<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Std. Plan No.</th>
<th>Title</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1010-0-E-07</td>
<td>101-R7</td>
<td>Superelevation Plan for Dual Highways (Crowned Surface)</td>
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<tr>
<td>1020-0-E-02</td>
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<td>Superelevation Plan for Dual Highways (Raised Median)</td>
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<tr>
<td>1040-0-E-06</td>
<td>104-R6</td>
<td>Superelevation Plan for Dual Highways (Tangent Surface)</td>
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<tr>
<td>1080-0-E-05</td>
<td>108-R5</td>
<td>Superelevation Plan for Concrete and Bituminous Surfacing</td>
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<tr>
<td>1090-0-E-04</td>
<td>109-R4</td>
<td>Superelevation Plan for Gravel Surfacing</td>
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<td>3010-0-E-12</td>
<td>301-R12</td>
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<tr>
<td>3030-0-E-03</td>
<td>303-R3</td>
<td>Curb Ramps</td>
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<td>3070-0-E-03</td>
<td>307-R3</td>
<td>Mailbox Turnout</td>
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<td>8 to 16 Inch Concrete Pavement</td>
<td>July 2020 - Revision</td>
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<td>4030-0-E-03</td>
<td>403-R3</td>
<td>Bends and Breaks for Concrete Box Culverts</td>
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<td>404-R4</td>
<td>Control Joints for Concrete Box Culverts</td>
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<td>410-R4</td>
<td>Flared End Sections for Culvert Pipes</td>
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<tr>
<td>4110-0-E-02</td>
<td>411-R2</td>
<td>Bedding and Backfill Requirements for Concrete Pipe</td>
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<td>4130-0-E-03</td>
<td>413-R3</td>
<td>Bar Grate for Flared End Sections</td>
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<tr>
<td>4140-0-E-03</td>
<td>414-R3</td>
<td>Pipe Siphon</td>
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<tr>
<td>4250-0-E-05</td>
<td>425-R5</td>
<td>Collars and Elbows for Concrete Pipes</td>
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<td>4280-0-E-04</td>
<td>428-R4</td>
<td>Concrete Plugs and Field Tap Details</td>
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<td>4350-0-E-02</td>
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<td>Manhole</td>
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<td>Curb Inlets and Junction Box</td>
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<td>4550-0-E-02</td>
<td>455-R2</td>
<td>Concrete Ditch Lining</td>
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<td>4900-0-E-01</td>
<td>490-R1</td>
<td>Bird Exclusion Netting</td>
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<td>5010-0-E-07</td>
<td>501-R7</td>
<td>Erosion Control</td>
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<td>547-R4</td>
<td>Concrete Flume, Type VII</td>
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<tr>
<td>5480-0-E-04</td>
<td>548-R4</td>
<td>Concrete Flume, Type VIII</td>
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<tr>
<td>7020-0-E-01</td>
<td>702-R1</td>
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<td>Bullnose (12.5’) (Tapered)</td>
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<td>4-Strand Wire Fence</td>
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<td>7400-0-E-01</td>
<td>740-R1</td>
<td>Midwest Guardrail System Bridge Approach Section</td>
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<td>Thrie-Beam Bridge Approach Section</td>
<td>July 2020 - Revision</td>
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<td>7430-0-E-03</td>
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<td>Guardrail Details</td>
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<td>7440-0-E-00</td>
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<td>Midwest Guardrail System Without Blockouts</td>
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<td>745-R2</td>
<td>End Anchorage Assembly</td>
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<td>Midwest Guardrail System Bridge Approach Section TL-2</td>
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<td>Culvert Mounted Guardrail Post</td>
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<td>Precast Concrete R.O.W. Marker</td>
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<td>R.O.W. Sign</td>
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<td>Highway Delineators and Chevrons</td>
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<td>910-R4</td>
<td>Signal Face Configuration</td>
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<td>911-R2</td>
<td>Signal Mounting</td>
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<td>912-R7</td>
<td>Traffic Signal Pole Detail</td>
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<td>913-R3</td>
<td>Span Wire Signal Pole Detail</td>
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<td>9140-0-E-08</td>
<td>914-R8</td>
<td>Pull Box Detail</td>
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<td>9200-0-E-07</td>
<td>920-R7</td>
<td>Traffic Control, Construction and Maintenance</td>
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<tr>
<td>9210-0-E-08</td>
<td>921-R8</td>
<td>Traffic Control, Construction and Maintenance</td>
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<td>9220-0-E-11</td>
<td>922-R11</td>
<td>Traffic Control for Asphalt Surfacing</td>
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<td>9230-0-E-02</td>
<td>923-R2</td>
<td>Traffic Control Road Closure</td>
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<td>9240-0-E-04</td>
<td>924-R4</td>
<td>Urban Traffic Control Plan</td>
<td>July 2020 - Revision</td>
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<td>9260-0-E-00</td>
<td>926</td>
<td>Typical Lane Closure Plan For Multilane Roadways</td>
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<td>941-R1</td>
<td>Pavement Marking</td>
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<tr>
<td>9420-0-E-00</td>
<td>942</td>
<td>Pavement Marking for Freeway Ramps</td>
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<tr>
<td>9430-0-E-00</td>
<td>943</td>
<td>Temporary Pavement Marking</td>
<td></td>
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</tbody>
</table>
Diagrammatic profile showing method of attaining super-elevation

Notes:
1. Super-elevation rate as shown in the plans is %.

For a slab width up to 12 ft., the super-elevation rate for the surfaced shoulder shall be the same as for the third lane.

At points marked "Lv" it may be necessary to insert a short convenient length of parabolic curve to eliminate the sharp break in the straight line transition.

For a wider slab width (up to 16 ft.), the super-elevation rate for the surfaced shoulder shall be the same as for a slab width up to 12 ft., width of roadway being rotated = (width of shoulder being rotated) + (full super-elevation minus reverse crown slope) + relative slope.

For a greater than or equal to 2 x, L = 24 ft. (width of roadway being rotated) + relative slope.

Full super-elevation (section A-A) and reverse crown (section A-A).

Reverse crown (section C-C) and full super-elevation (section C-C).

Outside edge of the 12 ft. inside lane when the super-elevation transition attains reverse crown.

For the outer roadway, the axis of rotation shall shift from the centerline of the lanes to the inside edge of the 12 ft. inside lane when the super-elevation transition attains reverse crown.

Super-elevation for dual highways with depressed medians of 40 ft. or less in width.

Design speed

<table>
<thead>
<tr>
<th>Minimum relative slope</th>
<th>Maximum relative slope</th>
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<tr>
<td>70</td>
<td>23.5</td>
</tr>
<tr>
<td>80</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Notes:
- The shoulder slope shall be maintained until the super-elevation rate on the roadway is such that the algebraic difference between cross slopes on the roadway and shoulder equals %.
- This algebraic difference shall not exceed %.
- If the outside roadway, the axis of rotation shall shift from the centerline of the lanes to the inside edge of the 12 ft. inside lane when the super-elevation transition attains reverse crown.

Super-elevation for dual highways (crowned)
Diagramatic profile showing method of attaining superelevation

Notes:

- The superelevation rates as shown in the plans
- At points marked "Lv" it may be necessary to insert a short convenient length of parabolic curve to eliminate the sharp break in the straight line transition.

-公式：
  \[ L = 24 \text{ ft. (width of roadway being rotated) } + 0.02 \times \text{change in roadway cross-slope} \times \text{relative slope} \]
  \[ L_r = 24 \text{ ft. (width of roadway being rotated) } - e/100 \times \text{full superelevation} \times \text{relative slope} \]

1 and Lv should be computed based on the 12 ft. driving lane width.

- 60% to 90% of the runoff length should be placed on the tangent.

Design Speed

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Maximum Relative Slope</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2 Lanes Rotated</td>
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<tr>
<td>20</td>
<td>0.05</td>
</tr>
<tr>
<td>30</td>
<td>0.10</td>
</tr>
<tr>
<td>40</td>
<td>0.15</td>
</tr>
<tr>
<td>50</td>
<td>0.20</td>
</tr>
<tr>
<td>60</td>
<td>0.25</td>
</tr>
<tr>
<td>70</td>
<td>0.30</td>
</tr>
<tr>
<td>80</td>
<td>0.35</td>
</tr>
<tr>
<td>90</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Diagrammatic Profile Showing Method of Attaining Superelevation

Notes:

- Superelevation rate as shown in the plans (in %)

For a 15 ft. slab width, the superelevation rate for the 3 ft. surfaced shoulder shall be the same as for the third lane.

At points marked **Lv**, it may be necessary to insert a short convenient length of parabolic curve to eliminate the sharp break in the straight line transition.

\[ L_r = 24 \text{ ft. (width of roadway being rotated)} \times e/100 \times \text{rel. slope} \]

\[ L = 24 \text{ ft. (width of roadway being rotated)} \times 0.02 \times \text{change in roadway cross-slope} \times \text{rel. slope} \]

For a 15 ft. slab width L and Lr should be computed based on the 12 ft. driving lane width.

A 60% to 80% of the runoff length should be placed on the tangent.

### Table of Design Speed vs. Maximum Relative Slope

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Maximum Relative Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>65</td>
<td>16</td>
</tr>
<tr>
<td>70</td>
<td>16</td>
</tr>
<tr>
<td>85</td>
<td>16</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
</tr>
</tbody>
</table>

### Superelevation for Dual Highways with Depressed Medians of 40 ft. or Less in Width

- The shoulder slope shall be maintained until the superelevation rate on the roadway is such that the algebraic difference between cross slopes on the roadway and shoulder equals 7%. This algebraic difference shall not exceed 7%.

- For dual highways, the superelevation rate on the shoulder shall be the same as for the through lane.
Diagrammatic Profile Showing Method of Attaining Superelevation

Notes:
1. Superelevation rate as shown in the plans (in %)
2. For a 12 ft. slab width, the superelevation rate for the 3 ft. paved shoulder shall be the same as for the third lane.
3. At points marked "Lv", it may be necessary to insert a short convenient length of parabolic curve to eliminate the sharp break in the straight line transition.
4. L = 24 ft. (width of roadway being rotated) + 0.02 (change in roadway cross-slope) + relative slope.
5. For a 15 ft. slab width L and L' should be computed based on the 12 ft. driving lane width.

\[
L = 24 + 0.02C + \text{Relative Slope}
\]

Design Speed | Maximum Relative Slope
--- | ---
40 | 1.0
50 | 1.0
70 | 0.7
80 | 0.7

Full Superelevation

For dual highways with depressed medians of 40 ft. or less in width.

Superelevation for dual highways with depressed medians of 40 ft. or less in width.

\[
\text{Superelevation Rate as shown in the plans (in %)}
\]

Table:

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Maximum Relative Slope</th>
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</thead>
<tbody>
<tr>
<td>40</td>
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<tr>
<td>50</td>
<td>1.0</td>
</tr>
<tr>
<td>70</td>
<td>0.7</td>
</tr>
<tr>
<td>80</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Adverse Crown Removed (Section B-B)

Reverse Crown (Section C-C)

Normal Crown (Section D-D)

Full Superelevation

Profile Control

Outer Roadway

Normal Crown

Tangent Runout

Profile Control

Inner Roadway

Full Superelevation

Profile Control

Superelevation Transition

Relative Slope

Diagrammatic Profile Showin
**Diagrammatic Profile Showing Method of Attaining Superelevation**

**Notes:**

- **b = Superelevation Rate as shown in the Plans (in %)**
- For a 28 ft. top system the superelevation rate for the 2 ft. surfaced shoulder will be the same as for theying lane.
- At points marked "Lv" it may be necessary to insert a short convenient length of parabolic curve to eliminate the sharp break in the straight line transition.

\[ Lr = \frac{e}{100} \times \text{RELATIVE SLOPE} \]

\[ L = \frac{0.02 \times \text{CHANGE IN ROADWAY CROSS-SLOPE}}{100} \times \text{RELATIVE SLOPE} \]

- Eliminate the sharp break in the straight line transition.

**Relative Slope Table**

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Maximum Relative Slope</th>
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<tbody>
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<td>2001</td>
</tr>
<tr>
<td>30</td>
<td>3001</td>
</tr>
<tr>
<td>40</td>
<td>4001</td>
</tr>
<tr>
<td>50</td>
<td>5001</td>
</tr>
</tbody>
</table>

- For a 28 ft. lane width, L and Lr should be computed using the 12 ft. driving lane width.

- For a 14 ft. lane width, L and Lr should be computed using the 12 ft. driving lane width.

- Run 7 to 90% of the run off length should be placed on the tangent.

**Notes:**

- 6% Earth
- 4% Surfaced
- 2% Earth
- -6% Surfaced
- -4% Surfaced
- 2%

**Diagram:**

- **Normal Crown**
- **Adverse Crown Removed**
- **Reverse Crown**
- **Full Superelevation**

**Legend:**

-建設速度 (Design Speed)
- 極限相対傾斜 (Maximum Relative Slope)
INTEGRAL CONCRETE CURB

TYPE II CONCRETE CURB, JANUARY 31, 1974

Pavement Details

INTEGRAL CONCRETE BARRIER CURB

INTEGRAL CONCRETE MEDIAN CURB

INTEGRAL CONCRETE CURB

INTEGRAL CONCRETE CURB

Pavement Details

Notes:

- One inch preformed expansion joint filler shall be placed at intervals of not more than 100 feet thru concrete barrier curb, concrete median curb, and concrete curb, type I.

- 1'-0" T = Pavement Thickness

- 1" R = Expansion Joint Filler

- 1'-0" S = Joint Sealant

- 0.359 SQ. FT.

- 1.33 CU. YDS./STA.

- 0.62 CU. YDS./STA.

- 0.87 CU. YDS./STA.

- 0.81 CU. YDS./STA.

- 0.46 CU. YDS./STA.

- 0.47 CU. YDS./STA.

- 0.44 CU. YDS./STA.
EXISTING PAVEMENT

CONCRETE ISLAND NOSE

CONCRETE PAVEMENT WIDENING

NO. 5 x 10" STAKE AT 10' STAKES TO BE DUG AND DRILLED INTO EXISTING PAVEMENT.

