# Illinois Tollway Standard Drawing Revisions

## Section B

### Drainage Structures, Curbs & Gutter

<table>
<thead>
<tr>
<th>Standard</th>
<th>Modification Summary</th>
<th>Effective: 03-01-2019</th>
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<tbody>
<tr>
<td>B1</td>
<td>Gutter and Curb Details</td>
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<td></td>
<td>Noted that the gutter depth shall match the paved shoulder depth (Note 12).</td>
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<td></td>
<td>Noted that the depth of concrete gutter overlay is variable and the top of gutter shall match the top of new shoulder overlay.</td>
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<td>Noted that the gutter depth shall match the paved shoulder depth (Note 12).</td>
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| B2       | Type G-2 and G-3 Gutter Transitions |                             |
|          | Noted that the gutter depth shall match the paved shoulder depth (Note 7). |                             |
|          | Noted that the gutter depth shall match the paved shoulder depth (Note 7). |                             |

| B3       | Type G-2/G-3 Gutter Transition at Traffic Barrier Terminal, Type T6 |                             |
|          | Added sheet to show transition to constant-slope concrete parapet. |                             |
|          | Added sheet to show transition to constant-slope concrete parapet. |                             |
|          | Added sheet to show transition to constant-slope concrete barrier. |                             |
|          | Previously Sheet 1. Noted that the gutter depth shall match the paved shoulder depth (Note 10). |                             |
|          | Previously Sheet 2. Noted that the gutter depth shall match the paved shoulder depth (Note 10). |                             |
|          | Previously Sheet 3. Noted that the gutter depth shall match the paved shoulder depth (Note 10). |                             |

| B6       | Headwall Type III 18''-24''-30''-36''-42''-48''-54''-60'' For 1:3, 1:4, 1:6, and 1:10 Slopes |                             |
|          | Added missing units in inches to Restraint Angle Detail. |                             |

| B8       | Catch Basins Type G and Type G Modified, Frames and Grates |                             |
|          | Noted the maximum height of the Type G-2, Type G-3, and Type G-3 Modified Catch Basins as 9'-0". |                             |
|          | Noted that the frame and grate rim elevation and offset is measured at the edge of shoulder (Note 14). |                             |
|          | Outlet pipe was redrawn to show the minimum 2'-0" sump. Note 6 was reworded. |                             |
|          | Outlet pipe was redrawn to show the minimum 2'-0" sump. Note 6 was reworded. |                             |

| B10      | Sloped Headwalls Type III Details |                             |
|          | Added dimensions and quantities for the Double Sloped Headwall Type III. |                             |

| B24      | Pipe Underdrains |                             |
|          | Revised Pipe Underdrain outlet details to show 45 degree bends or 90 degree elbow. |                             |
|          | Revised Pipe Underdrain outlet details to show Double Sloped Headwall Type III. |                             |
|          | Added detail for Pipe Underdrain outlet on high fill slope. |                             |
|          | Added chemically stabilized subgrade layer below subgrade aggregate. |                             |

### New Sheet
- Added sheet to show transition to constant-slope concrete parapet.

### Retired Standard
- Noted that the gutter depth shall match the paved shoulder depth (Note 7).
- Noted that the gutter depth shall match the paved shoulder depth (Note 10).

### Frame and Grate Type 21A
- Noted that the gutter depth shall match the paved shoulder depth (Note 12).
Notes:
1. For concrete curbs, type C transitions, the leading edge of curb in the direction of traffic shall begin flush with adjacent pavement or shoulder surface and transition to full height at the rate of one inch vertical to one foot horizontal.
2. Gutter transition details
   - Traffic barrier terminal type T1 (special) B-59
   - Traffic barrier terminal type T3 (special) B-32
   - Traffic barrier terminal type T6 (special) B-3
3. All slopes are expressed as units of vertical displacement to units of horizontal displacement v/h.
4. Reinforcement steel shall be accurately placed and firmly held in the position specified using epoxy coated steel chairs. Chair spacing shall not exceed 4'-0".
5. Gutter reinforcement shall be placed 8" above bottom of gutter following the subgrade slope.
6. Other gutter and curb transition details will be shown on the plans.
7. Continuous #4 bars shall be lapped a minimum of 1'-1".
8. For concrete gutter overalls, crack control joints shall be placed at locations of underlying joints and working cracks.
9. Gutter crack control joints to align in prolongation with pcc shoulder joints where existing. Crack control joints shall be sealed full depth and sealed in accordance with the standard specifications.
10. Expansion joints shall be constructed in gutter at maximum joint spacing of 60'-0". See expansion joint detail on sheet 2 of this standard.
11. Gutter removal to be paid as gutter removal special.
12. Gutter depth shall match paved shoulder depth.

**Notes:**
- See Note 11
- See Note 12

**Gutter Depth Shall Match Paved Shoulder Depth.**

**Gutter Removal To Be Paid As Gutter Removal Special.**
GUTTER TRANSITION TERMINATION

SECTION A-A

ASPHALT SHOULDER TRANSITION

SECTION B-B

GUTTER, TYPE G-3 TRANSITION

SECTION C-C

GUTTER, TYPE G-2 TRANSITION

EXPANSION JOINT

CRACK CONTROL JOINT

EXPANSION-CRACK CONTROL JOINTS

GUTTER, TYPE SPECIFIED

NOTE:

SEE SHEET 1 OF THIS SERIES FOR NOTES.
GUTTER TRANSITION NOTES:

1. PROVIDE 1" EXPANSION JOINT WITH PREFORMED JOINT FILLER BETWEEN TRANSITION SECTION AND WINDWALL, BARRIER, OR PARAPET.

2. SEE STANDARD B3 FOR GUTTER TRANSITIONS AT BRIDGE APPROACH.

3. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT (V:H).

