LRFD

Section 4.0

Revised: **Oct. 2006**

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(A1.1)

Use the following note on LRFD plans.
Omit parts not applicable

GENERAL NOTES:
Design Specifications:

2004 - AASHTO LRFD 3rd Edition and 2005 Interims (Superstructure)
Load and Resistance Factor Design
2002 - AASHTO 17th Edition (Substructure)
Load Factor Design
Seismic Performance Category
Acceleration Coefficient =
Use the following note on plans when repairing concrete deck.
Bridge deck rating (3 to 9) is from the bridge inspection report.
Bridge Deck Rating =

Design Loading:
HL-93 (LRFD Superstructure, LFD Substructure)
35#/Sq. Ft. No Future Wearing Surface
Defense Transporter Erector Loading
Earth 120 #/Cu. Ft., Equivalent Fluid Pressure 45#/Cu. Ft. (1)
Ø = ___
Superstructure: Simply-supported, non-composite for dead load.
Continuous composite for live load.
(2)

Use the following note on LFD plans after July 2003 Letting
Omit parts not applicable

GENERAL NOTES:
Design Specifications:

2002 - AASHTO 17th Edition
Load Factor Design
Seismic Performance Category
Acceleration Coefficient =
Use the following note on plans when repairing concrete deck.
Bridge deck rating (3 to 9) is from the bridge inspection report.
Bridge Deck Rating =

Design Loading:
HS20-44
HS20 Modified
35#/Sq. Ft. No Future Wearing Surface
Military 24,000# Tandem Axle
Defense Transporter Erector Loading
Earth 120 #/Cu. Ft., Equivalent Fluid Pressure 45#/Cu. Ft. (1)
Ø = ___
Fatigue Stress - Case I Case II Case III
Superstructure: Simply-supported, non-composite for dead load.
Continuous composite for live load.
(2)

(1) Use 45 #/cu. ft. (min.) for bridges and retaining walls, and 30 #/cu. ft.(min.), 60 #/cu. ft. (max.) for box culverts. (Modify if Ø angle dictates.)

(2) All Prestressed Concrete Girder Structures.

Omit parts underlined when not applicable.

General Notes Design Specifications, Loadings & Unit Stresses

(A1.2) Omit parts not applicable

Design Unit Stresses:

Class B Concrete (Substructure)	fc = 1,200	f'c = 3,000	psi
Class B-2 Concrete (Drilled Shafts & Rock Sockets)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete (Superstructure)	fc = 1,600	f'c = 4,000	psi
Class B-2 Concrete (Superstructure, except Prestressed Girders and Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete (Substructure)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete (Box Culvert)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi
Class B-2 Concrete (Superstructure, except Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi(1)
Reinforcing Steel (Grade 40)	fs = 20,000	fy = 40,000	psi
Reinforcing Steel (Grade 60)	fs = 24,000	fy = 60,000	psi
Structural Carbon Steel(ASTM A709 Grade 36)	fs = 20,000	fy = 36,000	psi
Structural Steel (ASTM A441)	fs = 23,000	fy = 42,000	psi
Structural Steel (ASTM A441)	fs = 25,000	fy = 46,000	psi
Structural Steel (ASTM A441)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade 42)	fs = 23,000	fy = 42,000	psi
Structural Steel (ASTM A709 Grade 50)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade 50W)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade HPS50W)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade HPS70W)	fs = 38,000	fy = 70,000	psi
Steel Pile (ASTM A709 Grade 36)	fb = **	fy = 36,000	psi
Steel Pile (ASTM A709 Grade 50)	fb = **	fy = 50,000	psi

For precast prestressed panel stresses, see sheet no. __.

For prestressed girder stresses, see sheet no's. __ & __.

** 6,000 9,000 12,000 Design bearing for point bearing piles which are to be driven to rock or other point bearing material shall be designed 9,000 psi, unless the Design Layout specifies otherwise.

(1) Slabs, diaphragms or beams poured integrally with the slab.

Note to Detailer: Use f'c and fy for Load Factor Design.

Omit parts underlined when not applicable.

All Boxes

(A2.0)

The box shown below indicating whether a precast or cip box was used should be checked by MoDot Construction personnel:

☐ Precast Box used

☐ Cast-in-Place Box used

All Boxes on Rock

(A2.1)

Anchor full length of walls by excavating 6″ into and casting concrete against vertical faces of hard, solid, undisturbed rock.

(A2.1.1)

Holes shall be drilled 12″ into solid rock with E1 and E2 bars grouted in.

All Boxes with Bottom Slab

(A2.2)

When alternate precast box sections are used, the minimum barrel length measured along the shortest wall from the first joint to the outside of the headwall, shall be 3′-2″. Reinforcement and dimensions for the wings and headwalls shall be in accordance with Missouri Standard Plans drawing.

Culverts on Rock Where Holes or Crevices may be Found
(Normally where soundings show rock to be very irregular)

(A2.3)

(The designer should check with Structural Project Manager before placing this note on the plans.)

Where, under short lengths of walls, top of rock is below elevations given for bottom of walls, plain concrete footings 3′-0″ in width shall be poured up from rock to bottom of walls. If top of rock is more than 3′-0″ below bottom of short wall sections, the walls between points of support on rock, shall be designed and reinforced as beams and spaces below walls filled as directed by the engineer. Payment for plain concrete footings and concrete reinforced as wall beams will be considered completely covered by the contract unit price for Class B-1 Concrete.

Box Type Structures on Rock or Shale Widened or Extended with Floor
(Example)

(A2.4)

Fill material under the 5″ slab shall be firmly tamped before the slab is poured.

Box Culverts with Bottom Slab that Encounter Rock

(Use the following note (A2.5) when specified on the Design Layout.)

(A2.5)

Excavate rock 6" below bottom slab and backfill with suitable material for culverts on rock in accordance with Sec 206.

Curved Box Culverts

(Box on curve)

(A2.6)

The contractor will have the option to build the curved portion of the structure on chords (maximum of 16'-0").

(Use the following note (A2.7) when special backfill is specified on the Design Layout.)

(A2.7)

Excavate 3'-0" below the box and fill with suitable backfill material.

For Box Culverts where collar is provided, place the following note on plan sheet.

(A2.8)

If precast option is used, collars shall be provided between all precast pieces.

For Box Culverts with transverse joint(s), place notes A2.9 and A2.10 on the plan sheet. These notes are not needed if an appropriate standard plan is referenced.

(A2.9)

A filter cloth 3 feet in width and double thickness shall be applied to all transverse joints in the top slab and sidewalls. The material shall be centered on the joint and the edges sealed with a mastic or with two sided tape. The filter cloth shall be a geotextile meeting the approval of the engineer and having a grab tensile strength of 180 pounds (ASTM D-4632) and an apparent opening size of 50 to 100 (ASTM D-4751). Cost of furnishing and installing the filter cloth will be considered completely covered by the contract unit price for other items.

(A2.10)

Preformed fiber expansion joint material shall be securely stitched to one face of the concrete with no. 10 gage copper wire or no. 12 gage soft drawn galvanized steel wire.

(A2.11)

If unsuitable material is encountered, excavation of unsuitable material and furnishing and placing of granular backfill shall be in accordance with Sec 206.

(A2.12)

Note: Slope of bottom slab shall be placed at natural stream gradient.

(A2.13)

Holes for anchor bolts shall be set with suitable templates in exact position and securely fixed to prevent displacement, or at the contractors option the holes may be drilled.

Neoprene Pads:

(A3.2) Does not apply to Type "N" PTFE Bearings & Laminated Neoprene Bearing Pad Assembly.

Bearings shall be 50 60 70 durometer neoprene pads.

Fabricated Steel Connections:

(A3.3) Use on all steel structures.

Field connections shall be made with 3/4" diameter high strength bolts and 13/16" diameter holes, except as noted.

Joint Filler:

(A3.4) Use on all structures (except culverts).

All joint filler shall be in accordance with Sec 1057 for preformed sponge rubber expansion and partition joint filler, except as noted.

Reinforcing Steel:

(A3.5)

Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise shown.

In "General Notes:" section of plans, place the following notes under the heading "Structural Steel Protective Coatings:".

Steel Structures - Non-Weathering Steel

(A4.1) For new steel - 2nd paragraph shall not apply.

Protective Coating: System G in accordance with Sec 1081.

Surface Preparation: Surface preparation of the existing steel shall be in accordance with Sec 1081 for "Recoating of Structural Steel (System G or H)". The cost of surface preparation will be considered completely covered by the contract lump sum unit price per sq. foot for "Surface Preparation for Recoating Structural Steel".

(A4.2) New Steel - contract unit price for the Fabricated Structural Steel.
Existing Steel - contract lump sum unit price per sq. foot for Field Application of Inorganic Zinc Primer.

Prime Coat: The cost of the prime coat will be considered completely covered by the contract unit lump sum price per sq. foot for the Fabricated Structural Steel "Field Application of Inorganic Zinc Primer". Tint of the prime coat for System G shall be similar to the color of the field coat to be used.

(A4.3)(✳) For existing steel - 2nd paragraph shall not apply.

Field Coat: The color of the finish field coat shall be Gray (Federal Standard #26373) Brown (Federal Standard #30045) Black (Federal Standard #17038) Dark Blue (Federal Standard #25052) Bright Blue (Federal Standard #25095). The cost of the intermediate field coat will be considered completely covered by the contract unit price per sq. foot tons for "Intermediate Field Coat (System G)". The cost of the finish field coat will be considered completely covered by the contract unit price per sq. foot tons for "Finish Field Coat (System G).

At the option of the contractor, the intermediate and finish field coats may be applied in the shop. The contractor shall exercise extreme care during all phases of loading, hauling, handling, erection and pouring of the slab to minimize damage and shall be fully responsible for all repairs and cleaning of the coating systems as required by the engineer.

New Steel Structures - Weathering Steel

(A4.11)

Protective Coating: System H in accordance with Sec 1081.

(A4.12)

Portions of the structural steel embedded in or in contact with concrete, including but not limited to the top flange of girders, shall be coated with not less than 2.0 mils of the prime coat for System H.

(A4.13)

Prime Coat: The prime coat shall be applied in the fabrication shop. The cost of the prime coat will be considered completely covered by the contract unit price for the Fabricated Structural Steel.

(✳) The coating color shall be specified on the Design Layout.

Omit parts underlined when not applicable.

Use notes (A4.14) and (A4.15) when weathering steel structures have an expansion device.

(A4.14)

The surfaces of all structural steel located under expansion joints shall be coated with complete System H within a distance of 1-1/2 times the girder depth, but not less than 10 feet, from the centerline of all deck joints. Within this limit, items to be coated shall include all surfaces of beam, girders, diaphragms, stiffeners, bearings and miscellaneous structural steel items.

(A4.15)

Field Coat: The color of the finish field coat shall be Brown (Federal Standard #30045). The cost of the intermediate and finish field coats will be considered completely covered by the contract unit price for the Fabricated Structural Steel. At the option of the contractor, the intermediate and finish field coats may be applied in the shop. The contractor shall exercise extreme care during all phases of loading, hauling, handling, erection and pouring of the slab to minimize damage and shall be fully responsible for all repairs and cleaning of the coating systems as required by the engineer.

(A4.20) Use note on recoating truss bridges.

For the duration of cleaning and recoating the truss spans, the truss span superstructure in any span shall not be draped with an impermeable surface subject to wind loads for a length any longer than 1/4 the span length at any one time regardless of height of coverage. Simultaneous work in adjacent spans is permissible using the specified limits in each span.

Structures having Access Doors

(A4.23)

Structural steel access doors shall be cleaned and coated in the shop or field with at least two coats of inorganic zinc primer to provide a minimum dry film thickness of 5 mils. In lieu of coating, the access doors may be galvanized in accordance with ASTM A123 and A153. The cost of coating or galvanizing doors will be considered completely covered by the contract unit price for other items.

(A4.24) Structure with no Other Fabricated Structural Steel.

Payment for furnishing, coating or galvanizing and installing access doors and frames will be considered completely covered by the contract unit price for other items.

Weathering steel or concrete structures having girder chairs but no coating item.

(A4.27)

Structural steel for the girder chairs shall be coated with not less than 2 mils of inorganic zinc primer. Scratched or damaged surfaces are to be touched up in the field before concrete is poured. In lieu of coating, the girder chairs may be galvanized in accordance with ASTM A123. The cost of coating or galvanizing the girder chairs will be considered completely covered by the contract unit price for other items.

Omit parts underlined when not applicable.

Structural Steel Protective Coatings:

(A4.31)

Protective Coating: Calcium Sulfonate System in accordance with Sec 1081.

Surface Preparation: Surface preparation of the existing steel shall be in accordance with Sec 1081 for "Overcoating of Structural Steel (Calcium Sulfonate System)". The cost of surface preparation will be considered completely covered by the contract lump sum unit price per sq. foot for "Surface Preparation for Overcoating Structural Steel".

(A4.32)

Rust Penetrating Sealer: The rust penetrating sealer shall be applied to the surfaces of all bearings, overlapping steel plates, pin connections, pin and hanger connections and other locations where rust bleeding, pack rust and layered rust is occurring. The cost of the rust penetrating sealer will be considered completely covered by the contract lump sum price for "Calcium Sulfonate Rust Penetrating Sealer".

(A4.33)

Prime Coat: The cost of the prime coat will be considered completely covered by the contract unit price per sq. foot tons for "Calcium Sulfonate Primer".

(A4.34)

Topcoat: The color of the topcoat shall be Gray (Federal Standard #26373) Brown (Federal Standard #30045) Tan (Federal Standard #23522) Green (Federal Standard #24260). The cost of the topcoat will be considered completely covered by the contract unit price per sq. foot tons for "Calcium Sulfonate Topcoat".

Structures with Exposed Piling

(A4.36) Use note for steel structures or combination structures of steel and concrete.

The prime coat on bracing for intermediate bents shall be the specified system and may be applied in the shop or field.

(A4.37) Use note for concrete structures.

All exposed surfaces of structural steel piles cast-in-place piles and steel sway bracing shall have protective coatings applied in accordance with Sec 702.

(A4.38) Use note when recoating existing exposed piles.

All exposed surfaces of the existing structural steel piles shall be coated with one 6-mil thickness of aluminum gray epoxy-mastic primer applied over an SSPC-SP6 surface preparation in accordance with Sec 1081. The requirements for bituminous coating shall be in accordance with Sec 702. These protective coatings will not be required below the normal low water line or below the existing ground line. The cost of surface preparation will be considered completely covered by the contract lump sum price for "Surface Preparation for Applying Epoxy-Mastic Primer". The cost of the aluminum gray epoxy-mastic primer and bituminous coating will be considered completely covered by the contract lump sum price for "Aluminum Gray Epoxy-Mastic Primer".

In "General Notes:" section of plans, place the following notes under the heading "Concrete Protective Coatings:".

(A4.41) Use note with weathering steel structures.

Temporary coating for concrete bents and piers (weathering steel) shall be applied on all concrete surfaces above the ground line or low water elevation on all abutments and intermediate bents in accordance with Sec 711.

(A4.42) Use note with coating for concrete bents and piers urethane or epoxy.

Protective coating for concrete bents and piers (Urethane) (Epoxy) shall be applied as shown on the bridge plans and in accordance with Sec 711.

Use notes when specified on Design Layout.

(A4.43)

Concrete and masonry protective coating shall be applied on all exposed concrete and stone areas in accordance with Sec 711.

(A4.44)

Sacrificial graffiti protective coating shall be applied on all exposed concrete and stone areas in accordance with Sec 711.

