



### 8. DRAINAGE

#### 8A. CATCH BASINS AND COVERS

##### [8A5](#) Inlet and Manhole Covers

sheet a: *Inlet Covers Type A, H, A-S, H-S and Z*

sheet b: *Inlet Covers Type B, B-A, C, MS, MS-A, and WM*

sheet c: *Inlet Covers Type F, HM, HM-S, S, T, HM-GJ, and HM-GJ-S*

sheet d: *Inlet Covers Type V, V-B, and VV-B*

sheet e: *Inlet Covers Type BW; Manhole Covers Type K, J, J-S, L and M*

##### [8A8](#) Catch Basins 3-FT, 4-FT, 5-FT and 6-FT Diameter

##### [8A9](#) Catch Basins 2x3-FT and 2.5x3-FT

#### 8B. MANHOLES

##### [8B9](#) Manholes 3-FT, 4-FT, 5-FT, 6-FT, 7-FT, 8-FT, 9-FT and 10-FT Diameter

##### [8B10](#) Manholes 3x3-FT, 4x4-FT, 5x5-FT, and 6x6-FT

##### [8B11](#) Manholes Variable Tee and Special 4-FT Diameter

#### 8C. INLETS

##### [8C6](#) Inlets 3-FT and 4-FT Diameter

##### [8C7](#) Inlets 2x2-FT, 2x2.5-FT, 2x3-FT, 2.5x3-FT and 2x3.5-FT

##### [8C8](#) Inlets Median 1 and 2 Grate

##### [8C9](#) Inlets Median 3 and 4 Grate

#### 8D. CURB AND GUTTER, AND SURFACE DRAINS

##### [8D1](#) Concrete Curb and Gutter

sheet a: *Concrete Curb and Gutter*

sheet b: *Concrete Curb Ties and Curb and Gutter Applications*

##### [8D2](#) Concrete Surface Drains Flume Type at Structures

a b c

##### [8D3](#) Concrete Surface Drains Drop Inlet Type at Structures

a b

##### [8D4](#) Concrete Surface Drains and Asphaltic Flumes

##### [8D5](#) Curb Ramps

sheet a: *Curb Ramps Types 1 and 1-A*

sheet b: *Curb Ramps Types 2 and 3*

sheet c: *Curb Ramps Type 4A and 4A1*

sheet d: *Curb Ramps Type 4B and 4B1*

sheet e: *Curb Ramps Type 5, 6, 7A, 7B & 8*

sheet f: *Curb Ramps Radial Detectable Warning Field Applications*

sheet g: *Curb Ramps Rectangular and Radial Detectable Warning Plates*

##### [8D13](#) Slotted Corrugated Metal Pipe Surface Drains

##### [8D14](#) Slotted Vane Drain

##### [8D15](#) Edgedrains

sheet a: *Edgedrain Outlet and Outfall Markers*

sheet b: *Edgedrain and Base Aggregate Open Graded*

sheet c: *Edgedrain and Base Aggregate Open Graded*

- [8D16](#) Concrete Gutter, Curb and Gutter and Pavement Ties
- [8D17](#) Manholes, Manhole and Inlet Covers
- [8D18](#) Driveway and Sidewalk Ramps Types X and Y
- [8D19](#) Driveway and Sidewalk Ramps Type Z
- [8D20](#) Driveways with Curb & Gutter Returns
- [8D21](#) Driveways without Curb & Gutter
- [8D22](#) Driveways without Curb & Gutter Resurfacing Projects Rural

## 8E. EROSION CONTROL DEVICES

- [8E5](#) Sodded Backslope Flume and Intercepting Embankment
- [8E8](#) Typical Installations of Erosion Bales/Temporary Ditch Checks
- [8E9](#) Silt Fence
- [8E10](#) Inlet Protection Type A, B, C and D
- [8E11](#) Turbidity Barrier
- [8E12](#) Silt Screen
- [8E14](#) Tracking Pad
- [8E15](#) Culvert Pipe Checks

## 8F. PIPE AND CULVERT

- [8F1](#) Apron Endwalls for Culvert Pipe
- [8F2](#) Apron Endwalls for Pipe Arch and Elliptical Pipe
- [8F3](#) Details for Pipe Cattle Pass, Concrete Endwalls and Steps
- [8F4](#) Joint Ties for Concrete Pipe and Concrete Collar Detail
- [8F6](#) Reinforced Concrete Apron Endwall for Pipe Underdrain
- [8F7](#) Steel Apron Endwalls for Culvert Pipe and Pipe Arch Sloped Side Drains
- [8F8](#) Steel Apron Endwalls for Culvert Pipe and Pipe Arch Sloped Cross Drains
- [8F10](#) Concrete Masonry Endwalls for Culvert Pipe and Pipe Arch

# 9. INTERSECTION DESIGN

## 9A. GEOMETRIC LAYOUTS

- [9A1](#) At-Grade Side Road Intersections
  - sheet a: *At-Grade Side Road Intersection, Types B1, B2, C and D and Tee Intersection Bypass Lane*
  - sheet b: *At-Grade Side Road Intersection, Types A1 and A2*

## 9B. CONDUIT

- [9B2](#) Conduit
- [9B4](#) Pull Box
- [9B16](#) Pull Box Non-Conductive

## 9C. BASES

- [9C2](#) Concrete Bases Types 1, 2, 5 and 6
- [9C3](#) Transformer/Pedestal Bases
- [9C4](#) Concrete Base Bolt Repair
- [9C5](#) Concrete Control Cabinet Bases
- [9C6](#) Concrete Control Cabinet Base, Type 9, Special