4. REINFORCEMENT BARS SHALL BE ACCURATELY PLACED AND FIRMLY HELD AT THE POSITION USING EPOXY COATED CHAIRS. CHAIR SPACING SHALL NOT EXCEED 4'-0".

5. GUTTER REINFORCEMENT BARS SHALL BE PLACED 3" ABOVE BOTTOM OF GUTTER FOLLOWING SUBGRADE SLOPE.

6. CONTINUOUS #4 BARS SHALL BE LAPPED A MINIMUM OF 7'-0".

7. GUTTER DEPTH SHALL MATCH PAVED SHOULDER DEPTH.

GUTTER TRANSITION AT ENTRANCE RAMP TERMINALS

GUTTER TRANSITION AT EXIT RAMP TERMINALS

APPROVED DATE

CHIEF ENGINEERING OFFICER

STANDARD B2-08
GUTTER, TYPE G-3 TRANSITION AT BRIDGE DEPARTURE

GUTTER, TYPE G-2 AT BRIDGE DEPARTURE

NOTE 1

SHOULDER, BARRIER OR WINGWALL, LEVEL LINE

NOTE 7

6" MIN.
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6 TO CONSTANT-SLOPE CONCRETE PARAPET

Gutter Transition Notes:
1. Slope to match adjacent shoulder slope.
2. Provide 1" expansion joint with preformed joint filler between transition section and wingwall or barrier wall.
3. Installation on curved wingwalls similar.
4. For details of traffic barrier terminal, type T6, see Illinois Tollway standard C6.
5. Gutter transistions shall be constructed to fit the standard location of the traffic barrier terminal, type T6.
6. All slopes are expressed as units of vertical displacement to units of horizontal displacement (V: H).
7. Gutter section shown at barrier wall shall match profile and vertical face of barrier, modify gutter face to match other barrier/parapet profiles. See Illinois Tollway Standard C4.
8. Continuous #4 bars shall be lapped a minimum of 1'-1".
9. Match shoulder slope in front of parapet or barrier.
10. Gutter depth shall match paved shoulder depth.

NOTE 9:
FILLER (1"
PREFORMED JOINT
BARS (TYP.)
EPOXY COATED
CONTINUOUS #4

NOTE 10:
AGGREGATE SHOULDER SPECIAL TYPE C

NOTE 7:
TOP FACE OF CURB AT CONCRETE PARAPET (SEE NOTE 7)

NOTE 8:
BARRIER TERMINAL, TYPE T6, SEE ILLINOIS TOLLWAY STANDARD C9.

ILLINOIS TOLLWAY
SPECIAL NOTES
DATE
CHIEF ENGINEERING OFFICER
APPROVED
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6 TO F-SHAPE CONCRETE PARAPET

LEGEND

A AGGREGATE SHOULDERS SPECIAL, TYPE C

NOTE:

SEE SHEET 1 OF THIS SERIES FOR GUTTER TRANSITION NOTES.
**PLAN**

- **Type**: G-3
- **Transition at Traffic Barrier Terminal, Type T6, to F-Shape Concrete Barrier, Single-Face

**ELEVATION**

- **Notes**:
  - See Sheet 1 of this series for Gutter Transition Notes.
  - BAR BARS (TYP.) EPOXY COATED CONTINUOUS #4
  - F-SHAPE CONCRETE BARRIER, F-SHAPE CONCRETE BARRIER, SINGLE FACE
  - F-SHAPE CONCRETE BARRIER, SINGLE FACE
  - PAVED SHOULDER
  - 6" MIN. (SEE NOTE 10)
  - LEVEL LINE
  - SUBGRADE SLOPE
  - F-Shape Concrete Barrier, Single Face
  - Continuous Epoxy Coated Bars (TYP.)
  - 9'-0" FROM CONCRETE BARRIER

**Legend**

- A: Aggregate Shoulders Special, Type C

**Dimensions**

- 2'-0"
- 3'-0"
- 6" MIN. (VARIETY)
- 11" MIN. TO 11" MIN. (VARIETY)
- 2" MIN. TO 1" MIN. (VARIETY)
- 1" MIN. TO 1" MIN. (VARIETY)
- 6" MIN. TO 3" MIN. (VARIETY)
- 1" MIN. TO 1" MIN. (VARIETY)

**Sheets**

- Sheet 6 of 6

**Approval**

- APPROVED DATE: 2-7-2012

**Standard**

- B3-08
CONCRETE FLUME DETAILS

CONCRETE FLUME

NOTES:
1. CONCRETE FLUMES SHALL BE CONSTRUCTED FLUSH WITH THE ADJACENT EXISTING OR PROPOSED SURFACES.
2. CLASS 31 CONCRETE SHALL BE USED THROUGHOUT.
3. WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6
   W4xW4, 58 LBS. PER 100 SQ. FT.
4. EPOXY COATED THE BARS 2'-6" LONG AT 12" O.C. SHALL
   BE PROVIDED AT ALL CONSTRUCTION JOINTS.
5. EPOXY COATED EXPANDED METAL FABRIC OF EQUIVALENT
   STRENGTH MAY BE USED IN LIEU OF WELDED WIRE
   REINFORCEMENT SUBJECT TO ENGINEER'S APPROVAL.
6. THE LOCATION OF THE ANCHOR WALL MAY BE ADJUSTED AS
   DIRECTED BY THE ENGINEER.
7. THE MATERIALS AND CONSTRUCTION OF THE CONCRETE FLUME
   SHALL CONFORM TO THE APPLICABLE PORTIONS OF THE
   STANDARD SPECIFICATIONS.

