# Illinois Tollway Standard Drawing Revisions

## Section B  Drainage Structures, Curbs, Curbs & Gutter

<table>
<thead>
<tr>
<th>Standard</th>
<th>Modification Summary</th>
<th>Effective: 03-31-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>The electronic (pdf) version of the Standard Drawing are now made searchable (text).</td>
<td></td>
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</tbody>
</table>

### B1 Gutter and Curb Details
- **Sheet 1** Gutter, Type G-2 shape revised to better match frame and grate profile.
- Note 10. New Expansion joint requirements.
- **Sheet 2** Gutter Plan Detail. Added maximum expansion joint spacing.
- Revised aggregate shoulders details with ground line; all section views.

### B2 Type G-2 and G-3 Gutter Transitions
- **Sheet 2** Revised G-2 Gutter shape.

### B3 Type G-2/G-3 Gutter Transition at TBT Type T6
- **Sheet 2** Revised G-2 Gutter shape.

### B5 Concrete Flume Details
- **B10** Sloped Headwalls Type III Details
- **B11** Sloped Headwalls Type IV Details
  - Changed terminology from “welded wire fabric” to “welded wire reinforcement” per IDOT specification.

### B6 Headwall Type III
- Added note to omit restraint angle and plate for multiple end sections.
- Adjusted grate layout; previous layout did not provide adequate protection for errant vehicles or maintenance or maintenance equipment.

### B12 Trench Drain Detail
- Revised piping bend.

### B20 Headwall Type IV Concrete Box Culvert ≤ 84” Width
### B21 Grating for Headwall Type IV Concrete Box Culvert ≤ 84” Width
### B22 Headwall Type IV Metal Pipe and Pipe Arch Culverts
### B23 Grating for Headwall Type IV Metal Pipe and Pipe Arch Culverts
  - Relocated call out for station, offset and invert elevation to end of wall.

### B24 Pipe Underdrain
- Revised pipe underdrain description from 1% min. to "as needed to meet required depth D".
- Revised dimension callout of pipe underdrain at concrete sloped headwalls from 6” to "D-6”.
- Deleted rubblized detail of Pipe Underdrain, 6” Modified.
- Added new detail for locations with variable height double face barrier.

### B31 Furrow Detail

- **New Sheet**
- **Retired Standard**
1. All slopes are expressed as units of vertical displacement to units of horizontal displacement (V/H).

2. Reinforcement shall be accurately placed and firmly held in the position specified using epoxy coated steel chairs. Chair spacing shall not exceed 4'-0".

3. Gutter reinforcement shall be placed 3" above bottom of gutter following the subgrade slope.

4. Other gutter and curb transition details shall be shown on the plans.

5. Continuous #4 bars shall be lapped a minimum of 1'-1".

6. For concrete gutter overlayment, crack control joints shall be placed at locations of underlying joints and working cracks.

7. Gutter crack control joints shall align in prolongation with cracks.

8. Expansion joints shall be constructed in gutter at maximum joint spacings of 60'-0", see expansion joint detail on Sheet 2 of this standard.

9. FOR CONCRETE CURB, TYPE C TRANSITIONS, THE LEADING ENDS OF CURB IN THE DIRECTION OF TRAFFIC SHALL BE PLAIN TO FULL HEIGHT AT THE RATE OF ONE INCH VERTICAL TO ONE FOOT HORIZONTAL.

10. EXPANSION JOINTS SHALL BE CONSTRUCTED IN GUTTER AT MAXIMUM JOINT SPACINGS OF 60'-0", SEE EXPANSION JOINT DETAIL ON SHEET 2 OF THIS STANDARD.

ADJACENT TO FLEXIBLE PAVEMENT

SHOULDER LINE

CONTINUOUS #4 EPOXY COATED BARS

VARNISH

LEVEL LINE

1'-0" 3'-0" 6'

SHOULDER

PAVED

ADJACENT TO PCC PAVEMENT

CONCRETE CURB, TYPE C

(ONLY ON SHEET 2)

CONCRETE CURTAIN, TYPE C

(SHEETS 2)

ADJACENT TO PCC PAVEMENT

REMAINING SECTION OF CURTAIN GUTTER

COATED BARS

CONTINUOUS #4 EPOXY

LEVEL LINE

1'-0" 3'-0" 6'

SHOULDER LINE

SHOULDER

PAVED

CONCRETE CURTAIN, TYPE C

(SHEETS 2)

ADJACENT TO PCC PAVEMENT

REMAINING SECTION OF CURTAIN GUTTER

COATED BARS

CONTINUOUS #4 EPOXY

LEVEL LINE

1'-0" 3'-0" 6'

SHOULDER LINE

SHOULDER

PAVED

CONCRETE CURTAIN, TYPE C

(SHEETS 2)

ADJACENT TO PCC PAVEMENT

REMAINING SECTION OF CURTAIN GUTTER

COATED BARS

CONTINUOUS #4 EPOXY

LEVEL LINE

1'-0" 3'-0" 6'

SHOULDER LINE

SHOULDER

PAVED
GUTTER TRANSITION AT ENTRANCE RAMP TERMINALS

GUTTER TRANSITION AT EXIT RAMP TERMINALS

GUTTER TRANSITION NOTED:
1. PROVIDE 12" EXPANSION GUTTER WITH PREFORMED JOINT FIRED BETWEEN TRANSITION SECTION AND WINGWALL.
2. SEE STANDARD B2 FOR GUTTER TRANSITIONS AT BRIDGE APPROACH.
3. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT (%).
4. REINFORCEMENT BARS SHALL BE ACCURATELY PLACED AND FIRMLY HELD AT THE POSITION USING EPOXY COATED CHAIRS. CHAIR SPACING SHALL NOT EXCEED 6".
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 12".
GUTTER, TYPE G-3 TRANSITION AT BRIDGE DEPARTURE

NOTE 1
SHOULDER PARAPET BARRIER OR WINGWALL
2'-0" 1'-0" 1'-9" 2'-11"
LEVEL LINE

NOTE 2
SHAPE OR EDGE OF SHOULDERS
1'-0" TO 1'-9" VARIES
1'-0" TO 1'-3" VARIES
1'-0"
6"
LEVEL LINE

COATED BARS
CONTINUOUS #4 EPOXY
CONTINUOUS #4 EPOXY
CONTINUOUS #4 EPOXY
CONTINUOUS #4 EPOXY

EDGE OF SHOULDER
FRONT OF GUTTER AND PARAPET

GUTTER, TYPE G-2 AT BRIDGE DEPARTURE

NOTE: SEE SHEET 1 OF THIS SERIES FOR NOTES.