Omit parts underlined when not applicable.

In "General Notes:" section of plans, place the following notes under the heading "Miscellaneous".

Use the following note on all grade separations & bridges over railroads.

(A5.1)

A minimum vertical clearance of __'-_" from top of rails crown of existing lanes and a minimum lateral clearance of __'-_" from the centerline of track to nearest temporary construction falsework centered on existing lane shall be maintained during construction.

Use the following note when traffic is to be maintained during construction.

(A5.2)

Traffic over structure to be maintained during construction. See Roadway plans for traffic control.

Use the following note on all jobs with high strength bolts.

(A5.3)

High strength bolts, nuts and washers will be sampled for quality assurance as specified in Sec 106 and Field Section (FS-712) from Materials Manual.

Use the following note for structures having detached wing walls at end bents.

(A5.4)

Payment for furnishing all materials, labor and excavation necessary to construct the Lt. Rt. both detached wing walls at End Bents No. __ and No.____ including the Class _ Excavation, __Pile, __(1)__, Class B B-1 Concrete (Substr.) (2) and Reinforcing Steel (Bridges), will be considered completely covered by the contract unit price for these items.

Use the following note on all structures.

(A5.5)

"Sec" refers to the sections in the standard and supplemental specifications unless specified otherwise.

(1) List all items used for the detached wing walls.

(2) For continuous concrete slab bridges, the detached wing walls could be either Class B or Class B-1. (For slab bridges with Class B spread footings, the detached wing walls might as well be Class B, otherwise, Class B-1 may be used.) Check with Project Manager.

Omit parts underlined when not applicable.

Integral End Bents (When bridge slab quantity using note B3.1 table only)

Use the following note (B1.1) on steel structures only.

(B1.1)

All concrete above the lower construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities.

(B1.2)

All concrete above the construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities.

Integral End Bents (When bridge slab quantity using note B3.21 table, slab bid per sq. yd.)

Use the following note (B1.3) on steel structures only.

(B1.3)

All concrete between the upper and lower construction joints in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Steel.

(B1.4)

All concrete above the construction joint in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Integral End Bents

(B1.5)

All reinforcement in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

Intermediate Bents with Concrete Diaphragms

(B1.5.1)

All reinforcement in the intermediate bent concrete diaphragms except reinforcement embedded in the beam cap is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

(B1.5.2)

All concrete above the intermediate beam cap is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Non-Integral End Bents with Concrete Diaphragms

(B1.5.3)

All reinforcement in the concrete diaphragms at End Bents No. __is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

(B1.5.4)

All concrete in the concrete diaphragm at End Bents is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Semi-Deep Abutments

(B1.6)

All concrete and reinforcing steel below top of slab and above construction joint in Semi-Deep Abutments is included in the Estimated Quantities for Slab on Semi-Deep Abutments.

Omit parts underlined when not applicable.

End Bents with Expansion Device

(B1.7)

Concrete above the upper construction joint in backwall at End Bents No. __ is included with Class B-2 Concrete (Slab on _____) Quantities.

Sidewalk

(B1.8)

All concrete and reinforcing steel in sidewalk will be considered completely covered by the contract unit price for Sidewalk (Bridges).

Continuous Concrete Slab Bridge (Notes B1.9.1 thru B1.9.6)

End Bents

(B1.9.1)

All concrete above the construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities.

(B1.9.2)

All reinforcement in the end bents (except detached wing walls) is included with the Superstructure Quantities.

Intermediate Column Bents integral with slab

(B1.9.3)

All concrete above construction joint between slab and columns in the intermediate bents is included with Superstructure Quantities.

(B1.9.4)

All reinforcement in the intermediate bent columns is included with Superstructure Quantities.

Intermediate Pile Cap Bents integral with slab

(B1.9.5)

All concrete in the intermediate bent caps is included with Superstructure Quantities.

(B1.9.6)

All reinforcement in the intermediate bent caps is included with Superstructure Quantities.

Omit parts underlined when not applicable.

Estimated Quantities Notes

Excavation, Sway Bracing & Neoprene Bearing Pads

Use the following note (B1.10) when total estimated excavation is less than 10 cubic yards (No "excavation" item in the Estimated Quantities).

(B1.10)

Cost of any required excavation for bridge will be considered completely covered by the contract unit price for other items.

Retaining Walls

(B1.11)

No Class 1 Excavation will be paid for above lower limits of roadway excavation.

Concrete Structures Having Sway Bracing on Load Bearing Piles

(B1.12)

The cost of furnishing and installing steel sway bracing on piles at the intermediate bents will be considered completely covered by the contract unit price for Fabricated Structural Carbon Steel (Misc.).

Note to Detailer:
For structures having steel sway bracing on piles, the weight of the bracing shall be shown under the substructure quantities.

(B1.13)

Cost of cleaning and coating of bracing at intermediate bents will be considered completely covered by the contract unit price for other items.

Structures Having Neoprene Bearing Pads

(B1.14) Does not apply to Type "N" PTFE Bearings & Laminated Neoprene Bearing Pad Assembly.

Plain Laminated Neoprene Bearing Pads (Tapered) shall be in accordance with Sec 716.

Omit parts underlined when not applicable.

Structures with Welded Wire Fabric

(B2.4)
Weight of 6 x 6 - W2.1 x W2.1 welded wire fabric is included in Estimated Weight of Reinforcing Steel. (✳)

WELDED WIRE FABRIC WEIGHT			
STYLE	SPACE	SIZE	LBS./100 SQ. FT.
6 x 6 - W2.1 x W2.1	6"	8 ga.	30
4 x 4 - W4 x W4	4"	4 ga.	85

See CRSI Manual for other sizes.

Table should not be shown on plans.

✳ Modify for type actually used. Show type on details where the fabric is shown.

"W" denotes smooth wire; the number following indicates cross sectional area in hundredths of a square inch. Deformed wire is denoted by the letter "D".

(B3.1)

	Estimated Quantities			
	Item	Substr.	Superstr.	Total
	Class 1 Excavation cu. yard			
②	Structural Steel Piles ( ) linear foot			
	Class B Concrete cu. yard			
③	Safety Barrier Curb linear foot			
	Reinforcing Steel (Bridges) pound			
①				

①In special cases, entries are made to the quantities table by the Construction after plans are completed. When notes are placed too close to the bottom of this table, additional quantities cannot be entered efficiently. The request has been made that space be left for at least four (4) additional entries to the table before notes are placed on the plans.

②The following note shall be placed under the estimated quantities box when steel piles are used in Seismic Performance Categories B, C & D.

(B3.2)
Cost of channel shear connectors C4 x 5.4 (ASTM A709 Grade 36) in place will be considered completely covered by the contract unit price for Structural Steel Piles (10 in. 12 in. 14 in.).

③Place an ✳ next to the safety barrier curb in the quantity box and add the following note under the estimated quantities box.

(B3.3)
✳ Safety barrier curb shall be cast-in-place option or slip-form option.

The following notes shall be placed under the estimated quantities box when CIP piles are used in Seismic Performance Categories B, C and D.

(B3.4)
All reinforcement in cast-in-place piling at end bents is included in the superstructure quantities.

Do not use for slab bridges with CIP Pile Caps.

(B3.5)
All reinforcement in cast-in-place piling at intermediate bents is included in the substructure quantities for intermediate bents.

Use for slab bridges with CIP Pile Caps.

(B3.6)
All reinforcement in cast-in-place piling at intermediate bents is included in the superstructure quantities for intermediate bents.

Place an ✳✳ next to the transverse diamond grooving in the quantity box and add the following note under the estimated quantities box.

(B3.7)
✳✳ MoDOT will allow, at the contractor's discretion, longitudinal or transverse diamond grooving of the surface of the concrete bridge deck.

Omit parts underlined when not applicable.

Estimated Quantities Notes

Estimated Quantities Tables
Box Culverts

Estimated Quantities Table for Box Culverts

The quantities table on box culvert plans should show an extra column to the right in the table that is labeled "Final Quantities". Estimated quantities should be inserted to the left of this column in the usual manner by the detailer as shown in the example below.

The four extra spaces at the bottom of the table are not required as specified before. (B3.11)

	Estimated Quantities			Final Quantities
	Class 4 Excavation	cu. yard		
*	Class B-1 Concrete (Culverts-Bridge)	cu. yard		
	Reinforcing Steel (Culverts-Bridge)	pound		

* Note to Detailer:
If distance from stream face of exterior wall to exterior wall is ≥ 20′ then should use (Culverts-Bridge) but if < 20′ should use Class B-1 Concrete (Culverts).

Omit parts underlined when not applicable.

The following table is to be placed on the design plans under the table of estimated quantities.

(B3.21) Table of Slab Quantities

Estimated Quantities for _____		
Item		Total
Class B-2 Concrete	cu. yard	
Reinforcing Steel	pound	
Reinforcing Steel (Epoxy Coated)	pound	

Fill in the blank above and in note below with "Slab on Steel", "Slab on Concrete I-Girder", "Slab on Concrete Bulb-Tee Girder", "Slab on Semi-Deep Abutment" or "Reinforced Concrete Slab Overlay".

"Reinforced Concrete Slab Overlay" will be used with prestressed concrete voided slab beams, box girders and double-tees.

(B3.22)
The table of Estimated Quantities for _____ represents the quantities used by the State in preparing the cost estimate for concrete slabs. The area of the concrete slab will be measured to the nearest square yard with the horizontal dimensions as shown on the plan of slab. Payment for prestressed panels, stay-in-place forms, conventional forms, all concrete and coated and uncoated reinforcing steel will be considered completely covered by the contract unit price for the slab. Variations may be encountered in the estimated quantities but the variations cannot be used for an adjustment in the contract unit price.

(B3.23)
Method of forming the slabs shall be as shown on the plans and in accordance with Sec 703. All hardware for forming the slab to be left in place as a permanent part of the structure shall be coated in accordance with ASTM A123 or ASTM B633 with a thickness class SC 4 and a finish type I, II or III.

(B3.24) Use note for optional forming.

Slab shall be cast-in-place with conventional forming or stay-in-place corrugated metal forms. Precast prestressed panels will not be permitted.

Stay-In-Place Forms:

(B3.30)
Permanent steel bridge deck forms, supports closure elements and accessories shall be in accordance with ASTM A446, Grades A thru F, having a coating class of G165 in accordance with ASTM A525. Complete shop drawings of the permanent steel deck forms shall be required in accordance with Sec 1080.

(B3.31)
Corrugations of stay-in-place forms shall be filled with an expanded polystyrene material. The polystyrene material shall be placed in the forms with an adhesive in accordance with the manufacturer's recommendations.

(B3.32)
Form sheets shall not rest directly on the top of girders, stringers or floorbeams flanges. Sheets shall be securely fastened to form supports with a minimum bearing length of one inch on each end. Form supports shall be placed in direct contact with the flange. Welding on or drilling holes in the flanges of the girders, stringers or floorbeams will not be permitted. All steel fabrication and construction shall be in accordance with Sec's 1080 and 712.

Omit parts underlined when not applicable.

Precast Prestressed Panels:

(B3.40)
The Estimated Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder are based on skewed precast prestressed end panels.

(B3.41) Use with Slab on Concrete I-Girder or Bulb-Tee Girder only.
Class B-2 Concrete quantity is based on minimum top flange thickness and minimum joint material thickness.

(B3.42)
The prestressed panel quantities are not included in the table of Estimated Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

The following table shall be placed under the Table of Estimated Quantities on the design plans for alternate asphaltic concrete wearing surface.

(B3.50)

Alternate Asphaltic Concrete Wearing Surface		
	Type of Wearing Surface with Asphalt Binder Type	Mix Used (✓)
✳	SP125BSM Mix with PG 76-22	
✳	SP125BLP Mix with PG 76-22	
✳	SP125BSM Mix with PG 70-22	
✳	SP125CLP Mix with PG 70-22	

MoDOT construction personnel shall complete column labeled "Mix Used (✓)".

✳ The "SP" designates a superpave mixture; the "125" indicates the nominal mixture aggregate size is 12.5 mm, "B" or "C" indicates the design level, the "SM" indicates Stone Mastic Asphalt, and the "LP" indicates the mixture contains limestone/porphyry. See the Design Layout for the type of Superpave mixture required.

See the Design Layout for the asphalt binder required.

(B3.53)

The contractor shall select one of the alternate asphaltic concrete wearing surfaces listed in the table. The mixture shall be in accordance with Sec 403 and produced in accordance with Sec 404.

(B3.54)

The area of the asphaltic concrete wearing surface will be measured and computed to the nearest square yard. This area will be measured transversely from out to out of overlay and longitudinally from end of slab to end of slab.

(B3.56)

Payment for alternate Asphaltic Concrete Wearing Surface will be considered completely covered by the contract unit price per square yard.

Reinforcing Steel Notes Bill of Reinforcing Steel

Place the following notes below or near the "Bill of Reinforcing Steel" when appropriate.

(C1.1)
Same marks used for unlike bars on different units
Bars in the above units are to be billed and tagged separately.

(C1.2)
Incomplete bill (Or bill for different units placed on different sheets)
See Sheet No. __ for bill of reinforcing steel for _____.

BENDING BY CRSI STANDARDS

(C1.3)
All standard hooks and bends other than 180 degree are to be bent with same procedure as for 90 degree standard hooks.

(C1.4)
Hooks and bends shall be in accordance with the procedures as shown on this sheet.

(C1.5)
Nominal lengths are based on out to out dimensions shown in bending diagrams and are listed for fabricators use. (Nearest inch)

(C1.6)
Payweights are based on actual lengths.

(C1.7)
Unless otherwise noted, diameter "D" is the same for all bends and hooks on a bar.

(C1.8)
E = Epoxy coated reinforcement.

(C1.9)
S = Stirrup.

(C1.10)
X = Bar is included in substructure quantities.

(C1.11)
Actual lengths are measured along centerline bar to the nearest inch.

(C1.12)
V = Bar dimensions vary in equal increments between dimensions shown on this line and the following line.

(C1.13)
No. ea. = Number of bars of each length.

(C1.14)
Four angle or channel spacers are required for each column spiral. Spacers are to be placed on inside of spirals. Length and weight of column spirals do not include splices or spacers.

(C1.15)
Reinforcing steel (Grade 60) fy = 60,000 psi.

EPOXY COATED REINFORCING STEEL

Note to Detailer: All reinforcement in the slab and above, and all reinforcement that extends into the slab, shall be epoxy coated; Also, any wing reinforcement that extends into the safety barrier curb shall be epoxy coated.

(Two additional reinforcing bars of each bar size that is required to be epoxy coated, should be included in the bar bill for test purposes. These additional bars should be added to one of the required bar marks and not as a special bar. Test bars should, preferably, be 10 feet or more in length. If a bar 10 foot long cannot be found, use the bar with the largest available straight section.

(C1.16)
Two additional (1) are included in bar bill for testing.

(1) Bar mark of bars for which additional bars have been included.

Reinforcing Steel Notes

Prestressed Girders & Prestressed Panels

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" or under the heading "Reinforcing Steel" when appropiate.)

(C2.1)
All dimensions are out to out.

(C2.2)
Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

(C2.3)
Actual lengths are measured along centerline of bar to the nearest inch.

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" for Prestressed Concrete I-Girders only.)

(C2.4)
Minimum clearance to reinforcing shall be 1".

(C2.5)
All reinforcement shall be Grade 60.

(C2.6)
The two D1 bars may be furnished as one bar at the fabricator's option.

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" for Double-Tee Prestressed Concrete Girders only.)