1. CLASS 31 CONCRETE SHALL BE USED THROUGHOUT.
2. WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6
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5. THE LOCATION OF THE ANCHOR WALL MAY BE ADJUSTED AS
   DIRECTED BY THE ENGINEER.
6. THE MATERIALS AND CONSTRUCTION OF THE CONCRETE FLUME
   SHALL CONFORM TO THE APPLICABLE PORTIONS OF THE
   STANDARD SPECIFICATIONS.

STANDARD SPECIFICATIONS.

THE MATERIALS AND CONSTRUCTION OF THE CONCRETE FLUME
shall conform to the applicable portions of the
standard specifications.

NOTE 1

ADJACENT EXISTING OR PROPOSED SURFACES.

CONCRETE FLUMES SHALL BE CONSTRUCTED FLUSH WITH THE
ADJACENT EXISTING OR PROPOSED SURFACES.

NOTE 2

CLASS 31 CONCRETE SHALL BE USED THROUGHOUT.

NOTE 3

WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6
W4xW4, 58 LBS. PER 100 SQ. FT.

NOTE 4

EPOXY COATED THE BARS 2'-6" LONG AT 12" O.C. SHALL
BE PROVIDED AT ALL CONSTRUCTION JOINTS.

NOTE 5

EPOXY COATED EXPANDED METAL FABRIC OF EQUIVALENT
STRENGTH MAY BE USED IN LIEU OF WELDED WIRE
REINFORCEMENT SUBJECT TO ENGINEER'S APPROVAL.

NOTE 6

THE LOCATION OF THE ANCHOR WALL MAY BE ADJUSTED AS
DIRECTED BY THE ENGINEER.

NOTE 7

THE MATERIALS AND CONSTRUCTION OF THE CONCRETE FLUME
SHALL CONFORM TO THE APPLICABLE PORTIONS OF THE
STANDARD SPECIFICATIONS.
PLAN VIEW OF STRUCTURE LOCATIONS

**FLARED BAR DETAILS**

**NOTES:**

1. All bars shall be bonded to the concrete.
2. All bars shall be bonded to the concrete.
3. All bars shall be bonded to the concrete.
4. All bars shall be bonded to the concrete.
5. All bars shall be bonded to the concrete.
6. All bars shall be bonded to the concrete.
7. All bars shall be bonded to the concrete.
8. All bars shall be bonded to the concrete.
9. All bars shall be bonded to the concrete.
10. All bars shall be bonded to the concrete.
11. All bars shall be bonded to the concrete.

**SECTION B-B**

**SECTION C-C**

**SECTION D-D**

**PLAN AND SECTION A-A**

**SECTION A-A**

**SECTION B-B**

**SECTION C-C**

**SECTION D-D**

**ISOMETRIC VIEW**

**INSTALLATION DETAIL**

**NOTES:**

1. All bars shall be bonded to the concrete.
2. All bars shall be bonded to the concrete.
3. All bars shall be bonded to the concrete.
4. All bars shall be bonded to the concrete.
5. All bars shall be bonded to the concrete.
6. All bars shall be bonded to the concrete.
7. All bars shall be bonded to the concrete.
8. All bars shall be bonded to the concrete.
9. All bars shall be bonded to the concrete.
10. All bars shall be bonded to the concrete.
11. All bars shall be bonded to the concrete.

**NOTE:**

- All bars shall be bonded to the concrete.
### Dimensions and Quantities in One Headwall Type III 1:3 Slope

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### Reinforcement Bars Schedule for One Headwall Type III 1:3 Slope

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### Reinforcement Bars Schedule for One Headwall Type III 1:6 Slope

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### Reinforcement Bars Schedule for One Headwall Type III 1:6 Slope

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### Notes:
- The 36", 42", and 48" bars type 2 shall be spaced full length and cut on the face.
- The bars not cut shall be spaced full length and cut on the face.
- The bars shall be spaced full length and cut on the face.
- All spaces are expressed as units of horizontal displacement and cut on the face.
### Notes:
1. All structural steel shall be AASHTO M270, Grade 36.
2. Galvanizing shall be in accordance with the standard specifications.
3. For placement of grates, see Sheet 1 in this series.
4. All tables and quantities are for single headwall type III.
5. All slopes are expressed as units of vertical displacement at intervals of horizontal displacement from.

### Typical Grate

**Headwall Type III End Entrance 1:10 Slope**

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**Headwall Type III End Entrance 1:20 Slope**

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**Headwall Type III End Entrance 1:30 Slope**

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**Headwall Type III End Entrance 1:40 Slope**

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### TYPICAL GRATE

Section E-E

**Dimensions and Quantities in One Headwall Type III End Entrance 1:10 Slope**

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**Dimensions and Quantities in One Headwall Type III End Entrance 1:20 Slope**

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**Dimensions and Quantities in One Headwall Type III End Entrance 1:30 Slope**

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**Dimensions and Quantities in One Headwall Type III End Entrance 1:40 Slope**

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</tr>
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</table>
CATCH BASIN TYPE G-4

NOTES:

1. See Sheet 1 of this series for additional notes.
2. Catch basins Type G-4 shall be used in tangent sections and on the low side of super-elevated pavement.
3. Catch basins Type G-4 shall be provided with a reinforced concrete slab top as detailed on this drawing.
4. Catch basins Type G-4 shall be provided with a reinforced concrete slab top as required.
5. Mortar or sealer shall be used when a precast reinforced concrete lid is used.
6. Frame and grate rim elevation and offset measured at the edge of shoulder.
7. Steel bars @ 8" CTR.
8. All concrete shall be Class C concrete.
9. Distance from outlet pipe to roadway to be verified by engineer.
CATCH BASIN TYPE G-5

