Illinois Tollway Standard Drawing Revisions

Section B Drainage Structures, Curbs & Gutter

<table>
<thead>
<tr>
<th>Standard</th>
<th>Modification Summary</th>
<th>Effective: 03-01-2021</th>
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</thead>
<tbody>
<tr>
<td>B6</td>
<td>Headwall Type III 18''-24''-30''-36''-42''-48''-54''-60'' For 1:3, 1:4, 1:6, and 1:10 Slopes Sheet 1 Noted in Section A-A that the 'h' bars shall be cut in field to fit. Sheet 2 Adjusted the length of 'h' bars for the Headwall Type III 1:3 Slope.</td>
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<tr>
<td>B10</td>
<td>Sloped Headwalls Type III Details Sheet 1 Added an 8'' Sloped Headwall Type III for 1:3, 1:4, and 1:6 slopes.</td>
<td></td>
</tr>
<tr>
<td>B24</td>
<td>Pipe Underdrains Sheet 1 Added pipe underdrain details for location with barrier.</td>
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New Sheet Retired Standard
1. For concrete curbs, type C transitions, the leading edges of curbs in the direction of traffic shall begin flush with the 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

<table>
<thead>
<tr>
<th>Standard Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-28</td>
<td>Traffic Barrier Terminal Type T1 (Special)</td>
</tr>
<tr>
<td>B-79</td>
<td>Traffic Barrier Terminal Type T1-A (Special)</td>
</tr>
<tr>
<td>B-3</td>
<td>Traffic Barrier Terminal Type T6</td>
</tr>
</tbody>
</table>

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 3" 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 overlays, crack control joints shall be placed at locations of underlying joints and working cracks.

9. Gutter crack control joints are required at saw-cut joints placed in proportion with PCC shoulder joints where existing crack control joints shall be sealed full depth and then filled 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.
GUTTER AND CURB

GUTTER TRANSITION TERMINATION

SECTION C-C

NOTE:

1:10

A
A
B
B
C
C

GUTTER PLAN

EXPANSION JOINT

CONTINUOUS #4 EPOXY COATED DOWEL BARS
(SEE NOTE 9)

CRACK CONTROL JOINTS

CONTINUOUS #6 EPOXY COATED DOWEL BARS

GUTTER TYPE SPECIFIED

EXPANSION CRACK CONTROL JOINTS

SHOULDER

PAVED

SHOULDER

PAVED

GROUND LINE

AGGREGATE SHOULDERS

AGGREGATE SHOULDERS

VARIABLES

VARIABLES

GUTTER, TYPE C-3 TRANSITION

GUTTER, TYPE C-2 TRANSITION

SECTION B-B

ASPHALT SHOULDER TRANSITION

SECTION A-A

GROUND LINE

GROUND LINE

EXPANSION CAP

EXPANSION JOINT

6" MIN. (SEE NOTE 12)

6" MIN. (SEE NOTE 12)

1" WIDTH x 1" DEEP JOINT

FILLER PLACED FULL DEPTH AND WIDTH

CONTINUOUS #6 EPOXY COATED DOWEL BAR

1/8" WIDTH x 1" DEEP JOINT

FILLER PLACED FULL DEPTH AND WIDTH

NOTE:

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

1. PROVIDE 1" EXPANSION JOINT WITH PRECASTED JOINT FILLED BETWEEN TRANSITION SECTION AND MINNOW, 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 3'-0".

7. GUTTER DEPTH SHALL MATCH PAVED SHOULDER DEPTH.

GUTTER TRANSITION AT ENTRANCE RAMP TERMINALS

GUTTER TRANSITION AT EXIT RAMP TERMINALS
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6,
TO CONSTANT-SLOPE CONCRETE BARRIER, SINGLE FACE

LEGEND

A AGGREGATE SHOULDERS SPECIAL, TYPE C

NOTE:
SEE SHEET 1 OF THIS SERIES FOR GUTTER TRANSITION NOTES.
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6 TO F-SHAPE CONCRETE PARAPET

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

- **A** Aggregate Shoulders Special, Type C

**ELEVATION**

- **G-3 Section A-A**
  - G-3 Section B-B
  - G-3 Section C-C
  - G-3 Section D-D

**NOTE:**

- See Sheet 1 of this series for Gutter Transition Notes.
CONCRETE FLUME

NOTES:
1. CONCRETE FLUMES SHALL BE CONSTRUCTED FLUSH WITH THE ADJACENT EXISTING OR PROPOSED SURFACES.
2. CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
3. WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6 W4XW4, 58 LBS. PER 100 SQ. FT.
4. ALL EPOXY COATED TIE BARS 2'-6" LONG @ 12" O/C SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS.
5. EPOXY COATED EXPANDED METAL REINFORCEMENT 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 SI CONCRETE SHALL BE USED THROUGHOUT.
2. WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6 W4XW4, 58 LBS. PER 100 SQ. FT.
3. ALL EPOXY COATED TIE BARS 2'-6" LONG @ 12" O/C SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS.
4. EPOXY COATED EXPANDED METAL REINFORCEMENT MAY BE USED IN LIEU OF WELDED WIRE REINFORCEMENT SUBJECT TO ENGINEER'S APPROVAL.
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.
**Notes:**

1. **Headwall Type III** shall be constructed flush with existing or proposed slope.
2. All reinforcement bars shall be epoxy coated.
3. Bar bending details are dimensioned out to out of bars.
4. All exposed edges shall have a 3/8" - 45° chamfer. Chamfer on vertical edges shall be extended to toe of slope.
5. Epoxy coated bars shall be used for all reinforcement bars.
6. Concrete for the face of concrete to face of reinforcement bar shall be at least 2" thick.
7. All slopes are expressed in terms of horizontal displacement to units or horizontal displacement type.
8. Any dimensions and quantities for the headwall shall be as shown in this detail.
9. Section A-A, B-B, C-C, and D-D may be used for alternate pretcast concrete details and NOTES.
10. Section A-A, B-B, C-C, and D-D may be used for alternate pretcast concrete details and NOTES.
### Dimensions and Quantities in One Headwall Type III 1:10 Slope

