Form C-104
Rev. 02/2009

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☐ **Conceptual Proposal** ☒ **Final Proposal** **Date** 4/7/2011

Contract ID _____ **Job No.** BRM-4989 (606)

County St. Louis **Original Bid Cost** $1,262,456.00

Contractor L. Krupp Construction, Inc. **By** Sean Kilian

Designed By Michael Banashek **Phone** (314) 280-0353

VECP# 11-07 **(to be completed by C.O.)** **VECP** ☒ **or** **PDVECP** ☐

1.Des cription of existing requirements and proposed change(s). Advantages/Disadvantages

We are proposing to replace end bent #1 with a concrete wall cast on top of a spread footing. We will also replace end bent #2 with a traditional pile and cap setup in lieu of the pile, footing, and wall setup currently planned. Finally, we will be utilizing a spread box beam superstructure with precast concrete panels and a concrete deck.

2.Es timate of reduction in construction costs. $61,148.25

3.P rediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.

Due to the spread box beam design and deletion of expansion joint in the deck, the maintenance costs in the future for this project should be reduced.

4.Ant icipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.

4/7/2011
(date)

5.Deadli ne for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.

_____ _____
(date) (effect)

6.Dates of any previous or concurrent submission of the same proposal.

1/19/2011, 2/14/2011, 4/1/2011
(date and/or dates)

Additional Comments:

**** Portion Below This Line To Be Filled Out by MoDOT ****

Comments: For CDG Engineers, Architects, Planners, Inc.

Glenn A. Smith, P.E. — Submitted By Resident Engineer — 4-12-11 — Date

Comments: DBE Changes Noted. The Contractor must make a good faith effort to meet the DBE Goal. The VE Approval does not Authorize a lesser DBE Participation. MoDOT Bridge reviewed & Approved. Recommend Approval.

☒ **Approval Recommended**

☐ **Rejection Recommended**

Ed Hamp D.E.S. — District Engineer — 4/18/11 — Date

Comments: N/A

☐ **Approval Recommended**

☐ **Rejection Recommended**

Federal Highway Administration
Required for FHWA Full Oversight Projects — Date

Comments: Approval is contingent on satisfactory results achieved in the field and written acknowledgement by the contractor that they are responsible for the consequences including unanticipated impacts or delays.

☒ **Approval**

☐ **Rejection**

David D. Oberhaus — Digitally signed by Ronald Morris
DN: cn=Ronald Morris, o=MoDOT, ou=3H35, email=Ronald.Morris@modot.mo.gov, c=US
Date: 2011.04.19 09:55:42 -05'00'

State Construction and Materials Engineer — Date

Distribution: Resident Engineer, Project Manager, District Construction & Materials Engineer, State Construction & Materials Engineer, FHWA Value Engineering Administrator – MoDOT, P. O. Box 270, Jefferson City, MO 65102

City of Fenton
Old Highway 141 Bridge Value Engineering Proposal
Final VE Quantities
3/29/2011

Pay Item	Description	Units	Plan Qty	Plan Unit Price	Plan Total Price	Revised Qty	Revised Unit Price	Revised Total	DIFFERENCE
206-10.00	Class 1 Excavation	CY	759	$25.00	$18,975.00	640	$25.00	$16,000.00	**($2,975.00)**
206-10.03	Class 1 Excavation in Rock	CY	10	$0.00	$0.00	10	$150.00	$1,500.00	**$1,500.00**
206-20.00	Class 2 Excavation	CY	101	$0.00	$0.00	101	$25.00	$2,525.00	**$2,525.00**
206-21.00	Class 2 Excavation in Rock	CY	19	$0.00	$0.00	19	$150.00	$2,850.00	**$2,850.00**
216-05.00	Removal of Bridge	LS	1	$10,000.00	$10,000.00	1	$10,000.00	$10,000.00	**$0.00**
503-10.10	Bridge Approach Slab (Bridge)	SY	267	$205.00	$54,735.00	267	$205.00	$54,735.00	**$0.00**
603-99.99	66" Precast Concrete Pipe Storm Sewer Adjustment	LS	1	$4,500.00	$4,500.00	1	$4,500.00	$4,500.00	**$0.00**
702-10.12	Structural Steel Piles (12")	LF	1245	$50.00	$62,250.00	120	$100.00	$12,000.00	**($50,250.00)**
702-70.00	Pile Point Reinforcement	EA	83	$105.00	$8,715.00	6	$105.00	$630.00	**($8,085.00)**
703-20.03	Class B Concrete (Substructure)	CY	371	$385.00	$142,835.00	252.1	$535.00	$134,873.50	**($7,961.50)**
703-42.13	Slab on Prestressed Concrete Box Beam	SY	0	$0.00	$0.00	308	$235.00	$72,380.00	**$72,380.00**
703-42.14	Class B-2 Concrete (Superstructure)	CY	56	$500.00	$28,000.00	0	$0.00	$0.00	**($28,000.00)**
705-60.50	Prestressed Concrete Box Beam (55 FT Span)	EA	12	$12,500.00	$150,000.00	7	$18,150.00	$127,050.00	**($22,950.00)**
7101000	Reinforcing Steel (Bridges)	LB	35990	$0.90	$32,391.00	18380	$0.90	$16,542.00	**($15,849.00)**
710-00.00	Reinforcing Steel (Epoxy Coated)	LB	10350	$1.00	$10,350.00	1410	$1.00	$1,410.00	**($8,940.00)**
711-01.00	Protective Coating-Concrete Bents (Urethane)	LS	1	$10,000.00	$10,000.00	0	$10,000.00	$0.00	**($10,000.00)**
712-23.00	Bridge Guard Rail	LF	128.33	$175.00	$22,457.75	117	$175.00	$20,475.00	**($1,982.75)**
715-10.01	Vertical Drain at End Bents	EA	2	$3,300.00	$6,600.00	2	$3,300.00	$6,600.00	**$0.00**
716-10.00	Plain Neoprene Bearing Pad	EA	0	$0.00	$0.00	14	$320.00	$4,480.00	**$4,480.00**
716-10.02	Laminated Neoprene Bearing Pad (P/S Structures)	EA	48	$275.00	$13,200.00	0	$320.00	$0.00	**($13,200.00)**
717-10.01	Preformed Compression Expansion Joint Seal (1-5/8 In.)	LF	103	$230.00	$23,690.00	0	$0.00	$0.00	**($23,690.00)**
999-99.01	Bridge Design (Horner & Shifrin)	LS	0	$0.00	$0.00	1	$35,000.00	$35,000.00	**$35,000.00**
999-99.02	Bridge Design Review (CDG)	LS	0	$0.00	$0.00	1	$14,000.00	$14,000.00	**$14,000.00**
	TOTALS				***$598,698.75***			***$537,550.50***	***($61,148.25)***

NOTE: THESE VALUES REPRESENT THE REVISED BRIDGE PORTION OF THIS PROJECT. THERE IS NO CHANGE TO ANY OTHER CONTRACT ITEMS.

