### Section B  Drainage Structures, Curbs & Gutter

<table>
<thead>
<tr>
<th>Standard</th>
<th>Modification Summary</th>
<th>Effective: 03-01-2018</th>
</tr>
</thead>
</table>
| **B1**  | Gutter and Curb Details | Sheet 1 Revised Note 9 to indicate that crack control joints shall be sealed per specifications.  
Sheet 2 Changed the line style to dashed at the shoulder transition. |
| **B2**  | Type G-2 and G-3 Gutter Transitions | Sheet 1 Revised Note 1 to include barrier or parapet. |
| **B3**  | Type G-2/G-3 Gutter Transition at Traffic Barrier Terminal, Type T6 | Sheet 1 Added Note 9 to indicate that the cross slope at Section A-A should match the shoulder slope in front of parapet or barrier.  
Sheet 2 in G-2 Section A-A changed the cross slope from 3% to (See Note 9).  
Corrected the reference to Note 8 at G-2 Section A-A to read (See Note 7).  
Sheet 3 in G-3 Section A-A changed the cross slope from 3% to (See Note 9).  
Corrected the reference to Note 8 at G-3 Section A-A to read (See Note 7). |
| **B5**  | Concrete Flume Details | Sheet 1 Revised Sections A-A and B-B to include a 6" bed of coarse aggregate.  
Made reference to Note 4 in Section A-A.  
Note 8 was removed. |
| **B12** | Trench Drain Detail | Sheet 1 Updated maximum rollover requirements (physical nose to gore nose) at Section A-A to be consistent with roadway design criteria.  
Sheet 2 Updated maximum rollover requirements (physical nose to gore nose) at Section E-E to be consistent with roadway design criteria. |
| **B24** | Pipe Underdrains | Sheet 1 Indicated a minimum 3" thickness of capping stone. |
| **B28** | Gutter Transition at Traffic Barrier Terminal Type T1 (Special) | Sheet 2 Changed the line style to dashed at the asphalt wedge. |
1. For concrete curbs, type C transitions, the leading edges of curb in the direction of traffic shall be 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

<table>
<thead>
<tr>
<th>Standard Drawing</th>
<th>Traffic Barrier Terminal Type T-10 Special</th>
<th>Traffic Barrier Terminal Type T-11 Special</th>
<th>Traffic Barrier Terminal Type T-12</th>
<th>Traffic Barrier Terminal Type T-13 Special</th>
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</thead>
<tbody>
<tr>
<td>B-11</td>
<td>B-30</td>
<td>B-79</td>
<td>B-20</td>
<td>B-30</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 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 overlays, crack control joints shall be placed at locations of underlying joints and working cracks.

9. Gutter crack control joints shall align in prolongation with PCC shoulder joints where existing crack control joints shall be sealed full depth and resealed 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.

NOTES:

- Standard B1-08
- New gutter overlay
- Remaining section of existing gutter
- Cone grade
- Shoulder line
- Adjacent to flexible pavement
- Adjacent to PCC pavement

CONCRETE CURB, TYPE C

(RAMP TOLL PLAZAS ONLY)
**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**

**GUTTER PLAN**

**EXPANSION JOINT**

**CRACK CONTROL JOINT**

**EXPANSION-CRACK CONTROL JOINTS**

**GUTTER, TYPE SPECIFIED**

**NOTE:**

See Sheet 1 of this series for notes.

**DATE:** 2-7-2012
GUTTER TRANSITION AT ENTRANCE RAMP TERMINALS

GUTTER TRANSITION AT EXIT RAMP TERMINALS

GUTTER TRANSITION NOTES:

1. PROVIDE 1'-0" EXPANSION JOINT WITH PREFORMED JOINT FILLETS BETWEEN TRANSITION SECTION AND WINGWALL, BARRIERS, OR PARAPETS.

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 EXPANDED CHAIR. 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 1'-0".
GUTTER, TYPE G-3 TRANSITION AT BRIDGE DEPARTURE

GUTTER, TYPE G-2 AT BRIDGE DEPARTURE

NOTE:
SEE SHEET 1 OF THIS SERIES FOR NOTES.
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6 TO 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 C9.
5. GUTTER TRANSITIONS 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 TO MATCH VERTICAL PROFILE OF TYPE F SAFETY SHAPE. MODIFY GUTTER FACE TO MATCH OTHER 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.

