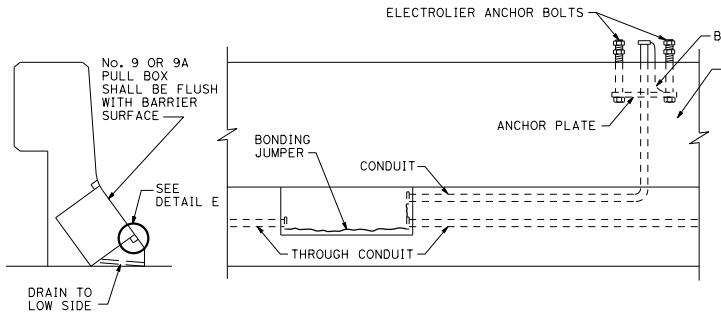
TOP VIEW



END VIEW

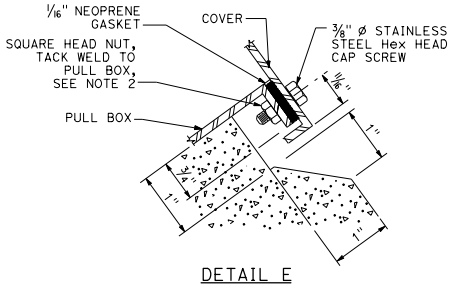
No. 9 PULL BOX INSTALLATION

DETAIL B

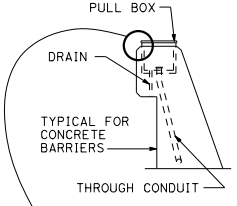


INSTALLATION IN SLOPING PARAPETS

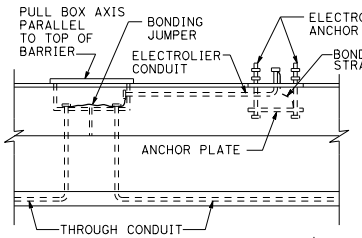
DETAIL D



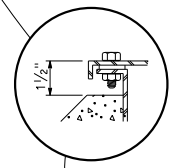
DETAIL E

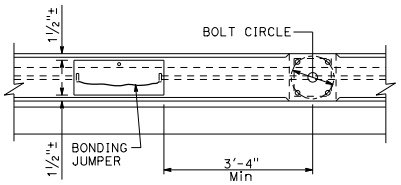


END VIEW

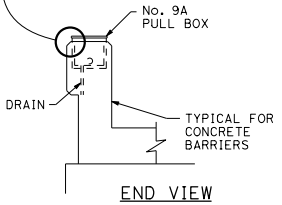


SIDE VIEW

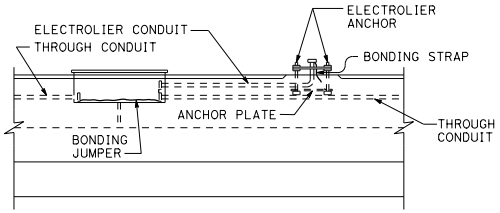




TOP VIEW



END VIEW



SIDE VIEW

No. 9A PULL BOX INSTALLATION

DETAIL C

NOTES:

1. Axis of pull box shall be parallel to top of barrier, sidewalk or railing.
2. See railing sheet for reinforcement and structural details at electroliers and pull boxes.
3. Top of pull boxes in sidewalk areas shall be flush with sidewalk. Modify base of pull box as required.
4. Boxes inside of vertical barrier or railing shall be closed during pouring of PCC with ¼" plywood of sufficient size to provide 1:1 chamfer on 3 sides of cover. Upper edge of plywood shall fit against lower edge of raintight hood.
5. Use drain in center if box is horizontal, or at low end if box is inclined. When box is mounted in sloping parapet ½" elongated drain hole inside at center or near end as required for drainage.
6. For electrolier anchorage bolts and grouting details, see Standard PLAN ES-6B.
7. See Standard Plan B14-3 for conduit in concrete barrier.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (STRUCTURE PULL BOX INSTALLATIONS)

NO SCALE

ES-9D

1-26-18

2018 STANDARD PLAN ES-9D

Return to Table of Contents

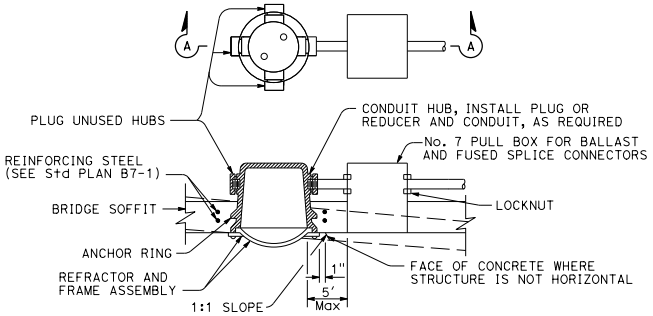
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

May 31, 2018
PLANS APPROVAL DATE

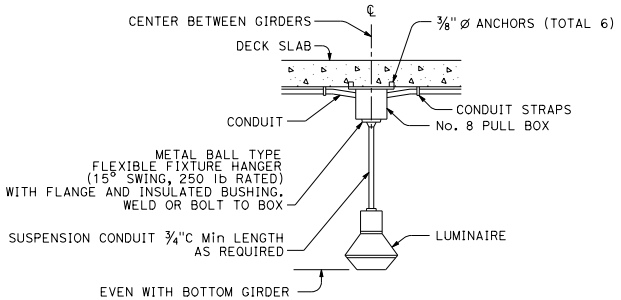
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



SECTION A-A

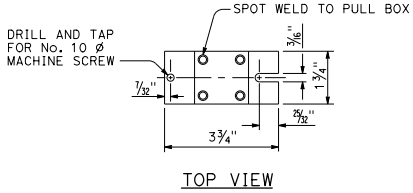
FLUSH-MOUNTED SOFFIT LUMINAIRE INSTALLATION

DETAIL F

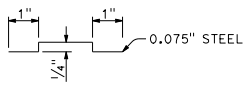


PENDANT SOFFIT LUMINAIRE INSTALLATION

DETAIL P



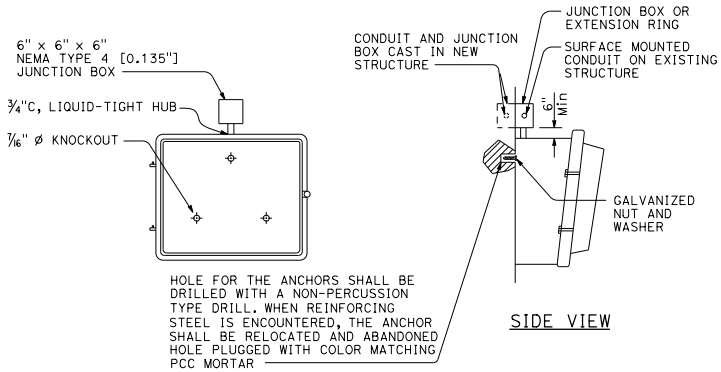
TOP VIEW



SIDE VIEW

TERMINAL BLOCK MOUNTING BRACKET

DETAIL T



SIDE VIEW

WALL-MOUNTED LUMINAIRE INSTALLATION

DETAIL W

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FLUSH-MOUNTED SOFFIT, PENDANT SOFFIT AND WALL-MOUNTED LUMINAIRE STRUCTURE INSTALLATIONS)

NO SCALE

ES-9E

1-26-18

Return to Table of Contents

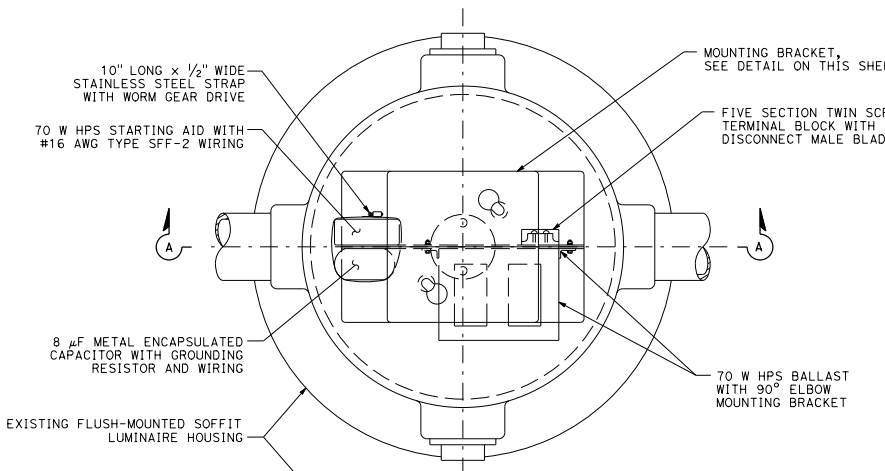
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H. R. J.
REGISTERED ELECTRICAL ENGINEER

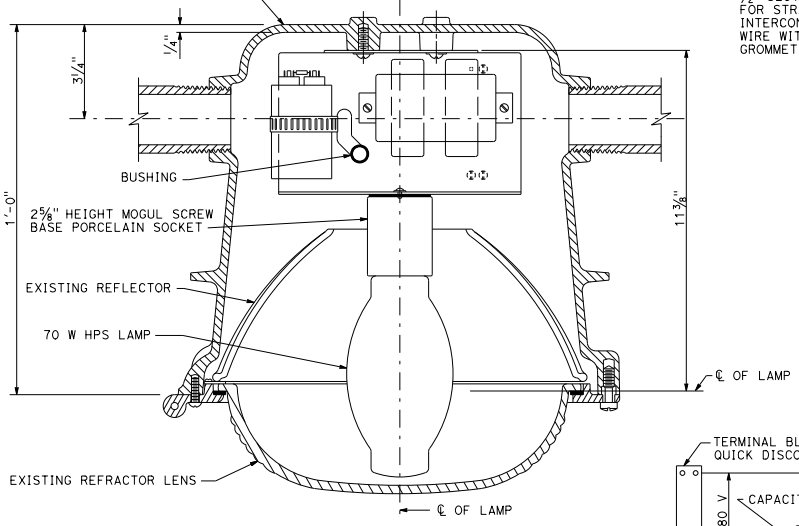
Registered Professional Engineer — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — Electrical — State of California

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

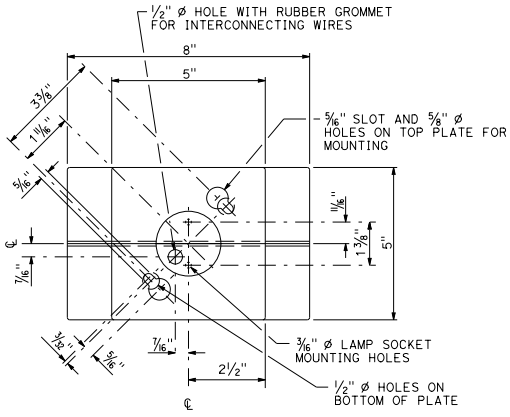


PLAN

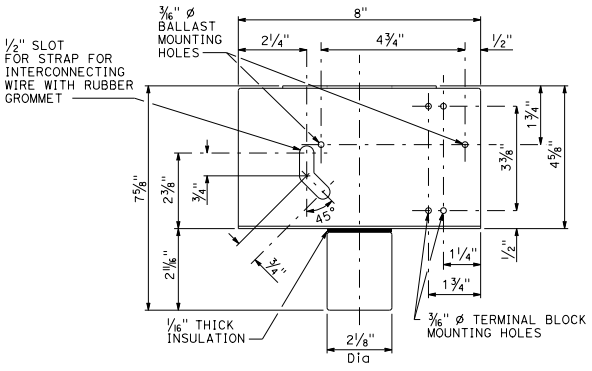


SECTION A-A

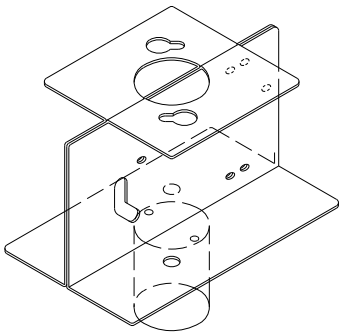
FLUSH-MOUNTED SOFFIT LUMINAIRE ASSEMBLY



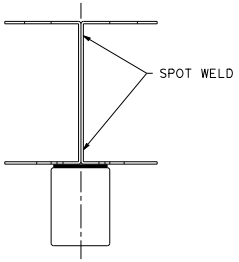
TOP VIEW



FRONT VIEW

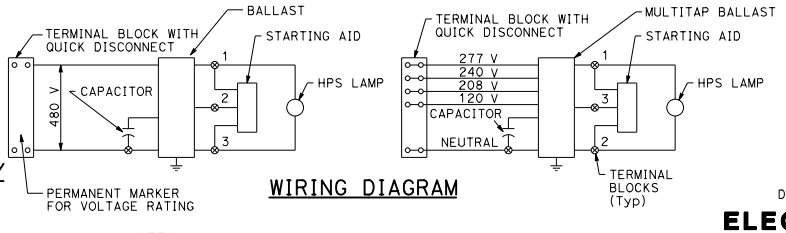


PREFORM TWO SHEETS 1/16" MILD STEEL AS SHOWN, SPOTWELD TOGETHER IN EACH CORNER WITH FOUR SPOTWELDS.



SIDE VIEW

MOUNTING BRACKET DETAILS



WIRING DIAGRAM

NOTES:

1. Use No. 8 ø machine screws, lockwashers and nuts for mounting ballast and terminal strips.
2. In-line fuse as required on Standard Plan ES-13B.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FLUSH-MOUNTED SOFFIT LUMINAIRE DETAILS)

NO SCALE

ES-9F

1-26-18

2018 STANDARD PLAN ES-9F

Return to Table of Contents

NOTE:
Curves represent the minimum maintained illuminance (FC).

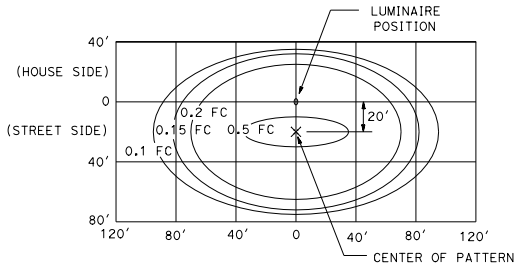
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

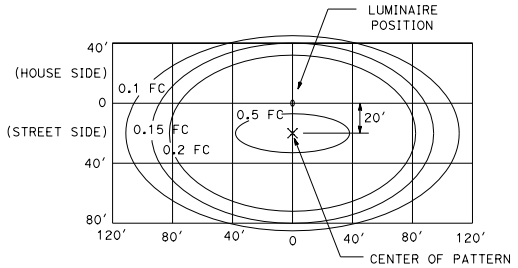
May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

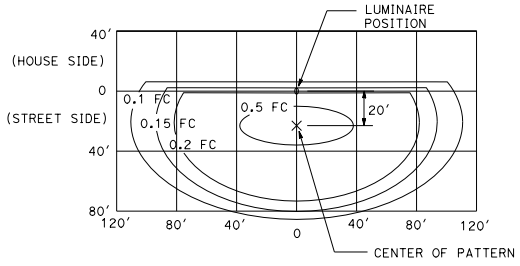
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



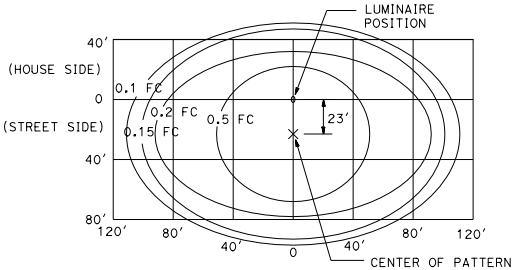
ROADWAY 1
34′ Mounting Height
165 W (Max)



ROADWAY 2
40′ Mounting Height
235 W (Max)



ROADWAY 3
40′ Mounting Height
with back side control
235 W (Max)



ROADWAY 4
40′ Mounting Height
300 W (Max)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ISOFOOTCANDLE CURVES)

NO SCALE

ES-10A

1-26-18

2018 STANDARD PLAN ES-10A

Return to Table of Contents

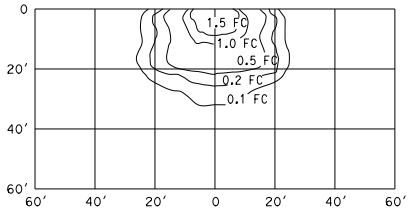
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

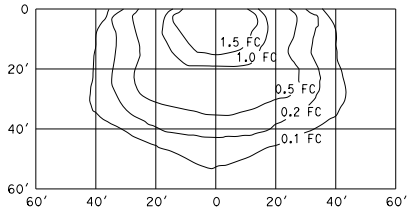
May 31, 2018
PLANS APPROVAL DATE

Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

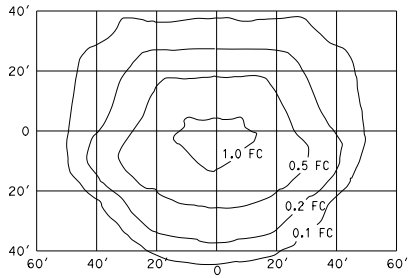
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



WALL-MOUNTED
15′ Mounting Height
ANSI Designation S62
Lamp operated at 5,800 lm
70 W (Max)

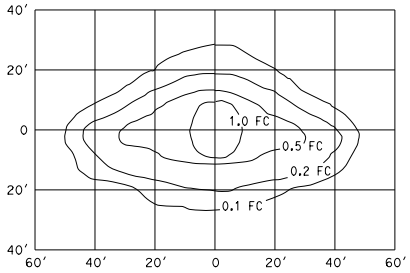


WALL-MOUNTED
15′ Mounting Height
ANSI Designation S54
Lamp operated at 9,500 lm
100 W (Max)

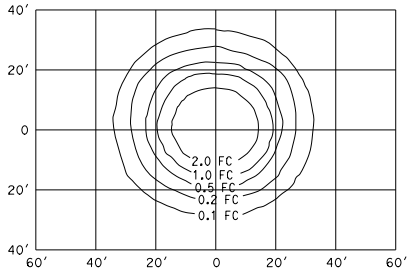


FLUSH-MOUNTED SOFFIT
17′ Mounting Height
ANSI Designation S62
Lamp operated at 5,800 lm
70 W (Max)

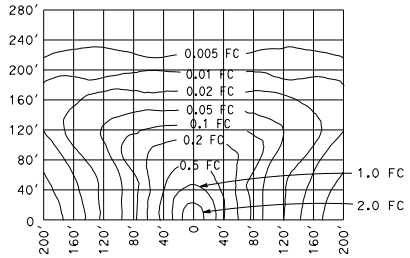
NOTE:
Curves represent the minimum maintained illuminance (FC).



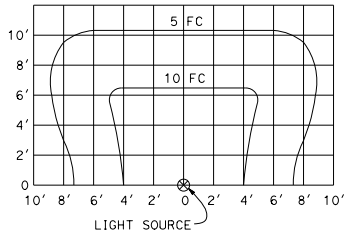
PENDANT SOFFIT
TYPE III SHORT
17′ Mounting Height
ANSI Designation S62
Lamp operated at 5,800 lm
70 W (Max)



PENDANT SOFFIT
17′ Mounting Height
ANSI Designation S62
Lamp operated at 5,800 lm
70 W (Max)



LOW-PRESSURE SODIUM
40′ Mounting Height
Lamp operated at 33,000 lm
180 W (Max)



SIGN ILLUMINATION
85 W (Max)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (ISOFOOTCANDLE CURVES)

NO SCALE

ES-10B

1-26-18

Return to Table of Contents

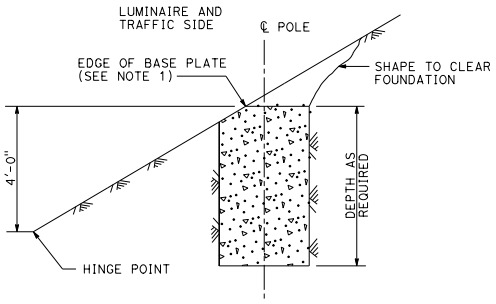
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

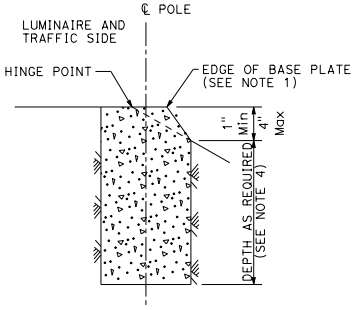
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

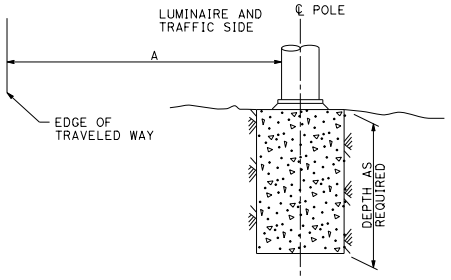
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CUT SLOPES
STEEPER THAN 4:1,
LESS THAN 2:1
DETAIL A-1
See Note 2 and 3



FILL SLOPES
STEEPER THAN 4:1,
LESS THAN 2:1
DETAIL A-2
See Note 2 and 3



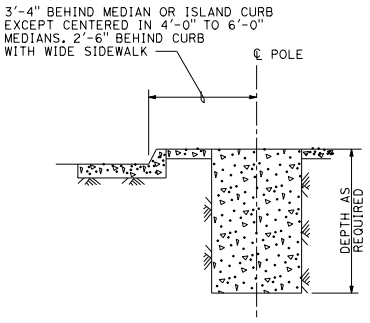
FLAT SECTIONS, CUT OR FILL SLOPES
4:1 OR FLATTER
DETAIL A-3
See Note 2

STANDARD TYPE	SETBACK (DIMENSION A)
32	30'-0" (Min)
31	20'-0" (Min)
15, 15D, 15-SB, 21, 21D, 30	ARM LENGTH (Min)

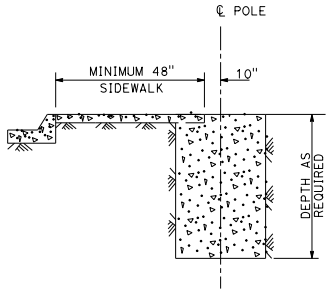
FOUNDATIONS ADJACENT TO ALL ROADWAYS EXCEPT IN SIDEWALK, MEDIAN AND ISLAND AREAS
DETAIL A

NOTES:

1. Where a portion of the foundation is above grade, the top edges shall have a 1" chamfer.
2. Slopes shall be horizontal to vertical ratio (Horizontal : Vertical).
3. Horizontal setbacks on cut and fill slopes steeper than 4:1 shall not exceed the distance shown for flat sections.
4. CIDH embedment depth shall be increased beyond standard depths by the diameter of the CIDH.