NOTES:
1. See Sheet 1 of this series for additional notes.
2. Catch basins Type G-5 shall be used in tangent sections and on the low side of super-elevated pavement.
3. Catch basins Type G-5 shall be provided with a reinforced concrete slab top as detailed on this drawing.
4. Catch basins Type G-5 shall be used when gutter, Type G-3 is provided.
5. Mortar or sealer shall be used when a precast reinforced concrete lid is used.
6. Frame and grate rim elevation and offset measured at the edge of shoulder.
7. 608 mm, Outfall pipe for Type G-5 catch basin.
8. All concrete shall be Class SI Concrete.
9. Distance from e-outfall pipe to e-roadway to be identified by engineer.
NOTE:
SEE SHEET 1 OF THIS SERIES FOR NOTES.
STIRrup Height Table

For Double SLOped HEADwall Type III

1 TO 3 SLOpe AND C=1'-11"

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<td>d3 E</td>
<td>18'-3&quot;</td>
<td>18'-5&quot;</td>
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<tr>
<td>d4 E</td>
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<td>22'</td>
</tr>
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<td>d5 E</td>
<td>25'-1&quot;</td>
<td>25'-3&quot;</td>
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<td>7'-6&quot;</td>
<td>7'-6&quot;</td>
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1 TO 4 SLOpe AND C=1'-11"

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<td>d7 E</td>
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1 TO 6 SLOpe AND C=1'-11"

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<td>18'-4&quot;</td>
<td>18'-6&quot;</td>
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<tr>
<td>d3 E</td>
<td>22'-3&quot;</td>
<td>22'-5&quot;</td>
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<tr>
<td>d4 E</td>
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<td>26'</td>
</tr>
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<td>d5 E</td>
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<td>10'-6&quot;</td>
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</tr>
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1 TO 4 SLOpe AND C=2'-1"

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<td>d3 E</td>
<td>24'-3&quot;</td>
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<td>12'-6&quot;</td>
</tr>
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<td>d7 E</td>
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<tr>
<td>d9 E</td>
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1 TO 6 SLOpe AND C=2'-1"

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<td>d3 E</td>
<td>26'-3&quot;</td>
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<tr>
<td>d4 E</td>
<td>30'</td>
<td>30'</td>
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<tr>
<td>d5 E</td>
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<td>d6 E</td>
<td>14'-6&quot;</td>
<td>14'-6&quot;</td>
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<td>d7 E</td>
<td>12'-8&quot;</td>
<td>12'-8&quot;</td>
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<tr>
<td>d8 E</td>
<td>10'-10&quot;</td>
<td>10'-10&quot;</td>
</tr>
<tr>
<td>d9 E</td>
<td>8'-2&quot;</td>
<td>8'-2&quot;</td>
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</tbody>
</table>

Notes:
1. The double sloped headwall shall be constructed flush with existing or proposed slope.
2. Class SI concrete shall be used throughout.
3. All reinforcement bars shown shall be epoxy coated.
4. Bar bending details are dimensioned out to out of bars.
5. Cover from face of concrete to face of reinforcement bar shall be 3" for surfaces formed against earth and 2" for all other surfaces unless otherwise shown.
6. Precast unit use is optional. The entire structure may be cast in place.
7. After the precast sloped headwall has been placed, the space between the headwall and pipe shall be completely filled with an approved non-shrink grout with a minimum 28-day compressive strength of 500 psi.
### SLOPED HEADWALLS

**TYPE III DETAILS**

#### STANDARD B10-10

**APPROVED DATE**

**CHIEF ENGINEERING OFFICER**

2-7-2012

---

**FOR DOUBLE SLOPED HEADWALL TYPE III**

**DIMENSIONS AND QUANTITIES**

**SLOPE**

1 TO 3

**DIMENSIONS**

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<tr>
<th>Pipe L</th>
<th>A</th>
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<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>Dim.</th>
<th>Cu Yd</th>
<th>Concrete</th>
<th>Mark</th>
<th>Size</th>
<th>No</th>
<th>Length</th>
<th>Lb</th>
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<tbody>
<tr>
<td>(2) - 6&quot; Pipe on (1) - 8&quot; Pipe</td>
<td>1'-5&quot;</td>
<td>6&quot;</td>
<td>1'-11&quot;</td>
<td>7'-8&quot;</td>
<td>3'-10&quot;</td>
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<td>8&quot;</td>
<td>2'-1&quot;</td>
<td>1'-7&quot;</td>
<td>3'-10&quot;</td>
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**SLOPE**

1 TO 4

**DIMENSIONS**

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<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>Dim.</th>
<th>Cu Yd</th>
<th>Concrete</th>
<th>Mark</th>
<th>Size</th>
<th>No</th>
<th>Length</th>
<th>Lb</th>
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<td>6&quot;</td>
<td>1'-11&quot;</td>
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**DIMENSIONS AND QUANTITIES**

**FOR DOUBLE SLOPED HEADWALL TYPE III**

**SLOPE**

1 TO 4

**DIMENSIONS**

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<th>C</th>
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<th>M</th>
<th>L</th>
<th>W</th>
<th>Dim.</th>
<th>Cu Yd</th>
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**ILLINOIS DOTWAY**

**SLOPED HEADWALLS**

**TYPE III DETAILS**

**STANDARD B10-10**
NOTES:

1. OUTLET PIPES AND PREFORMED CHANNEL INLETS SHALL BE SLOPED AT 4% OR STEEPER TOWARD OUTLET REGARDLESS OF THE SURFACE SLOPE.