G-3 SECTION A-A
G-3 SECTION B-B
G-3 SECTION C-C
G-3 SECTION D-D

LEGEND
1. AGGREGATE SHOULDERS SPECIAL, TYPE C
2. PAVED SHOULDER
3. EPOXY COATED BARS (TYP.)
4. CONTINUOUS #4 STEEL BARS
5. PREFORMED JOINT FILLER BETWEEN TYPICAL GUTTER TRANSITIONS
6. SLOPE.
7. SLOPE TO MATCH ADJACENT SHOULDER PROFILE
8. FILLER (1"
9. EDGE OF SHOULDER PROFILE
10. FRONT EDGE BOTTOM OF GUTTER
11. GUTTER, TYPE G-3
12. BACK OF GUTTER TAPER 37:1
13. LEVEL LINE
14. BARS (TYP.)
15. EDGE OF SHOULDER PROFILE
16. FRONT OF GUTTER AND EDGE OF SHOULDER PROFILE
17. LEVEL LINE
18. GUTTER FLOW LINE
19. GUTTER TYPE G-3
20. GUTTER TRANSITION NOTES
21. PREFORMED JOINT FILLER (TYP.)
22. FRONT OF GUTTER AND EDGE OF SHOULDER
23. ELEVATION
24. DIRECTION OF TRAFFIC
25. PLAN
26. SECTION
GUTTER, TYPE G-2 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6
TO CONCRETE PARAPET

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

LEGEND

1 AGGREGATE SHOULDERS SPECIAL, TYPE C
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6,
TO CONCRETE BARRIER, SINGLE-FACE

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

LEGEND
A AGGREGATE SHOULDERS SPECIAL, TYPE C
B CONCRETE BARRIER, SINGLE-FACE
C BARS (TYP.) EPOXY COATED CONTINUOUS #4
D PAVED SHOULDER
E EDGE OF SHOULDER PROFILE
F SUBGRADE SLOPE 1:10
G SUBGRADE SLOPE 1:4
H GUTTER FLOW LINE
I FRONT EDGE BOTTOM OF GUTTER
J BACK OF GUTTER
K PLAN
L ELEVATION
M DIRECTION OF TRAFFIC

G-3 SECTION A-A
AT CONCRETE BARRIER, SINGLE-FACE
(SEE NOTE 9)

G-3 SECTION B-B
9' - 0" FROM CONCRETE BARRIER

G-3 SECTION C-C
VARIIES 1" - 1 1/2" TO 1 7/8" VARIOUS SIZES

G-3 SECTION D-D
24' - 0" FROM CONCRETE BARRIER

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

LEGEND
A AGGREGATE SHOULDERS SPECIAL, TYPE C
B CONCRETE BARRIER, SINGLE-FACE
C BARS (TYP.) EPOXY COATED CONTINUOUS #4
D PAVED SHOULDER
E EDGE OF SHOULDER PROFILE
F SUBGRADE SLOPE 1:10
G SUBGRADE SLOPE 1:4
H GUTTER FLOW LINE
I FRONT EDGE BOTTOM OF GUTTER
J BACK OF GUTTER
K PLAN
L ELEVATION
M DIRECTION OF TRAFFIC

G-3 SECTION A-A
AT CONCRETE BARRIER, SINGLE-FACE
(SEE NOTE 9)

G-3 SECTION B-B
9' - 0" FROM CONCRETE BARRIER

G-3 SECTION C-C
VARIIES 1" - 1 1/2" TO 1 7/8" VARIOUS SIZES

G-3 SECTION D-D
24' - 0" FROM CONCRETE BARRIER

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

COARSE AGGREGATE CA-6

SECTION A-A
ADJACENT TO GUTTER

SECTION B-B

NOTE:
7.0 C.Y. CONCRETE / L.F.

OPTIONAL CONSTRUCTION JOINT

COARSE AGGREGATE CA-6

WELDED WIRE REINFORCEMENT (NOTE 3)

#4 TIE BARS 2'-6" LONG @ 12" CENTERS

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

COARSE AGGREGATE CA-6

WELDED WIRE REINFORCEMENT (NOTE 3)

#4 TIE BARS 2'-6" LONG @ 12" CENTERS

#4 EPOXY COATED TIE BARS 2'-6" LONG AT 12" O/C SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS.
### Dimensions and Quantities in One Headwall Type III 1:3 Slope

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<thead>
<tr>
<th>Dimensions</th>
<th>No. of Spans</th>
<th>Concrete</th>
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<tbody>
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<td>14'-8&quot;</td>
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<td>9'-0&quot;</td>
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</tr>
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<tr>
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<td>0</td>
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</tr>
<tr>
<td>4'-0&quot;</td>
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### Notes:
- **Type 1** and **Type 2** bars may be ordered full length and cut in the field.
- The long edges of the 1" and 1 1/4" bars shall be perpendicular.
- Quantities in this drawing are based on the Code's 2" grid. All dimensions in this section are for alternate thickness concrete headwalls.
- "STR." = Standard size bar
- All slopes are expressed as units of vertical displacement per foot of horizontal displacement.
### Typical Grate Dimensions and Quantities in One Headwall Type III End Entrance 1:10 Slope

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<thead>
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<th>Slab No</th>
<th>Headwall Grates</th>
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<tr>
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<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

**Notes:**
1. All structural steel shall be non-galvanized, Grade B or 50.
2. Galvanizing shall be in accordance with the standard specification.
3. For placement of grates, see Sheet 1 in this series.
4. All table dimensions and quantities are for single headwall Type III.
5. All slopes are expressed as units of vertical displacement to units of horizontal displacement. (V: H)
HEADWALL TYPE III ALTERNATE PRECAST CONCRETE DETAILS