MEDIAN, ISLAND
OR WIDE SIDEWALK
DETAIL B-1
7' Wide and wider



NARROW SIDEWALK
DETAIL B-2
Less than 7' wide

FOUNDATIONS IN SIDEWALK, MEDIAN AND ISLAND AREAS
DETAIL B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FOUNDATION INSTALLATIONS)

NO SCALE

ES-11

1-26-18

Return to Table of Contents

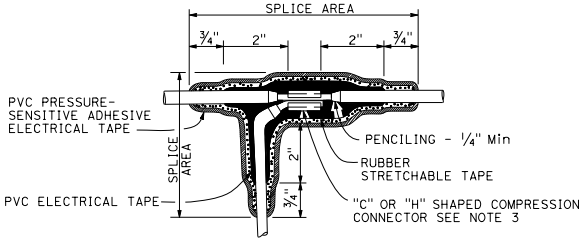
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

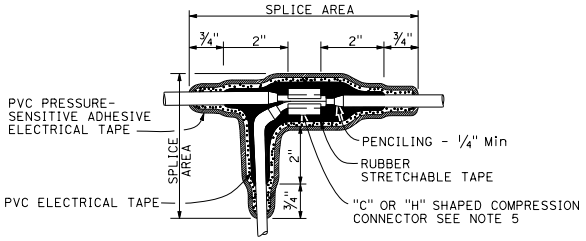
H.R.J
REGISTERED ELECTRICAL ENGINEER

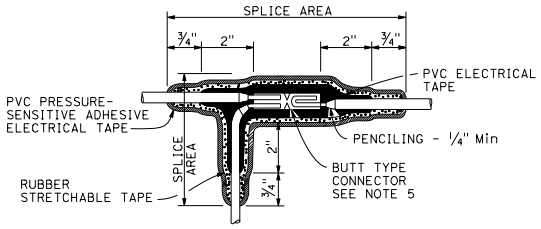
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

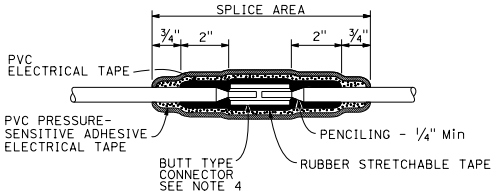
May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.





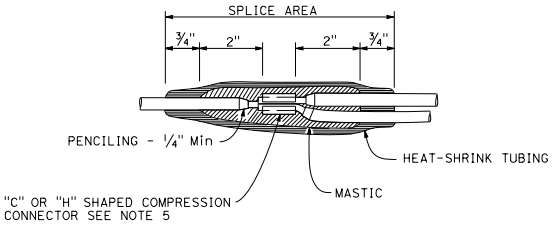


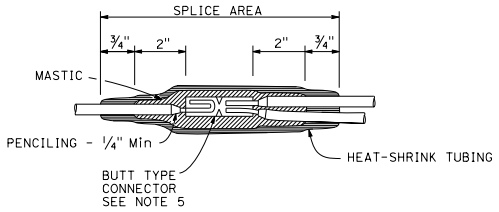


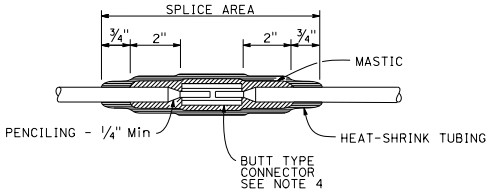
TYPICAL SPLICE INSULATION METHOD B

NOTES:

1. Dimensions are minimum.
2. Rubber tapes shall be rolled after application.
3. Between 1 free-end and 1 through conductor.
4. Between 2 free-end conductors.
5. Between 3 free-end conductors.







TYPICAL SPLICE INSULATION HEAT-SHRINK TUBING

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SPLICE INSULATION METHODS DETAILS)

NO SCALE

ES-13A

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

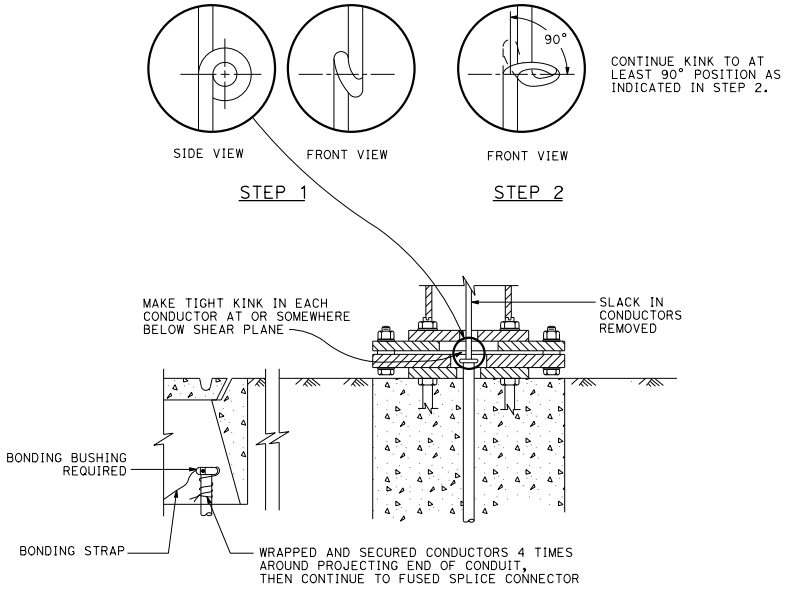
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CIRCUIT VOLTAGE	FUSE VOLTAGE RATING	FUSE CURRENT RATING						
		HPS LAMP BALLAST		LOW PRESSURE SODIUM BALLAST	INDUCTION SIGN LIGHTING	SINGLE PHASE (TWO WIRE) TRANSFORMERS (PRIMARY SIDE)		
		70 W	100 W	180 W	85 W	1 kVA	2 kVA	3 kVA
120 V	250 V	5 A	5 A	5 A	5 A	10 A	20 A	30 A
240 V	250 V	5 A	5 A	5 A	5 A	6 A	10 A	20 A
480 V	500-600 V	5 A	5 A	3 A	1 A (SEE NOTE 2)	3 A	6 A	10 A

NOTES:

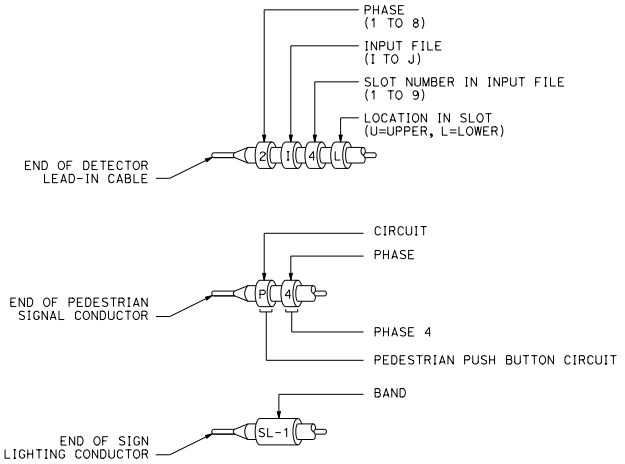
1. Primary lines of multiple ballasts shall be provided with fused connectors. Fuse ratings shall be as noted above.
2. See Standard Plan ES-15D, Type SC3 control.

FUSE RATINGS FOR FUSED CONNECTORS



KINKING DETAIL FOR SLIP BASE STANDARDS

DETAIL A



TYPICAL BANDING DETAILS

DETAIL B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (FUSE RATING, KINKING AND BANDING DETAIL)

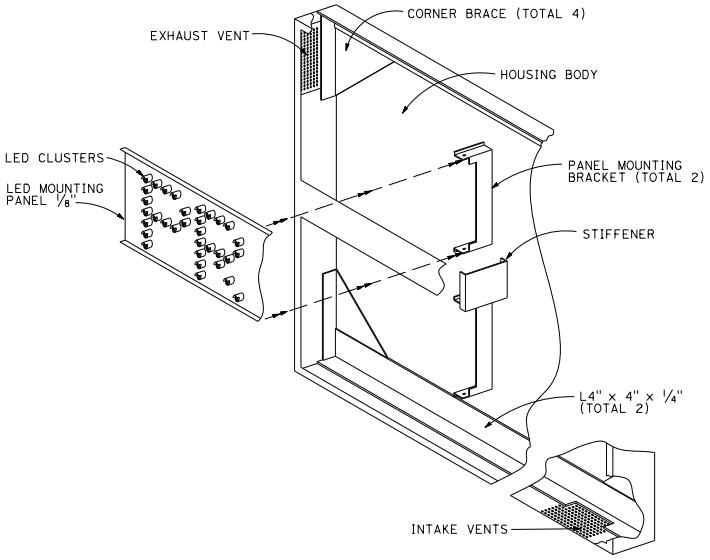
NO SCALE

ES-13B

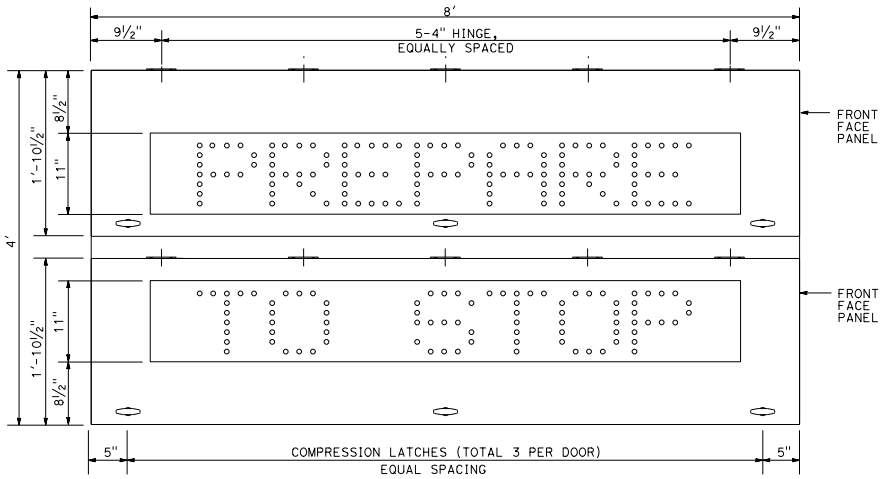
1-26-18

2018 STANDARD PLAN ES-13B

Return to Table of Contents



ISOMETRIC VIEW



TYPICAL FRONT VIEW OF SIGN UNIT

NOTES:

1. Sheet metal shall be 1/8".
2. Welds shall be continuous.
3. Powder coat all internal and external surfaces black.
4. The door frame shall utilize two gas spring lift arms and two latching devices to maintain an open position.
5. See Wiring Notes and Symbols on Standard Plan ES-14B, Detail A.

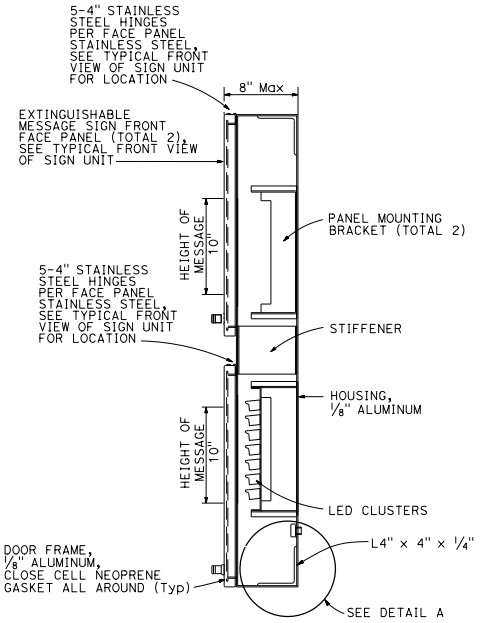
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER

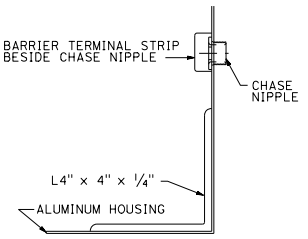
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CROSS-SECTION OF SIGN



DETAIL A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LED EXTINGUISHABLE MESSAGE SIGN 10" LETTERS)

NO SCALE

ES-14A

1-26-18

2018 STANDARD PLAN ES-14A

Return to Table of Contents

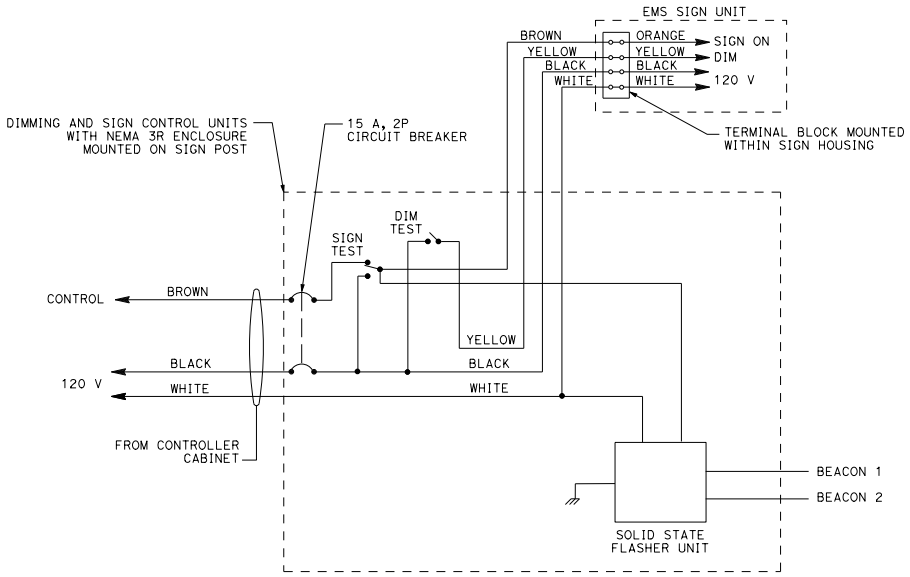
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J
REGISTERED ELECTRICAL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Registered Professional Engineer — Hamid Zolfaghari — No. E15636 — Exp. 12-31-19 — Electrical — State of California

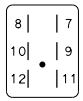
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



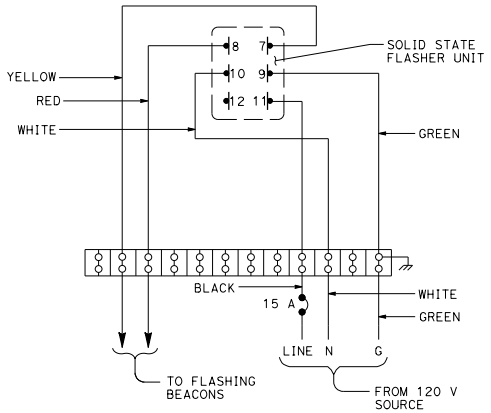
WIRING DIAGRAM
LED EXTINGUISHABLE MESSAGE SIGN
DETAIL A

THE FLASHER SHALL MATE WITH A CINCH-JONES SOCKET S-406-SB OR EQUAL AND CONNECTED AS FOLLOWS:

PIN	CIRCUIT	PIN	CIRCUIT
7	LOAD	10	NEUTRAL
8	LOAD	11	LINE
9	CHASSIS GROUND	12	NOT USED



CONNECTOR SOCKET
SOLID STATE FLASHER UNIT



WIRING DIAGRAM
FLASHING BEACON CONTROL ASSEMBLY
DETAIL B

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CONTROL ASSEMBLY WIRING DIAGRAMS)

NO SCALE

ES-14B

5-26-17

Return to Table of Contents

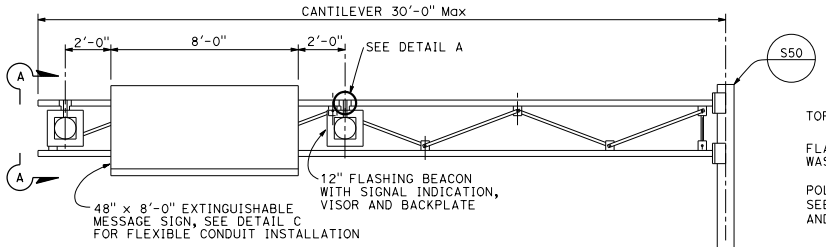
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

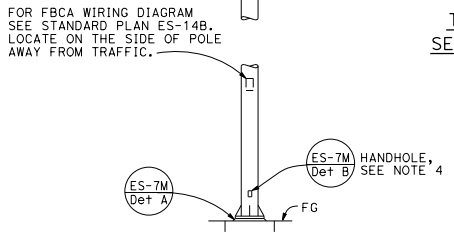
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

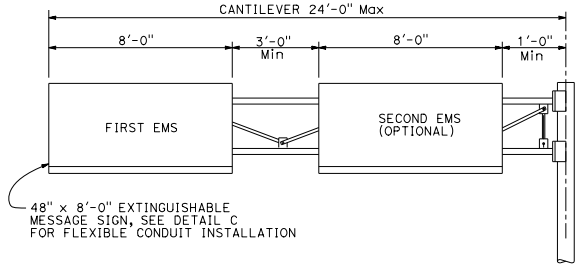
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

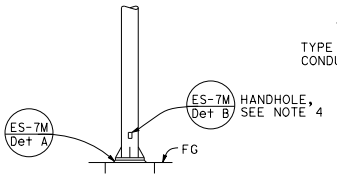




EMS WITH FLASHING BEACONS

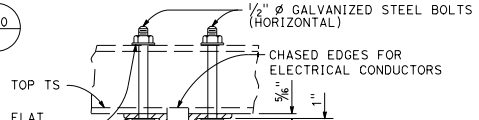
ELEVATION A



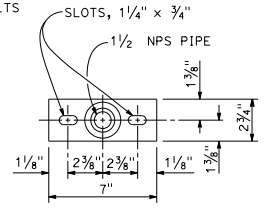


EMS WITHOUT FLASHING BEACONS

ELEVATION B



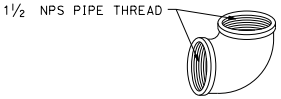
TOP VIEW
SECTION B-B



DETAIL A-1

POLE PLATE

DETAIL A

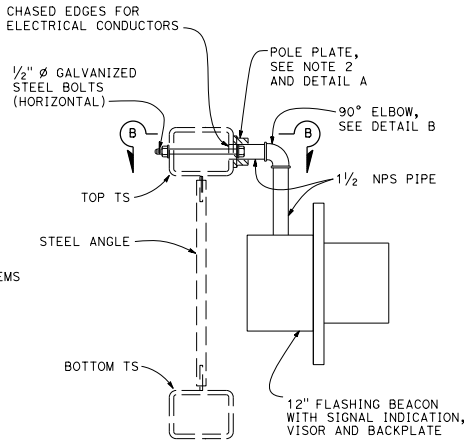


90° ELBOW

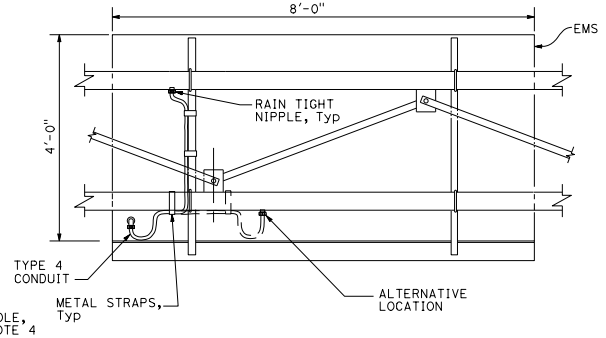
DETAIL B

NOTES:

1. Pole plate shall be bronze or galvanized ductile iron.
2. For structure information, see Standard Plan S50.
3. Wind loading (3-second gust): 100 mph.
4. Handhole shall be located on the downstream side of traffic.



