FOREWORD TO 2005 METRIC STANDARD PLANS

Nevada Department of Transportation (NDOT) English Standard Plans are published every two years. All significant 2005 revisions to the 2003 Standard Plans will be shown in “RED” and new 2005 plan sheets will have the contents entirely in “RED”.


Conditional Use of Certain Sheets
Certain sheets will have “Requires Chief Road Design Engineer Approval” referenced in the General Notes—this means that the Chief Road Design Engineer must approve the use of the information depicted on that sheet. Another condition would be “For Repair Only, not NCHRP 350 Approved for Test Level 3”—this means that the information on that sheet is not to be used for new or retrofit construction and is for repair work only, check with the Designer.

This edition is part of an continuous process to update the Standard Plans. Updates to Standard Plans will reflect the impetus of NCHRP Report 350 requirements, however approved products are shown in the Qualified Products List (QPL), included within each advertised project’s Special Provisions. If you find an error/omission or want to make a comment, make a copy of that sheet marked with your comments and mail to Dennis Coyle, Standards and Manuals Engineer, 1263 S. Stewart Street, Carson City, Nevada 89712, (775)-888-7598, Fax (775)-888-7401, Email: dcoyle@dot.state.nv.us.

Printed hardcopies or a CD version of the Standard Plans are available from Administrative Services, 1263 S. Stewart Street, Carson City, Nevada 89712, (775)-888-7070, Fax (775)-888-7101.
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SECTION A-A

8.0 m Unless Otherwise Noted on Plans
75 mm Surfacing Unless Otherwise Noted on Plans
(See Note 4)
PLAN

8.0 m Unless Otherwise Noted on Plans

SECTION D-D

75 mm Aggregate Base Min.

TYPE 4 TYPICAL PLAN

PLAN Slope

9.0 m or Less

- 227

3 m

2.27

See Note 3

More Than 9.0 m

- 100 m Surfacing Min.

100 mm Surfacing Min.

SECTION B-B

75 mm Aggregate Base Min.

SECTION C-C

APPROACH TYPES

Type 2A - Place Base and Surface as Shown
Type 2B - Place 150 mm Aggregate Base Course Only
Type 3 - Groove Approach Area Only

SECTION E-E

Approach Platform 15.0 m

DESIRABLE ROAD GRADES

Approaching Road Graded as Required

1. See the current edition of the AASHTO "Policy on Geometric Design of Highways and Streets" for further information on at-grade intersections and design vehicles.
2. Details for special approaches will be shown on the plans when they are required.
3. Paved approaches shall have a seal coat unless otherwise noted.
4. Approaches to be paved to the throat or right-of-way, whichever occurs first, unless otherwise noted on the plans.
5. Approaches may require the standard stop signs and stop bars as directed by the engineer.

LEGEND:
* = Angle of Repose

METRIC INDOT

NEVADA DEPARTMENT OF TRANSPORTATION

TYPE 1, 2, 3, 4 AND 5 APPROACH ROADS

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED

Chief Road Design Eng. 000000

Signed Origining On File R-52-1 00000
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<td>End Section</td>
<td>inlet or Outlet Ditch</td>
<td>Limit of payment for pipe, Structure excavation and backfill (See Sheet R-1.1.1)</td>
<td>Structure excavation and backfill included in price paid for end sections</td>
<td>Classification and payment as specified.</td>
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**LEGEND**
- Granular Backfill
- Structure Excavation
- Limits of Existing
- Roadway Embankment

**PRECAST CONCRETE END SECTIONS**

**PREFABRICATED METAL END SECTION**

**(Type 3 Connection)**

**SLOPE PAVEMENT WITH CUTOFF WALL**

**CHANNEL LINING**

**CONCRETE APRON**

**CHANNEL LINING AND SLOPE PAVEMENT**

**CULVERT EXTENSION WITH EXISTING HEADWALL**

**DROP INLETS IN EXCAVATION**

**(Type 3 Drop Inlet Illustrated)**

**DROP INLETS IN EMBANKMENT**

**(Type 3 Drop Inlet Illustrated)**

**METRIC NOTE**

**STRUCTURE EXCAVATION AND BACKFILL**

**(METHOD OF MEASUREMENT)**

Signed Original On File: R-1.1.2 (206.207)

Chief Road Design Eng.
GENERAL NOTES:

1. TRENCHES MORE THAN 1.2 m DEEP SHALL BE SHORED AND LACED BACK TO AT LEAST THE ANGLE OF REPOSE FOR EXISTING FIELD CONDITIONS, OR SOME OTHER MEANS OF PROTECTION SHALL BE PROVIDED.

2. IF HAZARDOUS FIELD CONDITIONS INDICATE GROUND MOVEMENT MAY BE EXPECTED, TRENCHES LESS THAN 1.2 m DEEP SHALL ALSO BE PROTECTED AS INDICATED IN GENERAL NOTE 1.

3. FOR THE PURPOSE OF PAYMENT, STRUCTURE EXCAVATION AND BACKFILL QUANTITIES ARE BASED ON THESE STANDARD DRAWINGS AND NO ADDITIONAL PAYMENT WILL BE MADE FOR SHORING.

4. IF SHORING IS USED, PAYMENT WILL BE MADE FOR STRUCTURE EXCAVATION AND BACKFILL BASED ON THESE STANDARD DRAWINGS AND NO ADDITIONAL PAYMENT WILL BE MADE FOR SHORING.

5. TRENCH EXCAVATION SHORING SHALL CONFORM TO OSHA REGULATIONS 29 CFR PART 1926, SUPPORT P, APPENDIX C.

6. THE QUANTITY OF STRUCTURE EXCAVATION AND BACKFILL MEASURED FOR PAYMENT SHALL BE THE NUMBER OF CUBIC METERS CALCULATED MINUS ANY SUPERFLUITY OF LIMITS IN OVERLAP.

7. THE LIMITS OF STRUCTURE EXCAVATION AND BACKFILL SHOWN HEREIN SHALL BE USED FOR THE METHOD OF MEASUREMENT AND PAYMENT ONLY. THERE SHALL BE NO ADDITIONAL COMPENSATION FOR ANY ADDITIONAL EXCAVATION OR BACKFILL REQUIRED FOR EXCAVATIONS TO MEET OSHA REGULATIONS.

8. SEE SHEET B-20.18 FOR EXCAVATION AND BACKFILL FOR PRECAST CONCRETE BOX CULVERT.

9. BEDDING MATERIAL SHALL BE GRANULAR BACKFILL OR TYPE 2 CLASS B AGGREGATE MEETING THE STABILITY REQUIREMENTS FOR GRANULAR BACKFILL. BEDDING MATERIAL WILL BE PAID FOR AS GRANULAR BACKFILL.
GENERAL NOTES:

1. TRENCHES MORE THAN 1.2 m DEEP SHALL BE SHORED, LAID BACK TO AT LEAST THE ANGLE OF REPOSE FOR EXISTING SOIL CONDITIONS, OR SOME OTHER MEANS OF PROTECTION SHALL BE PROVIDED.

2. IF HAZARDOUS FIELD CONDITIONS INDICATE GROUND MOVEMENT MAY BE EXPECTED, TRENCHES LESS THAN 1.3 m DEEP SHALL ALSO BE PROTECTED AS INDICATED IN GENERAL NOTE 1.

3. FOR THE PURPOSE OF PAYMENT, STRUCTURE EXCAVATION AND BACKFILL QUANTITIES ARE BASED ON THESE STANDARD DRAWINGS AND NO ADDITIONAL PAYMENT WILL BE MADE FOR SHORING.

4. IF SHORING IS USED, PAYMENT WILL BE MADE FOR STRUCTURE EXCAVATION AND BACKFILL BASED ON THESE STANDARD DRAWINGS AND NO ADDITIONAL PAYMENT WILL BE MADE FOR SHORING.

5. TRENCH EXCAVATION SHORING SHALL CONFORM TO OSHA REGULATIONS 29 CFR PART 1926, SUBPART P, APPENDIX C.

6. THE QUANTITY OF STRUCTURE EXCAVATION AND BACKFILL MEASURED FOR PAYMENT SHALL BE THE NUMBER OF LINEAL METERS CALCULATED MINUS ANY DUPLICATION OF LIMITS WHICH OVERLAP.

7. IF DIAMETER IS 1.8 m OR LESS, DURANULAR BACKFILL SHALL BE PLACED FOR A MINIMUM DEPTH OF 150 mm ABOVE THE TOP OF THE PPE FOR THE WIDTH OF THE TRENCH. COMPLETE THE TRENCH BACKFILL WITH GRANULAR BACKFILL OR ROADWAY EMBANKMENT.

8. THE LIMITS OF STRUCTURE EXCAVATION AND BACKFILL SHOWN HEREIN SHALL BE USED FOR THE METHOD OF MEASUREMENT AND PAYMENT ONLY. THERE SHALL BE NO ADDITIONAL COMPENSATION FOR ANY ADDITIONAL EXCAVATION OR BACKFILL REQUIRED FOR EXCAVATIONS TO MEET OSHA REGULATIONS.

LEGEND:

- Structure Excavation
- Granular Backfill
- Roadway Embankment
GENERAL NOTES:
1. MINIMUM DEPTHS AS SPECIFIED IN 'CULVERT INSTALLATION WITH UNSUITABLE FOUNDATIONS' ON SHEET H-111. NOTES NO. 6 & 8 WILL PREVAIL WHEN THESE CONDITIONS ARE ENCOUNTERED.
2. CONCRETE SHALL BE CLASS A OR AA. ADDITIONAL EXCAVATION FOR CLASS A BEDDING TO BE INCLUDED IN THE UNIT BD PRICE PER CUBIC YARD OF CONCRETE.
3. CLASS B BEDDING SHALL BE CAREFULLY SHAPED TO FIT PIPE PRIOR TO INSTALLATION.

LEGEND:
- GRANULAR BACKFILL

ALLOWABLE FILL HEIGHT FOR REINFORCED CONCRETE PIPE

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<td>B</td>
<td>C</td>
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### 65 mm × 13 mm Round Corrugated Aluminum Pipe

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### 75 mm × 25 mm Round Corrugated Aluminum Pipe

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### Maximum Height Cover for Structural Pipe (mm)

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### Notes:
- To determine proper metal thickness, choose the span in the left hand column that is next larger to size required. Example: if you need a 3251 mm span x 2261 mm rise structure, use the line for span 3.4 m.
- Contact Hydraulics Engineer for materials or sizes not listed.
## Round Corrugated Steel Pipe

### Dimensions & Spans

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### Corrugated Steel Pipe Arch

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### Corrugated Steel Pipe Arch

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<th>Diameter (mm)</th>
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### Allowable Fill Heights

#### For Structural Steel Plate Pipe Arch with 76.7 mm Corner Radius

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### Allowable Fill Heights

#### For Structural Steel Plate Pipe Arch with 81 mm Corner Radius

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### Allowable Fill Heights for Steel Culverts

#### For Structural Steel Plate Pipe Arch with 76.7 mm Corner Radius

<table>
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<th>Span (mm)</th>
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<td>Max. Cover in Meters</td>
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### Allowable Fill Heights for Steel Culverts

#### For Structural Steel Plate Pipe Arch with 81 mm Corner Radius

<table>
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### Notes:

- Corrugated Steel Pipe shall be designed for the maximum headroom specified for the size and span of pipe used.
- The table above provides the maximum headroom for various pipe diameters and spans.
- For detailed design and installation information, please refer to the standard sheet R-2-1.1.
GENERAL NOTES:

1. DRAIN PIPE SEAMS MAY BE CONTINUOUS, HELICAL LOCK SEAM OR HELICAL WELD SEAM.

2. DRAIN SECTIONS SHALL BE ASSEMBLED WITH THE COUPLING BAND SHOWN.

3. THE CROSS BAR SPACER SHALL BE WELDED TO THE BEARING BARS IN SUCH A MANNER AS TO DEVELOP A MINIMUM TENSILE STRENGTH OF 55,000 N NORMAL TO THE LONGITUDINAL AXIS OF THE BEARING BARS.

4. THE MAXIMUM VARIANCE FROM A STRAIGHT LINE BETWEEN THE EXTREME TOP CORNERS OF THE BEARING BARS SHALL BE 15 mm (6 in).

5. FOR CONTINUOUS RUNS OF S.C.W.P. IN EXCESS OF 60 m (200 ft), STANDARD FLUSHING INLETS SHALL BE INSTALLED AS SHOWN ON THE PLANS.

6. SPOT WELD SHALL DEVELOP MINIMUM REQUIRED STRENGTH OF STRAP.

7. DIMENSIONS SHOWN ARE MINIMUMS.

8. CONTRACTOR TO PROVIDE AN ADEQUATE METHOD OF KEEPING THE A.C. OUT OF PIPE DURING PAVING OPERATIONS.


10. CONCRETE SHALL BE CLASS A OR AA.

11. HYDRAULICS ENGINEER WILL STATE PIPE SIZE.

12. THE SPACER PLATES SHALL BE WELDED ON BOTH SIDES TO EACH BEARING BAR WITH FOUR 30 mm (1-1/4 in) FILLET WELDS.

13. H = HEIGHT OF BEARING BAR (65 mm OR 150 mm) - 13 mm CORRUGATION - GAGE OF PIPE IN mm.

14. THE DRAINS SHALL BE WELDED WITH A 5 mm FILLET WELD MINIMUM 25 mm LONG TO THE CORRUGATED STEEL PIPE ON EACH SIDE OF THE GRATE AT EVERY OTHER CORRUGATION.

SLOTTED DRAIN & CONCRETE BARRIER RAIL
(CAN BE USED WITH SHOULDER DIKE)

SLOTTED DRAIN, CONCRETE BARRIER RAIL & DROP INLET

ELEVATION VIEW

PLAN VIEW

SECTION A-A

SECTION B-B

SECTION C-C

B.E.M.P.
WITHOUT HEADWALL

1. Length of culvert shall be increased as follows:
   Consider each side separately. Measure pipe from roadway centerline to the intersection of pipe flow line and fill slope, to this dimension add 0.6 m when cover at shoulder is 0.3 m to 3.0 m, and an additional 150 mm for each succeeding 1.5 m of cover or portion thereof.

2. Length of culvert shall be increased as follows:
   Consider each side separately. Measure pipe from roadway centerline to the intersection of the top of pipe and fill slope, plus headwall thickness. To this dimension add 0.3 m when cover at shoulder is 0.3 m to 3.0 m, and an additional 150 mm for each succeeding 1.5 m of cover or portion thereof.

3. Precast concrete end section

4. Metal end section

MINIMUM CULVERT INSTALLATION

- R plot 450 mm min. where possible. If minimum cover is restrictive, compensate by utilizing higher class pipe or selective boring as recommended by the hydraulic section.

- Steel culverts: See standard sheet R-1.3.1.2

- Avoid using 1.1.1.2. For informational purposes only

- Contour this area to provide the minimum amount of obstruction exposure.

NOTE:

1. If, after extending the culvert and/or warping the fill slope for safety and/or aesthetics, the extension does not fulfill the requirements for a clear roadside recovery area, then vehicular traffic may be protected by a safety grate or by some other means such as guardrail, barrier rail, or another acceptable safety feature.

2. Normal structure excavation and backfill limits.
GENERAL NOTES:

1. CLASS AND TYPE OF CONCRETE SHALL BE AS SPECIFIED FOR REINFORCED CONCRETE PIPE.
2. STRUCTURAL DESIGN OF END SECTION SHALL CONFORM TO THAT OF STANDARD REINFORCED CONCRETE CULVERT PIPE.
3. LENGTH OF PIPE SHOWN ON THE DESIGN PLANS DOES NOT INCLUDE CONNECTOR SECTION LENGTH C1.
4. CONTACT HYDRAULICS ENGINEER FOR SIZES NOT LISTED.

* For Reference Only

PLAN

END VIEW

SECTION A-A

CROSS SECTION VIEW
450 mm RCP TO 1350 mm RCP

NEVADA DEPARTMENT OF TRANSPORTATION
RCP END SECTION
450 mm RCP TO 1350 mm RCP

Signed Original On File

CHIEF HYDRAULICS ENGINEER

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

R-2.3.1 (603)
### LENGTH OF REINFORCING BARS

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**QUANTITIES SHOWN BELOW ARE FOR TWO HEADWALLS.**

**GENERAL NOTES:**
1. Concrete shall be class A or AA.
2. Reinforcing steel shall be deformed bars with maximum spacing of 450 mm set 50 mm clear of surface of concrete except as noted. Bar ends shall be kept 40 mm clear of surface of concrete. Reinforcing bars may be cut and bent in field.
3. Footings shown are of minimum depth and shall be extended if soil is unsuitable or liable to seep.
4. Culvert pipes to be set on a skew shall be centered with headwalls are constructed. When headwalls are not constructed the pipes shall be centered exactly in overflow section.
5. For estimating headwall quantities on skewed culverts, use quantities for 0° skew, 15° to 45° - use quantities for 15° skew, 45° to 60° - use quantities for 30° skew, 45° to 85° - use quantities for 45° skew, over 85° - calculate quantities required. Culverts shall be installed on 5° bedding where if feasible.
6. No direct payment for anchor bolts.

---

**NEVADA DEPARTMENT OF TRANSPORTATION**

**CULVERT HEADWALLS**
1200 mm CMP TO 1800 mm CMP

---

**SIGNED ORIGINAL ON FILE**

**CHEF HYDRAULICS ENGINEER**

**R-2.4.2** (500)
**Quantities Shown Below Are for Two Headwalls**

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**General Notes:**

1. Concrete shall be class A-30A.
2. Reinforcing steel shall be deformed bars with minimum spacing of 450 mm set 60 mm clear of surface of concrete except at notches. Bar ends shall be kept 45 mm clear of surface of concrete. Reinforcing bars may be cut and bent in field.
3. Footings shown are of minimum depth and shall be extended if soil is unsuitable to grade.
4. Culvert pipes to be set on a skew shall be watered when headwalls are constructed. When headwalls are not constructed the pipes shall not be watered except in overflow sections.
5. For estimating headwall quantities on skewed culverts, 0° to 10° use quantities for 0° skew, 10° to 20° use quantities for 20° skew, 20° to 30° use quantities for 30° skew, over 30° calculate quantities required.
6. Culverts should be installed on 5° increments where it is feasible. Dimensions X, Y, L, and P are to remain constant regardless of minor variations in wall thickness due to class of pipe used.

---

**Metric Units:**

- 300 mm RCP to 900 mm RCP

---

**Signed Original On File:**

- 2-5.1

---

**City of Hydraulics Engineer:**

- (Signature)

---

**Culvert Headwalls**

---

**All Dimensions Are in Millimeters Unless Otherwise Noted.**
### Quantities Shown Below are for Two Headwalls

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### General Notes:
1. Concrete shall be Class A or AA.
2. Reinforcing steel shall be deformed bars with maximum spacing of 400 mm set 90 mm clear of surface of concrete. Exempt as noted. Bar ends shall be kept 40 mm clear of surface of concrete. Reinforcing bars may be cut and bent in field.
3. Footings shown are of minimum depth and shall be extended if soil is unsuitable or liable to subside.
4. Culvert pipes to be set on a skew shall be marked when headwalls are constructed. When headwalls are not constructed the pipes shall not be marked except in locations.
5. For estimating headwall quantities on skewed culverts:
   1° to 25° - Use quantities for 1° skew.
   26° to 45° - Use quantities for 15° skew.
   46° to 90° - Use quantities for 45° skew.
   Over 90° - Calculate quantities required.
   Culverts should be installed on 3° increments where it is feasible.

---

**NEVADA DEPARTMENT OF TRANSPORTATION**

CULVERT HEADWALLS
425 mm x 325 mm CMP to 2075 mm x 1425 mm CMP

Signed Original On File B-96.1

Chief Hydraulics Engineer
### Quantities Shown Below are for Two Headwalls

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<th>OVAL RCF</th>
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<th>SINGLE OVAL RCF</th>
<th>SINGLE OVAL RCF</th>
<th>DOUBLE OVAL RCF</th>
<th>SINGLE OVAL RCF</th>
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</table>

### General Notes:
1. Concrete shall be Class A or AA.
2. Reinforcing steel shall be of bars with maximum size of 43 mm clear of surface of concrete except as noted. Bar ends shall be kept 40 mm clear of surface of concrete. Reinforcing bars may be cut and bent in field.
3. Cover of minimum depth and shall be extended if soil is unsuitable or liable to scour.
4. Culvert pipe to be set on a skew shall be metered when headwalls are constructed. When headwalls are not constructed, the pipes shall not be metered except in overflow sections.
5. Dimensions A - C, and E to remain constant regardless of whether variations in wall thickness due to class of pipe used.
6. For estimating masonry quantities on curved culverts, 0° to 10°: use quantities for 0° skew. 11° to 25°: use quantities for 20° skew. 26° to 40°: use quantities for 30° skew. 41° to 55°: use quantities for 45° skew. Over 55°: calculate quantities required. Culverts shall be installed on 5° increments where it is feasible.

### Length of Reinforcing Bars (mm)

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### Culvert Headwalls
576 mm x 350 mm OVAL RCP TO 1500 mm x 950 mm OVAL RCP
ANNULAR COUPLING BAND

SECOND ANGLE CONNECTION ASSEMBLY IS OPTIONAL FOR PIPE 600 mm DIA OR LESS, REQUIRED FOR PIPE GREATER THAN 900 mm DIA.

END VIEW

ANNULAR COUPLING BAND

BAR & STRAP DETAIL

ALTERNATIVE ANNULAR COUPLING BAND FOR HCMP THRU 2100 mm

1. ALL COUPLING BAND CONNECTING HARDWARE SHALL BE GALVANIZED.
2. CORRUGATION A6 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.
3. CORRUGATION A2 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.
4. CORRUGATION A5 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.

UNIVERSAL COUPLING BAND FOR USE ON 1050 mm THRU 1500 mm CMP INCLUSIVE

DIMENSION A AS REQUIRED TO FIT HELIX ANGLE, 158 mm MIN.

DIMENSION B AS REQUIRED TO FIT HELIX ANGLE, 130 mm MIN.

ONE PIECE BAND OPTIONAL ON 1050 mm DIAMETER.

TWO PIECE BAND REQUIRED ABOVE 1050 mm DIAMETER.

COUPLING BAND FOR HELICAL WELD SEAM ONLY

GENERAL NOTES:

1. ALL COUPLING BAND CONNECTING HARDWARE SHALL BE GALVANIZED.
2. FOR PIPE ARCHES USE SAME WEDGE BAND AS FOR ROUND PIPE.
3. CORRUGATION A6 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.
4. CORRUGATION A5 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.