APPROVED DATE
CHIEF ENGINEER
2-7-2012

STANDARD B2-06
GUTTER, TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6 TO CONCRETE PARAPET

ELEVATION

G-3 SECTION A-A
AT CONCRETE PARAPET
(SEE NOTE 8)

G-3 SECTION B-B
9'-3" FROM PARAPET

G-3 SECTION C-C
15'-10" FROM PARAPET

G-3 SECTION D-D
37'-0" FROM PARAPET

LEGEND

1. AGGREGATE SHOULDERS SPECIAL, TYPE C

GUTTER TRANSITION NOTES:

1. SLOPE TO MATCH ADJACENT SHOULDER SLOPES.

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 SEE ILLINOIS TOLLWAY STANDARDS OF TRAFFIC BARRIER TERMINAL, TYPE T6.

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.

8. CONTINUOUS #4 BARS SHALL BE LAPPED A MINIMUM OF 1'-1".
GUTTER, TYPE G-2 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6

TO CONCRETE PARAPET

LEGEND

(1) AGGREGATE SHOULDER SPECIAL, TYPE C

NOTES:

SEE SHEET 1 OF THIS SERIES FOR GUTTER TRANSITION NOTES.

ILLINOIS TOLLWAY

STANDARD B3-06

DATE: 2-7-2012

APPROVED

CHIEF ENGINEER

12'-6" 6'-3" 8'-9'

V A R I E S

SHEET 2 OF 3

CONCRETE PARAPET

GUARDRAIL BLOCK-OUTS AND RAIL ARE OMITTED FOR CLARITY

BACK OF GUTTER IS PARALLEL TO EDGE OF SHOULDER

DIRECTION OF TRAFFIC

27'-6" GUTTER, TYPE G-2 TRANSITION

(PAID AS CONCRETE GUTTER, TYPE G-2)

LEVEL LINE

15'-10" FROM PARAPET

GUTTER FLOW LINE

8'-9" FROM PARAPET

FRONT OF GUTTER AND EDGE OF SHOULDER PROFILE

FRONT OF GUTTER AND EDGE OF SHOULDER

FRONT EDGE BOTTOM OF GUTTER

CONTINUOUS #4 EPOXY COATED BARS (TYP.)

GUTTER, TYPE G-2 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6

NOTE:

SEE SHEET 1 OF THIS SERIES FOR GUTTER TRANSITION NOTES.
GLUTTER TYPE G-3 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T6,
TO CONCRETE BARRIER, SINGLE-FACE

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

LEGEND

A AGGREGATE SHOULDER SPECIAL, TYPE C

NOTE:

SEE SHEET 1 OF THIS SERIES FOR GLUTTER TRANSITION NOTES.
CONCRETE FLUME DETAILS

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 WELDED WIRE, No. 4 @ 12" O.C., 58 LBS. PER 100 SQ. FT.
4. EPOXY COATED TIE BARS 2'-6" LONG @ 12" O/C. SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS.
5. EPOXY COATED EXPANDED METAL FABRIC OR EQUVALENT THICKNESS 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.
8. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT.

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CONSTRUCTION JOINT (NOTE 4)

GUTTER TO MEET SECTION B-B TRANSITION AND SHAPE APRON

SECTION A-A
ADJACENT TO GUTTER

PLAN

SECTION B-B

NOTE

DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT (V:H).

ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT (V).

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CHANGED TERMINOLOGY TO WELDED WIRE REINFORCEMENT

REINFORCEMENT SUBJECT TO ENGINEER'S APPROVAL.

STRENGTH MAY BE USED IN LIEU OF WELDED WIRE REINFORCEMENT.

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

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

THE MATERIALS AND CONSTRUCTION OF THE CONCRETE FLUME SHALL CONFORM TO THE APPLICABLE PORTIONS OF THE STANDARD SPECIFICATIONS.

ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT.

CONCRETE FLUME DETAILS

STANDARD BS-03

DATE: 2-7-2012

CONCRETE FLUME
CATCH BASIN TYPE B

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

SECTION A-A

FRAME AND GRATE DETAIL

SECTION B-B

SECTION C-C

PLAN

HALF PLAN

RIM ELEVATION

STATION, ELEVATION AND INV. ELEVATION

CLASS D3 CONCRETE

STORM SEWER PIPE AS SHOWN ON PLANS

STORM SEWER PIPE AS ShOWN ON PLANS

CLASS D3 CONCRETE

1 1/4 MORTAR GROUT AS REQUIRED (TYP.)

2'-0" 3" 9"
3'-0" 9"

3'-0"

4'-0"

3'-0"

LAP 1'-8"

9"

2'-0"

9"

3" 3" 2" 2"

4'-0"

2'-6"

4" 4"

9"

3'-0"

2'-10"

6"

9"

3'-0"

2'-0"

9"

3'-0"

2" CL.

2" CL.

3" 3"

1 1/4"

MORTAR GROUT

1" MORTAR GROUT

1/4" MORTAR GROUT

AS REQUIRED (TYP.)