- [9C8](#) Concrete Base, Type 7
- [9C9](#) Concrete Base, Type 8
- [9C10](#) Transformer Base for 15-Inch Bolt Circle
- [9C11](#) Concrete Base Type 10
- [9C12](#) Concrete Base Type 13  
a b
- [9C13](#) Concrete Base Type 10 and Type 13 Extension
- [9C14](#) Concrete Control Cabinet Base, Type L
- [9C15](#) Concrete Base Type 10 Special
- [9C16](#) Concrete Base Type 10 Special Extension

## 9D. CONTROL CABINETS

- [9D1](#) Cabinet Service Installation (Meter Breaker Pedestal)
- [9D2](#) Signal Control Cabinet
- [9D3](#) Post Mounted Controller Service Installation
- [9D4](#) Lighting Control Cabinet 120/240 Volt
- [9D5](#) L30 Lighting Control Cabinet 240/480 Volt

## 9E. POLE MOUNTINGS FOR TRAFFIC SIGNALS & LIGHTING UNITS

- [9E1](#) Pole Mountings
  - sheet a: *Pole Mountings for Traffic Signals Type 2*
  - sheet b: *Pole Mountings for Traffic Signals and Lighting Units Type 3 (Heavy Duty)*
  - sheet c: *Pole Mountings for Traffic Signals and Lighting Units Type 4*
  - sheet d: *Pole Mountings for Lighting Units Type 5 (30 feet)*
  - sheet e: *Pole Mountings for Lighting Units Type 6 (35 feet)*
  - sheet f: *Pole Mountings for Lighting Unit, Type 17 (40 feet)*
  - sheet g: *Hardware Details for Pole Mountings*
- [9E2](#) Freeway Lighting Unit Pole Wiring
- [9E3](#) Non-Freeway Lighting Unit Pole Wiring
- [9E4](#) Walkway Lighting Unit and Concrete Base, Type 11
- [9E5](#) Traffic Signal Standard Ornamental Bracket Mountings (Typical) for 13 ft. or 15 ft.
- [9E6](#) Traffic Signal Standard Poly Bracket Mountings (Typical) 13 ft. or 15 ft.
- [9E7](#) Traffic Signal Standard Pedestrian and Flasher Typical Mounting Details
- [9E8](#) Type 9, Type 10, Type 9/10 Special, Type 12 and Type 13 Poles with Monotube Arms
  - sheet a: *Type 9 Pole 15'-30' Monotube Arm*
  - sheet b: *Type 9 Special Pole 35' Monotube Arm*
  - sheet c: *Type 9 Special Pole 40' Monotube Arm*
  - sheet d: *Type 9 Special Pole 45' Monotube Arm*
  - sheet e: *Type 10 Pole 15'-30' Monotube Arm*
  - sheet f: *Type 10 Special Pole 35' Monotube Arm*
  - sheet g: *Type 10 Special Pole 40' Monotube Arm*
  - sheet h: *Type 10 Special Pole 45' Monotube Arm*
  - sheet i: *Type 12 Pole 35'-55' Monotube Arm*
  - sheet j: *Type 13 Pole 35'-55' Monotube Arm*
  - sheet k: *General Notes and Hardware Details for Type 9, Type 10, Type 9/10 Special, Type 12 and Type 13 Poles with Monotube Arms*
- [9E12](#) Over Height Poles and Monotube Arms
  - sheet a: *Over Height Type 9 Pole 15 - 30' Monotube Arm*
  - sheet b: *Over Height Type 10 Pole 15' - 30' Monotube Arm*

sheet c: *Over Height Type 12 Pole 35' - 55' Monotube Arm*

sheet d: *Over Height Type 13 Pole 35' - 55' Monotube Arm*

sheet e: *General Notes and Hardware Details for Over Height Type 9, 10, 12 and 13 Poles with Monotube Arms*

## 9F. LOOP DETECTORS

- [9F1](#) Details for the Installation of Temporary Traffic Signal Loop Detector Wires in any Existing Pavement
- [9F4](#) Loop Detector Installed in New Concrete Pavement Round CSCP Pullbox
- [9F7](#) Loop Detector Installed in New Concrete Base with new Asphaltic Overlay Round CSCP Pullbox
- [9F8](#) Loop Detector Placed in Crushed Aggregate Base (New Asphaltic Pavement)
- [9F9](#) Loop Detector Placed in Crushed Aggregate Base (New Concrete Pavement)
- [9F10](#) Loop Detector Installed in Existing or New Asphaltic Pavement with New Asphaltic Overlay
- [9F11](#) Loop Detector Installed in Existing Concrete Pavement with New Asphaltic Overlay
- [9F12](#) Loop Detector Installed in Existing Concrete Pavement
- [9F13](#) Loop Detector Installed in Existing Asphaltic Pavement
- [9F14](#) Loop Detector Installed in New Concrete Pavement Round CSCP Pull Box 45 Degree Elbows to Pull Box
- [9F15](#) Loop Detector Installed in Base Course with Pull (Splice) Box Off Roadway (Options)
  - sheet a: *Loop Detector Installed in Base Course with Pull (Splice) Box Off Roadway (Option 1)*
  - sheet b: *Loop Detector Installed in Base Course with Pull (Splice) Box Off Roadway (Option 2)*
- [9F16](#) Two Loop Detectors Installed in New Concrete Pavement Round CSCP Pull Box 45 Degree Elbows to Pull Box

## 9G. TEMPORARY TRAFFIC SIGNALS

- [9G1](#) Span Wire Temporary Traffic Signal
  - a b c d e f g
- [9G2](#) Bridge Temporary Traffic Signal Installation
  - a b c