DIFFERENT ANGLE CONNECTION TO BE USED AT CONTRACTORS OPTION.

FOR DOWN DRAINS, INSTALL SYNTHETIC RUBBER STRIPS.

10 mm DIA CARRIAGE BOLT WITH CUT WASHERS.

GENERAL NOTES:

1. ALL COUPLING BAND CONNECTING HARDWARE SHALL BE GALVANIZED.
2. FOR PIPE ARCHES USE SAME WEDGE BAND AS FOR ROUND PIPE.
3. CORRUGATION A6 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.
4. CORRUGATION A5 HOLE TO BE CENTERED ON 5.6 mm HOLE CENTER.
### GENERAL NOTES:

1. ALL COUPLING BAND CONNECTION HARDWARE SHALL BE GALVANIZED OR ELECTROPLATED IN ACCORDANCE WITH STANDARD SPECIFICATIONS.

2. FOR PIPE ANGLES USE SAME WIDTH BAND AS FOR ROUND PIPE OF EQUAL PERIPHERY.

3. TWO PIECE BAND IS REQUIRED FOR PIPE GREATER THAN 1000 MM DIAMETER.

4. TENSION STRAP MAY BE CONNECTED TO BAND OR STRAP AT OTHER SPOT WELDS OR SPOT WELDS THAT DEVELOP MINIMUM REQUIRED STRENGTH OR STRAP.

5. USE 32 mm CAGE LINE DIMENSION ON ATTACHED ANGLE LEGS FOR RIVETS AND WELDS.

6. BAND THICKNESS SHALL NOT BE LESS THAN 0.3 STANDARD THICKNESSES LIGHTER THAN THE THICKNESS OF THE PIPE.

7. DIMENSIONS AND THICKNESS SHOWN ARE MINIMUM.

8. ANGLE 50 mm LONG WITH 1.6 mm X 50 mm STRAP.

9. SPOT WELDS OF EQUIVALENT STRENGTH MAY BE EXCLUDED FROM SPOT WELDS OR RIVETS.

### CHANNEL COUPLING BAND

**FOR USE ON FLANGED END CMP**

(Channel coupling band shall be two piece.)

### NOMINAL DIMENSIONS

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<th>USE WITH CMP</th>
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<td>20 mm THICK OR LIGHTER</td>
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<td>2.8</td>
<td>25 mm THICK OR HEAVIER</td>
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### SPIRAL CMP

RETURN TO ACCEPT UNIVERSAL, ANGULAR, AND CHANNEL COUPLERS
NOTE:

1. WHEN FULL, LACED TOGETHER

PLACE LID THIS DIRECTION
ALL LIFTS
BEGIN & END ONLY

LACING: SINGLE BASKET
NOTE: OPTIONAL WIRE RING FASTENERS ALLOWED AS PER SPECIAL PROVISIONS.

LACING: BASKET TO BASKET

SECTION C-C

CULVERT SIZE

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<tr>
<td>950 mm</td>
<td>2100 mm</td>
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RIPRAP APRON

1. HYDRAULIC SECTION'S APPROVAL MUST BE OBTAINED PRIOR TO INCORPORATION INTO PLANS.
2. WHEN NO END SECTION IS USED, ADDITIONAL RIPRAP SHALL AS BE REQUIRED BY THE HYDRAULIC ENGINEER.
3. FOR MULTIPLE PIPE INSTALLATIONS, THIS DIMENSION SHALL BE ADJUSTED ACCORDING TO PIPE SEPARATION. INFORMATION IS ON DRAWING R-2.1.

INTERNAL CONNECTING WIRE DETAIL FOR WIRE MESH GABIONS

GABIONS LACING DETAIL
GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS A OR AA.

2. REINFORCING BARS SHALL BE NO. 13 BARS WITH MAXIMUM SPACING AT 450 mm CENTER, BARS TO BE EMBEDDED A MINIMUM OF 50 mm AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 40 mm.

3. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 25 mm.

4. STRUCTURAL STEEL WEIGHT INCLUDES NPS 2 PIPE AND THE 64 mm X 64 mm X 9.5 mm FRAME ANGLES.

5. NPS = NOMINAL PIPE SIZE DESIGNATOR. SEE ASTM A53.

6. STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE CENTER OF GRATE.

QUANTITIES:

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<th>CONCRETE</th>
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<th>STRUCT. STEEL</th>
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<td>0.27 cu. m.</td>
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<td>77 kg</td>
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* For Information Only
GENERAL NOTES:

1. FOR CASING PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 13 BARS AT 400 mm CENTERS TIGHTLY MESHED AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 50 mm AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 40 mm.

2. ALL CONCRETE SHALL BE CLASS A OR AA.

3. MANHOLE WITH MORE THAN ONE PIPE-INFLOW PIPE INVERT ELEVATIONS SHALL BE ≥ 30 mm ABOVE OUTFLOW PIPE ELEVATION.

4. FOR VALUES OF "H" SEE PLANS. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.

5. DO NOT PLACE PIPES IN TAPERED SECTION.

6. MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).

7. PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, AND STEPS SHALL CONFORM TO AASHTO M 199M (ASTM C-478M).

8. SHAPE FLOWLINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 1:10 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOWLINE.

9. T = PIPE WALL THICKNESS
**GENERAL NOTES:**

1. ALL CONCRETE SHALL BE CLASS A OR CLASS AA.
2. MANHOLES WITH MORE THAN ONE PIPE: THE INFLOW PIPE INVERT ELEVATION SHALL BE GREATER THAN OR EQUAL TO 30 mm ABOVE THE OUTFLOW PIPE INVERT ELEVATION.
3. FOR VALUES OF "N", SEE FLOWS. "N" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
4. PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, AND STEPS SHALL CONFORM TO ASHTO M 1984 (ASTM C 473B).
5. MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION IDENTIFICATION (IF APPLICABLE).
6. SHAKE FLOW LINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 1:10 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARDS FLOW LINE.

**SECTION A-A**

(For Variable Height Situations)

- 75 mm or 150 mm Grade Rings (100 mm or Waps as Required)
- Grout Joints to Suit Grade
- For Top slab Reinforcing

**SECTION B-B**

(For Maximum Height Situations)

Note: hydraulic engineer will look at other options for extreme maximum cover situations.
GENERAL NOTES:
1. THE WEIGHT OF FRAME SHALL BE 65 KG. MINIMUM AND THE WEIGHT OF COVER SHALL BE 58 KG. MINIMUM. TRAFFIC-STRENGTH MANHOLE FRAME & COVER SHALL COMPLY WITH AASHTO M-188-94 WITH FLEXIBLE, SELF-LIGHTING, MANHOLE FRAMES AND COVERS THAT MAY BE USED UPON APPROVAL BY THE ENGINEER.

2. THE FRAME SEAT AND COVER EDGE SHALL BE MACHINED TO A TRUE BEARING SURFACE ALL AROUND. THE FRAME & COVER SHALL BE COMPATIBLE WITH THE MANUFACTURER'S SPECIFICATIONS.

3. THE SURFACE SHOWN IS FOR ILLUSTRATION ONLY. ANY SURFACE DESIGN, OTHER THAN SMOOTH, MAY BE USED UPON APPROVAL.

4. FRAMES & COVERS SHALL CONFORM TO ASTM A48M, CLASS 275 FOR GRAY IRON CASTINGS.

5. A CAST-IN-PLACE CONCRETE COLLAR SHALL BE PLACED AROUND A MANHOLE FRAME UNLESS OTHERWISE DIRECTED.

6. MANHOLE COVER SHALL BE NAME OF ENTITY & SYSTEM FUNCTION (IF APPLICABLE).

7. ALL CONCRETE SHALL BE CLASS A OR AA.

8. CONCRETE COLLARS MAY BE FROIUTED ROUND, OR ANY OTHER APPROPRIATE SHAPE WHEN APPROVED BY THE ENGINEER.

9. COMMERCIAL PREFABRICATED RANGE RINGS FOR MANHOLES SHALL CONFORM TO AASHTO M 199 (ASTM C-473).

10. MANHOLE COVER & FRAME SHOWN, OTHER SHAPES MAY APPLY TO UTILITY AND VALVE COVERS AND FRAMES.

SECTION B-B
TRAFFIC-STRENGTH MANHOLE FRAME & COVER

SECTION A-A
MANHOLE COVER, FRAME, & CONCRETE COLLAR

NEVADA DEPARTMENT OF TRANSPORTATION

SIGNED ORIGINATING OFFICE: B-4-7.3 (600)
GENERAL NOTES:
1. ALL CURB RAMP'S SHALL BE 1:12 OR FLATTER.
2. GRATING, MANHOLE COVER, VALVE COVERS, OR SIMILAR ACCESSES SHALL NOT BE LOCATED IN AREA AT THE BASE OF THE CURB RAMP OR LANDING AREA.
3. TRANSITIONS FROM RAMPS TO GUTTERS OR ROADWAY SURFACE SHALL BE FLUSH AND FREE OF ABRupt CHANGES.
4. PLANTMIX BITUMINOUS OPEN-GRADED SURFACE SHALL BE FLUSH WITH THE EDGE OF THE GUTTER PAN IN THE AREA OF THE CURB RAMP.
5. ROUGH BROOM TEXTURE ON CURB RAMPS AND KINGS, TEXTURE SHALL PROVIDE A VISUAL CONTRAST TO THE MEDIAN ISLAND.
6. CONCRETE SHALL BE CLASS A OR AA.
7. AVOID DRAINAGE POCKETS IN CROSS WALK AREAS.
8. DETECTABLE WARNING SHALL BE INSTALLED PER MANUFACTURERS GUIDELINES AND CONFORM TO ADAAC (4133.2) "CONTRAST."
NEW ISLAND

SECTION A-A
REMOVAL IN EXISTING ISLAND

EXISTING ISLAND

LEGEND:

DETECTABLE WARNINGS

GENERAL NOTES:

1. ALL CURB RAMPS SHALL BE 1:12 OR FLATTER. ALL SLOPE RATES ARE RELATIVE TO LEVEL.

2. GRATING, MANHOLE, VALVE COVERS OR SIMILAR APPURTENANCES SHALL NOT BE LOCATED IN AREA AT THE BASE OF THE CURB RAMP OR LANDING AREA.

3. TRANSITIONS FROM RAMPS TO GUTTERS OR ROADWAY SURFACE SHALL BE FLUSH AND FREE OF Abrupt CHANGES.

4. PLANTMIX BITUMINOUS OPEN-GRATED SURFACE SHALL BE FLUSH WITH THE EDGE OF THE GUTTER PAN IN THE AREA OF THE CURB RAMP.

5. ROUGH BROW TEXTURE ON CURB RAMPS AND WINGS. TEXTURE SHALL PROVIDE A VISUAL CONTRAST TO THE MEDIAN ISLAND.

6. CONCRETE SHALL BE CLASS A OR AA.

7. AVOID DRAINAGE POCKETS IN CROSS WALK AREAS.

8. DETECTABLE WARNINGS SHALL BE INSTALLED PER MANUFACTURERS GUIDELINES AND CONFORM TO ADAAG 4.29.2 "CONTRAST."

SECTION B-B

ISLAND CURB RAMPS

ALL DIMENSIONS ARE IN METERS
UNLESS OTHERWISE NOTED

SIGNED ORIGIN ON FILE

9-5-24

CHIEF ROAD DESIGN ENGR.

METRIC NODOT

NEVADA DEPARTMENT OF TRANSPORTATION
GENERAL NOTES:
1. TYPE C DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DRAWING R-5.3.3.
2. THE TOTAL WIDTH "W" OF DRIVEWAY CURB OPENINGS SHALL NOT EXCEED 65% OF FRONT FOOTAGE.
3. NO DRIVEWAY SHALL BE LOCATED WITHIN 1.8 m OF A LIGHT POLE, FIRE HYDRANT, MAIL BOX, ABOVE-GROUND ELECTRICAL TRANSFER BOX, OR BLOCK WALL HIGHER THAN 0.6 m.
4. THE CENTERLINES OF DRIVEWAYS ON OPPOSITE SIDES OF THE STREET AT A CURB OPENING SHOUL DBE AT LEAST 3 m FROM EACH OTHER. WHEN A PROPERTY LINE FALLS IN A MEDIAN OPENING A JOINT DRIVEWAY AGREEMENT SHALL BE REQUIRED. NO DRIVEWAY WILL BE ALLOWED.
5. HANDICAPPED ACCESSIBLE SIDEWALKS SHALL BE PROVIDED. SEE STANDARD DRAWINGS R-5.2.1 TO R-5.2.2 AND R-5.3.3.
6. FOR ACTUAL DIMENSIONS SEE STRUCTURE LIST.
7. DRIVEWAY SPACING, CLEARANCES, AND RETURN RADIUS SHALL BE IN ACCORDANCE WITH THE DEPARTMENT'S ACCESS MANAGEMENT STANDARDS.

TYPE C
COMMERCIAL, INDUSTRIAL, AND MULTI-FAMILY DRIVEWAY GEOMETRICS
GENERAL NOTES:
1. ALL RAMPS SHALL BE 1:12 OR FLATTER.
2. CONCRETE DRIVEWAY CAN BE POURED MONOLITHICALLY WITH CURB AND GUTTER.
3. ALL SLOPE RATES ARE RELATIVE TO LEVEL.
4. LENGTH VARIES ACCORDING TO CURB AND GUTTER PROFILE, RETAINING CURBS AND ACQUISITION OF CONSTRUCTION EASEMENTS MAY BE NECESSARY.
5. IF THERE ARE R/W RESTRICTIONS, SIDEWALK WIDTHS CAN BE REDUCED TO 4'-0" WITH PRIOR APPROVAL FROM ASSISTANT CHIEF ROAD DESIGN ENGINEER. A 1.52 m (5') PASSING ZONE IS REQUIRED EVERY 61 m PER ADA. APPENDIX C. SECTION 4.3.4.
6. CONCRETE SHALL BE CLASS "A" OR "AA".
7. SEE TABLE 1-10. ON STANDARD DRAWING R-5.2.1.
GENERAL NOTES:

1. SPACING OF NO. 13 BARS LESS THAN 450 MM TO MEET LOCAL CODES SHALL BE NOTED IN THE STRUCTURE LIST.

2. WHEN CONSTRUCTING DRIVEWAYS WHERE CURB AND GUTTER EXISTS, COMPLETELY REMOVE EXISTING SECTIONS. DRIVEWAY MAY BE POURED MONOLITHIC TO A.C. LINE, IN WHICH CASE THE BARS SHALL BE CONTINUOUS. IF OPTIONAL SECTIONAL POUR IS USED, EXPANSION JOINTS AND REBAR END CLEARANCE SHALL APPLY AS SHOWN.

3. CONCRETE SHALL BE CLASS A OR AA.

4. CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DRAWINGS R-5.2.1, R-5.2.2, AND R-5.3.1.

5. FOR GRADE CHANGES GREATER THAN 3%, VERTICAL CURVES OF AT LEAST 3.0 M MUST BE USED.

6. DRIVEWAY GEOMETRICS SHALL GO TO THE P.C.

7. FOR ACTUAL DIMENSIONS, SEE STRUCTURE LIST.

8. SEE TABLE 1-12 ON DRAWING R-5.2.2, FOR "A" AND "B".

9. AVOID DRAINAGE POCKETS IN CROSS WALK AREAS.

10. DETECTABLE WARNINGS SHALL BE INSTALLED PER MANUFACTURERS GUIDELINES AND CONFORM TO ADAAG (4.29.2) "CONTRAST".
GENERAL NOTES:
1. MINIMUM 900 mm COVER OVER TOP OF CONDUIT AT SHOULDER LINE.
2. 2.6 mm BARE COPPER DETECTION WIRE TO LAY IN TRENCH ADJACENT TO CONDUIT AND ATTACH TO LOCATION MARKER AT EACH END.
3. LOCATION MARKER SHALL BE 50 mm P.V.C. OR 1.5 m STEEL FENCE POSTS.
GENERAL NOTES:
1. STRESS PANELS SHALL BE PLACED EVERY 400 m ON TANGENTS.
2. STRESS PANELS SHALL BE PLACED EVERY 200 m ON CURVES.
3. END PANELS SHALL BE USED WHENEVER A BREAK IN THE FENCE OCCURS, I.E., GATES, CATTLE GUARDS AND AT THE BEGINNING AND ENDING OF ALL CURVES.
4. SEE TABLE A FOR WOOD POST SPAACING ON CURVES.
5. BARBED WIRE SHALL BE USED FOR BOTTOM STRAND WHEN REQUIRED BY N.V. DEPT. OF WILDLIFE OR BUREAU OF LAND MANAGEMENT.
6. WIRES ARE TO BE TIED OFF AT STRETCH POINTS WRAP AND SPICE TO SELLY WITH AT LEAST 4 TURNS AT OPPOSITE END OF PANELS.
7. WOOD POSTS SHALL BE 150 mm Nominal Diameter.
8. ADD ADDITIONAL STRAND OF BARBED WIRE AND/OR A ROCK DEADMAN (MIN. MASS 25 kg) WHEN SPACE BETWEEN BOTTOM WIRE AND GROUND EXCEEDS 500 mm.
9. STEEL POST DEADMAN Driven approximetely 1 m into ground may be used in lieu of rock deadman.

TABLE A: WOOD POST SPAACING ON CURVED FENCE LINES

<table>
<thead>
<tr>
<th>RADIUS OF CURVE</th>
<th>LINE POINT</th>
<th>TREAT CURVE AS TANGENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>820</td>
<td>31</td>
<td>1500</td>
</tr>
<tr>
<td>1250</td>
<td>41</td>
<td>2500</td>
</tr>
<tr>
<td>2000</td>
<td>51</td>
<td>3000</td>
</tr>
<tr>
<td>2500</td>
<td>61</td>
<td>3500</td>
</tr>
</tbody>
</table>

NEVADA 4-WIRE FENCE PANEL DETAILS (TYPE C-NV-4B)
GENERAL NOTES:

1. Hinge post shall be 2.4 m in length and shall be buried 1 m in ground.
2. Barbed wire shall be used for bottom strand when required by NEV. DEPT. OF WILDLIFE OR BUREAU OF LAND MANAGEMENT.
3. Wires are to be tied off at stretch points, away and spliced to self with at least 4 turns at opposite end of panels.
4. Wood posts shall be 150 mm nominal diameter.
5. Add additional strand of barbed wire and/or a rock deadman (min. mass 25 kg) when space between bottom wire and ground exceeds 500 mm.
6. Steel post deadman driven approximately 1 m into ground may be used in lieu of rock deadman.
7. Steel line posts at 2.5 m spacing to maintain bottom wire clearance.

MINOR DRAINAGE CROSSING

WOOD STAY (40 mm
Nominal Dia.)

STEEL LINE POST

3 - 3.5 mm Smooth Wire Loops

Twisted Wire Stay (800 mm)

Wire Design & Spacing Same as Main Fence

NEVADA 4-WIRE FENCE PANEL DETAILS
(TYPE C-NV-4B)
DOUBLE BRACE END ASSEMBLY

CONSTRUCTION NOTES:

1. The pickets and the rails are to be mechanically driven into the ground where soil conditions permit. This may be determined by the engineer.

2. Nailed post spacing is 15.0 m, with 2 rails (4.5 m centers, post spacing). An exception will be made at corners, where the rails are to be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

3. Placement of posts and rails shall be as close to the center of the fence run as practicable, with the exception of corners, where the rails are to be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

4. Existing concrete wall, fence, and barrier are to be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

5. Concrete backfill full depth of hole for end of corner, assembly, post where soil conditions require.

6. Wire must be in contact with the ground at all points of contact, to prevent soil erosion. Wire should be driven into the ground at least 200 mm deep and not less than 50 mm from the cut-off points, and be driven into the ground at a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

7. In construction of the fence, the top horizontal brace shall be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

8. The top horizontal brace shall be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

9. In construction of the fence, the top horizontal brace shall be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

10. Nailed post spacing is 15.0 m, with 2 rails (4.5 m centers, post spacing). An exception will be made at corners, where the rails are to be driven into the ground, with 1.5 m centers without nails, and the rails are to be driven into the ground between the posts. In such cases, a minimum of 1.0 mm of wire shall be present between the rails and the ground at all points of contact.

11. Concrete backfill full depth of hole for end of corner, assembly, post where soil conditions require.

12. Concrete shall be Class A or B.

13. All dimensions are in millimeters.
DOUBLE SWING GATE

FRAME CONSTRUCTION GATES
THRU 3.7 m OPENING

FRAME CONSTRUCTION GATES
OVER 3.7 m TO 5.7 m OPENING

TRUSS RODS

TURBULENCE OR TRUSS TIGHTENER

NOTE: 9.5 mm ADJUSTABLE TRUSS RODS SHALL BE INSTALLED ON ALL GATES OVER 1.8 m IN WIDTH.
See Detail B Sheet H-6.1.3. FOR TRUSS TIGHTENER DETAIL.

GATE POST

2.4 m MAX

GATE POST

2.4 m MAX

GATE PANEL

18 mm O.D. INTERIOR STAY

TRUSS RODS

FRAME CONSTRUCTION GATES
THRU 1.8 m OPENING

FRAME CONSTRUCTION GATES
OVER 1.8 m TO 3.5 m OPENING

GATE OPENING (BETWEEN POSTS)

300

375 mm x 47 mm I.D.