NOTE: CONCRETE BASE COURSE W/INTEGRAL CURB

EXPANSION JOINT (SUBSIDIARY)

NO. 5 x 10" STAKE AT 10' STAKES TO BE DUG AND DRILLED INTO EXISTING PAVEMENT.

CONCRETE MEDIAN SURFACING

ONE INCH PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED ACROSS THE FULL WIDTH OF THE MEDIAN SURFACING AT INTERVALS OF NOT MORE THAN 40 FEET.

CONTRACTION AND EXPANSION JOINTS SHALL BE CONSTRUCTED WITH INTEGRAL CURB AND CONCRETE PAVEMENT WIDENING:

THE FOLLOWING NOTE IS TYPICAL FOR CONCRETE BASE COURSE WITH INTEGRAL CURB AND CONCRETE PAVEMENT WIDENING:

CONCRETE ISLAND NOSE

NOTE: CONCRETE PAVEMENT IS TO BE PROMPTED TO BUILD CONCRETE ISLAND NOSE.

COMBINATION CURB & GUTTER

NOTE: TRANSVERSE JOINTS SHALL BE PLACED EVERY 8 FEET AND JOINTS SHALL BE PLACED AT EACH HEADER, 2-HOLE 5 x 10" STAKES ARE TO BE USED. PLACE 1" PREFORMED EXPANSION JOINT FILLER AND SEAL AT THE RETURN OF JOINTS AT INTERSECTIONS.
DETAILS OF CURB DROPS

SECTION E-E

SECTION F-F

SECTION G-G

1" PREFORMED EXPANSION JOINT FILLER

JOINT SEALANT

INTERNAL CURB

TRANSITION SIDEWALK TO STREET

EXPANSION JOINT

JOINT SEALANT

JOINT SEALANT

JOINT SEALANT

TOP OF CURB + 6" MINIMUM

TOP OF CURB + 8" MINIMUM

TOP OF CURB + 10% MINIMUM

TOP OF CURB + 15% MINIMUM

SIDEWALK

NO. 4 REBAR, 4'-0" LONG

EXPANSION JOINT FILLER

1" PREFORMED EXPANSION JOINT FILLER

JOINT SEALANT

SIDEWALK AT DRIVEWAY

EXPANSION JOINT FILLER

1" PREFORMED EXPANSION JOINT FILLER

NO. 4 REBAR, 4'-0" LONG

SIDEWALK AT DRIVEWAY

SIDEWALK AT DRIVEWAY

SECTION H-H

SECTION I-I

SECTION J-J

SECTION K-K

SECTION L-L

SECTION M-M

SECTION N-N

SECTION O-O

SECTION P-P

SECTION Q-Q

SECTION R-R

SECTION S-S

SECTION T-T

SECTION U-U

SECTION V-V

SECTION W-W

SECTION X-X

SECTION Y-Y

SECTION Z-Z

SECTION AA-AA

SECTION BB-BB

SECTION CC-CC

SECTION DD-DD

SECTION EE-EE

SECTION FF-FF

SECTION GG-GG

SECTION HH-HH

SECTION II-II

SECTION JJ-JJ

SECTION KK-KK

SECTION LL-LL

SECTION MM-MM

SECTION NN-NN

SECTION OO-OO

SECTION PP-PP

SECTION QQ-QQ

SECTION RR-RR

SECTION SS-SS

SECTION TT-TT

SECTION UU-UU

SECTION VV-VV

SECTION WW-WW

SECTION XX-XX

SECTION YY-YY

SECTION ZZ-ZZ

SECTION ABB-AABB

SECTION CCC-CCCC

SECTION DDD-DDDD

SECTION EEE-EEEE

SECTION FFF-FFFF

SECTION GGG-GGGG

SECTION HHH-HHHH

SECTION III-III

SECTION JJJ-JJJJ

SECTION KKK-KKKK

SECTION LLL-LLLL

SECTION MLL-MLLL

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SECTION OOO-OOOO

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SECTION QQQ-QQQQ

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
1. The surface of all curb ramps shall be broomed perpendicular to the slope of the curb ramp.
2. Curb ramps shall be constructed at a uniform grade on the curb ramp, feet of new and short grade changes.
3. Detectable warning panels shall contrast visually and extend 2 ft minimum of the direction of pedestrian travel for the width of the ramp. Curb ramps detectable warning panels shall extend the full length of the traversable curb.
4. New curb ramps shall be cast in concrete detectable warning panels.
5. Turning space shall have minimum dimensions of 4 ft x 4 ft. and shall be a minimum of 1 ft. Any obstacles such as a curb or retaining wall for swiveling foot rests, the slope shall be 2% minimum in any direction.
6. The work of constructing curb ramps shall be included in the quantities for "Concrete Sidewalks", "Concrete Median Surfacing" or "Concrete Railings". The work is in substitution of curb work.
7. The work of constructing curb ramps shall not be paid for separately, but will be considered necessary to other items of work for which direct payment is made.

**NOTE:**
- The surface of all curb ramps shall be broomed perpendicular to the slope of the curb ramp.
- Curb ramps shall be constructed at a uniform grade on the curb ramp, feet of new and short grade changes.
- Detectable warning panels shall contrast visually and extend 2 ft minimum of the direction of pedestrian travel for the width of the ramp. Curb ramps detectable warning panels shall extend the full length of the traversable curb.
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**NOTES:**
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- The work of constructing curb ramps shall not be paid for separately, but will be considered necessary to other items of work for which direct payment is made.
**Type A Plan**

- **Isometric View**
  - Detectable Warning Panel
  - Concrete Curb Ramp When W is 4 ft.
  - Ramp Flare
  - Grass or Non-Walking Surface
  - Curb Transition

**Legend**
- Detectable Warning Panel
- Broomed Curbed Ramp When W is 4 to 6 ft.
- Ramp Flare
- Grass or Non-Walking Surface
- Curb Transition

**Slope Legend**
- Sidewalk Turning Space and Curb Cross Slope (5° Typical, 8° Max. Slope)
- Ramp Running Slope (6° Typical, 8° Max. Slope)
- Page Not to Page Size Typical, Slopes Max. Slope

**Sections**
- Type A Cross Section
  - Section A-A

**Type B Plan**

- **Isometric View**
  - Detectable Warning Panel
  - Concrete Curb Ramp When W is 4 ft.
  - Ramp Flare
  - Grass or Non-Walking Surface
  - Curb Transition

**Legend**
- Detectable Warning Panel
- Broomed Curbed Ramp When W is 4 to 6 ft.
- Ramp Flare
- Grass or Non-Walking Surface
- Curb Transition

**Slope Legend**
- Sidewalk Turning Space and Curb Cross Slope (5° Typical, 8° Max. Slope)
- Ramp Running Slope (6° Typical, 8° Max. Slope)
- Page Not to Page Size Typical, Slopes Max. Slope

**Sections**
- Type B Cross Section
  - Section A-A
RAMP RUNNING SLOPE 8.0% TYPICAL, 8.3% MAX. SLOPE

FLARE 90° TO RAMP 9.0% TYPICAL, 10.0% MAX. SLOPE

SIDEWALK/TURNING SPACE AND RAMP CROSS SLOPE 1.5% TYPICAL, 2.0% MAX. SLOPE

CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES. ANY SLOPES EXCEEDING THE MAXIMUMS SHALL NOT BE ACCEPTED WITHOUT PRIOR APPROVAL FROM THE ROADWAY DESIGN ENGINEER. AN EXCEPTION TO THIS IS THE TRANSITIONAL SEGMENT TO EXISTING SIDEWALK THAT CONNECT TO THE EXISTING SIDEWALK PANEL; THIS DOES NOT REQUIRE A STATEMENT OF TECHNICAL INFEASIBILITY. (REF. PROWAG CHAPTER R3 TECHNICAL REQUIREMENTS)

NOTE 4

SEE SHEET 1 FOR FOOT REST SWING SPACE

SEE SHEET 1 DETAIL AND NOTE 3

SEE SHEET 1 PLACEMENT OF DETECTABLE WARNING PANEL

EXISTING SHOULDER SLOPE

6'-0" TYP. (5" RISE)

15'-0" MAXIMUM

6'-0" TYP. (5" RISE)
**Curb Ramps**

**Type G Plan**

**Legend**
- Detectable Warning Panel
- Angled Curb Ramp When 5% to 8.3%
- Ramp Plane
- Grass or Non Walking Surface
- Curb Transition
- Curb Face Slope 1 Vert. 1 Horiz.

**Slope Legend**
- Sidewalk/Turning Space and Ramp Cross Slope 1.5% Typical, 2.0% Max. Slope
- Ramp Running Slope 8.0% Typical, 8.3% Max. Slope
-平面不束坡度8.0%典型，大于8.3%为束

**Notes**
- Foot Rest Swing 1'-0" for Foot Rest Swing
- Crosswalk See Sheet 1 Note 4
- CURB DETAIL See Sheet 1 Note 3
- DETECTABLE WARNING PANEL SEE PLACEMENT DETAIL AND SHEET 1 NOTE 4
- 1.5% Joint Sealant
- 1'-0" for Foot Rest Swing
- Joint Sealant
- 1.5% for Foot Rest Swing
- DETECTABLE WARNING PANEL SEE PLACEMENT DETAIL AND SHEET 1 NOTE 4

**Type G Cross Section**

**Section A-A**

**Notice**
- The contractor should account for construction tolerances to prevent exceeding the maximum slopes. Any slopes exceeding the maximum shall not be accepted without prior approval from the roadway design engineer. An exception to this is the transitional segment to existing sidewalk must connect to the existing sidewalk panel. This does not mean a statement of technical infeasibility. Refer, Chapter 83 Technical Requirements.
DETAILS OF TIE BAR

FOR EACH 12'-0" LANE
INTERVALS SHALL BE USED
PLACED AT UNIFORM
A MINIMUM OF 5 CHAIRS
BETWEEN LANES AND BETWEEN LANES AND SHOULDERS MUST BE TIED. MEDIAN SHOULD NOT BE TIED.

NO TIE BARS SHALL BE CLOSER THAN 1'-3" TO A TRANSVERSE JOINT. ALL LONGITUDINAL JOINTS
NOTE: T = PAVEMENT THICKNESS
8 TO 16 INCH
CONCRETE PAVEMENT

CONVENTIONAL SAWING

JOINT DETAIL

EARLY-SAW CUT

CONTRACTION JOINT

CONSTRUCTION JOINT

THE SAWING SPACING SHALL
BE THE SAME AS SHOWN FOR THE
EXPANSION JOINT. REFER TO JOIN, HARGE LOCATION TABLE AND THE SAWING
BAND HEIGHT AND SPACING TABLE ON SHEET 1 OF A.

DETAILS OF "W" BAR

FOR EACH 12'-0" LANE
INTERVALS SHALL BE USED
PLACED AT UNIFORM
A MINIMUM OF 5 CHAIRS
BETWEEN LANES AND BETWEEN LANES AND SHOULDERS MUST BE TIED. MEDIAN SHOULD NOT BE TIED.

NO TIE BARS SHALL BE CLOSER THAN 1'-3" TO A TRANSVERSE JOINT. ALL LONGITUDINAL JOINTS
NOTE: T = PAVEMENT THICKNESS
8 TO 16 INCH
CONCRETE PAVEMENT
TINING LIMITS GORE AREA

TINING WITH CONCRETE SHOULDER

STANDARD PLAN NO. 329-R11

NOTES:

? TINING IS REQUIRED FOR PAVEMENT WITH POSTED SPEEDS GREATER THAN 40 MPH WITH CONCLUDING TURN LANES.

? 16'-6" TRANSVERSE JOINT SPACING IS THE STANDARD JOINT SPACING REGARDLESS OF THE PAVEMENT THICKNESS.

? WARES FROM 10'-0" TO MAX. 16'-6".

? THE LONGITUDINAL JOINT BETWEEN THE SHOULDER AND THE 12'-0" DRIVING LANE IS NOT REQUIRED FOR SHOULDER WIDTHS OF 8'-0" OR LESS.

? TRANSVERSE JOINTS FOR DOWELED CONCRETE PAVEMENT SHALL BE CONSTRUCTED PERPENDICULAR TO THE ROADWAY.

STOP OR YIELD CONTROL ON ALL FOUR LEGS

STOP OR YIELD CONTROL ON THE SIDE STREETS ONLY
RURAL TIMING LIMITS WITH SURFACED SHOULDERS

JOINT LAYOUT (TYPICAL INTERSECTIONS WITH RAISED ISLANDS)

LEGEND

- SAWED CONTRACTION JOINT
- LONGITUDINAL JOINT

NOTES:
- TIMING IS REQUIRED FOR PAVEMENT WITH POSTED SPEEDS UNLESS LESS THAN 40 MPH INCLUDING TURN LANES.
- 16'-6" TRANSVERSE JOINT SPACING IS THE STANDARD JOINT SPACING REGARDLESS OF THE PAVEMENT THICKNESS.
- V VARS FROM 10'-0" TO MAX. 16'-0".
- VARIOUS SPACING IS USED AROUND INTERSECTIONS AND LARGE DRIVEWAYS WHICH IS TIED TO THE CONCRETE LAKES OR RAILROADS TO MATCH THE JOINTS.

SEE PLANS FOR TRANSITION DETAILS

FOR TIMING DETAILS SEE PLANS
NOTE:

For non-skewed culverts, dimension "X" shall be no less than 2'.
For skewed culverts, dimension "X" shall be no less than 2' plus one half the distance between inner faces of outer walls times tangent of skew angle.

THE DISTANCE BETWEEN INNER FACES OF OUTER WALLS TIMES TANGENT OF SKEW ANGLE.

NOTE:

For non-skewed culverts, dimension "X" shall be no less than 2'.
For skewed culverts, dimension "X" shall be no less than 2' plus one half the distance between inner faces of outer walls times tangent of skew angle.

THE ADDITIONAL ALLOWANCE FOR CONCRETE REQUIRED TO IN THE SPECIFICATIONS SHALL BE CONSIDERED FULL COMPENSATION FOR ANY ADDITIONAL CONCRETE, REINFORCING STEEL, AND WORK REQUIRED FOR EACH HORIZONTAL, BEND AND VERTICAL BREAK.