DBE Utilization Form
City of Fenton - Old Highway 141 Bridge

DBE Name and Address	Bid Item Number	$ Value of DBE Work	% of $ Applicable	$ Amount Applicable	% of Total Contract
ATK Safety Supply 6352 Cedar Springs Road Cedar Hill, MO 63016	6169901 6169902 6206171A 6205900 6205901 6205908	$9,789.00	100.00%	$9,789.00	0.79%
Roden's Landscaping, Inc. 7800 Highway N O'Fallon, MO 63368	8022099 8061099	$15,960.00	100.00%	$15,960.00	1.30%
D & S Fencing Co. 2800 Sunnyside Road Festus, MO 63028	6061054 6062300A 6062400 6063015 6069999 7122300	$36,775.00	100.00%	$36,775.00	2.99%
Saber, Inc. 1761 Ashby Road St. Louis, MO 63114	6181000	$8,400.00	100.00%	$8,400.00	0.68%
Bumpy's Steel Erection 327 Missouri Avenue Suite 516 East St. Louis, IL 62201	5031010 7101000 7101000 7034214	$22,212.40	100.00%	$22,212.40	1.80%
WW Petroleum P.O. Box 216 Macon, MO 63552	4011209 4011213 4013010 4020520	$25,000.00	60.00%	$15,000.00	1.22%
Eagle Distributors 27237 Roelker Road Unit A Wright City, MO 63034	7056050 7261330 7261366 7311099 7320630 7320666 7261324 7261515 7311098 7320615 7320624	$102,699.00	60.00%	$61,619.40	5.00%
Silver Eagle Construction Products 400 S. Cool Springs Road P.O. Box 997 O'Fallon, MO 63366	5031010 7021012 7027000 7161002	$7,388.00	60.00%	$4,432.80	0.36%
	7151001	$3,750.00	100.00%	$3,750.00	0.30%
Midwest Hauling and Contracting 2286 Rose Lane Pacific, MO 63069	6181000 3040504 4011209 4011213 4015010 4020520 7261330 7261336 7311099 7320630 7320666 6221001 7261324 7261515 7311098 7320615 7320624	$38,000.00	100.00%	$38,000.00	3.08%
Blue Diamond Services, LLC 5850 Dulin Creek Road P.O. Box 242 House Springs, MO 63051	2035599 6115099	$16,000.00	100.00%	$16,000.00	1.30%

Windstar Transportation, LLC 111 Summit Place Webster Groves, MO 63119	6085007 6091051 6091060 6091098 6091099 5031010 7032003 7034214	$4,621.60	100.00%	$4,621.60	0.38%
TOTALS		***$290,595.00***		***$236,560.20***	***19.20%***

***Sabur, Inc. has decided to pull off of this job due to their schedule being full and the difficulty of this project. I am including them as a DBE as they were previously approved and had a signed subcontract with us, but are not fulfilling their duties as a subcontractor on this project.

HORNER & SHIFRIN, INC.
ENGINEERS
5200 Oakland Avenue • St. Louis MO 63110
(314) 531-4321 • Fax: (314) 531-6966

NAME OF INDIVIDUAL PROVIDING THIS INFORMATION: Kelly L. Hayes, P.E.

P.E. / ID. NO.: 2007020276

STRUCTURE INVENTORY AND APPRAISAL SHEET

COUNTY: St. Louis BRIDGE NO.: 1420013 ROUTE: Old Highway 141

**********IDENTIFICATION**********

(1)	STATE NAME: Missouri	CODE: 297
(8)	STRUCTURE NUMBER #:	1420013
(5)	INVENTORY ROUTE (ON/UNDER)-:	152001410
(2)	HIGHWAY AGENCY DISTRICT:	06
(3)	COUNTY CODE: 096	(4) PLACE CODE: 189
(6)	FEATURES INTERSECTED:	Fenton Creek
(7)	FACILITY CARRIED:	Old Highway 141
(9)	LOCATION:	Section 3011, Township 44N, Range 5E
(11)	MILEPOINT:	0000000
(12)	BASE HIGHWAY NETWORK:	CODE: 0
(13)	LRS INVENTORY ROUTE & SUBROUTE #:	
(16)	LATITUDE: 38 DEG 30 MIN 33	SEC
(17)	LONGITUDE: 90 DEG 26 MIN 01	SEC
(98)	BORDER BRIDGE STATE CODE: % SHARE:	%
(99)	BORDER BRIDGE STRUCTURE NO. #:	

**********STRUCTURE TYPE AND MATERIAL********

(43)	STRUCTURE TYPE MAIN: MATERIAL: Prestressed Concrete	
	TYPE: Girder	CODE: 506
(44)	STRUCTURE TYPE APPR: MATERIAL:	
	TYPE:	CODE: 000
(45)	NUMBER OF SPANS IN MAIN UNIT:	001
(46)	NUMBER OF APPROACH SPANS:	0000
(107)	DECK STRUCTURE TYPE:	2
(108)	WEARING SURFACE/PROTECTIVE SYSTEM:	
A)	TYPE OF WEARING SURFACE:	CODE: 0
B)	TYPE OF MEMBRANE:	CODE: 0
C)	TYPE OF DECK PROTECTION:	CODE: 1

**********AGE AND SERVICE**********

(27)	YEAR BUILT:	2011
(106)	YEAR RECONSTRUCTED:	
(42)	TYPE OF SERVICE: ON:	Highway
	UNDER: Waterway	CODE: 15
(28)	LANES: ON STRUCTURE: 03	UNDER STRUCTURE: 00
(29)	AVERAGE DAILY TRAFFIC:	0010608
(30)	YEAR OF ADT: 2006	(109) TRUCK ADT:
(19)	BYPASS, DETOUR LENGTH:	2.2 miles

**********GEOMETRIC DATA**********

(48)	LENGTH OF MAXIMUM SPAN:	55 FT.
(49)	STRUCTURE LENGTH:	000058 FT.
(50)	CURB OR SIDEWALK: LEFT 00.0 FT.	RIGHT 00.0 FT.
(51)	BRIDGE ROADWAY WIDTH CURB TO CURB:	48.00 FT.
(52)	DECK WIDTH OUT TO OUT:	48 FT.
(32)	APPROACH ROADWAY WIDTH (2/SHOULDERS):	0048 FT.
(33)	BRIDGE MEDIAN: No median	CODE: 0
(34)	SKEW: 20 DEG (35) STRUCTURE FLARED:	0
(10)	INVENTORY ROUTE MIN VERT CLEAR: 99 FT	99 IN.
(47)	INVENTORY ROUTE TOTAL HORIZ CLEAR:	48.0 FT.
(53)	MIN VERT CLEAR OVER BRIDGE RDWY: 99 FT.	99 IN.
(54)	MIN VERT UNDERCLEAR REF: N	FT.IN.
(55)	MIN LAT UNDERCLEAR RT REF: N	FT.
(56)	MIN LAT UNDERCLEAR LT REF: N	FT.

**********NAVIGATION DATA**********

(38)	NAVIGATION CONTROL:	CODE: N
(111)	PIER PROTECTION:	CODE: 1
(39)	NAVIGATION VERTICAL CLEARANCE:	0000 FT.
(116)	VERT-LIFT BRIDGE NAV MIN VERT CLEAR:	FT.
(40)	NAVIGATION HORIZONTAL CLEARANCE:	00000 FT.