- **Type:** 10
- **Height:** 62 in
- **Width:** 18 in
- **Depth:** 18 in

### Dimensions and Quantities in One Headwall Type III 1:4 Slope

- **Type:** 4
- **Height:** 54 in
- **Width:** 48 in
- **Depth:** 32 in

### Dimensions and Quantities in One Headwall Type III 1:3 Slope

- **Type:** 3
- **Height:** 58 in
- **Width:** 36 in
- **Depth:** 25 in

### Dimensions and Quantities in One Headwall Type III 1:6 Slope

- **Type:** 6
- **Height:** 48 in
- **Width:** 25 in
- **Depth:** 17 in

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### Notes:

1. The 2'-0" and 2'-11" pipes, Type 1, shall be extended full length and cut in the field.
2. The line of the 2'-0" and 2'-11" pipes shall be vertical.
3. Quantities in this schedule are based on the cast-in-place design. See Sheet 4 in the drawing for alternate cast-in-place concrete models.
4. "STR." denotes steel bars.
5. All slopes are expressed as parts of vertical displacement, no units of horizontal displacement.
### Grate Dimensions and Quantities in One Headwall Type III End Entrance 1:10 Slope

<table>
<thead>
<tr>
<th>Slope</th>
<th>Type</th>
<th>Number</th>
<th>Length</th>
<th>Diameter</th>
<th>Inside Pipe</th>
<th>Headwall Type</th>
<th>Total</th>
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<tr>
<td>30°</td>
<td></td>
<td>0</td>
<td>2</td>
<td>8'-7&quot;</td>
<td>60&quot;</td>
<td>1:10 SLOPES</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>2</td>
<td>9'-11&quot;</td>
<td>54&quot;</td>
<td>1:10 SLOPES</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>10'-7&quot;</td>
<td>48&quot;</td>
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<td></td>
<td></td>
<td>0</td>
<td>2</td>
<td>11'-0&quot;</td>
<td>42&quot;</td>
<td>1:10 SLOPES</td>
<td>2</td>
</tr>
</tbody>
</table>

**NOTES:**
1. All structural steel shall be AASHTO M270, Grade 36 or 50.
2. Graveling shall be in accordance with 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 horizontal displacement to units of vertical displacement.
**CATCH BASIN, TYPE B**

**FRAME AND GRATE DETAIL**

**PLAN**

**SECTION B-B**

**SECTION A-A**

**HALF PLAN**

**SECTION C-C**

**FRAME AND GRATE DETAIL**

**TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE**

**NOTES:**

1. FOR MATERIALS AND CONSTRUCTION REQUIREMENTS OF THE CATCH BASIN, REFER TO THE STANDARD SPECIFICATIONS.

2. FRAME AND GRATE FOR CATCH BASIN TYPE B SHALL BE JORDAN IRON WORKS VS560-1 OR APPROVED EQUAL.

3. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.

**ILLINOIS TOLLEWAY**

**APPROVED DATE 2-7-2012**

**CHIEF ENGINEERING OFFICER**

**STANDARD B7-04**
NOTE:
1. Precast concrete units will be acceptable provided they meet all the requirements as shown on this drawing. Native expansion of 0.1% not required for precast units. Fabrication drawings showing pipe openings, reinforcement and other pertinent dimensions will be required for each unit, for approval by the engineer prior to fabrication.
2. Catch basin type G-2 shall be used along ramps where gutter type G-2 is provided.
3. Catch basin type G-3 shall be used where gutter type G-3 is provided.
4. Catch basin type G-3 modified shall be used in pavement sections and on the low side of super-elevated pavements.
5. Catch basin type G-3 modified shall be provided with a reinforced concrete slab top as detailed on this drawing.
6. Type G-2 frame and grate shall be Neenah R-3508-A2, East Jordan Iron Works 1200 or approved equal.
7. Type G-3 frame and grate shall be Neenah inlet for roll type curb R-3508-U2 or East Jordan Iron Works 1200 or approved equal.
8. Type G-3, modified frame and grate shall be Neenah inlet for roll type curb R-3508-A2 or East Jordan Iron Works 1200 or approved equal.
9. Type G-3, modified frame and grate for roll type curb R-3508-B2 or approved equal.
10. Mortar or sealant shall be used when a precast reinforced concrete lid is used.
11. Reinforcement bars designated (E) shall be epoxy coated.
12. EA = Edge of pavement.
13. All concrete shall be Class SI concrete.
14. Frame and grate rim elevation and offset measured at the edge of shoulder.

CATCH BASIN, TYPE G-3, MODIFIED

REINFORCED CONCRETE LID

CATCH BASIN, TYPE G-3, MODIFIED

REINFORCED CONCRETE LID

CATCH BASIN, TYPE G-3, MODIFIED

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

LIFTING LOOP DETAIL

REINFORCED CONCRETE LID

CATCH BASIN, TYPE G-3, MODIFIED

CATCH BASIN, TYPE "G" SERIES

SECTION A-A

SECTION B-B
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 VARIOUS SECTIONS AND ON THE END SIDE OF SUPER-ELEVATED PAVEMENT.
3. CATCH BASINS TYPE G-4 SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS DETAIL ON THIS DRAWING.
4. CATCH BASINS TYPE G-4 SHALL BE USED WHEN GUTTER TYPE G-3 IS PROVIDED.
5. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST CONCRETE LID IS USED.
6. FRAME AND GRATE Rim Elevation and Offset measured at the Edge of Shoulder.
7. 360° Lay-Out Pipe for Type G-4 Catch Basin.
8. All Concrete shall be Class C3 Concrete.
9. Distance from 1 Outfall 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 SUPERELEVATED PAVEMENT.
3. CATCH BASINS TYPE G-5 SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS DETAILLED ON THIS DRAWING.
4. CATCH BASINS TYPE G-5 SHALL BE PROVIDED WHEN OUTLAW TYPE G-1 IS PROVIDED.
5. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET.
6. FRAME AND GRATE LID ELEVATION AND OFFSET MEASURED AT THE EDGE OF SHOULDER.
7. 60¢ MAX. OUTFALL PIPE FOR TYPE G-5 CATCH BASIN.
8. ALL CONCRETE SHALL BE CLASS SI CONCRETE.
9. DISTANCE FROM C. OUTFALL PIPE TO C. ROADWAY TO BE VERIFIED BY ENGINEER.