2. TRENCH DRAIN MAY BE STUBBED DIRECTLY INTO DRAINAGE STRUCTURES OR OUTLET PIPES MAY BE USED TO CONNECT TRENCH DRAIN TO DRAINAGE STRUCTURES.

3. TRENCH EXCAVATION MUST ALLOW FOR A MINIMUM OF 12 INCHES OF CONCRETE TO BE PLACED UNDER AND ALONGSIDE THE TRENCH DRAIN CHANNEL SYSTEM.

4. THE FINISHED LEVEL OF CONCRETE MUST BE APPROXIMATELY 1/8" ABOVE THE TOP OF THE DRAIN CHANNEL.

5. TRENCH DRAINS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS DETAILS AND SPECIFICATIONS.

6. PROVIDE 1/8" EXPANSION JOINT WITH PREFORMED JOINT FILLER BETWEEN PAVED SHOULDER AND TRENCH DRAIN ENCASMENT.

7. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL PLACEMENT (V:H).

8. WHEN THE CONCRETE ENCASMENT FOR TRENCH DRAIN IS WITHIN 6" OF THE PAVEMENT, REPLACE THE GORE SURFACING WITH CLASS 53 CONCRETE 9" DEPTH. PAY ITEM: PORTLAND CEMENT CONCRETE SHOULDERS 9".

SECTION A-A
TRENCH DRAIN INSTALLATION

**MAXIMUM ROLLOVER AND MAXIMUM SLOPE FROM EDGE OF SHOULDER VARY FROM THE PHYSICAL NOSE TO THE GORE NOSE ACCORDING TO THE FOLLOWING:**

FOR EXIT RAMPS:
** 5% MAX ROLLOVER AND ** 9% MAX SLOPE FROM EDGE OF SHOULDER

FOR ENTRANCE RAMPS:
** 7% MAX ROLLOVER AND ** 10% MAX SLOPE FROM EDGE OF SHOULDER
# Pipe Arch and Elliptical Pipe Culverts

For pipe arch or elliptical pipe culverts select approximate E 1-1/2' pipe sizes shown, not the following actual sizes.

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THE BARS

The selection of the reinforcing bars and the reinforcing elements of concrete in the nominated size is added to the quantities shown.

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## Replacement Steel for One End

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### Notes
- Replacement bars during discussions are cut to cut, 2'-3".
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<td>1. The number of S, T and Z bars shall be proportioned for each foot increase in dimension S.</td>
</tr>
<tr>
<td>2. The length of S and Z bars shall be proportioned for each foot increase in dimension S.</td>
</tr>
<tr>
<td>3. The length of T bars shall be proportioned for each foot increase in dimension T.</td>
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<table>
<thead>
<tr>
<th>SHEET 2 OF 2</th>
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## Table of Dimensions

<table>
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<tr>
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<th>Depth</th>
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<th>Bottom Spacing</th>
<th>Tie Spacing</th>
<th>Headwall Pipe</th>
<th>Cullvert</th>
<th>Pipe Runner Layout</th>
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<td>6&quot;</td>
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## Table of Reinforcement Bars for One End

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<th>Type</th>
<th>Quantity (No.)</th>
<th>Size</th>
<th>Type</th>
<th>Quantity (No.)</th>
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<td>-</td>
<td>7</td>
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<td>-</td>
<td>5</td>
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</tbody>
</table>

---

### Notes
- Reinforcement bars bending dimensions are cut to size.

---

**Pipe Runner Layout**

For the Pipe Runner Layout for Single Culverts, see the following instructions:

1. **Pipe Runner Layout**: The layout of the pipe runner is based on the following considerations:
   - Headwall pipe
   - Cullvert pipe
   - Pipe runner

---

**Pipe Arch and Elliptical Pipe Culverts**

For the Pipe Arch and Elliptical Pipe Culverts, see the following instructions:

1. **Pipe Arch and Elliptical Pipe Culverts**: The layout of the pipe runner is based on the following considerations:
   - Headwall pipe
   - Cullvert pipe
   - Pipe runner

---

**Safety End Treatment**

For the Safety End Treatment, see the following instructions:

1. **Safety End Treatment**: The layout of the pipe runner is based on the following considerations:
   - Headwall pipe
   - Cullvert pipe
   - Pipe runner

---

**Table of Pipe Runners for One End**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Quantity (No.)</th>
<th>Size</th>
<th>Type</th>
<th>Quantity (No.)</th>
<th>Size</th>
<th>Type</th>
<th>Quantity (No.)</th>
</tr>
</thead>
<tbody>
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<tr>
<th>Size</th>
<th>Type</th>
<th>Quantity (No.)</th>
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<tbody>
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<td>-</td>
<td>7</td>
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</tbody>
</table>

---

**Diagram of Pipe Runner Layout**

The diagram shows the layout of the pipe runner for single culverts, including the following components:

- Headwall pipe
- Cullvert pipe
- Pipe runner

---

**Diagram of Pipe Arch and Elliptical Pipe Culverts**

The diagram shows the layout of the pipe arch and elliptical pipe culverts, including the following components:

- Headwall pipe
- Cullvert pipe
- Pipe runner
### Table of Dimensions

<table>
<thead>
<tr>
<th>6 x 6</th>
<th>4 x 4</th>
<th>4 x 2</th>
<th>3 x 3</th>
<th>5 x 3</th>
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<tbody>
<tr>
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</table>

### Table of Reinforcement Bars for One End

<table>
<thead>
<tr>
<th>NO.</th>
<th>LENGTH</th>
<th>1ST WALL</th>
<th>4TH WALL</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
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</thead>
<tbody>
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### Schedule

<table>
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<th>MATERIAL TYPE</th>
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</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Notes

- Reinforcement bars shown are cut to suit.
- Add the following additional reinforcement bars:
  - #4-T1 bars @ approximately
  - Additional reinforcing bars as required, 18" @ 12" spacing, 15° slope < 6°.