****

SUFFICIENCY RATING =

STATUS =

**********CLASSIFICATION**********CODE

(112)	NBIS BRIDGE LENGTH:	Y
(104)	HIGHWAY SYSTEM:	0
(26)	FUNCTIONAL CLASS:	17
(100)	DEFENSE HIGHWAY:	0
(101)	PARALLEL STRUCTURE:	N
(102)	DIRECTION OF TRAFFIC:	2
(103)	TEMPORARY STRUCTURE:	
(105)	FEDERAL LANDS HIGHWAYS:	0
(110)	DESIGNATED NATIONAL NETWORK:	0
(20)	TOLL:	3
(21)	MAINTAIN:	04
(22)	OWNER:	City of Fenton
(37)	HISTORICAL SIGNIFICANCE:	5

**********CONDITION**********CODE

(58)	DECK:	9
(59)	SUPERSTRUCTURE:	9
(60)	SUBSTRUCTURE:	9
(61)	CHANNEL & CHANNEL PROTECTION:	9
(62)	CULVERTS:	N

**********LOAD RATING AND POSTING********CODE

(31)	DESIGN LOAD:	6
(63)	OPERATING RATING METHOD:	1
(64)	OPERATING RATING:	90 tons
(65)	INVENTORY RATING METHOD:	1
(66)	INVENTORY RATING:	52 tons
(70)	BRIDGE POSTING:	5
(41)	STRUCTURE OPEN, POSTED OR CLOSED:	G

**********APPRAISAL**********CODE

(67)	STRUCTURAL EVALUATION:	9
(68)	DECK GEOMETRY:	9
(69)	UNDERCLEARANCES, VERTICAL & HORIZONTAL:	N
(71)	WATERWAY ADEQUACY:	4
(72)	APPROACH ROADWAY ALIGNMENT:	6
(36)	TRAFFIC SAFETY FEATURES:	1111
(113)	SCOUR CRITICAL BRIDGES:	8

**********PROPOSED IMPROVEMENTS**********

(75)	TYPE OF WORK:	CODE:
(76)	LENGTH OF STRUCTURE IMPROVEMENT:	FT.
(94)	BRIDGE IMPROVEMENT COST	$,000
(95)	ROADWAY IMPROVEMENT COST	$,000
(96)	TOTAL PROJECT COST	$,000
(97)	YEAR OF IMPROVEMENT COST ESTIMATE	
(114)	FUTURE ADT:	015763
(115)	YEAR OF FUTURE ADT:	2026

**********INSPECTIONS**********

(90)	INSPECTION DATE: /	(91) FREQUENCY: MO
(92)	CRITICAL FEATURE INSPECTION:	(93) CFI DATE
A)	FRACTURE CRIT DETAIL: - MO	A) /
B)	UNDERWATER INSP: - MO	B) /
C)	OTHER SPECIAL INSP: - MO	C) /

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: ~~4/1/2011~~ 3.31.11

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method - Summary

MODOT Bridge Inspection Rating Manual - Section 4

HS20 Truck:

Inventory Rating =	51.7	Tons	>	36	Tons	**OKAY**
Operating Rating =	90.1	Tons				
Posting =	77.5	Tons	>	40	Tons	**No Posting Req'd**

H20 Truck:

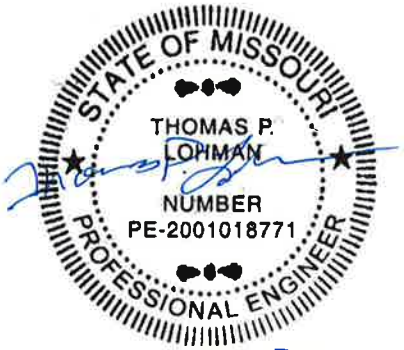
Inventory Rating =	41.3	Tons	>	20	Tons	**OKAY**
Operating Rating =	72.0	Tons				
Posting =	61.9	Tons	>	23	Tons	**No Posting Req'd**

3S2 Truck:

Inventory Rating =	72.0	Tons	>	36.64	Tons	**OKAY**
Operating Rating =	125.5	Tons				
Posting =	108.0	Tons	>	40	Tons	**No Posting Req'd**

MO5 Truck: *(Commercial Zones Only)*

Inventory Rating =	61.3	Tons	>	36.64	Tons	**OKAY**
Operating Rating =	106.8	Tons				
Posting =	91.8	Tons	>	70	Tons	**No Posting Req'd**

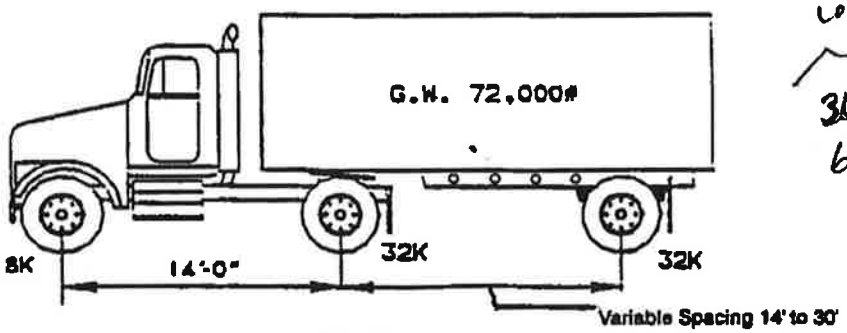


3.31.2011

RATING VEHICLE

Ratings are required at the inventory and operating levels by the load factor method on each bridge for the following vehicle.

LOAD FACTOR
36T INVENTORY
60T operating



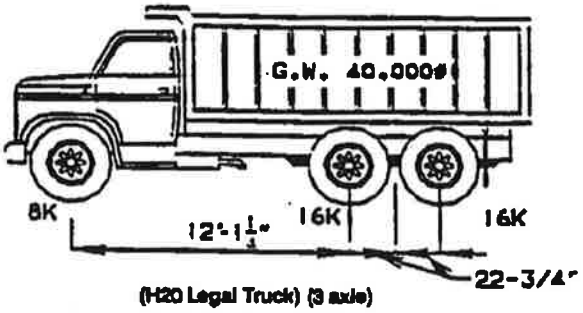
(HS20 Truck)

NOTE: To convert to the MS loading, multiply the HS20 vehicle and axle weights by 0.9.

See LPA Manual 3/23/2000
IX-3 Item 3. SI&A Report

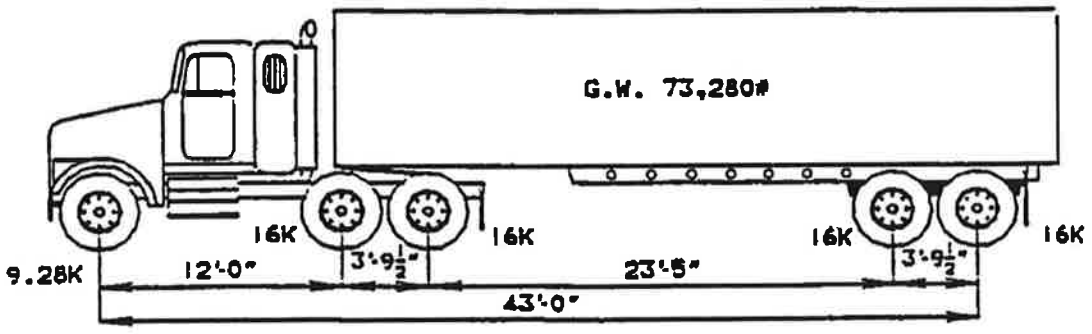
POSTING VEHICLES

Each bridge ~~designed below the HS20 level~~ should be checked to ensure proper posting. The following vehicles are established for this purpose. The H20 legal vehicle is used to model the load for single unit vehicles. The 3S2 vehicle is used as a model for all other vehicles. The MO5 vehicle is used to model the commercial zone loadings.