GENERAL NOTES:
1. USE OF PRECAST CONCRETE SHOWN IN ELEVATION IS FOR EXAMPLE ONLY. THE LENGTH AND NUMBER OF PRECAST SECTIONS REQUIRED TO CONSTRUCT THE END SECTION SHALL BE DETERMINED BY THE STRUCTURAL ENGINEER.
2. CONTRACTOR SHALL RETAIN THE SERVICES OF AN ILLINOIS LICENSED CONTRACTOR.
3. CONTRACTOR SHALL REVIEW THE DEVICES IN AN ALTERNATIVE CONCRETE PRECAST CONSTRUCTION DESIGNED IN ACCORDANCE WITH THIS SERIES FOR INSTALLATION AND FOR USE. PRECAST SECTIONS TO BE CONSTRUCTED AND DETAILING DETAILS FOR OBJECTION BASED ON CONSTRUCTIONAL, FUNCTIONAL, OR AESTHETIC REQUIREMENTS OF THE CONTRACTOR SHALL BE DEEMED ACCEPTABLE ONLY IF CONSTRUCTED IN ACCORDANCE WITH THIS SERIES.
4. CONTRACTOR SHALL CONSTRUCT THE END SECTION IN ACCORDANCE WITH THE REQUIREMENTS OF THIS SERIES.
5. CONCRETE SEGMENTS SHALL BE VHM-50, OR VM-60 CONCRETE.
6. CONTRACTOR SHALL RETAIN THE SERVICES OF AN ILLINOIS LICENSED CONTRACTOR.
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10. CONTRACTOR SHALL RETAIN THE SERVICES OF AN ILLINOIS LICENSED CONTRACTOR.

CONTRACTOR SHALL REVIEW THE DEVICES IN AN ALTERNATIVE CONCRETE PRECAST CONSTRUCTION DESIGNED IN ACCORDANCE WITH THIS SERIES FOR INSTALLATION AND FOR USE. PRECAST SECTIONS TO BE CONSTRUCTED AND DETAILING DETAILS FOR OBJECTION BASED ON CONSTRUCTIONAL, FUNCTIONAL, OR AESTHETIC REQUIREMENTS OF THE CONTRACTOR SHALL BE DEEMED ACCEPTABLE ONLY IF CONSTRUCTED IN ACCORDANCE WITH THIS SERIES.
CATCH BASIN TYPE B

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 MEYHAN FOUNDRY COMPANY TYPE R-3455C, EAST JORDAN IRON WORKS VS560-1 OR APPROVED EQUAL.
3. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.
REINFORCED CONCRETE LID

CATCH BASIN, TYPE G-3, MODIFIED

NOTES:
1. PRECAST CONCRETE UNITS WILL BE ACCEPTABLE PROVIDED THEY MEET ALL THE REQUIREMENTS AS SHOWN ON THIS DRAWING. BASE EXTENSION OF 3" 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 WILL BE USED ALONG RAMPS WHERE GUTTER TYPE G-2 IS PROVIDED.
3. CATCH BASIN, TYPE G-3 SHALL BE PROVIDED 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 SUPERELEVATED PAVEMENTS.
5. CATCH BASIN, TYPE G-3 MODIFIED SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS DETAILLED ON THIS DRAWING.
6. TYPE G-3 FRAME AND GRATE SHALL BE NEENAH INLET FOR ROLL TYPE CURB R-3501-U OR EAST JORDAN IRON WORKS 7545 OR APPROVED EQUAL.
7. TYPE G-3 FRAME AND GRATE SHALL BE NEENAH R-3508-A2, EAST JORDAN IRON WORKS 7300 OR APPROVED EQUAL.
8. TYPE G-2 FRAME AND GRATE SHALL BE NEENAH INLET FOR ROLL TYPE CURB R-3501-U OR EAST JORDAN IRON WORKS 7545 OR APPROVED EQUAL.
9. TYPE G-2 MODIFIED FRAME AND GRATE SHALL BE NEENAH R-3501-U OR EAST JORDAN IRON WORKS 7545 OR APPROVED EQUAL.
10. CONCRETE LID IS USED.
11. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.
12. E.O.P. = EDGE OF PAVEMENT.
13. ALL CONCRETE SHALL BE CLASS SI CONCRETE.

---

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

NOTE:
POSITION OF STEEL VARY FROM 3'-0" TO 5'-0" MEASURED FROM BACK OF GUTTER LINE.

STORM SEWER SIDE AND LOCATION AS SHOWN ON PLANS

MORTAR GROUT AS REQUIRED (TYPE G-1, G-2 & G-3)

(COLD BENT)

REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.

CATCH BASIN, TYPE G-3, MODIFIED SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS DETAILLED ON THIS DRAWING.