---

**FOR PIPE ARCHES**

- Use the following cut lengths:
  - Nissan
  - Cut 18" @ 12" spacing, 15° slope < 6°.

---

**Pipe Arch and Elliptical Pipe Culverts**

- For pipe of elliptical pipe culverts, select appropriate values for the following cut lengths:
  - Nissan
  - Additional reinforcing bars as required, 18" @ 12" spacing, 15° slope < 6°.

---

**Sheet 2 of 2**

- Standard: BIT-04
### Table of Reinforcement Bars for One End

<table>
<thead>
<tr>
<th>NO.</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>NO.</th>
<th>SIZE</th>
<th>LENGTH</th>
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<tbody>
<tr>
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<td>#4</td>
<td>3'-0&quot;</td>
<td>11</td>
<td>#5</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

### Notes for Tables:

1. THE NUMBER OF #4, #5, AND #6 BARS SHALL BE INCREASED BY 3" FOR EACH INCH OF INCREASE IN LENGTH "Lp".
2. THE NUMBER OF #5 BARS SHOWN IS FOR ONE PIPE; FOR TWO PIPES, THE NUMBER OF #5 BARS SHALL BE INCREASED BY 1 FOR EACH INCREASE OF 5" IN LENGTH "Lp".
3. THE LENGTH OF THE PIPE AND THE BARS SHALL BE INCREASED BY 1'-6" FOR EACH 5" OF INCREASE IN LENGTH "Lp".
4. THE NUMBER OF #7 BARS SHOWN IS FOR ONE PIPE; FOR TWO PIPES, THE NUMBER OF #7 BARS SHALL BE INCREASED BY 1 FOR EACH INCREASE OF 5" IN LENGTH "Lp".

### Diagram

- **K(E) Bars**
- **K1 Bars**
- **K(E) Dowels**
- **K1 Dowels**
- **Field Cutting Diagram**
- **Pipe Runner Layout**
- **D(E) and D(E) Bars**
- **F(E) and F(E) Bars**
- **V(E) and V(E) Bars**
- **T(E) Bars**
NOTES:
1. THE PREFERRED METHOD FOR ACHIEVING EROSION PROTECTION AT END SECTIONS SHALL BE THROUGH THE USE OF PRODUCTS THAT PROMOTE REVEGETATION WITHIN THE AREA OF CONCERN.
2. THICKNESS "t" WILL BE DETERMINED BY THE MANUFACTURER'S RECOMMENDATION FOR THE PRODUCT USED.
3. EROSION PROTECTION PLACEMENT SHALL BE INSTALLED FLUSH WITH ADJACENT GRADE.
4. FOR USE WITH STANDARDS B10 TO B18.
5. STONE RIPRAP SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND DRAINAGE DESIGN MANUAL.
**NOTES:**

1. No bars are to remain in the concrete wingwall.
2. The horizontal expansion bolts shall be of self-drilling and self-tapping type, with a minimum of 3/4" diameter and 4" length. The bolts shall be installed in accordance with the manufacturer's specifications.
3. Cuts in bars in field to fit medians or vertical clearance.

**GENERAL NOTES:**

1. All reinforced concrete sections shall have a 3:4 cut in bar at corners, and all sections shall be extended a minimum of 1 foot below finished ground level.
2. Cover the face of concrete to face of reinforcement shall be of 1/2" thick concrete slab.
3. Construction details shown are for reinforced concrete box culvert sections.
4. Concrete quantities shown are for reinforced concrete box culvert sections.
5. Cutouts are provided by separate plan.
6. All concrete are shown as units of vertical reinforcement to corners or horizontal reinforcement bar.

**TABLE OF BARS IN SLAB 1:4 SLOPE**

**TABLE OF BARS IN TWO WINGWALL 1:4 SLOPE**

**TABLE OF BARS IN ONE WINGWALL 1:4 SLOPE**

**REMOVAL DETAIL**

**SECTION A-A**

**SECTION B-B**

**SINGLE BOX § 84" WIDTH**

**GENERAL NOTES:**

1. Cutouts are provided by separate plan.
2. All concrete are shown as units of vertical reinforcement to corners or horizontal reinforcement bar.
3. All reinforcement bars shall be 2" cold finished flat.

**DATE**

**PRELIMINARY**

**MEANDER TYPE IV**

**CONCRETE BOX CULVERT**

**§ 84" WIDTH**

**STANDARD B20-05**
PLAN VIEW (NO SKEW)
SINGLE BOX CULVERT 84" WIDE

SECTION A-A
END TREATMENT - MULTIPLE OR SINGLE CELL
BOX CULVERT

SECTION B-B

TYPICAL GRATE
(NO SKEW)

GRATE
(WITH SKEW)

GRATING DIMENSIONS AND QUANTITIES
IN ONE HEADWALL TYPE IV
BASED ON A 1 FOOT WIDTH, 1:4 SLOPE, AND NO SKEW

GENERAL NOTES:
1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE BOX CULVERT HEADWALLS.
2. TABLE VALUES ARE FOR SINGLE BOX CULVERTS. DOUBLE THE NUMBER OF GRATES REQUIRED AND ADD AN ADDITIONAL WALL WHEN THICKNESS BEGINS TO BE SMALL OF THE CENTER WALL THICKNESS OF THE BOX CULVERTS.
3. QUANTITIES FOR SKEWED HEADWALLS NOT SHOWN.
4. FOR QUANTITY CALCULATIONS DIMENSION "W" SHALL BE MEASURED IN FEET.
5. QUANTITIES FOR SKEWED HEADWALLS NOT SHOWN.
6. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
7. ALL SIZES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF VERTICAL DISPLACEMENT TYPE.