SECTION A-A



FLEXIBLE CONDUIT INSTALLATION

DETAIL C

Back view of sign

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (EXTINGUISHABLE MESSAGE SIGN ON A FULL CANTILEVER)

NO SCALE

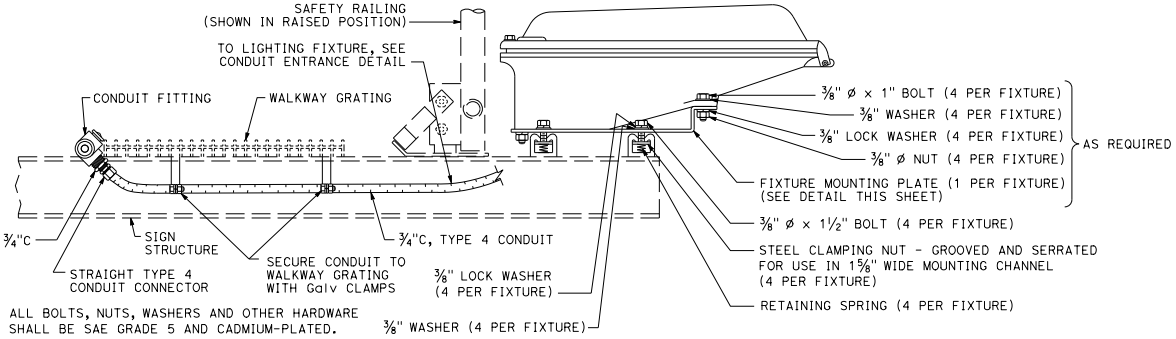
ES-14C

9-22-15

2018 STANDARD PLAN ES-14C

Return to Table of Contents

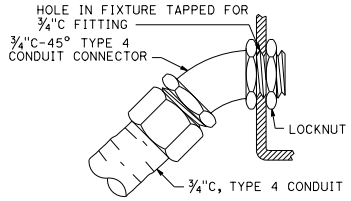
LENGTH OF PANEL	NUMBER OF FIXTURES (EACH)	FIXTURE SPACING SEE NOTES
5'-0"		2'-6"
6'-0"		3'-0"
7'-0"		3'-6"
8'-0"		4'-0"
9'-0"		4'-6"
10'-0"	1	5'-0"
11'-0"		5'-6"
12'-0"		6'-0"
13'-0"		6'-6"
14'-0"		7'-0"
15'-0"		7'-6"
16'-0"		8'-0"
17'-0"		4'-3":8'-6"
18'-0"		4'-6":9'-0"
19'-0"		4'-9":9'-6"
20'-0"		5'-0":10'-0"
21'-0"		5'-3":10'-6"
22'-0"		5'-6":11'-0"
23'-0"		5'-9":11'-6"
24'-0"	2	6'-0":12'-0"
25'-0"		6'-3":12'-6"
26'-0"		6'-6":13'-0"
27'-0"		6'-9":13'-6"
28'-0"		7'-0":14'-0"
29'-0"		7'-3":14'-6"
30'-0"		7'-6":15'-0"
31'-0"		7'-9":15'-6"
32'-0"		8'-0":16'-0"
33'-0"		5'-6":11'-0"
34'-0"		5'-8":11'-4"
35'-0"		5'-10":11'-8"
36'-0"		6'-0":12"-0"
37'-0"		6'-2":12'-4"
38'-0"		6'-4":12'-8"
39'-0"		6'-6":13'-0"
40'-0"	3	6'-8":13'-4"
41'-0"		6'-10":13'-8"
42'-0"		7'-0":14'-0"
43'-0"		7'-2":14'-4"
44'-0"		7'-4":14'-8"
45'-0"		7'-6":15'-0"
46'-0"		7'-8":15'-4"
47'-0"		7'-10":15'-8"
48'-0"		8'-0"-16'-0"
49'-0"		6'-1½":12'-3"
50'-0"		6'-3":12'-6"
51'-0"		6'-4½":12'-9"
52'-0"		6'-6":13'-0"
53'-0"		6'-7½":13'-3"
54'-0"		6'-9":13'-6"
55'-0"	4	6'-10½":13'-9"
56'-0"		7'-0":14'-0"
57'-0"		7'-1½":14'-3"
58'-0"		7'-3":14'-6"
59'-0"		7'-4½":14'-9"
60'-0"		7'-6":15'-0"
61'-0"		7'-7½":15'-3"
62'-0"		7'-9":15'-6"
63'-0"		7'-10½":15'-9"
64'-0"		8'-0":16'-0"



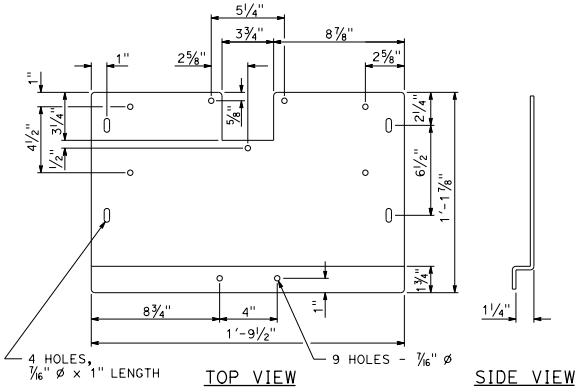
LIGHTING FIXTURE MOUNTING DETAIL (TYPICAL)

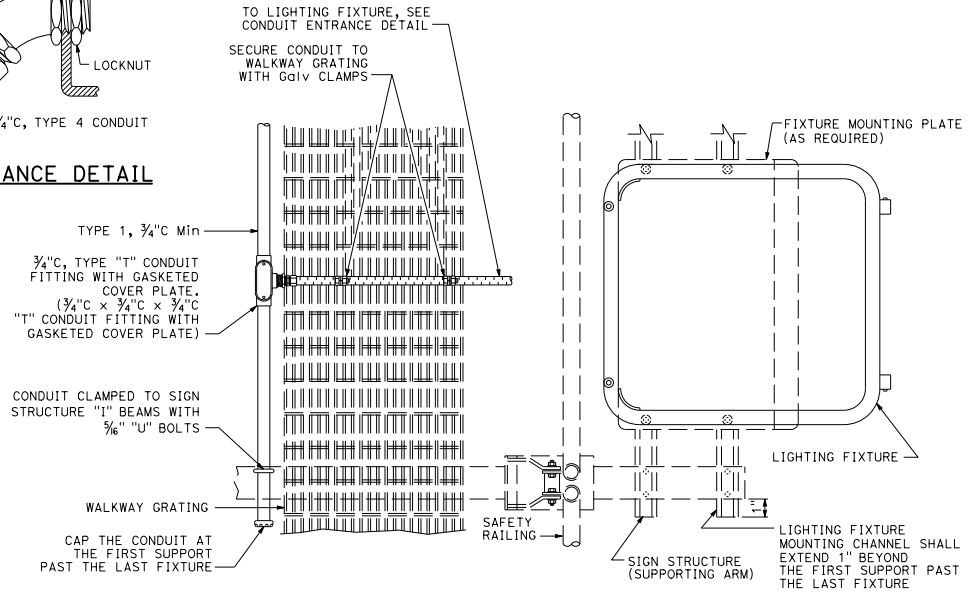
NOTES:

1. The first number listed is the dimension from the edge of the sign panel to the center of the end-most fixture. The second number listed is the dimension between centers of successive fixtures.
2. Where adjacent sign panels are spaced 1'-0" or less the combination of these panels (and spaces) shall be considered a single panel.
3. Physical configuration and mounting details may vary from what is shown.



CONDUIT ENTRANCE DETAIL





SIGN ILLUMINATION FIXTURE MOUNTING PLATE (TYPICAL)

NOTES:

1. Material: 0.135" hot-dip galvanized sheet steel after fabrication.
2. Left side is symmetrical with right side.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
Hamid Zolfaghari No. E15636 Exp.12-31-19 ELECTRICAL
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGN ILLUMINATION EQUIPMENT)

NO SCALE

ES-15A

1-26-18

2018 STANDARD PLAN ES-15A

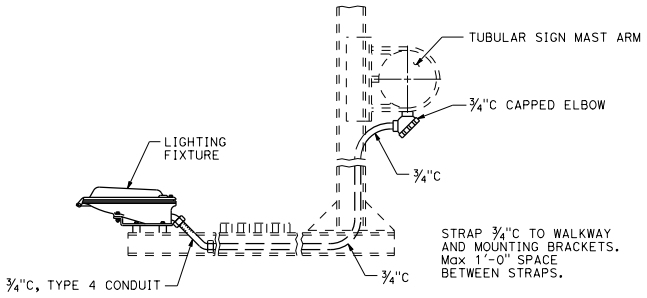
Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.J.
REGISTERED ELECTRICAL ENGINEER
May 31, 2018
PLANS APPROVAL DATE

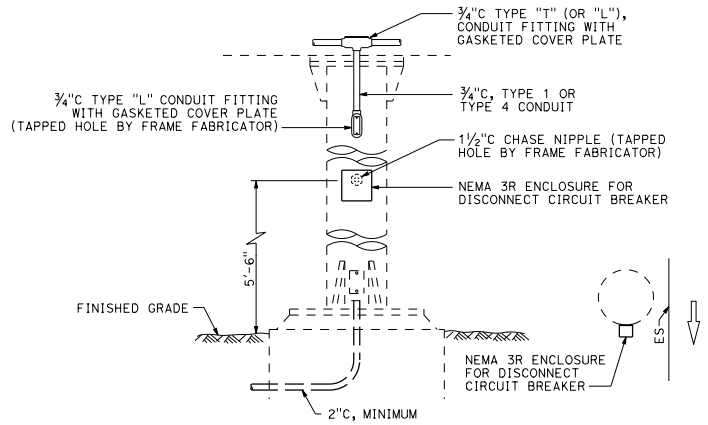
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS TUBULAR

DETAIL A

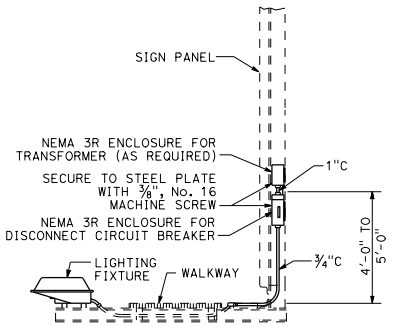


TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS ROUND POST

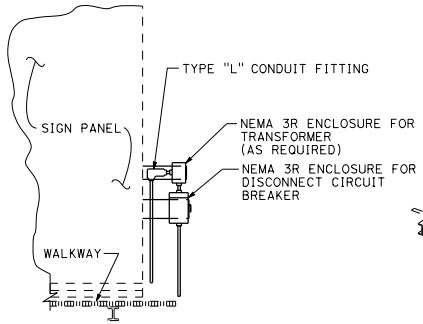
DETAIL B

NOTES:

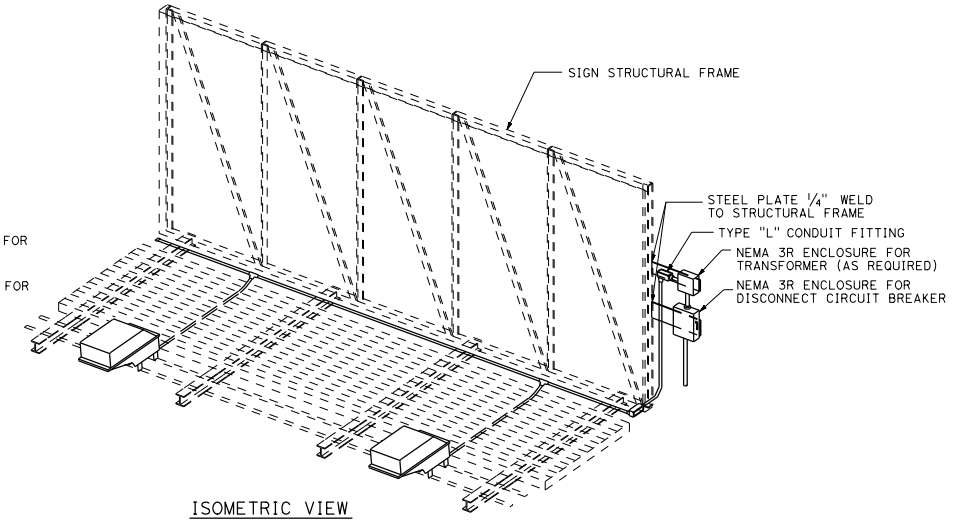
1. Type 4 conduit shall be secured to the nearest walkway bracket using one-hole galvanized malleable iron or steel straps and brass machine screws tapped into the bracket.
2. See Overhead Signs Standard Plans for overhead signs and frame juncture details for photoelectric unit installation.
3. Enclosures and straps shall be secured by ⅜" maximum size screws.
4. The Contactor and test switch enclosures shall be readily accessible from the sign walkway.



SIDE VIEW



FRONT VIEW



ISOMETRIC VIEW

TYPICAL SIGN ILLUMINATION EQUIPMENT INSTALLATION FOR OVERHEAD SIGNS BRIDGE MOUNTED

DETAIL C
See Note 4

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (SIGN ILLUMINATION EQUIPMENT)

NO SCALE

ES-15C

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H. R. J.
REGISTERED ELECTRICAL ENGINEER

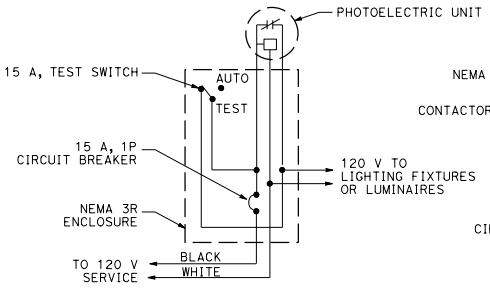
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

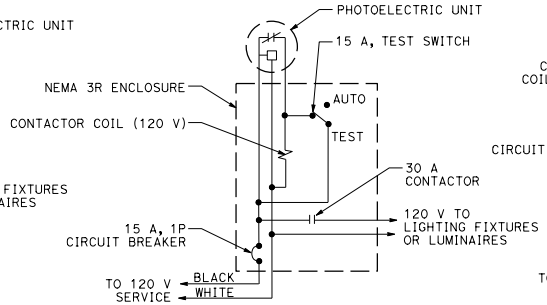
NOTE:

1. Type SC1A, SC2A, SC3A controls are similar to Types SC1, SC2 and SC controls respectively except test switch and wiring are not required.



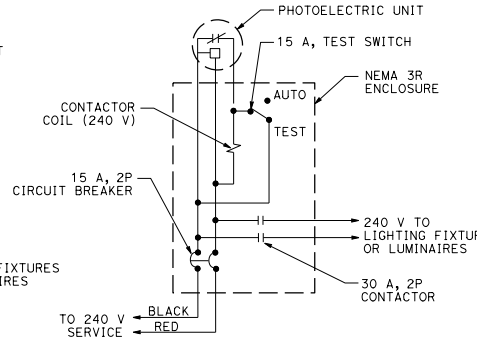
TYPE LC1 CONTROL

For 120 V unswitched circuit with no more than 1000 W load.



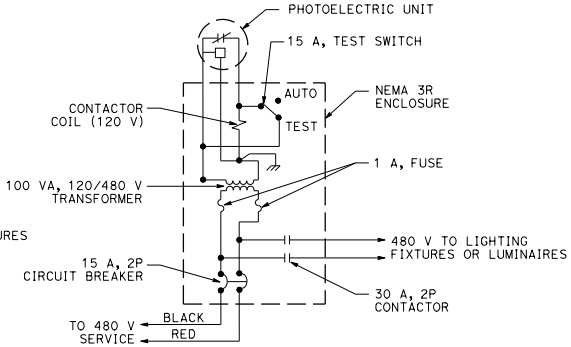
TYPE LC2 CONTROL

For 120 V unswitched circuit



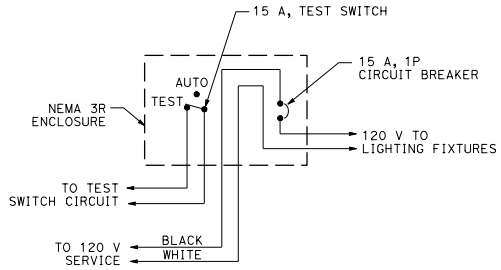
TYPE LC3 CONTROL

For 240 V unswitched circuits



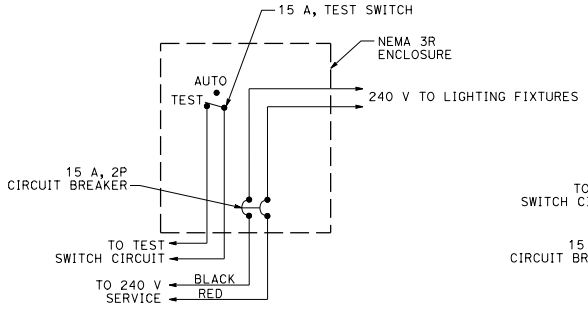
TYPE LC4 CONTROL

For 480 V unswitched circuits



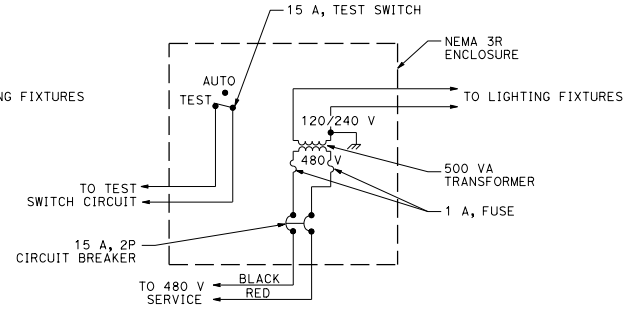
TYPE SC1 CONTROL

For 120 V switched circuit, see Note 1 for Type SC1A



TYPE SC2 CONTROL

For 240 V switched circuit, see Note 1 for Type SC2A



TYPE SC3 CONTROL

For 480 V switched sign circuit, see Note 1 for Type SC3A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (LIGHTING AND SIGN ILLUMINATION CONTROL)

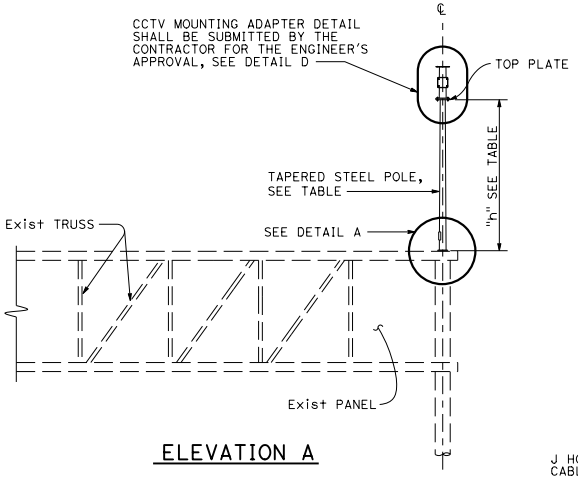
NO SCALE

ES-15D

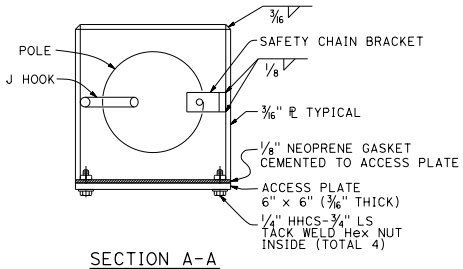
1-26-18

Return to Table of Contents

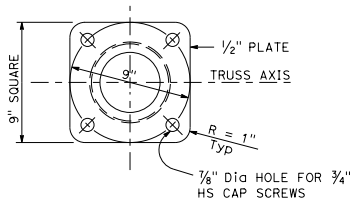
POLE EXTENSION TYPE	POLE DATA				HANDHOLE SIZE
	HEIGHT "h"	Min OD		THICKNESS	
		BASE	TOP		
CCTV 5	5′	4 3/16"	3 3/4"	0.1793"	3" x 5"
CCTV 10	10′	5 1/4"			
CCTV 15	15′	5 15/16"			



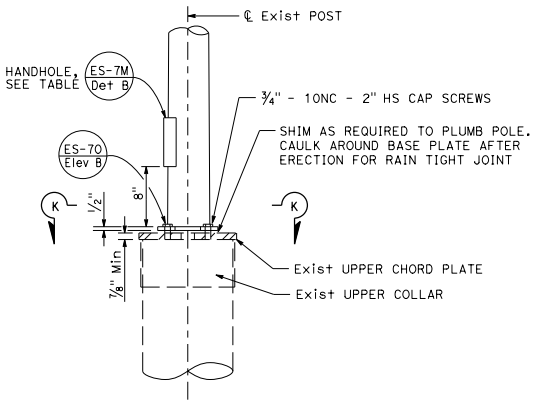
ELEVATION A



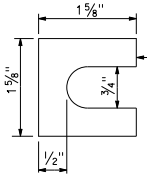
SECTION A-A



SECTION K-K



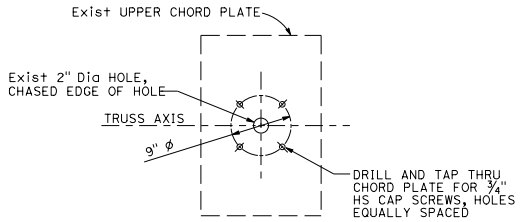
DETAIL A



FURNISH SHIMS 0.012" THICK AND 0.036" THICK. SHIM SHALL BE FABRICATED BRASS SHIM STOCK OR GALVANIZED STEEL

SHIM

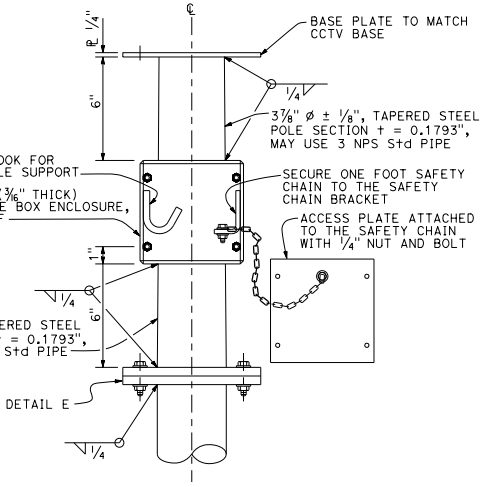
DETAIL B



UPPER CHORD PLATE

DETAIL C

See Note 3

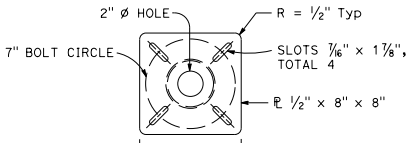


CLOSED CIRCUIT TELEVISION MOUNTING ADAPTER

DETAIL D

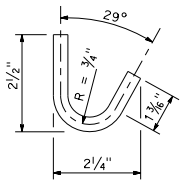
NOTES:

1. Verify controlling field dimensions before ordering or fabricating any material.
2. Bolt hole locations may vary at the discretion of the Engineer.
3. See Std Plan S13.
4. For wind loading see Standard Plan ES-7M.
5. Materials (Structural Steel):
   a. fy = 55,000 psi (tapered steel tube)
   b. fy = 50,000 psi (unless otherwise noted)



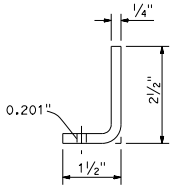
TOP PLATE

DETAIL E



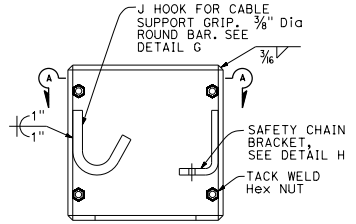
J HOOK

DETAIL G



SAFETY CHAIN BRACKET

DETAIL H



BOX ENCLOSURE

DETAIL F

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 5' TO 15' OVERHEAD SIGN MOUNTED POLE)

NO SCALE

ES-16A

1-26-18

Return to Table of Contents

POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH	
	HEIGHT "h"	Min OD		THICKNESS	"C"	THICKNESS	ANCHOR BOLT SIZE	BC = BOLT CIRCLE	Dia	"d"
		BASE	TOP							
CCTV 25	25′	7 3/8"	3 3/4"	0.1793"	1′-1"	1"	1 1/2" ø x 36"	11 1/2"	2′-6"	7′-0"
CCTV 30	30′	8"			1′-1 1/2"			1′-0"		7′-6"
CCTV 35	35′	8 5/8"			1′-2"			1′-1"		8′-0"
CCTV 40	40′	9 3/8"			1′-3"			1′-1 1/2"		8′-6"
CCTV 45	45′	10"						1′-2"		

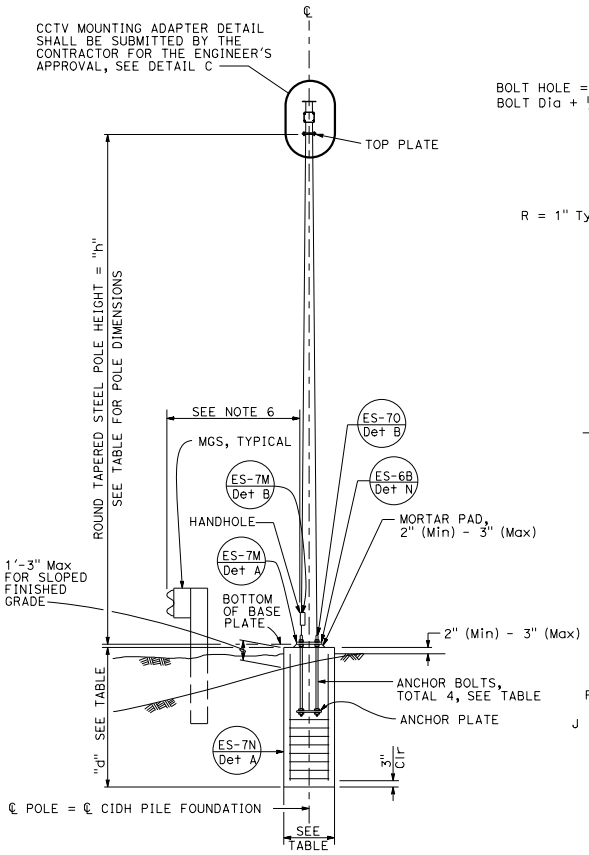
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

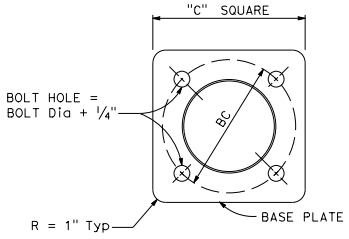
May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

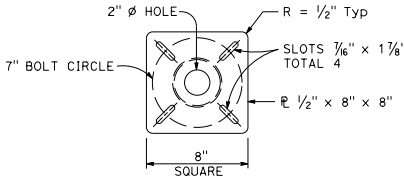


ELEVATION A



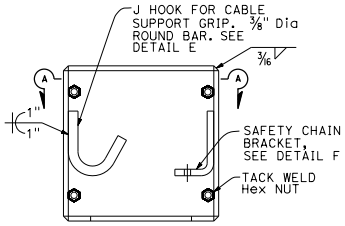
BASE PLATE

DETAIL A



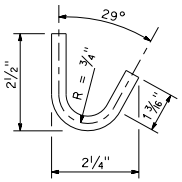
TOP PLATE

DETAIL B



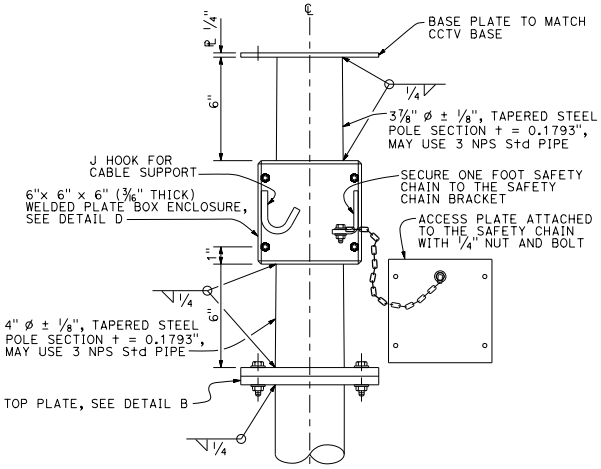
BOX ENCLOSURE

DETAIL D



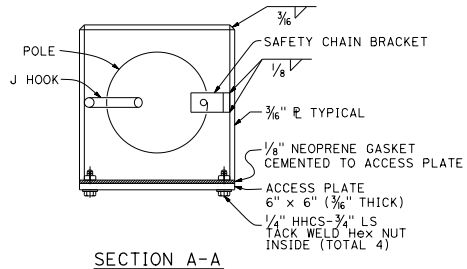
J HOOK

DETAIL E

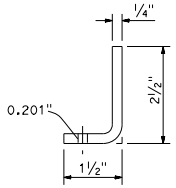


CLOSED CIRCUIT TELEVISION MOUNTING ADAPTER

DETAIL C



SECTION A-A



SAFETY CHAIN BRACKET

DETAIL F

NOTES:

1. Verify controlling field dimensions before ordering or fabricating any material.
2. During pole installation, the post shall be raked as necessary with the use of leveling nuts to provide a plumb pole axis.
3. For wind loading see Standard Plan ES-7M.
4. Materials (Structural Steel):
   a. fy = 55,000 psi (tapered steel tube and anchor bolts)
   b. fy = 50,000 psi (unless otherwise noted)
5. Materials (Reinforced Concrete):
   a. f′c = 3,625 psi
   b. fy = 60,000 psi
6. See A77R1 thru A77R8

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 25' TO 45' POLE)

NO SCALE

ES-16B

1-26-18

2018 STANDARD PLAN ES-16B

553

Return to Table of Contents

POLE TYPE	POLE DATA					BASE PLATE DATA					CIDH PILE DATA	
	HEIGHT "h"	Min OD		THICKNESS BOTTOM SEGMENT (Min 25' LONG)	Min THICKNESS UPPER SEGMENT(S)	Dia	THICKNESS	ANCHOR BOLT SIZE		BC = BOLT CIRCLE	"D"	"L"
		BASE	TOP					TOTAL	"d"			
HM CCTV 50	50'	18"	10⅞"	0.3125"	0.1875"	25"	2"	12	2¼"	20"	3'-6"	13'-0"
HM CCTV 60	60'		9½"									
HM CCTV 70	70'	22"	12"			30"	3"		3"	25"	4'-0"	14'-0"
HM CCTV 80	80'	22"	11⅝"	0.375"	0.25"	33"				27"	4'-6"	
HM CCTV 90	90'	25"	17⅛"			42"				37"	6'-0"	15'-0"

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

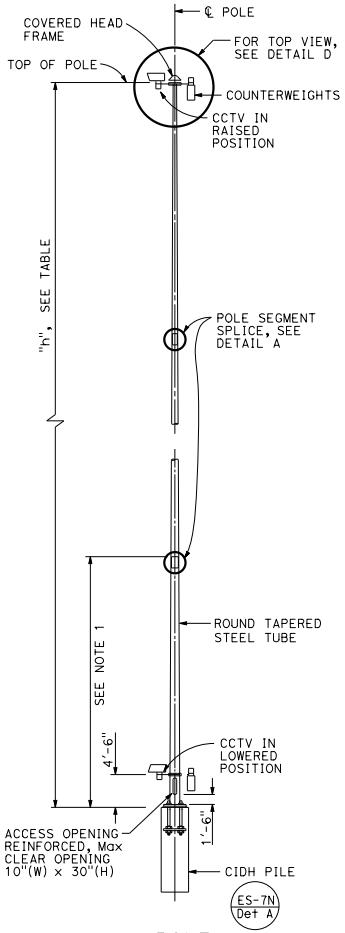
REGISTERED CIVIL ENGINEER

May 31, 2018

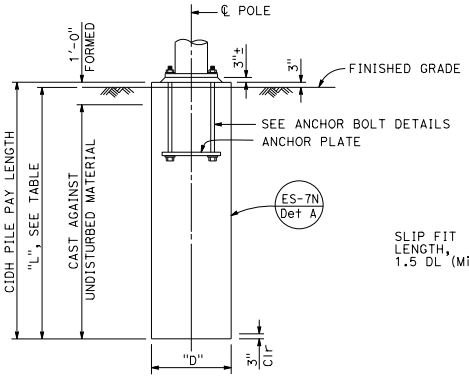
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

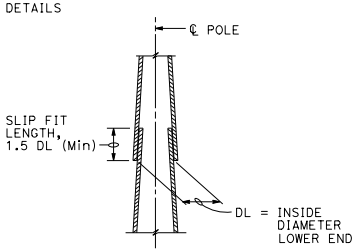
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



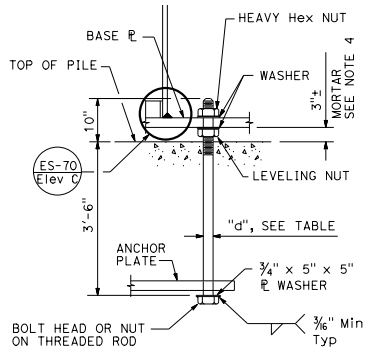
POLE
ELEVATION A



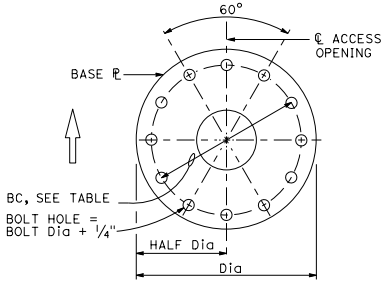
TYPICAL LOCATION
ELEVATION B



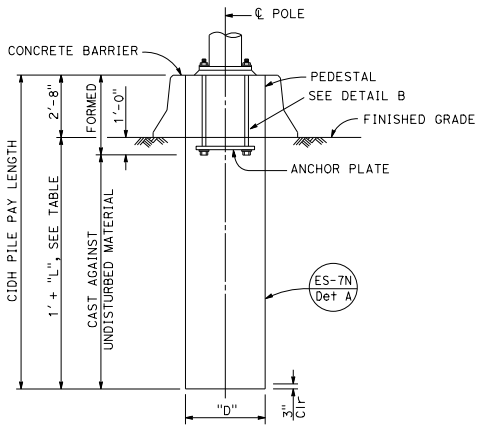
POLE SEGMENT SPLICE
DETAIL A



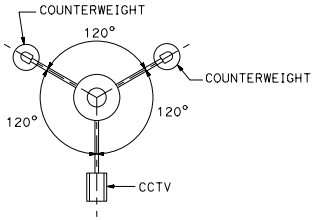
ANCHOR BOLT
DETAIL B



BASE PLATE
DETAIL C



MEDIAN LOCATION
ELEVATION C



TOP VIEW
DETAIL D

NOTES:

1. Pole details shall suit the lowering device and this foundation plan. Pole details shall be submitted to the Engineer for approval.
2. For closed circuit television details, see Electrical Plans.
3. Foundation design is based on a 3-second wind gust of 100 mph.
4. For central void and drain holes in mortar, see Standard Plan ES-6B detail N.
5. For wind loading see Standard Plan ES-7M.
6. Materials (Structural Steel):
   fy = 55,000 psi (tapered steel tube)
   fy = 50,000 psi (unless otherwise noted)
7. Access opening shall be located on the downstream side of traffic unless otherwise determined by the Engineer.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION, 50' TO 90' HIGH MAST POLE)

NO SCALE

ES-16C

1-26-18

2018 STANDARD PLAN ES-16C

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

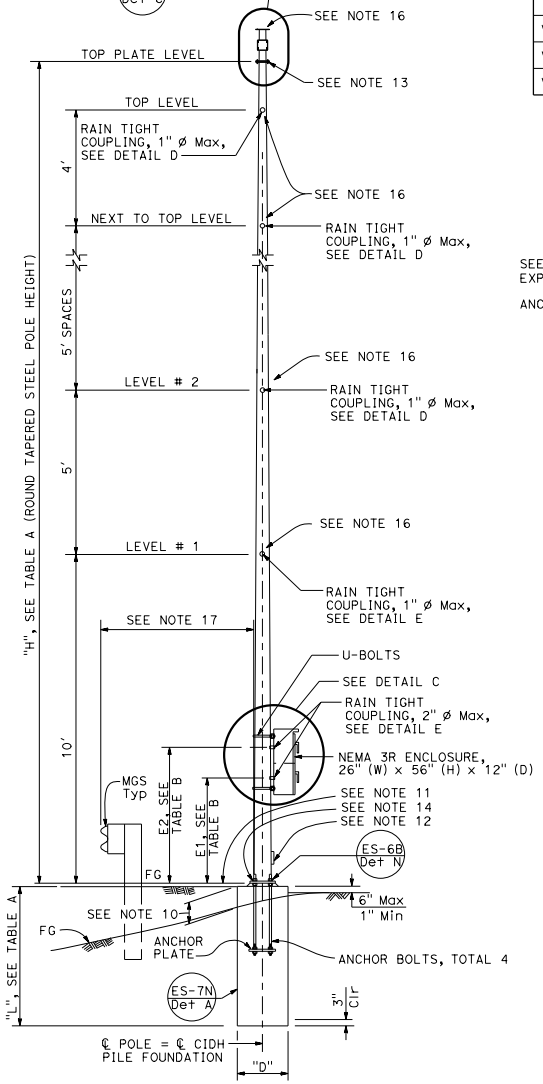
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WHEN CCTV IS REQUIRED, CCTV MOUNTING ADAPTER DETAIL SHALL BE SUBMITTED BY THE CONTRACTOR FOR THE ENGINEER'S APPROVAL, SEE ES-16B Det C



ELEVATION A

TABLE A

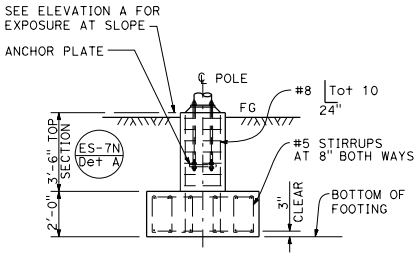
POLE TYPE	POLE DATA				BASE PLATE DATA				CIDH PILE DATA		
	HEIGHT "H"	Min OD BASE	Min OD TOP	THICKNESS	"C"	THICKNESS	ANCHOR BOLTS SIZE	BC = BOLT CIRCLE	"D"	"L" LEVEL GROUND	"L" UP TO 2:1
VDS 30	30'	8"	3 7/8"	0.1793"	1'-1 1/2"	1 1/2"	1 1/2" ø x 3'-0"	1'-0"	2'-6"	6'-0"	8'-0"
VDS 35	35'	8 3/4"	3 11/16"	0.1196"		2"				7'-0"	9'-0"
VDS 40	40'	12"	8 7/8"	0.1793"	1'-6"			1'-4"	3'-0"	9'-0"	11'-0"

TABLE B

POLE TYPE	COUPLING E1(Max)	COUPLING E2(Max)
VDS 30	3'-6"	4'-9"
VDS 35		
VDS 40		

TABLE C

SPREAD FOOTING		
GROUND	FOOTING SIZE (LENGTH x WIDTH x DEPTH)	REINFORCEMENT TOP & BOTTOM
LEVEL	8'-6" x 8'-6" x 2'-0"	12 - #5 EW
UP TO 2:1	10'-0" x 10'-0" x 2'-0"	15 - #5 EW

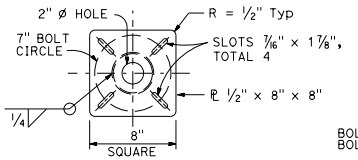


ALTERNATIVE FOOTING
ELEVATION B

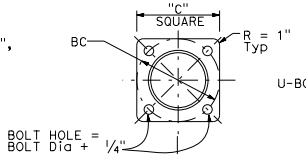
TABLE D - LIMITATION ON ATTACHMENTS *

LOCATION	MAXIMUM TOTAL EPA PER LEVEL (SQUARE FEET)	MAXIMUM TOTAL WEIGHT (lb)
LEVEL #1	14	200
LEVEL #2		
LEVEL #3	10 ***	
LEVEL #4 (VDS 35 AND VDS 40 ONLY)	2.5	50
LEVEL #5 (VDS 40 ONLY)		
NEXT TO TOP LEVEL		
TOP LEVEL		
ON TOP PLATE LEVEL **		

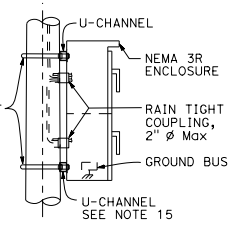
* MAXIMUM HORIZONTAL EXTENT BEYOND POLE FACE IS 4 FEET.
** MAXIMUM EXTENT ABOVE TOP PLATE IS 3 FEET.
*** 14 IF LEVEL #1 IS ZERO.



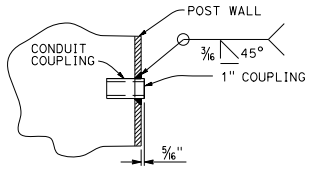
TOP PLATE
DETAIL A



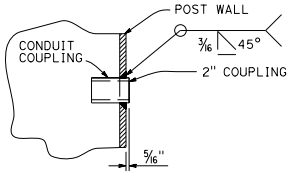
BASE PLATE
DETAIL B



DETAIL C



1" COUPLING
DETAIL D



2" COUPLING
DETAIL E

NOTES:

1. All steel shall be galvanized after fabrication.
2. The foundation shall be treated as level ground condition if the slope inclination is flatter than 4 : 1 (Horizontal : Vertical)
3. For devices mounted and mounting heights, see TABLE B.
4. For wind loading see Standard Plan ES-7M.
5. Materials (Structural Steel):
   a. fy = 55,000 psi (tapered steel tube)
   b. fy = 50,000 psi (unless otherwise noted)
6. Anchor bolts: fy = 55,000 psi
7. Materials (Reinforced Concrete):
   a. f'c = 3,600 psi
   b. fy = 60,000 psi
8. Verify all controlling field dimension before ordering of fabricating any material.
9. When no barriers are used, the NEMA 3R enclosure shall be located on the downstream side and perpendicular to the roadway.