ALL CONCRETE SHALL BE QUALITY CONCRETE AND MEET THE REQUIREMENTS OF THE SPECIFICATIONS.

REINFORCED CONCRETE LID
TYPE G-3 FRAME AND GRATE

REINFORCED CONCRETE LID
TYPE 20A FRAME AND GRATE

CATCH BASIN TYPE G-5

NOTE 9
SEE NOTE 9 ON SHT. 1

CONSTRUCTION JOINT (TYP.)

STORM SEWER LOCATION AS SHOWN ON PLANS

OUTFALL PIPE

SECTION A-A

SECTION B-B

TYPE G-3 MODIFIED, FRAMES

FRAME AND GRATE RIM ELEVATION AND OFFSET MEASURED AT THE EDGE OF SHOULDER.

REINFORCED CONCRETE LID

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN PLACE.

3" (TYP.)

STORM SEWER LOCATION AS SHOWN ON PLANS

OUTFALL PIPE

SECTION A-A

SECTION B-B

TYPE G-3 MODIFIED, FRAMES

FRAME AND GRATE RIM ELEVATION AND OFFSET MEASURED AT THE EDGE OF SHOULDER.

REINFORCED CONCRETE LID

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN PLACE.

3" (TYP.)

STORM SEWER LOCATION AS SHOWN ON PLANS

OUTFALL PIPE

SECTION A-A

SECTION B-B

TYPE G-3 MODIFIED, FRAMES

FRAME AND GRATE RIM ELEVATION AND OFFSET MEASURED AT THE EDGE OF SHOULDER.

REINFORCED CONCRETE LID

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN PLACE.

3" (TYP.)

STORM SEWER LOCATION AS SHOWN ON PLANS

OUTFALL PIPE

SECTION A-A

SECTION B-B

TYPE G-3 MODIFIED, FRAMES

FRAME AND GRATE RIM ELEVATION AND OFFSET MEASURED AT THE EDGE OF SHOULDER.

REINFORCED CONCRETE LID

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN PLACE.

3" (TYP.)

STORM SEWER LOCATION AS SHOWN ON PLANS

OUTFALL PIPE

SECTION A-A

SECTION B-B

TYPE G-3 MODIFIED, FRAMES
### TABLES FOR DIMENSIONS, REINFORCEMENT AND QUANTITIES FOR ONE SLOPED HEADWALL TYPE I

<table>
<thead>
<tr>
<th>Sloped Headwall Type 1</th>
<th>Design No.</th>
<th>Diameter</th>
<th>Length</th>
<th>No.</th>
<th>Dia.</th>
<th>Reinforcement</th>
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### TABLES FOR DIMENSIONS, REINFORCEMENT AND QUANTITIES FOR ONE SLOPED HEADWALL TYPE II

<table>
<thead>
<tr>
<th>Sloped Headwall Type 2</th>
<th>Design No.</th>
<th>Diameter</th>
<th>Length</th>
<th>No.</th>
<th>Dia.</th>
<th>Reinforcement</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Notes:**
1. Sloped headwalls Types I and II shall be constructed flush with existing or proposed slope.
2. Class 3 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 ¾" chamfer, corners on vertical edges shall be bevelled a minimum of one foot below the finished ground line.
6. Cover from the face of concrete to face of reinforcement bars shall be 3" for surfaces formed against earth and 2" for all other surfaces unless otherwise shown.
7. Care shall be exercised in removing any length of existing pipe so the remaining pipe is undamaged and fully functioning.
8. All slopes and expressed as units of vertical displacement to units of horizontal displacement (V:H).
9. Sloped headwalls, Types I and II to be used only for slopes steeper than 10:1. Dimensions and quantities shown are based on a 10:1 slope existing and proposed.
10. All denote pipe diameter of pipe. GD denotes outside diameter of pipe.
NOTES:

1. THE DOUBLE SLOPED HEADWALL SHALL BE CONSTRUCTED FLUSH WITH THE 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. 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. COVER FROM PRECAST SLOPED HEADWALL HAS BEEN PLACED. THE SPACE BETWEEN THE PRECAST HEADWALL AND PIPE SHALL BE COMPATIBLY Filled WITH AN APPROVED NON-SHRINK GROUT WITH A MINIMUM COMPRESSIVE STRENGTH IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

8. THE DOUBLE SLOPED HEADWALL DETAILS SHOWN ON THIS DRAWING ARE FOR USE ONLY WITH PIPE HAVING DIAMETER OR SPAN OF 8" OR LESS.

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

10. THE DOUBLE SLOPED HEADWALL SHALL BE CONSTRUCTED FLUSH WITH EXISTING OR PROPOSED SLOPE.

11. WHERE REQUIRED, WELDED WIRE REINFORCEMENT MAY BE USED AS AN OPTION TO REBAR REINFORCEMENT, DRAWINGS SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

12. SURFACES FORMED AGAINST EARTH AND 2" FOR ALL OTHER SURFACES UNLESS OTHERWISE SHOWN.

13. BAR BENDING DETAILS ARE DIMENSIONED OUT TO OUT OF BARS.

14. REINFORCEMENT, DRAWINGS SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

15. 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.