NOTE:
REINFORCEMENT SPACING AND GRADE SPACING ARE PER UNIT OF BOX CULVERT WIDTH AND DEPTH.

END TREATMENT - MULTIPLE OR SINGLE CELL
BOX CULVERT

SECTION B-B

TYPICAL GRATE
(NO SKEW)

GRATE
(WITH SKEW)

GRATING DIMENSIONS AND QUANTITIES
IN ONE HEADWALL TYPE IV
BASED ON A 1 FOOT WIDTH, 1:4 SLOPE, AND NO SKEW

GENERAL NOTES:
1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE BOX CULVERT HEADWALLS.
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NOTE:
REINFORCEMENT SPACING AND GRADE SPACING ARE PER UNIT OF BOX CULVERT WIDTH AND DEPTH.

END TREATMENT - MULTIPLE OR SINGLE CELL
BOX CULVERT

SECTION B-B

TYPICAL GRATE
(NO SKEW)

GRATE
(WITH SKEW)

GRATING DIMENSIONS AND QUANTITIES
IN ONE HEADWALL TYPE IV
BASED ON A 1 FOOT WIDTH, 1:4 SLOPE, AND NO SKEW

GENERAL NOTES:
1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE BOX CULVERT HEADWALLS.
2. TABLE VALUES ARE FOR SINGLE BOX CULVERTS. DOUBLE THE NUMBER OF GRATES REQUIRED AND ADD AN ADDITIONAL WALL WHEN THICKNESS BEGINS TO BE SMALL OF THE CENTER WALL THICKNESS OF THE BOX CULVERTS.
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6. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
7. ALL SIZES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF VERTICAL DISPLACEMENT TYPE.

NOTE:
REINFORCEMENT SPACING AND GRADE SPACING ARE PER UNIT OF BOX CULVERT WIDTH AND DEPTH.
NOTES:

1. ALL FRAMES AND GRATES SHALL CONFORM TO THE REQUIREMENTS OF ART. 1006.14 FOR GRAY IRON CASTINGS AND TO ART. 1006.15 FOR DUCTILE IRON CASTINGS.

2. FRAME AND GRATE TO BE NEENAH FOUNDRY COMPANY, NEENAH, WIS. EAST JORDAN IRON WORKS TS35 OR APPROVED EQUAL.

3. GRATE SHALL NOT BE BOLTED TO FRAME.
TOP VIEW

FRAMES BOLTED TOGETHER w/ (3) 1/4" X 2" GALV. HEX. HD. BOLTS AND NUT w/ GALV. WASHERS

2 1/8" X 1" SAFETY BAR (2 REQ'D SHOWN IN TOP VIEW ONLY)

3/4" X 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D PER FRAME)

SECTION B-B

(3) BOLT HOLES 3/8" DIA.

SECTION A-A

CAST FRAME

2 1/2" X 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D PER FRAME)

2 1/2" X 1" SAFETY BAR (2 REQ'D SHOWN IN TOP VIEW ONLY)

45° (TYPE)

1/4" BOLT AND NUT w/ GALV. WASHERS

1/4" (2 REQ'D) (SHOWN IN TOP VIEW ONLY)
NOTES:

1. ALL FRAMES AND GRATES SHALL CONFORM TO THE REQUIREMENTS OF ART. 1006.14 FOR GRAY IRON CASTINGS AND TO ART. 1006.15 FOR DUCTILE IRON CASTINGS.

2. FRAME AND GRATE TO BE NEENAH FOUNDRY COMPANY, NEENAH ND, R-3029-V, EAST JORDAN IRON WORKS 7036 OR APPROVED EQUAL.

3. GRATE SHALL NOT BE BOLTED TO FRAME.
CUTTER, TYPE G-2 TRANSITION AND CUTTER, TYPE G-3 TRANSITION
AT TRAFFIC BARRIER TERMINAL, TYPE T1 (SPECIAL)

GENERAL NOTES:
1. CUTTER TRANSITIONS SHALL BE PAID FOR PER FOOT AS CUTTER, TYPE G-2 OR CUTTER, TYPE G-3, AS SPECIFIED IN THE PLANS.
2. REFERENCE ILLINOIS TOLLWAY STANDARD DRAWING C1 FOR ADDITIONAL GUARDRAIL INFORMATION.
3. REFERENCE ILLINOIS TOLLWAY STANDARD DRAWING C6 FOR SHOULDER WIDENING INFORMATION.
GUTTER, TYPE G-2 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T1-A (SPECIAL)

GENERAL NOTES:

1. GUTTER TRANSITIONS SHALL BE PAID FOR PER FOOT AS GUTTER, TYPE G-2, OR AS SPECIFIED IN THE PLANS.

2. REFERENCE ILLINOIS TOLLWAY STANDARD DRAWING C1 FOR ADDITIONAL GUARDRAIL INFORMATION.

3. REFERENCE ILLINOIS TOLLWAY STANDARD DRAWING C12 FOR SHOULDER WIDENING INFORMATION.
NOTES:

1. SLOPED HEADWALL TYPES I AND II SHALL BE CONSTRUCTED ALLOWING EXISTING OR PROPOSED SLOPE.
2. CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
3. ALL REINFORCEMENT BARS SHOWN SHALL BE EPOXY COATED (E).
4. BAR BENDING DETAILS ARE DIMENSIONED OUT TO OUT OF BARS.
5. ALL EXPOSED EDGES SHALL HAVE A 45° CHAMFER.
6. SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT.
7. TYPE I AND II HEADWALLS TO BE USED ONLY FOR SLOPES STEEPER THAN 1:3. DIMENSIONS AND QUANTITIES ARE BASED ON A SLOPE 1:3.
8. MINIMUM OF ONE FOOT BELOW THE FINISHED GROUND.
9. PIPE AND HEADWALL SHALL BE 3" FOR SURFACES COVERED FROM THE FACE OF CONCRETE TO FACE OF EXISTING OR PROPOSED SLOPE.
10. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT.