   1'-3" (Max) for sloped finished grade.
11. Bottom of base plate.
12. Handhole. ES-7M Det B / ES-7M Det A
13. Top plate.
    Install a blank flange on the top plate when closed circuit television is not used.
14. ES-7O Elev B
15. U-channel with bracket.
16. Use the manufacturer's Effective Projected Area (EPA) for attachments. Assign attachments to nearest level and sum each level, see Table D for limitations.
17. See A77R1 thru A77R8

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ELECTRICAL SYSTEMS (CLOSED CIRCUIT TELEVISION WITH VEHICLE DETECTION SYSTEM, 30' TO 40' POLE)

NO SCALE

ES-16D

2018 STANDARD PLAN ES-16D

1-26-18

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

H.R.Z
REGISTERED ELECTRICAL ENGINEER

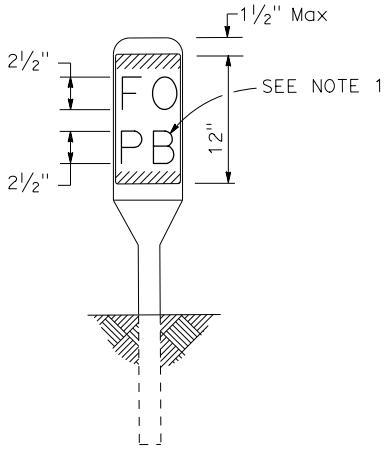
REGISTERED PROFESSIONAL ENGINEER
Hamid Zolfaghari
No. E15636
Exp. 12-31-19
ELECTRICAL
STATE OF CALIFORNIA

May 31, 2018
PLANS APPROVAL DATE

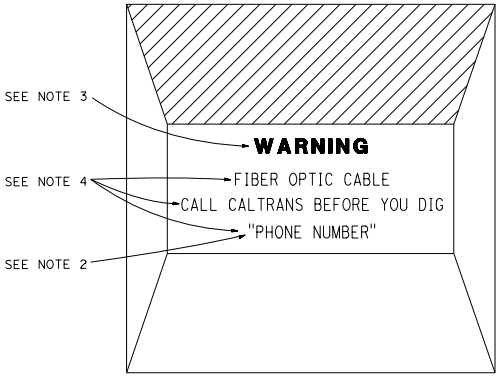
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

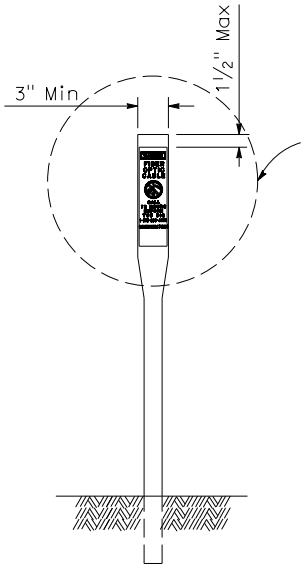
1. "PB" for Pull Box or "VT" for Vault.
2. Phone number as specified.
3. ⅜" black text.
4. ¼" black text.
5. 1" black text.
6. ½" black text



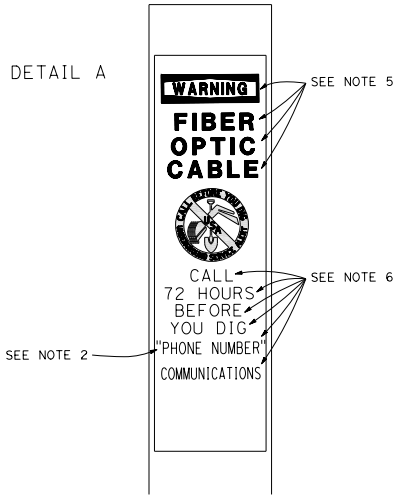
FIBER OPTIC MARKER
FOR VAULTS AND PULL BOXES



FIBER OPTIC MARKER
FOR PAVED AREAS



FIBER OPTIC MARKER
FOR UNPAVED AREAS



DETAIL A

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

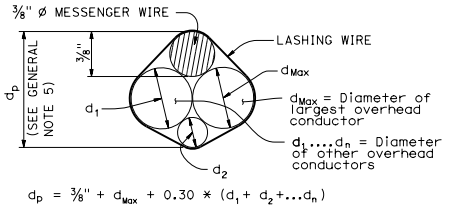
ELECTRICAL SYSTEMS
(FIBER OPTIC MARKER DETAILS)

NO SCALE

ES-17A

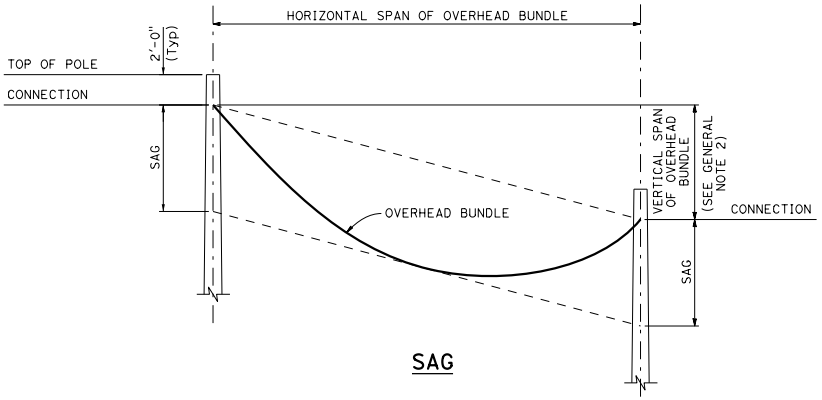
1-26-18

Return to Table of Contents



$d_p = 3/8" + d_{Max} + 0.30 * (d_1 + d_2 + ... d_n)$

PROJECTED DEPTH OF OVERHEAD BUNDLE, (d_p)



SAG

Design: AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Fifth Edition (LTS-5).

GROUP LOAD COMBINATIONS:

I Dead Load
II Dead Load + Wind Load
III Dead Load + 0.5 (Wind Load) + Ice Load
IV Fatigue: Not used

LOADING:

Wind Loading: 100 mph (3-second gust)
Wind Recurrence Interval: 10 years
Combined height, exposure, and elevated terrain factor = 1.05 (Exposure C, structure is not located on or over the top half of a ridge, hill, or escarpment)

Ice Loading: 3.0 psf on surfaces, 0.60 in radial thickness of ice at a unit weight of 60 pcf on overhead bundles

BASIC DESIGN VALUES:

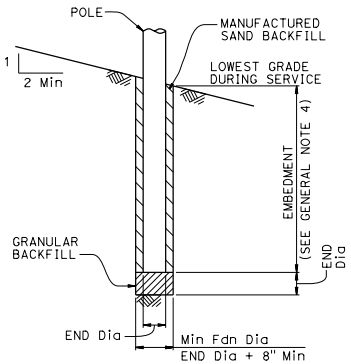
Timber Poles: Fb = 1850 psi
Fv = 110 psi
Fcp = 230 psi
Fc = 950 psi
E = 1500 x 10^3 psi

DESIGN WIRE BREAKING STRENGTHS:

ASTM A475, Utilities Grade, 7 strand modified by termination efficiency factor of 0.8

FOUNDATION DESIGN NOTES:

1. Pole embedment depth design is based on Broms' approximate procedure as described in Article 13.6 of AASHTO LTS-5.
2. Embedment depth is calculated based on following soil parameters,
   Cohesive Soil:
   Shear strength of soil c = 1500 psf.
   Cohesionless Soil:
   Ø = 30 deg, γ = 120 pcf.
   Soil assumed to be unsaturated.
3. An overload factor of 2.0 and an undercapacity factor of 0.7 were used for safety factor of 2.86.
4. Allowable vertical bearing pressure at the end bearing of poles is 3000 psf at 6 feet or more embedment.
5. Guy wire anchor minimum allowable tension capacity, "Qa" = 8,900 lbs.



POLE FOUNDATION

GENERAL NOTES:

1. The messenger wire and any combination of overhead conductors must not exceed either a self weight of 3.0 lb/ft or the maximum d in the pole selection tables.
2. The maximum vertical span is 10% of the horizontal span.
3. For poles with adjacent unbalanced horizontal spans, the shortest horizontal span must be at least 50% of the largest horizontal span.
4. Add 2'-0" for slopes above 1V:4H.
5. For a pole supporting multiple spans, calculate d_p for each span and use the largest value.
6. Do not exceed the attachments shown.

DIAMETERS AND SELF WEIGHT OF OVERHEAD CONDUCTORS

CONDUCTOR OR CABLE TYPE	DIAMETER d (in)	WEIGHT w (plf)
3 CONDUCTOR SIGNAL CABLE (3CSC)	0.400	0.0980
5 CONDUCTOR SIGNAL CABLE (5CSC)	0.500	0.1560
9 CONDUCTOR SIGNAL CABLE (9CSC)	0.650	0.2760
12 CONDUCTOR SIGNAL CABLE (12CSC)	0.800	0.3970
28 CONDUCTOR SIGNAL CABLE (28CSC)	0.900	0.6490
1-#14	0.166	0.0235
1-#12	0.185	0.0330
1-#10	0.210	0.0476
1-#8	0.271	0.0774
1-#6	0.310	0.1130
1-#4	0.359	0.1690
1-#3	0.388	0.2080
1-#2	0.420	0.2560
1-#1	0.498	0.3340
6-CONDUCTOR SIGNAL INTERCONNECT CABLE (SIC)	0.350	0.0860
12-CONDUCTOR SIGNAL INTERCONNECT CABLE (SIC)	0.500	0.1440
DETECTOR LEAD-IN CABLE (DLC)	0.310	0.0440
12 to 48-STRAND FIBER OPTIC CABLE (48FOC)	0.424	0.0600
72-STRAND FIBER OPTIC CABLE (72FOC)	0.484	0.0770
96-STRAND FIBER OPTIC CABLE (96FOC)	0.535	0.1050
144-STRAND FIBER OPTIC CABLE (144FOC)	0.670	0.1890
3/8" Ø MESSENGER WIRE	0.375	0.2730

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES GENERAL NOTES

NO SCALE

ES-18A

1-26-18

2018 STANDARD PLAN ES-18A

Return to Table of Contents

POLE SELECTION TABLE

LEGEND

- Wood Pole No Attachments
- A — Wood Pole with Attachments
- —OH— Overhead Bundle

OVERHEAD BUNDLE HORIZONTAL SPAN (Max)			CASE 1N				CASE 2N				CASE 3N				CASE 4N				CASE 5N
		MAXIMUM d_p	1"	1.5"	2.0"	2.5"	1"	1.5"	2.0"	2.5"	1.0"	1.5"	2.0"	2.5"	1"	1.5"	2.0"	2.5"	N/A
	50′	MINIMUM POLE CLASS	H-1	H-2	H-2	H-2	4	3	2	1	H-2	H-2	H-3	H-3	H-4	H-4	H-4	H-5	
		POLE EMBEDMENT (E)	11′				10′				11′				12′				
	100′	MINIMUM POLE CLASS	H-2	H-3	H-4	H-5	1	H-1	H-2	H-3	H-4	H-5	H-5	H-6	H-5	H-5	H-6		CLASS 1 E = 10′
		POLE EMBEDMENT (E)	12′				11′				12′				12′				
	150′	MINIMUM POLE CLASS	H-4	H-5	H-6		H-1	H-2	H-3	H-5	H-6				H-6				
		POLE EMBEDMENT (E)	12′				12′				12′				12′				
	200′	MINIMUM POLE CLASS	H-5	H-6			H-2	H-3	H-5										
		POLE EMBEDMENT (E)	12′				12′												

1. CCTV camera assembly or vehicle detection system
2. Overhead bundle consisting of a ⅜" ø messenger wire, overhead conductors, and lashing wire
3. Luminaire with mast arm
4. Pedestrian push button assembly or accessible push button assembly
5. Signal face with 3 indications or single sheet sign panel (10 SQFT Max)
6. Riser with weather head as required
7. Pull box as required
8. Grounding as required
9. Single flashing beacon or single sheet sign panel (4 SQFT Max)
10. Single sheet sign panel (4′ x 4′ Max) or signal face with 3 indications
11. Flashing beacon control assembly
12. NEMA 3R enclosure, 26"(W) x 56"(H) x 12"(D) Max dimensions. Max weight including batteries, 450 lbs
13. 25′ SQFT Max total photovoltaic panels mounted as shown as required
14. 2-12" flashing beacons

NOTES:

1. In addition to other restrictions on maximum horizontal span, this horizontal span must not exceed 100′.
2. Cases 1N, 3N and 4N may substitute the attachments shown in Case 5N if the photovoltaic panel is not included.
3. For Case 1N without an overhead bundle (item ②) use minimum pole class H-1 with E=11′.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

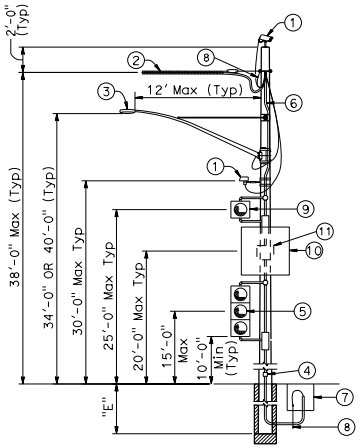
REGISTERED CIVIL ENGINEER

May 31, 2018

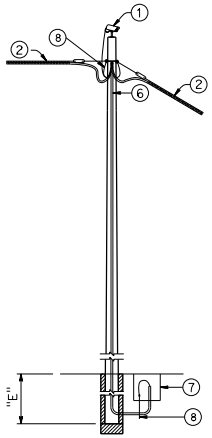
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

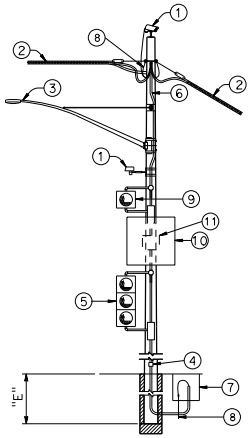
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



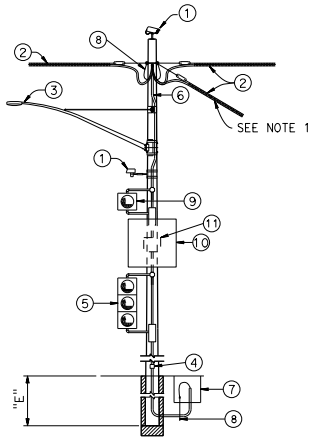
CASE 1N
POLE AT DEAD END WITH ATTACHMENTS
See Note 2



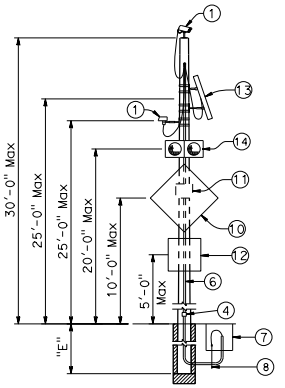
CASE 2N
POLE AT TANGENT WITHOUT ATTACHMENTS



CASE 3N
POLE AT TANGENT OR CORNER WITH ATTACHMENTS
See Note 2



CASE 4N
POLE AT JUNCTION WITH ATTACHMENTS
See Note 2



CASE 5N
POLE WITHOUT OVERHEAD BUNDLE WITH ATTACHMENTS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES
NON-GUYED - NO SIGNALS ON SPANS

NO SCALE

ES-18B

1-26-18

2018 STANDARD PLAN ES-18B

Return to Table of Contents

POLE SELECTION TABLE

LEGEND

A — Wood Pole with Attachments

—OH— Overhead Bundle

Guy Anchor

OVERHEAD BUNDLE HORIZONTAL SPAN (Max)		MAXIMUM d_p	CASE 1G 1"	1.5"	2.0"	2.5"	CASE 2G 1"	1.5"	2.0"	2.5"	CASE 3G 1"	1.5"	2.0"	2.5"	CASE 4G 1"	1.5"	2.0"	2.5"
	50′	MINIMUM POLE CLASS	H-1	H-1	H-2	H-2	1	1	1	1	1	1	1	H-1	H-2	H-2	H-3	H-3
		POLE EMBEDMENT (E)	10′				9′				9′				11′			
	100′	MINIMUM POLE CLASS	H-2	H-2	H-3	H-4	1	H-1	H-1	H-1	1	H-1	H-2	H-2	H-3	H-3	H-4	H-4
		POLE EMBEDMENT (E)	11′				9′				9′				12′			
	150′	MINIMUM POLE CLASS	H-3	H-3	H-4	H-5	H-1	H-1	H-2	H-2	H-2	H-3	H-3	H-3	H-4	H-5	H-5	H-6
		POLE EMBEDMENT (E)	11′				9′				9′				12′			
	200′	MINIMUM POLE CLASS	H-4	H-4	H-5	H-6	H-1	H-2	H-3	H-3	H-3	H-3	H-4	H-4	H-5	H-6		
		POLE EMBEDMENT (E)	11′				9′				9′				12′			

1. CCTV camera assembly or vehicle detection system
2. Overhead bundle consisting of a ⅜" ø messenger wire, overhead conductors, and lashing wire
3. Luminaire with mast arm
4. Pedestrian push button assembly or accessible push button assembly
5. Signal face with 3 indications or single sheet sign panel (10 SQFT Max)
6. Riser with weather head as required
7. Pull box as required
8. Grounding as required
9. Single flashing beacon or single sheet sign panel (4 SQFT Max)
10. Single sheet sign panel (4′ x 4′ Max) or signal face with 3 indications
11. Flashing beacon control assembly
12. ½" ø guy wire with white guy marker and strain insulator (for anchorage see "TEMPORARY WOOD POLES-DETAILS No. 2" sheet)

NOTES:

1. In addition to other restrictions on maximum horizontal span, this horizontal span must not exceed 100′.
2. Guy wire in line with opposing span ± 5°.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

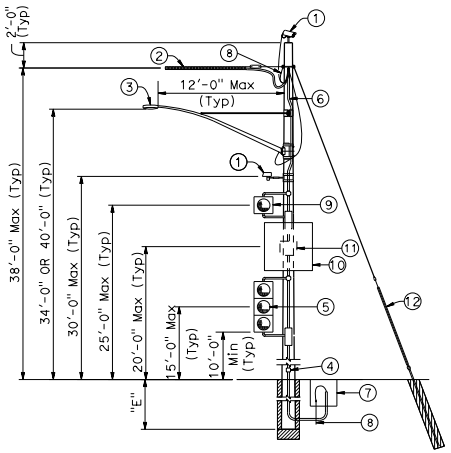
REGISTERED CIVIL ENGINEER

May 31, 2018

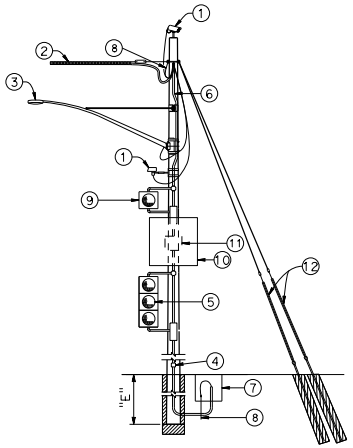
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 CIVIL — STATE OF CALIFORNIA

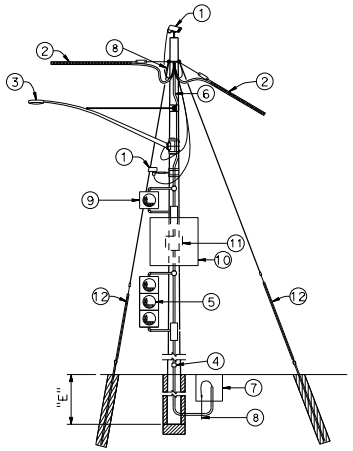
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



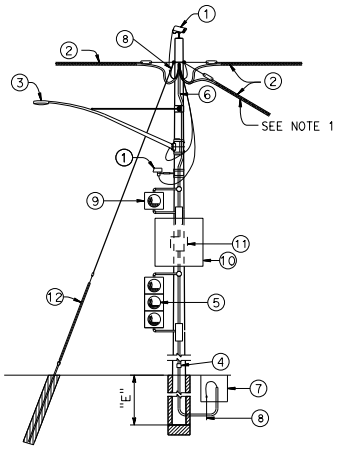
CASE 1G
POLE AT DEAD END
WITH ATTACHMENTS



CASE 2G
POLE AT DEAD END
WITH ATTACHMENTS



CASE 3G
POLE AT CORNER
WITH ATTACHMENTS



CASE 4G
POLE AT JUNCTION
WITH ATTACHMENTS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES GUYED - NO SIGNALS ON SPANS

NO SCALE

ES-18C

1-26-18

2018 STANDARD PLAN ES-18C

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

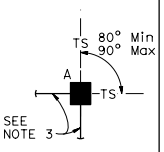
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND

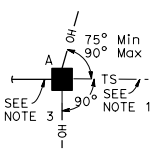
- A — Wood Pole with Attachments
- —TS— Overhead Bundle with Signal Faces (See Note 2)
- —OH— Overhead Bundle
- Guy Anchor

POLE SELECTION TABLE

CASE 1GT



CASE 2GT

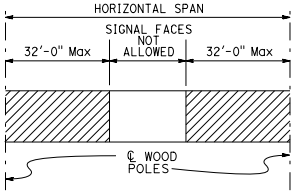


CASE 3GT

		MAXIMUM d_P	CASE 1GT 1"	CASE 1GT 1.5"	CASE 1GT 2.0"	CASE 2GT 1"	CASE 2GT 1.5"	CASE 2GT 2.0"	CASE 3GT 1"	CASE 3GT 1.5"	CASE 3GT 2.0"
OVERHEAD BUNDLE HORIZONTAL SPAN Max	50'	MINIMUM POLE CLASS	H-2	H-3	H-3	H-2	H-2	H-2	H-3	H-4	H-4
		POLE EMBEDMENT (E)	10'			10'			11'		
	100'	MINIMUM POLE CLASS	H-3	H-3	H-4	H-2	H-3	H-3	H-4	H-4	H-5
		POLE EMBEDMENT (E)	11'			10'			11'		
	150'	MINIMUM POLE CLASS	H-3	H-4	H-4	H-2	H-3	H-4	H-4	H-5	H-5
		POLE EMBEDMENT (E)	11'			10'			11'		

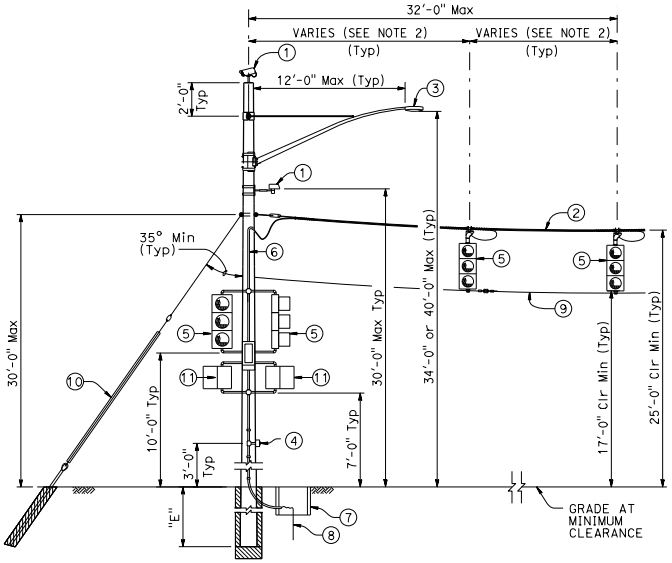
NOTES:

1. In addition to other restrictions on maximum horizontal span, this horizontal span must not exceed 100'.
2. Maximum of 2 SIGNAL FACES per span within the hatched regions indicated by "LOCATION OF SIGNAL FACES".
3. Guy wire in line with opposing span ± 5°.