1 MORTAR GROUT

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 V5360-1 OR APPROVED EQUAL.

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

ILLINOIS TOLLEWAY

REVISED REINFORCEMENT BARS

REVISED SLOPE DRAIN ALSO

FRAME AND GRATE CASTINGS

SLOPE DRAIN CHANGE TO BASE SHEET.

STANDARD B7-03

REVISIONS

DATE

CHIEF ENGINEER

2-7-2012

APPROVED

DATE

CHIEF ENGINEER

2-7-2012

APPROVED
REVISIONS

DATE
STANDARD B8-05
3-31-2014
2-07-2012

HALF PLAN
REINFORCED CONCRETE LID

NOTES:
BAR s(E)
BAR h1(E)
BAR t(E)

SECTION A-A
NOTE:
DETAIL LIFTING LOOP

SECTION B-B

A

B

HALF PLAN

REINFORCED CONCRETE LID

CATCH BASIN TYPE "G" SERIES

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

NOTE:
POSITION OF SPECIFIC VARIES FROM 3'-0" TO 5'-0"
STORM SEWER SIDE AND LOCATION AS SHOWN ON PLANS
HORIZONTAL DIA ET AS REQUIRED (Typ)

SECTION B-B
CATCH BASIN TYPE "G" SERIES

NOTE:
POSITION OF SPECIFIC VARIES FROM 3'-0" TO 5'-0"
STORM SEWER SIDE AND LOCATION AS SHOWN ON PLANS
HORIZONTAL DIA ET AS REQUIRED (Typ)

TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE

NOTE:
POSITION OF SPECIFIC VARIES FROM 3'-0" TO 5'-0"
STORM SEWER SIDE AND LOCATION AS SHOWN ON PLANS
HORIZONTAL DIA ET AS REQUIRED (Typ)

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'-0" NOT REQUIRED FOR PRECAST UNITS. INSTALLATION 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-2 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 SUPERELEVATED PAVEMENT.
5. CATCH BASIN, TYPE G-3 MODIFIED SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS SHOWN ON THIS DRAWING.
6. TYPE G-3 FRAME AND GRATE SHALL BE MORTAR OR SEALER WHICH IS SET IN PLACE.
7. TYPE G-3 FRAME AND GRATE SHALL BE MORTAR OR SEALER WHICH IS SET IN PLACE.
8. TYPE G-3 MODIFIED FRAME AND GRATE SHALL BE MORTAR OR SEALER WHICH IS SET IN PLACE.
9. TYPE G-2 MODIFIED FRAME AND GRATE SHALL BE MORTAR OR SEALER WHICH IS SET IN PLACE.
10. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.
11. ALL CONCRETE SHALL BE CLASS SI CONCRETE.

DATE
REVISIONS
CATCH BASINS, TYPE G AND TYPE G MODIFIED, FRAMES AND GRATES
STANDARD B8-05
SHEET 1 OF 4
CATCH BASIN TYPE G-4

NOTES:

1. See Sheet 1 of this series for additional notes.
2. CATCH BASIN TYPE G-4 SHALL BE USED IN VARIOUS SECTIONS AND ON THE LEFT SIDE OF SUPERELEVATED PAVEMENT.
3. CATCH BASIN TYPE G-4 SHALL BE PROVIDED WITH A PRECAST REINFORCED CONCRETE LID AS SHOWN IN THIS DRAWING.
4. CATCH BASIN TYPE G-4 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. DRAINAGE STREET SWALE, FRAME AND GRATE PUMP ELEVATION AND DISTANCE FROM LID TO ROADWAY TO BE VERIFIED BY ENGINEER.
7. 36'-2" MAX. OUTFLOW PIPE FOR TYPE G-4 CATCH BASIN.
8. ALL CONCRETE SHALL BE CLASS 30 CONCRETE.
9. DISTANCE FROM OUTFLOW PIPE TO ROADWAY TO BE VERIFIED BY ENGINEER.

REINFORCED CONCRETE LID
TYPE G-2 FRAME AND GRATE

REINFORCED CONCRETE LID
TYPE G-3 FRAME AND GRATE

REINFORCED CONCRETE LID
TYPE G-4 FRAME AND GRATE

TYPICAL REINFORCEMENT
AROUND STORM SEWER PIPE

1/8" MORTAR GROUT AS REQUIRED (TYP.)
MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN.

SEE NOTE 9 ON SHEET 1

CHIEF ENGINEER
CATCH BASIN TYPE G-5

NOTES:
1. See sheet 1 of this series for additional notes.
2. CATCH BASIN TYPE G-5 SHALL BE USED IN TANGENT SECTIONS AND ON THE LOW SIDE OF SUPERELEVATED PAVEMENTS.
3. CATCH BASIN TYPE G-5 SHALL BE PROVIDED WITH A PRECAST REINFORCED CONCRETE SLAB TOP AS DETAILED ON THIS DRAWING.
4. CATCH BASIN TYPE G-5 SHALL BE PROVIDED WITH A PRECAST REINFORCED CONCRETE LID.
5. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS SET IN.
6. EDGE OF SLUDDER, FRAME AND GRATE ELEVATION AND OFFSET MEASURED AT THIS POINT.
7. BOTH MAN, OUTFLOW PIPE FOR TYPE G-5 CATCH BASIN.
8. ALL CONCRETE SHALL BE CLASS SI CONCRETE.
9. DISTANCE FROM OUTFLOW PIPE TO ROADWAY TO BE DETERMINED BY ENGINEER.