This plan for bends and breaks shall be used in conjunction with concrete box culvert plans.

All details, dimensions, bar sizes, and spacing, except as shown on the plans shall be calculated and shall conform to the concrete box culvert plans.

The additional allowances for concrete required to in the specifications shall be considered full compensation for any additional concrete, reinforcing steel, and work required for each horizontal, bend, and vertical break.

The additional allowances of concrete for each vertical break or horizontal bend in barrel alignment shall be computed by multiplying the total linear feet of the inside perimeter of the culvert by 0.05 cu. yds.

EXAMPLE:

A 10' x 10' x 10' box culvert would have an inside perimeter of 80' x 0.05 cu. yds., or 4.00 cu. yds. of concrete.

For a bend with beams, go to the chart and locate the point of intersection of a sloping span length line with a vertical full depth line. From this point of intersection draw a horizontal line across the chart to intersect bar size lines. From this point of intersection draw a vertical line down to find the respective beam depth required. Spacing of bars can be found by relating the bar size intersects to the curved lines indicating required bar spacings.

EXAMPLE:

A twin 10' x 10' box culvert with a 10° deflection angle, a 24' span length, and a 20° bending angle would have 3 bars, size 7, 6" spacing, with a 10" beam depth; or 3 bars, size 6, 8" spacing, with a 13" beam depth.

Note that spacing of beam bars shall not be less than 3", and that beam depth shall not be less than the design slab thickness of the culvert.
**Details at Vertical Breaks**

**Table 1**

<table>
<thead>
<tr>
<th>Beam Width (in.)</th>
<th>S-1 Bars</th>
<th>S-3 Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12 through 20</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>21 through 27</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>28 through 40</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>More than 40</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>C 25'</th>
<th>C 30'</th>
<th>C 35'</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes for Horizontal Bends**

- Spacing of transverse slab bars shall be measured along centerline of culvert.
- Reinforcement in the bottom slab is to be placed in a pattern similar to that used in the top slab.
- All and corner bars not shown are to be placed the same as in a normal section of the culvert.

**Notes for Vertical Breaks**

- Longitudinal bars not shown are to be field bent to conform to the deflection angle and continued through the horizontal bend.
- Fanning of transverse slab bars may be used as an alternate to beams. At horizontal bends for spans and deflection angles as listed in Table 2.
- Where fanning is permitted, the transverse slab bars are to be fanned uniformly throughout a distance determined as follows:
  - Fanning distance = ( DEFLECTION ANGLE / 20 )
  - Spacing of bars times beam depth equals beam width equal to 2") clear spacing of bars from chart.

**Details at Vertical Breaks**

**Table 1**

<table>
<thead>
<tr>
<th>Beam Width (in.)</th>
<th>S-1 Bars</th>
<th>S-3 Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12 through 20</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>21 through 27</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>28 through 40</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>More than 40</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>Beam Width (in.)</th>
<th>S-1 Bars</th>
<th>S-3 Bars</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 through 10</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>11 through 20</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>21 through 30</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>31 through 40</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>More than 40</td>
<td>32</td>
<td>33</td>
</tr>
</tbody>
</table>
**SECTION SHOWING CONTROL JOINTS IN FLOOR AND WALLS**

**INTERIOR WALL AT CONTROL JOINT**

NO. 3 x 3'-0" DEFORMED BARS AT TF/2

NO. 3 x 3'-0" DEFORMED BARS AT TT/2

**SECTION SHOWING CONTROL JOINTS IN FLOOR AND WALLS**

**SECTION OF WALL**

FLOOR AND EXTERIOR WALL AT CONTROL JOINT

NO. 3 x 3'-0" DEFORMED BARS AT TF/2

NO. 3 x 3'-0" DEFORMED BARS AT TT/2

**TABLE OF ADDITIONAL BARS FOR CONTROL JOINTS**

<table>
<thead>
<tr>
<th>SPAN (FT)</th>
<th>NO. 3 IN FLOOR</th>
<th>NO. 3 IN WALL</th>
<th>NO. 6 IN FLOOR</th>
<th>NO. 6 IN WALL</th>
<th>NO. 6 BARS</th>
<th>TOTAL QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
<td>12</td>
<td>12</td>
<td>14</td>
<td>60</td>
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<tr>
<td>8</td>
<td>8</td>
<td>8</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>9</td>
<td>16</td>
<td>16</td>
<td>18</td>
<td>60</td>
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<tr>
<td>10</td>
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<td>10</td>
<td>18</td>
<td>18</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>11</td>
<td>20</td>
<td>20</td>
<td>22</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>12</td>
<td>22</td>
<td>22</td>
<td>24</td>
<td>60</td>
</tr>
</tbody>
</table>

*No. 3 bars are included in quantity*

**EXAMPLES:**

<table>
<thead>
<tr>
<th>SPAN (FT)</th>
<th>NO. 3 BARS</th>
<th>NO. 6 BARS</th>
<th>TOTAL QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>12</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>40</td>
<td>60</td>
</tr>
</tbody>
</table>

**NOTES:**

- Control joints shall be used on box culverts having fills of over 10 ft., when settlement is anticipated.
- All normal longitudinal bars in the floor and walls shall be cut to clear the forms by 1" minimum normal transverse floor bars and vertical wall bars shall be placed to clear the control joint forms by 1" minimum.
- The forming and placing of the sheet metal forms shall not be paid for directly, but shall be considered subsidiary to items for which payment is made.
- The sheet metal forms used at control joints shall be shaped to conform to the dimensions as shown on the plans and shall be supported so that no displacement occurs when concrete is placed.
- All longitudinal bars shall be intercepted at control joints.
- All reinforcing steel used shall conform to ASTM A615, Grade 60.
TABLE 1 - CONCRETE
STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

<table>
<thead>
<tr>
<th>INSTALLATION TYPE</th>
<th>BEDDING THICKNESS</th>
<th>MIDDLE AND OUTER BEDDING</th>
<th>LOWER SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>85% SW or 95% CL</td>
<td>90% SW, 95% ML, 90% CL, 95% SW or 95% ML ON NATURAL SOILS OF EQUAL FIRMNESS</td>
<td></td>
</tr>
<tr>
<td>TYPE 2</td>
<td>85% SW or 95% ML</td>
<td>90% SW, 95% ML, 90% CL, 95% SW or 95% ML ON NATURAL SOILS OF EQUAL FIRMNESS</td>
<td></td>
</tr>
<tr>
<td>TYPE 3</td>
<td>85% SW, 95% ML, 95% CL</td>
<td>90% SW, 95% ML, 90% CL, 95% SW or 95% ML ON NATURAL SOILS OF EQUAL FIRMNESS</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES FOR TRENCH INSTALLATIONS**
1. COMPATIBILITY AND SOIL SYMBOLS, I.E. 85% SW, REFER TO SW SOIL MATERIAL WITH MINIMUM STANDARD PROCTOR COMPACTION OF 85%.
2. THE TRENCH TOP ELEVATION SHALL BE NO LOWER THAN 1 FT. BELOW THE BOTTOM OF THE PAVEMENT EMBANKMENT MATERIAL.
3. SOIL IN BEDDING AND HAUNCH ZONES SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE MAJORITY OF SOIL IN THE HAUNCH AREA.
4. THE TRENCH MIDDLE SHALL BE DESIGNATED AS THE SPECIFIED COMPACTION IN THE MIDDLE AND BEDDING ZONES.
5. FOR TRENCH MIDDLE WITH LESS THAN 10 DEGREES OF VERTICAL, THE COMPATIBILITY ON FIRMNESS OF THE SOIL IN THE MIDDLE WALLS AND LOWER SIDE ZONE MUST NOT BE CONSIDERED.
6. FOR TRENCH WALLS WITH GREATER THAN 10 DEGREES OF VERTICAL THAT CONSISTS OF EMBANKMENT, THE LOWER SIDE SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE SOIL IN THE BACKFILL ZONE.

LIMITS OF BEDDING AND BACKFILL

EXCAVATION, BEDDING AND EMBANKMENT REQUIREMENTS

- **TRENCH INSTALLATION**
  - (A) DETERMINE THE FLOW LINE AND TRENCH BOTTOM ELEVATIONS.
  - (B) PLACE PIPE ON THE BEDDING MATERIAL AND COMPACT OUTER BEDDING MATERIAL (SEE CONCRETE - TABLE 1).
  - (C) PLACE BUILDING MATERIAL (SEE TABLE 1) LOOSELY.
  - (D) EXCAVATE TO PROPER ELEVATION.
  - (E) PLACE BEDDING MATERIAL (USE CONCRETE - TABLE 1) LOOSELY.
  - (F) PLACE THE PIPE ON THE BEDDING MATERIAL AND COMPACT OUTER BEDDING MATERIAL (USE CONCRETE - TABLE 1).
  - (G) PLACE AND COMPACT THE LOWER SIDE, HAUNCH AND OVERFILL MATERIAL AT 6 IN. INTERVALS.

EMBANKMENT INSTALLATION

- (A) DETERMINE THE FLOW LINE AND SPRING LINE ELEVATIONS.
- (B) IF FLOW LINE IS ABOVE THE NATURAL GROUND, PLACE AN EMBANKMENT AT LEAST 3 DO WIDE WITH 3:1 SLOPES OR FLAT AT SPRING LINE ELEVATION, COMPACTED AT REQUIRED COMPACTION.
- (C) IF THE FLOW LINE IS BELOW THE NATURAL GROUND BUT THE SPRING LINE IS ABOVE THE NATURAL GROUND, PLACE AN EMBANKMENT AT LEAST 3 FT. TO 4 FT. OF COHESIVE SOIL.
- (D) EXCAVATE TO PROPER ELEVATION.
- (E) PLACE BEDDING MATERIAL (USE CONCRETE - TABLE 1) LOOSELY.
- (F) PLACE THE PIPE ON THE BEDDING MATERIAL AND COMPACT OUTER BEDDING MATERIAL (USE CONCRETE - TABLE 1).
- (G) PLACE AND COMPACT THE LOWER SIDE, HAUNCH AND OVERFILL MATERIAL AT 6 IN. INTERVALS.
TABLE 1 - CONCRETE STANDARD INSTALLATIONS, SOILS AND MINIMUM COMPACTION REQUIREMENTS

<table>
<thead>
<tr>
<th>INSTALLATION</th>
<th>DECKING</th>
<th>MATERIAL</th>
<th>OUTSIDE PIPE</th>
<th>LOWER SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>95% SW</td>
<td>95% SW, 95% ML, 95% CL</td>
<td>R2</td>
<td>D</td>
</tr>
<tr>
<td>TYPE 2</td>
<td>95% SW, 95% ML, 95% CL</td>
<td>O/3</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>TYPE 3</td>
<td>95% SW, 95% ML, 95% CL</td>
<td>O/6</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2 - CONCRETE PIPE DIMENSIONS

<table>
<thead>
<tr>
<th>NOMINAL PIPE DIAMETERS (INCHES)</th>
<th>ROUND PIPE</th>
<th>HEX. ELIP. PIPE</th>
<th>V. ELIP. PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15.9</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>21.2</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>27.2</td>
<td>34.3</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>33.2</td>
<td>41.0</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>41.0</td>
<td>49.2</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 3 - SOIL CLASSIFICATION FOR BEDDING & BACKFILL

<table>
<thead>
<tr>
<th>SOIL GROUP</th>
<th>DESCRIPTION</th>
<th>PERCENTAGE PASSING SIEVE SERIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW</td>
<td>WELL GRADED SANDS AND GRAVELLY-SANDS</td>
<td>&gt; 50%</td>
</tr>
<tr>
<td>ML</td>
<td>MODERATELY GRADED CLAYS</td>
<td>&gt; 50%</td>
</tr>
<tr>
<td>CL</td>
<td>MODERATELY OR HIGHLY EXPANSIVE SOILS</td>
<td>5%</td>
</tr>
</tbody>
</table>

NOTES FOR EMBANKMENT INSTALLATIONS:

1. Compaction and soil symbols, i.e., 95% SW, refer to SW soil material with a minimum standard Proctor compaction of 95%.

2. Soil, in the outer bedding, haunch, and lower side zones, except within the ditch middle bedding, shall be compacted to at least the same compaction as the majority of the soil in the overfill zone.

3. Subsoil zones:
   a. 4.4 Subsoil zones designed as a trench with its top at an elevation lower than 1 ft below the bottom of the pavement, shall be compacted to the specified compaction of the majority of the soil in the overfill zone.
   b. The minimum width of a subsoil shall be 1.33D, or wider if required for adequate space to attain the specified compaction in the haunch and bedding zones.
   c. For subsoil zones with walls of natural soil, any portion of the lower side zone in the subsoil shall be at least 95% firm as an equivalent soil, placed to the compaction requirements stated in Table 1.

GENERAL NOTES:

1. In areas where lateral soil resistance is not necessary, e.g., flat, moss, or highly expansive soil, embankment shall be placed and compacted at the direction of the engineer.

2. To protect the pipe and backfill during construction, provide a minimum of 3 ft of compacted fill material over the top of the pipe before allowing any heavy equipment to traverse over the pipe. Extremely heavy equipment may require larger covers as determined by the contractor.

3. The pipe volume should not be subtracted from the volume of excavation.

4. These designs and standards are minimum, if a more restrictive design is required by the engineer or culvert manufacturer, then these standards shall be modified. Changes to pay item quantities due to unforeseen site conditions shall be calculated and reimbursed to the contractor upon a change order.

5. Both ends of the pipe shall be sealed with cohesive soil around the pipe extending 3 ft, or 6 ft, from each end. To protect against infiltration and erosion.