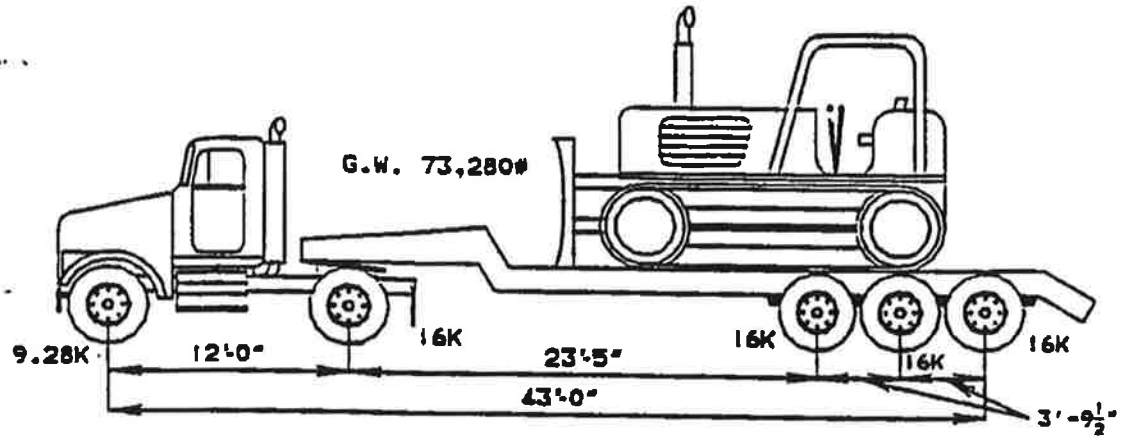
(H20 Legal Truck) (3 axle)

Single Unit Vehicle (Legal Limit = 23 Tons)



(3S2 Truck)

All Other Vehicles (Legal Limit = 40 Tons)



(MO5 Truck)

Commercial Zone Vehicle (Limit = 70 Tons)

LIVE LOAD DISTRIBUTION FACTORS

Live load distribution factors in accordance with AASHTO's Standard Specifications for Highway Bridges, except as follows:

A.) The distribution factor for exterior steel stringers supporting concrete floors shall be determined by assuming the flooring to act as a simple span between stringers or beams when the spacing from the adjacent interior girders to the face of rail or edge of curb is less than 5'-6" and the overhang is less than 18". Also, this method of distribution may be used for any girder spacing when there is no overhang. The first wheel load shall be placed no farther than 2'-0" from the face of rail or roadway face of curb.

B.) The live load distribution factor for a one-lane loading for slab-type structures may be calculated assuming the distribution of two wheel loads over the roadway width not to exceed 24 feet.

LOAD TESTING

Load testing of reinforced concrete bridges where the details of the reinforcement are unknown and an accurate loading history is not available will be permitted to establish load capacities. Allowable postings will be established at 75% of the proof load vehicle. The proof load vehicle shall be a single unit, 3-axle vehicle for short span bridges.

Load tests shall be performed by registered professional engineers. Load test reports shall include a description of how the test was performed, a summary of the gross weights, and axle weights and axle spacings of the vehicle used and the deflection under load.

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

Project Data

File: truck loads.CSP
Project: Fenton Creek Rating Trucks
Analysis Method: AASHTO Standard Specification
User Job Number: 1100110
State: FL
State Job Number:
Date: 3-30-11
By: Leap
Comments:

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

CURRENT LOADS

1.000*(Truck) HS20

1.000*(Truck) H20

1.000*(Truck) 3S2

1.000*(Truck) MO5

Standard Mode Options

Truck Factors		Lane Factors	
Moment	1.000	Moment	1.000
Shear	1.000	Shear	1.000
Deflection	1.000	Deflection	1.000

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

Load Details

Truck Load Details
Name: HS20
Factor: 1.00

Axles

#	Mag, K	Min, ft	Max, ft
1	8.000		
2	32.000	14.000	14.000
3	32.000	14.000	30.000

Truck Load Details
Name: H20
Factor: 1.00

Axles

#	Mag, K	Min, ft	Max, ft
1	8.000		
2	32.000	14.000	14.000

Truck Load Details
Name: 3S2
Factor: 1.00

Axles

#	Mag, K	Min, ft	Max, ft
1	9.280		
2	16.000	12.000	12.000
3	16.000	3.792	3.792
4	16.000	23.417	23.417
5	16.000	3.792	3.792

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

Truck Load Details
Name: MO5
Factor: 1.00

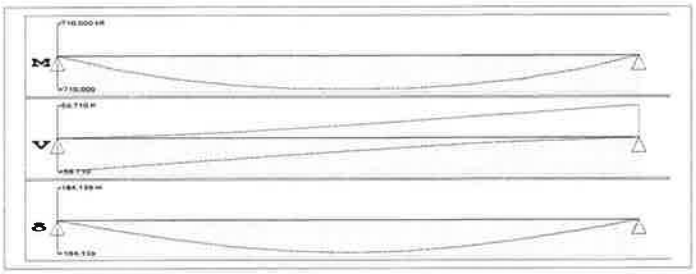
Axles

#	Mag, K	Min, ft	Max, ft
1	9.280		
2	16.000	12.000	12.000
3	16.000	23.417	23.417
4	16.000	3.792	3.792
5	16.000	3.792	3.792

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

ID: HS20
Type: Truck

Factors:
Moment: 1.000
Shear: 1.000
Deflection: 1.000



Span	Location (ft)	MOMENT (max) (min) (kft)	Corresponding Shear(+) (K)	Corresponding Shear(-) (K)	SHEAR (max) (min) (K)	Corresponding Moment(+) (kft)	Corresponding Moment(-) (kft)	DEFLECT (max) (min) (in)
1	0.000	0.000	59.710	0.000	59.710	0.000	0.000	0.00
		-0.000	59.710	0.000	0.000	0.000	-0.000	0.00
	5.500	289.200	52.582	0.000	52.582	289.200	0.000	57.43
		0.000	0.000	0.000	-3.200	158.400	0.000	0.00
	11.000	499.200	45.382	0.000	45.382	499.200	0.000	109.27
		0.000	0.000	0.000	-6.400	281.600	0.000	0.00
	16.500	630.000	38.182	0.000	38.182	630.000	0.000	150.11
		0.000	0.000	0.000	-11.055	425.600	0.000	0.00
	22.000	704.000	29.091	-2.909	30.982	681.600	0.000	175.30
		0.000	0.000	0.000	-17.455	576.000	0.000	0.00
	27.500	710.000	21.891	-21.891	23.855	656.000	0.000	184.14
		0.000	0.000	0.000	-23.855	656.000	0.000	0.00
	33.000	704.000	2.909	-29.091	17.455	576.000	0.000	175.30
		0.000	0.000	0.000	-30.982	681.600	0.000	0.00
	38.500	630.000	0.000	-38.182	11.055	425.600	0.000	150.11
		0.000	0.000	0.000	-38.182	630.000	0.000	0.00
	44.000	499.200	0.000	-45.382	6.400	281.600	0.000	109.27
		0.000	0.000	0.000	-45.382	499.200	0.000	0.00
	49.500	289.200	0.000	-52.582	3.200	158.400	0.000	57.43
		0.000	0.000	0.000	-52.582	289.200	0.000	0.00
	55.000	0.000	0.000	-59.710	0.000	0.000	-0.000	0.00
		-0.000	0.000	-59.710	-59.710	0.000	-0.000	0.00

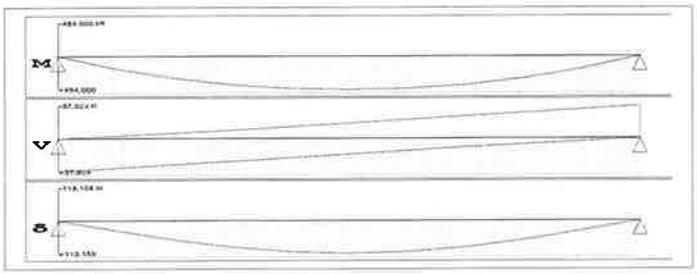
Support	Reaction Positive	Reaction Negative
1	0.000	-59.782
2	0.000	-59.782

Moment causing bottom tension and Shear causing left-up/right-down are positive. Deflection down is positive. Reaction down is positive.