SINGLE SWING GATE

GATE POST (SEE GATE POST CHART FOR SIZE)

GATE POST (SEE GATE POST CHART FOR SIZE)

GATE POST (SEE GATE POST CHART FOR SIZE)

GATE POST (SEE GATE POST CHART FOR SIZE)

NEVADA DEPARTMENT OF TRANSPORTATION

FENCE DETAILS
SWING GATE FOR UP TO 1.83 m CHAIN LINK FENCE

MIN. MADS

UP TO 1.8
UP TO 3.7
3.7 THRU 5.5
4.2 THRU 7.0
8.2 THRU 11.0

UP TO 1.8
UP TO 3.7
3.7 THRU 5.5
4.2 THRU 7.0
8.2 THRU 11.0

SINGLE GATE

DOUBLE GATE

18.16
18.16
18.16
18.16
18.16

8.91
8.91
8.91
8.91
8.91

GATE OPENING IN METERS

BENDING GATE O.D. (mm)

MIN. MADS

CLASS 1

CLASS 2

GENERAL NOTES:
1. DIMENSIONS AND MADS LISTED ABOVE ARE MINIMUM.
2. CONCRETE SHALL BE CLASS A OR AA.
3. CONCRETE SHALL BE CLASS X OR AA.
4. CONCRETE SHALL BE CLASS X OR AA.
5. CONCRETE SHALL BE CLASS X OR AA.
6. CONCRETE SHALL BE CLASS X OR AA.
7. CONCRETE SHALL BE CLASS X OR AA.
8. CONCRETE SHALL BE CLASS X OR AA.
9. CONCRETE SHALL BE CLASS X OR AA.
10. CONCRETE SHALL BE CLASS X OR AA.
11. CONCRETE SHALL BE CLASS X OR AA.
12. CONCRETE SHALL BE CLASS X OR AA.
13. CONCRETE SHALL BE CLASS X OR AA.
14. CONCRETE SHALL BE CLASS X OR AA.
15. CONCRETE SHALL BE CLASS X OR AA.
16. CONCRETE SHALL BE CLASS X OR AA.
17. CONCRETE SHALL BE CLASS X OR AA.
18. CONCRETE SHALL BE CLASS X OR AA.
19. CONCRETE SHALL BE CLASS X OR AA.
20. CONCRETE SHALL BE CLASS X OR AA.
21. CONCRETE SHALL BE CLASS X OR AA.
22. CONCRETE SHALL BE CLASS X OR AA.
23. CONCRETE SHALL BE CLASS X OR AA.
24. CONCRETE SHALL BE CLASS X OR AA.
25. CONCRETE SHALL BE CLASS X OR AA.
26. CONCRETE SHALL BE CLASS X OR AA.
27. CONCRETE SHALL BE CLASS X OR AA.
28. CONCRETE SHALL BE CLASS X OR AA.
29. CONCRETE SHALL BE CLASS X OR AA.
30. CONCRETE SHALL BE CLASS X OR AA.
GENERAL NOTES:

1. For Details and Dimensions Not Shown, See Sheets R-8.1.2 Thru R-8.4.3.

2. See Sheet T-8.5.1 for Special Guardrail Terminal End for Railroad Crossing.

3. See Sheet R-8.2.2 for Guardrail Anchor.

4. Minimum Installation:
   - Guardrail/Frangible Connector - 4.98 m
   - Guardrail On Guardrail - 5.81 m
   - Guardrail On Beam Section - 6.81 m
   - Approved "350" Terminal - 7.43 m

Any other variation that reduces the minimum length shall require approval of the Chief Road Design Engineer.

5. No Direct Payment For Additional Guardrail Panel.

6. The Length of the Transition Panel (395 m) shall be added to the Minimum Length of the Guardrail Guardrail, See Sheet R-8.5.1.

7. For Grading Details Not Shown, See R-8.2.1. For Other Approved "350" Terminals Not Shown, Refer to Manufacturer's Drawings.

8. On Retrofit Installations, if Minimum Cannot be Met and the Distance Between Side of Road and Edge of Pavement is less than 0.6 m, the Post shall be lengthened 0.3 m.

9. When Guardrail is Placed at Normal Edge of Pavement, the Tangent End Treatment Shall Be Placed on the Outer Layer to Get Head Place Clear of Edge of Pavement.

10. Approach Guardrail Terminals Shall Be "NCHRP 350", FHWA, and NDOT Approved.

11. A Reflectivity Object Marker Shall Be Installed on the Teardrop Head of the Approved "350" Terminal Per Manufacturer's Recommendations.

12. All Wood/Steel Posts Shall Be Stamped With the Length On or Near the Top Surface To Be Consistent With the Stamped Guardrail. The Stamped Length Shall Be Within 0.5 mm Of Actual Length for Steel, and No Stamping for Wood.
GENERAL NOTES:

1. FOR END TREATMENTS NOT SHOWN, REFER TO MANUFACTURER’S DRAWINGS.
2. SHOULDER DLES, DRAIN, AND CURBS ARE NOT TO BE INSTALLED IN THESE AREAS.
3. SEE STANDARD DRAWING R-8.2.2 FOR DETAILS NOT SHOWN.
4. GALVANIZED GUARDRAIL (TRIPLE CORRUGATION) SEE STANDARD DRAWING R-8.4.1.
5. CRASH CUSHION OR TANGENT END TREATMENT (B1-DIRECTIONAL) CAN BE FLARED AT 1:50 TAPER.
6. RECOVERABLE SLOPES REQUIRED BEHIND GATING PORTION OF END TREATMENT OR CRASH CUSHION.
7. ON RETROFIT INSTALLATIONS WHEN DISTANCE BETWEEN BACK OF POST AND HINGE POINT IS LESS THAN 0.6 m, THE POST SHALL BE LENGTHENED 0.3 m MINIMUM.
8. GUARDRAIL HEIGHTS ON STAGE CONSTRUCTION PROJECTS SHALL BE GOVERNED BY FINAL SURFACING HEIGHT.
9. REFERENCE: AASHTO ROADSIDE DESIGN GUIDE.
   CURRENT EDITION.
10. CLEAR ZONE SHOULD BE BASED ON DESIGN YEAR TRAFFIC VOLUMES.
11. RECOVERABLE SLOPES ARE 1:4 OR FLATTER.
12. APPROACH GUARDRAIL TERMINALS SHALL BE NCHRP 350, FHWA, AND NEVADA DOT APPROVED.

LEGEND:

- PAVED AREAS

NEVADA DEPARTMENT OF TRANSPORTATION

TYPICAL GUARDRAIL INSTALLATION

ALL DISTANCES ARE IN METERS UNLESS OTHERWISE NOTED

DESIGN SPEED (KMPH) | FLARE RATE
--- | ---
120 | 1:16
110 | 1:18
100 | 1:20
90 | 1:22
80 | 1:24
70 | 1:26
60 | 1:28
50 | 1:30
40 | 1:32

METHOD A
GUARDRAIL TERMINAL (TANGENTIAL)

Bid Item-Guardrail Terminal (Tangential) Each
11.43 m
1/4 or Flatter Slope
1/4 or Flatter Slope
3 m Min.
Hinge Line

Table 1
Normal Edge of Pavement
Y=0.6 m

METHOD B
GUARDRAIL TERMINAL (TANGENTIAL)

Bid Item-Guardrail Terminal (Tangential) Each
11.43 m
1/4 or Flatter Slope
1/4 or Flatter Slope
3 m Min.
Hinge Line

Table 1
Normal Edge of Pavement
Y=0.23 m
End 1/50 Taper

METHOD C
GUARDRAIL TERMINAL (FLARED) (PARABOLIC)

Bid Item-Guardrail Terminal (Flared) Each 11.43 m
1/4 or Flatter Slope
1/4 or Flatter Slope
3 m Min.
Hinge Line

Table 1
Normal Edge of Pavement

METHOD D
GUARDRAIL TERMINAL (FLARED) (STRAIGHT)

Bid Item-Guardrail Terminal (Flared) Each 11.43 m
1/4 or Flatter Slope
1/4 or Flatter Slope
3 m Min.
Hinge Line

Table 1
Normal Edge of Pavement

GENERAL NOTES:
1. FOR TYPICAL GUARDRAIL INSTALLATION, SEE R-8.1.1.
2. FOR DETAILS NOT SHOWN, INCLUDING HEIGHTS OF POSTS FOR SOIL TUBE INSTALLATION ON POSTS 1 AND 2. SEE MANUFACTURER'S DRAWINGS.
3. APPROACH AND TRAILING END GUARDRAIL TERMINALS SHALL BE "NCHRP REPORT 350" TEST LEVEL 3 (TL-3), FHWA, AND NEVADA DOT APPROVED.
4. "W" IS TO THE CENTER OF POST, EXCLUDING POSTS 1 AND 2. USE TABLE 1 FOR BREAKAWAY POSTS WITH BLOCKS, EXCLUDING POSTS 1 AND 2.

TABLE 1

<table>
<thead>
<tr>
<th>Terminal Ends</th>
<th>W (Flare)</th>
<th>X (Widening)</th>
<th>Y (Sly)</th>
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<tbody>
<tr>
<td>Method A</td>
<td>390 mm</td>
<td>2.22 m</td>
<td>0.6 m</td>
</tr>
<tr>
<td>Method B</td>
<td>390 mm</td>
<td>1.51 m to 1.76 m</td>
<td>0 to 0.2 m</td>
</tr>
<tr>
<td>Method C</td>
<td>390 mm to 845 mm</td>
<td>2.22 m to 2.67 m</td>
<td>0.6 m</td>
</tr>
<tr>
<td>Method D</td>
<td>390 mm to 1200 mm</td>
<td>2.22 m to 3.03 m</td>
<td>0.6 m</td>
</tr>
</tbody>
</table>

LEGEND:
- Paved Areas

Nevada Department of Transportation
GUARDRAIL TERMINALS GRADING PLAN

Signed Original On File 8-8-21 (615)
Chief Road Design Engt.
### Table A

<table>
<thead>
<tr>
<th>Radius (Meters)</th>
<th>Number of Crt Posts</th>
<th>Clear Area (Meters)</th>
<th>L</th>
<th>W</th>
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<tbody>
<tr>
<td>2.6</td>
<td>3</td>
<td>7.6</td>
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<td>5.2</td>
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<td>6.0</td>
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<td>12.7</td>
<td>11</td>
<td>15.0</td>
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### Diagram

#### Design Criteria Notes:

A. The design criteria is from FMWA Technical Advisory T 5040.32, dated April 13, 1992, called "Curved W-Beam Guardrail Installations at Minor Roadway Intersections."

B. This installation is acceptable for lower speed up to and equal to 50 km/h. LOW-VOLUME THROUGH ROADS INTERSECTED BY LOW-SPEED, LOW-VOLUME CROSS ROADS AND/OR DRIVEWAYS.

C. A flat approach to the curved guardrail installation is necessary to ensure proper performance of the system. The cross slope should not exceed 1%. When adjacent to a super-elevated section on the mainline, an analysis should be performed to evaluate the potential for vaulting of an errant vehicle.

D. In Table A, radii are not to be interpolated nor extrapolated. This installation is based on intersection angles near 90 degrees.

E. For the 2-6 meter radius layout, the guardrail panel is bolted to the center of the curved nose area.

F. For other layouts using larger radii, up to 10.7 m, the guardrail panel is bolted to the CRT posts in the curved nose area.

G. On CRT posts within the arc length, use 8 mm diameter bolts. Each CRT post will have 20 mm hole with a snug fitting insert 10 mm ID x 180 mm long, use 40 mm washers.

H. Clear area sizes are shown in Table A. The clear area must be kept free of fixed objects. For embankment slopes the hinge point should be greater than 0.6 m behind the front of posts. Embankment slopes will be flatter than or equal to 0.12 max/min.

I. Use the anchor terminal with low-speed, low-volume facilities with a step condition on cross road or approach.

### General Notes:

1. Use of this detail requires Chief Roadway Design Engineer approval. This installation is intended for the leading side to a bridge end. Especially where inadequate room is available to install other standard installations of guardrail, bid (flared or tangential) guardrail connectors, and guardrail terminals due to a nearby crossing or approach.

2. See contract structure list and standard plans for transition and terminal connector type.

3. The slope from the edge of the shoulder into the face of the guardrail should be 1:10 or flatter. See standard plan sheet R-8-2-1.

4. Guardrail installation shall be W-beam guardrail with breakaway CRT posts and no blocks. CRT-controlled release terminal timber posts are shown as item "FOP" in the NCHRP-A6TBA Joint Committee Task Force 13 Report "A Guide to Standardized Highway Barrier Hardware."

5. Radius in feet shall be etched into plate replacing the letters 'mm' shown on the identification plate detail. Digits shall be 48 mm high and 28 mm max width. Plate shall be galvanized after etching.

6. The guardrail identification plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail.

### Legend:

- **#** - clear area
- **** - CRT posts, no blocks, see note 4

---

**SPECIAL GUARDRAIL INSTALLATION CRT**

---

**NEVADA DEPARTMENT OF TRANSPORTATION**

**SIGNED ORIGINALLY ON FILE: R-8-2-1**

**CHEF ROAD DESIGN ENG.**

**VOL:** 4

**PAGE:** 105

**DRAWN:** 

**CHECKED:**

**REVISED:**

---

**NOTICE TO CONTRACTORS:**

This drawing is for the use of the Nevada Department of Transportation. Reproduction or use of this drawing without written permission of the Nevada Department of Transportation is prohibited.
GENERAL NOTES:
1. USE OF THIS DETAIL REQUIRES CHEFD ROADWAY DESIGN ENGINEER APPROVAL.
2. TO BE USED ONLY WITH "SPECIAL GUARDRAIL INSTALLATION CRT" STANDARD PLAN R-8.2.4.
3. OUTSIDE NUT SHALL BE TORQUED AGAINST INSIDE NUT A MINIMUM OF 136 Nm.
4. TOE NAIL PLATE AT CORNERS WITH 100 NAILS.
GENERAL NOTES:
1. USE NESTED THREE BEAM. SEE DETAIL "N", STANDARD PLAN DRAWING R-8.1.1.
2. A NCHRP 350, FHWA, AND NEVADA DOT APPROVED GUARDRAIL TERMINAL SHOULD BE USED IF THE ONE WAY FACILITY IS TO BE USED AS A "TWO WAY DETOUR. THE TERMINAL SHOULD BE LEFT IN PLACE ONCE THE DETOUR IS REMOVED.
3. FOR DETAILS OF TRIPLE CORRUGATION GUARDRAIL SEE STANDARD PLAN DRAWING R-8.4.1.
4. REFER TO AASHTO ROADSIDE DESIGN GUIDE, 1996 EDITION, SECTION 5.6.1 FOR DESIGN INFORMATION NOT SHOWN.
5. IF GUARDRAIL SYSTEM IS NOT SATISFACTORY, USE CONCRETE BARRIER RAIL. CHECK FOR VEHICLE ROLL ANGLE (TOP OF TALLER VEHICLES Hitting THE OBSTRUCTIONS).
6. SPACER MATERIAL MAY BE "F" BEAM, WOOD BLOCK, OR FORMED STRUCTURAL TUBING BY PRIOR APPROVAL OF THE ENGINEER. FOR DETAILS OF A SPACER BLOCK SEE STANDARD PLAN DRAWING R-8.4.1. SHY DISTANCE CAN BE ADJUSTED UPWARD TO FIT THE SPACER BLOCK.
GENERAL NOTES:

1. THESE DETAILS ARE TO BE USED ONLY WHEN GUARDRAIL POST CANNOT BE INSTALLED TO AVOID UNDERGROUND OBSTRUCTIONS WITH GUARDRAIL POSTS.
2. SEE SHEET R-8-A FOR DETAIL ON GALVANIZED GUARDRAIL (TRIPLE CORRUGATION) NOT SHOWN.
3. GUARDRAIL LENGTHS OF NEED SHALL BE BASED ON DESIGN YEAR TRAFFIC VOLUMES. SEE CURRENT EDITION OF THE MINIST GOVERNMENT DESIGN GUIDE FOR DETAILS.
4. CHECK FEASIBILITY OF REMOVING OBSTACLE OR EXTENDING CLOUVENT OUTSIDE CLEAR ZONE VERSUS COST OF REMOVAL.
5. IF THE GUARDRAIL SPACED OCCURS ON THE POSTS WHICH ARE ADJACENT TO THE MODIFIED POST THEN THREE CONTIGUOUS SECTIONS (7.43 m) OF GUARDRAIL ARE REQUIRED WITH THE MIDDLE SECTION BEING CENTERED AT THE LOCATION OF THE MODIFIED POST.
GENERAL NOTES:
1. WHEN DISTANCE BETWEEN BACK OF GUARDRAIL POST AND HINGE POINT IS LESS THAN 0.6 M, THE POST SHALL BE LENGTHENED 0.3 M MIN.

2. GUARDRAIL HEIGHTS ON HIGHWAY CONSTRUCTION PROJECTS SHALL BE GOVERNED BY FINAL SURFACING ELEVATION. HEIGHT MEASURED AT FACE OF RAIL ELEMENT.

3. ATTACH GUARDRAIL TO WOOD BLOCK AND STEEL POST WITH TWO BOLTS ON APPROACHING TRAFFIC SIDE OF BLOCK AND POST WEB.

4. TOP OF GUARDRAIL TO BE 810 MM ABOVE GROUND LINE OR SHOULDER SURFACING.

5. FOR DETAILS OF THE CROSS SECTION OF THREE BEAM RAIL ELEMENT, RAIL SPlice, TRANSITION SECTION, AND BACKUP PLATE, SEE STANDARD PLANS SHEET N-8.4.1.

6. ALL HARDWARE TO BE GALVANIZED.

NEVADA DEPARTMENT OF TRANSPORTATION

GALVANIZED GUARDRAIL
(TRIPLE CORRUGATION)
STEEL POST

Signed Originating: R-8.4.1 (65B)
Chief Road Design Engr.
GENERAL NOTES:
1. CONCRETE SHALL BE CLASS A OR AA.
2. MEDIAN BARRIER RAIL SHALL BE SCORED 5 mm DEEP VERTICALLY EVERY 4.5 m.
3. ALL CONTACT JOINTS SHALL BE AT PLANNED SCORED JOINT LOCATIONS.
4. ALL JOINTS AND OTHER LOCATIONS NEEDING SEALING SHALL FOLLOW REQUIREMENT SET IN DRAWING R-8.6.1.
5. FOR IMPACT ATTENUATOR ATTACHMENT DETAILS, SEE MANUFACTURER'S DRAWING.
6. REFER TO THE CURRENTLY ADOPTED ROADSIDE DESIGN GUIDE FOR FURTHER DESIGN INFORMATION NOT SHOWN HERE.
7. EXPANSION JOINTS AT ALL STRUCTURES. JOINTS IN BARRIER RAIL OVER A STRUCTURE SHALL BE AT THE SAME LOCATION AND OF THE SAME DIMENSIONS AS THOSE IN THE STRUCTURE. JOINT FILLER NOT REQUIRED IN EXPANSION JOINT IN BARRIER RAIL.
8. LENGTH 1 m MINIMUM OR LENGTH OF OBSTRUCTION, WHICHER IS GREATER, SEE CONTRACT PLANS FOR EXACT DIMENSIONS.
10. THE 1070 mm TYPE FA BARRIER RAIL MAY ALSO BE CONSIDERED ON THE OUTSIDE CURVE NEXT TO SENSITIVE AREAS SUCH AS SCHOOLS, HOUSING, DEVELOPMENTS, AND PROBLEM AREAS THAT NEED EXTRA PROTECTION.
11. FOR DETAILS NOT SHOWN SEE TYPE FA.
12. VARIES = 2/19 X H + 305.
13. FOR TRANSITIONS FOR HEIGHTS, SEE STANDARD PLAN SHEET R-8.6.3.
14. FOR DETAILS NOT SHOWN, SEE STANDARD PLAN SHEET R-8.6.1.
General Notes:
1. CONCRETE SHALL BE CLASS A OR AA.
2. THE HEIGHT OF THE BARRIER RAIL SHALL BE MEASURED FROM THE TOP
   OF THE PLANTMAX ETRUMINUS SURFACE OR THE TOP OF CONCRETE
   PAVEMENT.
3. ROUGHEN CONTACT FACE OF EXISTING RAIL TO 6 mm RELIEF PRIOR TO
   POURING NEW RAIL TRANSITION.
4. AT THE INDICATED REINFORCING LOCATIONS, DRILL 15 mm HOLES IN CONTACT
   FACE OF EXISTING RAIL TO A MINIMUM DEPTH OF 300 mm AND NO HILLS
   5 DEGREES FROM THE HORIZONTAL. SECURE ALL REINFORCING BARS IN THE
   DRILLED HOLES WITH AN EPOXY CONFORMING TO SECTION 728 OF THE
   STANDARD SPECIFICATIONS.
5. PLACE STRAIGHT AND/OR BENT 14 BAR REINFORCING BARS IN RAIL TRANSITIONS
   AS INDICATED. SPIRES IN REINFORCING STEEL AT TRANSITION ENDS ARE
   PERMITTED MINIMUM 300 mm LAY LENGTH.
6. FOR DETAILS NOT SHOWN, SEE R-8.6.1 TO R-8.6.2.

ELEVATION

SECTION A-A
EXISTING JERSEY TYPE A

SECTION B-B
EXISTING JERSEY TYPE A

SECTION C-C
TYPE FA

NEVADA DEPARTMENT OF TRANSPORTATION
CONCRETE BARRIER RAIL
Jersey Type A to Type FA

Signed Originating

Signed Drawing On File
R-8.6.3

Chief Road Design Eng.

150

610

610

610

610

NEEDS LARGER SCALE
GENERAL NOTES:
1. CONCRETE SHALL BE CLASS A OR AA.
2. THE HEIGHT OF THE BARRIER RAIL SHALL BE MEASURED FROM THE TOP OF THE PLANTING STUMPS SURFACE OR THE TOP OF CONCRETE PAVEMENT.
3. ROUGHEN CONTACT FACE OF EXISTING RAIL TO 6 MM RELIEF PRIOR TO FOURING NEW RAIL TRANSITION.
4. AT THE INDICATED REINFORCING LOCATIONS, DRILL 18 MM HOLES IN CONTACT FACE OF EXISTING RAIL TO A MINIMUM DEPTH OF Seks No. 13 REINFORCING BARS IN THE DRILLED HOLES WITH AN EPOXY CONFORMING TO SECTION 726 OF THE STANDARD SPECIFICATIONS.
5. PLACE STRAIGHT AND/OR BENT NO. 13 REINFORCING BARS IN RAIL TRANSITIONS AS INDICATED. SPACINGS IN REINFORCING STEEL AT TRANSITION ENDS ARE PERMITTED (MINIMUM 300 MM LAP LENGTH).
6. FOR DETAILS NOT SHOWN, SEE R-6.6.1 TO R-6.6.2.
GENERAL NOTES:

1. USE ONLY WHEN SPECIFIC CRITERIA ARE MET. THE CRITERIA FACTORS AND CLEAR ZONE, EXCLUSION OF TRAFFIC CENTER LINES, AND SPEED ZONES, APPROACH AND TRAILING END CRITERIA ARE TREATED SEPARATELY.

APPROACH END CRITERIA - REQUIRE CIVIL ENGINEER/DESIGNER TO BE USED FOR APPROACH END WHEN OUTSIDE CLEAR ZONE OR SPEEDS ARE LESS THAN OR EQUAL TO 60 MPH.