## 9H. INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

- [9H1](#) Base ITS Controller Cabinet
- [9H3](#) 2 Circuit Meter Breaker Pedestal
- [9H4](#) 2 Circuit Electrical Service Meter Breaker Pedestal and Breaker Disconnect Box
- [9H5](#) Cabinet Breaker Disconnect Box Installation
- [9H6](#) Signal Assembly Advance Flasher Type 1
- [9H7](#) Signal Assembly Ramp Control Side mount
- [9H8](#) Communications Manhole Detail
- [9H9](#) Communication Vault Type 1
- [9H10](#) Communication Vault Type Round
- [9H11](#) Identification Plaque Requirements and Placement
- [9H14](#) Wireless Detection Sensor Mounting
- [9H15](#) Microwave Detector Assembly and Mounted Controller Installation
- [9H16](#) Wireless Antenna Installation

# 10. FREEWAY LIGHTING DESIGN

## 10A. GENERAL

- [10A1](#) Electrical Handhole Wiring
- [10A2](#) Identification Plaques Light Poles
- [10A3](#) Circuit Identification Plaques Sign Bridges

[10A4](#) Identification Plaques Underdeck and High Mast Lighting

[10A5](#) Electrical Details Ground Mount Light Poles Isolated Neutral Systems

[10A6](#) Electrical Details Ground Mount Light Poles Grounded Neutral Systems

[10A7](#) Electrical Details Ground Mount Light Poles Phase-to-Phase Systems

[10A8](#) Electrical Details Structure Mount Light Poles Isolated Neutral Systems

[10A9](#) Electrical Details Structure Mount Light Poles Grounded Neutral Systems

[10A10](#) Electrical Details Structure Mount Light Poles Phase-to-Phase Systems

[10A11](#) Electrical Details Median Mount Light Poles Isolated Neutral Systems

[10A12](#) Electrical Details Median Mount Light Poles Grounded Neutral Systems

[10A14](#) Electrical Details High Mast Lighting  
a b

[10A15](#) Electrical Details Underdeck Lighting  
a b

[10A17](#) Poles  
sheet a: *Poles, Type 7 Aluminum - 35' - 10" Shaft*  
sheet b: *Poles, Type A Aluminum 47' - 6" Shaft*  
sheet c: *Poles, Type E Aluminum 49' - 0" Shaft*  
sheet d: *Poles, Type F Aluminum 49' - 0" Shaft*

[10A18](#) Luminaire Arms  
sheet a: *Luminaire Arms, Single Member 6-inch Clamp*  
sheet b: *Luminaire Arms, Truss Type 6-inch Clamp*

## 11. GEOMETRIC DESIGN

### 11A. MEDIANS

[11A1](#) Maintenance Crossover for Freeways

[11B1](#) Concrete Corrugated Median

[11B2](#) Concrete Median Nose

## 12. STRUCTURES

### 12A. GENERAL

[12A3](#) Name Plate (Structures)

[12A4](#) Structure Identification Plaques, Ramp Gates, Sign Bridges, Overhead Sign Supports and Traffic Signals

## 13. PAVEMENT DESIGN

### 13A. GENERAL

[13A3](#) Concrete Pavement Shoulders

[13A5](#) Shoulder Rumble Strip, Milling  
a b

[13A7](#) Continuously Reinforced Concrete Pavement Repair and Replacement

[13A8](#) Asphaltic Rumble Strips at Intersection

[13A9](#) Concrete Rumble Strips at Intersection

[13A10](#) 2-Lane Rural Shoulder Rumble Strip, Milling  
sheet a: *Shoulder Rumble Strips - Asphalt*  
sheet b: *Shoulder Rumble Strips - Concrete*  
sheet c: *Shoulder Rumble Strips - Asphalt, Sinusoidal*  
sheet d: *Shoulder Rumble Strips - Concrete, Sinusoidal*

sheet e: *Edge Line Rumble Strips – Asphalt*

sheet f: *Edge Line Rumble Strips – Concrete*

sheet g: *Shoulder and Edge Line Rumble Strips – Crossings, Intersections, Bridges, Driveways*

sheet h: *Shoulder and Edge Line Rumble Strips – Railroad, Passing, Climbing and Bypass Lanes*

[13A11](#) 2-Lane Rural Center Line Rumble Strip, Milling

sheet a: *Centerline Rumble Strips – Asphalt*

sheet b: *Centerline Rumble Strips – Concrete*

sheet c: *Centerline Rumble Strips – Asphalt, Sinusoidal*

sheet d: *Centerline Rumble Strips – Concrete, Sinusoidal*

## 13B. APPROACH DETAILS

[13B1](#) Pavement Details for Railroad Approach

sheet a: *Pavement Details for Railroad Approach*

sheet b: *Typical Sections for Railroad Approach*

[13B2](#) Concrete Pavement Approach Slab

sheet a: *Concrete Pavement Approach Slab*

sheet b: *Structural Approach Slab and Concrete Pavement Approach Slab*

## 13C. JOINTS

[13C1](#) Concrete Pavement Longitudinal Joints and Ties

[13C4](#) Urban Non-Doweled Concrete Pavement

[13C8](#) Concrete Pavement Partial Depth Repair

[13C9](#) Concrete Pavement Repair and Replacement

a b c

[13C10](#) Retrofit Dowel Bars

[13C11](#) Rural Doweled Concrete Pavement

a b

[13C13](#) Urban Doweled Concrete Pavement

[13C14](#) Base Patching Concrete

a b c

[13C15](#) Concrete Base

a b

[13C16](#) Detail for Right Turn Lane/ Tee Intersection Bypass Lane on a Concrete Roadway