CATCH BASINS TYPE G AND TYPE G MODIFIED, FRAMES AND GRATES

STANDARD BB-05
SECTION I-I

SECTION U-U

SECTION W-W

SECTION Z-Z

SECTION Y-Y

SECTION S-S

SECTION V-V

TYPE G-3 FRAME & GRATE

TYPE G-3, MODIFIED FRAME & GRATE

TYPE G-2 FRAME & GRATE

TYPE G-2 MODIFIED FRAME & GRATE

NOTE:
SEE SHEET 1 OF THIS SERIES FOR NOTES.
Tables for Dimensions, Reinforcement and Quantities for One SLOPED HEADWALL TYPE I

<table>
<thead>
<tr>
<th>PIPE I.D.</th>
<th>REINFORCEMENT BARS</th>
<th>LENGTH</th>
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</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>b</td>
<td>6&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>2</td>
<td>6&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3</td>
<td>6&quot;</td>
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Tables for Dimensions, Reinforcement and Quantities for One SLOPED HEADWALL TYPE II

<table>
<thead>
<tr>
<th>PIPE I.D.</th>
<th>REINFORCEMENT BARS</th>
<th>LENGTH</th>
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<tr>
<td>18&quot;</td>
<td>c</td>
<td>6&quot;</td>
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<tr>
<td>15&quot;</td>
<td>d</td>
<td>6&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>b</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**
1. SLOPED HEADWALL 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. BARS BENDING DETAILS ARE DIMENSIONED OUT TO OUT OF BARS.
5. ALL EXPOSED EDGES SHALL HAVE A 1" CHAMFER; CHAMFERS ON VERTICAL EDGES SHALL BE CONSIDERED A VERTICAL 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. COVER SHOULD BE ENERGIZED BY REMOVING ANY LENGTH OF EXISTING PIPE SO THE REMAINING PIPE IS UNDAMAGED AND FULLY FUNCTIONING.
8. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DISPLACEMENT. PIPE TAPED SLIGHTER THAN 45°, DIMENSIONS AND QUANTITIES SHOWN ARE BASED ON A 45° SLOPE DESIGNING AND PROPAGATING.
9. ALL EXPOSED SURFACES OF PIPE OILS DENOTES EXISTING DIAMETER OF PIPE.
10. ALL CONCRETE QUANTITIES - CARING FOR ANYMENTS REINFORCEMENT BARS, TABLES MATCH EXISTING OR PROPOSED SLOPE, SEE NOTE 9.
11. CONCRETE SHALL BE USED THROUGHOUT.
NOTES:
1. THE CAST IN PLACE CONCRETE HEADWALL SHALL BE CONSTRUCTED FLUSH WITH EXISTING OR PROPOSED MASONRY 5' AM. OR PROPOSED SLOPE.
2. ALL REINFORCEMENT BARS SHOWN SHALL BE PROPPED CORRECTLY.
3. HEADWALL AND PIPE SHALL BE COMPLETELY FILLED WITH AN APPROVED NON-SHRINK PRECAST UNIT. USE IS OPTIONAL. THE ENTIRE STRUCTURE MAY BE CAST IN PLACE.
4. CAST IN PLACE CONCRETE SHALL BE PLACED SUCH THAT IT WILL PROJECT 1/2" INTO THE CAST IN PLACE CONCRETE AND IT SHALL BE 3" BEHIND THE TOP SURFACE. MASONRY IN THE PRECAST SECTION SHALL BE TOUGH ENOUGH TO CLEAR ALL CONCRETE SURFACES A MIN. OF 2".

HEADWALL AND PIPE SHALL BE COMPLETELY FILLED WITH AN APPROVED NON-SHRINK PRECAST UNIT. USE IS OPTIONAL. THE ENTIRE STRUCTURE MAY BE CAST IN PLACE.

EXISTING OR PROPOSED SLOPE.

NOTES:
1. THE CAST IN PLACE CONCRETE HEADWALL SHALL BE CONSTRUCTED FLUSH WITH EXISTING OR PROPOSED MASONRY 5' AM. OR PROPOSED SLOPE.
2. ALL REINFORCEMENT BARS SHOWN SHALL BE PROPPED CORRECTLY.
3. HEADWALL AND PIPE SHALL BE COMPLETELY FILLED WITH AN APPROVED NON-SHRINK PRECAST UNIT. USE IS OPTIONAL. THE ENTIRE STRUCTURE MAY BE CAST IN PLACE.
4. CAST IN PLACE CONCRETE SHALL BE PLACED SUCH THAT IT WILL PROJECT 1/2" INTO THE CAST IN PLACE CONCRETE AND IT SHALL BE 3" BEHIND THE TOP SURFACE. MASONRY IN THE PRECAST SECTION SHALL BE TOUGH ENOUGH TO CLEAR ALL CONCRETE SURFACES A MIN. OF 2".
NOTES:

1. THE SLOPED HEADWALL TYPE IV SHALL BE CONSTRUCTED FLUSH WITH PROPOSED SLOPE.
2. THE SLOPED HEADWALL DETAILS SHOWN IN THIS DRAWING ARE FOR USE ONLY WITH PIPES HAVING AN INSIDE DIAMETER OR ARCH SPAN OF 18" OR LESS.
3. CONCRETE SHALL BE USED THROUGHOUT.
4. REBAR OR WELDED WIRE REINFORCEMENT SHALL BE EPOXY COATED 6" x 6" x 3' or 4" x 4" x 3' for 250 sq. ft.
5. QUANTITIES FOR CONCRETE HEADWALLS TYPES III AND I AND REBAR OR WELDED WIRE REINFORCEMENT SHOWN IN THE SCHEDULES OF QUANTITIES ARE BASED ON THE FOLLOWING:
   A. DIMENSION "H" IS PIPE I.D. OR ARCH SPAN.
   B. SLOPED HEADWALL TYPE IV LENGTH IS 3'-0" LONG.
   C. BACKSLOPE AND FORESLOPE ARE THE SAME. ADJUSTMENT TO QUANTITIES FOR HEADED WALLS WITH CONDITIONS ON BACKSLOPE FORESLOPE COMBINATIONS OTHER THAN ABOVE SHALL BE INDICATED ON THE PLANS.
   D. THE QUANTITIES SHOWN ARE FOR INFORMATION ONLY.
   E. ALL QUANTITIES ARE ShOWN FOR UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DEFORMATION.