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

ID: H20
Type: Truck

Factors:
Moment: 1.000
Shear: 1.000
Deflection: 1.000



Span	Location (ft)	MOMENT (max) (min) (kft)	Corresponding Shear(+) (K)	Corresponding Shear(-) (K)	SHEAR (max) (min) (K)	Corresponding Moment(+) (kft)	Corresponding Moment(-) (kft)	DEFLECT (max) (min) (in)
1	0.000	0.000	37.924	0.000	37.924	0.000	0.000	0.00
		-0.000	37.924	0.000	0.000	0.000	-0.000	0.00
	5.500	186.800	33.964	0.000	33.964	186.800	0.000	34.74
		0.000	0.000	0.000	-3.200	158.400	0.000	0.00
	11.000	329.600	29.964	-2.036	29.964	329.600	0.000	66.33
		0.000	0.000	0.000	-6.400	281.600	0.000	0.00
	16.500	428.400	25.964	-6.036	25.964	428.400	0.000	91.60
		0.000	0.000	0.000	-9.964	383.600	0.000	0.00
	22.000	483.200	21.964	-10.036	21.964	483.200	0.000	107.80
		0.000	0.000	0.000	-13.964	460.800	0.000	0.00
	27.500	494.000	17.964	-17.964	17.964	494.000	0.000	113.16
		0.000	0.000	0.000	-17.964	494.000	0.000	0.00
	33.000	483.200	10.036	-21.964	13.964	460.800	0.000	107.80
		0.000	0.000	0.000	-21.964	483.200	0.000	0.00
	38.500	428.400	6.036	-25.964	9.964	383.600	0.000	91.60
		0.000	0.000	0.000	-25.964	428.400	0.000	0.00
	44.000	329.600	2.036	-29.964	6.400	281.600	0.000	66.33
		0.000	0.000	0.000	-29.964	329.600	0.000	0.00
	49.500	186.800	0.000	-33.964	3.200	158.400	0.000	34.74
		0.000	0.000	0.000	-33.964	186.800	0.000	0.00
	55.000	0.000	0.000	-37.924	0.000	0.000	-0.000	0.00
		-0.000	0.000	-37.924	-37.924	0.000	-0.000	0.00

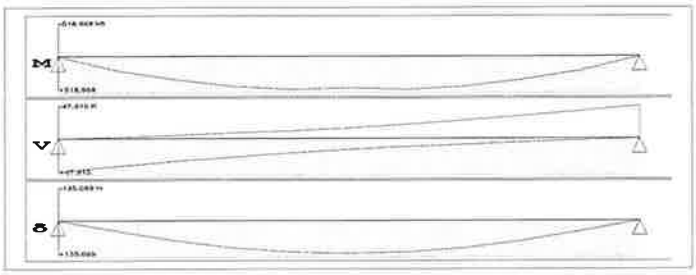
Support	Reaction Positive	Reaction Negative
1	0.000	-37.964
2	0.000	-37.964

Moment causing bottom tension and Shear causing left-up/right-down are positive. Deflection down is positive. Reaction down is positive.

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

ID: 3S2
Type: Truck

Factors:
Moment: 1.000
Shear: 1.000
Deflection: 1.000



Span	Location (ft)	MOMENT (max) (min) (kft)	Corresponding Shear(+) (K)	Corresponding Shear(-) (K)	SHEAR (max) (min) (K)	Corresponding Moment(+) (kft)	Corresponding Moment(-) (kft)	DEFLECT (max) (min) (in)
1	0.000	0.000	47.915	0.000	47.915	0.000	-0.000	0.00
		-0.000	47.915	0.000	0.000	0.000	-0.000	0.00
	5.500	223.632	40.660	0.000	40.660	223.632	0.000	43.27
		0.000	0.000	0.000	-2.097	103.800	0.000	0.00
	11.000	366.656	33.332	0.000	33.332	366.656	0.000	81.83
		0.000	0.000	0.000	-5.297	233.067	0.000	0.00
	16.500	470.832	26.004	0.000	26.764	441.600	0.000	111.83
		0.000	0.000	0.000	-8.497	327.133	0.000	0.00
	22.000	518.968	7.728	-8.272	21.000	462.011	0.000	129.91
		0.000	0.000	0.000	-11.697	386.000	0.000	0.00
	27.500	498.993	15.600	-15.600	15.600	498.993	0.000	135.09
		0.000	0.000	0.000	-15.600	498.993	0.000	0.00
	33.000	518.968	8.272	-7.728	11.697	386.000	0.000	129.91
		0.000	0.000	0.000	-21.000	462.011	0.000	0.00
	38.500	470.832	0.000	-26.004	8.497	327.133	0.000	111.83
		0.000	0.000	0.000	-26.764	441.600	0.000	0.00
	44.000	366.656	0.000	-33.332	5.297	233.067	0.000	81.83
		0.000	0.000	0.000	-33.332	366.656	0.000	0.00
	49.500	223.632	0.000	-40.660	2.097	103.800	0.000	43.27
		0.000	0.000	0.000	-40.660	223.632	0.000	0.00
	55.000	0.000	0.000	-47.915	0.000	0.000	-0.000	0.00
		-0.000	0.000	-47.915	-47.915	0.000	0.000	0.00

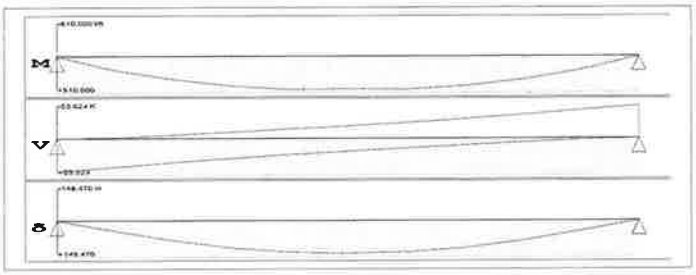
Support	Reaction Positive	Reaction Negative
1	0.000	-47.988
2	0.000	-47.988

Moment causing bottom tension and Shear causing left-up/right-down
are positive. Deflection down is positive. Reaction down is positive.

Horner & Shifrin, Inc.
5200 Oakland Ave.
St. Louis, MO 63110
Tel: 314-531-4321
Fax: 314-531-6966

ID: MO5
Type: Truck

Factors:
Moment: 1.000
Shear: 1.000
Deflection: 1.000



Span	Location (ft)	MOMENT (max) (min) (kft)	Corresponding Shear(+) (K)	Corresponding Shear(-) (K)	SHEAR (max) (min) (K)	Corresponding Moment(+) (kft)	Corresponding Moment(-) (kft)	DEFLECT (max) (min) (in)
1	0.000	0.000	53.624	0.000	53.624	0.000	0.000	0.00
		-0.000	53.624	0.000	0.000	0.000	-0.000	0.00
	5.500	255.032	46.369	0.000	46.369	255.032	0.000	47.41
		0.000	0.000	0.000	-2.097	103.800	0.000	0.00
	11.000	429.456	39.041	0.000	39.041	429.456	0.000	90.00
		0.000	0.000	0.000	-6.291	276.800	0.000	0.00
	16.500	547.933	20.885	0.000	32.473	535.800	0.000	123.33
		0.000	0.000	0.000	-11.091	427.000	0.000	0.00
	22.000	610.000	14.485	-1.515	26.073	573.600	0.000	143.36
		0.000	0.000	0.000	-15.891	524.400	0.000	0.00
	27.500	601.666	19.503	-19.503	20.691	569.000	0.000	148.47
		0.000	0.000	0.000	-20.691	569.000	0.000	0.00
	33.000	610.000	1.515	-14.485	15.891	524.400	0.000	143.36
		0.000	0.000	0.000	-26.073	573.600	0.000	0.00
	38.500	547.933	0.000	-20.885	11.091	427.000	0.000	123.33
		0.000	0.000	0.000	-32.473	535.800	0.000	0.00
	44.000	429.456	0.000	-39.041	6.291	276.800	0.000	90.00
		0.000	0.000	0.000	-39.041	429.456	0.000	0.00
	49.500	255.032	0.000	-46.369	2.097	103.800	0.000	47.41
		0.000	0.000	0.000	-46.369	255.032	0.000	0.00
	55.000	0.000	0.000	-53.624	0.000	0.000	-0.000	0.00
		-0.000	0.000	-53.624	-53.624	0.000	-0.000	0.00

Support	Reaction Positive	Reaction Negative
1	0.000	-53.697
2	0.000	-53.697

Moment causing bottom tension and Shear causing left-up/right-down are positive. Deflection down is positive. Reaction down is positive.