120 100 80 75 70 60 50 40 30 20 10

NOTES:

1. SLOPED HEADWALL TYPES I AND II SHALL BE CONSTRUCTED ALLOWING EXISTING OR PROPOSED SLOPE.
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120 100 80 75 70 60 50 40 30 20 10

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10. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT.
DEFINED CLEAR ZONE LOCATIONS
PLAN VIEW: NOT TO SCALE

SHIELDED LOCATIONS
PLAN VIEW: NOT TO SCALE

NOTES:
1. INSTALL STONE CHECK DAMS AT 50' SPACING ALONG FURROWS. STONE CHECK DAMS TO CONSIST OF CA-7 STONE, 2" LONG FILLED TO FULL DEPTH OF FURROW.
2. FURROWS TO BE SLICED/TILLED ALONG LEVEL CONTOUR IN BEGINNING.
3. FURROWS SHALL NOT BE INSTALLED IN UNSHIELDED, UNDEFINED CLEAR ZONE LOCATIONS.
4' MANHOLE PLAN  
SHOWING REBAR REINFORCEMENT
NO. 6 ING. 19 BARS
TOP & BOTTOM

BAR C

NO. 4 ING. 19
BAR C

BAR C TOP & BOTTOM (SEE TABLE)

SECTION A-A

SECTION B-B

5' MANHOLE PLAN  
SHOWING REBAR REINFORCEMENT
NO. 6 ING. 19 BARS
TOP & BOTTOM

BAR C

NO. 4 ING. 19
BAR C

BAR C TOP & BOTTOM (SEE TABLE)

5'-0" (1.52 m) LONG
NO. 6 ING. 19 BARS
TOP & BOTTOM

BAR C1

NO. 6 ING. 19
BAR C1

BAR C1 TOP & BOTTOM (SEE TABLE)
SECTION A-A

DIAMETER 6' (1.8 m) & 7' (2.1 m)

MIN. DIAMETER 7'-2" (2.18 m)

SEALER (TYP.) USE MORTAR OR SEALER (TYP.)

TOP & BOTTOM BAR C (TYP.)

SECTION B-B

DIAMETER 7' (2.1 m)

MIN. DIAMETER 8'-4" (2.54 m)

SEALER (TYP.) USE MORTAR OR SEALER (TYP.)

TOP & BOTTOM BAR C (TYP.)

NO. 4 (NO. 13) LENGTH 7'-6" (2.29 m) RADIUS 965 (38"")

NO. 6 (NO. 19) BARS TOP & BOTTOM (SEE TABLE)

TOP & BOTTOM BAR C (TYP.)

NO. 6 (NO. 19) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 4 (NO. 13) AT 12"

TOP MAT IS BOTTOM MAT OF REBAR - (TYP.)

LIFTING DEVICE.

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 8 (NO. 25) BARS TOP & BOTTOM (SEE TABLE)

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 8 (NO. 25) AT 12"

LIFTING DEVICE.

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 8 (NO. 25) BARS TOP & BOTTOM (SEE TABLE)

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 8 (NO. 25) AT 12"

LIFTING DEVICE.

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 8 (NO. 25) BARS TOP & BOTTOM (SEE TABLE)

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 8 (NO. 25) AT 12"

LIFTING DEVICE.

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 8 (NO. 25) BARS TOP & BOTTOM (SEE TABLE)

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 8 (NO. 25) AT 12"

LIFTING DEVICE.

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 8 (NO. 25) BARS TOP & BOTTOM (SEE TABLE)

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN SHOWING REBAR REINFORCEMENT DIRECTION (300) CENTERS EACH NO. 8 (NO. 25) AT 12"

LIFTING DEVICE.
**DIAMETER**

8' (2.4 m) & 9' (2.7 m)

**FLAT SLAB TOP**

8'6" (2.59 m)

**SECTION A-A**

- **MIN.** 9'-6" (2.90 m)
- **CL.** (TYP.) 1-1/4" (40)
- **MIN.** 9" (225)
- **SEALER (TYP.)** USE MORTAR OR BAR C
- **I.D.** 8' (2.4 m)

**SECTION B-B**

- **MIN.** 10'-8" (3.25 m)
- **CL.** (TYP.) 1-1/4" (40)
- **MIN.** 9" (225)
- **SEALER (TYP.)** USE MORTAR OR BAR C
- **I.D.** 9' (2.7 m)

**NO. 4 (NO. 13) LENGTH RADIUS**

8'-6" (2.99 m) 2'-11" (0.89 m)

**TOP & BOTTOM NO. 8 (NO. 25) BARS SHOWING REBAR REINFORCEMENT**

- 8'-6" (2.99 m) 5'-6" (1.68 m) LONG
- 4'-2" (1.27 m) 4'-8" (1.42 m)

**LIFTING DEVICE. TYPICAL LOCATION FOR TOP & BOTTOM NO. 8 (NO. 25) BARS SHOWN. TOP MAT IS BOTTOM MAT OF REBAR**

**NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN**