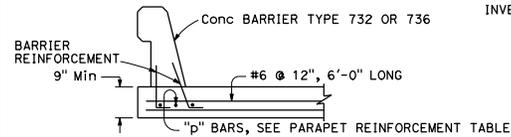


DESIGN NOTES:

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)
 $IM = 33(1.0 - 0.125D_c) \geq 0\%$ (AASHTO LRFD 3.6.2.2)
 D_c = minimum depth of earth cover
 Earth loads:
 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:
 $V_c = \{2.14\sqrt{f'_c} + 4600 \frac{A_s V_u d_c}{b d_w} \} b_w d_w \leq 4.0 \sqrt{f'_c} b_w d_w$ (Pounds)
 V_c shall not be less than $3.00 \sqrt{f'_c} b_w d_w$ for frame
 members and $2.5 \sqrt{f'_c} b_w d_w$ for simply supported members.
 Exclusion:
 Compressive reinforcement and negative moment
 reduction (for continuity) do not apply.
 Axial loading on members has not been considered.

CONSTRUCTION NOTES:

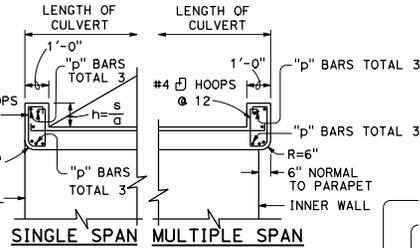
Construction loads:
 Strutting required as shown on Standard Plan D88.
 Strutting may be required on culvert extensions
 when existing parapet is removed.
 Expansion joints:
 Invert:
 No expansion joints shall be permitted.
 Roof and Walls:
 When cover is less than span length-
 Place 1/2" preformed 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 1/2" preformed expansion joint filler at 30'-0"
 ± centers and additional 1/2" preformed 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
 centerline 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)

GENERAL NOTES:

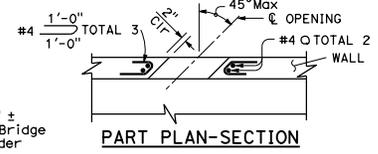
Designation:
 Standard single or multiple box culverts are shown on
 plans as span times height with maximum cover over
 roof thus: 8' x 5' RCB with 10' or
 double 10' x 5' RCB with 20', followed by
 alternatives.
 Alternatives:
 Single cell: Invert will be sloped unless "trapezoidal
 invert", "flat 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 fillet, 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.



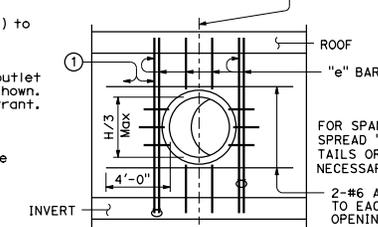
PARAPET DETAIL
 s = Clear span (ft)
 a = 12 cosine skew angle
 h = Height, 1'-0" Min

SPAN	PARAPET "d" BARS		
	SKW ANGLE TO	TO	TO
4'	0°	16°	31°
6'	15°	30°	45°
8'	#4	#4	#4
10'	#4	#4	#5
12'	#4	#5	#6
14'	#4	#5	#6
16'	#4	#6	#7
18'	#4	#6	#7
20'	#4	#7	#8
22'	#4	#7	#8

PARAPET REINFORCEMENT

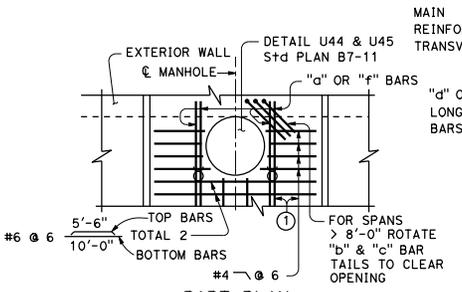


PART PLAN-SECTION

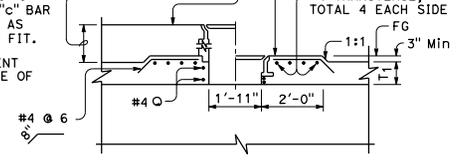


LONGITUDINAL SECTION UTILITY OPENING-WALL
 H=Height of box

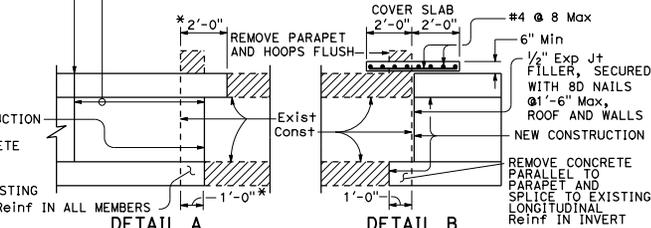
① Adjacent to each side of the opening, place additional bars equivalent to half the interrupted main reinforcement.



PART PLAN



PART LONGITUDINAL SECTION MANHOLE

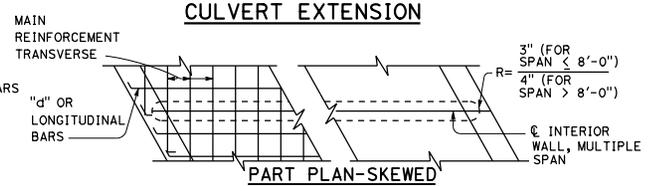


DETAIL A
 REMOVE CONCRETE PARALLEL TO PARAPET AND SPLICE TO EXISTING LONGITUDINAL REINF IN ALL MEMBERS

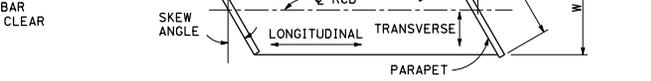
DETAIL B
 REMOVE CONCRETE PARALLEL TO PARAPET AND SPLICE TO EXISTING LONGITUDINAL REINF IN INVERT

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.

Single cell only, no skew allowed, 1'-0" minimum cover.
 * Measured perpendicular to parapet



CULVERT EXTENSION



RCB TERMINOLOGY

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
CAST-IN-PLACE REINFORCED CONCRETE BOX CULVERT MISCELLANEOUS DETAILS
 NO SCALE

2015 STANDARD PLAN D82

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET TOTAL SHEETS

REGISTERED CIVIL ENGINEER
 October 30, 2015
 PLANS APPROVAL DATE
 No. C59876
 Exp. 6-30-16
 CIVIL
 STATE OF CALIFORNIA

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