HORNER & SHIFRIN, INC. ENGINEERS
5200 Oakland Ave. | St. Louis, MO 63110
4166 W. Kearney St. | Springfield, MO 65803
640 Pierce Blvd., Ste. 200 | O'Fallon, IL 62269
www.HornerShifrin.com

SHEET NO _____ OF _____ JOB NO. 1100110

TITLE:

SUBJECT FILE FENTON CREEK

BY TPL DATE 3.30.11 CHECKED _____ DATE _____

RATING - LIVE LOAD

$$\text{Impact} = \frac{50}{L+125} = \frac{50}{55+125} = 0.28$$

truck	Moment from Consys	× Impact = 1.28 =	Input for spreadsheet
HS20	710 K.ft		909 K.ft
H20	494 K.ft		632 K.ft
3S2	519 K.ft		664 K.ft
MOS	610 K.ft		781 K.ft

HORNER & SHIFRIN, INC. ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPC
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = HS20

Material Properties:

Concrete:

f 'c* =	7000	psi
f 'ci* =	5500	psi
f 'c =	4000	psi
Ec* =	5072	ksi
Eci* =	4496	ksi
Ec =	3834	ksi
n =	5.52	

Prestressing Steel:

f_s' =	270	ksi
E_s' =	28000	ksi

Reinforcing Steel

f_y =	60	ksi
E_s =	29000	ksi
n =	7.56	

Girder Geometry and Strand Locations:

Girder Properties from Conspan:

A =	696	in^2
Y_b =	10.5	in
I =	34529	in^4
d =	21	in
b_{top} =	48	in
b_{eff} =	68	in (exterior girder)
t_s =	7.5	in
$A_{smidspan}$ =	0.248	in^2/ft (#5 @ 15")

Area of Slab Steel / ft

Strands:

# of Strands =	30	
$A_{s/strand}$ =		in^2
Y_{center} =	3.62	in
Y_{ends} =	3.62	in

Haunch Heights:

Mid Span =	1.00	in	(assume for
End =	3.25	in	simplification)

Prestressing Pattern:

d (in)	Str. @ Center	Str. @ Ends
1.75	14	14
3.75	14	14
5.75	0	0
7.75	0	0
9.75	0	0
11.75	0	0
13.75	0	0
15.75	2	2
20		0
22		0
24		0
26		0
28		0
30		0
32		0
34		0
Total	30	30

Prestress Loss =	25.90%		= Total prestress loss (Ext Girder) per Conspan
Fi =	43.90	k	= 0.75*270ksi*0.217in^2
Ff =	975.90	k	
ec =	6.88	in	

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = HS20

Section Properties for Girder Only near Mid Span (For Dead Load):

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.732	1.75	24.032	8.47	-	985.36	985.36
14	13.732	3.75	51.497	6.47	-	574.99	574.99
0	0.000	5.75	0.000	4.47	-	0.00	0.00
0	0.000	7.75	0.000	2.47	-	0.00	0.00
0	0.000	9.75	0.000	0.47	-	0.00	0.00
0	0.000	11.75	0.000	1.53	-	0.00	0.00
0	0.000	13.75	0.000	3.53	-	0.00	0.00
2	1.962	15.75	30.898	5.53	-	59.98	59.98
Girder	696	10.5	7308.0	0.28	34529	54.26	34583
P. Steel	29.427		106.4			1620.3	1620
Σ	725.43		7414.4				36204

Y_b = 10.22 in
Y_t = 10.78 in
I = 36204 in^4
S_b = 3542.2 in^3
S_t = 3358.6 in^3

Section Properties for Girder and Slab near Mid Span:

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	14.11	-	2734.329	2734.329
14	13.73	3.75	51.497	12.11	-	2014.154	2014.154
0	0.00	5.75	0.000	10.11	-	0	0
0	0.00	7.75	0.000	8.11	-	0	0
0	0.00	9.75	0.000	6.11	-	0	0
0	0.00	11.75	0.000	4.11	-	0	0
0	0.00	13.75	0.000	2.11	-	0	0
2	1.96	15.75	30.898	0.11	-	0.024069	0.024069
Girder	696.00	10.50	7308.00	5.36	34529.0	20001.5	54530.5
Haunch	36.28	21.50	780.12	5.64	3.02	1153.9	1156.9
Slab Steel	6.63	27.06	179.39	11.20	-	831.5	831.5
Slab	385.52	25.75	9927.24	9.89	1807.14	37703.0	39510.2
P. Steel	29.43	-	106.43	-	-	4748.5	4748.5
Σ	1153.86		18301.2				100778

Y_b = 15.86 in
Y_t = 5.14 in
Y_{tslab} = 13.64 in
I = 100778 in^4
S_b' = 6353.9 in^3
S_t' = 19609.5 in^3

Slab Steel Height (y) =
21+1+3+1+.75+.5*.625 = 27.06"

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = HS20

Section Properties for Girder and Slab near Mid Span:(Creep Considered - 3n)

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	11.04	-	1674.305	1674.305
14	13.73	3.75	51.497	9.04	-	1122.706	1122.706
0	0.00	5.75	0.000	7.04	-	0	0
0	0.00	7.75	0.000	5.04	-	0	0
0	0.00	9.75	0.000	3.04	-	0	0
0	0.00	11.75	0.000	1.04	-	0	0
0	0.00	13.75	0.000	0.96	-	0	0
2	1.96	15.75	30.898	2.96	-	17.16669	17.16669
Girder	696.00	10.50	7308.00	2.29	34529.0	3655.9	38184.9
Haunch	12.09	21.50	260.04	8.71	1.01	917.2	918.2
Slab Steel	6.63	27.06	179.39	14.27	-	1349.6	1349.6
Slab	128.51	25.75	3309.08	12.96	602.38	21578.2	22180.6
P. Steel	29.43	-	106.43	-	-	2814.2	2814.2
Σ	872.66		11162.9				65447

Y_b = 12.79 in
Y_t = 8.21 in
Y_{tslab} = 16.71 in
I = 65447 in^4
S_b" = 5116.3 in^3
S_t" = 7973.5 in^3

Ultimate Strength Analysis:

d = 25.88 in

ρ^* = 0.00370

β_1 = 0.7

f_{su}^* = 231.55 ksi

f 'c = 4 ksi

ϕM_n = 2833.69 k-ft

Impact = 0.278

	Interior	Exterior	
M_{DL} =	574.5	553.1	k-ft
M_{SDL} =	90.8	90.8	k-ft
M_{LL+I} =	605	570	k-ft
M_{PED} =	0	0	k-ft
RF(w/o Ped) =	1.50	1.61	
RF(w/ Ped) =	2.00	2.15	
	RF_{min} =	1.50	

Trk Wt = 36 Ton
M_{LL+I} = 907.2 k-ft

*M_{LL+I} per Consys * Impact*

	Interior	Exterior
DF =	0.6666	0.6286
Mped =	0	k-ft

Distribution Factors are Per Truck per AASHTO 3.23.2.3.2

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = HS20

	Interior		Exterior			
	LIVE	L + Ped	LIVE	L + Ped		
0.6 f'_c =	4.20	4.20	4.20	4.20	ksi	
0.4 f'_c =	2.80	2.80	2.80	2.80	ksi	
$f_{Prestress}$ =	-0.60	-0.60	-0.60	-0.60	ksi	
f_{DL} =	2.05	2.05	1.98	1.98	ksi	
f_{SDL} =	0.14	0.14	0.14	0.14	ksi	
f_{Ped} =	0.00	0.00	0.00	0.00	ksi	
f_{LL+I} =	0.37	0.37	0.35	0.35	ksi	
RF =	7.05	9.40	7.69	10.26	ksi	Full Loading
RF =	5.42	7.22	5.85	7.80	ksi	Live + 0.5(pre + D)