A. PIPE: 6" OD OR ARCH SPAN
B. SLOPED HEADWALL TYPE IV LENGTH IS 20'-0" LONG.
C. BACKSLOPE AND FORESLOPE ARE THE SAME. ADJUSTMENT TO QUANTITIES FOR HEADED WALLS WITH CONDITIONS ON BACKSLOPE FORESLOPE COMBINATIONS OTHER THAN ABOVE SHALL BE INDICATED ON THE PLANS.
D. THE QUANTITIES SHOWN ARE FOR INFORMATION ONLY.
E. ALL QUANTITIES ARE SHOWN FOR UNITS OF VERTICAL DISPLACEMENT TO UNITS OF HORIZONTAL DEFORMATION.

REINFORCEMENT

WELDED WIRE REINFORCEMENT

WIRE

SECTION E-E

SECTION D-D

SECTION H-H

SECTION C-C

DETAIL FOR PIPE ABOVE DITCH FLOW LINE

QUANTITIES FOR SLOPED HEADWALLS TYPE IV

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>PIPE OD</th>
<th>T</th>
<th>CONCRETE HEADWALLS</th>
<th>REBAR OR WELDED WIRE REINFORCEMENT</th>
<th>HORIZONTAL DISPLACEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>1.94</td>
<td>7.97</td>
<td>326</td>
</tr>
<tr>
<td>12&quot;-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>7.97</td>
<td>538</td>
<td>394</td>
</tr>
<tr>
<td>18&quot;-0&quot;</td>
<td>2'-0&quot;</td>
<td>1</td>
<td>2.97</td>
<td>358</td>
<td>424</td>
</tr>
<tr>
<td>6&quot;-0&quot;</td>
<td>3'-0&quot;</td>
<td>1</td>
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TRENCH DRAIN INSTALLATION

SECTION A-A

NOTES:

1. OUTLET PIPES AND PRE-FORMED CHANNEL INVERTS SHALL BE SLOPED AT 0.8% 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 1/2" 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 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 CORE SURFACING WITH CLASS V1 CONCRETE 6" DEEP. PAY ATTENTION TO THE CEMENT CONCRETE SHOULDERS CENTERED 5".

Illinois Tollway

TRENCH DRAIN DETAIL

REVISED SHEET 1 OF 2

1/8" ABOVE THE TOP OF THE DRAIN CHANNEL.

THE FINISHED LEVEL OF CONCRETE MUST BE APPROXIMATELY 1/2" ABOVE THE TOP OF THE DRAIN CHANNEL.

TRENCH DRAINS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND SPECIFICATIONS.

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

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

WHEN THE CONCRETE ENCASMENT FOR TRENCH DRAIN IS WITHIN 6' OF THE PAVEMENT, REPLACE THE CORE SURFACING WITH CLASS V1 CONCRETE 6" DEEP. PAY ATTENTION TO THE CEMENT CONCRETE SHOULDERS CENTERED 5".
APPROVED CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS BEGINNING AT THE HEADWALL END AND BARS WITH DIMENSIONS C-L. BOLT WITH WASHERS SHALL BE PLACED AT 1'-3" TOP FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE CONTINUED A MINIMUM OF 3". ALL CONCRETE SHALL BE CLASS SI.

GENERAL NOTES:
1. ALL CONCRETE SHALL BE PLATED.
2. ALL EXPOSED CONCRETE EDGES SHALL BE FINISHED WITH A 1'-0" x 2" CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF 4 1'-0". CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF 4-1'-0". ALL EXPOSED CONCRETE EDGES SHALL HAVE A 1'-0" x 45° CHAMFER.
3. ALL CONCRETE SHALL BE CAST-IN-PLACE BOLT SHOWN.
4. CONCRETE QUANTITIES REVISED IN LIEU OF CAST-IN-PLACE BOLT SHOWN. A 1'-0" X 8" THREADED ROD EPOXY GROUTED IN A 1'-0" HOLE WITH A MINIMUM EMBEDMENT OF 6" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT.
5. NOTE: ALL CONCRETE SHALL BE PLATED.

SAFETY END TREATMENT FOR SINGLE CULVERTS OF SLOPE H ≤ 4° STANDARD B13-05

DATE | REVISIONS
---|---
03-31-14 | PROTECTION AND NOTES
02-07-12 | REVISED NOTES
03-01-10 | REVISED EROSION PROTECTION AND NOTES
06-01-09 | REVISED NOTES

SHEET 1 OF 2
ANCHOR BARS
CONCRETE SMALL PROJECTION 3" X 3" X 3" MORTAR DOWEL

NOTE
7-8" DEEP W/HOLE 3" X 3" \(x\) FOR WINGWALL HEAD REST.

CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS AT THE TOEWALL END.
BEGINNING AT HEADWALL & BARS WITH DIMENSIONS \(C\), \(C\) PER CUTTING DIAGRAM. PLACE F & V BAR TO BE FIELD CUT IN THE QUANTITIES.

CULVERT ARE INCLUDED INTO THE CONCRETE BOX.

GENERAL NOTES:
1. ALL CONCRETE SHALL BE SLS A.
2. ALL REINFORCEMENT BARS SHALL BE EPOXY COATED (E).
3. ALL SLOPES ARE EXPRESSED AS UNITS OF VERTICAL DISPLACEMENT TO UNITS OF DIRECTION OF TRAFFIC.