a b

[13C18](#) Concrete Pavement Jointing

sheet a: *Concrete Pavement Jointing*

sheet b: *Concrete Placement Steel Reinforcement*

sheet c: *Concrete Pavement Joint Types*

sheet d: *Concrete Pavement Jointing at Utility Fixtures*

sheet e: *Concrete Pavement Jointing and Steel Reinforcement in Roundabouts*

sheet f: *Concrete Pavement Intersection Boxout for Integral Curb and Gutter*

sheet g: *Concrete Pavement Jointing Acceleration/Deceleration Lane*

[13C19](#) HMA Longitudinal Joints

## 14. INCIDENTAL DESIGN

### 14A. PRESERVATION DETAILS

[14A1](#) Tree Preservation Details

[14A2](#) Tree Planting Detail

## 14B. VEHICLE BARRIER SYSTEMS

### [14B7](#) Concrete Barrier Temporary Precast

a b c d e f g h i j k l m n

### [14B8](#) Crash Cushion/Sand Barrel Array and Other Temporary Barrier Layout Details

sheet a: *End Treatments and General Note*

sheet b: *End Treatments and Transitions from Unanchored barrier to Anchored Barrier*

sheet c: *Overlapping of Temporary Barrier and Temporary Barrier Downstream of Hazard*

sheet d: *Connecting Temporary Barrier to Permanent Barrier and Overlapping Downstream Temporary Barrier with Permanent Barrier*

sheet e: *Median Installation*

### [14B11](#) Concrete Barrier (Double Faced)

### [14B15](#) Steel Plate Beam Guard, Class "A", Installation and Elements

a b c

### [14B16](#) Anchorage for Steel Plate Beam Guard Type 2

a b

### [14B18](#) Steel Plate Beam Guard, Class "A"

sheet a: *Steel Plate Beam Guard, Class "A" (at Bridges, Obstacles and Sideroads/Driveways)*

sheet b: *Steel Plate Beam Guard, Class "A" at Median Approach to Bridges at Median Piers and Sign Supports*

### [14B20](#) Steel Thrie Beam Structure Approach

sheet a: *Steel Thrie Beam Structure Approach*

sheet b: *Steel Thrie Beam Structure Approach, Connection to Square End Parapets*

sheet c: *Steel Thrie Beam Structure Approach, Connection to Vertical Faced Parapets*

sheet d: *Steel Thrie Beam Structure Approach, Connection to Sloped End Parapets*

sheet e: *Steel Thrie Beam Structure Approach, Connection to Bridge Railing Types "F" and "W"*

sheet f: *Steel Thrie Beam Structure Approach, Connection to Bridge Railing Type "M"*

sheet g: *Steel Thrie Beam Structure Approach, Connector Plate Detail*

sheet h: *Steel Thrie Beam Structure Approach, Single Slope Attachment*

### [14B22](#) Concrete Barrier, Single Faced (with Anchorage)

a b

### [14B24](#) Steel Plate Beam Guard Energy Absorbing Terminal

a b c

### [14B25](#) Steel Plate Beam Guard, Class "A", Over Low Fill Culverts

### [14B26](#) Steel Thrie Beam Bullnose Terminal

a b c d e f g h

### [14B27](#) Steel Plate Beam Guard Short Radius Terminal

a b c

### [14B28](#) Guardrail Mow Strip

a b

### [14B29](#) Safety Edge

### [14B32](#) Concrete Barrier Single Slope (CBSS)

sheet a: *Concrete Barrier Single Slope-Standard, Barrier on Bridge, Delineation*

sheet b: *Concrete Barrier Single Slope-Steel Reinforcement*

sheet c: *Concrete Barrier Single Slope Fixed Object Protection*

sheet d: *Concrete Barrier Single Slope-Drainage and Joint Detail*

sheet e: *Concrete Barrier Single Slope-Cold Joint and Height Transition*

sheet f: *Concrete Barrier Single Slope-End Anchor and Median Barrier, Reinforcement*

sheet g: *Concrete Barrier Single Slope and Retaining Wall*

sheet h: *Concrete Barrier Single Slope-Retrofit and Repair*

### [14B33](#) Concrete Barrier Single Slope Thrie Beam Anchorage

- sheet a: *Concrete Barrier Single Slope 32-inch Thrie Beam Anchorage - Barrier Layout*
- sheet b: *Concrete Barrier Single Slope 32-inch Thrie Beam Anchorage - Steel Layout #1*
- sheet c: *Concrete Barrier Single Slope 32-inch Thrie Beam Anchorage - Steel Layout #2*
- sheet d: *Concrete Barrier Single Slope 36-inch Thrie Beam Anchorage - Barrier Layout*
- sheet e: *Concrete Barrier Single Slope 36-inch Thrie Beam Anchorage - Steel Layout #1*
- sheet f: *Concrete Barrier Single Slope 36-inch Thrie Beam Anchorage - Steel Layout #2*
- sheet g: *Concrete Barrier Single Slope 42-inch Thrie Beam Anchorage - Barrier Layout*
- sheet h: *Concrete Barrier Single Slope 42-inch Thrie Beam Anchorage - Steel Layout #1*

[14B34](#) Concrete Barrier Single Slope for Runs under 40-Foot Long

- sheet a: *32-inch, 36-inch and 42-inch Concrete Barrier Single Slope Class B*
- sheet b: *56-Inch Concrete Barrier Single Slope Class B*
- sheet c: *Concrete Barrier Single Slope Type B*