14. CONCRETE LID IS USED.

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

16. ALL CONCRETE SHALL BE CLASS SI CONCRETE.

---

REVISIONS

DATE
APPROVED
CHIEF ENGINEER

REVISIONS
DATE
STANDARD BB-05

SHEET 1 OF 4
CATCH BASIN TYPE G-4

NOTES:

1. See sheet 1 of this series for additional notes.

2. CATCH BASINS TYPE G-4 WILL BE USED IN TANGENT SECTIONS AND ON THE LOW SIDE OF SUPERELEVATED PAVEMENT.

3. CATCH BASINS TYPE G-4 MUST BE PROVIDED IN TANGENT SECTIONS AS SHOWN ON PLANS.

4. CATCH BASINS TYPE G-4 MUST BE USED IN TANGENT SECTIONS AND ON THE LOW SIDE OF SUPERELEVATED PAVEMENT.

5. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST CONCRETE LID IS USED.

6. EDGE OF SHOULDERS, FRAME AND GRATE Rim ELEVATION AND OFFSET MEASURED AT THIS POINT.

7. 36'-0" O.D. OUTFALL PIPE FOR TYPE G-4 CATCH BASIN.

8. ALL CONCRETE SHALL BE CLASS 33 CONCRETE.

9. DISTANCE FROM 1 OUTFALL PIPE TO Q ROADWAY TO BE VERIFIED BY ENGINEER.
The document contains drawings and tables related to slope headwalls of two different types (I and II) with dimensions, reinforcement bars, and quantities for one sloped headwall. It also includes notes on construction requirements, such as ensuring reinforcement is epoxy-coated and urethane-sealed. The tables detail various dimensions and quantities for the headwalls, including pipe internal diameters, lengths, and weights. The drawings illustrate sections and elevations of the headwalls, with labels for various measurements and notes for construction details.
ELEVATION

PLAN - SLOPED HEADWALL

SECTION A-A

SECTION B-B

SECTION C-C

NOTES:

1. THE PRECAST SLOPED HEADWALL SHALL BE COMPLETELY FILLED WITH AN APPROVED NON-SHRINK CONCRETE.

2. ALL CONCRETE SURFACES A MIN. OF 2" THICK).

3. CONCRETE SHALL BE TIPPED TO CLEAR VISIBILITY OR EXISTING OR PROPOSED SLOPE.

4. HEADWALL AND PIPE SHALL BE COMPLETELY FILLED WITH AN APPROVED NON-SHRINK CONCRETE.

5. COVER FROM FACE OF CONCRETE TO FACE OF REINFORCEMENT BAR SHALL BE 3" FOR PRECAST HEADWALL TYPE III.

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

7. WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6x6-W4xW4, 58 LBS. PER 100 SQ. YD. FOR PRECAST HEADWALL TYPE III.

8. THE SLOPED HEADWALL DETAILS SHOWN ON THIS SHEET ARE FOR USE WITH PRECAST HEADWALL TYPE III.

9. ALL SIZES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT.

10. I.D. DENOTES INSIDE DIAMETER OF PIPE. O.D. DENOTES OUTSIDE DIAMETER OF PIPE.

11. NOTES: MARK(E) NO.

DIMENSIONS AND QUANTITIES

FOR ONE SLOPED HEADWALL TYPE III

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*APPROVED WELDED WIRE REINFORCEMENT*
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 SI concrete, 9" depth. Pay Item 10, Portland cement concrete shoulders coated 9".

NOTES 8
VARIES FROM THE PHYSICAL NOSE TO THE GORE NOSE ACCORDING TO THE FOLLOWING:

FOR EXIT RAMPS:
**5% MAX. ROLLOVER** AND **50% MAX. SLOPE FROM EDGE OF SHOULDER**

FOR ENTRANCE RAMPS:
**7% MAX. ROLLOVER** AND **10% MAX. SLOPE FROM EDGE OF SHOULDER**
### Table of Dimensions

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**Pipe Arch and Elliptical Pipe Culverts**

For pipe arch of elliptical pipe culverts select appropriate "S" & "H" from sizes shown. Add the following additional bars:

- **Q(E) Bars**
  - #4 @ 12"
- **U(E) Bars**
  - #4 @ 12"
- **V(E) Bars**
  - #4 @ 12"
- **U(E) Bars**
  - #4 @ 12"

**Concrete**

Concrete in the wedge shall be added to the quantities shown.

**Notes**

- Reinforcement bars bending dimensions are out to out.
- Replacement bars bending dimensions are out to out.
### Table of Dimensions

| S, M, N | L | W | H | Δ | D | Length | n1 | n2 | n3 | n4 | n5 | n6 | n7 | n8 | n9 | n10 | n11 |
|---------|---|---|---|---|---|--------|---|---|---|---|---|---|---|---|---|---|
| 3       | 3 | 2 | 1 | 0 | 0 | 0      | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 4       | 4 | 3 | 2 | 1 | 0 | 0      | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 5       | 5 | 4 | 3 | 2 | 1 | 0      | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 6       | 6 | 5 | 4 | 3 | 2 | 1      | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 7       | 7 | 6 | 5 | 4 | 3 | 2      | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 8       | 8 | 7 | 6 | 5 | 4 | 3      | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