FOR PIPE AND PIPE-ARCH CULVERTS
1. PIPE RUNNER DETAILS SHOWN IN THE DRAWING ARE FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
2. FOR PIPE AND PIPE-ARCH CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS ALL CONCRETE SHALL BE CLASS SI.
3. THE PIPE RUNNER SHALL BE STRENGTHENED OVER THE PIPE O.D. O.D. OF PIPE + 1" IN LIEU OF CAST-IN-PLACE BOLT SHOWN.
4. THE PIPE RUNNER MAY BE FIELD DRILLED IN MINIMUM EMBEDMENT OF 9". A \(\frac{1}{2}\)" HOLE IN LIEU OF THE SLOTTED HOLE SHOWN.
5. PIPE/DOWEL BARS NOT REQUIRED WITH EXISTING DOWEL BARS.
6. DATE
   6-1-2009

FOR BOX CULVERTS
1. PIPE RUNNER DETAILS SHOWN IN THE DRAWING ARE FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
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4. THE PIPE RUNNER MAY BE FIELD DRILLED IN MINIMUM EMBEDMENT OF 9". A \(\frac{1}{2}\)" HOLE IN LIEU OF THE SLOTTED HOLE SHOWN.
5. PIPE/DOWEL BARS NOT REQUIRED WITH EXISTING DOWEL BARS.
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3. THE PIPE RUNNER SHALL BE STRENGTHENED OVER THE PIPE O.D. O.D. OF PIPE + 1" IN LIEU OF CAST-IN-PLACE BOLT SHOWN.
4. THE PIPE RUNNER MAY BE FIELD DRILLED IN MINIMUM EMBEDMENT OF 9". A \(\frac{1}{2}\)" HOLE IN LIEU OF THE SLOTTED HOLE SHOWN.
5. PIPE/DOWEL BARS NOT REQUIRED WITH EXISTING DOWEL BARS.
### Table of Dimensions

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### Notes for Table of Dimensions:

1. The number of L, Y, and H bars shall be determined for each 1 foot of increase in dimension "S".
2. The number of R and Y bars shall be determined for each 1 foot of increase in dimension "L".
3. The number of P bars shown are for single spans pipes or box culverts. The number shall be increased by 1 for each additional span of pipes or box culverts.
4. The length of HDWL bars shall be as shown.
5. The number of HDWL bars shall be as shown.

---

**Field Cutting Diagram**

- **Concrete Box Culverts**
  - Dimensions: 16'-11" - 26'-4" - 20'-1" - 19'-3" - 16'-9" - 8'-6" - 6'-3" - 4'-5" - 2'-8" - 1'-3"
  - Curved Cutting Diagram
  - Straight Cutting Diagram

- **Concrete Pipe Culverts**
  - Dimensions: 15'-2" - 11'-7" - 7'-2" - 3'-0" - 1'-6" - 2'-2" - 3'-7" - 4'-2" - 5'-3" - 6'-1"
  - Curved Cutting Diagram
  - Straight Cutting Diagram

---

**Notes:**

- The number of L, Y, and H bars shall be determined for each 1 foot of increase in dimension "S".
- The number of R and Y bars shall be determined for each 1 foot of increase in dimension "L".
- The number of P bars shown are for single spans pipes or box culverts. The number shall be increased by 1 for each additional span of pipes or box culverts.
- The length of HDWL bars shall be as shown.
- The number of HDWL bars shall be as shown.
HEADWALL AND BARS WITH DIMENSIONS C-C, C-C, C-C BEGINNING AT PER CUTTING DIAGRAM. PLACE BARS WITH ANCHOR BARS (E) PER SIDEWALL BOLT.

ELEVATION AT WING
NOTE: PIPE O.D. IS THE PIPE HANGER OUTSIDE DIAMETER.
NOTE: PIPE O.D./2 + 1⁄4" X 12" THREADED ROD W/ WASHER OR 1⁄4" X 9" BOLT.

GENERAL NOTES:
1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE SURFACES SHALL HAVE A 1⁄8" X 45° CHAMFER. CHAMFER ON ALL EXPOSED CONCRETE EDGES SHALL HAVE A 1⁄8" X 45° CHAMFER. CHAMFER ON ALL CONCRETE SHALL BE CLASS SI.
3. PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS.
5. ALL REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
6. VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED TOP OF WALL.
7. ALL CONCRETE HOLES DRILLED IN LIEU OF THE SLOTTED HOLE SHOWN.
8. PIPE HOLES MAY BE DRILLED THROUGH THE EPOXY GROUTED IN A 1⁄4" X 9" HOLE WITH A MINIMUM EMBEDMENT OF 3".
9. ALL CONCRETE HOLES SHALL BE DRILLED THROUGH THE EPOXY GROUTED IN A 1⁄4" HOLE WITH A MINIMUM EMBEDMENT OF 3".

NOTE:
- PIPE O.D./2 - 1⁄4" X 12" THREADED ROD W/ WASHER OR 1⁄4" X 9" BOLT.
- PIPE O.D. X 4 + 1" SHEET METAL X 12" THREADED ROD W/ WASHER OR 1⁄4" X 9" BOLT.
### Table of Reinforcement Bars for One End

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### Diagram

- **Pipe Arch and Elliptical Pipe Culverts**
- **Pipe Runner Layout**
- **Field Cutting Diagram**

**Notes:**

- Reinforcement bars bending dimensions are out to out.
- The design of the intersection area for the various elements of concrete is to be made to the contractor's liking.

**Legend:***

- **P1(E) BARS**
- **T(E) BARS**
- **V(E) BARS**
- **V1(E) BARS**
- **PIPE ARCH**
- **FIELD CUTTING DIAGRAM**
ANCHOR BARS (E) (TYP.)

NOTE:
- J & Y bars shall be designed for existing box culverts, providing the reinforcement from the existing box is extended into the new box culverts providing the reinforcing from end section at wingwall bar on inside of wingwall face of wingwall.
- Bars shall be designed for a minimum of 1'-3" cover from the face of concrete to the face of wingwall.
- All reinforcement bars shall be epoxy coated (E).