[14B35](#) Single-Faced NJ Shape Concrete Barrier to Single Slope Concrete Barrier Transitions

- sheet a: *32-Inch Single-Faced NJ Shape to 32-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet b: *32-Inch Single-Faced NJ Shape to 32-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet c: *32-Inch Single-Faced NJ Shape to 36-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet d: *32-Inch Single-Faced NJ Shape to 36-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet e: *42-Inch Single-Faced NJ Shape to 42-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet f: *42-Inch Single-Faced NJ Shape to 42-Inch Single Slope Concrete Barrier Transition - Steel Layout*

[14B36](#) F Shape Concrete Barrier to Single Slope Concrete Barrier Transitions

- sheet a: *32-Inch Single-Faced F Shape to 32-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet b: *32-Inch Single-Faced F Shape to 32-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet c: *32-nch Single-Faced F Shape to 36-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet d: *32-Inch Single-Faced F Shape to 36-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet e: *42-Inch Single-Faced F Shape to 42-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet f: *42-Inch Single-Faced F Shape to 42-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet g: *51-Inch Single-Faced F Shape to 42-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet h: *51-Inch Single-Faced F Shape to 42-Inch Single Slope Concrete Barrier Transition - Steel Layout*
- sheet i: *51-Inch Single-Faced F Shape to 56-Inch Single Slope Concrete Barrier Transition - Transition Layout*
- sheet j: *51-Inch Single-Faced F Shape to 56-Inch Single Slope Concrete Barrier Transition - Steel Layout*

[14B37](#) Double-Faced NJ Shape Concrete Barrier to Single Slope Concrete Barrier Transitions

- sheet a: *32-Inch Double-Faced NJ Shape to 36-Inch Single Slope Concrete Barrier Transition – Transition Layout*
- sheet b: *32-Inch Double-Faced NJ Shape to 36-Inch Single Slope Concrete Barrier Transition - Steel Layout*

[14B38](#) Double-Faced F Shape Concrete Barrier to Single Slope Concrete Barrier Transitions

- sheet a: *32-Inch Double-Faced F Shape to 32-Inch Single Slope Transition - Transition Layout*
- sheet b: *32-Inch Double-Faced F Shape to 32-Inch Single Slope Transition - Steel Layout*
- sheet c: *32-Inch Double-Faced F Shape to 36-Inch Single Slope Transition - Transition Layout*
- sheet d: *32-Inch Double-Faced F Shape to 36-Inch Single Slope Transition - Steel Layout*

[14B39](#) Height Transitions for Single Slope Concrete Barrier

- sheet a: *32-inch to 36-inch Single Slope Concrete Barrier Height Transition*
- sheet b: *36-inch to 42-inch Single Slope Concrete Barrier Height Transition*
- sheet c: *42-inch to 56-inch Single Slope Concrete Barrier Height Transition*

[14B40](#) Vertical Faced Concrete Barrier to Single Slope Concrete Barrier Transitions

- sheet a: *32-Inch Vertical to 32-Inch Single Slope Transition - Transition Layout*
- sheet b: *32-Inch Vertical to 32-Inch Single Slope Transition - Steel Layout*
- sheet c: *32-Inch Vertical to 36-Inch Single Slope Transition - Transition Layout*
- sheet d: *32-Inch Vertical to 36-Inch Single Slope Transition - Steel Layout*
- sheet e: *42-Inch Vertical to 42-Inch Single Slope Transition - Transition Layout*
- sheet f: *42-Inch Vertical to 42-Inch Single Slope Transition - Steel Layout*
- sheet g: *51-Inch Vertical to 42-Inch Single Slope Transition - Transition Layout*



- sheet h: *51-Inch Vertical to 42-Inch Single Slope Transition - Steel Layout*
- sheet i: *56-Inch Vertical to 56-Inch Single Slope Transition - Transition Layout*
- sheet j: *56-Inch Vertical to 56-Inch Single Slope Transition - Steel Layout*

[14B41](#) Single Slope Roadside Retaining Wall

- sheet a: *Single Slope Roadside Retaining Wall - Cross Section and Steel Details*
- sheet b: *Single Slope Roadside Retaining Wall - Placement and Drainage*

[14B42](#) Midwest Guardrail System (MGS) Guardrail

- sheet a: *Midwest Guardrail System (MGS) - Installation Cross Sections, Post and Block Details*
- sheet b: *MGS - Bolt, Post Spacing, Reflector Detail*
- sheet c: *MGS - Block-out Depth, Bolt Detail, Beam Lapping, Alternative Wood Block-out and Adjusting post spacing for Obstructions*
- sheet d: *MGS - Missing Post Details*

[14B43](#) Midwest Guardrail System Long Span (MGS L)

- sheet a: *Midwest Guardrail System Long Span (MGS L) Two-way Road Layout*
- sheet b: *Midwest Guardrail System Long Span (MGS L) One-way Road Layout*
- sheet c: *Midwest Guardrail System Long Span (MGS L) Cross Section and CRT Post Details*

[14B44](#) Midwest Guardrail System (MGS) Terminal

- sheet a: *Midwest Guardrail System (MGS) Energy Absorbing Terminal (EAT) - Layout*
- sheet b: *MGS EAT - Ground Strut, Anchor Cable Box, Bearing Plate*
- sheet c: *MGS EAT - Post Details, Block Detail, Marker Post Detail, Reflective Sheeting Detail*