(C2.7)
Minimum clearance to reinforcing shall be 1", except for 4 x 4 - W4 x W4 <u>and U2 bar</u>. (✳)

(C2.8)
All S and U reinforcing bars shall be epoxy coated.

(C2.9)
All reinforcement shall be Grade 60.

(Place the following notes with the above appropriate notes for prestressed panels.)

(C2.10)
Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise shown.

(C2.11)
If U1 bars interfere with placement of slab steel, U1 loops may be bent over, as necessary, to clear slab steel.

(C2.12)
Welded wire fabric or welded deformed bar mats providing a minimum area of reinforcing perpendicular to strands of 0.22 sq. in./ft., with spacing parallel to strands sufficient to insure proper handling, may be used in lieu of the #3-P2 bars shown. Wire or bar diameter shall not be larger then 0.375 inches. The above alternative reinforcement criteria may be used in lieu of the #3-P3 bars, when required, and placed over a width not less than 2 feet.

✳ Add U2 bar for skewed structures only.

Omit parts underlined when not applicable.

Reinforcing Steel Notes

Prestressed Girders & Prestressed Panels

(Place the following notes with the preceding appropriate notes for prestressed panels.)

(C2.13)
The reinforcing steel shall be tied securely to the 3/8" Ø strands with the following maximum spacing in each direction:
#3-P2 bars at 16 inches.
Welded wire fabric or welded deformed bar mats at 2'-0".

(C2.14)
Tie the #3-U1 bars to the #3-P2 bars, to the welded wire fabric or the welded deformed bar mats at about 3'-0" centers.

(C2.15)
The prestressed panel quantities are not included in the table of estimated quantities for the slab.

(Place the following note near mechanical bar splice detail.)

(C3.1) Use mechanical bar splices when clearances do not allow for lap splices.

The contractor shall use a mechanical bar splice for _____ bars at the specified location. The total bar lengths for bars indicated in the bill of reinforcing steel are determined based on the end of the bars being located flush to the face of the construction joint. No additional payment will be made for any additional bar lengths required for the mechanical bar splices. Mechanical bar splices shall be in accordance with Sec 706 <u>except that no measurement will be made for mechanical bar splice and will be considered completely covered by the contract unit price for the reinforcing steel</u>.

(Underlined portion to be used when the number of mechanical bar splices are less than 50.)

Place the following notes on the front sheet.

(D1.1)

Timber:

All timber shall be standard rough sawn. At the contractor's option, timber may be untreated or protected with commercially applied timber preservatives. All timber shall have a minimum strength of 1500 psi and shall be either douglas fir in accordance with paragraph 123B (MC-19), 124B (MC-19) and 130BB of the current edition of Standard Grading Rules for West Coast Lumber, southern pine in accordance with paragraphs 312 (MC-19), 342 (MC-19) and 405.1 of the current edition of Southern Pine Inspection Bureau Grading Rules, or a satisfactory grade of sound native oak.

(D1.2)

Bolts:

All bolts shall be high strength ASTM A325 except as noted.

(D1.3)

Misc:

The superstructure only & cap beam units will be provided by the State and shall be transported from _____ Maintenance Lot. The superstructure shall be returned and stored at the same location as designated by the engineer after Bridge No. _____ is open to traffic.

(D1.4)

All structural steel shall be ASTM A709 Grade 50W except piles, sway bracing, thrie beam rail assembly and structural tubing. Structural tubing coating shall be in accordance with Sec 718.

Place the following note with shim plate details on the bent sheet.

(D1.11)

Shim plates may be used between pile and channel at the end bents or angle at the intermediate bents. Shim plates may vary in thickness from 1/16" to thickness required.

Place the following note near half section of bridge flooring.

(D1.21)

Steel bridge flooring shall be Foster 5" RB/8.0 or American Bridge 5" Open I-Beam-Lok Type 8S open steel bridge flooring. Trim bars shall be required at the sides and ends of each 39'-10-1/2" unit.

(D1.22)

Note: Field connections shall be 7/8" Ø high strength bolts with holes 1-1/16" Ø except as noted.

Place the following note near details of u-bolts lifting device.

(D1.23)

U-bolts lifting device shall be on the inside top flange at both ends of each exterior stringer of each unit. U-bolts shall be removed during the time the bridge is open to traffic. Position of the U-bolts may be shifted slightly to miss the bars in the flooring.

Remove Old Roadway Fill Under Structure (When specified on the Design Layout.)

(E1.1)
Old roadway fill under the ends of the bridge shall be removed to natural ground line or elevation _____. Removal of old roadway fill will be considered completely covered by the contract unit price for roadway excavation.

Removal of Roadway Fill at Side (When specified on the Design Layout.)

(E1.2)
Old roadway fill on the left right shall be removed to the natural ground line for the length of the new bridge as roadway excavation. Removal of old roadway fill will be considered completely covered by the contract unit price for roadway excavation.

Fill at Pile Cap End Bents (All pile cap end bents)

(E1.4) ✳ Applies to Semi-Deep Abutment.
Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete approach (✳) beam within the limits of the structure and for not less than 25 feet in back of the fill face of the end bents before any piles are driven for any bents falling within the embankment section.

The following table is to be placed on plans and filled out as indicated for spread footings.

Table of spread footings

(E2.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Footing Data					
Bent No.	1 (Except detgched wing walls)	1 (Detgched wing walls only)	2	3	4
Foundation Material	Shale	Shgle	Rock		
Design Bearing ton/sq. foot	5.1	3.5	10.3		

Shallow Footings
(When specified on the Design Layout.)

(E2.2)

In no case shall footings of bents no. _ and _ be placed higher than elevations shown elevations _____.

Omit parts underlined when not applicable.

The following tables are to be placed on the design plans and filled out as indicated.

(E3.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile Data					
Bent No.	1 (Detached wing walls only)	1 (Except detached wing walls)	2	3	4
Pile Type and Size	HP10X42	HP10X42	HP12X53	HP12X53	HP10X42
Number	4	8	5	5	4
Approximate Length foot	40	35	50	70	80
① Design Bearing ton	35	25	60	60	35
Hammer Energy Required foot-pound	7,900	7,900	14,000	14,000	10,100

Minimum energy requirement of hammer is based on plan length and design bearing value of piles.

All piles shall be driven to practical refusal.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for point bearing piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru VI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E3.2)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E3.3)
Prebore to natural ground line.

(Use the following note when pile point reinforcement is required)

(E3.4)
Manufactured pile point reinforcement shall be used on all piles in this structure at Bents___and__.

Omit parts underlined when not applicable.

General Elevation and Plan Notes

Steel Pile & Spread Footing Data Table

The following tables are to be placed on the design plans and filled out as indicated.

(E3.5)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile and Footing Data							
Bent No.			1 (Detached wing walls only)	1 (Except detached wing walls)	2	3	4
Bearing Pile	Pile Type and Size		HP10X42	HP10X42			
	Number		8	4			
①	Approximate Length	foot	35	40			
	Design Bearing	ton	28	35			
	Hammer Energy Required	foot-pound	7,900	7,900			
Spread Footings	Foundation Material				Rock	Rock	Rock
	Design Bearing	ton/sq. foot			9.2	9.4	8.2

Minimum energy requirement of hammer is based on plan length and design bearing value of piles.

All piles shall be driven to practical refusal.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for point bearing piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru VI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E3.6)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E3.7)
Prebore to natural ground line.

(Use the following note when pile point reinforcement is required)

(E3.8)
Manufactured pile point reinforcement shall be used on all piles in this structure at Bents___and__.

Omit parts underlined when not applicable.

The following table is to be placed on the design plans and filled out as indicated. When steel piles are used as friction piles, use the table but leave out "Type" and "Pile Standard". Friction piles are not to be driven to refusal.

Friction Pile Table

(E4.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile Data						
	Bent or Pier No.	1 (Detached wing walls only)	1 (Except detached wing walls)	2	3	4
	Type	Foundation	Foundation	Trestle	Trestle	Foundation
	Kind	CIP	CIP	CIP	CIP	CIP
②	Number	8	4	8	8	4
	Approximate Length foot	35	55	40	40	55
①	Design Bearing ton	20	25	32	32	25
	Min. Tip Penetration elev.	500.0	500.0	490.0	490.0	500.0
	Pile Standard	702.02	702.02	702.02	702.02	702.02
	Hammer Energy Required foot-pound	8,000	8,000	8,000	8,000	8,000

Minimum energy requirement of hammer is based on plan length of piles.

All piles shall be driven to the minimum penetrations and to not less than the design bearings noted.

② This number should not include test piles. If test piles are specified, place an ✳ beside the number of piles at the bents indicated.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for friction piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru VI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E4.2)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E4.3)
Prebore to natural ground line.

(Use the following note when test piles are required.)
(E4.4)
✳ _ concrete test piles shall be driven in permanent position, one for each bents, at bents no. __, __ and ___.

(Use the following note when CIP piles are used in Seismic Performance Categories B, C, or D.)
(E4.5)
Fluted type cast-in-place pile shall not be permitted.

(E4.6)
Manufactured pile point reinforcement shall be used on all piles in this structure at Bents___and__.

Omit parts underlined when not applicable.

Horizontal curves (Bridges not of box culvert type)

(E5.1)

All bents are parallel.

Boring Data

(Place the following note on the Front Sheet when borings are provided)

(E5.2)

"⊕" Indicates location of borings.

Notice and Disclaimer Regarding Boring Log Data

The locations of all subsurface borings for this structure are shown on the bridge plan sheet(s) for this structure. Boring data for the numbered locations is shown on sheet(s) no. __. The boring data for all locations indicated, as well as any other boring logs or other factual records of subsurface data and investigations performed by the department for the design of the project, is available from the Project Contact upon written request as outlined in the Project Special Provisions. No greater significance or weight should be given to the boring data depicted on the plan sheets than is subsurface data available from the district or elsewhere.

The Commission does not represent or warrant that any such boring data accurately depicts the conditions to be encountered in constructing this project. A contractor assumes all risks it may encounter in basing its bid prices, time or schedule of performance on the boring data depicted here or those available from the district, or on any other documentation not expressly warranted, which the contractor may obtain from the Commission.

(Place the following note on all Retaining Wall Plans)

(E5.3)

The boring logs or other factual records of subsurface data and investigations performed by the department for the design of this project are available from the Project Contact upon written request as outlined in the Project Special Provisions.

(Place the following note on the Boring Data Sheet)

(E5.4)

For location of borings see sheet no. _.

Omit parts underlined when not applicable.

Final clearance - Bridges over railroads

(E5.5) Place an (✳) in the vertical clearance dimension and the following note on the front sheet of bridge plans.

(✳) Final vertical clearance from top of rails to bottom of superstructure shall be at least ✳✳. Track elevations should be verified in the field prior to construction to determine if the final vertical clearance shown will be obtained.

✳✳ Clearance specified on the Design Layout (23'-0" min.).

Seal Course
(Use the following notes when Seal Course is specified on the Design Layout.)

(E5.6)
Seal course is designed for a water elevation of _____.

(E5.7)
If the seal course is omitted, by the approval of the engineer, then the bottom of footing shall be placed at elevation <u>(1)</u>. <u>(2) Payment will be made for materials required to lengthen columns and footings. Footing length at elevation (1) shall be (3).</u>

(1) Elevation as shown on the Design Layout.
(2) Do not use payment sentence when footing elevation remains the same.
(3) Increase footing length when required by design.

Omit parts underlined when not applicable.

The following table is to be placed on the design plans and filled out.

(E6.1)

Rock Socket Data				
Bent No.	2	3	4	5
Foundation Material	Rock	Rock	Rock	Rock
Number	x	x	x	x
Design Side Friction tsf	x	x	x	x

(E6.2) Note may not be required with drilled shafts for high mast tower lighting.
An additional 4 feet has been added to V-bar lengths for possible change in drilled shaft or rock socket depth. This excess length shall be cut-off or included in the reinforcement lap if not required.

(E6.3) Note not required with drilled shafts for high mast tower lighting.
Concrete coring shall be performed on of the drilled shafts in accordance with Sec 701. Sonic logging testing shall be performed on all drilled shafts and rock sockets.

Note to designer: Coring shall be approximately 10% of the total number of drilled shafts (ie 1 in 10 shafts or 2 in 20 shafts) or only core one shaft for smaller structures unless additional cores would be prudent for a specific project.

(E6.4) Note to be used only with Drilled Shafts for High Mast Tower Lighting.
Drilling slurry, if used, shall require desanding.

(E6.5) Note to be used only with Drilled Shafts for High Mast Tower Lighting.
Drilled shaft diameter is required to be at least 21″ greater than the largest anticipated anchor bolt circle diameter per the DSP - High Mast Tower Lighting.

The following non-factored base reactions were used to design the drilled shafts for the ___ ft high mast lighting towers: overturning moment = ✳ kip-foot, base shear = ✳ kip and axial force = ✳ kip.

✳ Values used in the design of the drilled shaft.

Omit parts underlined when not applicable.

Expansion Device at End Bents
(G1.1)
Top of backwall for end bents no. _____ shall be formed to the crown and grade of the roadway. Backwall above upper construction joints shall not be poured until the superstructure slab has been poured in the adjacent span.
(G1.1.1)
All concrete above the upper construction joint in backwall shall be Class B-2.

Abutments with Flared Wings
(G1.2)
Longitudinal dimensions shown for bar spacing in the developed elevations are measured along front face of abutments.

Stub Bents
(G1.3)
Safety barrier curbs, parapets and end post shall not be poured until the slab has been poured in the adjacent span.

Stub Bents Embedded in Rock or on Footings
(G1.4)
Rock shall be excavated to provide at least 6" of earth under the beam and wings.

End Bents with Turned-Back Wings
(G1.5) (Use the following note for Non-Integral End Bents only.)
Field bending shall be required when necessary at the wings for #_-H___ bars in the backwalls for skewed structures and for #_-F___ bars in the wings for the slope of the wing.

(G1.6)
For reinforcement of the safety barrier curb, see sheet no. __.

Integral End Bents
(G1.7)
Bend F___ bars in field to clear girders.
(G1.7.1)
All vertical reinforcing bars in the substructure beams or caps shall be field adjusted to clear piles by at least 1-1/2".

(G1.8)
All concrete in the end bent above top of beam and below top of slab shall be Class B-2.
(G1.8.1)
Use the following note for structures having detached wing walls at end bents and there is no Reinforcing Steel (Epoxy Coated) listed in the Estimated Quantities.

The top two epoxy bars in the detached wing walls shall be included with the Superstructure Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

(G1.9)
Strands at end of the girder shall be field bent or, if necessary, cut in field to maintain 1-1/2" minimum clearance to fill face of end bent.

Integral End Bents (Steel structure without steel diaphragms at end bents)
(G1.10)
Concrete diaphragms at the integral end bents shall be poured a minimum of 12 hours before the slab is poured.

Omit parts underlined when not applicable.

Ground Line Within Semi-Deep Abutments
(G1.11)
In no case shall the earth within Abutments No. _ and _ be above the ground line below. Forms supporting the abutment slab may be left in place.

Pile Variation for Semi-Deep Abutments
(G1.12)
The maximum variation of the head of the pile and the battered face of the pile from the position shown on the plans shall be not more than 2 inches for piles under Abutments No._ and_ .

Protective Coating for Steel Shells and Structural Steel Piles for Semi-Deep Abutments
(G1.13)
Exposed steel piles steel pile shells within the abutment shall be coated with a heavy coating of an approved bituminous paint.