TRAILING END CRITERIA - MAY BE USED FOR TRAILING END FOR ALL SPEEDS WITH TRAFFIC IN ONE WAY TOWARDS ON-RAMP OR OFF-RAMP AND OPPOSING TRAFFIC CLEAR ZONE TO ONE WAY OF 250 FT. OR MORE.

2. JOINTS SHALL BE CLASS A OR B. TRANSVERSE JOINTS IN 25 MM PREMOLDED EXPANSION JOINT FILLER OR 25 MM OPEN TRANSMISSION JOINTS SHALL BE PLACED AT STRUCTURES. JOINTS IN BARRIER RAIL OVER A STRUCTURE SHALL BE AT THE SAME LOCATION AND OF THE SAME DIMENSION AS THOSE IN THE STRUCTURE.

3. 150 MM DEEP BARRIER END ANCHORS SHALL BE CONSTRUCTED IN THE FIRST AND LAST 3.6 M OF THE TEE, OR BARRELS SHALL BE WELDED. IF TRANSITIONS ARE USED, THE ANCHOR SHALL BE EXTENDED UNDER THE TRANSITION SECTION.

4. VERTICAL JOINTS SHALL HAVE A SINGLE COMPONENT HOT APPLIED SEALANT FULL DEPTH OF JOINT.

5. JOINT SEALER SHALL BE A SINGLE COMPONENT HOT APPLIED SEALANT 25 MM THICK.


7. JOINT FILLER SHALL BE PLACED IN OPEN JOINTS IN THE BARRIER AS REQUIRED TO MATCH JOINTS IN THE APPROACH SLAB DETAIL.

8. DOWELS AND REINFORCING STEEL TO EXTEND INTO END SECTIONS AT JOINT LOCATIONS AND TERMINATE BEARS AS NECESSARY TO MAINTAIN 4 IN MINIMUM COVER.

9. FOR DETAILS NOT SHOWN, REFER TO STANDARD PLAN R-6-06.1.

LEGEND:

- 20 MM X 20 MM STEEL DOWEL @ 0.6 M CENTERS
- (1/4" DOWEL SEE NOTE 51)

NEVADA DEPARTMENT OF TRANSPORTATION

VERTICAL TAPER
CONCRETE BARRIER RAIL

METRIC

SIGNED ORIGINAL ON FILE B-06-06.1

CHIEF ROAD DESIGN ENGR.
GENERAL NOTES:

1. USE OF THESE DETAILS REQUIRES CHIEF ROAD DESIGN ENGINEER APPROVAL. MINIMUM REQUIREMENTS FOR USE IN A MEDIAN – MEDIAN MUST BE AT LEAST 7.2 m WIDE AND GRADED SMOOTH WITH 116 OR FLATTER SLOPES.

2. CABLE SHALL BE 19 mm Dia. Wire Rope and Shall Conform to AASHO M50, Type 1, Class A Coating. Posts Shall Meet the Requirements of AASHO M75M Grade 250 and Shall Be Galvanized in Accordance with AASHO M11.

3. WHEN BARRIER IS IN MEDIAN, INSTALL 2 YELLOW REFLECTORS EVERY 5TH POST ON BOTH SIDES OF POST FACEING TRAFFIC. WHEN BARRIER IS ON THE RIGHT SIDE OF TRAFFIC INSTALL A WHITE REFLECTOR EVERY 6TH POST ON TRAFFIC SIDE ONLY.

4. STAGGER SPRING CABLE END ASSEMBLIES FOR CLEARANCE BETWEEN UNITS. INSTALLATION OF CABLE END ASSEMBLIES SHALL BE AS FOLLOWS:

   LENGTH OF CABLE RUNS:

   UP TO 152 m – USE THE SPRING CABLE END ASSEMBLY ON ONE END, AND TURNBUCKLE ONLY ON THE OTHER END OF EACH CABLE.

   OVER 152 m TO 457 m – USE THE SPRING CABLE END ASSEMBLY ON EACH END OF EACH CABLE.

5. SEE SETTING TEMPERATURE/SPRING COMPRESSION TABLE AND REFERENCE SPECIAL PROVISIONS FOR ADDITIONAL TENSIONING REQUIREMENTS.

6. POST SPACING ON A TANGENT SHALL BE 3.6 m MIN. TO 4.8 m MAX. POST SPACING ON A CURVE SHALL BE AS FOLLOWS:

   CURVE RADIUS SPRINGING
   214 m or More  4.8 m
   67 m to 214 m  3.6 m
   33 m to 67 m   2.4 m
   Less Than 33 m USE NOT RECOMMENDED

7. DISTANCE FROM TANGENT OF BARRIER RUN TO NOTCH FOR TOP CABLE ON BREAKAWAY ANCHOR ANGLE SHALL BE 1.2 m.

8. WHERE THE CABLE IS CONNECTED TO A CABLE SOCKET WITH A WEDGE TYPE CONNECTOR, ONE WIRE OF THE CABLE SHALL BE CRIMPED OVER THE BASE OF THE WEDGE TO HOLD IT FIRMLY IN PLACE DURING TENSIONING.

9. ALL HOLES SHALL BE 2 mm LARGER THAN THE BOLT DIAMETER UNLESS OTHERWISE NOTED.

10. CONCRETE SHALL BE CLASS A OR AA WITH F’=028 MPA. PLACE CONCRETE TERMINAL AND BACKFILL AT LEAST 2 WEEKS PRIOR TO TENSIONING THE CABLES. THE BOTTOM OF THE TERMINAL SHALL HAVE FULL AND EVEN BEARING ON THE SURFACE UNDER IT.

11. WELDING PER AWS D1.1®. REINFORCING STEEL A615M GRADE 420 AND A706M GRADE 420 AS NOTED.

12. PAYMENT WILL BE MADE UNDER:

   CABLE BARRIER LIN. METER
   CABLE BARRIER TERMINAL EACH

PLACING CABLE BARRIER AND CABLE BARRIER TERMINAL:

Cable barrier tensioning shall be installed by properly setting the spring compensation device and then permanently holding the unloaded position. Complete assembly of the cable barrier and set the compensating devices to a spring compression of 89 mm. Leave the springs in this setting for at least 2 weeks then set them to the proper setting as listed in the Temperature Spring Compression Table.
NOTE:

In urban or suburban areas where a raised and curbed median is provided, each project should be investigated to determine whether or not guide posts will be needed in the median.

**TABLE 1**

<table>
<thead>
<tr>
<th>Type of Guide Post</th>
<th>Type</th>
<th>Number of Pieces Required</th>
<th>45°</th>
<th>90°</th>
<th>135°</th>
<th>180°</th>
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</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>1</td>
<td>3</td>
<td>18</td>
<td>27</td>
<td>36</td>
<td>45</td>
</tr>
<tr>
<td>Flexible</td>
<td>2</td>
<td>6</td>
<td>36</td>
<td>54</td>
<td>72</td>
<td>90</td>
</tr>
<tr>
<td>Flexible</td>
<td>3</td>
<td>9</td>
<td>54</td>
<td>81</td>
<td>108</td>
<td>144</td>
</tr>
<tr>
<td>Flexible</td>
<td>4</td>
<td>12</td>
<td>81</td>
<td>120</td>
<td>156</td>
<td>210</td>
</tr>
<tr>
<td>Flexible</td>
<td>5</td>
<td>15</td>
<td>120</td>
<td>180</td>
<td>240</td>
<td>300</td>
</tr>
<tr>
<td>Flexible</td>
<td>6</td>
<td>18</td>
<td>180</td>
<td>270</td>
<td>360</td>
<td>450</td>
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<tr>
<td>Flexible</td>
<td>7</td>
<td>21</td>
<td>270</td>
<td>405</td>
<td>540</td>
<td>750</td>
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<tr>
<td>Flexible</td>
<td>8</td>
<td>24</td>
<td>405</td>
<td>630</td>
<td>900</td>
<td>1350</td>
</tr>
<tr>
<td>Flexible</td>
<td>9</td>
<td>27</td>
<td>630</td>
<td>945</td>
<td>1440</td>
<td>2100</td>
</tr>
<tr>
<td>Flexible</td>
<td>10</td>
<td>30</td>
<td>1260</td>
<td>1890</td>
<td>2880</td>
<td>4200</td>
</tr>
</tbody>
</table>

**GUIDE POST SPACING NOTES:**

**TYPE OF ROADWAY:**

1. **Multi-lane Divided Roadway:** Guide posts shall be installed at 200' intervals along the entire length of the roadway.

2. **Two Lane Undivided Roadway:** Guide posts shall be installed at 400' intervals along the entire length of the roadway.

3. **Flexible**

   - Guide posts shall be installed at 100' intervals along the entire length of the roadway.

**GENERAL NOTES:**

1. Guide posts shall be installed at the beginning and end of each curve and the spacing adjusted thereafter and length of the curve into equal spacing measured to point specified in Table 1.

2. Guide posts shall be installed at the beginning and end of each curve and the spacing adjusted thereafter and length of the curve into equal spacing measured to point specified in Table 1.

3. Guide posts shall be installed at the beginning and end of each curve and the spacing adjusted thereafter and length of the curve into equal spacing measured to point specified in Table 1.

4. Guide posts shall be installed at the beginning and end of each curve and the spacing adjusted thereafter and length of the curve into equal spacing measured to point specified in Table 1.

**METAL POST DETAILS**

- Thickness: 3.1 mm or 3.5 mm

**GUIDE POSTS**

- Signed Origin: On file, Date: 9-11-19

**NEVADA DEPARTMENT OF TRANSPORTATION**

- CHIEF ROAD DESIGN ENG. 10-2-19

- SCALE: 1"=20'
GENERAL NOTES:
1. MOUNTING HEIGHT TO BOTTOM OF “AUTHORIZED VEHICLES ONLY” SIGN SHALL BE 1.8 m FROM ORIGINAL GROUND.
2. TYPE II REFLECTIVE SHEETING SHALL BE USED ON SIGN INSTALLATIONS AND TYPE 2 (MODIFIED) OBJECT MARKERS.
3. IN SNOW PLOWED ROADWAYS USE STRINGERS AND TUBULAR STIFFENERS FOR ALL SIGNS, FOR DETAILS SEE T-331.4.
GENERAL NOTES:
1. All reflectors shall be selected & installed pursuant to the project plans & specifications or at the direction of the engineer. The depicted reflectors are for mounting location information only.
2. Spacing: See "Reflector Placement on Guardrail" notes and Table "A", of this sheet.
3. Reflectors shall be mounted at the angle specified by the manufacturer or as directed by the engineer.

REFLECTOR PLACEMENT SPACING ON GUARDRAIL/BARRIER RAIL

Spacing shall be:
(a) 15 meter on tangents and on curves of 90 meter radius or greater. If less than 90 meter radius see Table "A".
(b) Reflectors shall be omitted on the flared sections of guardrail.
(c) No direct payment for reflectors on barrier rail.

<table>
<thead>
<tr>
<th>Radius of Curve (in Meters)</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 15</td>
<td>6 m</td>
</tr>
<tr>
<td>45</td>
<td>9 m</td>
</tr>
<tr>
<td>60</td>
<td>11 m</td>
</tr>
<tr>
<td>≥ 90</td>
<td>12 m</td>
</tr>
</tbody>
</table>

TYPICAL GUARDRAIL-GUIDE POST INSTALLATION

GUARDRAIL-GUIDE POST LOCATION
GENERAL NOTES:
1. CONCRETE SHALL BE CLASS A OR AA.
2. MONUMENTS MAY BE Poured SQUARE OR ROUND.
3. MONUMENT STAMPING SHALL BE DONE ACCORDING TO LOCATION DIVISION'S "SPECIAL INSTRUCTIONS FOR SURVEY OR MAPPING CONSULTANTS" MANUAL.

SURVEY COVER & RING (CAST IRON)

SURVEY MONUMENTS

ALTERNATE PLACEMENT (CAST IRON)
GENERAL NOTES:
1. ALL WEAKENED PLANE JOINTS SHALL BE SAWN DiAGONALLY AS SHOWN. EXCEPT AS INDICATED IN THE END ANCHOR AND STRUCTURE APPROACH DETAILS, WHEN ONLY ONE LANE IS BEING CONSTRUCTED ALONGSIDE EXISTING LANE, JOINTS SHALL BE SAWN EITHER DIAGONALLY OR AS DIRECTED BY THE ENGINEER.
2. SPACING OF WEAKENED PLANE JOINTS SHALL BE SUCCESSIVELY 4.5 m, 3.3 m, 4.2 m, 3.6 m AND REPEAT, EXCEPT FOR THE FIRST JOINT AT PAVEMENT END ANCHORS AND AT REINFORCED STRUCTURE APPROACHES.
3. TRANSVERSE CONTACT JOINTS SHALL BE CONSTRUCTED AT LEAST 1.5 m FROM ANY TRANSVERSE WEAKENED PLANE JOINT.
4. LONGITUDINAL WEAKENED PLANE JOINTS SHALL BE CUT AT ALL LANE AND SHOULDER LINES EXCEPT WHERE LANE PLUS ADJACENT SHOULDER WIDTH IS LESS THAN OR EQUAL TO 4.6 m.
5. ALL TRANSVERSE CONTACT JOINTS SHALL BE SAWN AND JOINT SEALER USED PER RESPECTIVE TRANSVERSE CONTACT JOINT DETAIL ON SHEET.
6. ALL TIE BARS TO BE EPOXY COATED EXCEPT IN CLARK CO. TIE BARS TO BE PLACED IN MIDDLE 1/3 OF SLAB THICKNESS.
7. TRANSVERSE CONTACT JOINTS WITH DOWEL BARS SHALL BE USED AT ALL CONSTRUCTION JOINTS AND ELSEWHERE IF DIRECTED BY THE ENGINEER.
8. PAVEMENT END ANCHORS SHALL BE CONSTRUCTED AS THE TERMINAL PANELS OF ALL PAVEMENT NOT ABUTTING EXISTING CONCRETE PAVEMENTS OR STRUCTURES, AND ELSEWHERE IF DIRECTED BY THE ENGINEER.
9. INITIAL 3 mm WEAKENED PLANE JOINT SAW CUT TO BE DONE WITHIN SPECIFIED TIME LIMIT. RESERVOIR CUT SHALL BE DONE AT A LATER TIME.
10. RATIO OF DEPTH TO WIDTH OF JOINT SEALANT SHALL BE 1:1.
11. DOWEL BARS SHALL BE LOCATED WITHIN 25 mm OF THE PLANNED TRANSVERSE AND DEPTH LOCATION AND WITHIN 50 mm OF THE PLANNED LONGITUDINAL LOCATION.
12. THE DOWEL BARS SHALL BE PARALLEL TO THE PAVEMENT SURFACE AND CENTERLINE WITHIN A TOLERANCE OF 13 mm IN 460 mm.
13. DOWEL BARS SHALL NOT BE PLACED WITHIN 300 mm OF LONGITUDINAL JOINTS.
14. 0 = SLAB THICKNESS.
WEAKENED PLANE JOINTS LOCATION
(DOWELED PAVEMENT ONLY)
(Rumble strips shall not be used in urban areas)
For details not shown See Standard Plan Drawing R-10.1.2

GENERAL NOTES:
1. SHOULDER TRANSVERSE JOINTS SHALL BE THE SAME PATTERN AS MAIN ROADWAY.
2. SEE TYPICAL SECTION FOR WIDTH OF SHOULDER AND LONGITUDINAL WEAKENED PLANE JOINT LOCATION.
3. SEE CONTRACT PLANS SPECIAL DETAIL FOR CONCRETE RUMBLE STRIPS.

WEAKENED PLANE JOINTS LOCATION
(Rumble strips shall not be used in urban areas)
For details not shown See Standard Plan Drawing R-10.1.1
GENERAL NOTES:

1. Rumble strips shall be used on all outside shoulders that are 1.2 m wide or wider on both rural and rural divided highways. Rumble strips shall be used on all the inside shoulders of rural divided highways with shoulder width of 600 mm or more.

2. Rumble strips will not be placed in urban locations, nor on ramp shoulders, bridges, or bridge approach slabs, unless specifically designated in the plans.

3. Rumble strips may be continuous through all minor approaches, but shall be omitted across principal intersecting roadways.

4. Rumble strips can be placed on existing rolled in rumble strips if present.

5. For ramps and structures, see standard plan sheet R-10.15.

6. On concrete pavements, due to transverse joints, rumble strips will require a special detail.

LEGEND:

- Plantmix bituminous surface

Rumble strip detail

Rumble strip corrugations section A-A

Typical rumble strip placement
SLOPING AREAS
PLANTHOLE & SOAKER IRRIGATION DETAILS

SECTION
LEVEL AREAS

SECTION
STAKING DETAILS

NOTE: TOP OF ROOT BALL TO BE 25 mm ABOVE GRADE.

SECTION
PLANTING TECHNIQUES

SOIL SCHEDULE
SODFILL MATERIAL SHALL CONSIST OF TWO PARTS NATIVE SOIL AND ONE PART KUMUS.

PLANT TABLET SCHEDULE
FOR TREES, SHRUBS AND GROUNDCOVERS

PLANTING DETAILS
NEVADA DEPARTMENT OF TRANSPORTATION

SIGNED ORIGINAL ON FILE B-1111 (2/12)
CHIEF ROAD ENGINEER
**MAILBOX TURNOUT**

**TABLE 1**

<table>
<thead>
<tr>
<th>HIGHWAY TYPE AND TRAFFIC CONDITIONS</th>
<th>WIDTH (M) OF ALL-WEATHER SURFACE OF TURNOUT ON AVAILABLE SHOULDER AT MAILBOX</th>
<th>DISTANCE (M) ROADSIDE FACE OF MAILBOX TO BE OFFSET BEHIND EDGE OF TURNOUT OR USAGE SHOULDER</th>
<th>DEPTH BASE AGGREGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL HIGHWAY</td>
<td>PREFERRED (M)</td>
<td>MINIMUM (M)</td>
<td>MINIMUM (M)</td>
</tr>
<tr>
<td>ADT &gt; 10000 vpd</td>
<td>3.6</td>
<td>200 to 300</td>
<td>0</td>
</tr>
<tr>
<td>ADT 1000 to 10000 vpd</td>
<td>3.6</td>
<td>200 to 300</td>
<td>0</td>
</tr>
<tr>
<td>ADT 100 to 1500 vpd</td>
<td>3.0</td>
<td>200 to 300</td>
<td>0</td>
</tr>
<tr>
<td>RURAL ROAD ADT &lt; 1000 vpd</td>
<td>2.4</td>
<td>200 to 300</td>
<td>0</td>
</tr>
<tr>
<td>RESIDENTIAL STREET</td>
<td>2.4</td>
<td>200 to 300</td>
<td>0</td>
</tr>
<tr>
<td>CURVED</td>
<td>N/A</td>
<td>200 to 300</td>
<td>0</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

1. FOR FURTHER INFORMATION ON MAILBOXES SEE AASHTO "A GUIDE FOR ERECTING MAILBOXES ON HIGHWAYS, 1994 EDITION.
2. MAILBOXES WITHIN THE CLEAR ZONE SHALL BE THE TYPES SHOWN IN SHEETS R-12.1.2 AND R-12.1.3 OR AN APPROVED EQUAL.
3. ADT = AVERAGE DAILY TRAFFIC, vpd = VEHICLES PER DAY
4. FOR MAILBOX SPACING AND VARIABLE LENGTH SEE SHEETS SHEETS R-12.1.2 AND R-12.1.3
5. TURNOUT QUANTITIES IN PLAN SUMMARY SHEETS.
6. MILLED MATERIAL MAY BE USED IN LIEU OF AGGREGATE BASE.
7. INSTALL MAILBOXES ON FLAT SURFACE WITHOUT UNDULATIONS.

**NEVADA DEPARTMENT OF TRANSPORTATION**

**MAILBOX TURNOUTS**

**Signed Original On File R-12.11 (204)**

**CHEF ROAD DESIGN ENG.**

**METRIC NDOT**

**ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.**
GENERAL NOTES:

1. FOR FURTHER INFORMATION ON MAILBOXES SEE AASHTO "A GUIDE FOR ERECTING MAIL BOXES ON HIGHWAYS", 1994 EDITION.

2. INSTALLATION OF TYPE C MAILBOX ASSEMBLIES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

3. THE DIRECTION OF THE MAILBOX OPENING IN RELATION TO THE TRAVEL LANE SHALL BE SET BY THE U.S. POSTAL SERVICE.

4. 75 mm x 200 mm WHITE REFLECTORIZED SHEETING SHALL BE PLACED FACING TRAFFIC 300 mm ± 75 mm FROM GROUND ON ALL MAILBOX SUPPORT STRUCTURES.

5. LIGHTWEIGHT NEWSPAPER BOXES MAY BE MOUNTED BELOW THE MAILBOX ON THE MAILBOX SUPPORT.

6. HEAVY GAUGE STEEL MAILBOXES (>5kg) ARE NOT ALLOWED ON HIGH-SPEED HIGHWAYS.

7. INSTALL MAILBOXES ON FLAT SURFACE WITHOUT UNDULATIONS.
FRONT VIEW SIDE VIEW
MOUNTING DETAIL
OPTICAL DETECTOR

SIGNAL STANDARDS

1. For Pedestrian Push Button And Sign See Sheet 7-30.1.1.3
2. For Foundation Details See Sheet 7-30.1.16.
3. Mounting Heights of Sign and Pedestrian heads
and Pedestrian Push Buttons shall be applicable
To installations on Pole Types 20, 30 & 35.

TYPE 1-A

TYPE 1-B

POST TOP MOUNTED  SIDE BRACKET MOUNTED

TERMINAL COMPARTMENTS

NEVADA DEPARTMENT OF TRANSPORTATION

TYPE 1A AND 1B POLES,
OPTICAL MOUNT AND
TERMINAL COMPARTMENTS

Signed Originated: 1-30.1.2 (623)

CHEF SAFETY/TRAFFIC ENGR

METRIC

NOT TO SCALE
TRENCHING DETAIL

1. REMOVE AND REPLACE EXISTING SURFACE. NEW SURFACE MATERIAL SHALL BE FROM AN APPROVED COMMERCIAL SOURCE.
2. SEAL AND SAND NEW SURFACE. (AS DIRECTED BY THE ENGINEER)
3. TWO SACK SLURRY MIX CEMENT.
4. RECOMPACT EXISTING BASE.
5. ALL NEW SURFACE AND CONCRETE MATERIAL SHALL BE APPROVED BY ENGINEER.
6. NEW MATERIAL AND TRENCHING SHALL NOT BE PAID FOR DIRECTLY BUT INCLUDED IN THE PRICE FOR THE CONDUIT.
7. SAND BEDDING.
8. 2 CONDUIT DIAMETERS MINIMUM.
9. SAW CUT AS DIRECTED BY ENGINEER.
Pedestrian push buttons shall be installed on the crosswalk side of the signal pole, with the proper directional arrow positioned correctly.