[14B45](#) Midwest Guardrail System (MGS) Thrie Beam Transition

- sheet a: *Midwest Guardrail System (MGS) Thrie Beam Transition - Layout*
- sheet b: *MGS Thrie Beam Transition - Post Details, Thrie Beam Terminal Connector Details, Splice Detail, Cross Section*
- sheet c: *MGS Thrie Beam Transition - Thrie Beam Details, Post Details, Block Details*
- sheet d: *MGS Thrie Beam Transition - W and Thrie Beam Connection to Bridge Parapet with Square Ends*
- sheet e: *MGS Thrie Beam Transition - W and Thrie Beam Connection to Vertical Faced Parapets*
- sheet f: *MGS Thrie Beam Transition - W and Thrie Beam Connection to Bridge Parapets with Sloped Ends*
- sheet g: *MGS Thrie Beam Transition - Connection to W and F Bridge Parapet*
- sheet h: *MGS Thrie Beam Transition - Connection to M Bridge Parapet*
- sheet i: *MGS Thrie Beam Transition - Single Slope Connection Plate Details*
- sheet j: *MGS Thrie Beam Transition - Connection to Single Slope Barrier*
- sheet k: *MGS Thrie Beam Transition - Approach Connection to NY Bridge Parapets*
- sheet l: *MGS Thrie Beam Transition - Downstream Connection to NY Bridge Parapets*

[14B47](#) Midwest Guardrail System (MGS) Type 2 Terminal

- sheet a: *Midwest Guardrail System (MGS) Type 2 Terminal - Terminal Layout*
- sheet b: *MGS Type 2 Terminal - Details*
- sheet c: *MGS Type 2 Terminal – Post Components and Assemblies*
- sheet d: *MGS Type 2 Terminal – Ground Strut, Guardrail, Cable Assembly Components*
- sheet e: *MGS Type 2 Terminal – Arm Components and Assembly, Cable Bracket Components and Assembly*
- sheet f: *MGS Type 2 Terminal – Part List*
- sheet g: *MGS Type 2 Terminal – Part List*

[14B48](#) Retrofit Cantilever Blunt End

- sheet a: *Retrofit Cantilever Blunt End - Elevation, Section details, Installation and Bill of Materials*
- sheet b: *Retrofit Cantilever Blunt End - Components*

[14B49](#) Retrofit Cantilever Sloped End

- sheet a: *Retrofit Cantilever Sloped End - Elevation, Section Detail Installation and Bill of Materials*
- sheet b: *Retrofit Cantilever Sloped End - Anchor Plate Assembly Parts and Component Details*

[14B50](#) Thrie Beam Approach Retrofit Installation of Missing Post

- sheet a: *Thrie Beam Approach Retrofit Installation of Missing Post - Missing Post Cross-Beam Layout*

- sheet b: *Thrie Beam Approach Retrofit Installation of Missing Post - Missing Post Cross-Beam Components*
- sheet c: *Thrie Beam Approach Retrofit Installation of Missing Post -Post Details, Bill of Materials*

[14B51](#) Anchor Post Assembly Top Mounted

- sheet a: *Anchor Post Assembly Top-Mounted - Layout and Mounting Details*
- sheet b: *Anchor Post Assembly Top-Mounted - Assembly Details*
- sheet c: *Anchor Post Assembly Top-Mounted - Fill, Joint Placement and Bill of Materials*

[14B52](#) Cable Barrier Type 1

- sheet a: *Cable Barrier Type 1 - Layout, Material List*
- sheet b: *Cable Barrier Type 1 - Rock Excavation, Cross Section, Line Post Details*
- sheet c: *Cable Barrier Type 1- Layout, Bill of Materials*

[14B53](#) Short Radius MGS

- sheet a: *Short Radius Beam Guard and Terminal (MGS) - Layout*
- sheet b: *Short Radius Beam Guard and Terminal (MGS) - Short Radius Terminal Views, Detail A*
- sheet c: *Short Radius Beam Guard and Terminal (MGS) - Terminal Detail B, Detail C and Detail D*
- sheet d: *Short Radius Beam Guard and Terminal (MGS) - Terminal Anchor Bracket and Anchor Bracket Bearing Details*
- sheet e: *Short Radius Beam Guard and Terminal (MGS) - End Section Buffer, Terminal Connector, Reflector Sheeting Parts*
- sheet f: *Short Radius Beam Guard and Terminal (MGS) - Washer, Post, Tube, Plate and Terminal Post Details, Cable Assembly Detail*
- sheet g: *Short Radius Beam Guard and Terminal (MGS) - Part List*
- sheet h: *Short Radius Beam Guard and Terminal (MGS) - Part List*
- sheet i: *Short Radius Beam Guard and Terminal (MGS) - Part List*

**14C. RECREATIONAL FACILITIES**

[14C1](#) Timber Rail Guard Fence, Curb and Guard Post and Marker Post

[14C2](#) Historical Marker Construction

[14C3](#) Roadside Picnic Table

[14C6](#) Wayside Well Shelter and Pump and Well Platform

a b

[14C7](#) Picnic Tables, Single Pedestal

a b

**15. RW, ACCESS CONTROL AND TRAFFIC CONTROL**

**15A. MARKER POSTS**

[15A1](#) Marker Post for Right-of-Way

- sheet a: *Marker Post for Right-of-Way*
- sheet b: *Flexible Marker Post for Right-of-Way*

[15A3](#) Flexible Marker Post for Culvert End

a b

[15A4](#) Delineator and Delineator Post

- sheet a: *Flexible Delineator Post*
- sheet b: *Barrier Wall Delineator with Reflective Sheeting*
- sheet c: *Delineator Post with Reflective Sheeting*
- sheet d: *Channelizing Devices, Permanent Flexible Tubular Marker Post*
- sheet e: *Delineator Post with Reflective Sheeting*