RF_{min} = 5.42

	Interior		Exterior		
	LIVE	L + P	LIVE	L + P	
6 $(f'_c)^{1/2}$ =	0.50	0.50	0.50	0.50	ksi
$f_{Prestress}$ =	-3.30	-3.30	-3.30	-3.30	ksi
f_{DL} =	1.95	1.95	1.87	1.87	ksi
f_{SDL} =	0.21	0.21	0.21	0.21	ksi
f_{Ped} =	0.00	0.00	0.00	0.00	ksi
f_{LL+I} =	1.14	1.14	1.08	1.08	ksi
RF =	**1.44**	**1.92**	**1.59**	**2.12**	ksi

RF_{min} = 1.44

RF_{min} = 1.44
Inventory = **51.7** Ton

	Int.	Ext.	
RF =	2.50	2.69	Both are done with Pedestrian Loading
Operating =	**90.1**	Ton	
Posted =	**77.5**	Ton	

HS20 Truck		
Inventory =	**51.7**	Tons
Operating =	**90.1**	Tons
Posted =	**77.5**	Tons

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = H20

Material Properties:

Concrete:

f 'c* =	7000	psi
f 'ci* =	5500	psi
f 'c =	4000	psi
Ec* =	5072	ksi
Eci* =	4496	ksi
Ec =	3834	ksi
n =	5.52	

Prestressing Steel:

f_s' =	270	ksi
E_s' =	28000	ksi

Reinforcing Steel

f_y =	60	ksi
E_s =	29000	ksi
n =	7.56	

Girder Geometry and Strand Locations:

Girder Properties from Conspan:

A =	696	in^2
Y_b =	10.5	in
I =	34529	in^4
d =	21	in
b_{top} =	48	in
b_{eff} =	68	in
t_s =	7.5	in
$A_{smidspan}$ =	0.248	in^2/ft

Area of Slab Steel / ft

Strands:

# of Strands =	30	
$A_{s/strand}$ =	0.217	in^2
Y_{center} =	3.62	in
Y_{ends} =	3.62	in

Haunch Heights:

Mid Span =	1.00	in
End =	3.25	in

Prestressing Pattern:

d (in)	Str. @ Center	Str. @ Ends
1.75	14	14
3.75	14	14
5.75	0	0
7.75	0	0
9.75	0	0
11.75	0	0
13.75	0	0
15.75	2	2
20	0	0
22	0	0
24	0	0
26	0	0
28	0	0
30	0	0
32	0	0
34	0	0
Total	30	30

Prestress Loss =	25.90%	
Fi =	43.9	k
Ff =	975.897	k
ec =	6.88	in

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = H20

Section Properties for Girder Only near Mid Span (For Dead Load):

# Strands	A (in²)	y (in)	Ay (in³)	d (in)	I_o (in⁴)	Ad^2 (in⁴)	I (in⁴)
14	13.732	1.75	24.032	8.47	-	985.36	985.36
14	13.732	3.75	51.497	6.47	-	574.99	574.99
0	0.000	5.75	0.000	4.47	-	0.00	0.00
0	0.000	7.75	0.000	2.47	-	0.00	0.00
0	0.000	9.75	0.000	0.47	-	0.00	0.00
0	0.000	11.75	0.000	1.53	-	0.00	0.00
0	0.000	13.75	0.000	3.53	-	0.00	0.00
2	1.962	15.75	30.898	5.53	-	59.98	59.98
Girder	696	10.5	7308.0	0.28	34529	54.26	34583
P. Steel	29.427		106.4			1620.3	1620
Σ	725.43		7414.4				36204

Y_b = 10.22 in
Y_t = 10.78 in
I = 36204 in⁴
S_b = 3542.2 in³
S_t = 3358.6 in³

Section Properties for Girder and Slab near Mid Span:

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in²)	y (in)	Ay (in³)	d (in)	I_o (in⁴)	Ad^2 (in⁴)	I (in⁴)
14	13.73	1.75	24.032	14.11	-	2734.329	2734.329
14	13.73	3.75	51.497	12.11	-	2014.154	2014.154
0	0.00	5.75	0.000	10.11	-	0	0
0	0.00	7.75	0.000	8.11	-	0	0
0	0.00	9.75	0.000	6.11	-	0	0
0	0.00	11.75	0.000	4.11	-	0	0
0	0.00	13.75	0.000	2.11	-	0	0
2	1.96	15.75	30.898	0.11	-	0.024069	0.024069
Girder	696.00	10.50	7308.00	5.36	34529.0	20001.5	54530.5
Haunch	36.28	21.50	780.12	5.64	3.02	1153.9	1156.9
Slab Steel	6.63	27.06	179.39	11.20	-	831.5	831.5
Slab	385.52	25.75	9927.24	9.89	1807.14	37703.0	39510.2
P. Steel	29.43	-	106.43	-	-	4748.5	4748.5
Σ	1153.86		18301.2				100778

Y_b = 15.86 in
Y_t = 5.14 in
Y_{tslab} = 13.64 in
I = 100778 in⁴
S_b' = 6353.9 in³
S_t' = 19609.5 in³

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = H20

Section Properties for Girder and Slab near Mid Span:(Creep Considered - 3n)

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	11.04	-	1674.305	1674.305
14	13.73	3.75	51.497	9.04	-	1122.706	1122.706
0	0.00	5.75	0.000	7.04	-	0	0
0	0.00	7.75	0.000	5.04	-	0	0
0	0.00	9.75	0.000	3.04	-	0	0
0	0.00	11.75	0.000	1.04	-	0	0
0	0.00	13.75	0.000	0.96	-	0	0
2	1.96	15.75	30.898	2.96	-	17.16669	17.16669
Girder	696.00	10.50	7308.00	2.29	34529.0	3655.9	38184.9
Haunch	12.09	21.50	260.04	8.71	1.01	917.2	918.2
Slab Steel	6.63	27.06	179.39	14.27	-	1349.6	1349.6
Slab	128.51	25.75	3309.08	12.96	602.38	21578.2	22180.6
P. Steel	29.43	-	106.43	-	-	2814.2	2814.2
Σ	872.66		11162.9				65447

Y_b = 12.79 in
Y_t = 8.21 in
Y_{tslab} = 16.71 in
I = 65447 in^4
S_b'' = 5116.3 in^3
S_t'' = 7973.5 in^3

Ultimate Strength Analysis:

d = 25.88 in

ρ^* = 0.00370

β_1 = 0.7

f_{su}^* = 231.55 ksi f'_c = 4 ksi

ϕM_n = 2833.69 k-ft Impact = 0.278

	Interior	Exterior	
M_{DL} =	574.5	553.1	k-ft
M_{SDL} =	90.8	90.8	k-ft
M_{LL+I} =	421	397	k-ft
M_{PED} =	0	0	k-ft
RF(w/o Ped) =	2.16	2.32	
RF(w/ Ped) =	2.88	3.10	
	RF_{min} =	**2.16**	