**TYPE 1** - Position pedestrian push buttons on signal pole when the width of the pole allows (2) pedestrian heads to be of the same mounting height.

**TYPE 2** - Position pedestrian push buttons on signal pole when the width of the pole does not allow (2) pedestrian heads to be mounted at the same height.

**NOTE:**
1. ARROW TO BE LEFT OR RIGHT OR BOTH AS REQUIRED.
2. PORCELAIN ENAMELED, 230 mm x 305 mm SIGN, BLACK SYMBOLS ON WHITE BACKGROUND.
3. NPS = NOMINAL PIPE SIZE DESIGNATOR, SEE ASTM A53.
GENERAL NOTES:
1. ALL FASTENERS AND ASSOCIATED HARDWARE SHALL BE STAINLESS STEEL.
2. TWO (2) NO. 12 AWG CONDUCTORS SHALL BE INSTALLED BETWEEN THE INTERNALLY ILLUMINATED STREET NAME SIGN AND THE POLE LUMINARIES. THE PHOTO ELECTRIC (PED) CONTROL FOR THE LUMINARIES OR ELECTRICAL SERVICES WILL OPERATE THE INTERNALLY ILLUMINATED SIGN.
3. THE BALLAST WILL BE HIGH OUTPUT "VALMONT 603934W" OR EQUIVALENT, BALLASTS SHALL BE ENCLOSED AND POTENTIALLY.
4. FLUORESCENT LIGHTING WILL BE PROVIDED BY 2-POWERA STANDARD LAMPS. FLUORESCENT SOCKETS WILL BE D-E TYPE SOCKET WITH A RUBBER GASKET ON THE LAMP MOUNTING SURFACE TO PREVENT POSSIBLE WATER DAMAGE.
5. WIRE CONNECTIONS WILL BE MADE WITH INSULATED COMPRESSION WIRE NUTS.
6. STREET NAME SIGN WIRING TO RUN THROUGH TWO (2) WATER TIGHT 90° FITTINGS WITH FLEXIBLE CONDUIT. USE A DRAIN LOOP SUFFICIENT ENOUGH TO ALLOW SIGN MOVEMENT. USE WATER TIGHT RUBBER GROMMET OR BUSHING AT POLE ENTRY.
7. CLAMP-ON DETAILS SHALL BE USED FOR INTERNALLY ILLUMINATED STREET NAME SIGN SUPPORT ARM ASSEMBLY.
8. PIN BOLTS SHALL BE A325 WITH THREADS EXCLUDED FROM THE SHEAR PLANE. PIN BOLT AND 180 mm DIA PIPES SHALL HAVE 5 mm DIA HOLES FOR A 3 mm DIA GALVANIZED COTTER PIN. THREE (3) PIPES SHALL BE FURNISHED WITH A 10 mm DIA HOLE FOR EACH PIN BOLT. AN 18 mm DIA HOLE FOR EACH PIN BOLT SHALL BE FIELD DRILLED THROUGH THE POLE. AFTER ARM ORIENTATION HAS BEEN APPROVED BY THE ENGINEER.
FLASHER WARNING SIGN DETAIL

Locate NWF-1 sign vertically on mast arm no lower than 5.6 m from the roadway surface. Distance is measured from the bottom edge of the sign to the actual travel lane surface. Locate the sign horizontally on mast arm 7.6 m from pole. Distance is measured from the middle of the sign to the perimeter of the Type 35 Modified Pole.

LEGEND

Shop drawings shall be submitted on all Type 30 and Type 35 Modified Poles.
PLAN

19 mm (Min.) Flexible Tubing

32 mm Sawcut

6 mm Sawcut

Loop Wire

ELEVATION

Loop Sealant

Concrete or Plantmix

Concrete

Pavement Joint or Crack

Conduit-Diameter Varies

SECTION A-A

Conduit Against Side

100

NO. 5 PULL BOX

CONDUIT LOCATION (SEE GENERAL NOTES 1 AND 2)

GENERAL NOTES:

1. ALL PULL BOXES SHALL BE NO. 5
   SEE SHEET T-30.1.1B FOR DETAILS NOT SHOWN

2. PAYMENT SHALL BE MADE UNDER THE FOLLOWING ITEMS:
   CONDUIT - DIAMETER VARIES
   NO. 5 PULL BOX
   1.8 m x 1.8 m DETECTOR LOOPS
SERVICE PEDESTAL ENCLOSURE: 12 GA. SHEET METAL BODY AND EQUIPMENT MOUNTING PANEL. 14 GA. FRONT COVER(S) AND BACK COVER(S). FOR ALL EQUIPMENT ENCLOSURES, SHEET METAL SHALL BE FINISHED WITH ZINC CHROME PLATE AND GREEN BAKED ENAMEL FINISH. WELDING SECTION FOR F.U.E.S.E.R. STANDARDS.

UTILITY METER SECTION, 100, 125 OR 200 AMP AS INDICATED; ON PLANS 1000 VOLT, 1 PHASE, 3 WIRE. THE SECTION SHALL HAVE A HINGED COVER WITH PADLOCK TAB.

CIRCUIT BREAKER DISTRIBUTION SECTION, 125 OR 200 AMP AS NEEDED, 120/240 VOLT, 1 PHASE, 3 WIRE. THE SECTION SHALL BE COMPLETE WITH SEPARATE DEAD FRONT COPPER BUSING.

EQUIPMENT MOUNTING PANEL, 250 MM H x 300 MM W MIN., OPEN OR ENCLOSURE, FOR LIGHTING CONTACTORS AS NEEDED.

DISTRIBUTION AND EQUIPMENT SECTION DOOR WITH HINGE AND PADLOCK TAB.

BASE AND ENCLOSURE WIDTH (400 MM TYP.)

BASE DEPTH (400 MM TYP.)

ENCLOSURE DEPTH (425 MM TYP.)

TYPICAL MOUNTING BASE DETAIL (DIMENSIONS MAY VARY DEPENDING ON MANUFACTURER)

SERVICE PEDESTAL

GENERAL NOTES:
1. BARE COPPER GROUNDING CONDUCTOR SHALL BE LOOPED AROUND ANCHOR BOLTS ONE TIME AND CONNECTED TO EACH ANCHOR BOLT BEFORE CONTINUING DOWN TO THE GROUNDING PLATE.
2. CABINET COVERS SHALL BE PARALLEL WITH CURB.
3. IN AREAS WHERE R/W PERMITS, THE CONCRETE BASE SHALL BE PLACED AT THE BACK EDGE OF THE SIDEWALK.
4. CABINET COVERS SHALL OPEN TOWARDS THE STREET WHEN CABINETS ARE LOCATED AT BACK OF WALK.
5. CABINET COVERS SHALL OPEN PARALLEL TO THE SIDEWALK FACING THE DIRECTION OF TRAFFIC WHEN LOCATED WITHIN THE SIDEWALK.

GROUND PLATE SHALL BE MADE OF NONFERROUS MATERIALS (TYPICALLY BRASS OR COPPER).

SERVICE PEDESTAL ENCLOSURE

BACK OF CURB

1.2 M MIN.

PEDESTAL

GROUNDING CONDUCTOR

CONCRETE CAP

SHEET ROCK FILL (2 LAYERS)

50 MM PVC SERVICE ENTRANCE CONDUIT

50 MM TAPER

ANCHOR BOLT, TYP.: 6.5 MM X 450 MM X 50 MM

ANCHOR BOLT, TYP.: 8.0 MM X 450 MM X 50 MM

HIT RESISTANT NUTS AND 2 FLAT WASHERS PER BOLT

PULL SPACE ACCESS DOOR WITH HANDLE, PER SERVING UTILITY REQUIREMENTS.

DISTRIBUTION AND EQUIPMENT SECTION WITH HINGE AND PADLOCK TAB.

SEPARATE PEDESTAL ENCLOSURE MOUNTING BASE (OPTIONAL)

BEHIND SIDEWALK (FOR WIDTHS 1.52 M OR LESS)

OPEN AREA

SERVICE PEDESTAL SETBACK WITHIN R/W LIMITS

LEGEND:
- WHERE INSUFFICIENT PUBLIC RIGHT-OF-WAY IS AVAILABLE TO LOCATE SIDEWALK OUTSIDE THE 1.52 M NORMAL SIDEWALK WIDTH, THE PEDESTRIAN ACCESS MAY BE REDUCED TO 1.2 M FOR A LENGTH OF 0.6 M.
GENERAL NOTES:
1. BARRIER POSTS ARE TO BE USED ONLY WHERE PAD MOUNTED TRANSFORMERS ARE INSTALLED IN AREAS SUBJECT TO DAMAGE BY VEHICULAR TRAFFIC. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH THE SERVING UTILITY COMPANY TO DETERMINE THE EXACT NUMBER OF POSTS REQUIRED.

2. FOOTINGS TO BE DRILLED HOLES, AS SHOWN, AND FILLED WITH CLASS A OR AA CONCRETE.

3. POST CONSTRUCTED OF 150 MM STANDARD PIPE (WELL CASING) PRIMED AND PAINTED YELLOW, AND CONCRETE FILLED.
GENERAL NOTES:
1. ISLANDS SHALL BE PLACED ONLY ON SLOPES GREATER THAN 1:10.
2. WHEN USING SAFETY BARS THE TOP OF THE FOUNDATION SHALL BE PLACED FLUSH WITH THE TOP OF THE FOUNDATION ISLAND.
3. CONCRETE SHALL BE CLASS A OR AA.
4. WHERE DETECTOR LOOPS ARE CUT INTO PAVEMENT, 1.8 m ROUND LOOPS MAY BE USED IN LIEU OF 1.8 m x 1.8 m SQUARE LOOP DETECTORS.

FOUNDATION ISLAND PLAN

NEVADA DEPARTMENT OF TRANSPORTATION

SIGNAL POLE AND LOOP DETECTOR LOCATIONS

FOUNDATIONS ISLAND

METRIC NDOT

SIGNED ORIGINAL ON FILE T-30-1,8 (6/33)

CHEF SAFETY/TRAFFIC ENG
### CIDH Pile Details

<table>
<thead>
<tr>
<th>Height (m)</th>
<th>Min Pole</th>
<th>Min Pole</th>
<th>Min Pole</th>
<th>Base Plate</th>
<th>Anchor Bolts</th>
<th>CIDH File Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.3</td>
<td>427</td>
<td>64</td>
<td>775</td>
<td>Total</td>
<td>6</td>
<td>8</td>
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<tr>
<td>30.5</td>
<td>475</td>
<td>7.9</td>
<td>775</td>
<td>6</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>38.8</td>
<td>233</td>
<td>7.9</td>
<td>903</td>
<td>8</td>
<td>8</td>
<td>120</td>
</tr>
</tbody>
</table>

- Increase "h" by 0.8 meter for all heights, "w" and all foundation materials for construction on or within 0.8 meter of sloping ground (shall be to 0.1151.
- Site foundation materials shall be assumed as shaly clay, gravel or gravelized sand.

### Pole Segment Splice Detail

**Typical Elevation**

**Section A-A**

**BASE PLATE DETAILS**

See Note 9

**NOTES:**

1. Design specifications and all standard specifications for structural supports for highway signs, lightmasts, and traffic signals.

2. Pole details shall suit the lowering device and this foundation plan. Pole details shall suit the lowered elements and all foundations. According to the height, the entire lifting and assembly of the pole shall vary from 1.5 to 2.0 meters.

3. All materials shall be galvanized after fabrication.

4. For number of luminaires to be mounted on the pole, see electrical plans.

5. Transom depth, base plate, and anchor bolt detail shall be based on a minimum of a maximum of 65 meters and a maximum effective projected area (EPA) of 1.05 times the diameter of the pole. Incremental minimum pole diameter (in.) shall be accommodated in the design, but minimum pole diameter (in.) shall not vary less than 0.5 times the design.

6. Design wind pressures are based on a 3-second gust speed of 145 km/h and 4.5 m/s for design catalog.

7. Fatty design based on natural wind gust loads and fatigue importance category.

8. Splice fit length shall not be less than 1.5 in.

9. Base plate shape optional, either round or hexagonal as shown.

10. Anchor bolts shall be made from steel bar conforming to AMS M 614 Grade 70, including all supplements requirements.

11. The following soil parameters were used to determine pile length: L1.

### Weld Detail

- Base PL
- Bolt Dia -6
- BC -127 mm
- See Table

### Annular Ring Detail

- Annular ring
- See Weld Detail

### Pole Details

- Pole
- Bolt head or heavy hex nut on threaded rod
- See Weld Detail

### Anchor Bolt Detail

- Bolt head or heavy hex nut on threaded rod
- See Annular Ring Detail

### Handhole Detail

- Bolt head or heavy hex nut on threaded rod
- See Weld Detail

### Median Location

**Conduit, Electrical Plans**

**Pedestal**

**Concrete barrier**

**Foundation Depth**

**Weld Splice**

**Circular Tubular Steel Tube**

### Soil Data

<table>
<thead>
<tr>
<th>Site Foundation Material</th>
<th>Minimum Unit Weight (kN/m^3)</th>
<th>Min. Density (kN/m^3)</th>
<th>Dry Unit (kN/m^3)</th>
<th>Cohesion (kN/m)</th>
<th>Subgrade Modulus (kN/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay</td>
<td>2.000</td>
<td>44</td>
<td>9.500</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Clay</td>
<td>2.000</td>
<td>44</td>
<td>9.500</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

### Handhole Data

<table>
<thead>
<tr>
<th>Site Foundation Material</th>
<th>Minimum Unit Weight (kN/m^3)</th>
<th>Unconfined Compressive Strength (kPa)</th>
<th>Initial Rock Modulus 5% (kPa)</th>
<th>Rock Constant</th>
<th>Rock Quality Design (CD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>2.080</td>
<td>1.200</td>
<td>3.450</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### Notes

- Pole length shall be max. 25 mm x 10 mm with a lockable handle and shall suit the lowering device.

- All dimensions are in millimeters unless otherwise noted.
GENERAL NOTES:

1. SHOP DRAWINGS AND STRUCTURAL CALCULATIONS SHALL BE SUBMITTED AND APPROVED BEFORE POLES MAY BE UTILIZED ON PROJECT.

2. IF INDICATED IN THE PLANS, ALL POLES SHALL BE PRIME PAINTED BY MANUFACTURER AND FINISH PAINTED BY CONTRACTOR, SEE STANDARD SPECIFICATION SECTION 114.03.01.

3. THE DISTANCE FROM THE ROADWAY SURFACE TO THE BOTTOM OF THE MAST ARM SIGNAL HEADS SHALL BE 5.1 m.

4. SEE STANDARD PLAN DRAWING T-30.1.15 FOR POLE BASE, HANDHOLE, SIGNAL ARM, AND LUMINARIE ATTACHMENT DETAILS.

POLE TYPE 30 (MAST ARMS ≤ 13.72 m)
POLE TYPE 35 (MAST ARMS ≤ 13.72 m)
POLE TYPE 35-A (MAST ARMS > 13.72 m)

POLE TYPE 30-A (MAST ARMS > 13.72 m)
**DEVICE**
- SIGNAL 300-3 Sec. w/Backplates (2W)
- SIGN 36 x 36" Rectangle
- SIGN 93-4 600x600
- SIGNAL 150-5 Sec. w/backplates
- SIGN R-80 Std. 5" 900x123
- SIGN Street Name-Free Swinging Soc/30
- SIGNAL Dual-300-3 Sec. w/Backplates
- SIGNAL Dual-Pedestrian

**PROJECT AREA (m²)**
- 0.91
- 0.36
- 1.27
- 1.01
- 1.05
- 1.05
- 1.05
- 1.05
- 0.74

**HEIGHT (m)**
- 1.68
- 1.68
- 1.68
- 0.91
- 2.44
- 3.66
- 3.66
- 3.66

**LUMINAIRE ARM DATA**

**DESIGN CRITERIA**
- ASSESS STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNS (4TH EDITION 1996) AND CURRENT INTERIM TRL (EXCLUDING SECTION 111 FATIGUE DESIGN).
- BASIC WIND SPEED = 145 km/h.

---

**LOADING INFORMATION**

**NEVADA DEPARTMENT OF TRANSPORTATION**

**SIGNED ORIGINOV ON FILE**
- T-30.14 (E23)

---

**NOTE:** TYPE 30-A & 35-A DECKS SHALL ALSO SUPPORT THE ALTERNATE LOADING SHOWN ABOVE.
LUMINAIRE ARM ATTACHMENT

POSE BASE PLATE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SQUARE</th>
<th>BOLT CIRCLE</th>
<th>WALL THK (mm)</th>
<th>HOLE (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 &amp; 35A</td>
<td>493</td>
<td>483</td>
<td>45</td>
<td>57</td>
</tr>
<tr>
<td>35 &amp; 35A</td>
<td>493</td>
<td>483</td>
<td>45</td>
<td>57</td>
</tr>
</tbody>
</table>

SIGNAL ARM SIMPLEX KEY

HANDHOLE 112 mm STAINLESS STEEL SCREW

SECTION A-A

POLE BASE COVER 3.13 mm H.R.M.S.

13 mm NUT HOLDER WITH FASTENERS FOR ORDERING LOCATED AT 180° TO HANDHOLE

15 mm NUT HOLDER WITH FASTENERS FOR ORDERING LOCATED AT 180° TO HANDHOLE

SYMBOL

NEVADA DEPARTMENT OF TRANSPORTATION

TYPE 30 & 30A
35 & 35A
DETAILS

Signed Original On File 1-30-15 (623)

CHEF SAFETY/TRAFFIC ENG.
**Pole Grounding Detail**

1. Connect banding wire to the reinforcing steel rods near the midpoints of the foundation or anchor bolts.
2. Ground plates shall be made of nonferrous material (typically bronze or copper). Install "NSI" ground plate or equivalent.

**General Notes:**

1. All dimensions are nominal.
2. Rubber tapes shall be rolled after application.
3. When PVC tape is used as a final layer, paint finished splice with electrical insulating coating.

**Conductor Splicing Methods**

**Type A Splice Method (Two Free Ends)**
1. Completely cover the splice area with an electrical insulating coating and allow to dry.
2. Apply electrical filler compound with minimum thickness of 4 mm.
3. Apply 3 layers of half lapped PVC tape.

**Type B Splice Method (Three Free Ends or One Free End and One Through Conductor)**
1. Completely cover the splice area with an electrical insulating coating and allow to dry.
2. Apply 2 layers of electrical insulating pad with minimum thickness of 4 mm, each layer or 2 layers, half lapped, synthetic oleoresin, or felt lapping rubber tape.
3. Apply 3 layers of half lapped PVC tape.

---

**Pile Foundation Table**

<table>
<thead>
<tr>
<th>Pole Type</th>
<th>Mast Arm Length</th>
<th><strong>&quot;O&quot;</strong></th>
<th><strong>&quot;W&quot;</strong></th>
<th>Anchor Bolts (4 Each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A &amp; 1B</td>
<td>N/A</td>
<td>0.92 m</td>
<td>0.92 m</td>
<td>6/0 x 6/0 x 100</td>
</tr>
<tr>
<td>7</td>
<td>ALL</td>
<td>1.52 m</td>
<td>1.52 m</td>
<td>7/0 x 7/0 x 100</td>
</tr>
<tr>
<td>14</td>
<td>ALL</td>
<td>2.66 m</td>
<td>2.66 m</td>
<td>7/0 x 7/0 x 100</td>
</tr>
<tr>
<td>28</td>
<td>ALL</td>
<td>5.66 m</td>
<td>5.66 m</td>
<td>9/0 x 9/0 x 150</td>
</tr>
<tr>
<td>30 &amp; 35</td>
<td>≥ 13.7 m</td>
<td>5.66 m</td>
<td>5.66 m</td>
<td>9/0 x 9/0 x 150</td>
</tr>
<tr>
<td>30A &amp; 35A</td>
<td>&gt; 13.7 m</td>
<td>5.66 m</td>
<td>5.66 m</td>
<td>9/0 x 9/0 x 150</td>
</tr>
</tbody>
</table>

**Note:** Concrete shall be Class A or AA.

---

**Conductor Splicing Methods**

NEVADA DEPARTMENT OF TRANSPORTATION

PILE FOUNDATION, POLE GROUNDING DETAIL, CONDUCTOR SPLICE METHODS

Signed Original On File T.30.1.6 (6/23)
LIGHTING FIXTURE MOUNTING DETAIL (TYPICAL)

**FIXTURE SPACING TABLE**

<table>
<thead>
<tr>
<th>Number</th>
<th>Fixture Spacing (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1500</td>
</tr>
<tr>
<td>2</td>
<td>1500</td>
</tr>
<tr>
<td>3</td>
<td>1500</td>
</tr>
<tr>
<td>4</td>
<td>1500</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

- Lighting Fixture Mounting Plate
- Dimensional and material specifications provided

**DETAILS**

- Conduit: 19 mm, Type "TT" (Galvanized Steel Code)
- Conduit Fitting: 19 mm, Type "TT" (Galvanized Steel Code)
- Gasket Cover Plate: May be used, in which case the 19 to 13 mm Reducer is not required.

**NOTES**

- All Bolts, Nuts, Washers and other Hardware Shall Be SAE Grade 5, and Locknut/Plug.