6. Bedding and backfill material is not paid for directly, but is Substantive to the linear feet of culvert.

7. Bedding and backfill material shall meet ASTM D 987 or equivalent grades as shown in Table 3.

8. Percent compaction shall be determined in accordance with Nebraska Standard Test Method 7-9.
TABLE 1 - CONCRETE INSTALLATION, SOILS AND MINIMUM COMPACTION REQUIREMENTS

<table>
<thead>
<tr>
<th>INSTALLATION TYPE</th>
<th>BENDING TENSION</th>
<th>MINIMUM AND MAXIMUM BENDING</th>
<th>LOWER SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>95% SW, 95% ML</td>
<td>90% SW, 95% ML OR 100% CL</td>
<td></td>
</tr>
<tr>
<td>TYPE 2</td>
<td>95% SW, 95% ML</td>
<td>95% SW, 95% ML OR 95% CL</td>
<td></td>
</tr>
<tr>
<td>TYPE 3</td>
<td>95% SW, 95% ML</td>
<td>95% SW, 95% ML OR 95% CL</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
- INSTALLATION TYPE 1 AND TYPE 2 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 1 WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE I WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE I WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL.
- INSTALLATION TYPE 2 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 2 WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE I WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL.
- INSTALLATION TYPE 3 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 3 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 2 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 3 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE.

TABLE 2 - MAXIMUM FILL HEIGHTS (FEET) FOR STANDARD DESIGN (AASHTO M 170) ROUND CONCRETE PIPE

<table>
<thead>
<tr>
<th>PIPE CLASS</th>
<th>MINIMUM CIRCUMFERENTIAL REINFORCEMENT IN % OF PIPE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.09</td>
</tr>
<tr>
<td>24</td>
<td>0.15</td>
</tr>
</tbody>
</table>

TABLE 3 - LOADS FOR CONCRETE PIPE

<table>
<thead>
<tr>
<th>PIPE CLASS</th>
<th>CLASS</th>
<th>MINIMUM COMPACTION REQUIREMENTS IN % OF PIPE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>HI</td>
<td>0.09</td>
</tr>
<tr>
<td>24</td>
<td>HI</td>
<td>0.15</td>
</tr>
</tbody>
</table>

TABLE 4 - MAXIMUM FILL HEIGHTS (FEET) FOR STANDARD DESIGN (AASHTO M 170) ROUND CONCRETE PIPE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>PIPE SIZE (IN.)</th>
<th>MINIMUM CLEARANCE FROM THE BOTTOM OF THE PAVEMENT TO THE TOP OF THE PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>96</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>96</td>
</tr>
</tbody>
</table>

TABLE 5 - NOTES:
- MAXIMUM FILL HEIGHTS FOR THE TYPE 1, 2, AND 3 INSTALLATIONS ARE SHOWN IN TABLE 4.
- INSTALLATION TYPE 2 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 2 WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE I WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL.

TABLE 6 - LOADS FOR CONCRETE PIPE

<table>
<thead>
<tr>
<th>PIPE CLASS</th>
<th>MINIMUM COMPACTION REQUIREMENTS IN % OF PIPE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.09</td>
</tr>
<tr>
<td>24</td>
<td>0.15</td>
</tr>
</tbody>
</table>

TABLE 7 - NOTES:
- MAXIMUM FILL HEIGHTS FOR THE TYPE 1, 2, AND 3 INSTALLATIONS ARE SHOWN IN TABLE 4.
- INSTALLATION TYPE 2 AND TYPE 1 ARE IMPROVED METHODS IN ORDER TO SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE 2 WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL. THE CONTRACTOR WILL CHOOSE THE INSTALLATION TYPE AND CLASS OF PIPE. ACTUAL SUPPORT HIGHER FILL HEIGHTS USING CLASS III, IV, AND V CIRCULAR CONCRETE PIPE. INSTALLATION TYPE I WILL PROVIDE THE BEST IN-SITU PERFORMANCE USING GREATER COMPACTION WITH GRANULAR BEDDING AND BACKFILL.

TABLE 8 - LOADS FOR CONCRETE PIPE

<table>
<thead>
<tr>
<th>PIPE CLASS</th>
<th>MINIMUM COMPACTION REQUIREMENTS IN % OF PIPE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.09</td>
</tr>
<tr>
<td>24</td>
<td>0.15</td>
</tr>
</tbody>
</table>
TABLE 1 - PLASTIC SOIL CLASSIFICATION FOR GRANULAR FILL MATERIAL

<table>
<thead>
<tr>
<th>SOIL GROUP</th>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
<th>D (MIN.)</th>
<th>% PASSING SIEVE SIZES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN</td>
<td></td>
<td>WELL GRADED SAND, GRAVEL, Silt, or Silt-Sand; LITTLE OR NO FINE MATERIAL</td>
<td>100%</td>
<td>1/4 in. of Coarse Fraction</td>
</tr>
<tr>
<td>DP</td>
<td></td>
<td>Poorly Graded Sand and Gravel; Little or No Fine Material</td>
<td>100%</td>
<td>1/4 in. of Coarse Fraction</td>
</tr>
<tr>
<td>SN</td>
<td></td>
<td>Silt and Sand which are Mixed, but CHIEFLY Sandier Than Silt</td>
<td>100%</td>
<td>Varies 5% to 12%</td>
</tr>
<tr>
<td>SP</td>
<td></td>
<td>Poorly Graded Sand and Gravel-Sand; Little or No Fine Material</td>
<td>100%</td>
<td>Varies 5% to 12%</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>Silty Sand, Silt, or Silt-Sand Not Interstratified</td>
<td>100%</td>
<td>2 in. of Coarse Fraction</td>
</tr>
<tr>
<td>SM</td>
<td></td>
<td>Silty Sands, Sandy Silt, or Sandy Silt Not Interstratified</td>
<td>100%</td>
<td>2 in. of Coarse Fraction</td>
</tr>
</tbody>
</table>

TABLE 2 - PLASTIC MINIMUM D (INCHES)

<table>
<thead>
<tr>
<th>PIPE BOTTOM</th>
<th>TYPICAL TRENCH INSTALLATION</th>
<th>COMPACTED GRANULAR MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE BOTTOM</td>
<td>COMPACTED GRANULAR MATERIAL</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

- Installations as shown are required under all surfaced roadways, bridges and crossings for drain pipe or under pipe outside the roadway prism for back of curb. The 2021 GPA plan may be used for underground crossings, assuming that the proper requirements are met.
- Pipes shall be installed in accordance with standard specifications.
- Trenches shall be excavated in accordance with approved safety practice.

**Typical Trench Installation**

- Place 3 ft. to 4 ft. of cohesive soil plug at the outlet around the culvert to prevent secondary flows.

**Typical Embankment Installation**

- Place 3 ft. to 4 ft. of cohesive soil plug at the outlet around the culvert to prevent secondary flows.

**End Section**

- Lift lines at 6" max. intervals (typ.)

**End Section**

- Lift lines at 6" max. intervals (typ.)
DESCRIPTION OF REVISIONS

SIDE ELEVATION

DETAILED OF COLLARS

DETAILS OF CONCRETE ELBOWS

BAR LOCATION DETAILS

BAR SCHEDULE OF BARS FOR COLLAR

DATA FOR COLLARS

DATA FOR PRECAST ELBOWS

NOTES:

ALL QUANTITIES ARE BASED ON DIMENSIONS SHOWN ON THIS PLAN. NO ADJUSTMENTS WILL BE MADE ON THESE QUANTITIES IF OTHER STANDARDS ARE USED.

WHEN A CONCRETE COLLAR, CONNECTING EXISTING AND NEW CONCRETE PIPE, IS CONSTRUCTED WITH A BEND, IT SHALL BE CONSIDERED AS A COLLAR NOT AN ELBOW.

ALL REINFORCING STEEL USED SHALL CONFORM TO THE REQUIREMENTS OF THE ASTM DESIGNATIONS APPLICABLE TO THE SUITABILITY OF STEEL USED.

ALL CONCRETE USED SHALL BE CLASS 47B-3000.

REINFORCING BARS SHALL BE LAPPED WHERE THE BEND IS MADE.

REINFORCING BARS SHALL BE LAPPED AND TIED WHERE THE BEND IS MADE.

WELDED WIRE FABRIC OR EQUAL SHALL BE LAPPED 12" AT SPECIFIEDs.

THE LOCATION OF THE PIPE SHALL BE MARKED WHEN CASTING TO ASSURE CORRECT ALIGNMENT WHEN INSTALLING AND TESTING.

ALL PIPE DIMENSIONS SHOWN ARE NOMINAL.
SLAB REINFORCING BARS (SEE TABLE NO. 1)

2-No. 5 bars @ 3'-0" (R REQUIRED

LIFT BARS AS REQUIRED (SEE SHEET 2 OF 3)

FLAT SLAB BASE

TABLE NO. 1

<table>
<thead>
<tr>
<th>MANHOLE SIZE</th>
<th>HORIZONTAL</th>
<th>MANHOLE HORIZONTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASE</td>
<td>TOP</td>
</tr>
<tr>
<td>24&quot;</td>
<td>30&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>36&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>42&quot;</td>
<td>36&quot;</td>
</tr>
</tbody>
</table>

TABLE NO. 2

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>VERTICAL</th>
<th>% OF BAR</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8&quot;</td>
<td>0.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE NO. 3

<table>
<thead>
<tr>
<th>MANHOLE SIZE</th>
<th>BASE AND TOP SLAB FOR ROUND MANHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LICONIC</td>
</tr>
<tr>
<td></td>
<td>SLAB</td>
</tr>
<tr>
<td></td>
<td>24&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>42&quot;</td>
</tr>
</tbody>
</table>

NOTES

DIMENSION "A" SHALL BE THE DIFFERENCE BETWEEN THE MANHOLE TOP ELEVATION AND THE FLAT TOP ELEVATION FOR TYPE "A" MANHOLE.

DIMENSION "B" SHALL BE THE DIFFERENCE BETWEEN THE MANHOLE TOP ELEVATION AND THE TOP OF THE ECCENTRIC TRANSITION SECTION FOR TYPE "B" MANHOLE.

MINIMUM "A" SHALL BE 9" UNDER PIPE AND 0" AT "A" DISTANCE FROM THE TRANSITION SECTION.

DIMENSION "A" SHALL NOT EXCEED 5'-0".

WHEN RECONSTRUCTING OR ADJUSTING TO GRADE AN EXISTING MANHOLE, TYPE "A" ON "B" MANHOLE, "A" MAY BE INCREASED TO 5'-0", IF THE INT. SECTION WOULD REQUIRE.

DIMENSION "A" TO BE IN EXCESS OF 5'-0", THEN THE CONE SECTION OF THE FLAT SLAB TOP MUST BE RAISED AND THE 2'-0" MAX. DIMENSION "B" ALREADY APPLIES.

DIMENSION "C" SHALL BE THE DIFFERENCE BETWEEN THE FLANGE ELEVATION SHOWN ON THE PLANS AND THE FLAT SLAB TOP ELEVATION SHOWN ON THE PLANS. ONE OR MORE PRECAST CONCRETE BASE SECTIONS MAY BE PROVIDED TO OBTAIN THE DESIRED HEIGHT. THE CONTRACTOR MAY PROVIDE ANY LENGTH OF PRECAST CONCRETE BASE SECTION.

MINIMUM "C" IS 2'-0".

IF ADDITIONAL LENGTH IS PROVIDED, THE LEVEL BLOCKS SHALL BE SET AT THE PROPER ELEVATION WITH THE FLANGE SO THAT THE FLAT SLAB TOP ELEVATION SHOWN ON THE PLANS WILL BE OBTAINED. ALL ADDITIONAL MATERIAL OR WORK REQUIRED SHALL BE AT THE CONTRACTOR'S EXPENSE.

DIMENSION "D" SHALL BE THE DIFFERENCE BETWEEN THE FLANGE ELEVATION SHOWN ON THE PLANS AND THE MANHOLE TOP ELEVATION SHOWN ON THE PLANS. THE FURNISHING AND PLACING OF MANHOLE STEPS AND LIFT BARS SHALL BE SUBSIDIARY TO THE MANHOLE.

THE MAX CLEARANCE OF REINFORCING STEEL SHALL BE 2".

BARS SIZES SHOWN ON THE PLANS ARE THE MAX. SIZES THAT MAY BE USED AT EACH LOCATION. THESE SIZES ARE BASED ON CENTER BARS. SECTIONS WHICH ARE USUALLY VISIBLE FROM THE FABRICATION. THE CONTRACTOR MAY PROVIDE BAR BARS SECTIONS OF LARGER SIZES THAN SHOWN ON THE PLANS. ADDITIONAL REINFORCEMENT SHALL BE USED FOR BARS. SECTIONS OF A LARGER THAN SHOWN ON THE PLANS.

EACH SECTION SHALL BE SET IN A FRESH BED OF MORTAR AND POINTED UP INSIDE AND OUT, OR A COLD FORMED JOURNAL MATERIAL COMPLIANT TO FEDERAL SPECIFICATIONS 55-0-0202.

THE CONTRACTOR MAY, AT HIS OPTION, CAST-IN-PLACE THE FIRST SECTION OF THE MANHOLE WHEN THE STANDARD PRECASTS ARE NOT AVAILABLE. THE CONCRETE WALL. TOLERANCES AND REINFORCING STEEL AREA SHOWN ON THE PLANS. THE MIN. CLEARANCE OF REINFORCING STEEL SHALL BE 2".
MINIMUM WALL THICKNESS SHALL BE 8".

PURPOSES ONLY). THE MINIMUM HORIZONTAL REINFORCING SHALL BE NO. 4 BARS AT 12" CENTERS AND THE HANDLED IN THE SAME MANNER.

USED FOR ALL FOUR WALLS IN A PARTICULAR LIFT OR POUR. THE SAME WALL DESIGN MAY BE USED THROUGHOUT THE WALL THICKNESS AND THE AMOUNT OF HORIZONTAL REINFORCING AS DETERMINED FROM THE CHART SHALL BE LOCATED BETWEEN THE 7-FOOT AND 8-FOOT SPAN LENGTH LINES.

8" THICK WALL WITH 0.40 SQ. IN./FT. OF REINFORCING STEEL IS REQUIRED. THE HORIZONTAL BARS MAY BE FROM THIS POINT OF INTERSECTION, DRAW A HORIZONTAL LINE TO THE RIGHT TO FIND THE REQUIRED AMOUNT OF STEEL REQUIRED FOR A PARTICULAR VALUE OF "H" AND A LONG SPAN DIMENSION "LS". TO USE THE CHART, CHART NO. 1 SHALL BE USED TO DETERMINE THE WALL THICKNESS AND THE AMOUNT OF HORIZONTAL REINFORCING

LOCAL CONDITIONS AND SPECIFICATIONS OF THE PLANS, THE DIMENSIONS SHALL BE OF SUFFICIENT DIMENSION TO ACCOMMODATE PIPES OF MORTAR AND POINTED UP INSIDE AND OUT.