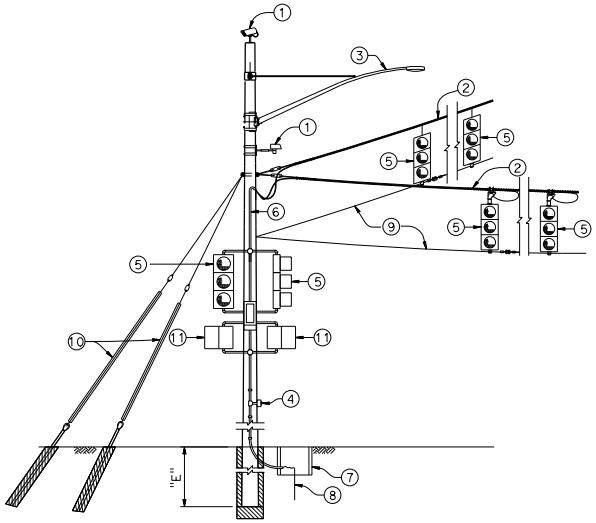


LOCATION OF SIGNAL FACES

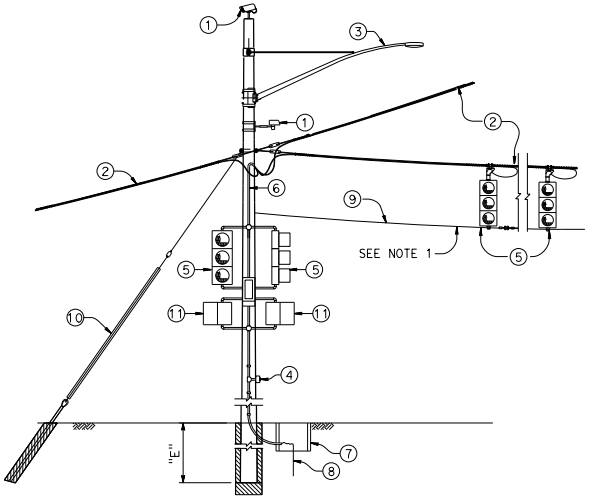
1. CCTV camera assembly or vehicle detection system
2. Overhead bundle consisting of ⅜" ø messenger wire and overhead conductors and lashing wire
3. Luminaire with mast arm
4. Pedestrian push button assembly or accessible push button assembly
5. Signal face with 3 indications or single sheet sign panel (10 SQFT Max)
6. Riser with weather head as required
7. Pull box as required
8. Grounding as required
9. ⅜" ø tether wire
10. ½" ø guy wire with white guy marker and strain insulator. For anchorage see "TEMPORARY WOOD POLES-DETAILS No. 2" sheet
11. Pedestrian signal head



CASE 1GT
POLE AT DEAD END WITH ATTACHMENTS



CASE 2GT
POLE AT CORNER WITH ATTACHMENTS



CASE 3GT
POLE AT JUNCTION WITH ATTACHMENTS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES GUYED - WITH SIGNAL FACES ON SPANS

NO SCALE

ES-18D

1-26-18

2018 STANDARD PLAN ES-18D

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

May 31, 2018

PLANS APPROVAL DATE

Stanley P. Johnson No. C57793 Exp. 3-31-20 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND

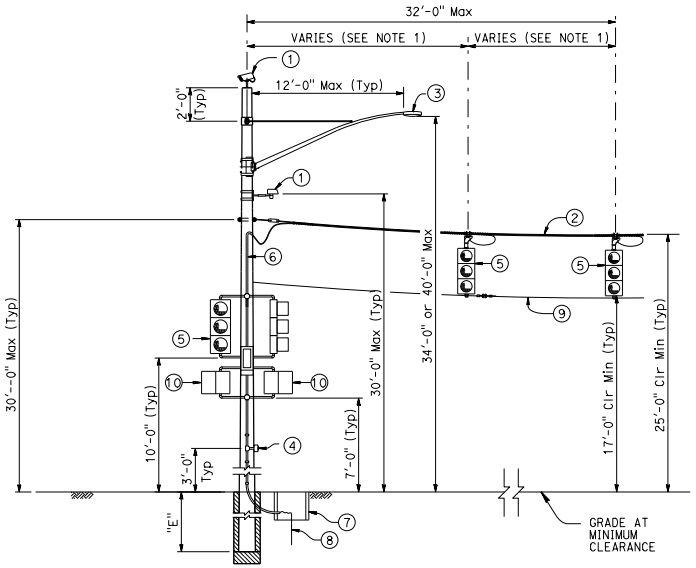
A — Wood Pole with Attachments

— TS — Overhead Bundle with Signal Faces (See Note 1)

POLE SELECTION TABLE

OVERHEAD BUNDLE HORIZONTAL SPAN (Max)			A — TS — CASE 1NT		
75′		MAXIMUM d_p	1"	1.5"	2.0"
		MINIMUM POLE CLASS	H-5	H-6	H-6
		POLE EMBEDMENT (E)	13′		

1. CCTV camera assembly or vehicle detection system
2. Overhead bundle consisting of a ⅜" ø messenger wire and overhead conductors and lashing wire
3. Luminaire with mast arm
4. Pedestrian push button assembly or accessible push button assembly
5. Signal face with 3 indications or single sheet sign panel (10 SQFT Max)
6. Riser with weather head as required
7. Pull box as required
8. Grounding as required
9. ⅜" ø tether wire
10. Pedestrian signal head

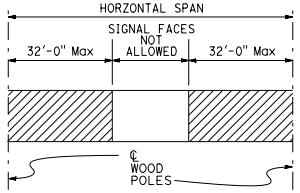


CASE 1NT

POLE AT DEAD END WITH ATTACHMENTS

NOTE:

1. Maximum of 2 SIGNAL FACES per span within the hatched regions indicated by "LOCATION OF SIGNAL FACES".



LOCATION OF SIGNAL FACES

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES NON-GUYED-WITH SIGNAL FACES ON SPAN

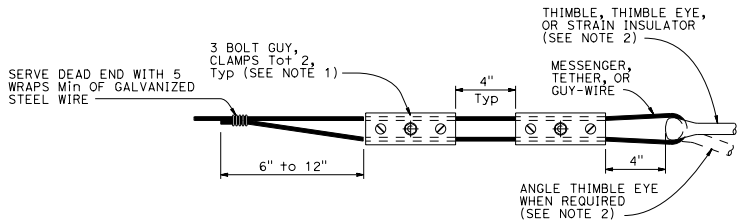
NO SCALE

ES-18E

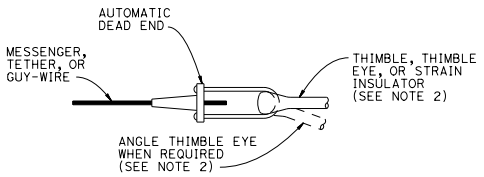
1-26-18

2018 STANDARD PLAN ES-18E

Return to Table of Contents



ALTERNATIVE TERMINATION OF MESSENGER WIRES USING GUY CLAMPS



TERMINATION OF WIRES USING AUTOMATIC DEAD END

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

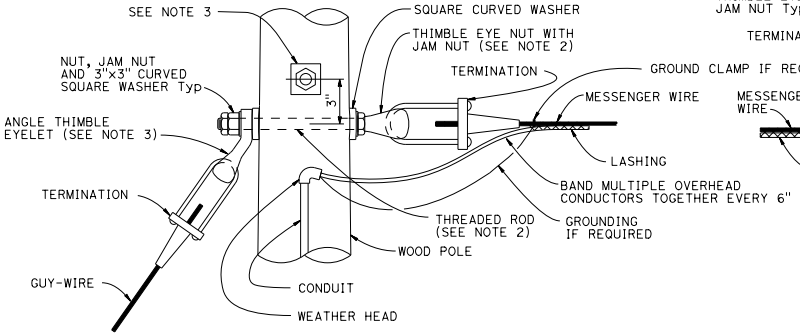
REGISTERED CIVIL ENGINEER

May 31, 2018

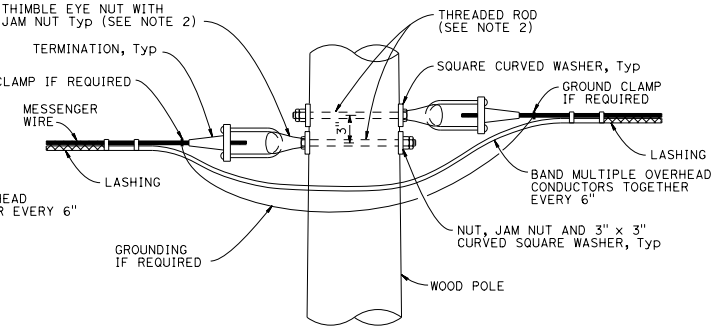
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

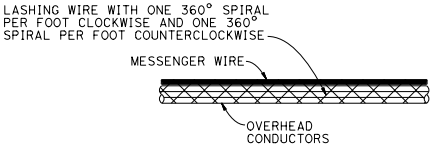
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



POLE AT DEAD END WITH GUY-WIRE CONNECTION

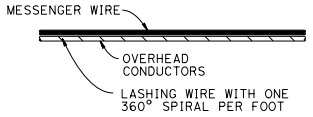


POLE AT TANGENT OR CORNER CONNECTION



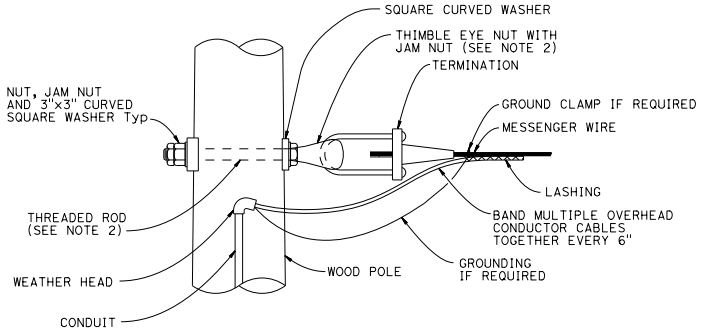
DOUBLE LASHING DETAIL

USE IF d_p IS GREATER THAN 1½"

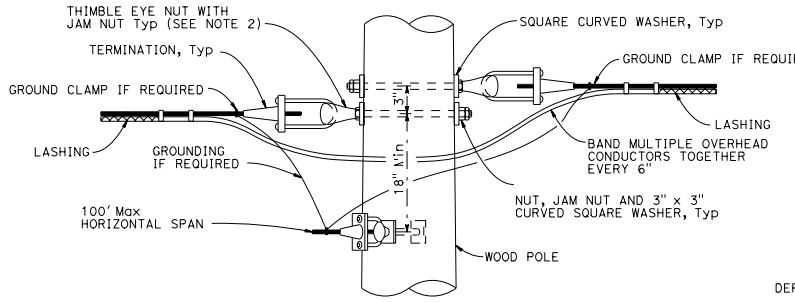


TYPICAL LASHING DETAIL

USE IF d_p IS 1½" OR LESS



POLE AT DEAD END CONNECTION



POLE AT JUNCTION CONNECTION

NOTES:

1. For guy wires use 3 clamps.
2. Use ⅝" ø except ¾" ø at guyed wires
3. Install additional angle thimble eyelet at poles with two guy wires.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES DETAILS No. 1

NO SCALE

ES-19A

1-26-18

2018 STANDARD PLAN ES-19A

Return to Table of Contents

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

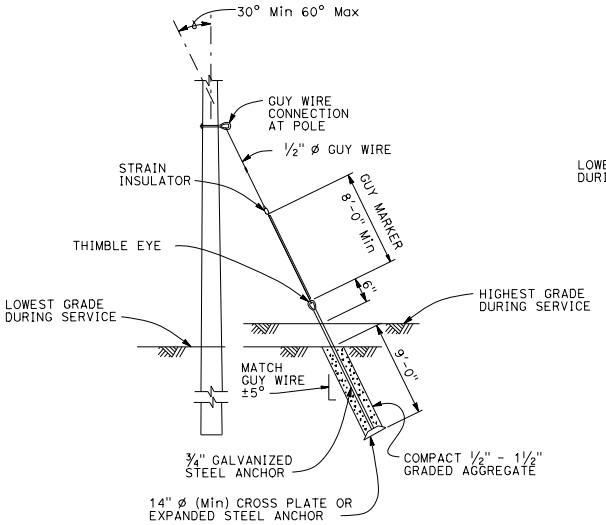
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

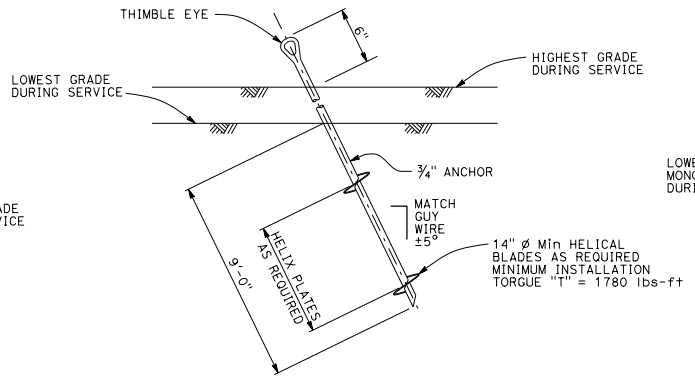
1. For minimum allowable tension capacity of anchors see "Temporary Wood Poles - General Notes" sheet.



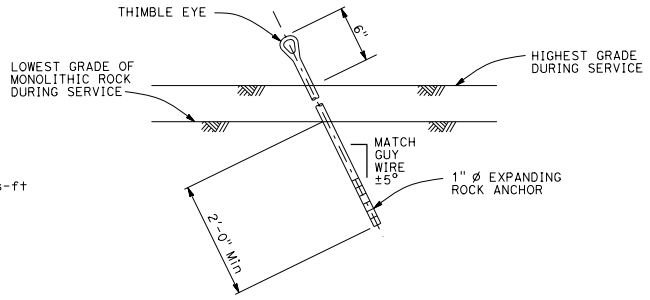
NOTE:

Helical anchor detail may be used in place of expanded steel anchors.

EXPANDED STEEL ANCHOR DETAIL



HELICAL ANCHOR DETAIL



EXPANDING ROCK ANCHOR DETAIL

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

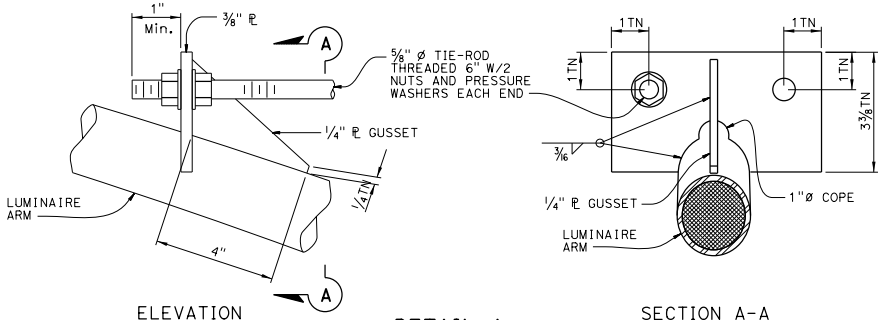
TEMPORARY WOOD POLES DETAILS No. 2

NO SCALE

ES-19B

1-26-18

Return to Table of Contents



DETAIL A
TIE-ROD AT LUMINAIRE ARM

NOTES:

1. Luminaire mast arms must be in compliance with Standard Plan ES-6D with noted modifications.
2. Verify pole dimensions at tie-rod attachment height. Fabricate 8" flat bar with "L" Dimension to maintain an open gap between flanges in finished installation.
3. Not all screw heads and bolt heads are shown for clarity.
4. Mast arm not shown for clarity.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

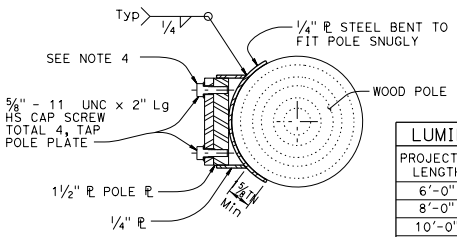
REGISTERED CIVIL ENGINEER

May 31, 2018
PLANS APPROVAL DATE

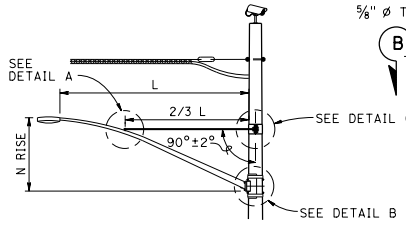
REGISTERED PROFESSIONAL ENGINEER — Stanley P. Johnson — No. C57793 — Exp. 3-31-20 — CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

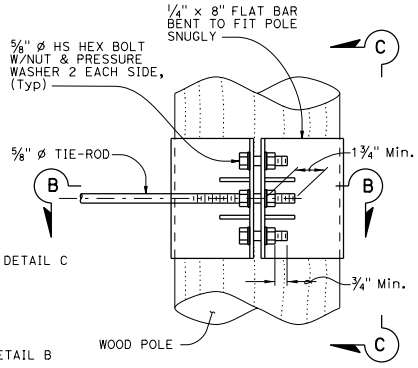
NOTE:
Not all screw and bolt heads shown for clarity.



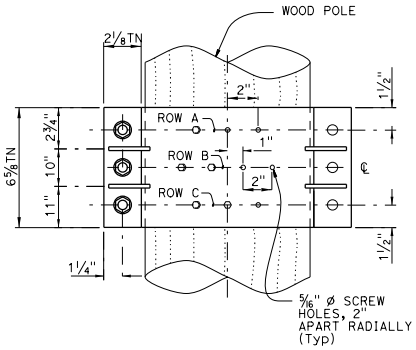
LUMINAIRE MAST ARM DATA			
PROJECTED LENGTH	N RISE	Min OD AT POLE	NOMINAL THICKNESS
6'-0"	2'-0"±	3 1/4"	0.1196"
8'-0"	2'-6"±	3 1/2"	
10'-0"	3'-3"±	3 7/8"	
12'-0"	4'-3"±		



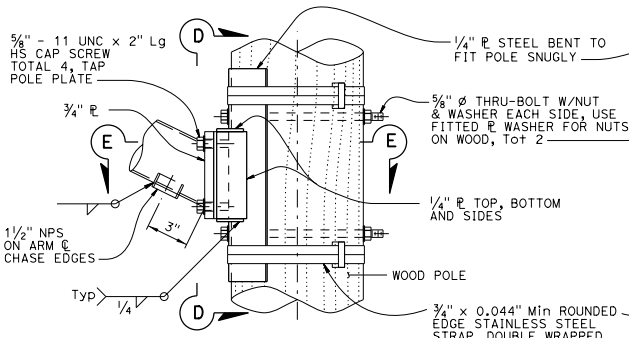
LUMINAIRE MAST ARM



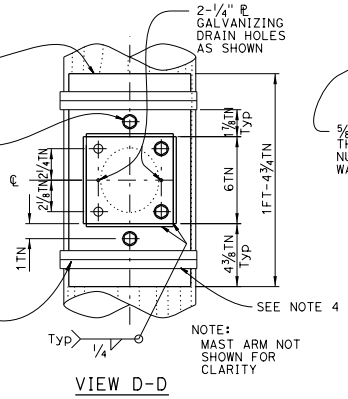
ELEVATION



VIEW C-C

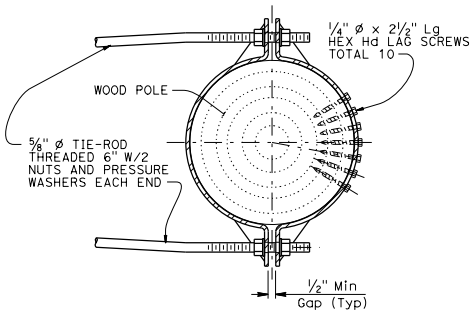


ELEVATION

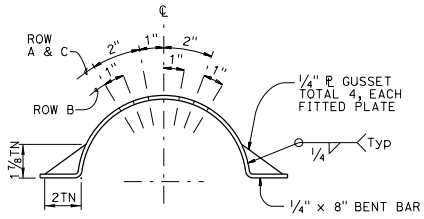


VIEW D-D

DETAIL B
ARM CONNECTION DETAILS



SECTION B-B



LAG SCREW AND GUSSET PLATE LAYOUT

DETAIL C
TIE-ROD AT POLE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES DETAILS No. 3

NO SCALE

ES-19C

1-26-18

2018 STANDARD PLAN ES-19C

Return to Table of Contents

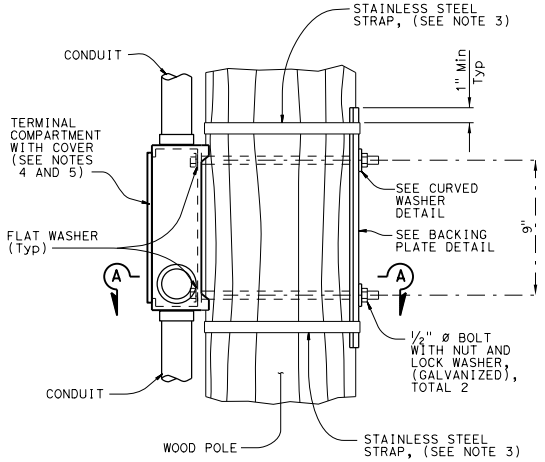
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

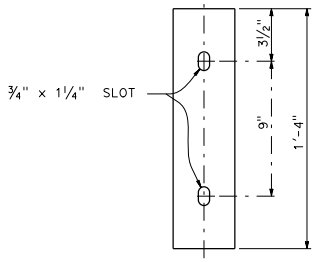
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

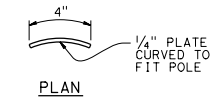
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



ELEVATION

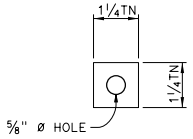


ELEVATION

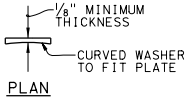


PLAN

BACKING PLATE DETAIL



ELEVATION

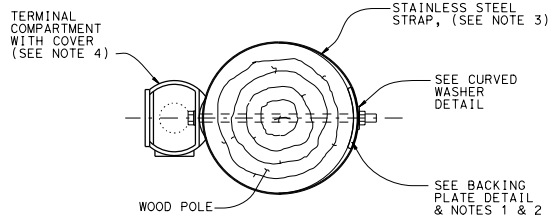


PLAN

CURVED WASHER DETAIL

NOTES:

1. Verify pole dimensions at terminal compartment for fabrication of backing plate and curved washer.
2. Backing plate to be galvanized after fabrication.
3. ¾" x 0.044" minimum, rounded edge stainless steel straps, double wrapped with 2" long bend under stainless steel strap buckle.
4. For miscellaneous details for signal mounting not shown see Standard Plan ES-4D.
5. If the terminal compartment has a cable entry guide on the rear face, remove the cable entry guide to a level that will not interfere with the wood post. Close any unused cable entry locations with raintight cap.