**SIGN LIGHTING FIXTURES**

- Designed by: MCDONALD ENGINEERING
- Certified by: NEVADA DEPARTMENT OF TRANSPORTATION

**SIGNED ORIGINEER**

- Dated: 7-30-90

**ENGINEER**

- Approval Date: 7-30-90

**SHEET NUMBER**

- 1 of 5

**SHEET SCALE**

- 3/4" = 1'-0"
SECTION B-B
Special Pull Box No. 3/8(T), No. 5(T), No. 7(T) & No. 9(T) Traffic Rated Pull Box

SPECIAL PULL BOX MINIMUM DIMENSION TABLE

| Pull Box | Minimum Depth Box | L | Width | Minimum Depth Box | L | Width | Minimum Depth Box | L | Width | Minimum Depth Box | L | Width | Minimum Depth Box | L | Width | Minimum Depth Box | L | Width |
|----------|-------------------|---|-------|-------------------|---|-------|-------------------|---|-------|-------------------|---|-------|-------------------|---|-------|-------------------|---|-------|-------------------|---|-------|
| No. 3/8  | 0 No Extension    | 760| 560  | 8 mm No Extension | 180| 250  | 15 mm No Extension | 180| 250  | 20 mm No Extension | 180| 250  | 25 mm No Extension | 180| 250  |
| No. 5    | 600 mm            | 910| 580  | 10 mm            | 380| 380  | 20 mm            | 380| 380  | 30 mm            | 380| 380  | 35 mm            | 380| 380  |
| No. 6    | 500 mm            | 910| 580  | 10 mm            | 380| 380  | 20 mm            | 380| 380  | 30 mm            | 380| 380  | 35 mm            | 380| 380  |

ELECTRICAL TRAFFIC RATED PULL BOX MINIMUM DIMENSION TABLE

<table>
<thead>
<tr>
<th>Pull Box</th>
<th>CONCRETE BOX</th>
<th>STEEL COVER</th>
<th>EXTENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 3/4</td>
<td>180</td>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td>No. 4/5</td>
<td>380</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>No. 6/7</td>
<td>380</td>
<td>300</td>
<td>250</td>
</tr>
</tbody>
</table>

GENERAL NOTES FOR ELECTRICAL MANHOLE:
1. A compacted base and a concrete footing support shall be constructed prior to placement of the cast iron frame as directed by the engineer.
2. Adjustments to elevations shall be made with collar risers as required. Minimum depth 450 mm.
3. Refer to Standard Plan R-4.7.3 for concrete collar details.

GENERAL NOTES FOR ELECTRICAL MANHOLE:
1. A compaction base and a concrete footing support shall be constructed prior to placement of the cast-iron frame as directed by the engineer.
2. Adjustments to elevations shall be made with collar risers as required. Minimum depth 450 mm.
3. Refer to Standard Plan R-4.7.3 for concrete collar details.

GENERAL NOTES FOR ELECTRICAL PULL BOXES:
1. TRAFFIC PULL BOX SHALL BE PROVIDED WITH STEEL COVER AND SPECIAL CONCRETE FOUNDATION. STEEL COVER SHALL HAVE EMBOSSED NON-SLIP PATTERN.
2. STEEL REINFORCING SHOULDS BE AS REGULARLY USED IN THE STANDARD PRODUCTS OF THE RESPECTIVE MANUFACTURER.
3. TOP OF PULL BOXES SHALL BE FLUSH WITH SURROUNDING GRADE OR TOP OF CURB OR WRAP AROUND CURB OR Edge WHERE Pull Box Is AT CURB OR ON CURVATURE.
4. PLUMBING BOXES SHOWN ADJACENT TO PULL BOXES SHOWN ADJACENT TO CURB SHALL BE PLACED ALONG CURB OR CURVATURE.
5. TOP OF PULL BOX SHALL BE ADJUSTED SO THAT THE TOP OF THE PULL BOX IS FLUSH WITH THE TOP OF CURB.
6. BONDED JUMPER FOR METAL COVERS SHALL BE 1 MM LENGTH.
7. ALL COVERS AND BOXES SHALL BE INTERCHANGEABLE WITH THE SAME NOMINAL SIZE AND IDENTIFICATION.
8. PULL BOXES FOR ELECTRICAL AND SIGNAL EQUIPMENT SHALL BE LOCATED AT THE SAME SITE AS THE ADJACENT ELECTRICAL OR SIGNAL EQUIPMENT. PULL BOXES SHALL BE PLACED ALONG CURB OR EDGE OF WALKER EXCEPT WHERE THIS IS IMPRACTICAL. A BOX MAY BE PLACED IN ANOTHER SUITABLE PROTECTED AND ACCESSIBLE LOCATION.
9. IN AREAS WHERE THE POSSIBILITIES OF MATERIAL EROSION FROM AROUND THE PULL BOX EXIST, THE PULL BOX SHALL BE PLACED IN A MINIMUM DEPTH OF 500 MM DEPTH ON EACH SIDE AND 350 MM DEPTH AT TOP OF BOX.
10. USE SPECIAL PULL BOXES ONLY WHEN INDICATED ON PLANS.
TYPE "A" UNDERPASS LUMINAIRE

PENDANT INSTALLATION
(TYPE "C" UNDERPASS LUMINAIRE)

TYPE "B" UNDERPASS LUMINAIRE

JUNCTION BOX DETAIL

1. JUNCTION BOX AND COVER SHALL BE 1 3/8 in. T STEEL.
2. A 3.16in. angle, with flanges, shall be welded to the junction box for support.
3. JUNCTION BOX COVER SHALL BE FASTENED WITH 1/4" X 7/8" STRAIGHT WASHERS AND 7/16" HEX. SCREW.
4. COVER SHALL BE ON BOX DURING POURING.
5. AN APPROVED APPROVED W/P 8/32" MESH MAY BE USED.
6. JUNCTION BOX COVER SHALL BE FASTENED WITH 1/4" X 7/8" STRAIGHT WASHERS AND 7/16" HEX. SCREW.
7. COOK OFF FOR UP TO 30 MIN. BOTTOM SHALL BE BUILT UP 50 MM ABOVE COVER TO CLEAR STRUCTURAL STEEL.

DETAIL "B"

NEVADA DEPARTMENT OF TRANSPORTATION
UNDERPASS LUMINARES & JUNCTION BOX

SIGNED ORIGINATING ENGINEER T.-30.1.99 (623)

CHIEF SAFETY/TRAFFIC ENGINEER T.-30.1.99 (623)
GENERAL NOTES:
1. SEAM WELD CONSTRUCTION W/ 5 DIA FILLET WELD OUTSIDE EDGES.
   TACK WELD CONSTRUCTION FOR INNER FRAME AND ANGLE 6 mm x 18 mm x 127 mm CENTERS.
2. GASKET MATERIAL 3 mm x 50 mm NEOPRENE EPDM AND SBR SPONGE WITH PSA.
3. WHERE CAP SCREWS ARE USED TO ATTACH COVER TO BOX EITHER OF THE FOLLOWING METHODS OF PROVIDING ADEQUATE THREADING MAY BE USED:
   A. TACK WELD SQUARE NUT TO BOTTOM OF FLANGE (TOTAL 4), OR
   B. TACK WELD A 6 mm x 15 mm x 200 mm BAR BENEATH FLANGE (TOTAL 2).
4. DO NOT CUT OR WELD TO BRIDGE RAIL REINFORCING STEEL.

NEMA 3 BRIDGE JUNCTION BOX

13 mm Notch (Typ)

16 mm Typ

13 mm x 150 mm Hex Bolt (Typ)

TYPE 1

10 mm x 25 mm FH Brass Machine Screws (18 Pcs)

10 mm Thickness Galvanized Screw Cover Secured W/ 6 - 10 mm x 25 mm Flat Head Brass Machine Screws

Material: 3.5 mm Thickness Steel, Hot Dip Galv. After Fabrication

VIEW A-A

TYPE 2

Cover Details

2.6 mm Steel cover (markings per specifications) (Total 4).

2 mm Neoprene gasket

Square head nut, tackweld to pull box. See Note 3.

Pull Box

Drain to low side

INSTALLATION IN SLOPING PARAPETS

SECTION C-C

NEVADA DEPARTMENT OF TRANSPORTATION

ALL DISTANCES ARE IN METERS
UNLESS OTHERWISE NOTED

COVER DETAILS

PULL BOX DETAIL
GENERAL NOTES:
1. HCS SHOULD NOT BE LESS THAN 1.8 m FROM THE SHOULDER LINE. IF NO SHOULDER, HE SHOULD NOT BE LESS THAN 3.6 m FROM THE EDGE OF TRAVEL. MAY, IN URBAN AREAS, A LESSER CLEARANCE MAY BE USED WHERE NEEDED.
2. FOR SIGN PANEL BRACING DETAILS, SEE T-31.1.4.
3. ALL SIGN SUPPORTS SHALL BE OF BREAKAWAY DESIGN.
4. FOR DOUBLE POST BRACES SUPPORTS, MAINTAIN HCS CLEAR ZONE WIDTH. MAXIMUM OF 3 m, EXCEPT WHEN PROTECTED BY GUARDRAIL OR BARRIER RAIL. FOR CLEAR ZONE WIDTH, REFER TO AASHTO ROADWAY DESIGN GUIDE CURRENT EDITION.
5. SIGN ISLAND REQUIRED WHEN HC IS 6.1 m OR SIGN SLOPE IS STEEPER THAN 1:4, OR WHEN REQUIRED IN CONTRACT PLANS.
6. SEE SHEET T-31.1.9 FOR SIGN ISLAND CONSTRUCTION.
7. FOR SIGN POSTS, SEE POST SELECTION CHARTS ON SHEET T-31.1.2.
8. FOR MATERIALS NOT DIRECTLY SPECIFIED, SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS.
9. SIGN PANELS TO BE ALUMINUM SHEET CONSTRUCTION.
10. CC-CORNER CLEARANCE
    VC-HORIZONTAL CLEARANCE
    VC-VERTICAL CLEARANCE
11. PREPAINT THE EXPOSED PORTION OF FASTENING HARDWARE ON THE FACE OF THE SIGN PANELS WITH BAKED ENAMEL TO MATCH THE SIGN FACE.

NOTES:
1. MIN CC=0.3 m.
2. MAX VC FOR SINGLE SIGN=3.0 m.
3. MAX VC FOR DOUBLE SIGN=3.3 m.
4. MAX HCS=3.6 m.
5. SPECIAL DESIGN MAY BE NEEDED IF GIVEN LIMITS ARE EXCEEDED.
### POST SELECTION CHART

<table>
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<tr>
<th>SIGN AREA (m²)</th>
<th>(0&lt;²&lt;2.4)</th>
<th>2.4&lt;²&lt;3.0</th>
<th>3.0&lt;²&lt;3.6</th>
<th>3.6&lt;²&lt;4.2</th>
<th>4.2&lt;²&lt;4.5</th>
<th>4.5&lt;²&lt;5.0</th>
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<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
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<td>B</td>
<td>B</td>
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<td>A</td>
<td>B</td>
<td>C</td>
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<td>C</td>
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<td>C</td>
<td>C</td>
<td>C</td>
<td>D</td>
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<td>C</td>
<td>D</td>
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<td>F</td>
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<td>C</td>
<td>D</td>
<td>E</td>
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<td>F</td>
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<td>E</td>
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<td>F</td>
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### POST SELECTION CHART

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<tr>
<th>POST TYPE</th>
<th>DESCRIPTION</th>
<th>REFERENCE SHEET</th>
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<tbody>
<tr>
<td>A</td>
<td>64mm Square Metal Post (2.8 mm)-single post</td>
<td>T-31.2.1</td>
</tr>
<tr>
<td>B</td>
<td>64mm Square Metal Post (3.5 mm)-single post</td>
<td>T-31.2.1</td>
</tr>
<tr>
<td>C</td>
<td>Single Post Unbraced NPS3 Round MetalPost</td>
<td>T-31.3.1 thru T-31.3.2</td>
</tr>
<tr>
<td>D</td>
<td>Double Post Unbraced NPS3 Round MetalPost</td>
<td>T-31.3.1 thru T-31.3.2</td>
</tr>
<tr>
<td></td>
<td>Double Post Braced (See Note 4)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Post-NPS3 Round MetalPost</td>
<td>T-31.4.1 thru T-31.4.3</td>
</tr>
<tr>
<td>F</td>
<td>Special Design—contact Traffic Engineering</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

1. MAJOR & SECONDARY SIGNS.  
2. ALTERNATE POSTS MUST BE APPROVED BY TRAFFIC ENGINEERING.  
3. NPS = NOMINAL PIPE SIZE DESIGNATOR, SEE ASTM A53.  
4. FOR DOUBLE POST BRACED SUPPORTS, MAINTAIN H/C > CLEAR ZONE WIDTH MAXIMUM OF 8 m, EXCEPT WHEN PROTECTED BY GUARDRAIL OR BARRIER RAIL FOR CLEAR ZONE WIDTHS, REFER TO ASHTO ROADSIDE DESIGN GUIDE CURRENT EDITION.

---

**NEVADA DEPARTMENT OF TRANSPORTATION**  
**ROADSIDE SIGNS**  
**GENERAL POST SELECTION CHARTS**  
**SIGNED ORIGINAL ON FILE**  
**T-31.2.1 (6/27)**  
**SHEET SAFETY/TRAFFIC ENG**  
**METRIC**  
**INNOT**
10 mm x 25 mm carriage head bolt & nut with fiber insert, 2 flat washers, (Typ)

13 mm x 100 mm carriage bolt & nut with fiber insert, 2 flat washers through sign & post, (Typ)

GENERAL NOTES:
1. BRACE(S) REQUIRED IF W > 450 mm, INSTALL AS SHOWN.
2. BRACE: 9.5 mm x 32 mm ALUMINUM ALLOY.
3. COST FOR BRACING IS INCLUDED IN SIGN.
2 STRINGER MOUNTING

3 STRINGER MOUNTING

4 STRINGER MOUNTING

NOTE: To obtain desired panel width, each of 2 panels may be cut less than 1200 mm, (450 mm Min. each).

SUB PANEL ASSEMBLY & Z BAR BRACING

VERTICAL JOINT CLOSURE STRIP

GENERAL NOTES:
1. STRINGERS: 75 mm x 68 mm x 6.4 mm OR 68 mm x 68 mm x 6.4 mm ALUMINUM ALLOY Z-BAR.
2. STRINGERS REQUIRED ON ALL SIGNS REQUIRING MULTIPLE POSTS.
3. TUBULAR STIFFENERS REQUIRED WHEN W>3.0m.
4. COST FOR BRACING IS INCLUDED IN SIGN.
5. ONE VERTICAL JOINT IF W EXCEEDS 3.6 m. TWO VERTICAL JOINTS IF W EXCEEDS 7.2 m.
6. FOR ALTERNATE STEEL TUBE BRACING, SEE STANDARD PLAN DRAWING T-31.15.
(STEEL TUBE BRACING ON ROUND METAL POSTS)

DETAIL "A"

10 mm Dia. x 90 mm carriage bolts with fiber insert hex nuts and flat washers.

(See Table - 1)

Steel tubing

See Detail "A"

50 mm

Steel tubing

Round metal post

Sign panel

6 mm Dia. x 64 mm carriage bolts @ 150 mm. o.c. with fiber insert hex nuts and flat washers.

(See Table - 2)

Steel tubing

DETAIL "B"

10 mm Dia. carriage bolts with fiber inserts & flat washers (See Table 3)

50 mm

Steel tubing

Timber post

Sign panel

(See Table - 2)

STEEL TUBE BRACING ON WOOD POSTS

GENERAL NOTES:
1. FOR SUB-PANEL ASSEMBLY & VERTICAL JOINT CLOSURE

<table>
<thead>
<tr>
<th>PIPE Dia. (mm)</th>
<th>O.D.</th>
<th>A</th>
<th>B</th>
<th>CLAMP STOCK</th>
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<tr>
<td>NPS 3</td>
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<td>132</td>
<td>173</td>
<td>6 X 38</td>
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<table>
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<td>(Clamp Sizes)</td>
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<table>
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<th>TABLE - 2</th>
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<tbody>
<tr>
<td>(Tubing Size)</td>
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</table>

<table>
<thead>
<tr>
<th>TABLE - 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Post Size)</td>
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</table>

<table>
<thead>
<tr>
<th>POST SIZE (mm)</th>
<th>BOLT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 x 100</td>
<td>60 x 160</td>
</tr>
<tr>
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<tr>
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<td>100 x 150</td>
<td>60 x 210</td>
</tr>
<tr>
<td>100 x 200</td>
<td>60 x 210</td>
</tr>
</tbody>
</table>
GENERAL NOTES:
1. SIGN ISLANDS TO BE COMPACTED TO 95%.
2. PAYMENT FOR SIGN ISLAND WILL BE AS NOTED IN CONTRACT PLANS AND SPECIAL PROVISIONS.
4. USE 1/2 MAX FOR NARROW RIGHT-OF-WAYS OR 1/6 PREFERRED FOR ALL OTHERS.
GENERAL NOTES:
1. FOOTINGS TO BE DRILLED HOLES AS SHOWN & FILLED WITH CLASS A OR CLASS AA CONCRETE.
2. ANCHOR POST INCLUDED IN COST OF SIGN POST.
GENERAL NOTES:
1. ANCHOR POST INCLUDED IN COST OF SIGN POST.
3. INNER POSTS ARE THOSE CLOSEST TO ROADWAY, AND THE OUTER POSTS ARE THOSE FARthest AWAY.

10 mm x 100 mm round head, square neck carriage bolt (bolt head colored to match sign face), hex nut with fiber insert, flat washer through sign & post (Typ)

Post length as shown on sign summary sheet

Multi-Directional slip Base and footing
See Standard Plan Drawing T-31.1.2

ROADSIDE SIGNS
ROUND METAL POSTS
UNBRACED

NEVADA DEPARTMENT OF TRANSPORTATION
METRIC
NOTO

ROUTES CT.

SIGNED ORIGIN ON FILE
T-31.1.1 16/7"
GENERAL NOTES:
1. ALL PARTS AND HARDWARE SHALL BE GALVANIZED AS PER SECTION 715 OF THE NEVADA DOT STANDARD SPECIFICATIONS, EXCEPT AS NOTED.
2. MULTI-DIRECTIONAL SLIP BASES ARE NOT REQUIRED BEHIND CONCRETE BARRIER RAIL OR BEHIND GUARDRAIL WHERE THE SIGN POST IS GREATER THAN D.8 m FROM THE BACK SIDE OF THE GUARDRAIL POST.
3. NPS = NOMINAL PIPE SIZE DESIGNATOR, USE STANDARD WEIGHT PIPE FOR SIGN POST AND SLEEVE, SEE ASTM A53.

ASSEMBLY ELEVATION VIEW
- 16 mm -11 x 80 mm Bolt, Type I ASTM A 325 or Type I ASTM A 449 (Grade 51) Each With Three USS Through Hardened Washers ASTM F 436 Type 11 And One Nyloc Insert Stop Nut ASTM A 993M DL. All Items shall be galvanized as per manufacturer's specifications. Torque within the range of 33 - 39 N·m. See BOLT DETAIL below.

BOLT DETAIL
- n = A typical manufacturer's identification
- Type I ASTM A449
- Type I ASTM A325
- 16 mm x 80 mm bolt
- 16 mm x 80 mm bolt

PLAN VIEW
- TOP/BOTTOM PLATE
- Plate Thickness = 16 mm

FOOTING DETAIL
- Multi-Directional Slip Base Assembly
- Top Of Foundation & Finished Grade
- Drilled And Filled With Class A or AA Concrete
- Slip Base Support
- Ground Line
- Chord Line

ROADSIDE SIGNS
ROUND METAL POSTS
MULTI-DIRECTIONAL SLIP BASE

NEVADA DEPARTMENT OF TRANSPORTATION

ROUTES:
- 31.2

SIGNED ORIGINAL ON FILE T-31.2

CHIEF SAFETY/TRAFFIC ENGR.

METRIC NOTED

ALL DISTANCES ARE IN METERS
UNLESS OTHERWISE NOTED

7-38
GENERAL NOTES:
1. FOOTINGS TO BE DRILLED HOLES AS SHOWN & FILLED WITH CLASS A OR CLASS AA CONCRETE.
2. ANCHOR POST & BRACING INCLUDED IN COST OF SIGN POST.
4. NPS = NOMINAL PIPE SIZE DESIGNATOR, SEE ASTM A53.
5. INNER POSTS ARE THOSE CLOSEST TO THE ROADWAY, AND THE OUTER POSTS ARE THOSE FARTHEST AWAY.

NEVADA DEPARTMENT OF TRANSPORTATION
ROADSIDE SIGNS
ROUND METAL POSTS
BRACED

SIGNED ORIGINAL ON FILE
T-31.1.1 (627)
CHEF SAFETY/TRAFFIC ENG.
For details on sign location, post type, panel bracing, and sign islands, see Standard Plan Drawings T-31.1.1 through T-31.1.6.

For details on sign location, post type, panel bracing, and sign islands, see Standard Plan Drawings T-31.1.1 through T-31.1.6.

DETAIL "D" (BRACE)

For details on sign location, post type, panel bracing, and sign islands, see Standard Plan Drawings T-31.1.1 through T-31.1.6.

DETAIL "E" (POST)
GENERAL NOTES:
2. NPS = NOMINAL PIPE SIZE DESIGNATOR, SEE ASTM A53.
GENERAL NOTES:
1. ALL POSTS WITH CROSS SECTIONAL AREA LARGER THAN 100 mm x 100 mm ARE TO BE DRILLED AS SHOWN.
3. "Z" BARS WILL BE USED ON ALL SIGNS REQUIRING TWO POSTS.
4. FOR DOUBLE POST INSTALLATIONS, INNER POSTS ARE THOSE CLOSEST TO ROADWAY, AND OUTER POSTS ARE THOSE FARDEST AWAY.

RECTANGULAR TIMBER POST SELECTION

<table>
<thead>
<tr>
<th>TABLE OF HOLE DIAMETERS (mm)</th>
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</thead>
<tbody>
<tr>
<td>Post Size (ID)</td>
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</tr>
<tr>
<td>100 mm D.o.</td>
</tr>
<tr>
<td>100 mm D.o.</td>
</tr>
<tr>
<td>Hole Dia.</td>
</tr>
<tr>
<td>No Hole</td>
</tr>
<tr>
<td>30</td>
</tr>
</tbody>
</table>

6 mm x 20 mm round head, hex nut with fiber inserts, at 300 mm spacing.

76 mm x 68 mm x 6.4 mm or 68 mm x 68 mm x 6.4 mm aluminum alloy strap or suitable alternate, (b) length to be W = 200 mm.

5/16" hex head bolt and nut with fiber insert, two flat washers and a lock-washer. (Length of bolt bolt to be as required by post dimension.)

7.6 mm x 32 mm Aluminum alloy strap with 13 mm carriage bolt, hex nut with fiber insert, 2 flat washers through sign, post and strap. (for W = 450 mm)
GENERAL NOTES:
1. ALL DRILLED HOLES IN TIMBER TO BE 16 mm DIAMETER UNLESS OTHERWISE NOTED.
2. BACK BRACE HOLE IN 100 mm x 100 mm POST TO BE DRILLED AND FITTED IN FIELD. ALL OTHER HOLES MAY BE SHOP DRILLED IN STANDARD POSITION.
3. FOOTINGS TO BE DRILLED 450 mm DIAMETER, 1.1 m DEEP, FILLED WITH CLASS A OR CLASS AA CONCRETE.
4. FOR DETAILS ON SIGN LOCATION, POST TYPE, PANEL, BRACING, AND SIGN ISLANDS, SEE STANDARD PLAN DRAWINGS T-31.1.1 THRU T-31.1.6.