[15A7](#) Object Marker for Hazardous Culverts

**15B. FENCING**

[15B1](#) Fence Woven Wire

a b

[15B3](#) Chain Link Fence

a b

[15B10](#) Wood Gate, Double Leaf

a b c

[15B11](#) Wood Gate, Single Leaf

a b

[15B12](#) Pipe Gate Details

a b

**15C. MARKING AND SIGNING**

[15C2](#) Barricades and Signs for Mainline, Detour, On Ramp, Off Ramp Closures and Advanced Width Restriction

sheet a: *Barricades and Signs for Mainline Closures*

sheet b: *Barricades and Signs for Various Closures*

sheet c: *Detour Signing for Mainline Closures*

sheet d: *On-Ramp Lane Closure*

sheet e: *Traffic Control, Guidance Signing for Off-Ramp Lane Closure*

sheet f: *Advanced Width Restriction Signing*

sheet g: *Traffic Control for Exit Ramp Closure*

sheet h: *Modified Route Assembly for Detour Signing*

[15C3](#) Barricades and Signs for Sideroad Closures

[15C4](#) Traffic Control, Advance Warning Signs 45 M.P.H. or Greater, Two Way Undivided Road Open to Traffic

[15C5](#) Traffic Control, Advance Warning Signs 40 M.P.H. or Less, Two Way Undivided Road Open to Traffic

[15C6](#) Signing and Marking for Two Lane Bridges

[15C7](#) Pavement Marking Words, Symbols and Arrows

sheet a: *Pavement Marking Symbols*

sheet b: *Pavement Marking Words*

sheet c: *Pavement Marking Arrows*

sheet d: *Roundabout Marking Arrows*

sheet e: *Pavement Marking for Bike Lanes*

[15C8](#) Pavement Marking, Mainline and Turn Lanes

sheet a: *Longitudinal Marking (Mainline)*

sheet b: *Pavement Marking (Turn Lanes)*

sheet c: *Pavement Marking (Turn Lanes)*

sheet d: *Pavement Marking (Turn Lanes)*

[15C9](#) Signing and Pavement Crossing, RR Truck Stopping Lane Marking Railroad Grade

sheet a: *Signing and Pavement Marking Details for Railroad - Highway Grade Crossings*

sheet b: *Railroad Truck Stopping Lane Pavement Markings*

[15C11](#) Channelizing Devices

sheet a: *Channelizing Devices - Flexible Tubular Marker Post*

sheet b: *Channelizing Devices - Drums, Cones, Barricades and Vertical Panel*

[15C12](#) Traffic Control for Lane Closure with Flagging Operation

a b

[15C14](#) Aerial Enforcement Bars Pavement Marking Details

[15C18](#) Median Island Marking

sheet a: *Pavement Markings, Median Islands*

sheet b: *Pavement Markings, Median Island Nose*

sheet c: *Median Pavement Markings, Double Arrow Warning Sign Placement*

- [15C19](#) Moving Pavement Marking Operations
  - sheet a: *Moving Pavement Marking Operation - Two-Lane Two-Way Roadway*
  - sheet b: *Moving Pavement Marking Operation – Multi-lane Undivided Roadway*
  - sheet c: *Moving Pavement Marking Operation - Multi-Lane Divided Roadway*
- [15C20](#) Yield Markings
- [15C21](#) Signing and Marking for Two Lane to Four Lane Divided Transitions
- [15C26](#) End-of-Roadway Signing
- [15C29](#) Bicycle Lane Pavement Marking
  - sheet a: *Bicycle Lane Marking*
  - sheet b: *Bicycle Lane – Pavement Marking for Shared Lane 35 MPH or Less*
- [15C31](#) Pavement Marking (Ramps and Gores)
  - sheet a: *Pavement Marking Exit Ramp and Parallel Exit Ramp*
  - sheet b: *Pavement Marking Major Split Freeway to Freeway*
  - sheet c: *Pavement Marking Entrance Ramp and Parallel Entrance Ramp*
  - sheet d: *Pavement Marking, Lane Drop and Lane Reduction*
- [15C33](#) Stop Line and Crosswalk Pavement Marking
- [15C34](#) Standard Application for Temporary Raised Pavement Markers, Type II
- [15C35](#) Pavement Marking
  - sheet a: *Pavement Marking (Intersections)*
  - sheet b: *Pavement Marking (Climbing and Passing Lanes)*
  - sheet c: *Pavement Marking (Climbing and Passing Lanes)*
- [15C36](#) Parking Stall Marking