All Substructure Sheets with Bearing Anchor Bolts
(G1.15)
All reinforcing bars in the tops of substructure beams or caps shall be spaced to clear anchor bolt wells for bearings by at least 1/2".

All Substructure Sheets with Girder Chairs.
(G1.16)
Cost of furnishing, fabricating and installing girder chairs will be considered completely covered by the contract unit price for Fabricated Structural _____ Steel.

(G1.40) Use the following note at all fixed intermediate bents on prestressed girder bridges with steps of 2" or more.

For steps 2" or more, use 2-1/4" x 1/2" joint filler up vertical face.

(G1.41) Use the following note when vertical column steel is hooked into the bent beam.

At the contractor's option, the hooks of V-Bars embedded in the beam cap may be oriented inward or outward for Seismic Category A. Bending the hook outward, away from the column core, is not allowed for Seismic Category B, C, or D.

(G1.42) Place the following note on plans when using Optional Section for Column-Web beam joints.

At the contractor's option, the details shown in optional section _-_ may be used for column-web beam or tie beam at intermediate bent no. _. No additional payment will be made for this substitution.

(G1.43) Place the following note on plans when you have adjoining twin bridges.

Preformed compression joint seal shall be in accordance with Sec 717. Payment will be considered completely covered by the contract unit price for other items included in the contract.

Omit parts underlined when not applicable.

Deadman Anchors (✳) Size of rod.

(G2.1)
Construction sequence:

(G2.2)
Construct end bent with anchor tees in place.

(G2.3)
Construct deadman with anchor tees in place.

(G2.4)
Machine compact fill up to elevation of (✳)" Ø rod and turnbuckle.

(G2.5)
Install (✳)" Ø rod, clevis and turnbuckle assembly.

(G2.6)
Tighten turnbuckle until snug.

(G2.7)
Hand compact fill for 12" (min.) over (✳)" Ø rod and turnbuckle.

(G2.8)
Machine compact remaining fill.

(G2.9)
All anchor tees, rods, clevises, turnbuckles, etc. shall be fabricated from ASTM A709 Grade 36, ASTM A668 Class F or equivalent steel and galvanized in accordance with Sec 1081. Shop drawings will not be required. All concrete shall be Class B. All reinforcing steel shall be Grade 60.

(G2.10)
All metal members of the anchorage system not embedded in concrete shall be cleaned and receive a heavy coating of an approved bituminous paint.

(G2.11)
Fine aggregate shall be in accordance with Sec 1005 and shall be placed below and above the rod and turnbuckles.

(G2.12)
Payment for all materials, excavation, backfill and any other incidental work necessary to complete the Deadman Anchorage Assembly will be considered completely covered by the contract unit price per each.

(G2.13)
Note: Reinforcing steel lengths are based on nominal lengths, out to out.

(G3.1)

Drain pipe may be either 6″ diameter corrugated metallic-coated steel pipe underdrain, 4″ diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4″ diameter corrugated polyethylene (PE) drain pipe.

(G3.2)

Place drain pipe at fill face of end bent and slope to lowest grade of ground line, also missing the lower beam of end bent by 1-1/2″. (See elevation at end bent.)

(G3.3)

Perforated pipe shall be placed at fill face side at the bottom of end bent and plain pipe shall be used where the vertical drain ends to the exit at ground line.

(G4.1)

Substructure Quantity Table for Bent No.		
Item		Quantity
Class 1 Excavation	cu. yard	x
Structural Steel Pile (in.)	linear foot	x
Class B Concrete (Substructure)	cu. yard	x
Reinforcing Steel (Bridges)	pound	x

✳ Items shown are for example only, use actual items and quantities for each bent.

(G4.2)
Note: These quantities are included in the estimated quantities table on sheet no. __.

Note to Detailer:

Place substructure quantity table on right side of substructure bent sheet.

(G5.1)
All concrete for cast-in-place piles shall be Class B-1.

(G5.2)
Additional thickness may be required for thin shelled types to provide sufficient strength to withstand driving without injury and to resist harmful distortion or buckling due to soil pressure after being driven and the mandrel removed.

(G5.3)
Where 3/4" closure plates are required for tips of pipe piles, the closure plates shall not project beyond the outside diameter of the pipe piles. Satisfactory weldments may be made by beveling tip ends of pipe or by use of inside backing rings. In either case, proper gaps shall be used to obtain weld penetration full thickness of pipe.

(G5.4)
Splice details for cast-in-place concrete piles shall be in accordance with the manufacturer's recommendations.

(G5.5)
All splices of shells for cast-in-place concrete piles shall be made watertight and to the full strength of the shell above and below the splice to permit hard driving without damage. All shells damaged during driving shall be replaced without cost to the State. Shell sections used for splicing shall be at least 5'-0" in length. The splice at the tapered section shall be at least 3'-0" below the streambed for intermediate trestle type bents.

(G5.6)
Waterjetting will be permitted with 20" or 24" piles.

(G5.7)
The minimum wall thickness of any spot or local area of any type shall not be more than 12.5% under the specified nominal wall thickness.

(G5.8)
Note: INDICATE IN REMARKS COLUMN:
A.) IF PILING WERE DRIVEN TO PRACTICAL REFUSAL.
B.) PILE BATTER IF OTHER THAN SHOWN ON BENT DETAIL SHEET.
C.) TYPE OF PILING USED.

(G5.9)
Note: THIS SHEET TO BE COMPLETED BY MoDOT CONSTRUCTION PERSONNEL.

Plate Girders - (Shop welding)

(H1.1)✱
By approval of the engineer, the contractor may omit any shop flange splice by extending the heavier flange plate and providing approved modifications of details at field flange splices and elsewhere as required. All cost of any required design, plan revisions or re-checking of shop drawings shall be borne by the contractor. Payweight in any case will be based on material shown on Design Plans.

(✱) To be used only with the permission of the Structural Project Manager.

Welded Shop Splices

(Place the following note near Welded Shop Splice Details.)

(H1.1.1)
Welded shop web and flange splices may be permitted when detailed on the shop drawings and approved by the engineer. No additional payment will be made for optional welded shop web and flange splices.

(H1.2)
② Weld to compression flange as located on the elevations of girder.

Add the following note to note (H1.2), only when girders are built up with A514 or A517 steel flanges.

(H1.3)
Intermediate web stiffeners shall not be welded to plates of A514 or A517 steel.

Plate Girders with Camber

(Place the following note near the elevation of girder.)

(H1.4)
Plate girders shall be fabricated to be in accordance with the camber diagram shown on sheet no. __.

Detail Camber Diagram with note (H1.5), Dead Load Deflection Diagram with notes (H1.6) and (H1.6.1), and Theoretical Slab Haunch with note (H1.7).

(H1.5)
Camber includes allowance for vertical curve, superelevation transition, and for dead load deflection due to concrete slab, curb, asphalt, concrete wearing surface and structural steel.

(H1.6)
____% of dead load deflection is due to the weight of structural steel.

(H1.6.1)
Dead load deflection includes weight of structural steel, concrete slab, and barrier curb.

Omit parts underlined when not applicable.

(H1.7)
____ dimensions may vary if the girder camber after erection differs from plan camber by more or less than the % of Dead Load Deflection due to weight of structural steel. No payment will be made for any adjustment in forming or additional concrete required for variation in haunching.

Note: Increase the haunch by 1/2"± more than what is required to make one size shear connector work for both the C.I.P. and the S.I.P. Options.

ASTM A709 Grade 50W Structural Steel (Uncoated)

(Place the following note near detail of bolted field splice.)

(H1.8)
Contact surfaces shall be in accordance with Sec 1081 for surface preparation.

Structures without Longitudinal Section

(Place the following note just above slab at part section near end diaphragm and draw an arrow to the top of diaphragm.)

(H1.9)
Haunch slab to bear.

Top of End Bent Backwall (Without expansion device)

(H1.10)
Two layers of 30# roofing felt.

Section thru Spans

(Place the following note on the slab sheet when applicable.)

(H1.11)
For details of safety barrier curb parapet median bridge rail not shown, see sheet no. __.

Web Stiffeners

(H1.12)
Whenever longitudinal stiffeners interfere with bolting the diaphragms cross frames in place, clip stiffeners.

(H1.13)
Longitudinal web stiffeners shall be placed on the outside of exterior girders and on the side opposite of the transverse web stiffener plates for interior girders.

(H1.14)
Transverse web stiffeners shall be located as shown in the plan of structural steel.

(H1.15)
Intermediate web stiffener plate and diaphragm spacing may vary from plan dimensions by a maximum of 3" for diaphragm to connect to the intermediate web stiffener plate.

Wide Flange Beams - (Shop Welding)

(H1.16) To be used only with permission of the Structural Project Manager. By approval of the engineer, the contractor may omit any shop splice by extending the heavier beam and providing an approved modification of details at the field splices. All costs of any required redesign, plan revisions or rechecking of shop drawings shall be borne by the contractor. Payweight in any case will be based on material shown on the design plans.

Shear Connectors

(H1.17) Include shear connectors in material which connectors are attached. Weight of _____ pound of shear connectors is included in the weight of Fabricated Structural _____ Steel.

(H1.18)

Shear connectors shall be in accordance with Sec 712, 1037 and 1080.

Notch Toughness for Wide Flange Beams

(Place an ✳ with all the beam sizes indicated on the "Plan of Structural Steel".)
(Place the following note near the "Plan of Structural Steel".)

(H1.19)

✳ Notch toughness is required for all wide flange beams.

(Place an ✳ with the flange plate, pin plate or hanger bar size indicated on the "Detail of Flange Plates, Pin Plate Connection or Hanger Connection".)

(H1.20)

✳ Notch toughness is required for all <u>welded flange plates</u> <u>pin plates</u> <u>hanger bars</u>.

Notch Toughness for Plate Girders

(Place the following note on the sheet with the Elevation of Girder.)
(See Section 2.4, Page 12-2 for typical examples for the location of ✳✳✳ on details for plate girders.)

(H1.21)

✳✳✳ Indicates flange plates subject to notch toughness requirements.

All web plates shall be subject to notch toughness requirements.

(H1.21.1)

The flange and web splice plates shall be subject to notch toughness requirements, when notch toughness is required for flanges on both sides of splice.

(Place ✳✳✳ near the size of flange splice plates, pin plates or hanger bars and the following note near the detail of flange splice, pin plate connection or hanger connection.)

(H1.22)

✳✳✳ Indicates <u>flange splice plates</u> <u>pin plates</u> <u>hanger bars</u> subject to notch toughness requirements.

Structural Steel for Wide Flange Beams and Plate Girder Structures

(H1.23)

Fabricated structural steel shall be ASTM A709 Grade <u>36</u> <u>50</u>, except as noted.

Tangent Structures on Straight Grades

(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)

Plan of Structural Steel and Elevation of Stringers or Girders

(H1.24)

Longitudinal dimensions are horizontal from ℄ bearing to ℄ bearing.

Omit parts underlined when not applicable.

Oversized Holes for Intermediate Diaphragms

Place the following note near the intermediate diaphragm detail on all tangent wide flange and plate girder structures.

(H1.26)
At the contractor's option, holes in the diaphragm plate of non slab bearing diaphragms may be made 3/16" larger than the nominal diameter of the bolt. A hardened washer shall be used under the bolt head and nut when this option is used. Holes in the girder diaphragm connection plate or transverse web stiffener shall be standard size.

Slab drain attachment holes

Place the following note near the Elevation of Girder detail for plate girders or near the plan view for Wide Flange Beams when Slab Drains are used.

(H1.27)
For location of slab drain attachment holes, see slab drain details sheet.

Tangent Structures on Vertical Curve Grades

(Details of part-longitudinal sections at bents and at steel joints will be required on plans for bridges on vertical curves.)

Plan of Structural Steel

Dimensions given in plan should be identical to horizontal dimensions detailed in Part-Longitudinal Sections or blocking diagram.

(H1.28)
Longitudinal dimensions are horizontal from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on Sheet no. __.

Elevation of Constant Depth or Variable Depth Stringers or Girders

(H1.29)
Longitudinal dimensions are horizontal from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on Sheet no. __.

Horizontally Curved Structures on Straight Grades

(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)

Plan of Structural Steel

(H1.31)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg.

Omit parts underlined when not applicable.

Horizontally Curved Structures on Straight Grades
(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)

Elevation of Stringers or Girders
(H1.32)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg.

Horizontally Curved Structures on Vertical Curve Grades
(Details of part-longitudinal sections at bents and at steel joints will be required on plans for bridges on vertical curves.)

Plan of Structural Steel
(H1.36)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on sheet no. __.

Elevation of Constant Depth or Variable Depth Stringers or Girders
(H1.37)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on sheet no. __.

Structures on Vertical Curve
(H1.39)
Elevations shown are at top of web before dead load deflection.

6 x 6 x 3/8 Angle Connection to Top Flange
(H1.40)
The two 3/4" Ø high strength bolts that connect the 6 x 6 x 3/8 angle to the top flange shall be placed so the nut is on the inside of flange toward the web.

6 x 6 x 3/8 Angle Connection to Top Flange for Structures on Vertical Curve
(H1.40.1)
The 6 x 6 x 3/8 angle legs shall be adjusted to the variable angle between bearing stiffener and top flange created by girder tilt due to grade requirements.

Bolted Field Splices for Plate Girders & Wide Flange Stringers
(H1.41)
Use 7/8" Ø high strength bolts with 15/16" Ø holes.

Place the following note near the Plan of Structural Steel for all bridges with stage construction or bridge widening projects.
(H1.42)

Bolts on intermediate diaphragms and cross frames that connect <u>girders</u> <u>stringers</u> under different construction stage slab pours shall be installed snug tight, then tightened after both adjacent slab pours are completed.

Omit parts underlined when not applicable.

Tubes for Voids

(H2.1)
Tubes for producing voids shall have an outside diameter of ①_✳_ and shall be anchored at not more than ③_✳_ centers. Fiber tubes shall have a wall thickness of not less than ②_✳_.

(✳) See the following table for ① ② ③.

(Do not show this table on plans.)

Voids	①	②	③
7"	7.0"	0.200"	4'-0"
8"	8.0"	0.200"	4'-0"
9"	9.0"	0.200"	4'-0"
10"	10.0"	0.225"	4'-0"
11"	11.0"	0.225"	4'-0"
12"	12.0"	0.225"	4'-0"
14"	14.0"	0.250"	4'-0"
15-3/4"	15.7"	0.300"	3'-0"
16-3/4"	16.7"	0.300"	3'-0"
18-3/4"	18.7"	0.300"	2'-6"
20-7/8"	20.85"	0.350"	2'-0"
21-7/8"	21.85"	0.350"	21"
22-7/8"	22.85"	0.375"	18"
24-7/8"	24.85"	0.375"	18"

(H2.5)
Concrete for prestressed panels shall be Class A-1 with f'c = 6,000 psi, f'ci = 3,500 psi.

(H2.6)
The top surface of all panels shall receive a scored finish with a depth of scoring of 1/8" perpendicular to the prestressing strands in the panels.

(H2.7)
Prestressing tendons shall be high-tensile strength uncoated seven-wire, low-relaxation strands for prestressed concrete in accordance with AASHTO M 203 Grade 270, with nominal diameter of strand = 3/8" and nominal area = 0.085 sq. in. and minimum ultimate strength = 22.95 kips (270 ksi). Larger strands may be used with the same spacing and initial tension.

(H2.8)
Initial prestressing force = 17.2 kips/strand.

(H2.9)
The method and sequence of releasing the strands shall be shown on the shop drawings.

(H2.10)
Suitable anchorage devices for lifting panels may be cast in panels, provided the devices are shown on the shop drawings and approved by the engineer. Panel lengths shall be determined by the contractor and shown on the shop drawings.