NEVADA DEPARTMENT OF TRANSPORTATION
ROADSIDE SIGNS
TIMBER GORE SIGNS

SIGNED ORIGINATING OFFICE: T-31.5.2
CHIEF SAFETY/TRAFFIC ENGINEER: M. D. DAVIS

METRIC NDOT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
### Typical Applications:

NDOT Standard Sheets T-35.1.2 thru T-35.1.17 include a variety of traffic control methods, but do not include a layout for every conceivable work situation. Typical applications should be altered when necessary to fit the conditions of a particular temporary traffic control zone. For additional information refer to the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD) and revisions.

### Advance Warning Arrow Panel

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<th>MINIMUM SIZE (mm)</th>
<th>POSTED SPEED</th>
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<tr>
<td>A</td>
<td>1220 x 810</td>
<td>50 km/h OR LESS</td>
</tr>
<tr>
<td>B</td>
<td>1524 x 762</td>
<td>60 km/h TO 80 km/h</td>
</tr>
<tr>
<td>C</td>
<td>2440 x 1220</td>
<td>90 km/h OR MORE</td>
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</table>

### Taper Length and Channelizing Device Spacing

#### Speed (km/h)

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<tr>
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<th>LENGTH FOR MERGING TAPER (L)</th>
<th>DEVICE SPACING (m)</th>
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<tr>
<td>30</td>
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#### Line Width (m)

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<th>3.3 m</th>
<th>3.6 m</th>
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<tbody>
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<td>6</td>
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</tr>
<tr>
<td>10</td>
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</tr>
<tr>
<td>17</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
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</tbody>
</table>

### Buffer Length

<table>
<thead>
<tr>
<th>SPEED (km/h)</th>
<th>LENGTH (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
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<td>70</td>
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<td>80</td>
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<td>90</td>
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<td>185</td>
</tr>
<tr>
<td>110</td>
<td>220</td>
</tr>
<tr>
<td>120</td>
<td>250</td>
</tr>
</tbody>
</table>

### General Notes

1. R2-1 and W3-5A may be used to reduce existing speed limit to 90 km/h if existing speed limit is 10 km/h thru 120 km/h. Other speed reductions must be approved by the Director. Speed limit may be reduced by 15 km/h minimum, to 23 km/h maximum.

2. The W-3 signs shall be used when the recommended speed on a curve is 50 km/h or less. The W-4 signs shall be used when the recommended speed is 60 km/h or greater.

3. The W-6, 5 and R4-1 signs shall be installed alternately at 0.8 km intervals when the lengths of crossovers exceed 0.8 km.

4. All regulatory signs (R series) shall be black on retroreflective white.

5. All warning signs (W series) shall be black on retroreflective orange.

6. Warning signs shall be a minimum of 900 mm x 900 mm for speeds of 70 km/h or less, R2-1 shall be 900 mm x 1200 mm.

7. Warning signs shall be a minimum of 1200 mm x 1200 mm for speeds of 80 km/h or greater, R2-1 shall be 1200 mm x 1500 mm.
LEGEND

- Work Area
- Channelizing Devices
- Arrow Board
- ≥ 70 km/h
- Optional
- See GENERAL NOTE No. 1.
- Flagger Locations to be Determined by the Field Engineer
- Temporary Impact Attenuator
- See Standard SH 1-35.1.2.2
- Temporary Barrier Rail

See 1-35.1.1 for TABLES and GENERAL NOTES

BARRIER RAIL FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>FLARE RATE</th>
</tr>
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<tbody>
<tr>
<td>150 km/h</td>
<td>1119</td>
</tr>
<tr>
<td>100 km/h</td>
<td>1108</td>
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<tr>
<td>70 km/h</td>
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<td>50 km/h</td>
<td>1100</td>
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<tr>
<td>30 km/h</td>
<td>1106</td>
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<tr>
<td>20 km/h</td>
<td>1110</td>
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<tr>
<td>10 km/h</td>
<td>1112</td>
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<tr>
<td>5 km/h</td>
<td>1114</td>
</tr>
<tr>
<td>2.5 km/h</td>
<td>1104</td>
</tr>
</tbody>
</table>

TWO LANE - TWO WAY
LEGEND

- Work Area
- Channelizing Devices
- ≥ 70 km/h
- Optional
- See GENERAL NOTE No. 1.
- Temporary Striping
- Temporary Impact Attenuator
- Temporary Barrier Rail

See T-35.1.1 For TABLES AND GENERAL NOTES

BARRIER RAIL FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>FLARE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mph</td>
<td>1:22</td>
</tr>
<tr>
<td>110 km/h</td>
<td>1:20</td>
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<tr>
<td>100 km/h</td>
<td>1:18</td>
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<tr>
<td>90 km/h</td>
<td>1:16</td>
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<tr>
<td>80 km/h</td>
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<tr>
<td>70 km/h</td>
<td>1:12</td>
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<tr>
<td>60 km/h</td>
<td>1:10</td>
</tr>
<tr>
<td>50 km/h</td>
<td>1:08</td>
</tr>
</tbody>
</table>

NEVADA DEPARTMENT OF TRANSPORTATION

TYPICAL TRAFFIC CONTROL FOR MULTILANE SHIFT

ALL DISTANCES ARE IN MILES UNLESS OTHERWISE NOTED

Signed Original On File 7-35.1.1 (625)
EXISTING PAVEMENT MARKINGS MAY REQUIRE REMOVAL IN
THE CROSSOVER AREA AND NEW MARKINGS INSTALLED.

LEGEND

- Work Area
- Channelizing Devices
- Arrow Board
- 3.45 mph
- Optional
* - See GENERAL NOTE No. 1.
** - See GENERAL NOTE No. 2.
*** - See GENERAL NOTE No. 3.
- Temporary Striping

See T-35.1.1 For TABLES and GENERAL NOTES
LEGEND:

- WORK ZONE

- CHANNELIZING DEVICES @ 1.8 m SPACING

- CHANNELIZING DEVICES

- USE WHEN SPEEDS ARE ≥ 70 km/h

NOTE - REMOVE MEDIAN TRAFFIC CONTROL SIGNS ON A
TWO LANE FACILITY

See T-35.1.1 for TABLES and GENERAL NOTES
LEGEND:
- WORK ZONE
- CHANNELIZING DEVICES • 1.8 m SPACING
- CHANNELIZING DEVICES
- ARROW BOARD
- USE WHEN SPEEDS ARE ≥ 70 km/h

NOTE - REMOVE MEDIAN TRAFFIC CONTROL SIGNS ON A TWO LANE FACILITY.

See T-35.1.1 FOR TABLES AND GENERAL NOTES
**TYPE II BARRICADE**

<table>
<thead>
<tr>
<th>Type I BARRICADE</th>
<th>Type II BARRICADE</th>
<th>Type III B BARRICADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of Stripes</td>
<td>Roll Length &lt; 0.9 m = 100 mm</td>
<td>150 mm</td>
</tr>
<tr>
<td></td>
<td>Roll Length &gt; 0.9 m = 150 mm</td>
<td></td>
</tr>
<tr>
<td>Number of Retroreflective Rail Faces</td>
<td>2 (One Each Direction)</td>
<td>4 (Two Each Direction)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 (One Direction Only)</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

1. ALL BARRICADES USED MUST COMPLY WITH NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350. SEE QUALIFIED PRODUCTS LIST FOR APPROVED PRODUCTS.

2. TYPE III B BARRICADES USED FOR TEMPORARY SIGN SUPPORTS, SIGNS SHALL BE MOUNTED 300 mm MIN. FROM GROUND AND COMPLY WITH M.U.T.C.D. CURRENT EDITION.

3. MARKINGS FOR BARRICADE RAILS SHALL BE RETROREFLECTIVE ORANGE AND WHITE STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION OF TRAFFIC.
SECTION A-A

DETAIl "B"

POST DETAILS

(ELECTROPLATED BOLTS AND NUTS AND PROTECTIVE FLAT NONMETALLIC WASHERS)

VERTICAL PANEL

TRAFFIC CONES

1. CONES TO BE PREDIMINATELY ORANGE.
2. CONES TO BE USED DURING HOURS OF DARKNESS SHALL BE RETROREFLECTIVE AS SHOWN ABOVE.
3. CONES SHALL HAVE WEIGHTED BASES.

TRAFFIC DRUMS

① - 50 mm MAX. NON RETROREFLECTIVE MATERIAL
② - 100 mm MIN. - 150 mm MAX. RETROREFLECTIVE MATERIAL

NOTE: DRUMS SHALL HAVE A MIN. OF 2 WHITE AND 2 ORANGE RETROREFLECTIVE BANDS AND 450 mm WIDTH REGARDLESS OF ORIENTATION.
GENERAL NOTES:

1. SHAPES OF THE SAND FILLED MODULES ARE USED FOR ILLUSTRATION PURPOSES ONLY.

2. AT LOCATIONS WHERE VIBRATIONS AND/OR SURFACE SLOPES MAY CAUSE MODULES TO SHIFT, MODULES SHALL BE ANCHORED TO PREVENT MOVEMENT ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AND AS APPROVED BY THE ENGINEER.

3. IN FREEZING CONDITIONS, SAND HAVING A MOISTURE CONTENT OF 3% OR MORE SHALL BE MIXED WITH 5% ROCK SALT.

4. FOR OTHER SAND MODULE LAYOUTS NOT SHOWN, SEE STANDARD AND MANUALS ENGINEER.

5. THE LEADING MODULE OF EACH ATTENUATOR SHALL BE DELINEATED. THE BLACK STRIPE SHALL BE SLOPED DOWN TOWARD THE SIDE WHICH TRAFFIC WILL PASS. THE BACKGROUND SHALL BE RETRO-REFLECTIVE YELLOW. ADDITIONALLY A MARKER PANEL SHALL BE PLACED WITH SHEETING APPROXIMATELY 750 mm SQUARE. THE PANEL IS COVERED WITH YELLOW RETROREFLECTIVE SHEETING WITH BLACK STRIPES 125 mm WIDE. BLACK STRIPES SHALL BE AT 45 DEGREES WITH 100 mm SPACE BETWEEN STRIPES.

6. THE MAXIMUM LATERAL AND LONGITUDINAL SLOPE THAT SAND MODULES MAY BE INSTALLED SHALL NOT EXCEED 5%

7. AN ANGLED CENTERLINE OF THE SAND BARREL ARRAY MAY BE SHIFTED UP TO 5 DEGREES TOWARDS ON-COMING TRAFFIC.

LEGEND:

1. THE CIRCLED NUMBER INDICATES THE MASS IN KILOGRAMS OF THAT SAND FILLED MODULE.

2. PPCBR = PORTABLE PRECAST CONCRETE BARRIER RAIL. \( V_d \) = DESIGN VELOCITY.

TYPICAL LAYOUTS (SEE LEGEND)
**GENERAL NOTES:**

1. **ONE RAILROAD CROSSING KIT (DETAIL A) PER TRAVEL LANE.**

2. **THE FIRST TRANSVERSE BAND OF THE RAILROAD PAVEMENT SYMBOL SHOULD BE DIRECTLY OPPOSITE THE ADVANCE WARNING SIGN (10D-10).** If needed, supplemental railroad pavement markings symbols may be placed between the first railroad pavement marking symbol and the railroad crossing, but should be at least 15 m from the stop bar.

3. **A THREE-LANE ROADWAY SHOULD BE MARKED WITH A CENTER LINE FOR TWO-LANE APPROACH OPERATION ON THE APPROACH TO A RAILROAD CROSSING.**

4. **ON MULTI-LANE ROADS, THE TRANSVERSE BANDS SHOULD EXTEND ACROSS ALL APPROACH TRAVEL LAKES, AND INDIVIDUAL R&R SYMBOLS SHOULD BE USED IN EACH APPROACH TRAVEL LANE.**

5. **PAVEMENT MARKINGS FOR STOP BARS, TRANSVERSE BANDS AND CENTER LINES ARE REQUIRED IN ADDITION TO PAVEMENT MARKINGS AS SHOWN IN DETAIL A.**

6. **ADDITIONAL INFORMATION ON RAILROAD GRADE CROSSINGS CAN BE FOUND IN THE CURRENT MUTCD, PART VIII.**

7. **STOP BARS SHALL BE PERPENDICULAR TO ROADWAY AND SHALL BE WHITE.**

8. **FOR SIGN MOUNTING DETAILS, SEE STANDARD PLAN DRAWINGS T-31.1 THRU T-31.5, T-31.6, AND T-31.2.**

9. **THE DISTANCE X SHALL BE NOTED IN THE PLANS AND/OR STRUCTURE LIST.**

**LEGEND:**

- **R/R CROSSING SIGNAL OR SIGN**
- **R/R CROSSING SIGNAL AND GATE (TYPICAL)**
- **STOP BAR (TYPICAL) 0.5 M SOLID WHITE**

**SPEED CONVERSION TABLE**

<table>
<thead>
<tr>
<th>MPH</th>
<th>km/h</th>
</tr>
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<tbody>
<tr>
<td>20</td>
<td>32</td>
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<tr>
<td>25</td>
<td>40</td>
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<tr>
<td>30</td>
<td>50</td>
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<tr>
<td>35 &amp; 40</td>
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<tr>
<td>45</td>
<td>70</td>
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<tr>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>55</td>
<td>90</td>
</tr>
<tr>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>65 &amp; 70</td>
<td>110</td>
</tr>
<tr>
<td>75</td>
<td>120</td>
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</tbody>
</table>

**D**

Table for minimum spacing of advance warning sign

<table>
<thead>
<tr>
<th>SPEED (km/h)</th>
<th>SPACING (m)</th>
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</thead>
<tbody>
<tr>
<td>30</td>
<td>32</td>
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<tr>
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</table>

**NEVADA DEPARTMENT OF TRANSPORTATION**

**RAILROAD CROSSING: SIGNAL & GATE PLACEMENT PAVEMENT MARKINGS**

**NOTE:**

- All dimensions are in meters unless otherwise noted.

- **Signed Original On:** 1-30-3

- **Scale:** 1/100

- **Drawn By:** [Signature]

- **Prepared By:** [Signature]

- **Checked By:** [Signature]

- **Approved By:** [Signature]

- **Date:** 1-30-3

- **Document Number:** 15-27-634
GENERAL NOTES:
1. RING TYPE GUARDRAIL MAY BE INSTALLED TO PROVIDE PROTECTION FOR THE SIGNAL ASSEMBLY IN INDUSTRIAL OR OTHER AREAS INVOLVING ONLY LOW-SPEED HIGHWAY TRAFFIC AND WHERE SIGNALS ARE VULNERABLE TO DAMAGE BY TURNING/STOP TRAFFIC. USE OF RING TYPE GUARDRAIL REQUIRES APPROVAL BY THE CHEF SAFETY ENGINEER OR THE CHEF ROADWAY DESIGN ENGINEER.

2. FOR RAILROAD-HIGHWAY GRADE CROSSINGS MARKING DETAILS REFER TO STANDARD PLAN DRAWING T-35.3.

3. FOR "W" BEAM GUARDRAIL DETAILS SEE STANDARD PLAN DRAWING R-8.5.1.

4. FOR TRIPLE CORRUGATION GUARDRAIL DETAILS SEE STANDARD PLAN DRAWING R-8.4.1.

5. SPECIAL GUARDRAIL TERMINAL END TO BE INSTALLED ON GUARDRAIL END NEAREST TO RAILROAD.

6. NO POST HOLES SHALL BE DRILLED NEXT TO THE SIGNAL APPARATUS WITHOUT FIRST NOTIFYING THE RAILROAD INSPECTOR.

7. FOR SIGNALS WITH LESS THAN 2.1 m, REFER TO DRAWING R-9.3.1 AND 1996 AASHO ROADSIDE DESIGN GUIDE TABLE 5.3 FOR ALTERNATE POST SPACING.

8. FOR TRIPLE CORRUGATION TERMINAL CONNECTOR DETAILS NOT SHOWN REFER TO STANDARDIZED HIGHWAY BARRIER HARDWARE BY AASHTO-ADG-A112B REPORT MAY 1995.

9. FORM CONCRETE AROUND 150 mm x 200 mm POST WRAPPED WITH 1-LAYER OF 6 mm TO 13 mm THICK EXPANDED POLYSTYRENE FOAM SHEETING, DON'T NAIL POLYSTYRENE FOAM TO POST.
**Splice Notes:**

The bolted splice shall conform to current specifications for structural joints using ASTM A325 bolts.

**Location of Splices:**
The splice shall be located so as not to interfere with mounting the walkway brackets or the clip angles for the pedestrian signs. The wind bracing in the area of the bolted chord splice shall be bolted to the chord angles with a 50 mm unthreaded bolt, with hex head and nut, 2 ext washers and lock washer.

**Bolts:**
All A325 bolts shall be high strength with an interference type fit and torqued to the required amount as stated in the above specifications.

**Filter Plate:**
The plate welded to the angle legs on the inside shall be welded before punching the bolt holes, they shall be the same length as the cover plates, the plates are not necessary. The distance between the front and back faces of the plate is the post alternative splice details may be used if approved by the engineer.

**Typical Section J-J**

Note: Diagonals in Plane of Truss, Not shown. Bi-Plane Frames.

**Bolted Chord Splice**

- **Chord Dia.:**
  - Nominal Bolt Dia. (mm)
  - 12.7
  - 15.2

- **Splice Dia.:**
  - 7.7

- **Hanger Dia.:**
  - 7.7

- **Connector Plate Dia.:**
  - 12.7

- **Rotation:**
  - 12.7

**Overhead Signs Structural Frame Details**

Signed Originating Engineer: T-361.6 16227

CHIEF BRIDGE ENGINEER
**OVERHEAD SIGNS**

**WALKWAY SAFETY RAILING DETAILS**

GENERAL NOTES:

1. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT THE COMPLETED HINGE AND LATCH ASSEMBLY WILL HOLD THE SAFETY RAILING IN A STIFFENED MANNER FREE OF MOBILE WIRE IN THE RESTED POSITION MAXIMUM ALLOWABLE DISPLACEMENT FROM VERTICAL AT TOP OF RUNNING WIRE (CATENARY) SHALL BE 3/8 IN.

2. DETAILS FOR BOLTING HINGE BASE & TO WALKWAY BRACKET MAY BE SUBMITTED FOR APPROVAL.

3. ALTERNATIVE DETAILS APPROVED BY THE ENGINEER MAY BE SUBSTITUTED FOR THE SAFETY CHAIN CONNECTIONS SHOWN.

4. NPS = NOMINAL PIPE SIZE DESIGNATOR. SEE ASTM A53.

**NEVADA DEPARTMENT OF TRANSPORTATION**

**METRIC**

**SIGNED ORIGINAL ON FILE**

T-36-1.11 (6/27)

CHIEF BRIDGE ENGINEER

[Diagram details and specifications are provided as per the notes above.]
**LIGHT FIXTURE MOUNTING DETAIL**

Note: NPS = Nominal Pipe Size Designator. See ASTM A53.

**DETAIL "A"**

- **Light Fixture (Bottom)**
  - Stainless Steel Lock Nut
  - 2 mm Stainless Steel Washer

- **Fixture Mounting Channel**
  - 41 mm x 31 mm x 2.0 mm or 41 mm x 41 mm x 2.4 mm
  - Continuous-Slot Channel

- **Light Fixture Clamping Nut**
  - 64 mm 8 – 20 Threads/25 mm Stainless Steel Nut
  - 10 mm x 25 mm Long Round Head Machine Screw

- **Continuous-Slot Channel**
  - 10 mm x 25 mm Long Round Head Machine Screw

- **SEE DETAIL "A"**
  - 25

- **SIDE VIEW - SINGLE FACED SIGN TYPES C**

- **PHOTOELECTRIC CONTROL UNIT**
  - 3/4" NPS Std. Pipe Or, A Permitted
  - Top Of Sign Panel
  - 3/4" X 11"

- **SIGNALS 4880 MM THRU 5400 MM**
  - 2-1/2" X 11"

- **NEVADA DEPARTMENT OF TRANSPORTATION**
  - OVERHEAD SIGNS LIGHTWEIGHT (LIGHT FIXTURE MOUNTING DETAILS)

- **Signed Origin On File**
  - T-36.11.5 (6/27)
  - Chief Safety Traffic Eng.
NOTES:
1. Footings shall be placed with long dimensions normal to axis of sign.
2. On single pole signs the post shall be boxed out of plum with use of the leveling nuts to make the bottom of the sign face level.
3. 51 mm @ anchor bolts may be substituted for 44 mm bolts.
4. NPS = Nominal Pipe Size (Designator—see ASTM A53).

GENERAL NOTES:

SECTION A-A:

CONSTRUCTION:
Standard Specifications for Road and Bridge Constructions—Current Edition and Supplements there to.

WELDING:
All welding continuous unless otherwise noted.

6 NPS THRU 12 NPS POST
14 NPS POST

NEVADA DEPARTMENT OF TRANSPORTATION
OVERHEAD SIGNS
LIGHTWEIGHT POST DETAILS

SIGNED ORIGINAL ON FILE T-36.11S (627)
CHIEF SAFETY/TRAFFIC ENG.
**NOTES:**
1. BACKFILL SHALL BE IN PLACE PRIOR TO ERECTION OF POST.
2. SLOPE PROTECTION REQUIRED WHEN INDICATED ON THE PLANS.
3. PILE PEDESTAL SHALL BE FORMED 150 mm WIDE, RELIEF GROUND MATERIAL MENTIONED SHALL BE PLACED AGAINST UNDISTURBED MATERIAL.
4. NPS = NOMINAL PIPE SIZE DESIGNATOR SEE ASTM A53.