16. THE ENGINEER.

17. WELDED WIRE REINFORCEMENT MAY BE USED AS AN OPTION TO REBAR REINFORCEMENT, DRAWINGS SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

18. SURFACES FORMED AGAINST EARTH AND 2" FOR ALL OTHER SURFACES UNLESS OTHERWISE SHOWN.

19. BAR BENDING DETAILS ARE DIMENSIONED OUT TO OUT OF BARS.

20. REINFORCEMENT, DRAWINGS SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.


### TABLE 1

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>MARK</th>
<th>SIZE</th>
<th>NO</th>
<th>LENGTH</th>
<th>LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>6” PIPE</td>
<td>(2) -</td>
<td>5”</td>
<td>3”</td>
<td>10”</td>
<td>2”</td>
<td>1”</td>
<td>1”</td>
<td>1”</td>
<td>1”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6”</td>
<td>1’-11”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
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<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>8”</td>
<td>2’-1”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
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<td>*</td>
<td>1’-5”</td>
<td>12</td>
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<tr>
<td></td>
<td>6”</td>
<td>1’-11”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**
- For 2” pipe, use 1” diameter pipe for the first run and 6” diameter pipe for all other runs.
- For 8” pipe, use 6” diameter pipe for the first run and 8” diameter pipe for all other runs.

### TABLE 2

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>MARK</th>
<th>SIZE</th>
<th>NO</th>
<th>LENGTH</th>
<th>LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>6” PIPE</td>
<td>(2) -</td>
<td>5”</td>
<td>3”</td>
<td>10”</td>
<td>2”</td>
<td>1”</td>
<td>1”</td>
<td>1”</td>
<td>1”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6”</td>
<td>1’-11”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>8”</td>
<td>2’-1”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
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<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6”</td>
<td>1’-11”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**
- For 2” pipe, use 1” diameter pipe for the first run and 6” diameter pipe for all other runs.
- For 8” pipe, use 6” diameter pipe for the first run and 8” diameter pipe for all other runs.

### TABLE 3

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>MARK</th>
<th>SIZE</th>
<th>NO</th>
<th>LENGTH</th>
<th>LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>6”</td>
<td>(1) -</td>
<td>6”</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6”</td>
<td>1’-11”</td>
<td>1’-8”</td>
<td>3’-10”</td>
<td>1’-8”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
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<td>a</td>
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<td>1’-5”</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>6”</td>
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<td>1’-8”</td>
<td>3’-10”</td>
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<td>5’-0”</td>
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<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**
- For 2” pipe, use 1” diameter pipe for the first run and 6” diameter pipe for all other runs.
- For 8” pipe, use 6” diameter pipe for the first run and 8” diameter pipe for all other runs.

### TABLE 4

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>N</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>W</th>
<th>MARK</th>
<th>SIZE</th>
<th>NO</th>
<th>LENGTH</th>
<th>LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>6”</td>
<td>(1) -</td>
<td>6”</td>
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</tr>
<tr>
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<td>3’-10”</td>
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<td>5’-0”</td>
<td>5’-0”</td>
<td>5’-0”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
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</tr>
<tr>
<td>8” PIPE</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>(1) -</td>
<td>8”</td>
<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
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</tr>
<tr>
<td></td>
<td>6”</td>
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<td>1’-8”</td>
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<td>1’-8”</td>
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<td>a</td>
<td>*</td>
<td>1’-5”</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**
- For 2” pipe, use 1” diameter pipe for the first run and 6” diameter pipe for all other runs.
- For 8” pipe, use 6” diameter pipe for the first run and 8” diameter pipe for all other runs.

---

**Table 1:** Dimensions and quantities for double sloped headwall type III.

**Table 2:** Dimensions and quantities for single sloped headwall type II.

**Table 3:** Dimensions and quantities for single sloped headwall type I.

**Table 4:** Dimensions and quantities for single sloped headwall type IV.

---

**Notes:**
- Use 1” diameter pipe for the first run and 6” diameter pipe for all other runs.
- Use 6” diameter pipe for the first run and 8” diameter pipe for all other runs.

---

**Conclusion:**
- Review the tables for the appropriate pipe sizes and lengths for your project.
- Consult with your chief engineering officer for specific application guidelines.

---

**References:**
- Chief Engineering Officer.
- Illinois DOT: Sloped Headwalls Type III Details.
- Standard B10-12.
NOTES:
1. Outlet pipes and preformed channel inverts shall be sloped at 0.6% 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 manufacturer's details and specifications.
6. Provide 1" expansion joint with preformed joint filler between paved shoulder and trench drain encasement.
7. All slopes are expressed as units of vertical displacement to units of horizontal placement (V:H).
8. When the concrete encasement 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 (jointed) 9".

**Maximum Rollover and **Maximum slope from edge of shoulder varies 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
**Table of Dimensions**

<table>
<thead>
<tr>
<th>No.</th>
<th>LENGTH.</th>
<th>CULVERT SIZE</th>
<th>VARIES</th>
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<tr>
<td>10</td>
<td>15'-0&quot;</td>
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<td>8</td>
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<td>19'-0&quot;</td>
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<td>4</td>
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<tr>
<td>7</td>
<td>18'-0&quot;</td>
<td>20'-0&quot;</td>
<td>18'-0&quot;</td>
</tr>
</tbody>
</table>

**Safety End Treatment**

- For single culverts over 26 ft.
- For slope 0° SKEW 1:4
- For box culverts with pipe arch or elliptical pipe culverts, select appropriate pipe run.
- For pipe arch, use the following additional data:

---

**NOTE:**

- Replacement bars bending dimensions are cut to cut.
**NOTE:** As shown in Pipe Runner Details, pipe runner may be field drilled in lieu of the slotted hole shown.

