GENERAL NOTES:

DESIGN SPECIFICATIONS: AASHTO LRFD Bridge Design Specifications, 3rd Edition

LIVE LOAD: H-20

CONSTRUCTION DESIGN: It is the construction Contractor’s responsibility to provide for supporting construction loads that exceed AASHTO H-20, and any construction load applied prior to 2 feet of compacted fill placed above the top slab.

SURFACE FINISH: All concrete surfaces shall receive a general surface finish.

SKEWED CONSTRUCTION JOINTS: Construction joints in barrel of culverts with skewed wingwalls may be placed parallel to the headwall and the reinforcing steel, and the slab may be cut provided that the cut/reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with Table 1 on this sheet. The cost of construction joints and additional reinforcing shall be at the expense of the Contractor.

CULVERT EXTENSIONS: For cut-backs and tie-ins into existing concrete box culverts see Sheet 6 of T.

REINFORCING STEEL: ASTM A615, see the “Box Culvert Data Tables” in the Contract Plans for grade and bar spacing. See the Reinforcing Bar List in the Contract Plans for bar sizes and bar bending details.

SCHEMATIC “A” – PLAN VIEW
HEADWALL & WINGWALL ALIGNMENT

NOTE: All headwall and culvert skew angles are measured in degrees from a line perpendicular to the centerline of culvert (counter-clockwise positive). See Schematic “A”.

SCHEMATIC “B” – PLAN VIEW
CULVERT ALIGNMENT

NOTE: For Culvert skew see Contract Plans.

| TABLE 1 – MINIMUM BAR SPlice LENGTHS FOR LONGITUDINAL REINFORCING |
|------------------|------------------|------------------|------------------|------------------|
| BAR SIZE | SPlice CLASS 1 | BAR SIZE | SPlice CLASS 1 | BAR SIZE | SPlice CLASS 1 |
| (0.455 in | 0.655 in | (0.455 in | 0.655 in | (0.455 in | 0.655 in |
| -500 psi | 5500 psi | -500 psi | 5500 psi | -500 psi | 5500 psi |
| M6 | 5 | M6 | 5 | M6 | 5 |
| M10 | 10 | M10 | 10 | M10 | 10 |
| M12 | 12 | M12 | 12 | M12 | 12 |

TABLE 1 NOTE: Splice lengths are based on an AASHTO Class B tension lap splice for the Specification Section 346 concrete class shown.

INSTRUCTIONS TO DESIGNER
1. Designs for box culverts shown in this Index are to be produced only by computer analysis, utilizing the Department’s LRFD Box Culvert Program. Designs are to be limited to the live loads and dimensional/restraints shown in the General Notes of this Index and to the fill on the corridor(s), as shown in the Contract Plans.

2. Headwalls with skew angles less than 90° or greater than 90° require special design authorization. Other design should be considered. Contact the District Drainage Engineer to obtain authorization.

CONCRETE BOX CULVERT DETAILS (LRFD)
CULVERT BARREL NOTES:
1. Space Bars 110 and 112 with a bar in each corner, and at the 6" of interior walls (for multiple barrel culverts only), and the remaining bars placed at equispacing shown in the Contract Plans. Adjust last bar spacing when required.
2. Place Bars 111 and 114 at spacing shown in the Contract Plans evenly between Bars 109 and 111.
3. Locate the first transverse bar from the ends of the culvert at one half the bar spacing, but provide the minimum reinforcement cover and not greater than 4" clear.

TYPICAL SECTION THRU SINGLE BARREL CULVERT

WINGWALL ELEVATION – Variable Height
(Left End shown - other corners similar)

WINGWALL SECTION A-A
1. For small angles, the Contractor may elect to fill the area between the box and the wingwall footing with unconfined concrete. For wingwall skew angles less than 95 degrees, field bend wingwall reinforcement as necessary while maintaining cover. No additional pavement will be made for this work.

2. Location of Construction Joint determined by WP at theoretical intersection of:
   - Inside face of Headwall and outside face of Box Exterior Wall, for SW<90°.
   - Outside face of Wingwall and outside face of Box Exterior Wall, for SW>90°.

3. Provide 6" chamfer when angle "A" is greater than 45°. Maintain minimum wall thickness. Field adjust reinforcing to maintain cover.

4. Wingwall Skew Angles (SW) are measured from the adjacent box exterior wall to the wingwall.

5. Turn or extend Wingwall/Cutoff Walls as necessary to meet Box Cutoff Wall.

6. Provide additional reinforcement in the top of the top slab below traffic railings to ensure a minimum area of 0.80 sq. ft./ft. transverse reinforcing.

DETAIL I
TRAFFIC RAILING ATTACHMENT TO HEADWALL

DETAIL J
LEFT HEADWALL SECTION
(Right Headwall similar)

DETAIL K
LEFT CUTOFF WALL SECTION
(Right Cutoff Wall similar)
**INLET TYPE A GRATE**

**NOTES:**
1. Cost of Steel Grating to be included in cost of Box Culvert.
2. Reinforcing steel 2" clear for Slightly & Moderately Aggressive Environments, and 3" clear for Extremely Aggressive Environments.

---

**PLAN**

**INLET IN TOP OF BOX CULVERT**

The number is to be placed in the center of the top surface of all bridge culvert headwalls. For Bridge Number see Plan/Profile sheet(s).

**TOP VIEW OF HEADWALL**

---

**SECTION THRU RECESSED V-GROOVE TO FORM INSERBED FIGURES**

Black Plastic Figures 3" in height as approved by the Engineer may be used in lieu of numbers formed by 3/8" V-Grooves. V-Grooves shall be formed by preformed figures.

---

**INLET TYPE B GRATE**

---

**ASPHALTIC CONCRETE BASE**

**NOTE:** Extra base is required when cross box culverts are located on facilities subject to high speed traffic (>45 mph) or high traffic volumes (>1600 ADT) and the cover is within the range specified in the notation above.

---

**EXTRA BASE FOR BOX CULVERTS CROSSING UNDER FLEXIBLE PAVEMENT**

---

**CONCRETE BOX CULVERT DETAILS (LRFD)**