---

**PILE FOUNDATION**

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>PILE FOUNDATION</th>
<th>SPREAD FOOTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPS</td>
<td>Pedestal (mm)</td>
<td>Pile Dia. (mm)</td>
</tr>
<tr>
<td>6</td>
<td>11.13</td>
<td>610</td>
</tr>
<tr>
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<td>13.97</td>
<td>610</td>
</tr>
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<td>8</td>
<td>9.18</td>
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<tr>
<td>14</td>
<td>12.73</td>
<td>1015</td>
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</tbody>
</table>

**SECTION "K"-"K"**

6 NPS AND 8 NPS POSTS

**SECTION "H"-"H"**

10 NPS THRU 14 NPS POSTS

**SECTION "U"-"U"**

**SPREAD FOOTING**

**PLAN**
**Broken Yellow Line**

- Type A
- Type B
- Type D

Including Freeways:
I-215: I-515 Junction north to I-15

**Clear Side Shall Face**
On-coming Traffic.

**Broken White Line (Urban)**

- Type E

**Passing/No Passing Zone**

- Type A
- Type D

**Double Solid Yellow Line**

- Type A
- Type D

Where Applicable:

- Type A
- Type D

**Two Way Left Turn Lane**

- See Plan Sheets for Location

**Exit Ramp (Gore)**

- Type E

**Broken White Line (Rural)**

**Non-Reflective & Reflective Markers**

- Type A - Non-Reflective Yellow Marker
- Type B - Non-Reflective White Marker
- Type C - One Way Clear Reflective Marker
- Type D - Two Way Yellow Reflective Marker
- Type E - Red/Clear Reflective Marker

**Permanent Raised Pavement Markers**

- Epoxy

**Reflector**

- NEVADA DEPARTMENT OF TRANSPORTATION

Signed Original On File: T-37, L.1 (633)
FOR ARROWS & LEGEND DETAILS SEE SHOT T-38.1.2

Red Side Shall Face
Wrong Way Traffic.

Red Side Shall Face
Wrong Way Traffic.

2/3L-Storage Line

DOTTED WHITE LINE

DOTTED WHITE -- INTERSECTIONS
DUAL TURN LANES (CAT TRACKS)

Storage Line

PERMANENT RAISED PAVEMENT MARKERS

NEVADA DEPARTMENT OF TRANSPORTATION

Signed Original On File T-371.2 (633)

Chief Safety/Traffic Engineer
PLACEMENT OF MERGE ARROWS

TYPICAL LANE REDUCTION
For further details on "LANE REDUCTION" See Part II of the MUTCD

TYPICAL PARALLEL ACCELERATION LANE
For further details on "PARALLEL ACCELERATION LANE" See Part II of the MUTCD

HOV LANE
(1.71 m²)

LEFT/STRAIGHT
ARROW
(2.51 m²)

LEFT/STRAIGHT/RIGHT
ARROW
(3.36 m²)

STRAIGHT ARROW
(1.44 m²)

EXIT ARROW
(2.88 m²)

TURN ARROW
(1.44 m²)

MERGE ARROW
(3.90 m²)

WRONG WAY ARROW
(3.07 m²)

BICYCLE
(0.51 m²)

NOTE: THESE LEGENDS AS SHOWN ARE FOR BIKE LANE USE.
GENERAL NOTES:
1. START WITH AN ARROW AT THE ENTRANCE OF THE TURN LANE.
2. THE ARROW/ONLY CLOSEST TO CROSSWALK SHALL BE INSTALLED 2.4 m BEHIND THE STOP BAR.
3. THE STORAGE LINE IS EQUAL TO THE STORAGE LENGTH PLUS THE DECELERATION LENGTH.
4. WHEN CALCULATING DISTANCE BETWEEN MARKINGS, ROUND TO THE NEAREST WHOLE NUMBER.

LEGEND:
* RIGHT ARROWS WHERE APPLICABLE
** RAISED PAVEMENT MARKERS WHERE APPLICABLE.
FOR DETAILS SEE STANDARD PLAN T-37.1.2.
SPACING TABLE

<table>
<thead>
<tr>
<th>&quot;W&quot; (m)</th>
<th>Number of Type D Raised Pavement Markers Per Median Nose</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 to 0.6</td>
<td>3</td>
</tr>
<tr>
<td>&gt;0.6 to 0.9</td>
<td>4</td>
</tr>
<tr>
<td>&gt;0.9 to 1.2</td>
<td>5</td>
</tr>
<tr>
<td>&gt;1.2</td>
<td>1 Each For Every 0.3 m of Curb Length</td>
</tr>
</tbody>
</table>

* (1) Raised Pavement Marker Each Shall Be Placed On The P.C. and The P.T. Of The Median Nose; All Others Spaced Equally Between P.T. & P.C.

Legend:

- YELLOW PERMANENT PAVEMENT STRIPING (VARIES)

GENERAL NOTES:

1. FOR MEDIANS WIDER THAN 1.2 m, THE ENTIRE MEDIAN SHALL BE PAINTED FROM THE MEDIAN NOSE BACK 1.5 m OR TO THE FIRST P.C., WHICH EVER IS GREATER.
2. FOR MEDIANS 1.2 m WIDE OR LESS, THE ENTIRE MEDIAN SHALL BE PAINTED.
3. SEE STANDARD PLAN SHEET T-37.1.1 FOR TYPE D RAISED PAVEMENT MARKER.
4. SEE STANDARD PLAN SHEET R-9.2.1 FOR TYPE 2 OBJECT MARKER.
NOTES:

1. NOTES ON 3, 4, & 5 OF SHEET B-20.1.3 SHALL APPLY.

2. WHEN THE ADDITION OF CELLS CAUSES THE LENGTHS OF THE "g", "f" AND "q" BARS TO EXCEED 1900 mm, THE BARS WILL REQUIRE SPLICING. SPLICES FOR THE "g" BARS SHALL BE CENTERED ABOUT THE CENTER LINE OF THE INTERIOR WALL. SPLICES FOR THE "q" BARS SHALL BE CENTERED ABOUT THE CENTER OF THE CELLS. SPLICES FOR THE "f" BARS SHALL BE DONE AT THE 45 DEGREE LINE AND CONFORM TO THE SPLICE DETAIL SHOWN. SPLICE LOCATIONS SHALL BE ALTERNATED FROM A TO B. SEE DETAIL SHOWN. SPLICE LENGTHS FOR THE "g" AND "q" BARS SHALL BE AS FOLLOWS:

   - No. 13 Bars = 400 mm
   - No. 19 Bars = 600 mm
   - No. 22 Bars = 800 mm
   - No. 25 Bars = 1000 mm

3. FOR DIMENSIONS, BAR SIZES, BAR SPACING, AND ROOF SECTION SPACING DETAIL, SEE SHEET B-20.1.3. FOR GENERAL NOTES, SEE SHEET B-20.1.1.
# Cubic Meters of Concrete and Kilograms of Reinforcing for Two Type II Headwalls

<table>
<thead>
<tr>
<th>Span (m)</th>
<th>Single Box</th>
<th>Double Box</th>
<th>Triple Box</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D*Skew</td>
<td>15° Skew</td>
<td>30° Skew</td>
</tr>
<tr>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

## Quantities for Additional Cells

Concrete for two Type II Headwalls for each additional cell (cu meter) (add this quantity to the quantity for a double box): 0.80 (Span m) \times 0.21 / Cos Skew Angle

For height (h) less than 3.7 meters: 0.80 (Span m) \times 0.21 / Cos Skew Angle

For height (h) equal to or greater than 3.7 meters: 0.86 (Span m) \times 0.21 / Cos Skew Angle

Reinforcing for two Type II Headwalls for each additional cell (kilograms) (add this quantity to the quantity for a double box): 0.44 (Span m) \times 0.21 / Cos Skew Angle

For height (h) less than or equal to 2.1 meters: 0.44 (Span m) \times 0.21 / Cos Skew Angle

For height (h) equal to 2.4 or 2.7 meters: 0.58 (Span m) \times 0.21 / Cos Skew Angle

For height (h) equal to or greater than 3.2 meters: 0.63 (Span m) \times 0.21 / Cos Skew Angle

### Angle COSine

- U° - 1.0000
- 0° - 1.0000
- D° - 0.7071

---

**NEVADA DEPARTMENT OF TRANSPORTATION**

**RCB CULVERTS**

**TYPE II HEADWALLS**


Chef Bridge Engineer: [Redacted]

Signed on Sheet: 2/20/18

Dimensions are in millimeters unless otherwise noted.
<table>
<thead>
<tr>
<th>SPAN</th>
<th>SINGLE BOX</th>
<th>DOUBLE BOX</th>
<th>TRIPLE BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0° SKEW</td>
<td>15° SKEW</td>
<td>30° SKEW</td>
</tr>
<tr>
<td></td>
<td>CONC</td>
<td>REINF</td>
<td>CONC</td>
</tr>
<tr>
<td>0.8</td>
<td>0.0</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>1.2</td>
<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
</tr>
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<td>1.5</td>
</tr>
<tr>
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<td>2.4</td>
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<tr>
<td>3.9</td>
<td>3.3</td>
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<tr>
<td>4.2</td>
<td>3.6</td>
<td>3.9</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Note: Quantities shown are for two type I headwalls, one at the inlet and one at the outlet.
NOTES:
1. FOR GENERAL NOTES SEE SHEET B-20.1.1.
2. DOWEL HOLES SHALL BE DRILLED 300 mm INTO EXISTING CONCRETE. DIAMETER OF HOLE SHALL BE 6 mm LARGER THAN DIAMETER OF BAR, HOLE MAY BE INCLINED NO MORE THAN 5° OFF THE HORIZONTAL. DOWELS SHALL BE EPOXYED INTO CLEAN HOLES. EPOXY SHALL CONFORM TO THE REQUIREMENT OF SECTION 728 OF THE STANDARD SPECIFICATIONS.

NOTE:
Old Headwalls To Remain In Place, Unless Otherwise Noted.

PART LONGITUDINAL SECTION

R.C.B. CULVERT EXTENSION

ELEVATION

PLAN

METHOD OF PLUGGING R.C.B.
NOTE: Width And Height Varies.

METHOD OF EXTENDING R.C.B. CULVERTS

NEVADA DEPARTMENT OF TRANSPORTATION

CERTIFIED DRAWN ON FILE:
B-20.1.1 (S02)

CHIEF BRIDGE ENGINEER

ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE NOTED

SIGNED ORIGIN OF FILE:
B-20.1.1 (502)

* – Place Bars in Center Of Walls And Slabs

* – 75 mm To Center Of Hole.
CONCRETE PAVING

BITUMINOUS PAVING

MINIMUM COVER CONDITIONS

15 mm Max. Average Gap of Joint for Spans Up to 300 mm
20 mm Max. Average Gap of Joint for Spans Over 300 mm

General Notes:

1. CONCRETE SHALL BE AS SPECIFIED IN AASHTO M299 OR M273 (ASTM C1433), AS MODIFIED IN SUBSECTION 5.02.03.24.

2. REINFORCING STEEL SHALL BE AASHTO M31 (ASTM A616) GRADE 60, WELDED WIRE FABRIC SHALL BE AASHTO M65 (ASTM A625) (SMOOTH WIRE), OR AASHTO M22 (ASTM A475) (DEFORMED WIRE). REINFORCING STEEL IN THE TOP SLAB SHALL HAVE AN EPOXY COATING CONFORMING TO AASHTO M264 (ASTM D695) WHEN THERE IS 150 mm OR LESS OF COVER ON THE RCB (CLARK COUNTY EXCLUDED).

3. BEDDING MATERIAL SHALL BE GRANULAR BACKFILL OR TYPE 2 CLASS B AGGREGATE MEETING THE RESISTIVITY REQUIREMENTS FOR GRANULAR BACKFILL. BEDDING MATERIAL WILL BE PAID FOR AS GRANULAR BACKFILL.

4. HEADWALL DETAILS SHALL BE AS SHOWN IN THE STANDARD PLANS. EXPOSED REINFORCEMENTS TO THE CAST-IN-PLACE HEADWALL TO THE PRECAST BOX SHALL CONSIST OF EITHER NO. 3 BARS AT 300 mm SPACINGS OR EXPOSURE OF THE PRECAST BOX WELDED WIRE FABRIC. THE NO. 3 BARS SHALL BE CAST A MINIMUM OF 460 mm INTO THE PRECAST BOX SEGMENT. BOTH THE NO. 3 BAR OR WELDED WIRE FABRIC SHALL EXTEND INTO HEADWALL TO 50 mm CLEAR OF THE HEADING FACE.

5. JOINT MATERIAL SHALL BE A PREFORMED JOINT MATERIAL MAST EC M198 TYPE 2. THE JOINT MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. A DOUBLE APPLICATION OF JOINT MATERIAL SHALL BE USED. APPLY ONE APPLICATION TO THE TONGUE AND THE OTHER TO THE GROOVE. THE MINIMUM SIZE OF JOINT MATERIAL SHALL BE 30 mm. ANY JOINT MATERIAL EXTENDING FROM THE INTERIOR OF THE JOINT SHALL BE REMOVED FLUSH WITH THE BOX WALL.

6. IN ADDITION TO THE MARKINGS REQUIRED BY THE AASHTO AND ASTM SPECIFICATIONS, MARK EACH BOX SECTION WITH THE APPROPRIATE NDOT CONTRACT NUMBER.

7. REINFORCING STEEL SHALL EXTEND FULL WIDTH OF CONCRETE PAVEMENT AND SHALL HAVE A MINIMUM CLEARANCE OF 75 mm ON THE BOTTOM. IN AREAS OF THE STATE WHERE ROAD SALTS ARE USED, THE REINFORCING STEEL SHALL BE EPOXY COATED. REINFORCING IS TO BE PLACED PARALLEL TO THE CENTERLINE OF ROAD FOR LONGITUDINAL REINFORCEMENT AND PARALLEL TO THE PRECAST BOX FOR TRANSVERSE REINFORCEMENT.

8. LENGTH OF CULVERT SHALL BE INCREASED AS FOLLOWS: ADD 600 mm TO EACH END WHEN COVER IS SHOULDER 5% 0 TO 1:1-1:6 AND ADD AN ADDITIONAL 300 mm TO EACH END FOR EACH SUCCEEDING 1:5 m OF COVER OR PORTION THEREOF.

9. FILL CYLINDRICAL LIFTING HOLES (LOCATED BY MANUFACTURER) WITH AN APPROVED EPOXY NON-SHRINK DURITE. HOLES WITH AN APPROVED CONICAL SHAPE FOR THE BOTTOM 75 mm MAY BE FILLED WITH A CONCRETE DURITE COMPRISING ONE PART BY VOLUME OF CEMENT TO TWO PARTS BY VOLUME OF SAND WITH ONLY ENOUGH WATER TO PERMIT PLACING AND TAMING. AN APPROVED CUSTOM PLUG MAY BE USED. AN OPTIONAL METHOD OF LIFTING MAY BE USED WITH APPROVAL.

PRECAST CONCRETE BOX CULVERT

TYPICAL CULVERT INSTALLATION
HP PILE POINT ATTACHMENT NOTES:

1. HP PILE POINT ATTACHMENTS ARE REQUIRED ONLY WHEN SHOWN ON THE PLANS OR IN THE SPECIAL PROVISIONS.

2. THE PILE POINT CONFIGURATION SHALL BE AS SHOWN ON PLANS.

3. PILE POINT ATTACHMENTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A275 GRADE 450-240 UNLESS NOTED OTHERWISE.

4. WELDS FOR ATTACHMENTS SHALL BE AS RECOMMENDED BY THE MANUFACTURER.

TYPICAL HP PILE POINT DETAIL

PILE SPLICE NOTES:

1. PILE SPLICE WELDS SHALL CONFORM TO ANSI D1.1.

2. PILE MUST BE STOPPED AT LEAST 1000 mm ABOVE GROUND PRIOR TO SPLICING.

SINGLE VEE-GROOVE BUTT WELD

PERMITTED FOR ALL POSITIONS

SINGLE BEVEL-GROOVE BUTT WELD

PERMITTED IN HORIZONTAL POSITION ONLY

PILE SPLICE WELDING DETAILS
END REDWOOD STRIPS AT TOP OF RADIAL SECTION WHEN THEIR INTERMEDIATE DISTANCE FROM EACH OTHER REACHES 1000 mm.

NOTES:
1. SLOPE PAVING IS TO BE DIVIDED INTO EQUALLY SPACED PANELS. THE WIDTH OF EACH PANEL IS TO BE AS NEARLY 3000 mm AS SITE DIMENSIONS WILL PERMIT.
2. THESE DETAILS WILL NOT APPLY IN TOTAL TO ANY ONE SITE, BUT ARE INTENDED TO BE GENERAL ENOUGH TO COVER ALL POSSIBILITIES. TO OBTAIN LIMITS OF SLOPE PAVING FOR A SPECIFIC SITE, CONSULT THE PLAN SHEETS.
3. CONCRETE SHALL BE CLASS A OR AA WITH FIBER REINFORCING.

38X89 Redwood, Saw As Shown & Reassembl. Remove Upper Portion After Concrete Cures.
25 mm. Sodroot
10c Galvanized
80 mm. Concrete Slope Pavement
80 mm. Concrete Slope Pavement
1200 O.C. (Stapler)
Stoke

Concrete Slope Pavement
Rough Finish (Typ.)

SECTION A-A
(WITH SIDEWALK)

SECTION A-A
(WITH DITCH)

SECTION A-A
(TOE OF SLOPE)

SECTION B-B
(AT PIER)

SECTION C-C
(AT ABUTMENT)

SECTION D-D
(AT WINGWALL)

SECTION E-E
(EDGE OF SLOPE)
### REINFORCED CONCRETE RETAINING WALL TYPES 1A & 1B

#### Table of Dimensions and Reinforcing Steel

<table>
<thead>
<tr>
<th>Design</th>
<th>W</th>
<th>S</th>
<th>Depth</th>
<th>Concrete m³/m³</th>
<th>Steel kg/m³</th>
<th>L1</th>
<th>L2</th>
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<tbody>
<tr>
<td>1A</td>
<td></td>
<td></td>
<td></td>
<td>0.81</td>
<td>1.22</td>
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<td>0.81</td>
</tr>
<tr>
<td>1B</td>
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<td></td>
<td></td>
<td>0.81</td>
<td>1.22</td>
<td>0.81</td>
<td>0.81</td>
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</tbody>
</table>

#### Notes
- For general notes, see B-30-1.3
- For details, see drainage requirements, see Sheets B-30-1.3 thru B-30-15.
- Roughness construction joint surface to 6 mm amplitude.
- Structural engineer will verify maximum allowable bearing pressures for actual site soil conditions.

### TYPICAL SECTION

#### Design

<table>
<thead>
<tr>
<th>Design</th>
<th>W</th>
<th>S</th>
<th>Depth</th>
<th>Concrete m³/m³</th>
<th>Steel kg/m³</th>
<th>L1</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
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<td></td>
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<td>0.81</td>
<td>1.22</td>
<td>0.81</td>
<td>0.81</td>
</tr>
<tr>
<td>1B</td>
<td></td>
<td></td>
<td></td>
<td>0.81</td>
<td>1.22</td>
<td>0.81</td>
<td>0.81</td>
</tr>
</tbody>
</table>

#### Notes
1. For general notes, see B-30-1.3
2. For details, see drainage requirements, see Sheets B-30-1.3 thru B-30-15.
3. Roughness construction joint surface to 6 mm amplitude.
4. Structural engineer will verify maximum allowable bearing pressures for actual site soil conditions.

### NEVADA DEPARTMENT OF TRANSPORTATION

#### TYPES 1A & 1B CANTILEVER CONCRETE RETAINING WALLS

*(Signed original on file)*

*Chef Bridge Engineer*

*All dimensions are in millimeters. Unless otherwise noted.*

*Denotes a bundle of two bars*
# Reinforced Concrete Retaining Wall Type 2

## Table of Embeddings and Reinforcing Steel

<table>
<thead>
<tr>
<th>Block Fill Condition</th>
<th>Wall Type Required for Seismic Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.7g</td>
</tr>
<tr>
<td>Level backfill with surcharge</td>
<td>2</td>
</tr>
<tr>
<td>Sloping backfill with surcharge</td>
<td>2</td>
</tr>
<tr>
<td>Slope ≤ 1:3</td>
<td>2</td>
</tr>
<tr>
<td>1.3 ≤ Slope ≤ 1:2</td>
<td>2</td>
</tr>
</tbody>
</table>

* Special design required

## Type 2 - Reinforced Concrete Retaining Wall

### Design W

<table>
<thead>
<tr>
<th>Design W</th>
<th>1200</th>
<th>1600</th>
<th>2400</th>
<th>3000</th>
<th>3800</th>
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<tbody>
<tr>
<td>W</td>
<td>1250</td>
<td>1550</td>
<td>2000</td>
<td>2450</td>
<td>2900</td>
</tr>
<tr>
<td>Batter, Z</td>
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<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Horiz.</td>
<td>1030</td>
<td>1080</td>
<td>1150</td>
<td>1500</td>
<td>2500</td>
</tr>
<tr>
<td>Vert.</td>
<td>1030</td>
<td>1080</td>
<td>1150</td>
<td>1500</td>
<td>2500</td>
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</tbody>
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### Concrete m³/m³

<table>
<thead>
<tr>
<th>Rein X 1/2</th>
<th>0.86</th>
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<th>1.62</th>
<th>2.14</th>
<th>3.08</th>
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<tr>
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<td>66</td>
<td>90</td>
<td>119</td>
<td>164</td>
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</tbody>
</table>

### Notes:
1. For general notes see B-30.1.3
2. For details not shown and drainage requirements see sheets B-30.1.3 thru B-30.1.5.
3. Roughen Construction joint surface to 6 mm amplitude.
4. Geotechnical engineer will verify maximum allowable bearing pressures for actual site soil conditions.
WEPP HOLE

DETAIL C

WEPP HOLE NOTES:

1. 100 mm dia. drill at 7600 mm max., center to center. Exposed edges may be located 75 mm above finish grade.

2. 0.98 cubic meters of Type 3 Bc, 300 mm. Geotextile fabric securely tied. Geotextile shall meet the following:
   - 100 mm. Welded spunlace or geotextile material.
   - Minimum tensile strength of 15.6 kN/m.
   - Minimum puncture strength of 44.5 N.
   - Minimum elongation at break of 100%.

3. 15.2 mm square aluminum or galvanized steel wire mesh.
   - Not less than 120 mm per 25 mm and minimum wire diameter 0.70 mm.

WALL EXPANSION JOINTS AND WEAKENED PLANES

PLAN OF WALL WITH EXPANSION JOINT ONLY

PLAN OF WALL WITH EXPANSION JOINT AND WATERSTOP

SECTION WEAKENED PLANES

DETAIL A

WATERSTOP

WATERSTOP NOTES:

Holes will be provided in the outer 13 millimeters of the web, except for those, etc. Tie web to #10 reinforcing bars @ 400 millimeters maximum intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.

Waterstop to have 5 or more pairs of rounded ribs to provide 55 square millimeter minimum rib cross-section area on each half of the waterstop.
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<tr>
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<td>Drop Inlet, Type 2 &amp; 2A (R-4.2.1)</td>
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