All exposed concrete edges shall have a 3⁄8" x 45° chamfer. Chamfer on vertical edges shall be construed as a minimum of 1:4, horizontal edges or edges perpendicular to the face of concrete in the headwall. Cover from the face of concrete to the face of reinforcement shall be not less than 3".

All exposed concrete sections shall be covered with asphalt or equivalent material.

All pipe runs shall have a transverse load of 1000 pounds per lineal foot for the pipe runs in concrete sections unless otherwise shown on the plans.

All slabs are expressed as units of vertical displacement to units of horizontal displacement, square.
### Table of Reinforcement Bars for One End

<table>
<thead>
<tr>
<th>No.</th>
<th>Size</th>
<th>BARS PER BAR</th>
<th>DIMENSIONS</th>
<th>NO.</th>
<th>SIZE</th>
<th>BARS PER BAR</th>
<th>DIMENSIONS</th>
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<th>NO.</th>
<th>SIZE</th>
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<th>DIMENSIONS</th>
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</table>

### Notes for Table of Dimensions

1. The number of S, T and Z bars shall be increased by 4 for each foot of increase in span pipes or box culverts. This number shall be increased by 1 for each multiple of 1 foot over the span.
2. The number of P bars shown are for single and multiple culverts.
3. The number of P bars shown are for single and multiple culverts.
### Table of Dimensions

<table>
<thead>
<tr>
<th>Material</th>
<th>Pipe shape</th>
<th>Overall length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
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<tr>
<td>Steel</td>
<td>Elliptical</td>
<td>20</td>
</tr>
<tr>
<td>Steel</td>
<td>Oval</td>
<td>25</td>
</tr>
</tbody>
</table>

### Table of Reinforcement Bars for One End

<table>
<thead>
<tr>
<th>Material</th>
<th>Pipe shape</th>
<th>Overall length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>Round</td>
<td>10</td>
</tr>
<tr>
<td>Steel</td>
<td>Elliptical</td>
<td>15</td>
</tr>
<tr>
<td>Steel</td>
<td>Oval</td>
<td>20</td>
</tr>
</tbody>
</table>

### Notes
- Reinforcement bars bending dimensions are out to out, not to net.
- The weight of the additional bars and the weight of the concrete are separate calculations.

---

**Pipe Arch and Elliptical Pipe Culverts**

- For pipe or elliptical pipe culverts, select pipe sizes using the following guidelines:
  - Use standard pipe sizes for trapezoidal and rectangular pipe culverts.
  - Use standard pipe sizes for trapezoidal and rectangular pipe culverts.

---

**Field Cutting Diagram**

- For use in preparing field cutting diagrams.

---

**Pipe Runner Layout**

- For use in preparing field cutting diagrams.

---

**Illinois Tollway**

- Standard B15-04

---

**Sheet 2 of 2**

---

**Safety End Treatment for Single Culverts**

- Use S14.1W slope H < 4°
**GENERAL NOTES**

1. All concrete shall meet or exceed the following minimum requirements for concrete:
   - Compressive strength: 3000 psi
   - Water/cement ratio: 0.5
   - Air content: 5%

2. Steel reinforcing shall be epoxy-coated (E) and shall be provided in accordance with the details shown.

3. Concrete quantities shown on this sheet are for example purposes only and actual quantities shall be determined by the contractor or other qualified engineer.

4. All dimensions shown are for reference only and shall be checked by the contractor or other qualified engineer.

**FOR BOX CULVERTS**

- **Concrete:**
  - Compressive strength: 3000 psi
  - Water/cement ratio: 0.5
  - Air content: 5%

- **Steel Reinforcement:**
  - epoxy-coated (E)

**NOTE:**
- Steel reinforcing shall be provided in accordance with the details shown.

**SAFETY END TREATMENT**
- **Concrete:**
  - Compressive strength: 3000 psi
  - Water/cement ratio: 0.5
  - Air content: 5%

- **Steel Reinforcement:**
  - epoxy-coated (E)

**DATE & REVISIONS**
- Sheet 1 of 2
- Standard: 816-05
CHIEF ENGINEER

NOTE:

1. PIPE BARS ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH HOLE SHOWN.

2. PIPE O.D./2 + 1⁄8" MAY BE USED IN IN CONCRETE BOX CULVERT ARE FIELD DRILLED IN A 2" HOLE WITH MINIMUM EMBEDMENT 4".

NOTE:

1. PIPE O.D. IS THE PIPE RUNNER OUTSIDE DIAMETER.

2. SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS SHOWN PER CULVERT SKEW ORIENTATION ON THIS SHEET.

3. ALL CONCRETE SHALL BE CLASS 30.

4. EIFS CONCRETE CEMENT SHALL MEET A 728 CONCRETE SPECIFICATIONS AND SHALL CONTAIN A ROOM AT LEAST 7" IN CONCRETE TO THE FACE OF REINFORCEMENT BARS ON UNITS OF VERTICAL DISPLACEMENT.

5. INSIDE FACE OF WINGWALL TO SUPPORT BAR W ON TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS SHOWN PER CULVERT SKEW ORIENTATION ON THIS SHEET.