(H2.11)
When square end panels are used at skewed bents, the skewed portion shall be cast full depth. No separate payment will be made for additional concrete and reinforcing required.

(H2.12)
Use #3-P3 bars if panel is skewed 45° or greater.

(H2.13)
All reinforcement other than prestressing strands shall be epoxy coated.

(H2.14)
End panels shall be dimensioned 1" min. to 1-1/2" max. from the inside face of diaphragm.

(H2.15)
S-bars shown are bottom steel in slab between panels and used with squared end panels only.

(H2.16)
Cost of S-bars will be considered completely covered by the contract unit price for the slab.

(H2.17)
S-bars are not listed in the bill of reinforcing.

(H2.18)
All panel support pads shall be glued to the girder. When support thickness exceeds 1-1/2 inches, the pads shall be glued top and bottom. The glue used shall be the type recommended by the panel support pads manufacturer.

(H2.19)
Precast panels may be in contact with stirrup reinforcing in diaphragms.

(H2.20)
Extend S-Bars 18 inches beyond the front face of end bents only.

(H2.21)
Any strand 2'-0" or shorter shall have a #4 reinforcing bar on each side of it, centered between strands. Strands 2'-0" or shorter may then be debonded at the fabricator's option.

(H2.22)
Support from diaphragm forms is required under the optional skewed end until cast-in-place concrete has reached 3,000 psi compressive strength.

(H2.26)
Minimum preformed fiber expansion joint material or polystyrene bedding material thickness shall be 1 inch. Thicker material may be used on one or both sides of the girder to reduce cast-in-place concrete thickness to within tolerances. No more than 2 inches total thickness shall be used.

(H2.27)
The same thickness of preformed fiber expansion joint material shall be used under any one edge of any panel except at locations where top flange thickness may be stepped. The maximum change in thickness between adjacent panels shall be 1/4 inch. The polystyrene bedding material may be cut with a transition to match haunch height above top of flange.

(H2.28)
At the contractor's option, the variation in slab thickness over prestressed panels may be eliminated or reduced by increasing and varying the girder top flange thickness. Dimensions shall be shown on the shop drawings.

(H2.29)
Slab thickness over prestressed panels varies due to girder camber.

(H2.30)
In order to maintain minimum slab thickness, it may be necessary to raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for necessary grade adjustment.

(H2.31)
Use slab haunching diagram on sheet no. xx for determining thickness of preformed fiber expansion joint material or polystyrene bedding material within the limits noted in general notes.

(H2.34)
Minimum preformed fiber expansion joint material or polystyrene bedding material thickness shall be 1 inch, except over splice plates where minimum thickness shall be 1/4 inch. When the material is less than 1/2 inch thick over a splice plate, the width of material at the splice shall be the same width as panel on splice. Thicker material may be used on one or both sides of the girder to reduce cast-in-place concrete thickness to within tolerances. No more than 2" total thickness shall be used.

(H2.35)
The same thickness of material shall be used under any one edge of any panel except at splices, and the maximum change in thickness between adjacent panels shall be 1/4 inch to correct for variations from girder camber diagram. The polystyrene bedding material may be cut to match haunch height above top of flange.

(H2.36)
Adjustment in the slab thickness, preformed fiber expansion joint material or polystyrene bedding material thickness, or grade will be necessary if the girder camber after erection differs from plan camber by more than the % of dead load deflection due to the weight of structural steel. No payment will be made for additional labor or materials for the adjustment.

(H2.37)
S-bars shown are used with skewed end panels, or square end panels of square structures only. The #5 S-bars shall extend the width of slab (2'-6" lap if necessary) or to within 3 inches of expansion device assemblies.

(H2.38)
The thickness of the preformed fiber expansion joint material or polystyrene bedding material shall be adjusted to achieve the slab haunching dimension found on sheet no. xx. These adjustments shall be within the limits noted in the general notes.

(H2.39)
U1 Bars may be oriented at right angles to location and spacing shown. U1 Bars shall be placed between P1 Bars.

(H2.40)
The same thickness of material shall be used under any one edge of any panel except at locations where top flange thinckness may be stepped. The maximum change in thickness between adjacent panels shall be 1/4 inch. The polystyrene bedding material may be cut to match haunch height above top of flange.

General Notes: Prestressed I Girders and Double-Tee Girders

(H2.41)
Concrete for prestressed girders shall be Class A-1 with f'c = _____ psi and f'ci = _____ psi.

(H2.42)
(+) indicates prestressing strand.

(H2.43)
Use __ strands with an initial prestress force of ___ kips.

For Type 6 girders and Bulb-T may use 0.6" strands if required by design.

(H2.44)
Prestressing tendons shall be uncoated, seven-wire, low-relaxation strands, 1/2 0.6 inch diameter in accordance with AASHTO M 203, Grade 270. Pretensioned members shall be in accordance with Sec 1029.

Place the following notes with the above general notes for Prestressed I-Girders only.

(H2.45)
Galvanize the 1/2" bearing plate (ASTM A709 Grade 36) in accordance with ASTM A123.

(H2.46)
Cost of furnishing, galvanizing and installing the 1/2" bearing plate (ASTM A709 Grade 36) and welded studs in the prestressed girder will be considered completely covered by the contract unit price for Prestressed Concrete I-Girder per each.

(H2.47)
Cost of 3/4" Ø coil tie rods placed in diaphragms will be considered completely covered by the contract unit price for Prestressed Concrete I-Girder.

(H2.48) (✱)
Exterior and interior girders are the same, except for coil ties, and coil inserts for slab drains and holes for steel intermediate diaphragms.

(H2.49)
Coil ties shall be held in place in the forms by slotted wire-setting-studs projecting thru forms. Studs are to be left in place or replaced with temporary plugs until girders are erected, then replaced by coil tie rods.

(H2.50)
All B1 and C1 bars shall be epoxy coated.

Use the following note when the panel option is used.
Place ✱✱✱ at the top corners of Girder at Girder Dimensions Detail.

(H2.51)
✱✱✱ At contractor's option a 1-1/2" to 1-3/4" smooth finish strip is permitted to facilitate placement of preformed fiber expansion joint material or expanded or extruded polystyrene bedding material for the prestressed panels.

(✱) Use only when applicable.

Omit parts underlined when not applicable.

General Notes: Prestressed I-Girders and Double-Tee Girders

The following note is not applicable when the number of bottom strands is equal to the number of Bent-up strands.

(H2.52)
** At the contractor's option the location for bent-up strands may be varied from that shown. The total number of bent-up strands shall not be changed. One strand tie bar is required for each layer of bent-up strands except at end bents which require one bar on the bottom layer of strands only. No additional payment will be made if additional strand tie bars are required.

Place the following notes with the above general notes for Prestressed Double-Tee Girders only.

(H2.53)
Girders shall be handled and erected into position in a manner that will not impair the strength of the girder.

(H2.54)
The vertical face of the exterior girder that will be in contact with the slab shall be roughened by sand blasting, or other approved methods, to provide suitable bond between girder and slab.

(H2.55)
All exposed edges of concrete shall have a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H2.56)
Payment for edge block will be considered completely covered by the contract unit price for the double-tee girders.

** Place 2 asterisks next to note telling which strands are bent-up.

Place the following note near diaphragm details.

(H2.57)
Diaphragms at intermediate bents shall be built vertical.

Slab Haunching
Use this note for all prestressed "double-tee" girder structures, except 34'-0" and 40'-0" (Unsymmetrical) roadways.
(H2.58)
The slab thickness varies from (1) to (2) within the parabolic crown.

(1) Minimum slab thickness.
(2) Minimum slab thickness minus 1/4".

Place the following table with camber diagram.

(H2.59)
Conversion factors for girder camber

0.1 pt. = 0.314 x 0.5 pt.		
0.2 pt. = 0.593 x 0.5 pt.		Use with spans 75' and
0.3 pt. = 0.813 x 0.5 pt.		greater in length.
0.4 pt. = 0.952 x 0.5 pt.		
0.25 pt. = 0.7125 x 0.5 pt.		
Use with spans less than 75' in length.		

Place the following note near the slab haunching diagram.

(H2.60) Omit parts as necessary for double-tee structures.
If girder camber is different from that shown in the camber diagram, adjustment of the slab haunches, an increase in slab thickness or a raise in grade uniformly throughout the structure shall be necessary. No payment will be made for additional labor or materials required for variation in haunching, slab thickness or grade adjustment.

(H2.61)
Concrete in the slab haunches is included in the Estimated Quantities for Slab on Steel Concrete I-Girders Concrete Bulb-tee Girders.

Use the following note with non-integral bents for prestressed bridges only.

(H2.62)
Prestressing strands at End Bents No. _ and _ and Intermediate Bents No. _ and _ shall be trimmed to within 1/8 inch of concrete if exposed, or 1 inch of concrete if encased. Exposed ends of girders shall be given 2 coats of an asphalt paint. Ends of girders which will be encased in concrete diaphragms shall not be painted.

Omit parts underlined when not applicable.

(H2.64)
(✳) In lieu of 2-1/2″ outside diameter washers, contractor may substitute a 3/16″ (Min. thickness) plate with four 15/16″ Ø holes and one hardened washer per bolt.

(H2.65)
(✳✳) Bolts shall be tightened to provide a tension of one-half that specified in Sec 712 for high strength bolt installation. A325 bolts may be substituted for and installed in accordance with the requirements for the specified A307 bolts.

(H2.66)
All diaphragm materials including bolts, nuts, and washers shall be galvanized.

(H2.67)
Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.

(H2.68)
Payment for furnishing and installing steel intermediate diaphragms will be considered completely covered by the contract unit price for Steel Intermediate Diaphragm for P/S Concrete Girders.

(H2.69)
Shop drawings will not be required for steel intermediate diaphragms and angle connections.

Place the following note on the Prestressed I Girder sheet.

(H2.70)
The 1-1/2″ Ø holes shall be cast in the web for steel intermediate diaphragms. Drilling is not allowed.

Place the following note on the Prestressed I Girder sheet for stream crossing only.

(H2.71)
Place vent holes at or near upgrade 1/3 point of girders and clear reinforcing steel or strands by 1-1/2″ minimum and steel intermediate diaphragms bolt connection by 6″ minimum.

Place the following notes on the Prestressed Double-Tee Girder slab sheet.

(H2.80)
Slab thickness shall be adjusted for any difference in girder camber from that shown in camber diagram. Concrete in the slab is included in the estimated quantities as Class B-2 concrete.

(H2.81)
The slab is to be built parallel to grade and to a minimum thickness of _____″ (Except varies from _____″ to _____″ within parabolic crown).

Note: For the location of (✳) and (✳✳), see Bridge Manual Section 3.55.

Place the following notes with the appropriate prestressed "double-tee" girder general notes:.

(H2.82)
In order to maintain minimum slab thickness it may be necessary to raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for variation in thickness or necessary grade adjustment.

(H2.83)
See girder sheet for girder camber diagram.

(H2.84)
Lifting loops: Provide lifting loops in each end of double-tee girder, located near center of stem, 2 feet from each end.

(H2.85)
Welded wire fabric: Adequate reinforcing other than the specified welded wire fabric may be used with the approval of the engineer.

Use the following notes when a prestressed "double-tee" girder is used with a thrie beam bridge rail.

(H2.86)
See slab sheet for spacing of rail posts.

(H2.87)
See thrie beam rail sheet for details of bolt spacing at rail posts and anchor bolt lengths.

(H2.88)
✳ Length of coil tie rods at exterior girders at end bents = '- ".

(H2.89)
(✳) At the contractor's option, rectangular fill plates may be used in lieu of diamond fill plates as shown in Optional Detail "B".

The following notes apply to Type "C" Bearings.

(H3.1)
Anchor bolts for Type "C" bearings shall be 1" Ø ASTM A709 Grade 50W steel swedged bolts, with no heads or nuts and shall extend 10" into the concrete. Swedging shall be 1" less than the extension into the concrete. Anchor bolts shall be set during the placing of concrete or grouted in the anchor bolt wells prior to the erection of steel. The top of anchor bolts shall be set approximately 1/4" below the top of bearing.

(H3.2)
Anchor bolts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.3)
Weight of the anchor bolts for the bearings are included in the weight of the Fabricated Structural Steel.

(H3.4)
"⌒" Indicates machine finish surface.

(H3.5)
Shop drawings are not required for the lead plates and the preformed fabric pads.

The following notes apply to Type "D" Bearings.

(H3.6)
Anchor bolts for Type "D" bearings shall be 1-1/4" Ø 1-1/2" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 12" 15" into the concrete with ASTM A194 - 2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F436 hardened washers for the fixed bearings and no heavy hexagon nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extension into the concrete.

(H3.7)
Anchor bolts, hardened washers and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.8)
Weight of the anchor bolts, hardened washers and heavy hexagon nuts for bearings are included in the weight of the Fabricated Structural Steel.

(H3.9)
"⌒" Indicates machine finish surface.

(H3.10)
Shop drawings are not required for the lead plates and the preformed fabric pads.

The following note applies to Type "D" Bearings Modified.

(H3.11)
Place the heads of 3/4" Ø bolts on the bottom side of the top bearing plate.

Omit parts underlined when not applicable.

Superstructure Notes

Bearings Type E

The following notes apply to Type "E" Bearings.

(H3.15)
Anchor bolts for Type "E" bearings shall be 1-1/4"_Ø 1-1/2"_Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 12"_15" into the concrete with ASTM A194 - 2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F436 hardened washers for the fixed bearings and no heavy hexagon nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extension into the concrete.

(H3.16)
Anchor bolts, hardened washers and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.17)
Weight of the anchor bolts, hardened washers and heavy hexagon nuts for bearings are included in the weight of the Fabricated Structural Steel.

(H3.18)
"∽" Indicates machine finish surface.

(H3.19)
(1) bonded lubricant

(H3.20)
A lubricant coating shall be applied in the shop to both mating surfaces of the bearing assembly. The lubricant, method of cleaning, and application shall meet the requirements of MIL-L-23398 and MIL-L-46147. The coated areas shall be protected for shipping and erection.

(H3.21)
Shop drawings are not required for the lead plates and the preformed fabric pads.

The following note apply to Type "E" Bearings Modified.

(H3.22)
Place the heads of 3/4" Ø bolts on the bottom side of the top bearing plate.

Omit parts underlined when not applicable.

(H3.25)
Anchor bolts shall be 1-1/2" 2" 2-1/2" 3" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 15" 18" 25" xx" into the concrete with ASTM A194 - 2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

(H3.26)
All structural steel for the anchor bolts and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.27)
Neoprene Elastomeric Pads shall be 60 70 Durometer.

Use the following note when ASTM A709 Grade 50W steel is not used for superstructure.

(H3.29) Use grade per Design Comps.
Structural steel for sole plate shall be ASTM A709 Grade 36 50 and shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum). The stainless steel plate shall be protected from any coating.

Use the following note when ASTM A709 Grade 50W steel is used for superstructure.

(H3.29.1)
Structural steel for sole plate shall be ASTM A709 Grade 50W. The anchor bolts and welds shall have corrosion resistance and weathering characteristics compatible with the base material.

(H3.30)
Type N PTFE Bearings shall be in accordance with Sec 716.

(H3.32)
Stopper plates and straps shall be provided to prevent loss of support due to creeping of PTFE bearings. Payment for fabricating and installing the stopper plates and straps will be considered completely covered by the contract unit price for Type N PTFE Bearing.