SECTION A-A

SIDE MOUNTING TERMINAL COMPARTMENT

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES DETAILS No. 4

NO SCALE

ES-19D

1-26-18

2018 STANDARD PLAN ES-19D

Return to Table of Contents

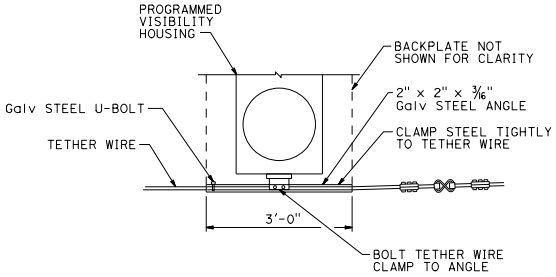
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER

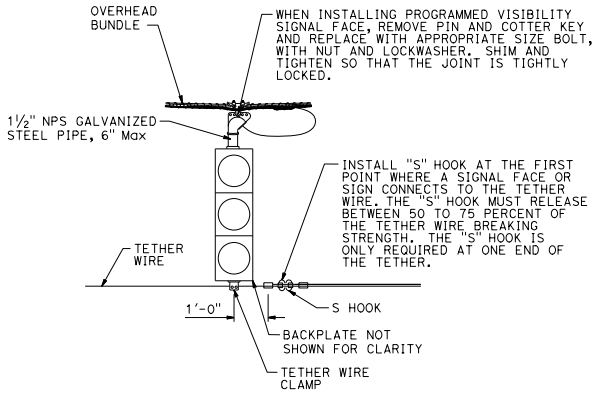
May 31, 2018
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Stanley P. Johnson
No. C57793
Exp. 3-31-20
CIVIL
STATE OF CALIFORNIA

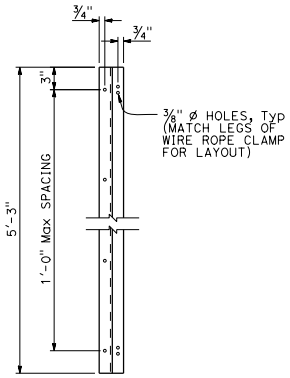
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



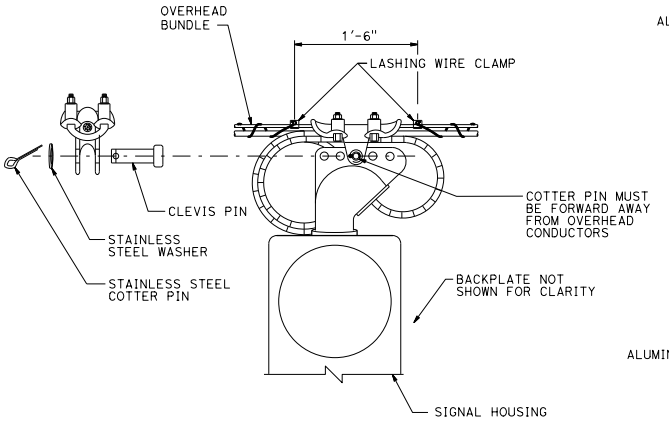
TETHER WIRE ATTACHMENT FOR PROGRAMMED VISIBILITY SIGNAL FACE



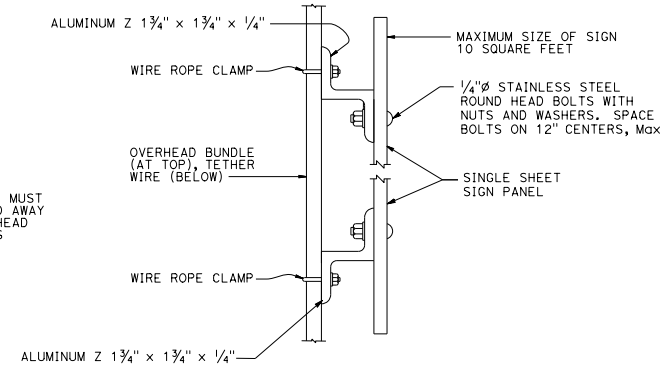
SIGNAL FACE SUPPORT



Z-BAR ELEVATION

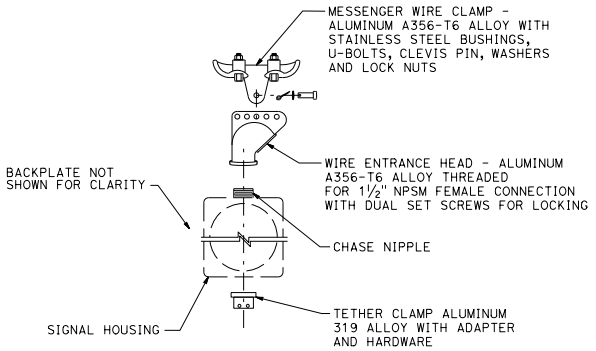


MESSENGER WIRE CLAMP COTTER PIN DETAIL



THE OVERLAPPED CONNECTION OF ADJUSTABLE HANGERS MUST USE A MINIMUM OF 2 BOLTS WITH A MINIMUM SPACING BETWEEN BOLTS OF 2"

SIGN MOUNTING DETAIL



SIGNAL FACE SUPPORT EXPLODED VIEW

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TEMPORARY WOOD POLES DETAILS No. 5

NO SCALE

ES-19E

1-26-18

2018 STANDARD PLAN ES-19E

Return to Table of Contents

Page No.

-A-

Abbreviations
General (A3A through A3C) 1-3
Electrical Systems (ES-1C) 477
Abutment, Excavation and Backfill
(A62C) 30
Access Door, Bridge (B0-13) 321
Access Gate, Sound Wall
(B15-10 through B15-14) 399-403
Access Opening, Bridge Utility Detail
(B7-11) 350
Accessible Parking-Off-Street
(A90A) 152
Accessible Parking-On-Street
(A90B) 153
Anchor Assembly, End
(See Midwest Guardrail System)
Anchorage System, Cable
Pipe Downdrains (D87C) 233
Arch Culvert
Construction Load On (D88) 235
Endwalls, Reinforced Concrete
(D86C) 230
Headwalls, Reinforced Concrete
(D86C) 230
Warped Wingwalls,
Reinforced Concrete (D86C) 230

-B-

Backfill and Excavation
(A62A through A62G) 28-35
Backfill, Permeable or Pervious,
Bridge (B0-3) 319
Balanced Lightweight Overhead Signs
(See Overhead Signs)
Banding of Conductor Ends
(ES-13B) 545
Barbed Wire, Fence (A86, A86A, A86B,
A86C, A86D) 143-147
Barricade, Portable (A73C) 40
Barriers
California ST-10 Bridge Rail
(B11-68 through B11-70) 375-377
California ST-20S Bridge Rail
(B11-71 through B11-74) 378-381
California ST-30 Bridge Rail
(B11-65) 372
California ST-40 Bridge Rail
(B11-66, B11-67) 373-374
California ST-70 Bridge Rail
(B11-75 through B11-78) 382-385

Page No.

Barriers (continued)
Concrete,
Type 60M Series
(A76A through A76I) 42-53
Type 80 (B11-60, B11-61) 367-368
Type 80SW (B11-62 through
B11-64) 369-371
Type 732 (B11-55) 362
Type 732SW (B11-58, B11-59) 365-366
Type 736 (B11-56) 363
Type 742 (B11-57) 364
Wildlife Passageway
(A76J through A76L) 54-56
Portable Concrete (Type 60K)
(A63A, A63B) 36-37
Thrie Beam - (See Thrie Beam Barrier)
Bedding, Pipe and Pipe Arches
(A62D, A62DA, A62F) 31, 32, 34
Box Culverts - (See Culverts)
Box Girder
Details (B7-1) 344
Utility Opening (B7-10) 349
Bridge
Abutment, Excavation & Backfill
(A62C) 30
Access Door, Bridge (B0-13) 321
Access Openings (B7-11) 350
Alternative Stirrups (B0-5) 320
Bumper, Temporary (B0-1) 318
Cast-In-Place Post-Tensioned
Girder Details (B8-5) 351
Deck Construction Joints
(B0-5) 320
Deck, Transverse Reinforcement
(B0-5) 320
Drain Details, Types A, B, Area,
Pedestrian Structure, Deck
Bleeder (B7-5) 345
Drain Type D-3 (B7-7) 347
Drain Types D-1 and D-2
(B7-6) 346
Electrical Details, Structure
Installations (ES-9A through
ES-9F) 535-540
Excavation and Backfill -
Limits of Payment
(A62B, A62C) 29-30
Girder, Reinforcement (B0-5) 320
Joint Seal Details (B6-21) 343
Polystyrene, Vertical and
Horizontal Protection of
(B0-13) 321
Soffit Luminaire Installation
(ES-9E, ES-9F) 539-540
Surcharge (A62B) 29

Page No.

Bridge (continued)
Temporary Bumper (B0-1) 318
Wall Expansion Joint (B0-3) 319
Waterstop (B0-1, B0-3) 318-319
Weakened Plane Joint (B0-3) 319
Weep Hole (B0-3) 319

-C-

Cabinet,
Controller (ES-3A through ES-3C2) 485-489
Irrigation Controller Enclosure (ES-3H) 494
Telephone Demarcation (ES-3D through ES-3G) 490-493
Cable Railing, Retaining Wall (B11-47) 359
Cantilever Flashing Beacon Details (ES-7K, ES-7L) 524-525
Cast-In-Drilled-Hole Concrete Pile 16" and 24" (B2-3) 322
For Overhead Signs (See Overhead Signs)
Centerline Rumble Strip Details, Ground-In Indentations (A40D) 25
Chain Link Fence (A85, A85A, A85B) 140-142
Chain Link Railing (B11-7) 358
Chain Link Railing Type 7 (B11-52) 361
Changeable Message Sign, Overhead Sign Model 500 (S101 through S116) 456-471
Changeable Message Sign, Overhead Sign Model 500 and 510
Gusset Plate Details (S142) 474
Safety Cable Anchorage (S141) 473
Walkway Safety Railing (S140) 472
Channelizers (A73C) 40
Closed Circuit Television
Foundation Details High Mast Pole (ES-16C) 554
Pole Details (ES-16A, ES-16B, ES-16D) 552, 553, 555
Communication Conduit In/On Bridges (B14-3) 387
Concrete Barrier,
California ST-10 Bridge Rail (B11-68 through B11-70) 375-377
California ST-20S Bridge Rail (B11-71 through B11-74) 378-381
California ST-30 Bridge Rail (B11-65) 372
California ST-40 Bridge Rail (B11-66, B11-67) 373-374

Page No.

Concrete Barrier (continued)
California ST-70 Bridge Rail (B11-75 through B11-78) 382-385
Portable (Type 60K) (A63A, A63B) 36-37
Type 60M Series (A76A through A76I) 42-53
Type 732 (B11-55) 362
Type 732SW (B11-58, B11-59) 365-366
Type 736 (B11-56) 363
Type 742 (B11-57) 364
Type 80 (B11-60, B11-61) 367-368
Type 80SW (B11-62 through B11-64) 369-371
Concrete Pavement
Continuously Reinforced (P4) 158
Continuously Reinforced (Widened Lane) (P5A) 159
Continuously Reinforced (Widened Lane), Lane and Shoulder Addition/Replacement (P5B) 160
Continuously Reinforced, Expansion Joint and Anchor Details (P31B) 175
Continuously Reinforced, Single Piece Transverse Bar Assembly (P13) 166
Continuously Reinforced, Terminal Joint Details (P31A) 174
Continuously Reinforced, Tie Bars and Joint Details (P16) 169
Continuously Reinforced, Transverse Construction Joint (P14) 167
Continuously Reinforced, Wide Flange Beam Terminals (P32A, P32B) 176-177
Dowel Bar Basket Details (P12) 165
Dowel Bar Details (P10) 164
Dowel Bar Retrofit (P7) 162
Drainage Inlet Details (P45, P46) 181-182
Individual Slab Replacement with Rapid Set Concrete (P8) 163
Joint Seals (P20) 172
Jointed Plain (Widened Lane), Lane and Shoulder Addition/Replacement (P3B) 157
Jointed Plain (Widened Lane)-New Construction (P2) 155
Jointed Plain, End Panel Pavement Transitions (P30) 173
Jointed Plain, Lane and Shoulder Addition/Replacement (P3A) 156
Jointed Plain-New Construction (P1) 154
Lane Schematics and Isolation Joint Details (P18) 171
Ramp Transition Paving Details (P35) 180
Spall Repair (P6) 161
Tie Bar Basket Details (P17) 170
Tie Bar Details (P15) 168

Page No.

Concrete Pavement-Lane Drop Paving
Details (P33, P34) 178-179
Concrete Pile
16" and 24" Cast-In-Drilled-Hole (B2-3) .. 322
Class 200 (B2-8) 324
Class 90 and Class 140 (B2-5) 323
Load Test Pile Details
(B2-9 through B2-11) 325-327
Conduit, Installation Details Bridge
(B14-3, ES-9B) 387, 536
Construction Load on Culvert (D88) 235
Controller Cabinet Details (ES-3A through
ES-3C2) 485-489
Corrugated Metal Pipe Coupling Band Details,
Standard and Positive Joints (D97A through
D97G) 246-251
Coupling Band Details, Corrugated Metal Pipe
(D97A through D97G) 246-251
Covers, Pipe Inlets
(D75A, D75B) 210-211
Crash Cushions Sand Filled (Bidirectional)
(A81C) 137
Crash Cushions Sand Filled (Unidirectional)
(A81A, A81B) 135-136
Crash Cushions Sand Filled, Temporary
(Bidirectional) (T1B) 279
(Shoulder Installations) (T2) 280
(Unidirectional) (T1A) 278
Crib Walls
Excavation and Backfill (A62B) 29
Reinforced Concrete Types A, B, C Details
(C7A through C7C) 191-193
Cross Drain Interceptor Details (P53) 186
Culvert
Box, Cast-In-Place Reinforced Concrete
General Details (D80, D81) 221-222
Miscellaneous Details (D82) 223
Wingwalls
Types A, B, C (D84) 226
Types D and E (D85) 227
Warped (D86A) 228
Box, Precast Reinforced Concrete
General Details (D83A) 224
Miscellaneous Details (D83B) 225
Concrete Arch Headwalls, Endwalls and
Warped Wingwalls (D86C) 230
Construction Load on (D88) 235
Excavation and Backfill Details
(A62D through A62G) 31-35
Flared End Sections
Concrete (D94B) 245
Metal and Plastic (D94A) 244
Pipe Headwalls and Endwalls
Straight and "L" (D89) 237

Page No.

Culvert (continued)
Pipe Headwalls, Endwalls and Wingwalls
Types A, B, C (D90) 238
Warped Wingwalls (D86B) 229
Curb Ramp Details and Island Passageway
Details (A88A, A88B) 150-151
Curbs and Driveways (A87A) 148

-D-

Debris Rack Cage (D93C) 243
Deck Drain
Types A, B, Area, Pedestrian Structure,
Deck Bleeder (B7-5) 345
Types D-1 and D-2 (B7-6) 346
Types D-3 (B7-7) 347
Deck Drainage Details (B7-8) 348
Delineators (A73C) 40
Depressions, Gutter (D78A) 216
Dessert Tortoise Fence (A84B) 139
Detectors, Electrical Systems
(ES-5A through ES-5D) 504-507
Dikes, Asphalt Concrete (A87B) 149
Ditch Excavation (A62A) 28
Drainage Inlets,
CIP (D72A through D72G) 195-201
Details (D74) 209
Precast (D73A through D73G) 202-208
Markers (D71) 194
Drains,
Bridge Area, Pedestrian Structure,
Deck Bleeder (B7-5) 345
Bridge
Type A (B7-5) 345
Type B (B7-5) 345
Type D-1 (B7-6) 346
Type D-2 (B7-6) 346
Type D-3 (B7-7) 347
Downdrains (D87A through D87C) .. 231-233
Overside (D87D) 234
Pipe Riser Connections (D93A) 241
Retaining Wall (B3-6) 337
Slotted Corrugated Steel Pipe
(D98A, D98B) 255-256
Slotted Plastic Pipe (D98D) 257
Underdrains (D102) 265
Driveways (A87A) 148

-E-

Edge Drain
Cleanout and Vent Details (P52) 185
Outlet and Vent Details (P51) 184
Edge Line Rumble Strip Details,
Ground-In Indentations (A40C) 24

Page No.

Electrical Systems
Abbreviations (ES-1C) 477
Foundation Installations (ES-11) 543
Fuse Rating, Kinking and Banding Detail (ES-13B) 545
Isofootcandle Curves (ES-10A, ES-10B) 541-542
Legend (ES-1A through ES-1C) 475-477
Service Equipment and Wiring Diagrams (ES-2A through ES-2G) 478-484
Structure Installation Details (ES-9A through ES-9F) 535-540
Electronics Assembly Connection Diagram, Electrical Systems (ES-3I through ES-3L) 495-498
End Caps,
Guard Railing (A77M1) 60
Thrie Beam Barrier (A78C1) 113
End Section, Flared (D94A, D94B) 244-245
Entrance Taper, Downdrain (D87A, D87B) 231-232
Equipment Mountings, Electrical Systems (ES-4A through ES-4E) 499-503
Equipment Identification Characters, Electrical Systems (ES-7B) 516
Erosion Control
Fiber Roll and Compost Sock (H51) 276
Rolled Erosion Control Product (H52) 277
Excavation and Backfill
Bridge (A62B, A62C) 29-30
Bridge Embankment Surcharge (A62B) 29
Crib Walls (A62B) 29
Ditch (A62A) 28
Headwalls, Pipe (A62A) 28
Miscellaneous (A62A) 28
Pipe and Culvert (A62D through A62G) 31-35
Retaining Walls (A62B) 29
Roadway (A62A) 28
Slope Protection (A62A) 28
Underdrains (D102) 265
Wingwalls (A62A) 28
Expansion Fitting, Electrical Systems Structure Electrical Conduit (ES-9B) 536
Extinguishable Message Sign 10" Letters (ES-14A) 546
Extinguishable Message Sign (ES-14B) 547
Extinguishable Message Sign and Flashing Beacon (S50, ES-14C) 440, 548

-F-

Fence
Barbed Wire and Wire Mesh (A86, A86A, A86B, A86C, A86D) .. 143-147

Page No.

Fence (continued)
Chain Link (A85, A85A, A85B) 140-142
Desert Tortoise (A84B) 139
Temporary Desert Tortoise (A84A) 138
Fiber Optic Marker Details, Electrical Systems (ES-17A) 556
Flared End Section (D94A, D94B) 244-245
Flashing Beacon
Advance (ES-7J) 523
Cantilever with Type 9, 9A and 9B Sign (ES-7K, ES-7L) 524-525
Extinguishable Message Sign (ES-14C) 548
Flume Downdrain (D87D) 234
Foundation, Electrical Systems
Location Details (ES-11) 543
Fuse Ratings, Electrical Systems (ES-13B) 545

-G-

Gabion Basket Details (D100A, D100B) 263-264
Girder Details
Box (B7-1) 344
Post-Tensioned, Cast-In-Place (B8-5) 351
T-Beam (B6-1) 341
Grate Details Retaining Wall Drains (B3-6) 337
Grated Line Drain Details
(D98G through D98J) 259-262
Grounding, Service, Electrical Systems (ES-2A) 478
Guardrail - (See Midwest Guardrail System)
Gutter Depressions (D78A) 216
Gutter, Retaining Wall (B3-6) 337

-H-

Handrailing, Bridge Tubular (B11-51) 360
Heads, Signal, Mounting and Details (ES-4A through ES-4E) 499-503
Headwalls (Endwalls, Wingwalls)
Arch Culvert Warped Wingwalls (D86C) 230
Box Culvert Wingwalls
Types A, B, C (D84) 226
Types D and E (D85) 227
Warped (D86A) 228
Pipe - Straight and "L" (D89) 237
Pipe Culvert Wingwalls
Types A, B, C (D90) 238
Warped (D86B) 229
Highway Post Marker (A73B) 39
Hot Mix Asphalt Dikes (A87B) 149
Hot Mix Asphalt Overside Drain (D87D) 234
Hot Mix Asphalt Paving, Longitudinal Tapered Notched Wedge Joint (P70) 187

Page No.