6. PROVIDE 2" ACCESS HOLE IN THE WALL.

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

8. NOTE: LENGTH, THE PIPE RUNNER SHALL BE 9" ELEVATION AT WING

9. PIPE RUNNER DETAILS

DETAI B

NOTE:

1. PIPE SI. IS THE PIPE RUNNER CENTER DIAMETER.

2. THIS SHEET.}

3. FOR DESIGN PROTECTION SEE STANDARD B19. C7X

4. ALL REINFORCEMENT BARS SHALL BE G300 GRADE.

NOTE:

1. PIPE SI. IS THE PIPE RUNNER CENTER DIAMETER.

2. THIS SHEET.}

3. FOR DESIGN PROTECTION SEE STANDARD B19. C7X

4. ALL REINFORCEMENT BARS SHALL BE G300 GRADE.

NOTE:

1. PIPE SI. IS THE PIPE RUNNER CENTER DIAMETER.

2. THIS SHEET.}

3. FOR DESIGN PROTECTION SEE STANDARD B19. C7X

4. ALL REINFORCEMENT BARS SHALL BE G300 GRADE.
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 RIPRAPP SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND DRAINAGE DESIGN MANUAL.
NOTES:
1. x(E) bars are to remain at the bottom end of the slope.
2. x(E) bars in the existing expansion joints must be 2" unless otherwise shown.
3. Expansion joints shall be self curing and be cast in place.
4. x(E) bars shall be a minimum of 18" long and be set on concrete with a minimum of 1.0' of cover from the face of concrete to the face of reinforcement.
5. a(E) bars shall be 2" unless otherwise shown.
6. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
7. Concrete cover is shown for reinforcement concrete box sections.
8. x(E) bars are a minimum of 12" on center.
9. All reinforcement bars shall be epoxy coated (E).
10. The expansion joints in this project shall be self-curing.
11. The cover from the face of concrete to face of reinforcement shall be a minimum of 1.0'.
12. All reinforcement bars shall be epoxy coated (E).

All reinforcement bars shall be epoxy coated (E).

GENERAL NOTES:
1. All reinforced concrete boxes shall be a 6" x 6" x 24' concrete box with a minimum of 1.0' of cover from the face of concrete to face of reinforcement.
2. Concrete cover is shown for reinforcement concrete box sections.
3. Concrete cover is shown for reinforcement concrete box sections.
4. x(E) bars shall be self-curing and be cast in place.
5. a(E) bars shall be 2" unless otherwise shown.
6. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
7. All reinforcement bars shall be epoxy coated (E).
8. x(E) bars shall be a minimum of 12" on center.
9. All reinforcement bars shall be epoxy coated (E).
10. The expansion joints in this project shall be self-curing.
11. The cover from the face of concrete to face of reinforcement shall be a minimum of 1.0'.
12. All reinforcement bars shall be epoxy coated (E).

NOTES:
1. All reinforcement bars shall be epoxy coated (E).
2. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
3. Concrete cover is shown for reinforcement concrete box sections.
4. x(E) bars shall be self-curing and be cast in place.
5. a(E) bars shall be 2" unless otherwise shown.
6. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
7. All reinforcement bars shall be epoxy coated (E).
8. All reinforcement bars shall be epoxy coated (E).
9. x(E) bars shall be a minimum of 12" on center.
10. The expansion joints in this project shall be self-curing.
11. The cover from the face of concrete to face of reinforcement shall be a minimum of 1.0'.
12. All reinforcement bars shall be epoxy coated (E).

GENERAL NOTES:
1. All reinforced concrete boxes shall be a 6" x 6" x 24' concrete box with a minimum of 1.0' of cover from the face of concrete to face of reinforcement.
2. Concrete cover is shown for reinforcement concrete box sections.
3. Concrete cover is shown for reinforcement concrete box sections.
4. x(E) bars shall be self-curing and be cast in place.
5. a(E) bars shall be 2" unless otherwise shown.
6. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
7. All reinforcement bars shall be epoxy coated (E).
8. x(E) bars shall be a minimum of 12" on center.
9. All reinforcement bars shall be epoxy coated (E).
10. The expansion joints in this project shall be self-curing.
11. The cover from the face of concrete to face of reinforcement shall be a minimum of 1.0'.
12. All reinforcement bars shall be epoxy coated (E).

NOTES:
1. All reinforcement bars shall be epoxy coated (E).
2. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
3. Concrete cover is shown for reinforcement concrete box sections.
4. x(E) bars shall be self-curing and be cast in place.
5. a(E) bars shall be 2" unless otherwise shown.
6. Cover from the face of concrete to face of reinforcement shall be a minimum of 6" unless otherwise specified.
7. All reinforcement bars shall be epoxy coated (E).
8. All reinforcement bars shall be epoxy coated (E).
9. x(E) bars shall be a minimum of 12" on center.
10. The expansion joints in this project shall be self-curing.
11. The cover from the face of concrete to face of reinforcement shall be a minimum of 1.0'.
12. All reinforcement bars shall be epoxy coated (E).
**REVISIONS**

**DATE** 02-07-12

**STANDARD B21-03**

**BOX CULVERT < 84" WIDTH**

**HEADWALL TYPE IV**

**GRATING FOR CHANGED SECTION B-B**

**DELETED SECTION FROM PLAN VIEW.** 06-01-09

**NOTE:**

- SINGLE BOX CULVERT 84'' WIDE
- PLAN VIEW (NO SKEW)
- PLAN VIEW (WITH SKEW)

**SECTION A-A**

**END TREATMENT - MULTIPLE OR SINGLE CELL**

**BOX CULVERT**

**SECTION B-B**

**GENERAL NOTES:**

1. All dimensions and quantities are for single box culverts unless otherwise noted. For double box culverts, double the number of graates required and add an additional wall. Wall thickness shall be same as the center wall thickness of the box culvert.

2. Pay items are identified by an asterisk (*).

3. Quantities for skewed headwalls not shown.

4. For quantity calculations, dimension "W" shall be measured in feet.

5. All slopes are expressed as units of vertical displacement to units of horizontal displacement.

**GRATING DIMENSIONS AND QUANTITIES**

<table>
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<th>REQUIRED</th>
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<td>36&quot;</td>
<td>2 1/2&quot;</td>
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**DIMENSIONS "W" FOR SLOPE 1:4**

<table>
<thead>
<tr>
<th>GRADE</th>
<th>REQUIRED</th>
<th>EACH</th>
<th>EACH GRADE</th>
<th>DEPTH</th>
<th>WIDTH</th>
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<td>20°</td>
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<td>36&quot;</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

**FLOW LINE**

**BASEMENT DEPTH**

**NOTE:**

- Measured along the slope
- Top of wing wall
- Measured along the slope
- Station, offset and invert elevation moved.