THE FURNISHING AND PLACING OF MANHOLE STEPS SHALL BE SUBSIDIARY TO THE MANHOLE. THE SHORTER CLEAR SPAN "SS" SHALL BE USED TO FIND A BASE AND TOP SLAB DESIGN FROM THE TABLE NO. 5. THE LONGER CLEAR SPAN "LS" OF THE WALLS, AS SEEN IN A HORIZONTAL SECTION, SHALL BE USED TO FIND A WALL DESIGN FROM CHART NO. 5.

NOTES

TABLE NO. 4

CROSS SECTIONAL AREAS IN SQUARE INCHES OF BARS IN WALL SECTIONS ONE FOOT HIGH

<table>
<thead>
<tr>
<th>SPC</th>
<th>NO. 4</th>
<th>NO. 5</th>
<th>NO. 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot;</td>
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<td>8&quot;</td>
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TABLE NO. 5

BASE AND TOP SLAB FOR RECTANGULAR MANHOLE

<table>
<thead>
<tr>
<th>LS &quot;FT&quot; TO &quot;SS&quot; &quot;FT&quot;</th>
<th>2&quot;</th>
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</tbody>
</table>

Notes

FOR TYPE "C" MANHOLE, THE MAX. VALUES OF "H" SHALL BE:

MAX. H = 21 FEET WHEN LS = 9 FEET
MAX. H = 19 FEET WHEN LS = 8 FEET
MAX. H = 17 FEET WHEN LS = 7 FEET
MAX. H = 15 FEET WHEN LS = 6 FEET
MAX. H = 13 FEET WHEN LS = 5 FEET

THE LONGER CLEAR SPAN "LS" OF THE WALLS, AS SEEN IN A HORIZONTAL SECTION, SHALL BE USED TO FIND A WALL DESIGN FROM CHART NO. 5.

THE SHORTER CLEAR SPAN "SS" SHALL BE USED TO FIND A BASE AND TOP SLAB DESIGN FROM THE TABLE NO. 5.

THE MAX. CONCRETE WALL THICKNESS SHALL BE 2" EXCEPT AS SHOWN.

THE REINFORCING STEPS SHALL BE OF SUCH A SIZE TO ACCOMMODATE REINFORCING BARS AND SHEDS OF MORTAR, POINTED UP INSIDE AND OUT.

FOR INTER AND DRAINAGE MANSNE STEPS SHALL BE SUBSIDIARY TO THE MANHOLE. THE TOP SLAB MAY BE CAST-IN-PLACE OR PRECAST, BUT IF IT IS PRECAST, IT SHALL BE SET IN A FRESH BED OF MORTAR AND POINTED UP INSIDE AND OUT.

FOR INTER AND DRAINAGE MANSNE STEPS SHALL BE OF SUCH A SIZE TO ACCOMMODATE REINFORCING BARS AND SHEDS OF MORTAR, POINTED UP INSIDE AND OUT.
HALF TOP VIEW

SECTION C-C

FRAME

During pavement construction, the frame casting to be temporarily held in position by bolting to flange casting. Bolts to be removed after concrete has hardened.

HALF TOP VIEW

SECTION B-B

FLANGE

DETAILS OF FRAME AND FLANGE

TYPE I

TELESCOPIC TYPE (CAST IRON)

TYPE II

NON-TELESCOPIC TYPE (CAST IRON)

TYPE III

NON-TELESCOPIC TYPE (CAST IRON)

HALF PLAN

SECTION A-A

DETAILS OF COVER

CAST IRON

WEIGHTS

CAST IRON

NOTES

ADJUSTING RINGS MAY BE USED IN ORDER TO OBTAIN THE REQUIRED ELEVATION OF EITHER NEW OR EXISTING MANHOLES. THE RINGS ARE SUBSEQUENT TO BOLT MANHOLES, ADJUST MANHOLES TO ELEVATION OF RECONSTRUCT MANHOLES.

THE ADJUSTING RINGS SHALL BE HELD HOUSING TO THE FRAME AND TO EACH OTHER BY USE OF SET SCREWS IN THE FLANGE LEADS OF THE RING. ADJUSTING RINGS MAY BE USED TO A MAXIMUM HEIGHT OF 12 INCHES.

THE CONTRACTOR SHALL INSPECT THE CONDITION AND VERIFY THE DIMENSIONS OF EXISTING MANHOLE PRIOR TO USING ADJUSTING RINGS.

FOR TYPE I COVER (STORM SEWER), USE DETAILS AS SHOWN.

FOR TYPE II COVER (SANITARY SEWER), OMIT 3⁄8" DIA. HOLES IN COVER.

FOR TYPE III ASSEMBLY IS NORMALLY USED OUTSIDE OF PAVEMENT.

TYPE I AND II ASSEMBLY IS NORMALLY USED IN PAVEMENT.

FOR TYPE A COVER (STORM SEWER), USE DETAILS AS SHOWN.

FOR TYPE B COVER (SANITARY SEWER), USE DETAILS AS SHOWN.

ADJUSTING RINGS ARE SUBSEQUENT TO BOLT MANHOLES, ADJUST MANHOLES TO ELEVATION OF RECONSTRUCT MANHOLES.

THE ADJUSTING RINGS MAY BE USED IN ORDER TO OBTAIN THE REQUIRED ELEVATION OF EITHER NEW OR EXISTING MANHOLES.

THE ADJUSTING RINGS SHALL BE HELD HOUSING TO THE FRAME AND TO EACH OTHER BY USE OF SET SCREWS IN THE FLANGE LEADS OF THE RING. ADJUSTING RINGS MAY BE USED TO A MAXIMUM HEIGHT OF 12 INCHES.

THE CONTRACTOR SHALL INSPECT THE CONDITION AND VERIFY THE DIMENSIONS OF EXISTING MANHOLE PRIOR TO USING ADJUSTING RINGS.
### Table: Curb Inlet Cover Quantities

<table>
<thead>
<tr>
<th>Curb Inlet Cover</th>
<th>Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu. Yds.</td>
<td>0.720</td>
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### Diagram: Curb Inlet Cover

- **PLAN:** Shows the layout of the curb inlets and junctions. The plan includes various dimensions and annotations for the placement of materials and bars.
- **ELEVATION:** Provides the vertical perspective of the curb inlets, detailing the depth and height of the features.

### Notes:
- The top elevation of the inlet lid, when installed, shall be at least 10" below the finished shoulder slope of the roadway cross-sections.
- Concrete covers may be cast in place or precast.
- The cast-in-place cover shall be over 4" in depth, continuing to the specifications of the curb inlets and junctions when the top of the concrete is 4" from the curb. The finishing and placing of cast iron steps shall be subservient to the item for which direct payment is made.
- The gutter depression template shall be used in the throat opening.
- The quantities of concrete and steel for curb inlet covers include the portion of concrete and steel below and back of the curb section as shown on this plan.
- The concrete covers may be cast in place or precast.
- The cast iron covers shall be over 4" in depth, continuing to the specifications of the curb inlets and junctions when the top of the concrete is 4" from the curb. The finishing and placing of cast iron steps shall be subservient to the item for which direct payment is made.

---

**Table:**

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Length</th>
<th>Diameter</th>
<th>Wall Thickness</th>
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</thead>
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<tr>
<td>8&quot;</td>
<td>4'-0&quot;</td>
<td>10&quot;</td>
<td>6.7</td>
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<tr>
<td>6&quot;</td>
<td>2'-6&quot;</td>
<td>8&quot;</td>
<td>6.7</td>
</tr>
<tr>
<td>4&quot;</td>
<td>1'-6&quot;</td>
<td>6&quot;</td>
<td>6.7</td>
</tr>
</tbody>
</table>

**NOTES:**
- The minimum covering, measured from the face of concrete to the surface of any reinforcing bar, shall be 10".
- Concrete covers may be cast in place or precast.
- Cast iron covers shall be over 4" in depth, continuing to the specifications of the curb inlets and junctions when the top of the concrete is 4" from the curb. The finishing and placing of cast iron steps shall be subservient to the item for which direct payment is made.
- The gutter depression template shall be used in the throat opening.
- The quantities of concrete and steel for curb inlet covers include the portion of concrete and steel below and back of the curb section as shown on this plan.
- The concrete covers may be cast in place or precast.
- The cast iron covers shall be over 4" in depth, continuing to the specifications of the curb inlets and junctions when the top of the concrete is 4" from the curb. The finishing and placing of cast iron steps shall be subservient to the item for which direct payment is made.
NOTE:

MAY BE USED ON OTHER STRUCTURES SUCH AS LARGE CORRUGATED METAL PIPES.

THE CONTRACTOR SHALL USE NETTING CONSISTING OF OPENINGS NO LARGER THAN 1/2" WIDE.

THE NETTING MATERIAL WILL BE CONSTRUCTED OF EXTRUDED POLYPROPYLENE OR NYLON WIRE.

THE CONTRACTOR SHALL INSTALL NETTING IN A MANNER THAT GAPS BETWEEN THE NETTING AND THE BRIDGE/BOX CULVERT ARE LESS THAN 1/2 AT THE POINT OF ATTACHMENT. LOOSE FITTING NETTING IS DESIRABLE FOR STRUCTURES SUCH AS BOX CULVERTS WHERE NETTING FITTED TIGHT TO THE STRUCTURE MAY ALLOW NESTING.

NETTING SHOULD OVERLAP IN END AREAS OF BOX CULVERTS BY APPROXIMATELY 3 FT, AND SHOULD EXTEND TO THE BOTTOM OF THE CULVERT IF PRESENT. FOR SLAB BRIDGES, NETTING SHOULD BE PULLED TIGHT AGAINST THE STRUCTURE AT UNDERNEATH CORNER AREAS BETWEEN THE UNDERSIDE OF A BRIDGE DECK AND PIER CAP AND MAINTAINED TO MINIMIZE SAGGING.

DEVICES SUCH AS STEEL CABLES AND EYE BOLTS USED TO SECURE NETTING TO THE STRUCTURE SHOULD BE OF ADEQUATE NUMBER AND STRENGTH TO ACCOUNT FOR THE WEIGHT OF THE NET AND SUBSEQUENT STRETCHING, AND SHALL MEET THE SPECIFICATIONS OUTLINED IN SECTION 1062 OF THE STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION.

PLASTIC CABLE OR "ZIP" TIES SHOULD BE USED TO SECURE TO THE STEEL CABLES AND TO BUNCH EXCESS NETTING WHERE NEEDED.

STANDARD DIMENSIONAL LUMBER SECURELY ATTACHED TO THE STRUCTURE MAY REPLACE THE STEEL CABLES AND EYE BOLTS.

THE CONTRACTOR SHALL INSTALL THE NETTING IN A MANNER THAT WILLS MINIMIZE THE OBSTRUCTION TO WATERCOURSES DURING PERIODS OF HIGH FLOW BY KEEPING THE NETTING TAUT TO THE TOP OF THE CULVERT.

NETTING MIGHT OVERLAP IN END AREAS OF BOX CULVERTS AND SHOULD BE OF ADEQUATE NUMBER AND STRENGTH TO ACCOUNT FOR THE WEIGHT OF THE NET AND SUBSEQUENT STRETCHING, AND SHALL MEET THE SPECIFICATIONS OUTLINED IN SECTION 1062 OF THE STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION.

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THE CONTRACTOR SHALL INSTALL THE NETTING IN A MANNER THAT WILLS MINIMIZE THE OBSTRUCTION TO WATERCOURSES DURING PERIODS OF HIGH FLOW BY KEEPING THE NETTING TAUT TO THE TOP OF THE CULVERT.

FURTHER GUIDANCE FOR PLACEMENT IS AVAILABLE FROM THE HUMAN ENVIRONMENTAL SECTION IN PLANNING AND PROJECT DEVELOPMENT.
TYPICAL EROSION CONTROL BLANKET INSTALLATION

NOTES:
1. THIS PLAN IS APPLICABLE FOR THE FOLLOWING EROSION CONTROL CLASS NO. 1B, 1C, 1D, 1E, 1F, 2A, 2B & 2C.
2. SOIL RETENTION BLANKET SHALL BE LAID A MINIMUM OF 2'-6" UP THE BACKSLOPE AND FORESLOPE.
3. CHECK SLOTS ARE PLACED PERPENDICULAR TO DITCH CENTER LINE ON 25'-0" INTERVALS.
4. THE MANUFACTURERS' RECOMMENDED STAPLING PATTERNS SHALL GOVERN OVER THE PLANS.
5. THIS PLAN IS APPLICABLE FOR THE FOLLOWING EROSION CONTROL CLASS NO. 1B, 1C, 1D, 1E, 1F, 2A, 2B & 2C.

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3. THE MANUFACTURERS' RECOMMENDED STAPLING PATTERNS SHALL GOVERN OVER THE PLANS.

TYPICAL CROSS-SECTION

# THE FIRST ROLL OF BLANKET SHALL BE LAID DOWN THE CENTER OF THE DITCH.
TYPICAL INSTALLATION AT PIPE CULVERT
(SHOWING STRAIGHT PIPE)

TYPICAL INSTALLATION AT BOX CULVERT

PLAN VIEW STAPLING DIAGRAM

NOTE:
OFFSET EROSION CONTROL PLACEMENT ALONG THE DRAINAGE PATH
THERE IS NO DEFINED DRAINAGE PATH

EROSION CONTROL BLANKET PLACEMENT AT SPLASH BASIN

PLAN VIEW STAPLING DIAGRAM

ADVISED BY THIS FOR USE ON THE NATIONAL HIGHWAY SYSTEM
STANDARD PLAN NO. 502-R2

TOE OF FILL (MINIMUM)
6'-0" OFFSET FROM TOE OF SLOPE
30"

OPTION ONE (PREFERRED)
SILT FENCE SPLICE
(ACROSS DITCH)

OPTION TWO (WITH LIMITED R.O.W.)
SILT FENCE AT CORNERS SHALL HAVE A RADIUS OF 6'-0" MINIMUM TO 12'-0" MAXIMUM

TRENCH DETAIL
SILT FENCE MAY ALSO BE INSTALLED WITH A SILT FENCE PLOW. NO STAPLING IS REQUIRED WHEN THE SILT FENCE PLOW IS USED.