-I-

Inlet Depressions
Concrete Shoulders (D78B) 217
Hot Mix Asphalt Shoulder (D78C) 218
Inlets, Drainage
CIP (D72A through D72G) 195-201
Details (D74)..... 209
Precast (D73A through D73G) 202-208
Markers (D71) 194
Irrigation Supply Line In/On Bridges
(B14-4, B14-5)..... 388-389
Isolux Curves, Electrical Systems
(ES-10A, ES-10B) 541-542

-J-

Joint Seal Details (B6-21) 343
Joints,
Composite Steel Spiral Rib Pipe (D97J) . 254
Concrete Pavement
Joint Seals (P20)..... 172
Lane Schematics and Isolation
Joint Details (P18) 171
Concrete Pipe (D97H) 252
Corrugated Metal Pipe
(D97A through D97G) 246-251
Corrugated Polyvinyl Chloride Pipe
(D97I) 253
Junction Structure, Cast-In-Place Reinforced
Concrete (D91A, D91B) 239-240

-L-

Landscape
Details (H2 through H9)..... 267-274
Irrigation Controller Enclosure Cabinet
(H10) 275
Symbols (H1)..... 266
Lane Closures,
Changeable Lane Closure on Multilane
Conventional Highways and
Expressways(T11A)..... 289
Moving Two lane Highways (T17)..... 295
Stationary Freeways and Expressways
(T10)..... 286
Stationary Freeways and Expressways
Complete Closures (T10A) 287
Stationary Multilane Conventional Highways
(T11, T12) 288-290
Stationary Ramp (T14) 292
Stationary Two Lane Conventional Highways
(T13)..... 291
Layouts, Guardrail
(See Midwest Guardrail System)

Page No.

Legend, Electrical Systems
(ES-1A through ES-1C) 475-477
Lighting Standards
Foundation Location Details (ES-11).....543
Type 32 (ES-6G).....514
Types 15 and 21 (ES-6A) 508
Types 15 and 21, Barrier Rail Mounted
(ES-6B).....509
Types 15D and 21D Double Luminaire Arm
(ES-6D).....511
Types 30 and 31 (ES-6E) 512
Types 30 and 31, Slip Base Plate Details
(ES-6F) 513
Types 5 and 10 (ES-6C) 510
Lightweight Overhead Sign
(See Overhead Signs)
Load Test Pile Details
(B2-9 through B2-11) 325-327
Loop Detectors
(ES-5A through ES-5D) 504-507
Luminaries Soffit, Bridge
(ES-9E, ES-9F)..... 539-540

-M-

Manhole Frame and Cover,
Bridge Deck or Sidewalk (B7-11).....350
Markers (A73A, A73B) 38-39
Markers, Pavement (See Pavement Markers)
Markings, Pavement (See Pavement Markings)
Message Sign, Extinguishable
10" Letters (ES-14A, ES-14B) 546-547
Flashing Beacon (ES-14C).....548
Metal Beam Guard Railing
Reconstruct Installation (A77L3).....59
Metal Marker Post (A73B).....39
Metal Railing
Anchor Cable and Anchor Plate (A77S3) 101
End Anchor Assembly (Type CA)
(A77T1).....102
Midwest Guardrail System
Buried Post Anchor (A77T2).....103
Connections to:
Abutments and Walls (A77U3).....106
Bridge Railings with Sidewalks
(A77V1, A77V2)..... 109-110
Bridge Railings without Sidewalks
(A77U1, A77U2)..... 104-105
Delineation, Typical (A77N4).....64
Dike Positioning Details (A77N4).....64
Embankment Widening for End Treatments
(See Typical Layouts)

Page No.

Midwest Guardrail System (continued)
End Anchors End Anchor Assembly (Type SFT) (A77S1) 99
Layouts,Typical
Embankments (A77P1 through A77P6) 80-85
Fixed Objects
Between Separate Roadbeds
(One-Way Traffic) (A77R2) 92
(Two-Way Traffic) (A77R1) 91
Roadside (A77R3 through A77R8) . 93-98
Structure Approach (A77Q1 through A77Q3) 86-88
Structure Departure (A77Q4 and A77Q5) 89-90
Line Post Installation, Typical Embedment and Hinge Point Offset Details (A77N3) 63
Rail Tensioning Assembly (A77S2) 100
Standard Hardware (A77M1) 60
Standard Railing Section Installation
Steel Post with Notched Wood or Notched Recycled Plastic Block (A77L2) 58
Wood Post with Wood Block (A77L1) 57
Steel Post with Notched Wood Block Details (A77N2) 62
Transition Railing (Type WB-31), (A77U4) 107
Transition to Metal Beam Guardrail (A77U5) 108
Vegetation Control:
Minor Concrete (A77N5 through A77N11) 65-72
Fiber or Rubber Mat (A77N12 through A77N18) 73-79
Monuments, Survey (A74) 41

-N-

Non-Traffic Pull box (ES-8A) 532

-O-

Object Markers (A73A) 38
Overhead Signs
Changeable Message
Model 500 (S101 through S116) ... 456-471
Models 500 and 510 Gusset Plate Details (S142) 474
Models 500 and 510 Safety Cable Anchorage (S141) 473
Models 500 and 510 Walkway Safety Railing (S140) 472
Lightweight - Extinguishable Message Sign and Flashing Beacons (S50) 440

Page No.

Overhead Signs (continued)
Lightweight
Foundation Details (S49) 439
Post Details (S48) 438
Steel Frame Removable Sign Panel Frames (S20) 427
Truss
Frame Juncture Details (S13) 420
Gusset Plate Details (S6) 414
Instruction & Examples (S1) 409
Post Type II through IX (S2) 410
Removable Sign Panel Frames
110" and 120" Sign Panels (S22) 429
Overhead Formed Panel Mounting Details (S21) 428
Sign Mounting Panel Details
Laminated Panel, Type A (S19) 426
Single Post Type
Base Plate and Anchorage Details (S3) 411
Foundations Round Pedestal (S8) 415
Structural Frame Members (S4, S5) 412-413
Two Post Type
Base Plate and Anchorage Details (S10) 417
Foundations Round Pedestal (S15) 421
Frame Juncture Details (S13) 420
Post Type I-S through VII-S (S9) 416
Structural Frame
Details (S12) 419
Members (S11) 418
Tubular
Base Plate and Anchorage Details (S35) 435
Foundation Details (S36, S37) 436-437
Instructions and Examples (S30) 430
Single Post Type, Layout and Pipe Selection (S31) 431
Structural Frame Details (S33, S34) 433-434
Two Post Types, Layout and Pipe Selection (S32) 432
Walkway Details (S16, S17, S17A) . 422-424
Walkway Safety Railing Details (S18) 425
Overside Drains (D87D) 234

-P-

Panels, Sign Overhead and Roadside Details (S81 through S95) 441-455
Parking, Accessible -Off-Street (A90A) 152
Parking, Accessible -On-Street (A90B) 153
Pavement Edge Treatments (P74 through P76) 188-190

Page No.

Pavement Markers and Traffic Lines
(A20A through A20E) 12-16
Pavement Markings-
Arrows (A24A, A24B) 17-18
Crosswalks (A24F) 22
Symbols and Numerals (A24B, A24C) . 18-19
Words (A24D) 20
Words, Limit and Yield Lines (A24E) 21
Pavement Structure Drainage System Details
(P50) 183
Pavement, Asphalt Concrete Paving
(Longitudinal Tapered Notched Wedge Joint),
(P70) 187
Pavement, Concrete (See Concrete Pavement)
Pedestrian
Barricade (ES-7Q) 530
Push Button (ES-5C) 506
Signals (ES-4B, ES-4C) 500-501
Signs (ES-5C) 506
Permeable Backfill, Bridge (B0-3) 319
Pervious Backfill, Bridge (B0-3) 319
Photoelectric Control Unit Pole Top Details
(ES-7N) 527
Pile Foundation, Overhead Signs
(S8, S36, S37, S49) 415, 436, 437, 439
Pile, Concrete
16" and 24" Cast-In-Drilled-Hole
(B2-3) 322
Class 200 (B2-8) 324
Class 90 and Class 140 (B2-5) 323
Load Test Pile Details
(B2-9, B2-10, B2-11) 325-327
Pipe
Coupling Band Details, Corrugated Metal Pipe
(D97A through D97G) 246-251
Culvert Headwalls, Excavation and Backfill
(A62A) 28
Downdrains (D87A through D87C) .. 231-233
Headwalls,
Endwalls and Warped Wingwalls
(D86B) 229
Straight and "L" (D89) 237
Types A, B, C (D90) 238
Pipe Inlets
Covers for Side Opening Inlets
(D75A, D75B) 210-211
General Details
(D75A through D75C) 210-212
Grate and Frame Details (D77B) 214
Metal and Concrete
(D75A, D75B) 210-211
Pumping Installations (D75C) 212
Trash Racks (D75C, D77C) 212, 215

Page No.

Pipe Riser
Connections (D93A, D93B) 241-242
with Debris Rack Cage (D93C) 243
Pipe Strut Details, Structural Steel Plate
(D88A) 236
Polystyrene, Protection of, in Structures
(B0-13) 321
Portable Barricade (A73C) 40
Portland Cement Concrete Pavement
(See Concrete Pavement)
Post Anchorage Details, Bridge Railing
Chain Link (B11-7) 358
Tubular Hand (B11-51) 360
Post-Tensioned Cast-In-Place Girder Details
(B8-5) 351
Precast Reinforced Concrete
Box Culvert (D83A, D83B) 224-225
Pipe - Direct Design Method
(D79, D79A) 219-220
Protection of Polystyrene in Structures
(B0-13) 321
Pull Box,
Non-Traffic (ES-8A) 532
Structures (ES-9A through ES-9F) .. 535-540
Traffic (ES-8B) 533
Push Button Assembly Post (ES-7A) 515

-R-

Railing
Barrier, Bridge
California ST-10 Bridge Rail
(B11-68 through B11-70) 375-377
California ST-20S Bridge Rail
(B11-71 through B11-74) 378-381
California ST-30 Bridge Rail (B11-65) .. 372
California ST-40 Bridge Rail
(B11-66, B11-67) 373-374
California ST-70 Bridge Rail
(B11-75 through B11-78) 382-385
Type 732 (B11-55) 362
Type 732SW (B11-58, B11-59) 365-366
Type 736 (B11-56) 363
Type 742 (B11-57) 364
Type 80 (B11-60, B11-61) 367-368
Type 80SW
(B11-62 through B11-64) 369-371
Cable, Retaining Wall (B11-47) 359
Chain Link Type 7 (B11-52) 361
Metal Tubular Bridge Handrailing
(B11-51) 360
Temporary (Type K) (T3A, T3B) 281-282
Ramp, Curb Details (A88A, A88B) 150-151

Reinforced Concrete Crib Wall

Page No.
(C7A through C7C)....191-193
Reinforced Concrete Pipe, Precast Direct Design Method (D79, D79A)....219-220
Retaining Walls
Cable Railing (B11-47)....359
Details (B3-5, B3-6)....336-337
Excavation and Backfill Limits of Payment (A62B)....29
Type 1 (Case 1) (B3-1A)....328
Type 1 (Case 2) (B3-1B)....329
Type 1 (Case 3) (B3-1C)....330
Type 1A (Case 1) (B3-3A)....331
Type 1A (Case 2) (B3-3B)....332
Type 5 (Case 1) (B3-4A)....333
Type 5 (Case 2) (B3-4B)....334
Type 5 (Case 3) (B3-4C)....335
Type 6 (Case 1) (B3-7A)....338
Type 6 (Case 2) (B3-7B)....339
Type 6 Details (B3-7C)....340
Utility Opening (B3-6)....337
Riser
Connections
Crossdrains (D93A, D93B)....241-242
Drainage Inlets (D93B)....242
Pipe With Debris Rack Cage (D93C)....243
Underdrain (D102)....265
Roadside Sign
Mounting Hardware (RS4)....408
Panels (See Sign Panels)
Post and Pole Installation Details (RS2, RS3)....406-407
Typical Installation Details (RS1 through RS4)....405-408
Rock Legend (A10H)....11
Rumble Strip Details,
Shoulder Ground-In Indentations (A40B)..23
Edge Line Ground-In Indentations (A40C) 24
Centerline Ground-In Indentations (A40D) 25
Rumble Strip Placement,
Freeway Exit Ramps (A40E)....26
Freeway Entrance Ramps (A40E)....26
Intersections (A40E)....26
Intersections with Left Turn Pockets (A40F)....27
Railroad Crossings (A40F)....27
Private Roads (A40F)....27
Major Driveways (A40F)....27

-S-

Service Equipment, Signal and Lighting (ES-2A through ES-2G)....478-484
Shaped Bedding (A62D, A62DA, A62F)....31, 32, 34
Shoulder Rumble Strip Details,
Page No.
Ground-In Indentations (A40B)....23
Sign Illumination, Internally Illuminated Street Name Sign (ES-7P)....529
Sign Lighting
Mercury Equipment (ES-15A)....549
Sign Lighting Control (ES-15D)....551
Sign Lighting Equipment (ES-15C)....550
Sign Panels Overhead and Roadside Details (S81 through S95)....441-455
Sign, Extinguishable Message (ES-14A through ES-14C)....546-548
Signal and Lighting
Equipment Identification Characters (ES-7B)....516
Foundation Location Details (ES-11)....543
Heads and Mountings (ES-4A through ES-4E)....499-503
Installation Details (ES-7M through ES-7O)....526-528
Pedestrian Push Buttons (ES-5C)....506
Push Button Assembly Post Details (ES-7A)....515
Standard Details No. 1, No. 2 and No. 3 (ES-7M through ES-7O)....526-528
Standard, Case 1 thru Case 5 Arm Loading, 100 mph Wind Velocity (ES-7C through ES-7H)....517-522
Standard, Type 1 (ES-7B)....516
Standard, Type TS (ES-7A)....515
Terminal Compartment (ES-4D, ES-4E)....502-503
Signs
Overhead (See Overhead Signs)
Roadside
Mounting Hardware (RS4)....408
Post and Pole Installation Details (RS2, RS3)....406-407
Typical Installation Details (RS1 through RS4)....405-408
Slip Base Details, Type 30 and 31 Lighting Standards (ES-6F)....513
Slotted Corrugated Steel Pipe Drain Details (D98A, D98B)....255-256
Slotted Pipe Grate Extension Detail (D98F)....258
Slotted Plastic Pipe Drain Details (D98D)....257
Snow Pole Bracket (A73B)....39
Soffit Luminaries, Bridge (ES-9E, ES-9F)....539-540
Soil Legend (A10F, A10G)....9-10
Sound Walls Masonry Block
Access Gate (B15-10 through B15-14)....399-403
Sound Walls Masonry Block (continued)

Page No.
Miscellaneous Details (B15-9)..... 398
On Footing (B15-1, B15-2)..... 390-391
On Pile Cap (B15-3 through B15-5). 392-394
On Type 736S/SV Barrier
(B15-6 through B15-8)..... 395-397
On Type 736S/SV Barrier on Pile Footing
For Spanning Utilities (B15-15)..... 404
Sprinkler Conduit In/On Bridges (B14-3)..... 387
Splice Vaults, Electrical Systems
(ES-8C)..... 534
Standard Lighting
Foundation Location Details (ES-11)..... 543
Type 32 (ES-6G)..... 514
Type TS (ES-7A)..... 515
Types 15 and 21 (ES-6A)..... 508
Types 15 and 21, Barrier Rail Mounted
(ES-6B)..... 509
Types 15D and 21D Double Luminaire Arm
(ES-6D)..... 511
Types 30 and 31 (ES-6E)..... 512
Types 30 and 31 Slip Base Base Plate
Details (ES-6F)..... 513
Types 5 and 10 (ES-6C)..... 510
Standard Traffic Signal and Lighting
Arm Loading, 100 mph Wind Velocity
(ES-7C through ES-7H)..... 517-522
Cantilever Advance Flashing Beacon with
Type 9, 9A, 9B Sign
(ES-7K, ES-7L)..... 524-525
Miscellaneous Attachment (ES-7R)..... 531
Miscellaneous Details
(ES-7M through ES-7O)..... 526-528
Push Button Assembly Post (ES-7A)..... 515
Type 40-0-100 (ES-7J)..... 523
Type I Standards and Equipment
Identification Characters (ES-7B)..... 516
Stirrups, Alternative (B0-5)..... 320
Structural Steel Plate
Excavation & Backfill (A62F)..... 34
Vehicular Undercrossings (B14-1)..... 386
Structure Approach
Drainage Details (B9-6)..... 357
Slab Details (B9-5)..... 356
Type N (30) (B9-1)..... 352
Type R (30) (B9-2)..... 353
Type R (10) (B9-3)..... 354
Type EQ (10) (B9-4)..... 355
Structure Installations, Electrical Details
(ES-9A through ES-9F)..... 535-540
Strut Details for Structural Plate Pipes, Arches
and Vehicular Undercrossings (D88A).... 236
Supply Line In/On Bridges
(B14-4, B14-5)..... 388-389
Surcharge, Bridge Embankment (A62B)..... 29
Survey Monuments (A74)..... 41

Page No.
Symbols and Lines, General
(A10A through A10E)..... 4-8
Symbols, Landscape (H1)..... 266

-T-

Tapered Inlets, Overside Drains (D87D)..... 234
T-Beam
Details (B6-1)..... 341
Utility Openings (B6-10)..... 342
Temporary Bumpers, Bridge (B0-1)..... 318
Temporary Crash Cushion, Sand Filled
(T1A, T1B, T2)..... 278-280
Temporary Desert Tortoise Fence
(A84A)..... 138
Temporary Pedestrian Access Routes
Curb Ramp Options (T34)..... 300
Ramp (T33)..... 299
Typical Sidewalk/Crosswalk Closure
and Pedestrian Detour (T32)..... 298
Typical Sidewalk Closure and Pedestrian
Detour (T30)..... 296
Typical Sidewalk Diversion Within
Roadbed (T31)..... 297
Temporary Railing (Type K)
(T3A, T3B)..... 281-282
Temporary Terminal Section (Type K) (T5)... 284
Temporary Traffic Screen (T4)..... 283
Temporary Water Pollution Control Details
(T51 through T67)..... 301-317
Temporary Wood Poles, Electrical Systems
(ES-18A through ES-19E)..... 557-566
Thrie Beam Barrier
Connections to:
Abutments and Walls (A78G)..... 130
Bridge Railing, Typical Layout (A78H). 131
Bridge Railings without Sidewalks
(A78F1, A78F2)..... 128-129
Concrete Barrier (A78I)..... 132
Emergency Passageway and End Anchor
Assembly (A78E2)..... 126
End Anchors and End Treatment
Crash Cushion (A78E3)..... 127
Terminal System (A78E1)..... 125
Fixed Objects in Median (A78D1)..... 123
On Bridge (A78D2)..... 124
Post and Block Details (A78C2)..... 114
Standard Hardware (A78C1)..... 113
Standard Railing Section Installation
Steel Post with Notched Wood or Notched
Recycled Plastic Block (A78B)..... 112
Wood Post with Wood Block (A78A).... 111
Transition Railing
(Type DTB) (A78K)..... 134
Thrie Beam Barrier (continued)

Page No.

Transition Railing (continued)
(Type STB) (A78J) 133
Vegetation Control
Minor Concrete
(A78C3 through A78C6) 115-118
Fiber or Rubber Mat
(A78C7 through A78C10) 119-122
Traffic Control System
Changeable Lane Closure on Multilane Conventional Highways and Expressways(T11A) 289
Half Road Closure on Multilane Conventional Highways and Expressways (T12) 290
Lane and Complete Closures on Freeways and Expressways (T10A) 287
Lane Closure on
Freeways and Expressways (T10) 286
Multilane Conventional Highways (T11) 288
Two Lane Conventional Highways (T13) 291
Moving Lane Closure on Multilane Highways (T15, T16) 293-294
Two Lane Highways (T17) 295
Ramp Closures (T14) 292
Tables for Lane and Ramp Closures (T9) 285
Traffic Lines and Pavement Markers (A20A through A20E) 12-16
Traffic Pull box (ES-8B) 533
Traffic Signal and Highway Lighting (See Lighting; Signal and Lighting)
Trash Rack, Drainage and Pipe Inlets (D72E, D73E, D75C, D77C) 199, 206, 212, 215
Tubular Handrailing (B11-51) 360
Tubular Overhead Signs (See Overhead Signs)

-U-

Underdrains
Excavation and Backfill (D102) 265
Risers (D102) 265
Typical Details (D102) 265
Utilities Details (B7-11) 350
Utility
Access Door (B0-13) 321
Access Opening (B7-11) 350
Opening - Box Girder (B7-10) 349

-V-

Vehicle Detectors, Electrical Systems
Loop (ES-5A through ES-5D) 504-507
Magnetic (ES-5C) 506

Page No.

Magnetometer (ES-5D) 507
Vehicular Undercrossing Structural Steel Plate (B14-1) 386

-W-

Wall Expansion Joint, Bridge (B0-3) 319
Warped Wingwalls
Arch Culvert (D86C) 230
Box Culvert (D86A) 228
Excavation and Backfill (A62A) 28
Pipe Culvert (D86B) 229
Water Pollution Control, Temporary (See Temporary Water Pollution Control Details)
Waterstop, Bridge (B0-1, B0-3) 318-319
Weakened Plane Joint, Bridge (B0-3) 319
Weep Hole, Bridge (B0-3) 319
Wingwalls
Arch Culverts (D86C) 230
Box Culverts
Types A, B, C (D84) 226
Types D and E (D85) 227
Warped (D86A) 228
Excavation and Backfill (A62A) 28
Pipe Culvert (D86B, D90) 229, 238
Wire Mesh Fence (A86, A86A, A86B, A86C, A86D) 143-147
Wiring and Splice Insulation Method Details, Electrical
(ES-13A, ES-13B) 544-545
Wiring Diagram Flashing Beacon Control Assembly (ES-14B) 547