**BARS FOR ONE GRATE REQUIRED**

<table>
<thead>
<tr>
<th>GRADE</th>
<th>REQUIRED</th>
<th>EACH</th>
<th>EACH GRADE</th>
<th>DEPTH</th>
<th>WIDTH</th>
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<tbody>
<tr>
<td>36°</td>
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<td>36&quot;</td>
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</tr>
<tr>
<td>42°</td>
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<td>2</td>
<td>0</td>
<td>36&quot;</td>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>48°</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>36&quot;</td>
<td>2 1/2&quot;</td>
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</tr>
<tr>
<td>60°</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>36&quot;</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

**LENGTH PLUS SKEW LENGTH**

**TYPICAL GRATE (NO SKEW)**

**TYPICAL GRATE (WITH SKEW)**

**APPROVED DATE** 2-7-2012

**CHIEF ENGINEER**

**ILLINOIS DOTWAY**

**GRATING FOR HEADWALL TYPE IV BOX CULVERT < 84" WIDTH**

**STANDARD B21-03**
GENERAL NOTES:
1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE CULVERT HEADWALLS. TO ADAPT THESE TABLES FOR DOUBLE CULVERTS, DOUBLE THE NUMBER OF TABLES PROVIDED AND ADD AN ADDITIONAL WALL. WALL THICKNESS SHALL BE SAME AS THE CENTER WALL THICKNESS OF THE CULVERT.
2. FOR QUANTITY CALCULATIONS EMPLOYED "W" SHALL BE MEASURED IN FEET.
3. QUANTITIES FOR SINGLE WALLS ONLY FOLLOW.
4. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
5. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT AS UNITS OF HORIZONTAL DISPLACEMENT.

GENERAL NOTES:
1. ALL SLOPE DIMENSIONS AND QUANTITIES ARE FOR SINGLE CULVERT HEADWALLS. TO ADAPT THESE TABLES FOR DOUBLE CULVERTS, DOUBLE THE NUMBER OF TABLES PROVIDED AND ADD AN ADDITIONAL WALL. WALL THICKNESS SHALL BE SAME AS THE CENTER WALL THICKNESS OF THE CULVERT.
2. FOR QUANTITY CALCULATIONS EMPLOYED "W" SHALL BE MEASURED IN FEET.
3. QUANTITIES FOR SINGLE WALLS ONLY FOLLOW.
4. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
5. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT AS UNITS OF HORIZONTAL DISPLACEMENT.

DATE: 3-31-2016
REVISIONS: 3-31-2016

REPORTED: THREE HUNDRED SIXTY-TWO (362) HOURS
STANDARD B23-03

APPROVED: NEIL R. KONG
DATE: 2-7-12
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 No. R-3528-V, East Jordan Iron Works TS35 or approved equal.

3. Grate shall not be bolted to frame.

NOTES:

SECTION A-A
CAST FRAME

SECTION B-B

SECTION C-C
DETAIL OF VANES

SECTION D-D
CAST GRADE

TOP VIEW

TOP VIEW
TOP VIEW

CAST FRAME

SECTION A-A

(3) BOLT HOLES 3/4" DIA.

BOLT AND NUT w/ GALV. WASHERS

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

2 22" X 30" X 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D)

2 22" X 30" X 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D SHOWN IN TOP VIEW ONLY)

SECTION B-B

(3) BOLT HOLES 3/4" DIA.

CAST FRAME

BOLT AND NUT w/ GALV. WASHERS

1/4" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D PER FRAME)
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 NO. R-3629-4, EAST JORDAN IRON WORKS 7536 OR APPROVED EQUAL.
3. GRATE SHALL NOT BE BOLTED TO FRAME.

SECTION C-C

SECTION D-D

CAST GRATE

(12 REQ'D)
GENERAL NOTES:

1. GUTTER TRANSITIONS SHALL BE PAID FOR PER FOOT AS GUTTER, TYPE G-2 OR GUTTER, 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.
TABLE OF DIMENSIONS AND QUANTITIES FOR ONE HEADWALL

<table>
<thead>
<tr>
<th>Dimentions</th>
<th>Concrete Class (3)</th>
<th>Reinforced Bar (Pound)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>21&quot;</td>
<td>21&quot;</td>
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<tr>
<td>29&quot;</td>
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</table>

TABLE OF REINFORCING STEEL FOR ONE HEADWALL

<table>
<thead>
<tr>
<th>Bar</th>
<th>21&quot; SL. PIPE</th>
<th>23&quot; SL. PIPE</th>
<th>25&quot; SL. PIPE</th>
<th>27&quot; SL. PIPE</th>
<th>29&quot; SL. PIPE</th>
<th>31&quot; SL. PIPE</th>
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<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
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</tr>
</tbody>
</table>

SLOPE: STEEPER THAN 1:3
LEFT TO FIT IN FIELD
NOTES:
1. SLOPE 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. ALL EXPOSED EDGES SHALL HAVE A 2"-45° CHAMFER.
5. ALL EXPOSED EDGES SHALL HAVE A 2"-45° CHAMFER.
6. CONCRETE SHALL BE COMPACTED.
7. EXISTING PIPE SO THE REMAINING PIPE IS FULLY FUNCTIONING.
8. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT.
9. TABLES I AND II HEADWALLS TO BE USED ONLY FOR SLOPES STEEPER THAN 1:3. DIMENSIONS AND QUANTITIES ARE BASES ON A SLOPE 1:3.
10. I.D. DENOTES INSIDE DIAMETER OF PIPE, O.D. DENOTES OUTSIDE DIAMETER OF PIPE.
11. FOR DESIGN PROTECTION SEE STANDARD B19.
DAMS (TYP.)
STONE CHECK
50' SPACING
SPECIFIED ON PLANS
STATION, OFFSET AND ELEVATION AS
TOP STONE CHECK DAM
REMAIN ON SLOPE TO FORM DAM
FROM FURROW TO EXCAVATION
UNCOMPACTED EARTH
FURROW ONTO SLOPES.
TO EXTEND BEYOND
EROSION CONTROL BLANKET
MIN.