### Table of Reinforcement Bars for One End

| S, M, N | L | W | H | Δ | D | Length | n1 | n2 | n3 | n4 | n5 | n6 | n7 | n8 | n9 | n10 | n11 |
|---------|---|---|---|---|---|--------|---|---|---|---|---|---|---|---|---|---|
| 3       | 3 | 2 | 1 | 0 | 0 | 0      | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 4       | 4 | 3 | 2 | 1 | 0 | 0      | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 5       | 5 | 4 | 3 | 2 | 1 | 0      | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 6       | 6 | 5 | 4 | 3 | 2 | 1      | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 7       | 7 | 6 | 5 | 4 | 3 | 2      | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 8       | 8 | 7 | 6 | 5 | 4 | 3      | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

### Notes
- Reinforcement bars' bending directions are not to scale.

### Diagrams
- **Pipe Arch and Elliptical Pipe Culverts**: Diagram showing the layout and reinforcing bars for pipe arches and circular culverts.
- **Reinforced Concrete Culverts**: Diagram illustrating the placement of reinforcing bars for circular culverts.

### Additional Information
- **Safety End Treatment**: Guidelines for single culverts with slope H ≤ 1.
- **Standard B15-04**: Reference standard for construction practices.
### TABLE OF DIMENSIONS

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### TABLE OF REINFORCEMENT BARS FOR MINIMUM “S” - ONE END

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<td>1-C(E) BAR</td>
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<tr>
<td>1-C(E) BAR</td>
<td>#4-E(E) BARS</td>
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### FIELD CUTTING DIAGRAM

- **0° WALL**
- **30° WALL**

### PIPE RUNNER LAYOUT

- **K(E) BARS**
- **H(E) AND H1(E) DOWELS**
- **U1(E) BARS - ONE PER EACH LENGTH SHOWN**
- **F(E) AND F1(E) BARS**
- **S(E) BARS**
- **Z(E) BARS**
- **T(E) BARS**
- **REINF.**

### NOTES FOR TABLES:

1. **The number of K, S, and H bars shall be increased by one for each foot of increase in dimension “W”.**
2. **The length of K and S bars shall be increased by 30" for each foot of increase in dimension “W”.**
3. **The number of H, K, S, and Z bars for single span pipes shall be increased by 4 for each foot of increase in dimension “W”.**
4. **The number of H, K, S, and Z bars for single span pipes shall be increased by 8 for each 20' pipe or box culvert.**
5. **The number of H, K, S, and Z bars for single span pipes shall be increased by 16 for each 40' pipe or box culvert.**
6. **The length of the bar shall be increased by 1'-1" for each foot of increase in dimension “W”.**
7. **2 bars for 30° wall, 2 bars for 0° wall.**

### SAFETY END TREATMENT

- **FOR SINGLE CULVERTS AND MULTIPLE CULVERTS 25° SLOPE, 14° SLOPE, H 6°**

### STANDARD B16-05

[ILLINOIS TOLWAY]
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<td>4'-6&quot;</td>
<td>4'-6&quot;</td>
<td>6&quot;</td>
<td>40</td>
</tr>
</tbody>
</table>

### Schedule

<table>
<thead>
<tr>
<th>Material Type</th>
<th>No. of Pipes</th>
<th>1st Wall</th>
<th>4th Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4 @ 12&quot;</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>#5</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>#6</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Table of Reinforcement Bars for One End

For Pipe Runners

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Width (in)</th>
<th>Depth (in)</th>
<th>Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>12</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>120</td>
<td>12</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>180</td>
<td>12</td>
<td>6</td>
<td>20</td>
</tr>
</tbody>
</table>

For Box Culverts

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Width (in)</th>
<th>Depth (in)</th>
<th>Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>30</td>
<td>20</td>
<td>12</td>
<td>75</td>
</tr>
</tbody>
</table>

For Pipe Arches

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Width (in)</th>
<th>Depth (in)</th>
<th>Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>18</td>
<td>12</td>
<td>100</td>
</tr>
<tr>
<td>80</td>
<td>18</td>
<td>12</td>
<td>200</td>
</tr>
<tr>
<td>120</td>
<td>18</td>
<td>12</td>
<td>300</td>
</tr>
</tbody>
</table>

### Diagrams

- **Field Cutting Diagram**
- **Pipe Runners Layout**
- **Table of Reinforcement Bars for One End**
- **Notes**
  - Reinforcement bars bending dimensions are to the outside.
  - The weight of the additional bars and the concrete quantities are to be added to the quantities shown.

---

**Sheet 2 of 2**

**Illinois Tollway**

**Standard B17-04**

**Approved by:**

DATE: 6-1-2009

**Field Cutting Diagram**

**Pipe Runners Layout**

**Table of Reinforcement Bars for One End**

**Notes**

- Reinforcement bars bending dimensions are to the outside.
- The weight of the additional bars and the concrete quantities are to be added to the quantities shown.
### Table of Dimensions