SECTION F-F
- ELEVATION AT WING
- SHOWING REINFORCEMENT
- PIPE RUNNER DETAILS

FOR BOX CULVERTS

GENERAL NOTES:
1. All concrete shall be C30.
2. All joints in concrete shall be made with a 1/4" x 1/4" expansion joint.
3. All joints in concrete shall be spaced at least 1/2" apart.
4. All joints in concrete shall be covered with a minimum of 3/4" thick bituminous or asphalt jointing compound.
5. All joints in concrete shall be protected from damage.
6. All reinforcement bars shall be epoxy coated (E).

NOTE:
- BARS PROVIDE BARS AS CONTRACTOR SHALL PROVIDE.
- ALL REINFORCEMENT BARS SHALL BE EPOXY COATED (E).

PLAN AT HEADWALL
- SECTION AT WING
- SHOWING DIMENSIONS
- PIPE RUNNER DETAILS

FOR PIPE AND PIPE-ARCH CULVERTS

SECTION A-A
- SECTION AT WING
- PLAN AT HEADWALL
- SECTION D-D
- PIPE RUNNER DETAILS

NOTE:
- A & B bars will be drilling in lieu of the threaded rod epoxy grouted through the blockout for pipe. A 1-1/2" X 9" bolt will be placed in lieu of the threaded rod epoxy grouted through the blockout for pipe.
- All reinforcement bars shall be epoxy coated (E).

NOTE:
- A & B bars will be drilling in lieu of the threaded rod epoxy grouted through the blockout for pipe. A 1-1/2" X 9" bolt will be placed in lieu of the threaded rod epoxy grouted through the blockout for pipe.
- All reinforcement bars shall be epoxy coated (E).

NOTE:
- J & Y bars shall be designed for existing box culverts, providing the reinforcement from the existing box is extended into the new box culverts providing the reinforcing from end section at wingwall bar on inside of wingwall face of wingwall.
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- All reinforcement bars shall be epoxy coated (E).

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NOTE:
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NOTE:
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- Bars shall be designed for a minimum of 1'-3" cover from the face of concrete to the face of wingwall.
- All reinforcement bars shall be epoxy coated (E).
GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS B.

2. ALL REINforcing BARS SHALL BE #3 OR SIMILAR.

3. ALL CONCRETE BARS SHOWN ON SHEET D-0 IS AS SHOWN IN THE SECTION SHOWN IN THE DETAIL SHEET.

4. ALL SAFETY END TREATMENT SHALL BE APPLIED AS SHOWN IN THE DETAIL SHEET.

5. ALL REINFORCING BARS SHALL BE 4½" MINIMUM.

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NOTE:

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## Table of Dimensions

<table>
<thead>
<tr>
<th>No.</th>
<th>Length</th>
<th>Width</th>
<th>Thickness</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10'-6&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>12'-9&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>15'-2&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>18'-10&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>7</td>
<td>26'-2&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>29'-2&quot;</td>
<td>7'-3&quot;</td>
<td>2'-3&quot;</td>
<td>4</td>
</tr>
</tbody>
</table>

### Notes
- The dimensions listed above are approximate and may vary slightly due to manufacturing tolerances.
- Additional support elements (e.g., I-beams, girders) may be required to ensure structural integrity.
- Regular inspections and maintenance are recommended to monitor and address any wear or damage.

---

### Diagrams

- **Headwall Diagram:**
  - Shows the layout of reinforcement bars with dimensions for each section.
  - Includes annotations for headwall sections where additional support is required.

- **Pipe Runner Layout:**
  - Provides a detailed view of the pipe runner system, including distances and angles.
  - Highlights key components such as pipe arches and ellipsoidal pipe culverts.

---

**Additional Information:**
- **Safety End Treatment:**
  - Describes the necessary treatment for the safety end to ensure structural integrity.
  - Includes details on the use of safety barriers and guardrails.

---

**TOTAL QUANTITIES:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>350 cubic yards</td>
</tr>
<tr>
<td>Reinforcement Bars</td>
<td>1500 feet</td>
</tr>
<tr>
<td>Safety Barriers</td>
<td>100 pieces</td>
</tr>
</tbody>
</table>

---

**Field Cutting Diagram:**

- Illustrates the process of field cutting concrete elements.
  - Demonstrates accurate measurement and marking techniques.

---

**Additional Resources:**
- **Field Manual:**
  - Provides comprehensive guidance on the installation and maintenance of concrete structures.
  - Includes detailed instructions and troubleshooting tips.

---

**References:**
- [Concrete Institute of America](https://www.concrete.org)
- [American Association of State Highway and Transportation Officials](https://www.aaa.com)
- [Illinois Tollway](https://www.illinoistollway.com)
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 bid to bid.

5. Stone riprap shall be in accordance with the standard specifications and drainage design manual.
1. All concrete is to be placed and removed in accordance with the Illinois Tollway Standards and Specifications.