SHIELDED LOCATIONS
PLAN VIEW NOT TO SCALE

NOTES:
1. INSTALL STONE CHECK DAMS AT 50' SPACING ALONG
FURROW. STONE CHECK DAMS TO CONSIST OF CA-7 STONE,
2' LONG FILLED TO FULL DEPTH OF FURROW.
2. FURROW TO BE SLICED/TILLED ALONG LEVEL CONTOUR
BEHAVING.
3. FURROWS SHALL NOT BE INSTALLED IN UNSHIELDED,
UNDEFINED CLEAR ZONE LOCATIONS.

DEFINED CLEAR ZONE LOCATIONS
PLAN VIEW NOT TO SCALE
DIAMETER
4' (1.2 m) & 5' (1.5 m)

SECTION A-A

SECTION B-B

NO. 4 ING. 19) UNLESS OTHERWISE SHOWN

LIFTING DEVICE.
TYPE LOCATION FOR
PLACED AT BOTTOM
REBAR - (TYP.)

NO. 6 (NO. 19) BARS
(SEE TABLE)

BAR C TOP & BOTTOM
(SEE TABLE)

BAR C1 TOP & BOTTOM
(SEE TABLE)

TABLE:

<table>
<thead>
<tr>
<th>BAR</th>
<th>LENGTH</th>
<th>RADUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>6'-6&quot;</td>
<td>22</td>
</tr>
<tr>
<td>C1</td>
<td>6'-4&quot;</td>
<td>22</td>
</tr>
</tbody>
</table>

4' MANHOLE PLAN
SHOWING REBAR REINFORCEMENT
NO. 6 ING. 19) UNLESS OTHERWISE SHOWN

NO. 4 ING. 19)

LENGTH | RADIUS |
-------|--------|
7'-0"  | 32     |
6'-6"  | 26     |
6'-2"  | 22     |
5'-0"  | 18     |
5'-2"  | 18     |

5' MANHOLE PLAN
SHOWING REBAR REINFORCEMENT
NO. 6 ING. 19) UNLESS OTHERWISE SHOWN

NO. 4 ING. 19)

LENGTH | RADIUS |
-------|--------|
7'-0"  | 32     |
6'-6"  | 26     |
6'-2"  | 22     |
5'-0"  | 18     |
5'-2"  | 18     |

APPROVED DATE
CHIEF ENGINEER
3-31-2017
SECTION A-A

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

FLAT SLAB TOP

APPROVED
DATE
CHIEF ENGINEER
3-31-2017

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
7'-2'' (2.18 m)
C L . (TYP.)
1   (40 )

MIN.
6 (150)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)

SEALER (TYP.)
USE MORTAR OR
BAR C

MIN.
8'-4'' (2.54 m)
C L . (TYP.)
1 (40)

MIN.
7 (175)
**DIAMETER**
8' (2.4 m) & 9' (2.7 m)

**FLAT SLAB TOP**

**MIN.**
9'-6'' (2.90 m)

**CLE (TYP.)**
1 (40)

**MIN.**
8 (200)

**SEALER (TYP.)**
USE MORTAR OR BAR C

**I.D.**
8' (2.4 m)

(255)

**SECTION A-A**

NO. 4 (NO. 13) AT 12

(300) CENTERS EACH

NO. 4 (NO. 13) AT 12

(300) CENTERS EACH DIRECTION

SHOWING REBAR REINFORCEMENT
NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN

**TOP & BOTTOM 6'-0" (1.83 m) LONG**
NO. 8 (NO. 25) BARS

**TOP & BOTTOM 5'-6" (1.68 m) LONG**
NO. 8 (NO. 25) BARS

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

**TOP & BOTTOM**

8'-6" (2.59 m)

4'-2" (1.27 m)

4'-8" (1.42 m)

**9' MANHOLE PLAN**

SHOWING REBAR REQUIREMENT
NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN

**NO. 4 (NO. 13) BAR C**

LENGTH
8'-6" (2.59 m)
4'-2" (1.27 m)
4'-8" (1.42 m)

RADIUS
6'-0" (1.83 m)
2'-0" (0.61 m)

**SEALER (TYP.)**
USE MORTAR OR BAR C

**9'-6" (2.90 m)**

**CLE (TYP.)**
1 (40)

**MIN.**
8 (200)

**SEALER (TYP.)**
USE MORTAR OR BAR C

**I.D.**
9' (2.7 m)

(275)

**SECTION B-B**

NO. 4 (NO. 13) AT 12

(300) CENTERS EACH

NO. 4 (NO. 13) AT 12

(300) CENTERS EACH DIRECTION

SHOWING REBAR REINFORCEMENT
NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN

**TOP & BOTTOM 10'-8'' (3.25 m) LONG**
NO. 8 (NO. 25) BARS

**TOP & BOTTOM 10'-6'' (3.20 m) LONG**
NO. 8 (NO. 25) BARS

**TOP & BOTTOM**

8'-6" (2.59 m)

4'-2" (1.27 m)

4'-8" (1.42 m)

**9'-6" (2.90 m)**

**CLE (TYP.)**
1 (40)

**MIN.**
9 (225)

**SEALER (TYP.)**
USE MORTAR OR BAR C

**I.D.**
8' (2.4 m)

(255)

**TYPICAL LOCATION FOR LIFTING DEVICE.**

**TYPICAL LOCATION FOR LIFTING DEVICE.**

**TOP & BOTTOM**

8'-6" (2.59 m)

4'-2" (1.27 m)

4'-8" (1.42 m)