(H3.33)
The bottom face of the 1/8" stainless steel plate that is welded to the sole plate shall be lubricated with a lubricant that is approved by the bearing manufacturer.

Omit parts underlined when not applicable.

(H3.45)
Anchor bolts shall be 1-1/2" 2" 2-1/2" 3" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 15" 18" 25" xx" into the concrete with ASTM A194 - 2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

(H3.46)
All structural steel for the anchor bolts and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.47)
Neoprene Elastomeric Pads shall be 60 70 Durometer.

Use the following note when ASTM A709 Grade 50W steel is not used for superstructure.

(H3.49) Use grade per Design Comps.
Structural steel for sole plate shall be ASTM A709 Grade 36 50 and shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

Use the following note when ASTM A709 Grade 50W steel is used for superstructure.

(H3.49.1)
Structural steel for sole plate shall be ASTM A709 Grade 50W. The anchor bolts and welds shall have corrosion resistance and weathering characteristics compatible with the base material.

(H3.50)
Laminated Neoprene Bearing Pad Assembly shall be in accordance with Sec 716.

The following notes apply to Flat Plate Bearings.

(H3.65)
Flat plate bearings shall be straightened to plane surfaces.

(H3.66)
Anchor bolts shall be 1" Ø ASTM A709 Grade 50W steel swedged bolts, 10" long with no heads or nuts. Top of anchor bolts shall be set approximately 1/2" above top of bottom flange.

(H3.67)
Bottom flange of beam <u>and bevel</u> plate shall have 1-1/4" Ø holes at fixed end and 1-1/4" x 2-1/2" slots at expansion end.

(H3.68)
Shop drawings are not required for the lead plates and the preformed fabric pads.

(H3.69)
Weight of the anchor bolts for bearings are included in the weight of the Fabricated Structural Steel.

The following notes apply to Rolled Steel Bearing Plates (Deck Girder Repair and Widening).

(H3.70)
Material shall be ASTM A709 Grade 36 steel. Holes in 7/8" plates for 3/4" x 2-1/4" and 1-1/2" x 3" anchors shall be made for a driving fit. After anchors are driven in place, anchors shall be lightly tack welded to the 7/8" plates.

(H3.71)
Edge "A" shall be rounded (1/16" to 1/8" radius).

The following notes apply to Carbon Steel Casting (Truss).

(H3.75)
All fillets shall have a 3/4" radius.

(H3.76)
Anchor bolts shall be 1-1/2" Ø ASTM A709 Grade 50W steel swedge bolts and shall extend 15" into concrete with ASTM A194-2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Furnish one 4" Ø pin, AISI C1042, with 2 heavy hexagon pin nuts.

(H3.77)
Material for bearing shall be carbon steel castings and will be considered completely covered by the contract unit price for Carbon Steel Castings. Pins, anchor bolts, heavy hexagon nuts, pipe and rolled steel bearing plates will be considered completely covered by the contract unit price for Structural Carbon Steel.

(H3.78)
Shop drawings are not required for the lead plates and the preformed fabric pads.

Omit parts underlined when not applicable.

(H4.1)
Cost of furnishing and placing anchor bolts for light standard will be considered completely covered by the contract unit price for other items.

(H4.2)(✳)
All conduit shall be rigid non-metallic schedule 40 heavy wall PVC (polyvinyl chloride plastic) with 3" minimum cover in concrete. Each section of conduit shall bear the Underwriters' Laboratories, Inc., (UL) label.

(H4.2.1)
All Conduit Clamps shall be commercially available conduit clamp approved by the engineer.

(H4.3)
Shift reinforcing steel in field where necessary to clear conduit and junction boxes.

(H4.4)
Light standards, wiring and fixtures shall be furnished and installed by others.

(H4.5)
Top of light standard supports shall be made horizontal; anchor bolts shall be placed vertically.

(H4.6)
For details of light standards, underdeck lighting, and wiring, see electrical plans.

(H4.7)
Expansion fittings shall provide a minimum movement in either direction of _____ at open joints and _____at filled joints. Expansion fittings shall be equal to Carlon Electrical Construction Products or Cantex, Inc.

(H4.7.1)
Anchor bolts and nuts shall be AASHTO M314-90 Grade 55. Anchor bolts, nuts and washers shall be fully galvanized.

(✳) 3" cover cannot be achieved when conduit is in the slab.

Omit parts underlined when not applicable.

(H4.8)
All end bent and parapet, sidewalk, safety barrier curb junction boxes shall be PVC molded flush surface mounted and equal to Carlon Electrical Construction Products or Cantex, Inc. The conduit terminations shall be permanent or separable. The terminations and covers shall be of watertight construction and shall meet requirements for NEMA 4 enclosure.

Add the following note for all structures with conduit.
(H4.9)
Weepholes shall be provided at appropriated locations to drain any moisture in the conduit system.

Use the following note for conduit not encased in concrete.
(H4.10)
Conduit shall be secured to concrete with clamps at about 5'-0" cts. Concrete anchors for clamps shall be in accordance with Federal Specification FF-S-325, Group II, Type 4, Class I and shall be galvanized in accordance with ASTM -153, B695-91 Class 50 or stainless steel. Minimum embedment in concrete shall be 1-3/4". The supplier shall furnish a manufacturer's certification that the concrete anchors meet the required material and galvanizing specifications.

Use the following note for payment of Conduit System.

(H4.11)
Payment for furnishing and installing Conduit System, complete-in-place, will be considered completely covered by the contract lump sum price for Conduit System on Structure.

* Surface mount junction boxes, except on sidewalks, when existing concrete is present. Flush mount junction boxes in new concrete.

Omit parts underlined when not applicable.

(H5.1) For stage construction or other special cases, see Structural Project Manager.

Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be spliced before fingers are cut. The surface of cut shall be perpendicular to the surface of plate. The cut shall not exceed 1/8" in width. The centerline of cut shall not deviate more than 1/16" from the position of centerline of cut shown. No splicing of finger plate or finger plate assembly will be allowed after fingers are cut. The expansion device shall be fabricated and installed to the crown and grade of the roadway.

(H5.2)

Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased ___" for each 10° fall or rise in temperature at installation.

(H5.3)

Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

(H5.4)

Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.5)

Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Finger Plate) per linear foot.

(H5.6)

Concrete shall be forced under and around finger plate supporting hardware, anchors, angles and bars. Proper consolidation shall be achieved by localized internal vibration.

(H5.7) Use note for steel structures.

All holes shown for connections to be subpunched 11/16" Ø (shop or field drill) and reamed to 13/16" Ø in field.

(H5.8) Place note near "Plan of Slab".

"the web of W14 x 43" is for steel structures

"the 3/4" vertical mounting plate" is for P/S structures.

Longitudinal reinforcing steel shall be placed so that ends shall not be more than ±1" from <u>the web of W14 x 43</u> <u>and</u> <u>the 3/4" vertical mounting plate</u> at the expansion device.

(H5.9)

Complete joint penetration welds utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.

Omit parts underlined when not applicable.

(H5.16)
Expansion device shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion device shall be fabricated and installed to the crown and grade of the roadway.

(H5.17)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased ___" for each 10° fall or rise in temperature at installation.

(H5.18)
Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be in accordance with Sec 1037.

(H5.19)
Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.20)
Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion device will be considered completely covered by the contract unit price for Expansion Device (Flat Plate) per linear foot.

(H5.21)
Concrete shall be forced under and around the flat plate, anchors and angles. Proper consolidation shall be achieved by localized internal vibration. Finishing of the concrete shall be achieved by hand finishing within one foot of the expansion device. The vertical and horizontal concrete vent holes shall be offset from each other. Do not alternate holes at the 12" spacing.

(H5.22) Use this note when expansion device is at an end bent.
Bevel plates shall be used at end bents when the grade of the slab at the expansion device is 3% or more.

(H5.23) Place this note near "Plan of Slab".
Longitudinal reinforcing steel shall be placed so that ends shall not be more than ±1" from <u>vertical plate and the vertical leg of the angle</u> at the expansion device.

(H5.24)
Complete joint penetration welds utilized in the fabrication of the expansion device shall be nondestructively tested by an approved method.

Omit parts underlined when not applicable.

(H5.31)
Expansion joint system shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed to the crown and grade of the roadway.

(H5.32)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased ___" for each 10° fall or rise in temperature at installation.

(H5.33)
Structural steel for the expansion joint system shall be ASTM A709 Grade 36. Anchors for the expansion joint system shall be in accordance with Sec 1037. Preformed compression seal expansion joint system shall be in accordance with Sec 717.

(H5.34)
Structural steel for the expansion joint system and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.35)
Concrete shall be forced under armor angle and around anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

(H5.36) Place this note near "Plan of Slab".
Longitudinal reinforcing steel shall be placed so that ends shall not be more than ±1" from vertical leg of angle at the expansion joint system.

(H5.37)
Curb plate anchors shall be a drilled cone expansion or a cast-in-place wing type threaded insert. The minimum ultimate pullout capacity for these anchors shall be 2700 lbs in f'c = 4000 psi concrete. Lead anchors will not be permitted. Holes in the barrier curb for anchors shall not be drilled until the concrete is at least 7 days old.

Place the following notes near the "Tables of Transverse Bridge Seal Dimensions".

(H5.38)
Size of armor angle: Vertical leg of angle shall be a minimum of ② + 3/4". Horizontal leg of angle shall be a minimum of 3". Minimum thickness of angle shall be 1/2".

(H5.39)
If a seal size larger than that indicated on the plans is used, the movement range, the opening at 60° and all dimensions for the armor angles shall be shown on the shop drawings.

(H5.40)
Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion joint will be considered completely covered by the contract unit price for Preformed Compression Seal Expansion Joint System.

Omit parts underlined when not applicable.

(H5.46)
Expansion joint system shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed to the crown and grade of the roadway.

The strip seal gland shall be installed in joints in one continous piece without field splices. Factory splicing will be permitted for joints in excess of 53 feet.

(H5.47)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased ___" for each 10° fall or rise in temperature at installation.

(H5.48)
Structural steel for the expansion joint system shall be ASTM A709 Grade 36 except the steel armor may be ASTM A709 Grade 50W. Anchors for the expansion joint system shall be in accordance with Sec 1037. Strip seal expansion joint system shall be in accordance with Sec 717.

(H5.49)
Structural steel for the expansion joint system and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.50)
Concrete shall be forced under and around steel armor and anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

(H5.51) Place this note near "Plan of Slab".
Longitudinal reinforcing steel shall be placed so that ends shall not be more than ±1" from vertical leg of the steel armor at the expansion joint system.

(H5.52)
Curb plate anchors shall be a drilled cone expansion or a cast-in-place wing type threaded insert. The minimum ultimate pullout capacity for these anchors shall be 2700 lbs in f'c = 4000 psi concrete. Lead anchors will not be permitted. Holes in the barrier curb for anchors shall not be drilled until the concrete is at least 7 days old.

(H5.53) Use note with polymer concrete next to strip seal.
Polymer concrete shall be in accordance with Sec 623.

(H5.54)
Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion joint will be considered completely covered by the contract unit price for Strip Seal Expansion Joint System.

Omit parts underlined when not applicable.

(H5.61)
Expansion joint system shall be fabricated in one section, except for stage construction and when the length is over 50 feet. A complete joint penetration groove welded splice shall be required. Welds shall be ground flush to provide a smooth surface. The expansion joint system shall be fabricated and installed to the crown and grade of the roadway.

(H5.62)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased or decreased ___" for each 10° fall or rise in temperature at installation.

(H5.63)
Structural steel for the expansion joint system shall be ASTM A709 Grade 36. Anchors for the expansion joint system shall be in accordance with Sec 1037. Silicone Expansion Joint Sealant Systems shall be in accordance with Sec 717.

(H5.64)
Structural steel for the expansion joint system and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.65)
Concrete shall be forced under armor angle and around anchors. Proper consolidation of the concrete shall be achieved by localized internal vibration.

(H5.66) Place this note near "Plan of Slab".
Longitudinal reinforcing steel shall be placed so that ends shall not be more than ±1" from vertical leg of angle at the expansion joint system.

(H5.67)
Curb plate anchors shall be a drilled cone expansion or a cast-in-place wing type threaded insert. The minimum ultimate pullout capacity for these anchors shall be 2700 lbs in f'c = 4000 psi concrete. Lead anchors will not be permitted. Holes in the barrier curb for anchors shall not be drilled until the concrete is at least 7 days old.

(H5.68) Use note with polymer concrete next to silicone sealant.
Polymer concrete shall be in accordance with Sec 623.

(H5.69)
Payment for furnishing, coating or galvanizing and installing the structural steel for the expansion joint will be considered completely covered by the contract unit price for Silicone Expansion Joint Sealant System.

Omit parts underlined when not applicable.

Use the following note H5.76 in Oct. 2004 lettings and beyond.
(H5.70) Use the following table and notes with alternate expansion joint system.

Alternate Expansion Joint System	
Type of Expansion Joint System	Type Used (✓)
Preformed Compression Seal Expansion Joint System	
Silicone Expansion Joint Sealant System	

MoDOT construction personnel will complete column labeled "Type Used (✓)".

The contractor shall select one of the alternate expansion joint system listed in the table. The alternate expansion joint system method of measurement and basis of payment shall be in accordance with Sec 717.

I-Beam, Plate Girder Bridges - Continuous Slabs

(H6.1)
The contractor shall pour and satisfactorily finish the slab pours at the rate given. Retarder, if used, shall be an approved type and retard the set of concrete to 2.5 hours.

Prestressed Concrete Structures - Continuous Spans

(H6.4)
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the slab pours at the rate given.

(H6.5)
End diaphragms at expansion devices may be poured with a construction joint between the diaphragm and slab, or monolithic with the slab.

(H6.6) Omit underlined part on non-integral end bents.
The concrete diaphragm at the intermediate bents <u>and integral end bents</u> shall be poured a minimum of 30 minutes and a maximum of 2 hours before the slab is poured.

Prestressed Double-Tee Concrete Structures

(H6.9)
The diaphragms at the intermediate and end bents shall be poured a minimum of 30 minutes and a maximum of 2 hours before the slab is poured across the diaphragm at bents.

(H6.10)
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the slab pours at not less than 25 cubic yards per hour.

Solid or Voided Slab Structure - Continuous and Simple Spans

(H6.13) (*) See Manual Section 3.30 for determining rate of pour.
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the roadway slab at a rate of not less than (*)cubic yards per hour. The contractor shall observe the transverse construction joints shown on the plans, unless the contractor is equipped to pour and satisfactorily finish the roadway slab at a rate which permits a continuous pouring through some or all joints as approved by the engineer.

Steel and Prestressed Structures - Simple Spans

(H6.15)
The contractor shall pour and satisfactorily finish the roadway slab at a rate of not less than 25 cubic yards per hour.

Omit parts underlined when not applicable.

Widen, Extension, Repair, and Stage Construction

Place the following note on the plans when the closure pour is specified on the design layout.

(H6.17) Underline part not required when forms stay in place permanently.
Expansive Class B-2 concrete shall be used in the closure pour.
<u>Forms shall be released before the closure pour.</u>

All Structures with Longitudinal Construction Joints

The following note shall be used on all structures with slabs wider than 54' containing a longitudinal construction joint. ① shall be replaced by the value corresponding to the total roadway width divided by the larger pour width when the construction joint is used.

(H6.18)
The longitudinal construction joint may be omitted with the approval of the engineer. When the longitudinal construction joint is omitted, the minimum rate of pour for alternate pouring sequences shall be increased by a factor of ① .

Omit parts underlined when not applicable.