<table>
<thead>
<tr>
<th>No.</th>
<th>L</th>
<th>W</th>
<th>D</th>
<th>S</th>
<th>M</th>
<th>D1(E) Bar</th>
<th>L1(E) Bar</th>
<th>R1(E) Bar</th>
<th>F1(E) Bar</th>
<th>K1(E) Bar</th>
<th>U1(E) Bar</th>
<th>H(E) Dowels</th>
<th>K(E) Bars</th>
<th>L(E) Bars</th>
<th>H(E) Dowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
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<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
</tr>
<tr>
<td>2</td>
<td>6'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
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<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
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</tr>
<tr>
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<td>7'</td>
<td>3'</td>
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</tr>
<tr>
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<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
<td>3'</td>
</tr>
</tbody>
</table>

### Table of Reinf. Bars for 1' Run

<table>
<thead>
<tr>
<th>No.</th>
<th>1st Wall</th>
<th>2nd Wall</th>
<th>3rd Wall</th>
<th>4th Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
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<td>5</td>
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<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table of Reinforcement Bars for 1' Run

<table>
<thead>
<tr>
<th>No.</th>
<th>1st Wall</th>
<th>2nd Wall</th>
<th>3rd Wall</th>
<th>4th Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
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</tr>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Field Cutting Diagram

1. **K(E) Bars**
2. **L(E) Bars**
3. **T(E) Bars**
4. **H(E) Dowels**

**Notes for Tables:**

1. The number of H(E) Dowels shall be increased by 1 for each foot of increase in dimension "H".
2. The length of pipe and the bars shall be determined by the length of each piece of pipe in +/− 1/2".
3. The number of P(E) bars shown are for single span pipes or pipe culverts. For each multiple of pipe or box added, the number of bars shall be increased by 2 for each multiple of pipe or box added.
4. T(E) Bars shall be increased by 1/2" for each foot of increase in dimension "W".
5. 2 bars for 10'-8" wall, 2 bars for 45° wall.
6. The length of N(E) Bar shall include 1-1/2" bend length.
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 #10 to #18.
5. Stone riprap shall be in accordance with the standard specifications and drainage design manual.
PLAN

SECTION A-A

NOTES:
1. All dimensions are to be between the centerline of the slope.
2. VEA Expansion bolts shall be used in place of VEA Expansion anchors. The VEA Expansion bolts shall be a minimum of 3/4" in diameter and the concrete box shall be in accordance with the standard specifications.
3. The remaining portion of the VEA Expansion bolts shall be used in the other wall.
4. All reinforcement bars shall be epoxy coated (E).
5. Existing materials shall be removed.
6. Existing apron to be removed.
7. Existing concrete shall be removed.
8. Existing slab shall be removed.
9. Existing materials shall be removed.
10. Existing concrete shall be removed.

REMOVAL DETAIL

SECTION A-A

SECTION B-B

SINGLE BOX >> 84" WIDTH

TABLE OF BARS IN SLAB >> 1/4 SLOPE

NO. OF SPACES

TABLE OF BARS IN ONE WINGWALL >> 1/4 SLOPE

NO. OF REINFORCEMENT BARS

GENERAL NOTES:
1. All reinforced concrete shall be a 1/4" by 1/4" by 1/4" concrete. The minimum reinforcement shall be a minimum of 0.02 reinforcing steel, and a minimum of 0.01 reinforcing steel on the outside of the box.
SECTION A-A
END TREATMENT - MULTIPLE OR SINGLE CELL
BOX CULVERT

PLAN VIEW (NO SKEW)
SINGLE BOX CULVERT 5 64" WIDE

PLAN VIEW (WITH SKEW)
SINGLE BOX CULVERT 5 64" WIDE

NOTE:
DIMENSIONS AND SPACING ARE SHOWN TO MEET SPECIFICATIONS OR GENERAL NOTES.

GENERAL NOTES:
1. ALL DIMENSIONS AND SPACING ARE SHOWN TO MEET SPECIFICATIONS OR GENERAL NOTES.
2. FOR VARIOUS CULVERT SIZES AND SKEWS.
3. ALL TYPICAL GRATE DIMENSIONS AND QUANTITIES ARE FOR SINGLE BOX CULVERTS. TO ACQUIRE ONE OR THREE TRIALS FOR SINGLE BOX CULVERTS, CONTACT THE NUMBER OF CULVERT RECOMMENDED AND IN添写 ADDITIONAL WALL SPACE.
4. DIMENSIONS SHOWN ARE MEASURED ALONG THE SLANT OF THE BOX CULVERT.
5. FOR VARIOUS CULVERT SIZES AND SKEWS.

REINFORCEMENT BARS AND GRATE SPACING ARE
APPROVED

MEASUREMENTS ALONG THE SLOPE
SECTION B-B

TYPICAL GRATE
(NO SKEW)

TYPICAL GRATE
(WITH SKEW)

GRATING DIMENSIONS AND QUANTITIES
IN ONE HEADWALL TYPE IV
BASED ON 1 FOOT WIDTH, 64 DEGREE, 0 NO SKEW

GRATING FOR BOX CULVERT 5 64" WIDE

NOTE:
DIMENSIONS "X" FOR SLOPE 1:2.14
FOR VARIOUS CULVERT SIZES AND SKEWS

[Diagram and table of grate dimensions and quantities]
**ALL CONCRETE SHALL BE CLASS SI.**

Bars shall be used in the other wall. Cut in the field. The remaining portion of the "v(E)" bars shall be used in the other wall.