## 15D. TRAFFIC CONTROL

- [15D4](#) Traffic Control, Ramp Construction Staging
- [15D5](#) Traffic Control, Single Lane Crossover Entrance with Barrier
- [15D6](#) Traffic Control, Two-Lane Two-Way Operation
- [15D7](#) Traffic Control, Temporary Exit Ramp Crossover
- [15D8](#) Traffic Control, Temporary Entrance Ramp Crossover
- [15D9](#) Traffic Control, Single Lane Crossover Exit
- [15D10](#) Traffic Control, Single Lane Crossover Exit with Barrier
- [15D11](#) Traffic Control, Single Lane Crossover
- [15D12](#) Traffic Control
  - sheet a: *Traffic Control, Lane Closure*
  - sheet b: *Traffic Control, Lane Closure, Speed Reduction*
  - sheet c: *Traffic Control, Lane Closure, Dynamic Late Merge System*
  - sheet d: *Traffic Control, Lane Closure, Basic Traffic Queue Warning System*
  - sheet e: *Traffic Control, Lane Closure, Traffic Queue Warning System*
  - sheet f: *Traffic Control, Lane Closure, With Temporary Rumble Strips*
- [15D13](#) Temporary Emergency Pullouts
- [15D14](#) Traffic Control, Two Lane Closure on Freeway or Expressway
- [15D15](#) Traffic Control, Ramp within Lane Closure
  - sheet a: *Traffic Control, Parallel Entrance Ramp within Right Lane Closure*
  - sheet b: *Traffic Control, Entrance Ramp within Left Lane Closure*
  - sheet c: *Traffic Control, Tapered Entrance Ramp within Right Lane Closure*
  - sheet d: *Traffic Control, Tapered Entrance Ramp within Left Lane Closure*
  - sheet e: *Traffic Control, Parallel Exit Ramp within Lane Closure*
- [15D16](#) Traffic Control, Exit Ramp Closure

- [15D20](#) Traffic Control, Single Lane Closure, Non-Freeway/Expressway
  - sheet a: *Traffic Control, Single Lane Closure, Divided Non-Freeway/Expressway*
  - sheet b: *Traffic Control, Single Right Lane Closure Undivided Non-Freeway/Expressway*
  - sheet c: *Traffic Control, Single Left Lane Closure Undivided Non-Freeway/Expressway*
- [15D21](#) Traffic Control, Intersection within Single Lane Closure
  - sheet a: *Traffic Control, Intersection within Single Right Lane Closure*
  - sheet b: *Traffic Control, Intersection within Single Left Lane Closure*
- [15D22](#) Traffic Control, Two Lane Closure, Non-Freeway/Expressway
- [15D23](#) Traffic Control, Intersection within Two Lane Closure
  - sheet a: *Traffic Control, Intersection within Two Right Lane Closure*
  - sheet b: *Traffic Control, Intersection within Two Left Lane Closure*
- [15D27](#) Traffic Control, Shoulder Closure on Divided Roadway, Speeds Greater than 40 M.P.H.
- [15D28](#) Traffic Control, Work on Shoulder or Parking Lane, Undivided Roadway
- [15D29](#) Traffic Control, Vehicle Entrance/Exit or Haul Road
- [15D30](#) Traffic Control, Pedestrian Accommodation
  - sheet a: *Traffic Control, Pedestrian Accommodation*
  - sheet b: *Traffic Control, Temporary ADA Compliant Pedestrian Accommodation*
  - sheet c: *Traffic Control, Temporary Pedestrian Accommodation*
  - sheet d: *Traffic Control, Pedestrian Accommodation*
  - sheet e: *Traffic Control, Pedestrian Accommodation*
  - sheet f: *Traffic Control, Pedestrian Accommodation*
  - sheet g: *Traffic Control, Pedestrian Accommodation*
  - sheet h: *Traffic Control, Pedestrian Accommodation*
  - sheet i: *Traffic Control, Pedestrian Accommodation*
  - sheet j: *Traffic Control, Pedestrian Accommodation*
  - sheet k: *Traffic Control, Pedestrian Accommodation*
  - sheet l: *Traffic Control, Pedestrian Accommodation*
- [15D31](#) Traffic Control, Temporary Bypass Roadway
- [15D32](#) Traffic Control, One Lane Road Stop Condition
- [15D33](#) Traffic Control, One Lane Road with Temporary Signals
- [15D35](#) Ramp Gate
  - a b c
- [15D36](#) Barricade Rack
- [15D37](#) Traffic Control, Flagging Operation, Roundabout
- [15D39](#) Traffic Control for Drop-off Signing
- [15D40](#) Traffic Control, Lane Shift, Multi-Lane Divided or One-Way Road
  - sheet a: *Traffic Control, Full Lane Shift, Non-Freeway/Expressway or Multilane Divided 45MPH or Under*
  - sheet b: *Traffic Control, Full Lane Shift Multilane Divided 50MPH and Greater*
  - sheet c: *Traffic Control, Partial Lane Shift, Non-Freeway/Expressway or Multilane Divided 45MPH or Under*
  - sheet d: *Traffic Control, Partial Lane Shift Multilane Divided 50MPH and Greater*
- [15D41](#) Traffic Control, Lane Shift, Multi-lane Divided
  - sheet a: *Traffic Control Multiple Lane Shift Divided Road*
  - sheet b: *Traffic Control Multiple Lane Shift Divided Road Temporary Rumble Strips*
- [15D42](#) Traffic Control, Two Lane Full Freeway Closure
- [15D43](#) Traffic Control, Short Duration Mobile Operations
- [15D44](#) Traffic Control, Signing on Roadways with Milled Surfaces
- [15D45](#) Traffic Control, Signing on Roadways with Loose Gravel
- [15D46](#) Traffic Control, One-Way Signing

- [15D47](#) Traffic Control, Ingress/Egress
  - sheet a: *Ingress/Egress with Barrier*
  - sheet b: *Ingress/Egress without Barrier*
- [15D48](#) Traffic Control, Lane Shift in Flagging Operation
- [15D49](#) Traffic Control, System Ramp Closure
- [15D50](#) Traffic Control, Added Lane Closure
  - sheet a: *Added Lane Closure without Lane Shift*
  - sheet b: *Added Lane Closure with Lane Shift*
- [15D51](#) Traffic Control, Mobile Operations on an Undivided Roadway

## 16. SURVEYING

### 16A. MONUMENTS

- [16A1](#) Landmark Reference Monuments and Covers