SILT FENCE MINIMUM ROLL WIDTH:
SILT FENCE SHOULD BE 30" ABOVE GRADE (MAY VARY)
SILT FENCE SPLICE BACKFILL SEE TRENCH DETAIL
TRENCH AND COMPACT BACKFILL SEE TRENCH DETAIL

SILT FENCE AT CORNERS SHALL HAVE A RADIUS OF 6'-0" MINIMUM MULTIPLE BAYS MAY BE USED
NOTE:
POST SPACING 6'-0" MAXIMUM

SILT FENCE WITH SILT TRAP
ACROSS SPLIT

HIGH POROSITY SILT FENCE
ACROSS SPLIT
NOTE:
POST SPACING 6'-0" MAXIMUM

SILT FENCE WITH SILT TRAP
ACROSS SPLIT

STEEL POST INSTALLATION
APR 14

FABRIC
STEEL POST
PLASTIC CABLE TIES
STEEL POST
PLASTIC ZIP TIES

SILT FENCE BAYS
6'-0" OFFSET FROM TOE OF FILL, MINIMUM
6'-0" APPROX.

SILT FENCE SPLICE
(ACROSS DITCH)

PROFILE VIEW
ATTACHMENT TO POST

BACK VIEW
ATTACHMENT TO POST

PLASTIC CABLE TIES ARE REQUIRED.
FOR EACH STEEL STUDDED "T" LINE POST, 3 PLASTIC CABLE TIES ARE REQUIRED.
2" X 2" X 6'-0" NOMINAL WOOD STAKES SPACING, 6'-0" MAXIMUM ON CENTER DRIVER UNLESS FIRM.

SILT FENCE]);

STEEL POST
6'-0" MAX.
LOW POROSITY
STEEL POST
6'-0" MAX.
LOW POROSITY
STEEL POST
6'-0" MAX.
LOW POROSITY
STEEL POST
6'-0" MAX.
LOW POROSITY

STEEL POST
PLASTIC CABLE TIES
STEEL POST
PLASTIC ZIP TIES

NOTE:
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SILT FENCE WITH SILT TRAP
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HIGH POROSITY SILT FENCE
ACROSS SPLIT
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POST SPACING 6'-0" MAXIMUM

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STEEL POST INSTALLATION
APR 14

FABRIC
STEEL POST
PLASTIC CABLE TIES
STEEL POST
PLASTIC ZIP TIES

SILT FENCE BAYS
6'-0" OFFSET FROM TOE OF FILL, MINIMUM
6'-0" APPROX.

SILT FENCE SPLICE
(ACROSS DITCH)

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ACROSS SPLIT

HIGH POROSITY SILT FENCE
ACROSS SPLIT
NOTE:
POST SPACING 6'-0" MAXIMUM

SILT FENCE WITH SILT TRAP
ACROSS SPLIT

STEEL POST INSTALLATION
APR 14

FABRIC
STEEL POST
PLASTIC CABLE TIES
STEEL POST
PLASTIC ZIP TIES

SILT FENCE BAYS
6'-0" OFFSET FROM TOE OF FILL, MINIMUM
6'-0" APPROX.

SILT FENCE SPLICE
(ACROSS DITCH)

PROFILE VIEW
ATTACHMENT TO POST

BACK VIEW
ATTACHMENT TO POST

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FOR EACH STEEL STUDDED "T" LINE POST, 3 PLASTIC CABLE TIES ARE REQUIRED.
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NOTE:
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SILT FENCE WITH SILT TRAP
ACROSS SPLIT

HIGH POROSITY SILT FENCE
ACROSS SPLIT
NOTE:
POST SPACING 6'-0" MAXIMUM

SILT FENCE WITH SILT TRAP
ACROSS SPLIT

STEEL POST INSTALLATION
APR 14

FABRIC
STEEL POST
PLASTIC CABLE TIES
STEEL POST
PLASTIC ZIP TIES

SILT FENCE BAYS
6'-0" OFFSET FROM TOE OF FILL, MINIMUM
6'-0" APPROX.

SILT FENCE SPLICE
(ACROSS DITCH)

PROFILE VIEW
ATTACHMENT TO POST

BACK VIEW
ATTACHMENT TO POST

PLASTIC CABLE TIES ARE REQUIRED.
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NOTE:
POST SPACING 6'-0" MAXIMUM

SILT FENCE WITH SILT TRAP
ACROSS SPLIT

HIGH POROSITY SILT FENCE
ACROSS SPLIT
NOTE:
POST SPACING 6'-0" MAXIMUM
SILT FENCE OUTLET PROTECTION

Notes:
1. SILT FENCE SHOULD BE BROUGHT FlUSH WITH WING WALLS ON BOX CULVERTS IF IT CANT BE INSTALLED ALONG THE BOX CULVERT.
2. IF APPLICABLE, SILT FENCE AROUND THE CULVERT SHOULD BE ADJUSTED TO ALLOW FOR THE INSTALLATION OF EROSION CONTROL AS SHOWN IN STANDARD PLAN 501.
3. SILT FENCE MAY GO IN PLACE OF SILT FENCE ABOVE THE OPENING OF A CULVERT, AS SHOWN IN SPECIAL PLAN 2.

SILT FENCE INLET PROTECTION

COIR SILT FENCE - ON WOOD POSTS - DRY INSTALLATION

SILT FENCE CURB INLET

PLAN VIEW
SILT FENCE FOR GRATE, AREA, MEDIAN INLETS OR JUNCTION BOXES
* I'-0" IF POSSIBLE (UP TO H'"")

SILT FENCE DETAILS

NOTE:
from vertical, toward flow.
incline stake 15° TO 20° MAX.

STEEL STANDED "T" LINE POSTS 5'-6" LENGTH

PLASTIC CABLE TIES - Stapled to posts if staples are used they must be through all layers. (H'""")
PLASTIC CABLE TIES - (STAPLED TO POSTS IF STAPLES ARE USED THEY MUST BE THROUGH ALL LAYERS) (H'"")
PLASTIC CABLE TIES - SHOWN ON EACH STAKE

STAPLES ARE USED THEY MUST BE THROUGH ALL LAYERS
PLASTIC CABLE TIES - IF STAPLES ARE USED THEY MUST BE THROUGH ALL LAYERS

PLASTIC CABLE TIES - SHOWN ON EACH STAKE

6" X 1" WIRE STAPLE EVERY 2'-0"

2'-0" OUTSIDE OF WALL + E'-0"
SOIL PLATE DETAIL

8½" x 2½" x 2½"

ANCHOR BASE PLATE DETAIL

8½" x 9" x 3½"

TOP SLIP BASE DETAIL

8½" x 4" x 9"

BOTTOM SLIP BASE DETAIL

8½" x 5" x 5½"

NOTE:

* USE GRADE 5 BOLTS, NUTS, AND WASHERS UNLESS NOTED OTHERWISE.

* ALL STEEL COMPONENTS (PLATE, ANGLES, ETC.) ARE GRADE 36 STEEL EXCEPT WHERE NOTED.

* THE TERMINAL ANCHORAGE SECTION SHALL INCLUDE POSTS 1 THRU 7. CABLE COMPENSATORS ON ONE END, TURNBUCKLES ON THE OTHER END OF EACH INDIVIDUAL CABLE, AND ALL OTHER PARTS USED TO ASSEMBLE POSTS 1 THRU 7, AND WIRE ROPE.

* CABLE RUNS OVER 1000 FT. USE CABLE COMPENSATORS ON EACH END OF CABLE.

* OTHER PARTS USED TO ASSEMBLE POSTS 1 THRU 7, CABLE COMPENSATORS ON ONE END, TURNBUCKLE ON THE OTHER END OF EACH INDIVIDUAL CABLE, ALL OTHER PARTS USED TO ASSEMBLE POSTS 1 THRU 7, AND WIRE ROPE.

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NOTE: SPRING COMPRESSION FROM UNLOADED POSITION ON EACH SPRING.

PRIOR TO FINAL ACCEPTANCE BY THE STATE, THE FOLLOWING RULES SHALL BE USED TO TIGHTEN THE TURNBUCKLES, DEPENDING ON THE TEMPERATURE AT THE TIME OF THE ADJUSTMENT.

<table>
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NOTE: SPRING COMPRESSION FROM UNLOADED POSITION ON EACH SPRING.

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The kicker lever should be flush with the top of the kicker plate, and the 3½" leg of the kicker plate gusset should line up with the kicker lever, and the bottom of the kicker plate gusset should align with the bottom of the kicker plate.

NOTE:
DESCRIPTION OF REVISION

ADDED CABLE ON BOTTOM RAIL

TRAFFIC

ITEM A

SEE DETAIL A ASSEMBLY

ITEM B

SEE DETAIL A

NOTES:

1. SLOTTED RAIL NO. 1 12'-6", SHOP BEND TO R=34'-2"
2. SLOTTED RAIL NO. 2 12'-6", SHOP BEND TO R=34'-2"
3. SLOTTED RAIL NO. 3 12'-6", TAPERED
4. 3⁄8" U-BOLT CABLE CLIPS 3 PER CABLE SPACED OUT ON NOSE, TO HOLD CABLE TO BACKSIDE OF THE RAIL.
5. NOSE CABLE WITH SWAGED END BUTTONS
6. NOSE CABLE ANCHOR PLATE (HOLE OF SPLICE)
7. 3⁄8" STEEL PLATE (A306)
8. NOSE CABLE ANCHOR PLATE (TAPERED)
9. FIXED OBJECT
10. ENDS VIEW
11. CURRENT TAPERED GUARDRAIL

NOTES:

1. STEEL MEMBERS SHALL BE GALVANIZED AS REQUIRED, SECURED WITH WASHER AND HEX NUT.
2. ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. MEASUREMENTS ARE VIEW BACK OF RAIL TO BACK OF RAIL.
4. FOR GUARDRAIL LAPPING DETAIL, SEE SHEET 2 OF 3.
5. MEASUREMENTS ARE FROM BACK OF RAIL TO BACK OF RAIL.
**NEBRASKA DEPARTMENT OF TRANSPORTATION**

**4-STRAND WIRE FENCE**

- **TYPICAL DEADMAN ANCHOR**
  - Line posts shall be constructed with a minimum of one wood or four steel.
  - Gate detail: 6'-0" MAX. to 18'-0" MAX.

- **SMOOTH OR BARBED WIRE FENCE DETAIL**

- **DRAINAGE STRUCTURE TERMINAL DETAIL**
  - Entrance to NDOT border: 5'-6" MAX.

**NOTES**

- Pull posts shall be used at sharp breaks in vertical grades or at approximately 330'-0" centers on straight runs or as directed by the engineer.
- Deadman anchors shall be used at sharp sag breaks in vertical grades or at approximately 50'-0" centers on straight runs or as directed by the engineer.
- The smooth wire gate fastener shall be of sufficient length to provide ease in opening and closing of the gate sections.
- Line posts shall be constructed with a minimum of one wood or four steel.
- Studied tie line posts shall be either galvanized or painted.

**DATE:** APRIL 1, 2013

**ORIGINAL:**

**ACCEPTED FOR USE ON THE NATIONAL HIGHWAY SYSTEM**

**R0A D W  A Y  D I V I S I O N**

**COMPUTER:** NDOT DESIGN 134

**DATE:** 29 - JUN - 2021 09:20

**FILE:** 71400e01.dgn

**REV. NO.**
THREE-BEAM BRIDGE APPROACH SECTION

**CONNECTION NOTES:**

FOR DIVIDED ROADWAY:
- INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)
- TRAFFIC FLOW

FOR 2-LANE ROADWAY:
- INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)
- FOR APPROACHING TRAFFIC:
  - INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)
- FOR DEPARTING TRAFFIC:
  - INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

**PLAN VIEW**

- POST 1
- POST 2
- POST 3
- POST 4
- POST 5
- POST 6
- POST 7
- POST 8
- POST 9
- POST 10

**ELEVATIONS**

- 31" ELEVATION
- 34" ELEVATION

**CONCRETE RAIL**

- POST SPACING AT 1'-6"
- POST SPACING AT 3'-1"
- POST SPACING AT 6'-3"

**DELINEATOR**

- **ON ALTERNATE ASSEMBLY OMIT POST 1.**
- **ON ALTERNATE ASSEMBLY USE POST 2A.**

**3'-1" RESURFACING**

- OR SURFACING
- TAPER RAIL HEIGHT 25'-0" MIN.

**GROUND LEVEL**

- OR SURFACING
- ELEVATION

**31" ELEVATION**

- TAPER RAIL HEIGHT 25'-0" MIN.
RAIL DETAIL

- **Concrete Anchors**: 6" dia. ASTM A325 hex head bolts with washers (2) 4" dia. ASTM A307 hex head bolts with nuts & washers

- **Thru Bolt**: 5" dia. holes in post web & one 5" dia. hole in concrete anchors

- **Control Bolt and Splice**: 6" x 6" wood block and one 6" dia. hole in concrete anchors

- **Long Post**: 4" dia. holes in post web for 8" dia. anchor head bolts

- **Wood Block**: 6" x 6" x 8" wood block

- **Offset Block**: 6" x 8" x 19" offset block

- **Delineator**: Wood block 6" x 6" x 8"

- **Approach Section**: 34 in. B.A.S. block detail

- **SIDE VIEW**: Post 11 & beyond

- **NOTE**: All steel members shall be galvanized in accordance with the standard specifications.

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TABLE D

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</table>

**NOTE:** The X and Y distances found in the tables shall be measured from a line that parallels the edge of the pavement.
**GUARDRAIL DETAILS**

**ALTERNATE OFFSET BLOCK & STEEL POST**

- **SIDE VIEW**
  - CURBED LOCATIONS
  - NON-CURBED LOCATIONS

- **PLATE WASHER**
  - 8" or 10" x 6'-0"

- **WOOD POST BOLT ASSEMBLY**
  - 8" or 10" x 6'-0"

- **STEEL POST BOLT ASSEMBLY**
  - 8" or 10" x 6'-0"

**NOTES:**

- All hole diameters are 3/8".
- W6 = 6.5 or W6 = 9 post x 4½" x 16" offset blocks to be used with MGE installations.
- Offset blocks listed on the approved products list may also be used.
- No washer needed to be put in offset block against post or empty hole as needed to prevent rotation when no voids are present.