(H7.1)
Slab drains may be fabricated of either 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing ASTM A500 or A501.

(H7.1.1)
Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.

(H7.2) (✳)
Outside dimensions of drains are 8" x 4"
piece "A" is 8-3/4" x 4-3/4" and piece "B" = 8" x 4".

(H7.3) (✳)
Piece "A" shall be cast in the concrete. Prior to placement of wearing surface, piece "B" shall be inserted into piece "A".

(H7.4)
Locate drains piece "A"(✳) in slab by dimensions shown in Part Section Near Drain.

(H7.5)
Shift reinforcing steel in field where necessary to clear drains.

(H7.6)
The drains pieces "A" and "B", (✳) coil inserts and bracket assembly shall be galvanized in accordance with ASTM A123.

(H7.7)
All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153.

(H7.8)
The coil insert required bolt hole for the bracket assembly attachment shall be located on the Prestressed I-Girder Prestressed Bulb-tee Plate Girder Wide Flange Beam shop drawings.

(H7.9)
Shop drawings will not be required for the slab drains and the bracket assembly.

Place the following notes (H7.10) and (H7.11) on the prestressed I girder slab drain standard.

(H7.10)
Coil inserts shall have a concrete pull-out strength (Ultimate load) of at least 2,500 pounds in 5,000 psi concrete.

(H7.11)
The bolt required to attach the slab drain bracket assembly to the prestressed girder web shall be supplied by the prestressed I-Girder fabricator.

(H7.12)
The bolt for the bracket assembly attachment shall be located on the plate girder shop drawings.

(✳) Use with wearing surface.

Omit parts underlined when not applicable.

(H9.2)
Panel lengths of channel members shall be attached continuously to a minimum of four posts and a maximum of six posts (except at end bents).

(H9.3)
All bolts, nuts, washers, and plates and elastomeric materials will be considered completely covered by the contract unit price for Bridge Guardrail (Thrie Beam) other items.

(H9.4) Use underline part for temporary bridges.
All steel connecting bolts and fasteners for posts and railing, and all anchor bolts, nuts, washers and plates shall be galvanized after fabrication except for bottom plate. Protective coating and material requirement of steel railing shall be in accordance with Sec 1040.

(H9.5) Use post instead of blockout for temporary bridges.

Rail posts shall be set perpendicular to roadway profile grade, vertically in cross section and aligned in accordance with Sec 713 except that the rail posts shall be aligned by the use of shims such that the post deviates not more than 1/2 inch from true horizontal alignment after final adjustment. The shims shall be 3″ x 1 3/4″ and placed between the blockout post and the thrie beam rail. The thickness of the shims shall be determined by the contractor and verified by the engineer before ordering material for this work.

Use the following note only when a base plate is used.
(H9.6)
Rail posts shall be seated on elastomeric pads having the same dimensions as the post base plate and 1/16″ thickness. Such pads may be any elastomeric material, plain or fibered, having a hardness (Durometer) of 50 or above, as certified by the manufacturer. Additional pads or half pads may be used in shimming for alignment. Post heights shown will increase by the thickness of the pad.

(H9.7)
At the expansion slots in the thrie beam rails and channels, the bolts shall be tightened and backed off one-half turn and the threads shall be burred.

Omit parts underlined when not applicable.

(H9.8)
At the thrie beam connection to blockout on wings, the bolts shall be tightened and backed off one-half turn and the threads shall be burred.

(H9.9)
Minimum length of thrie beam sections is equal to one post space.

(H9.10)
5/8" Ø button-head, oval shoulder bolts with 3/8" min. thickness hex nuts shall be used at all slots.

(H9.11)
Thrie beam guardrail on the bridge shall be 12 gage steel.

(H9.12) Use top plates instead of cap rail angles for temporary bridges.
Posts, cap rail angles, top plates, base plates, channels and channel splice plates shall be fabricated from ASTM A709 Grade 36 steel and galvanized.

(H9.15) Use post instead of blockout for temporary bridges.
Washers shall be used at all post bolts between the bolt head and beam. The flat washers shall be rectangular in shape, 3" x 1-3/4" x 3/16" minimum and with a 11/16" x 1" slot, or when necessary of such design as to fit the contour of the beam. A 3" x 1-3/4" x 5/8" rectangular washer shall be used between the blockout and the thrie beam rail.

(H9.16)
Special drilling of the thrie beam may be required at the splices. All drilling details shall be shown on the shop drawings.

(H9.17)
Fabrication of structural steel shall be in accordance with Sec 1080.

Do not use the following note with prestress double-tee or temporary bridge structures.

(H9.18)
Expansion splices in the thrie beam rail shall be made at either the first or second post on either side of the joint and on structure at bridge ends. When the splice is made at the second post, an expansion slot shall be provided in the thrie beam rail for connection to the first post to allow for movement.

Do not use the following note with prestress double-tee or temporary bridge structures.

(H9.19)
In addition to the expansion provisions at the expansion joints, expansion splices in the thrie beam rail and the channel shall be provided at other locations so that the maximum length without expansion provisions does not exceed 200 ft.

Use the following note with prestress double-tee structures.
Do not use any of the following notes for temporary bridges.

(H9.20)
Expansion splices in the thrie beam rail and the channel shall be provided at locations so that the maximum length without expansion provisions does not exceed 200 ft.

(H9.21)
Shim plates 6" x 6" x 1/16" may be used between the top of the post and the channel member as required for vertical alignment.

(H9.22)
See slab sheet for rail post spacing.

(H9.23)
See Missouri Standard Plans drawing 606.00 for details not shown.

(H9.24)
Bolt shall not be bent in slab depths greater than 14", use 12" straight embeddment.

(H9.25)
Shim plates 6"x3"x1/16" may be used between post W6x20 and 1/2" bent plate connection as required for horizontal alignment.

(H9.26)
Shim plate shall be galvanized after fabrication.

(H9.27)
Shim plates 6"x6"x1/16" may be used between post W6x20 and 6"x6"x3/8" plate and shim plates 6"x3-1/2"x1/16" may be used between post W6x20 and 1/2" bent plate connection as required for horizontal alignment.

(H9.28)
Bar supports shall be Beam Bolsters (BB-ref. CRSI) and shall be galvanized. See Sec 706.

Use the following notes where required and with temporary bridges thrie beam sheet.

(H9.30)
Grade A321 threaded rods with 2 hex nuts and washers may be substituted for the A307 anchor bolts.

(H9.31)
If type "A" guardrail is not attached to ends of the temporary structure, flared ends shall be required. The existing thrie beam rails shall be modified to accept flared ends. Cost for furnishing and installing flared ends will be considered completely covered by the contract unit price for other items.

(H9.32)
Contractor shall verify all dimensions in field before ordering materials.

(H9.33)
See preceding sheet for rail post spacing.

(H9.34)
At the bridge ends for head to head traffic, guardrail shall be used at all four corners and for single directional traffic, guardrail shall be used at the entrance ends only unless required at the exit.

(H9.35)
Bottom plate shall be fabricated from ASTM A709 Grade 50W steel and welded to two 5" floor bars. Bottom plate shall not be galvanized.

(H9.36)
The size of the base and bottom plate may be increased depending on which grid option is used.

(H9.37)
Optional welding of the post to the base plate, in lieu of the weld shown, is a 5/16" fillet weld all around, including the edges of the post flanges.

(H9.38)
Semi-circular notches centered on the axis of the post web ends may be made to facilitate galvanizing.

(H10.1)
Top of safety median barrier curb (Type C) (Type D) and median barrier curb shall be built parallel to grade with barrier curb joints (Except at end bents) normal to grade.

(H10.2)
All exposed edges of safety median barrier curb (Type C) (Type D) and median shall have either a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H10.3)
Payment for all concrete and reinforcement, complete-in-place will be considered completely covered by the contract unit price for safety median barrier curb (Type C) (Type D) per linear foot.

(H10.4)
Concrete in the safety median barrier curb (Type C) (Type D) shall be Class B-1.

The following note shall be used for safety barrier curb.
(H10.5)
Measurement of safety barrier curb is to the nearest linear foot for each structure, measured along the outside top of slab from end of wing to end of wing.

The following note shall be used for safety barrier curb or barrier curb (Type D) near median.
(H10.6)
Measurement of safety barrier curb (Type D) is to the nearest linear foot for each structure, measured along the outside top of slab from end of slab to end of slab ℄ to ℄ of sleeper slab.

The following note shall be used for median barrier curb and median barrier curb (Type C).
(H10.7)
Measurement of median barrier curb (Type C) is to the nearest linear foot for each structure, measured along the top of slab from end of slab to end of slab ℄ to ℄ of sleeper slab.

The following note shall be used on all barrier curbs.
(H10.7.1)
Concrete traffic barrier delineators shall be placed on top of the safety median barrier curb (Type C) (Type D) as shown on Missouri Standard Plans 617.10 and in accordance with Sec 617. Concrete traffic barrier delineators will be considered completely covered by the contract unit price for "Safety Median Barrier Curb (Type C) (Type D)".

The following notes shall be placed under cross-section thru safety barrier or median barrier curb.
(H10.8)
Use a minimum lap of 2'-11" for #5 horizontal safety median barrier curb (Type C) (Type D) bars.

(H10.9)
The cross-sectional area for each curb above the slab = (✳) sq. ft.

(✳) 2.28 for a 16" safety barrier curb.
2.96 for a median barrier curb.
3.49 for a barrier curb (Type D).
4.70 for a median barrier curb (Type C).

Omit parts underlined when not applicable.

The following notes shall be used for double-tee structures.

(H10.10)
Coil inserts shall have a concrete ultimate pullout strength of not less than 36,000 pounds in 5000 psi concrete and an ultimate tensile strength of not less than 36,000 pounds.

(H10.11)
Threaded coil rods shall have an ultimate capacity of 36,000 pounds. All coil inserts and threaded coil rods shall be galvanized in accordance with ASTM A153.

(H10.12)
Payment for furnishing and installing coil inserts and threaded coil rods will be considered completely covered by the contract unit price for Safety Median Barrier Curb (Type C) (Type D).

Elevation of Safety Barrier Curb

(H10.12.1)
Longitudinal dimensions are horizontal arc dimensions.

(H10.12.2)
Longitudinal dimensions are along top of safety barrier curb outside edge of slab parallel to grade.

(H10.13)
(✱✱) The R3 M3 bar and #5 bottom transverse slab bar in cantilever (P/S panels only) combination may be furnished as one bar as shown, at the contractor's option.

(H10.14)
Note: Use a minimum lap of 2'-0" between K9 and K10 bars.

(H10.15)
(✱✱✱) The K1 and K2 bar combination may be furnished as one bar as shown, at the contractor's option.

(H10.16)
The curb shall be cured by application of Type 1-D or Type 2 Liquid Membrane-Forming Compound in accordance with Sec 1055. Surface sealing for concrete in accordance with Sec 703 will not be permitted.

(H10.17)
(✱) The M1 and M2 bar combination may be furnished as one bar, as shown, at the contractor's option. (All dimensions are out to out.)

(H10.18)
Concrete in the barrier curb (Type D) and median barrier curb Transition (Type D) shall be Class B-1.

Optional slip form barrier curb details shall be placed on all jobs (except P/S Double-tee Structures) where applicable.

Add #5 crisscross bars for slip-form option. Base the length of these bars on the shortest distance between joints and use typically on each side of joints throughout structure.

(H10.81)
Joint sealant and backer rods shall be used on all slip-form barrier curbs (Type C) instead of joint filler and shall be in accordance with Sec 717 for silicone joint sealant for saw cut and formed joints (except at end of slab of the end bents).

(H10.82)
Plastic waterstop shall not be used with slip-form option.

(H10.83)
For Slip-Form Option, all sides of the safety median barrier curb (Type C) (Type D) shall have a vertically broomed finish and the curb top shall have a transversely broomed finish.

(H10.84)
C Bars (Slip-form option only) shall be used in addition to cast-in-place conventional forming reinforcement for bridge safety median barrier curb (Type C) (Type D).

(H10.85)
Cost of silicone joint sealant and backer rod complete-in-place will be considered completely covered by the contract unit price for Safety Median Barrier Curb (Type C) (Type D).

(H10.86)
The curb shall be cured by application of Type 1-D or Type 2 Liquid Membrane-Forming Compound in accordance with Sec 1055. Surface sealing for concrete in accordance with Sec 703 will not be permitted.

Omit parts underlined when not applicable.

(H10.90)
Method of attachment for the Type F Temporary Barrier shall be the Tie-Down Strap Bolt through deck.

(H10.91)
Temporary Barrier shall not be attached to the bridge.

Construction Joint

(H11.1)
Finish each side of joint with a 1/4 inch radius edging tool.

Pin and Flat Hexagonal Nut

(H11.2)
Material: Pin = ASTM A688 (Class F)
Nut = ASTM A709 Grade 36

Plastic Waterstop
(Use in the Curb and Parapet filled joints as specified in Sec. 3.30.)

(H11.3)
Plastic waterstop shall be placed in all safety median barrier curb (Type C) (Type D) filled joints, except structures with superelevation, use on all lower barrier curb joints only.

(H11.4)
Cost of plastic waterstop, complete-in-place, will be considered completely covered by the contract unit price for Concrete Safety Median Barrier Curb (Type C) (Type D).

Sign Supports

(H11.5)
Payment for furnishing and placing anchor bolts for sign supports will be considered completely covered by the contract unit price for other items.

(H11.6)
Payment for furnishing and erecting approximately ___ pounds of steel for sign supports will be considered completely covered by the contract lump sum price for Fabricated Sign Support Brackets.

Plan of Slab: All Structures

(H11.8)
Longitudinal slab dimensions are measured horizontally.

Pedestrian Guard Fence (Chain Link Type): General Notes

(H11.10)
Pedestrian guard fence (Chain link type) shall be in accordance with Sec 1043 except all fabric shall have the top and bottom edges knuckled.

(H11.11)
All rail post shall be vertical. Grout of 1/2" minimum thickness shall be placed under floor plates to provide for vertical alignment of rail posts.

(H11.12)
Payment for furnishing, galvanizing and erecting the fence and frame complete with anchor bolts and washers will be considered completely covered by the contract unit price for (72 in.) Pedestrian Fence (Structures) per linear foot.

(H11.13)
Dimensions of pedestrian guard fence are measured horizontally.

(H11.14)
The maximum spacing allowed for the braced panels (Pull posts) is 100 ft.

(H11.15)
Connect the lower end of the 1/2" Ø rod to the end of the braced panel to which the stretcher bar is attached.

(H11.16)
(112 in.) Curved Top Pedestrian Fence (Structures) will be measured to the nearest linear foot for each structure measured along the bottom outside edge of the sidewalk curb from _____ to _____.

(H11.17)
Core wire size for wire fabric shall be 6 gage minimum.

Omit parts underlined when not applicable.

Sidewalks

(H11.20)
All exposed edges of sidewalk shall have either a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H11.21)
Payment for all concrete and reinforecment complete-in-place will be considered completely covered by the contract unit price for Sidewalk (Bridges) per sq. foot.

(H11.22)
Concrete in the sidewalk shall be Class B-2.

(H11.23)
Measurement of the sidewalk is to the nearest square foot for each structure, measured horizontally from the outside face of safety barrier curb to the outside edge of sidewalk and from end of slab to end of slab.

Expansion Device Movement Gauge

(H11.24)
A movement gauge shall be provided on one side of bridge at all safety barrier curb expansion joints.

(H11.25)
All steel shall be galvanized.

(H11.26)
Cost of movement gauge complete-in-place will be considered completely covered by the contract unit price for Safety Barrier Curb.