**NOTE:**
- 2'-9" BARS @ 2'-9" (TYP.)
- 3" BARS @ 6" CTRS.
- EACH FACE @ 8" CTRS.
- 2-#4 h1(E) BARS
- 3" C.L.
- 4" t(E) BARS
- #4 s(E) BARS @ 12"
- 4" x 4" x 2" FOR GRATE (TYP.)
- 3" x 2" MIN. 6" CTR.
- END OF THE SLOPE HEADWALL
- NOTE: 2'-2" SPA @ 1'-9"
- 4'-3" H 54 (FLOOR SLABS)
- v(E) BARS
- 4'-9" H 60 (FLOOR SLABS)
- 6"x4"x2" FOR GRATE (TYP.)
- 6"x4"x2" FOR BOTTOM SLOTS GRATE (TYP.)
- 4"x4"x2" FOR GRATE (TYP.)
- TOP SLOTS
- 4" x 4" x 2" FOR GRATE (TYP.)
- 3" x 2" MIN. 6" CTR.
- 4' x 4' x 2" FOR GRATE (TYP.)
- 2'-2" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.
- 2'-0" MIN. 6" CTR.

**DIMENSIONS AND QUANTITIES IN TWO WINGWALLS 1:4 SLOPE**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>WIDTH</th>
<th>LENGTH</th>
<th>NO.</th>
<th>DIA.</th>
<th>WT. (PLATE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>6&quot;</td>
<td>52</td>
</tr>
<tr>
<td>2</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>5&quot;</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>4&quot;</td>
<td>52</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>TYPE</th>
<th>WIDTH</th>
<th>LENGTH</th>
<th>NO.</th>
<th>DIA.</th>
<th>WT. (PLATE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>6&quot;</td>
<td>52</td>
</tr>
<tr>
<td>2</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>5&quot;</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>4&quot;</td>
<td>52</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**
1. Type 2 "v(E)" bars shall be ordered full length and cut in the field. The remaining portion of the "v(E)" bars shall be used in the other wall.
2. The long leg of the "v(E)" bars shall be vertical.
3. The bars are identified by an asterisk (*) as shown on the plan.
4. See standard bars for spacing details.
5. All concrete shall be class SI.
6. All bars are assumed as being in horizontal alignment to units of horizontal alignment type.
7. All reinforcement bars shall be epoxy coated SI.
PLAN VIEW (NO SKEW)

SINGLE BOX CULVERT 84" WIDE

PLAN VIEW (WITH SKEW)

END TREATMENT - MULTIPLE OR SINGLE CELL BOX CULVERT

SECTION A-A

NOTE:
REINFORCEMENT BARS AND GRATE SPACING ARE COMPLIANT TO BOX CULVERT AT NORMAL (NO SKEW).

NOTE:
REINFORCEMENT BARS AND GRATE SPACING ARE COMPLIANT TO BOX CULVERT AT NORMAL (NO SKEW).

SECTION B-B

GRATING DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE IV PIPE
BASED ON 4' FOOT WIDTH, 1:4 SLOPE AND SKEW

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Type A</th>
<th>Type B</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>12'-6&quot;</td>
<td>12'-6&quot;</td>
</tr>
<tr>
<td>H</td>
<td>3'-8&quot;</td>
<td>3'-8&quot;</td>
</tr>
<tr>
<td>L</td>
<td>10°</td>
<td>10°</td>
</tr>
<tr>
<td>B</td>
<td>6'-4&quot;</td>
<td>6'-4&quot;</td>
</tr>
<tr>
<td>A</td>
<td>12'-6&quot;</td>
<td>12'-6&quot;</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE CULVERTS MEASURED TO SKEW. SEE TABLE FOR DOUBLE CULVERTS. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
2. QUANTITIES FOR SKEWED HEADWALLS NOT SHOWN.
3. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (*).
4. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT IN UNITS OF Horizontal DISPLACEMENT.
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-3528-V, EAST JORDAN IRON WORKS TS35 OR APPROVED EQUAL.

3. GRATE SHALL NOT BE BOLTED TO FRAME.
ADDED FRAME AND GRATE CASTINGS

28 1/4" X 24" X 1" SAFETY BAR (SHOWN IN TOP VIEW ONLY)

3/8" X 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D)

28" X 9" X 1" SAFETY BAR

(SEEN IN TOP VIEW ONLY)

1/4" HOLE

TOP VIEW

SECTION A-A

SECTION B-B

FRAME AND GRATE
TYPE 21A

APPROVED:

DATE: 6-30-2008

CHIEF ENGINEER

ILLINOIS TOLLWAY

STANDARD B26-01
NOTES:

1. ALL FRAMES AND GRATES SHALL CONFORM TO THE REQUIREMENTS OF ART. 1006.14 FOR GRAY IRON CASTINGS AND TO ART. 1006.25 FOR DUCTILE IRON CASTINGS.