**DELINEATOR NOTES:**

- 4 lanes: Yellow on left and white on right, 3 lanes: White on both sides.

- Delineators are a minimum of 9" high and are double-faced high intensity delineators on a 4 lane roadway. Single-faced high intensity delineators on a 4 lane roadway.

- When guardrail is attached to a bridge approach deck, a guardrail delineation at 10'-0" spacing shall be used. When the remaining guardrail length is 150 feet or less use 60 feet spacing when the remaining guardrail length is greater than 150 feet.

- When guardrail is independent of a bridge, a guardrail delineation at 75 feet spacing when the guardrail length is 200 feet or less use 50 feet spacing when the guardrail length is greater than 200 feet.

- Delineators are a minimum of 3" high and are 6" wide as required, designed with 1" radius.

- All steel members shall be galvanized in accordance with the standard specifications.

- Post spacing shall be 6'-0" unless otherwise noted in the plans.

- Guardrail lapping procedure -- Traffic Flow
GUARDRAIL DETAILS

W-THREE BEAM TRANSITION (10 GAUGE)
(34" ELEVATION FOR FUTURE 3" OVERLAY Y SHAPE)

W-THREE BEAM TRANSITION (10 GAUGE)
31" ELEVATION (ASYMMETRICAL SHAPE)

MIDWEST GUARDRAIL SYSTEM (MOSI) INSTALLATION
(PAID FOR AS W-BEAM GUARDRAIL)

ELEVATION

PLAN

NO BOLT

FOR 3/8 BOLTS
1" DIAM HOLE

BOLT SLOTS (TYP.)

FOR 3/4 BOLTS
1 1/4" SPLICE
20"

BOLT SLOTS (TYP.)

FOR 3/8 BOLTS
1" SPLICE
3 1/4"

BOLT SLOTS (TYP.)

FOR 3/4 BOLTS
1 1/4" SPLICE
20"

BOLT SLOTS (TYP.)

FOR 3/8 BOLTS
1" SPLICE
3 1/4"

BOLT SLOTS (TYP.)

FOR 3/4 BOLTS
1 1/4" SPLICE
20"

BOLT SLOTS (TYP.)

FOR 3/8 BOLTS
1" SPLICE
3 1/4"

BOLT SLOTS (TYP.)

FOR 3/4 BOLTS
1 1/4" SPLICE
20"

BOLT SLOTS (TYP.)

FOR 3/8 BOLTS
1" SPLICE
3 1/4"
MIDWEST GUARDRAIL SYSTEM
WITHOUT BLOCKOUTS

ELEVATION

ELEVATION LEVEL ON SURFACE
WE + 9 + 6' POST
ON WE + 6.5 + 6' POST

NOTES:
DELCALATIONS SUBSIDIARY GUARDRAIL.
BUTTON HEAD W4 x 96" 66A + LENGTH AS REQUIRED, SECURED WITH HEX NUT.
ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

SIDE

W-BEAM BACKUP PLATE

FRONT

W-BEAM BACKUP PLATE
END ANCHORAGE ASSEMBLY

STRUT AND YOKE ASSEMBLY

BREAKAWAY TERMINAL POST SLEEVE

BEARING PLATE

CABLE END PLATE

ANCHOR PLATE END VIEW

FOUNDATION TUBE

DETAILS OF CABLE ASSEMBLY
FOR DIVIDED ROADWAY
INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

FOR 2-LANE ROADWAY
INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

CONNECTION NOTES:

(1) INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

FOR APPROACHING TRAFFIC
INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

FOR DEPARTING TRAFFIC
INSTALL THREE-BEAM END SHOE, BETWEEN NESTED GUARDRAIL ELEMENTS, (SUBSIDIARY TO BRIDGE APPROACH SECTION)

ELEVATION

PLAN VIEW

LEGEND

1. W6 x 9 x 8.5 POST OR W6 x 8.5 x 6 POST
2. 6" x 6" x 22" OFFSET BLOCK
3. 6" x 8" x 12" 1/4" 1/2" OFFSET BLOCK
4. 6" x 12" x 14" 1/4" 1/2" OFFSET BLOCK

NOTES:

- DEVICES SUBSIDIARY TO BRIDGE APPROACH SECTION
- BUTTON HEAD BOLT 1/2" DIA. + LENGTH AS REQUIRED, SECURED WITH HEX NUT.
- ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
W-BEAM BACKUP PLATE
FRONT
SIDE
1'-0"
3'-1"
6'-3" (TYP.)

PARAPET GUARDRAIL
S3 x 5.7

M-BEAM BACKUP PLATE
SQUARE WASHER
1-5/16"
1-1/2"
36" DIA. x 9/16" SLOT

NOTES:

ALL STEEL MEMBERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

MINIMUM BOND STRENGTH OF 1305 PSI.

FOR ADDITIONAL DETAILS SEE PLAN 744.

THE EPOXY USED TO SECURE THREADED RODS MUST HAVE A MINIMUM BOND STRENGTH OF 1300 PSI.

ANY OF THE FOUR MOUNTING TYPE 1-4 OR ATTACHMENT DESIGNS ON SHEETS 3-6 CAN BE USED WITH THE M-BeAM-BeAM, W-BEAM GUARDRAIL SYSTEM ATTACHED TO PARAPET.

WING
WING
CULVERT WALL
CULVERT SLAB
DIA.
SLOT
DIA. 1-5/16"
DIA. 1-1/2"
DIA. 36"

ATTACHMENT

PARAPET MOUNTED POST (S3 x 5.7)

PLAN VIEW

ELEVATION

(MGS SHOWN)
NEBRASKA DEPARTMENT OF TRANSPORTATION

ATTACHMENT

STANDARD PLAN NO. 747-R1
PARAPET GUARDRAIL

POST DETAILS

S3 x 5.7 POST

STEEL TUBE

TOP VIEW

SIDE VIEW

SIDE VIEW

END VIEW

POST STANDOFF

TOP VIEW

SIDE VIEW
For top mounting plate gusset details see Sheet 2 of 6

For steel tube details see Sheet 2 of 6

For bottom mounting plate details see Sheet 3 of 6

Top mounting plate 6" x 9" x 1/4"
PARAPET GUARDRAIL ATTACHMENT

TOP MOUNTING PLATE
E 10" x 3" x ½"

TOP PLATE GUSSET
E 3" x 3" x ½"

BOTTOM MOUNTING PLATE
E 8" x 3" x ½"

TOP VIEW

SIDE VIEW

ISOMETRIC VIEW

SECTION A-A
CULVERT MOUNTED GUARDRAIL POST

**PLAN VIEW**

- Culvert Wall
- Culvert Slab
- Soil Fill
- Top Plate
- Bottom Plate
- Delineator (See Note)

**ELEVATION (NOS SHOWN)**

- Culvert Wall
- Culvert Slab
- Soil Fill
- Top Plate
- Bottom Plate
- Delineator (See Note)

**SECTION A-A**

- W-BEAM
- Three-Beam

**SECTION B-B**

- W-BEAM
- Three-Beam

**SECTION C-C**

- W-BEAM
- Three-Beam

**NOTES:**

- Delineators subsidiary to guardrail.

**DELINEATOR NOTES:**

- All steel members shall be galvanized in accordance with the standard specifications.

**ANCHORAGE WILL INCLUDE EPOXY-RESIN BASE BONDING SYSTEM PROVIDED ON THE NDOT APPROVED PRODUCTS LIST.**

**FOR ADDITIONAL DETAILS SEE PLAN 743.**

**PRODUCTS LIST.**
TYPICAL SECTION THROUGH LETTER

DETAIL OF LETTERS

FRONT ELEVATION

BENDING DIAGRAM

QUANTITIES

CONCRETE 0.06 CU. YDS.
REINFORCING STEEL 6.0 LBS.

SIDE VIEW

FRONT VIEW

QUANTITIES

2 - PIECES 2 X 8 X 8/4 WELDED WIRE
WITH 44" LONG & 12" WIDE
1 - BOTTOM STIRRUP 4 ½" X 5 ½" NO. 4 GAGE
3 - PIECES 2 X 8 X 8/4 WELDED WIRE
1 - TOP STIRRUP 2 ½" X 5 ½" NO. 4 GAGE
APPROXIMATELY 20 TIE WIRES

NOTES:

STIRRUPS SHALL NOT BE SET WITHIN CORPORATE LIMITS UNLESS OTHERWISE PROVIDED IN THE PLANS OR DRAWN BY THE ENGINEER.

NOTES:

MARKERS SHALL NOT BE SET WITHIN CORPORATE LIMITS UNLESS OTHERWISE PROVIDED IN THE PLANS OR DRAWN BY THE ENGINEER.

PRECAST CONCRETE
R.O.W. MARKER

TYPICAL LOCATION SKETCH

MARKERS ARE TO BE SET WITH THE LETTERED FACE TOWARD THE CENTERLINE OF THE ROADWAY. MARKERS SHALL BE PLACED TYPICALLY 500 FEET APART OR AT THE CENTER OF HILLS AND SHALL BE NOT MORE THAN 1000 FEET APART.

NOTE:

THESE DIMENSIONS CAN BE VARIED 60 OR LESS DEPENDING ON STEEL IS DESIRED.

MARKERS ARE TO BE SET WITH THE LETTERED FACE TOWARD THE CENTERLINE OF THE ROADWAY. MARKERS SHALL BE PLACED TYPICALLY 500 FEET APART OR AT THE CENTER OF HILLS AND SHALL BE NOT MORE THAN 1000 FEET APART.
POSTS ARE TO BE SET WITH THE LETTERS FACING TOWARD THE CENTERLINE OF THE ROADWAY. POSTS SHALL BE PLACED AT ALL BREAKS IN THE R.O.W. LINE AND AT TOP OF HILLS AND SHALL BE NO MORE THAN 600 FEET APART.

NOTES:
POSTS SHALL BE PLACED WITHIN 6" OF CORPORATE LIMITS UNLESS OTHERWISE PROVISIONED ON THE PLANS OR ORDERED BY THE ENGINEER.

POSTS SHALL NOT BE SET WITHIN THE CORPORATE LIMITS UNLESS OTHERWISE PROVISIONED ON THE PLANS OR ORDERED BY THE ENGINEER.

DETAIL OF SIGN
(NO BORDER W/BLACK ON ORANGE)
LIFTING SLOT DETAIL

PLAN VIEW

SECTION C-C

MARKER LOCATION

SIDE VIEW

ELEVATION VIEW

NOTE:

1. These details are for the fabrication and installation of concrete protection barriers. Details shown are typical.

Concrete protection barriers shall be made of 6000 psi concrete and be precast in accordance with applicable portions of Section 500 in the Standard Specifications. The barriers may be removed when the concrete has attained a compressive strength of 2,000 psi. The barriers may be installed within the plans shown once the concrete has attained a compressive strength of 3,000 psi. The barriers may be shipped when the concrete has attained a compressive strength of 1,000 psi.

2. The Loop reinforcing steel (bars 6D1, 6D2, and 6D3) shall be smooth, meeting the requirements of ASTM A 706 when the concrete has attained a compressive strength of 5,000 psi. Plant once the concrete has attained a compressive strength of 3,000 psi. The barriers may be shipped once the concrete has attained a compressive strength of 5,000 psi.

3. All steel shall be zinc-coated (galvanized) as specified below or coated to equivalent standards.

Zinc-coated (galvanized) steel bars shall meet the requirements of ASTM A 123, coating grade 60, minimum coating 0.025 to 0.050 inches, per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

4. The Loop reinforcing steel must be supplied by the Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

5. Zinc-coated (galvanized) steel bars shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

6. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

7. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

8. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

9. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

10. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

11. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.

12. The Loop reinforcing steel shall meet the requirements of ASTM A 416, coating grade 60, minimum coating 0.025 to 0.050 inches per square foot. The bars shall be furnished prior to galvanizing. The presence of a 2.14 psi shall be specified as with others. All zinc coating damage due to fabrication or handling shall be repaired with a zinc disbonded coat of equivalent standards with ASTM A 123.
TYPICAL DELINEATOR LAYOUT
FOR TRANSITION LANE

TYPICAL DELINEATOR LAYOUT
FOR HIGH VOLUME RURAL ROADS
AND STATE HIGHWAYS
REFERENCES

1. Refer to the plans for signal head type, location and number of signal heads.

NOTES

1. Refer to the plans for signal head type, location and number of signal heads.

SYMBOLS

- **T** - Solid Yellow Arrow
- **R** - Solid Red Arrow
- **G** - Flashing Yellow Arrow

STANDARD SIGNAL FACE ARRANGEMENTS

- **TS-1** - Solid Yellow Arrow
- **TS-2** - Solid Red Arrow
- **TS-3** - Flashing Yellow Arrow

SYMBOL LEGEND

- Solid Yellow Arrow
- Solid Red Arrow
- Flashing Yellow Arrow

REFERENCES

1. Refer to the plans for signal head type, location and number of signal heads.

NOTES

1. Refer to the plans for signal head type, location and number of signal heads.
**Channelization Devices**

Channelization devices are used to manage traffic flow and delineate specific areas. Understanding their design and use is crucial for effective traffic management.

### Barricades

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<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<td>Type I</td>
<td>Designed to be used individually or in groups to mark specific locations.</td>
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<tr>
<td>Type II</td>
<td>Most commonly used to channelize or delineate traffic flow but may also be</td>
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<td>used for traffic control zones and to guide drivers and pedestrians safely.</td>
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**Spacings of Barricades**

<table>
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<th>Width of Rail</th>
<th>Spacing of Devices</th>
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<tr>
<td>3 ft</td>
<td>18&quot; min.</td>
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<tr>
<td>4 ft</td>
<td>24&quot; min.</td>
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**Reflectors**

Reflectors are crucial for visibility, especially in low light conditions. Their design and placement are critical for safety.