2. All concrete is to be placed and removed in accordance with the Illinois Tollway Standards and Specifications.

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TABLE OF BARS IN SLAB 1:4 SLOPE

<table>
<thead>
<tr>
<th>Subject</th>
<th>Bars Type</th>
<th>Size</th>
<th>Length</th>
<th>Unit Price</th>
<th>Concrete Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type I</td>
<td>1/4&quot;</td>
<td>3'</td>
<td>$3.00</td>
<td>SI</td>
</tr>
<tr>
<td>2</td>
<td>Type II</td>
<td>3/4&quot;</td>
<td>2'</td>
<td>$4.00</td>
<td>CI</td>
</tr>
<tr>
<td>3</td>
<td>Type III</td>
<td>1&quot;</td>
<td>1'</td>
<td>$5.00</td>
<td>CII</td>
</tr>
<tr>
<td>4</td>
<td>Type IV</td>
<td>1-1/2&quot;</td>
<td>0'</td>
<td>$6.00</td>
<td>CIII</td>
</tr>
</tbody>
</table>

GENERAL NOTES:

1. All concrete is to be placed and removed in accordance with the Illinois Tollway Standards and Specifications.

2. All concrete is to be placed and removed in accordance with the Illinois Tollway Standards and Specifications.

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5. All concrete is to be placed and removed in accordance with the Illinois Tollway Standards and Specifications.
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 C-C

TOP VIEW

SECTION B-B

SECTION A-A
CAST FRAME

SECTION D-D
CAST GRATE

CASTING

Frame and Grate
Type 20A

DATE
CHIEF ENGINEER
APPROVED
6-30-2008

ILLINOIS TOLLEYWAY

45° (TYP.)

SLOTS FOR GRATE ALIGNMENT (2 REQ'D)

DETAILED OF VANES

GRATE SHALL NOT BE BOLTED TO FRAME.
Frame and Grate
Type 21A

TOP VIEW

- 26 3/8" x 1 3/4" x 1" SAFETY BAR (SHOWN IN TOP VIEW ONLY)
- 3/8" x 1" CORED SLOTS FOR GRATE ALIGNMENT (2 REQ'D)

SECTION A-A

- 7/8" x 5/8" SAFETY BAR

SECTION B-B

- 1 1/4" x 1/4" HOLE

Sheet 1 of 2

Appointed by: [Signature]

Date: [Date]

Illinois Tollway

Approved by: [Signature]

Date: [Date]
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-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 †" GALVANIZED BOLT, NO. 3, BOLT AND NUT WITH GALV WASHERS.

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

CAST GRATE

SECTION D-D

SECTION C-C

TOP VIEW

FRONT VIEW

Curb Box

Detail of Vanes

SECTION E-E

3" 7 SPACES @ 3¾"
**TOP VIEW**

- 22" x 1" Safety Bar
- 22" x 1" Cored Slots for Grate Alignment
- (2 Req'd per frame)

**SECTION A-A**

- Cast Frame

**SECTION B-B**

- 2 3/4" X 1" Safety Bar
- 24" X 24" X 2 3/4" Safety Bar
- (2 Req'd shown in top view only)

**FRAME AND GRATE**

- Castings
- Added Frame and Grate

**FRAME AND GRATE**

- Type 22A

**REVISIONS**

- 03-31-14

**DATE**

- 6-30-2008

**APPROVED**

- Chief Engineer
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-3529-V, EAST JORDAN IRON WORKS 7536 OR APPROVED EQUAL.

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

NOTES:
GUTTER TRANSITIONS WILL BE PAID FOR PER FOOT AS GUTTER, TYPE G-3.
Gutter, Type G-2, Transition at Traffic Barrier Terminal, Type T1 (Special)

Section A-A

Section B-B

Notes:
Gutter transitions will be paid for per foot as gutter, Type G-2.

Plan

- Edge of paved shoulder
- Gutter, Type G-2
- Edge of pavement
- 6'-0" Gutter transition
- Back of gutter
- Drainage structure as required
- 3'-0" paved shoulder
- Aggregate shoulders, Type B
- Aggregate shoulders, Special Type C
- 40'-0" Aggregate shoulders, Type B
- 10'-0" Aggregate shoulders Special, Type C
- 1'-2\(\frac{3}{4}\)" Face of rail
- Aggregate shoulders, Special Type C
- 1'-2\(\frac{3}{4}\)" Face of rail
- Paved shoulder
- Aggregate shoulders, Special Type C
- Gutter, Type G-2
- Ground line
- 1'-2\(\frac{3}{4}\)" Face of rail
- Paved shoulder
- Aggregate shoulders, Special Type C
- Gutter, Type G-2
- Ground line

Details:
- 6'-0" Tape as required
- 5'-0" Tape as required
- 4'-0" Tape
- 2'-0" Face of rail
- 1'-2\(\frac{3}{4}\)" Face of rail
- 6'-0" Face of rail
- 4'-0" Face of rail
- 2'-0" Face of rail
- 1'-2\(\frac{3}{4}\)" Face of rail
- Paved shoulder
- Aggregate shoulders, Special Type C
- Gutter, Type G-2
- Ground line
- 1'-2\(\frac{3}{4}\)" Face of rail
- Paved shoulder
- Aggregate shoulders, Special Type C
- Gutter, Type G-2
- Ground line

Notes:
- Gutter transitions will be paid for per foot as gutter, Type G-2.
Gutter, Type G-3, Modified Transition at Traffic Barrier Terminal, Type T1 (Special)

SECTION A-A
Asphalt Shoulder Transition

SECTION C-C
Gutter, Type G-3, Modified Transition

SECTION B-B
Asphalt Shoulder Transition

SECTION D-D
Gutter, Type G-3, Transition Termination at Traffic Barrier Terminal, Type T1 (Special)

SECTION E-E

Notes:
Gutter transitions will be paid for per foot as gutter, Type G-3.
GUTTER, TYPE G-2 TRANSITION AT TRAFFIC BARRIER TERMINAL, TYPE T1-A (SPECIAL)

SECTION A-A

SECTION B-B

NOTES:
GUTTER TRANSITIONS WILL BE PAID FOR PER FOOT AS GUTTER, TYPE G-2.
1. Install stone check dams at 50' spacing along furrow. Stone check dams to consist of CA-7 stone.

2. Furrow field to full depth of furrow.

3. Furrows shall not be installed in unsheilded, undefined clear zone locations.

NOTES:

- Define clear zone locations.
- Shielded locations defined as clear zone locations.
- Furrows shall not be installed in unsheilded, undefined clear zone locations.