2. FRAME AND GRATE TO BE NEENAH FOUNDRY COMPANY, NEENAH NO. R-3527-VF, EAST JORDAN IRON WORKS 7540 OR APPROVED EQUAL.

3. GRATE SHALL NOT BE BOLTED TO FRAME.

4. CURB BOX SHALL BE BOLTED TO FRAME WITH 7/16" GALVANIZED HEX. NO. BOLT AND NUT WITH DILY WASHERS.

5. CURB BOXES SHALL ONLY BE USED AT SAG LOCATIONS.
TOP VIEW

SECTION A-A

CAST FRAME

SECTION B-B

CAST FRAME

22" X 1" SAFETY BAR
2 REQ'D PER FRAME

FRAME AND GRATE
ADDED FRAME AND GRATE CASTINGS

REVISIONS
DATE
STANDARD B27-01
TYPE 22A
FRAME AND GRATE

CASTING
03-31-14

APPROVED
DATE
CHIEF ENGINEER
6-30-2008

(2) REQ'D (SHOWN IN TOP VIEW ONLY)

BOLT AND NUT w/ GALV. WASHERS

(3) †-11 X 3 GALV. HEX. HD.
FRAMES BOLTED TOGETHER w/
(3) BOLT HOLES ¾" DIA.
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-V, EAST JORDAN IRON WORKS 7518 OR APPROVED EQUAL.

3. GRATE SHALL NOT BE BOLTED TO FRAME.
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 AND GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T1 (SPECIAL)
AGGREGATE SHOULDERS SPECIAL, TYPE C
GUTTER, TYPE G-3, MODIFIED (87'-0")

NOTE:
ASPHALT
PAVED SHOULDER
SHOULDERS, TYPE B
AGGREGATE
ASPHALT WEDGE
DIRECTION OF TRAFFIC

SECTION C-C
ASPHALT SHOULDER TRANSITION

SECTION E-E
GUTTER, TYPE G-3, MODIFIED TRANSITION

SECTION D-D

SECTION F-F
GUTTER, TYPE G-3, MODIFIED

SECTION G-G
GUTTER, TYPE G-3

NOTE:
SEE SHEET 1 OF THIS SERIES FOR NOTES

GUTTER, TYPE G-3 TRANSITION TERMINATION AT TRAFFIC BARRIER TERMINAL,
TYPE T1 (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.
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 FURROW. STONE CHECK DAMS TO CONSIST OF CaT STONE.
2. FURROWS TO BE SLICED/TILLED ALONG LEVEL CONTOUR DESIGNING.
3. FURROWS SHALL NOT BE INSTALLED IN UNSHIELDED, UNDEFINED CLEAR ZONE LOCATIONS.

DETAIL FURROW SEE DETAIL FURROW SHIELDED LOCATIONS

FURROW DETAIL
SECTION VIEW NOT TO SCALE
**SECTION A-A**

- **Bar C**
  - 6'-6" (1.98 m)
  - Length: 7'-0" (2.13 m)
  - Radius: 26"

- **Bar C1**
  - 6'-6" (1.98 m)
  - Length: 7'-0" (2.13 m)
  - Radius: 22"

**TYPICAL LOCATION FOR LIFTING DEVICE.**

**SECTION B-B**

- **Bar C**
  - 6'-6" (1.98 m)
  - Length: 7'-0" (2.13 m)
  - Radius: 26"

- **Bar C1**
  - 6'-6" (1.98 m)
  - Length: 7'-0" (2.13 m)
  - Radius: 22"

**REBAR - (TYP.)**

**NO. 6 (NO. 19) BARS**

**Bar C1 TOP & BOTTOM**

**SEALER (TYP.)**

USE MORTAR OR BAR C

**FLAT SLAB TOP SHEET 1 OF 3**

**APPROVED DATE**

CHIEF ENGINEER 3-31-2017
DIAMETER 6' (1.8 m) & 7' (2.1 m)

FLAT SLAB TOP

APPROVED DATE
CHIEF ENGINEER
3-31-2017

TYPICAL LOCATION FOR LIFTING DEVICE.

NO. 4 (NO. 13) BAR C
LENGTH
7'-6" (2.29 m)
RADIUS
7'-2" (2.18 m)
SECTION A-A
NO. 6 (NO. 19) BARS
TOP & BOTTOM

NO. 6 (NO. 19) UNLESS OTHERWISE SHOWN

SECTION B-B
NO. 8 (NO. 25) BARS
TOP & BOTTOM

NO. 8 (NO. 25) UNLESS OTHERWISE SHOWN

SHOWING REBAR REINFORCEMENT
NO. 6 (NO. 19) UNLESS OTHERWISE SHOWN

SECTION A-A

REBAR - (TYP.)
PLACED AT BOTTOM

TOP MAT IS BOTTOM MAT OF REBAR
SHOWING REBAR REINFORCEMENT

NO. 4 (NO. 13) AT 12
CENTERS EACH DIRECTION

NO. 6 (NO. 19) 5'-6" (1.68 m) LONG
TOP & BOTTOM

NO. 8 (NO. 25) 7'-2" (2.18 m) LONG
TOP & BOTTOM