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<tr>
<th>Coefficient of Retroreflection</th>
<th>Application</th>
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<tbody>
<tr>
<td>Yellow/Orange</td>
<td>Used to warn road users of conditions created by the work zone.</td>
</tr>
<tr>
<td>Fluorescent Red-White</td>
<td>Used to channelize or delineate traffic flow.</td>
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</table>

**Drums**

Drums are another effective tool for channelizing traffic. They must be designed and placed with care to ensure safety.

- ReflectORIZED Plastic Drums
- E-6289

**Cone Design**

- 42" Cones
- 28" Min. Height
- Yellow/Orange, not less than 28" in height

**Vertical Panels**

Vertical panels are used in temporary traffic control zones. They must be designed to meet specific standards for visibility and impact resistance.

**Table of Coefficients**

<table>
<thead>
<tr>
<th>Coefficient of Retroreflection</th>
<th>Description</th>
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<tbody>
<tr>
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<td>Used for visibility in low light conditions.</td>
</tr>
<tr>
<td>Fluorescent Red-White</td>
<td>Used for warning or channelization.</td>
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**Conclusion**

Understanding the design, use, and placement of channelization devices is essential for effective traffic management and safety.
DESCRIPTION OF REVISION KE = WS JAN 18

EMERGENCY USE ONLY 24" 11 FT. 12 FT.

FORMULA WORK AREA SHALL WEAR HIGH-VISIBILITY SAFETY APPAREL. HIGH-VISIBILITY SAFETY APPAREL
AND HAVE IN THEIR POSSESSION, A VALID FLAGGER CERTIFICATION CARD. FLAGGING AS OUTLINED IN THE CURRENT MUTCD AND THE DEPARTMENT OF ROADS FLAGGER'S GUIDANCE THAN RED FLAGS. USE OF FLAGS SHOULD BE LIMITED TO EMERGENCY SITUATIONS.

THE STOP/SLOW PADDLE IS PLACED ON A RIGID STAFF, THE MINIMUM LENGTH OF THE STAFF, PADDLES SHALL BE AT LEAST 18 INCHES WIDE WITH LETTERS AT LEAST 6 INCHES HIGH. IF THE STOP/SLOW FLAGGER PADDLE SHALL HAVE AN OCTAGONAL SHAPE ON A RIGID HANDLE. STOP/SLOW

OPPOSING TRAFFIC LANE DIVIDERS ARE DELINEATION DEVICES USED AS CENTER LANE DIVIDERS FACING TRAFFIC. IDENTICAL TO THE CHANNELIZING DEVICE SPACING REQUIREMENTS. WHEN USED TO DELINEATE BARRICADES, OR WITH SIGNS AND ARE INTENDED TO WARN THE DRIVER THAT THEY ARE NECESSARY TO SUPPLEMENT THE REFLECTORIZED SIGNS, BARRIERS, AND CHANNELIZING DEVICES CONSTRUCTION AND MAINTENANCE ACTIVITIES OFTEN CREATE CONDITIONS ON OR NEAR THE ROADWAY. THIS SIGN SHALL PROVIDE ADDITIONAL WARNING AND DIRECTIONAL INFORMATION TO ASSIST IN MERGING AND CONTROLLING ROAD USERS THROUGH OR AROUND A CONSTRUCTION ZONE. THE ADEQUACY OF THE FLOODLIGHT PLACEMENT AND ELIMINATION OF POTENTIAL GLARE SHOULD BE CHECKED BY DRIVING THROUGH THE PROJECT. IN NO CASE SHALL FLOODLIGHTING BE PERMITTED TO CREATE A DISABLING GLARE FOR DRIVERS.

THE TEMPORARY RUMBLE STRIP SHOULD HAVE AN INSTALLED HEIGHT OF "". PREFORMED TEMPORARY RUMBLE STRIPS MAY BE MADE OF ASPHALT PAVING MATERIAL, EPOXY AND TYPE III BARRICADE THAT ACCOMPANIES THE ADVANCE WARNING SIGNS.

WORKER VISIBILITY THE ROADWAY DESIGNER SHOULD BE CONCERNED WITH THE VISIBILITY OF WORKER DURING CONSTRUCTION OR MAINTENANCE ACTIVITIES.only in the day and night time period. THE TEMPORARY RUMBLE STRIP SHOULD HAVE AN INSTALLED HEIGHT OF "". PREFORMED TEMPORARY RUMBLE STRIPS MAY BE MADE OF ASPHALT PAVING MATERIAL, EPOXY AND TYPE III BARRICADE THAT ACCOMPANIES THE ADVANCE WARNING SIGNS.

THE CURVE, AND NOT ON THE INSIDE OF THE CURVE. AS A SERIES OF FLASHING LIGHTS IN A ROW WOULD TEND TO OBSCURE THE DESIRED PATH. BARRICADES, OR WITH SIGNS AND ARE INTENDED TO WARN THE DRIVER THAT THEY ARE NECESSARY TO SUPPLEMENT THE REFLECTORIZED SIGNS, BARRIERS, AND CHANNELIZING DEVICES CONSTRUCTION AND MAINTENANCE ACTIVITIES OFTEN CREATE CONDITIONS ON OR NEAR THE ROADWAY. THIS SIGN SHALL PROVIDE ADDITIONAL WARNING AND DIRECTIONAL INFORMATION TO ASSIST IN MERGING AND CONTROLLING ROAD USERS THROUGH OR AROUND A CONSTRUCTION ZONE. THE ADEQUACY OF THE FLOODLIGHT PLACEMENT AND ELIMINATION OF POTENTIAL GLARE SHOULD BE CHECKED BY DRIVING THROUGH THE PROJECT. IN NO CASE SHALL FLOODLIGHTING BE PERMITTED TO CREATE A DISABLING GLARE FOR DRIVERS.

THE TEMPORARY RUMBLE STRIP SHOULD HAVE AN INSTALLED HEIGHT OF "". PREFORMED TEMPORARY RUMBLE STRIPS MAY BE MADE OF ASPHALT PAVING MATERIAL, EPOXY AND TYPE III BARRICADE THAT ACCOMPANIES THE ADVANCE WARNING SIGNS.

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1. **Temporary Sign Supports**

   All temporary sign supports should be designed to ensure their security and integrity. These supports are intended to secure signs in place for the period of time they are needed. When possible, these supports should not be used in areas where permanent sign supports, such as guardrail or concrete protection barriers, are already installed. For areas where these barriers are not present, temporary supports should be installed in a manner that does not interfere with the traffic stream.

2. **Portable Dynamic Message Signs (PDMS)**

   The use of PDMS should be limited to the following scenarios:
   - When it is necessary to provide real-time information to drivers.
   - When the information is expected to change frequently.
   - When the information is critical for safety.

   PDMS should be designed to be easily removed and repositioned. They should also be designed to be compatible with other traffic control devices and to blend into the surroundings.

3. **Taper Formula**

   The taper formula used for temporary channelization devices is as follows:

   \[
   L = S \times W \text{ for speeds of } 45 \text{ mph or more.}
   \]

   Where:
   - \( L \) is the taper length.
   - \( S \) is the numerical value of the posted speed limit.
   - \( W \) is the width of the taper.

   For speeds less than 12 hours.

4. **Work Zone Speed Limit Notes**

   - Work zone speed limits should be posted in the work area.
   - The speed limit should be posted on all signs in the work area. The speed limit should be reduced to a minimum of 15 mph for any new work zone.
   - The speed limit should be reduced to a minimum of 15 mph for any new work zone.
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5. **Traffic Control Devices**

   Traffic control devices should be installed so as not to obstruct the view of the road. They should also be designed to be easily removed and repositioned. These devices should be designed to be compatible with other traffic control devices and to blend into the surroundings.

6. **Crashworthiness**

   All traffic control devices should be crashworthy and qualify as such according to the testing and acceptance guidelines of the National Cooperative Highway Research Program (NCHRP).
TAPER FORMULA

L = S x W FOR SPEEDS OF 45 MPH OR MORE.

L = (W x 60) / S FOR SPEEDS OF 40 MPH OR LESS.

WHERE:
S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.
W = WIDTH OF OFFSET (LANE WIDTH).
L = MINIMUM LENGTH OF TAPER.

LEGEND

INSTALLATION BY OTHERS
REFLECTORIZED PLASTIC DRUM
SINGLE POSTED SIGN
DOUBLE POSTED SIGN

NOTES

1. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
2. SIGNS SHOWN SHOULD BE INSTALLED ALONGSIDE ROADWAY OR TRAVEL PATH IN ACCORDANCE WITH THE DETAILS OF AND AT THE LOCATIONS SHOWN IN THE着实PAKANS. SIGNS INSTALLED BY THE DEPARTMENT OR OTHER GOVERNMENT AGENCIES SHALL BE MAINTAINED AND REMOVED BY THEIR FORCES.
3. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
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7. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
8. SIGNS SHOWN ARE USUALLY FOR ONE DIRECTION OF TRAVEL ONLY.
DESCRIPTION OF REVISION

W6-3-36

E JAN 18

F

G

L

N

FOR SPEEDS OF 40 MPH OR LESS.

C (OPTIONAL)

T E S K AN

JAN 19

I A (OPTIONAL)

R I TOOK OUT 1/2 L ON SHEET 2

MARKING 2' DASH - 6' GAP

TEMPORARY WHITE PAVEMENT

R11-2-48

TWO LANES CLOSED NEAR INTERSECTION

W20-1A-48

BEYOND DETOUR

W20-5LA-48

CENTERLINE

R4-7B-18

W4-2L-48

W20-1A-48

G20-2B-48

R3-2-24

A

R3-2-24

A

A

A

L = S x W FOR SPEEDS OF 45 MPH OR MORE.

L = WIDTH OF OFFSET (LANE WIDTH).

S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.

TAPER FORMULA

L = 5 x w for speeds of 45 MPH or more.

L = 20 x w for speeds of 40 MPH or less.

WHERE:

L = WORKING LENGTH OF TAPES.

S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK.

W = WIDTH OF OFFSET LANE MIRRO
Permanent Pavement Markings Installed in Grooves

### Pavement Marking

#### 2-Lane Roadway
- **Required Location for Edge Lines**
  - **Roadway Width**
    - Less than 24 ft: Surtape
    - 24 ft or more: Painted Edge
- **Shoulder Type**
  - Edge of Pavement Edgeline
  - Surtape
- **Distance from Centerline of Roadway to Outside Edge of Pavement Edgeline**
  - 10 ft or less

#### 3 or 5 Lane with Two-Way Left Turn Lane
- **Roadway Width**
  - Less than 24 ft: Surtape
  - 24 ft or more: Painted Edge
- **Shoulder Type**
  - Edge of Pavement Edgeline
  - Surtape
- **Distance from Centerline of Roadway to Outside Edge of Pavement Edgeline**
  - 10 ft or less
WIDENING BOTH SIDES WITH RIGHT TURN BAY

WIDENING BOTH SIDES

WIDENING ON DEPARTURE SIDE

WIDENING ON APPROACH SIDE

TYPICAL MARKING FOR MEDIAN W/NO LEFT TURN

NOTES:
1. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
2. LENGTH OF TURN BAYS SHOWN IS FOR ILLUSTRATION PURPOSES. ACTUAL LENGTHS WILL BE IN Accordance WITH Field CONDITIONS.
3. THE WIDTH OF TRAVELED LANE SHAUL BE FROM 12 FEET TO 14 FEET. ACTUAL WIDTHS WILL BE AS REQUIRED BY THE ENGINEER.
4. LENGTHS OF TURN BAYS FOR THE MAJOR TURNING MOVEMENT SHOULD BE FROM 150 FEET TO 240 FEET. ACTUAL LENGTHS WILL BE AS REQUIRED BY THE ENGINEER.
5. MINIMUM LENGTH OF TURN BAYS SHALL BE 75 FEET. DESIRABLE LENGTHS OF TURN BAYS SHALL BE FROM 150 FEET TO 240 FEET. ACTUAL LENGTHS WILL BE AS REQUIRED BY THE ENGINEER.
6. THE WIDTH OF TRAVELED LANE SHALL BE 12 FEET, UNLESS OTHERWISE APPROVED OTHERWISE BY THE ENGINEER.

FIELD CONDITIONS.
1. THE STRIPING OF LEFT TURN LANES ARE CONSIDERED OPTIONAL, UNLESS OTHERWISE REQUIRED BY THE ENGINEER.
2. ALL TEMPORARY MARKINGS SHALL BE NO LESS THAN 4 INCHES WIDE.
3. LENGTHS OF TURN BAYS SHOWN IS FOR ILLUSTRATION PURPOSES. ACTUAL LENGTHS WILL BE IN Accordance WITH Field CONDITIONS.
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**TABLE I**

<table>
<thead>
<tr>
<th>Broken Lines</th>
<th>Type of Marking</th>
<th>Length</th>
<th>Material Allowed</th>
<th>Edges</th>
<th>Shoulder</th>
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<tr>
<td>Paint</td>
<td>Rural</td>
<td>Urban</td>
<td>Paint</td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>RPM/Overlay Marker</td>
<td>2 at 12'</td>
<td>2 at 3'</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

<table>
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<tr>
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**TABLE II**

<table>
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</tbody>
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**NOTES:**

1. All temporary markings shall be no less than 4 inches wide.
2. All temporary markings shall be no closer than 4 inches to the edge of the traveled portion of the roadway or to any objects,curbs, edges, etc., so as not to interfere with traffic.
3. All temporary markings shall be no closer than 4 inches to any objects,curbs, edges, etc., so as not to interfere with traffic.
4. A temporary marking shall be removed upon completion of permanent striping.
5. Permanent markings shall be painted in either a solid or broken line, or a combination of both, to meet the requirements of the final pavement marking specification.
6. Permanent markings shall be no closer than 4 inches to any objects,curbs, edges, etc., so as not to interfere with traffic.
7. Permanent markings shall be painted in either a solid or broken line, or a combination of both, to meet the requirements of the final pavement marking specification.

**LEGEND**

- RPM/OVERLAY MARKER
- PAINT/TAPE
- **BIDIRECTIONAL RPM/OVERLAY MARKER**