(I1.1)
Outline of old work is indicated by dashed lines. Heavy lines indicate new work.

(I1.2)
Contractor shall verify all dimensions in field before ordering new material.

(I1.3)
Bars bonded in old concrete not removed shall be cleanly stripped and embedded into new concrete where possible. If length is available, old bars shall extend into new concrete at least 40 diameters for smooth bars and 30 diameters for deformed bars, unless otherwise noted.

Use the following notes where a broken concrete surface has no new concrete against it. Use bituminous paint below ground line and qualified special mortar above ground line.

(I1.4)
The area exposed by the removal of concrete and not covered with new concrete shall be coated with an approved bituminous paint qualified special mortar in accordance with Sec 704.

(I1.5) Use with joint filler joints with Asphaltic Concrete Wearing Surface.
Joint shall be cleaned per the manufacturers recommendations. Cost of Concrete and Asphalt Joint Sealer and Backer Rod will be considered completely covered by contract unit price per other items included in the contract.

Concrete Slab with Overlay
(I1.10) Use note for all wearing surfaces except epoxy polymer concrete overlay.
In order to maintain grade and a minimum thickness of overlay as shown on plans it may be necessary to use additional quantities of overlay at various locations throughout the structure. The cost of furnishing and installing the overlay will be considered completely covered in the contract unit price, including all additional labor, materials or equipment for variations in thickness of overlay.

(I1.10a) Use note for total surface hydrodemolitions.
In order to maintain grade and a minimum thickness of overlay as shown on plans it may be necessary to use additional quantities of overlay at various locations throughout the structure. See Special Provisions for Method of Measurement.

(I1.11) Use note for only epoxy polymer concrete overlay.
The contractor shall exercise care to ensure spillage over joint edges is prevented and that a neat line is obtained along any terminating edge of the epoxy polymer concrete.

(I1.12) Use note only with preventive maintenance jobs.
Concrete for repairing concrete deck shall be a qualified special mortar in accordance with Sec 704 instead of the Class B-2 or B-1 concrete.

Omit parts underlined when not applicable.

Use the following note I1.13 in Oct. 2004 lettings and beyond.

(I1.13) Use the following table and notes with alternate concrete wearing surfaces.

Alternate Concrete Wearing Surface	
Type of Concrete Wearing Surface	Type Used (✓)
Low Slump Concrete Wearing Surface	
Silica Fume Concrete Wearing Surface	

MoDOT construction personnel will complete column labeled "Type Used (✓)".

The contractor shall select one of the alternate concrete wearing surfaces listed in the table. The alternate concrete wearing surface method of measurement and basis of payment shall be in accordance with Sec 505.

Bridge Anchor Section - Guardrail

(I1.15)

Where attaching bridge guardrail to an existing bridge, a full-length bolt hole shall be drilled through the curb end post as shown on the plans. Full-length, A307 bolts shall attach the guardrail to the roadway face of the curb end post with the plate and nuts on the back side of the curb end post. Existing guardrail attachment holes in curb end post shall be filled with an approved epoxy mortar. Payment for this work will be considered completely covered by the contract unit price for the bridge anchor section (Roadway Item).

Removal and Storage of Existing Bridge Rails

(I1.20)
The existing bridge rails and posts shall be stored at a location as designated by the engineer on the MoDOT Maintenance Lot at _____.

Extension of Box Culverts

(I1.41)
Bottom of top slab, top of bottom slab, and inside faces of walls shall be built flush with the old structure.

(I1.42)
Bottom of new slab shall be built flush with the bottom of slab of the old box and the height of walls varied as necessary to extend the walls into rock as specified.

Use the following two notes for making end bents integral.

(I1.51)
The exposed and accessible surfaces of the existing structural steel and bearings that will be encased in concrete shall be cleaned with a minimum of SSPC-SP-2 surface preparation before concrete is poured. Payment for cleaning steel to be encased in concrete will be considered completely covered by the contract unit price for Class B-2 Concrete Slab on Steel.

Omit parts underlined when not applicable.

Curb Block-Out

(I1.60)

7/8" Ø Threadded Rods with nuts and washers shall be used in place of 7/8"Ø Bolts (ASTM A307).

(I1.61)

1"Ø holes shall be drilled through existing end post for placement of 7/8"Ø threaded rods, nuts, and washers.

Widening

(I1.62)

Dimensions:
Longitudinal dimensions are based on the original design plans.

(I1.63)

Traffic:
Maintain one lane of traffic during construction (see Roadway Traffic Control Plans).

(I1.64)

Stringer Support:
All existing stringers in the span being strengthened shall be raised simultaneously ✳ at jacking point and supported during welding of new steel plates.

(I1.65)

The temporary supports must be capable of safely supporting a service load of approximately ✳✳ tons per stringer (factor of safety not included) (see Special Provisions).

(I1.66)

✳ Scarification not required for Asphaltic Concrete Wearing Surface and Epoxy Polymer Concrete Overlay.

Use Resin Anchors unless concrete depths are insufficient.

(I2.1)
The contractor shall use one of the qualified resin anchor systems in accordance with Sec 1039.

(I2.2) ✳ Pay item in which resin anchor system is embedded.
Cost of furnishing and installing the resin anchor system complete-in-place will be considered completely covered by the contract unit price for ✳ .

(I2.3)
The minimum embedment depth in concrete with f'c = 4,000 psi for the resin anchor system shall be that required to meet the minimum ultimate pullout strength in accordance with Sec 1039 but shall not be less than 5".

Note to designer: A minimum factor of safety of 2 should be used when determining the number of anchors to be used.

(Use the following note when reinforcing steel is substituted for the threaded rod stud.)

(I2.4)
A An epoxy coated # ✳✳✳✳ Grade 60 reinforcing bar ✳✳✳✳✳ long shall be substituted for the ✳✳✳✳✳✳ Ø threaded rod.

✳✳✳✳ Bar size.
✳✳✳✳✳ Length of bar required by design.
✳✳✳✳✳✳ Diameter of threaded rod.

Omit parts underlined when not applicable.

Cone Expansion Anchors

(I2.30) ✳✳✳ Pay item in which cone expansion anchor is embedded.
Cost of furnishing and installing cone expanson anchor will be considered completely covered by the contract unit price for __✳✳✳__.

(I2.31)
The __✳__" diameter cone expansion anchors shall have a minimum ultimate pullout strength of __✳✳__ lbs. in concrete with f'c = 4,000 psi.

✳ DIAMETER	✳✳ PULLOUT
3/8"	3,900
1/2"	7,500
5/8"	10,800
3/4"	12,000

Omit parts underlined when not applicable.

(I3.1)
Any half-soling required in the areas designated as special repair zones shall be completed in alphabetical sequence. Any repair in the remainder of the bridge that is adjacent to Zone A and not designated as a special repair zone shall be completed prior to work in Zone A.

(I3.2)
Removal and repair shall be completed in one special repair zone and concrete shall have attained a compressive strength of 3200 psi before work can be started in the next special repair zone. Before placing concrete in areas adjacent to areas of subsequent repair, the concrete shall be separated with a material such as polyethylene sheets to aid in removal of old concrete.

(I3.5) Use following note for structures with multiple column bents.
Zones with the same letter designation may be repaired at the same time.

(I3.6) Use following note for structures with single column bents.
Zones with the same letter designation may be repaired at the same time except for the zones directly adjacent to the centerline of bent. If either of the zones adjacent to centerline of bent has a single repair area of over 10 square feet or a total repair area of over 20 square feet, that zone shall be repaired before removing concrete in the other zone of the same designation at that bent.

(I3.10) Use following note for voided or solid slab structures.
If any single repair area does not exceed 4 square feet in size and the total repair within a special repair zone does not exceed 12 square feet, the special repair zone requirement does not apply for that zone. Any damage sustained to the void tube as a result of the contractor's operations shall be patched or replaced as required by the engineer at the contractor's expense.

(I3.11) Use following note for voided slab structures.
An exposed void in the deck shall be patched as approved by the engineer in a manner that shall maintain the void area completely free of concrete. Cost of patching an exposed void will be considered completely covered by the contract unit price for repairing concrete deck (half-soling).

(I3.12) Use following note for voided slab structures.
When a deteriorated portion of the void tube is beyond the point of patching as determined by the engineer, the portion of the deteriorated void tube shall be replaced. The void area shall be maintained completely free of concrete. Cutting of the longitudinal reinforcing steel will not be permitted. The fiber tubes for producing the voids shall have an outside diameter with the wall thickness the same as the existing tubes and anchored at not more than the original spacing. Cost of replacing the void tube will be considered completely covered by the contract unit price for deck repair with void tube replacement.

Use following notes for box and deck girder structures.

(I3.16)
Total width of full depth repair shall not exceed 1/3 of the deck width at one time. For any area of deck repair that extends over a concrete girder and is more than 18 inches in length along the girder, the concrete removal shall stop at the centerline of girder and repair completed in this area. Prior to continuing work in this area, the concrete shall have attained a compressive strength of 3200 psi. No traffic shall be permitted over the girder that is undergoing repair.

(I3.17)
When the full depth repair extends over a diaphragm or girder and the deteriorated concrete extends into the diaphragm or girder, all deteriorated concrete shall be removed and replaced as full depth repair. Concrete in girders shall not be removed below the deck haunch of the girder without prior review and approval from the engineer.

Use following notes for box girder structures.

(I3.20)
Interior falsework installed by the contractor resting on the bottom slab shall be removed where entry access is available.

(I3.21)
If any single repair area does not exceed 9 square feet in size and the total repair within a special repair zone does not exceed 27 square feet, the special repair zone requirement does not apply for that zone. Half-soling repair in the special repair zone, on either side of the intermediate bents, shall be to a depth that will not expose half the diameter of the longitudinal reinforcing bar. Full depth repair shall be made when removal of deteriorated concrete exposes half or more of the diameter of the longitudinal reinforcing bar.

(J1.1)
Factor of safety shall be 2.0 for overturning, 1.5 for sliding and 2.0 for bearing.

(J1.2)
The cost of joint filler and joint seal, complete-in-place, will be considered completely covered by the contract unit price for Concrete Traffic Barrier (Type A D). See Roadway Plans.

(J1.3)
For seismic design the factor of safety shall be 1.5 for overturning and 1.1 for sliding.

(J1.4)
ϕ = __° for backfill material to be retained by the mechanically stabilized earth wall system.

(J1.5)
ϕ = __° for foundation material the wall is to rest on.

(J1.6)
$\phi \geq 34°$ for the select granular backfill for structural systems.

(J1.7)
Design $\phi = 34°$ for the select granular backfill for structural systems.

(J1.8)
All concrete for leveling pad and coping shall be Class B or B-1 with f'c = 4000 psi.

(J1.9)
The boring logs or other factual records of subsurface data and investigations performed by the department for the design of this project is available from the Project Contact upon written request.

(J1.10)
Panel reinforcement shall be epoxy coated.

(J1.11)
Anchorage reinforcement shall be spaced to avoid roadway drop inlet behind wall.

(J1.12)
A filter cloth meeting the requirements for a Separation Geotextile material shall be placed between the select granular backfill for structural systems and the backfill being retained by the mechanically stabilized earth wall system.

(J1.13)
Coping shall be required on this structure unless a small block system is used. Bond breaker (roofing felt or other approved alternate) between wall panel and coping required if coping is cast in place.

Omit parts underlined when not applicable.

For Battered Walls

(J1.14)
The top and bottom elevations are given for a vertical wall. If a battered wall system is used, the height of the wall shall be adjusted as necessary to fit the ground slope and the concrete leveling pad shall be adjusted as necessary to account for the wall batter. If a fence is built on an extended gutter, then the height of the wall shall be adjusted further.

The baseline of the wall shown is for a vertical wall. If a battered wall system is used, this baseline shall correspond to Elevation _____.

For Walls Near Bridge Abutments (Responsibility of Bridge Division)

(J1.15)
The contractor shall be solely responsible to coordinate construction of the wall with bridge and roadway construction and ensure that the bridge and roadway construction, resulting or existing obstructions, shall not impact the construction or performance of the wall. Soil reinforcement shall be designed and placed to avoid damage by pile driving, guardrail post installation, utility and sign foundations. (See Roadway and Bridge plans.)

PREQUALIFIED MSE WALL SYSTEMS

(J1.16)

MSE Wall Systems Data Table					
Proprietary Wall Systems		Combination Wall Systems			
Manufacturer	System	Facing Unit Manufacturer	Facing Unit	Geogrid Manufacturer	Geogrid

MSE Wall Systems Data Table is to be completed by MoDOT construction personnel to record the manufacturer of the proprietary wall system or the manufacturers of the combination wall system that was used for constructing the MSE wall.

Use following note when wall is required to be built vertical. Small block walls can not be built vertical.

(J1.17)
The MSE wall system shall be built vertical.

Use note when only the small or large block wall is required. Do not use note when small and large blocks can be used.

(J1.18)
The MSE wall system shall be a small large block wall system in accordance with Sec 720.

(J1.19)
Topmost layer of reinforcement shall be fully covered with select granular backfill for structural systems, as approved by the wall manufacturer, before placement of the Separation Geotextile.

(J1.20)
Adjustment in the vertical alignment of the drainage pipes from that depicted in the plans may be necessary to ensure positive flow out of the drainage system.

Outlet ends of pipes shall be located to avoid clogging or flow into the drainage system.

(J1.21)
Inverted U-shape reinforced capstone may be used in lieu of coping. Panel dowels for capstone as required by manufacturer.

Approach Slab Notes General

(K1.1)
All concrete for the bridge approach slab and sleeper slab shall be in accordance with Sec 503 (f'c = 4,000 psi).

(K1.2)
All joint filler shall be in accordance with Sec 1057 for preformed fiber expansion joint filler, except as noted.

(K1.3)
The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with Fy = 60,000 psi.

(K1.4)
Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise shown.

(K1.5)
The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by lap splicing the #4 & #6 bars 18" and 2'-2" respectively.

(K1.6)
Mechanical bar splices shall be in accordance with Sec 706.

(K1.7)
* Seal joint between vertical face of approach slab and wing with "Silicone Joint Sealant for Saw Cut and Formed Joints" in accordance with Sec 717.

(K1.9)
Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

(K1.11)
The contractor shall pour and satisfactorily finish the bridge or semi-deep slab before pouring the bridge approach slabs.

(K1.12)
Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge or semi-deep slab.

(K1.14)
Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other appurtenances and incidental work as shown on this sheet, complete in place, will be considered completely covered by the contract unit price for Bridge Approach Slab (Bridge) per sq. yard.

(K1.15)
For Concrete Approach Pavement details, see roadway plans.

(K1.17)
See Missouri Standard Plans Drawing 609.00 for details of Type A Barrier Curb.

(K1.18)
With the approval of the engineer, the contractor may crown the bottom of the approach slab to match the crown of the roadway surface.

(K1.19)
At the contractor's option, Grade 40 reinforcement may be substituted for the Grade 60 #5 dowel bars connecting the bridge approach slab to the bridge abutment. No additional payment will be made for this substitution.

(K1.20)
When Grade 40 reinforcement is substituted for the Grade 60 #5 dowel bars connecting the bridge approach slab to the bridge abutment, the reinforcement may be bent up to 90 degrees with a 2" minimum radius near the abutment to allow compaction of the backfill material near the abutment. Damage to epoxy coating shall be repaired in accordance with Sec 710.

(K1.21)
Drain pipe may be either 6" diameter corrugated metallic-coated pipe underdrain, 4" diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4" diameter corrugated polyethylene (PE) drain pipe.