Trk Wt = 20 Ton
M_{LL+I} = 631.2 k-ft

*M_{LL+I} per Consys * Impact*

	Interior	Exterior
DF =	0.6666	0.6286
Mped =	0	k-ft

Distribution Factors are Per Truck per AASHTO 3.23.2.3.2

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = H20

	Interior		Exterior			
	LIVE	**L + Ped**	**LIVE**	**L + Ped**		
0.6 f'_c =	4.20	4.20	4.20	4.20	ksi	
0.4 f'_c =	2.80	2.80	2.80	2.80	ksi	
$f_{Prestress}$ =	-0.60	-0.60	-0.60	-0.60	ksi	
f_{DL} =	2.05	2.05	1.98	1.98	ksi	
f_{SDL} =	0.14	0.14	0.14	0.14	ksi	
f_{Ped} =	0.00	0.00	0.00	0.00	ksi	
f_{LL+I} =	0.26	0.26	0.24	0.24	ksi	
RF =	10.13	13.51	11.06	14.75	ksi	Full Loading
RF =	7.78	10.38	8.41	11.22	ksi	Live + 0.5(pre + D)

RF_{min} = 7.78

	Interior		Exterior		
	LIVE	L + P	LIVE	L + P	
6 $(f'_c)^{1/2}$ =	0.50	0.50	0.50	0.50	ksi
$f_{Prestress}$ =	-3.30	-3.30	-3.30	-3.30	ksi
f_{DL} =	1.95	1.95	1.87	1.87	ksi
f_{SDL} =	0.21	0.21	0.21	0.21	ksi
f_{Ped} =	0.00	0.00	0.00	0.00	ksi
f_{LL+I} =	0.79	0.79	0.75	0.75	ksi
RF =	**2.07**	**2.75**	**2.29**	**3.05**	ksi

RF_{min} = 2.07

RF_{min} = 2.07
Inventory = **41.3** Ton

	Int.	Ext.	
RF =	3.60	3.87	Both are done with Pedestrian Loading
Operating =	**72.0**	Ton	
Posted =	**61.9**	Ton	

H20 Truck		
Inventory =	**41.3**	Tons
Operating =	**72.0**	Tons
Posted =	**61.9**	Tons

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = 3S2

Material Properties:

Concrete:			Prestressing Steel:		
f 'c* =	7000	psi	f_s' =	270	ksi
f 'ci* =	5500	psi	E_s' =	28000	ksi
f 'c =	4000	psi			
Ec* =	5072	ksi	Reinforcing Steel		
Eci* =	4496	ksi	f_y =	60	ksi
Ec =	3834	ksi	E_s =	29000	ksi
n =	5.52		n =	7.56	

Girder Geometry and Strand Locations:

Girder Properties from Conspan:

A =	696	in^2
Y_b =	10.5	in
I =	34529	in^4
d =	21	in
b_{top} =	48	in
b_{eff} =	68	in
t_s =	7.5	in
$A_{smidspan}$ =	0.248	in^2/ft

Area of Slab Steel / ft

Strands:

# of Strands =	30	
$A_{s/strand}$ =	0.217	in^2
Y_{center} =	3.62	in
Y_{ends} =	3.62	in

Haunch Heights:

Mid Span =	1.00	in
End =	3.25	in

Prestressing Pattern:

d (in)	Str. @ Center	Str. @ Ends
1.75	14	14
3.75	14	14
5.75	0	0
7.75	0	0
9.75	0	0
11.75	0	0
13.75	0	0
15.75	2	2
20	0	0
22	0	0
24	0	0
26	0	0
28	0	0
30	0	0
32	0	0
34	0	0
Total	30	30

Prestress Loss =	25.90%	
Fi =	43.9	k
Ff =	975.897	k
ec =	6.88	in

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = 3S2

Section Properties for Girder Only near Mid Span (For Dead Load):

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.732	1.75	24.032	8.47	-	985.36	985.36
14	13.732	3.75	51.497	6.47	-	574.99	574.99
0	0.000	5.75	0.000	4.47	-	0.00	0.00
0	0.000	7.75	0.000	2.47	-	0.00	0.00
0	0.000	9.75	0.000	0.47	-	0.00	0.00
0	0.000	11.75	0.000	1.53	-	0.00	0.00
0	0.000	13.75	0.000	3.53	-	0.00	0.00
2	1.962	15.75	30.898	5.53	-	59.98	59.98
Girder	696	10.5	7308.0	0.28	34529	54.26	34583
P. Steel	29.427		106.4			1620.3	1620
Σ	725.43		7414.4				36204

Y_b = 10.22 in
Y_t = 10.78 in
I = 36204 in^4
S_b = 3542.2 in^3
S_t = 3358.6 in^3

Section Properties for Girder and Slab near Mid Span:

n = 1.32
n = 5.72

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	14.11	-	2734.329	2734.329
14	13.73	3.75	51.497	12.11	-	2014.154	2014.154
0	0.00	5.75	0.000	10.11	-	0	0
0	0.00	7.75	0.000	8.11	-	0	0
0	0.00	9.75	0.000	6.11	-	0	0
0	0.00	11.75	0.000	4.11	-	0	0
0	0.00	13.75	0.000	2.11	-	0	0
2	1.96	15.75	30.898	0.11	-	0.024069	0.024069
Girder	696.00	10.50	7308.00	5.36	34529.0	20001.5	54530.5
Haunch	36.28	21.50	780.12	5.64	3.02	1153.9	1156.9
Slab Steel	6.63	27.06	179.39	11.20	-	831.5	831.5
Slab	385.52	25.75	9927.24	9.89	1807.14	37703.0	39510.2
P. Steel	29.43	-	106.43	-	-	4748.5	4748.5
Σ	1153.86		18301.2				100778

Y_b = 15.86 in
Y_t = 5.14 in
Y_{tslab} = 13.64 in
I = 100778 in^4
S_b' = 6353.9 in^3
S_t' = 19609.5 in^3

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = 3S2

Section Properties for Girder and Slab near Mid Span:(Creep Considered - 3n)

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	11.04	-	1674.305	1674.305
14	13.73	3.75	51.497	9.04	-	1122.706	1122.706
0	0.00	5.75	0.000	7.04	-	0	0
0	0.00	7.75	0.000	5.04	-	0	0
0	0.00	9.75	0.000	3.04	-	0	0
0	0.00	11.75	0.000	1.04	-	0	0
0	0.00	13.75	0.000	0.96	-	0	0
2	1.96	15.75	30.898	2.96	-	17.16669	17.16669
Girder	696.00	10.50	7308.00	2.29	34529.0	3655.9	38184.9
Haunch	12.09	21.50	260.04	8.71	1.01	917.2	918.2
Slab Steel	6.63	27.06	179.39	14.27	-	1349.6	1349.6
Slab	128.51	25.75	3309.08	12.96	602.38	21578.2	22180.6
P. Steel	29.43	-	106.43	-	-	2814.2	2814.2
Σ	872.66		11162.9				65447

Y_b = 12.79 in
Y_t = 8.21 in
Y_{tslab} = 16.71 in
I = 65447 in^4
S_b" = 5116.3 in^3
S_t" = 7973.5 in^3

Ultimate Strength Analysis:

d = 25.88 in

ρ^* = 0.00370

β_1 = 0.7

f_{su}^* = 231.55 ksi f'_c = 4 ksi

ϕM_n = 2833.69 k-ft Impact = 0.278

	Interior	Exterior	
M_{DL} =	574.5	553.1	k-ft
M_{SDL} =	90.8	90.8	k-ft
M_{LL+I} =	442	417	k-ft
M_{PED} =	0	0	k-ft
RF(w/o Ped) =	2.05	2.21	
RF(w/ Ped) =	2.74	2.95	
	RF_{min} =	**2.05**	

Trk Wt = 36.64 Ton
M_{LL+I} = 663.1 k-ft

*M_{LL+I} per Consys * Impact*

	Interior	Exterior
DF =	0.6666	0.6286
Mped =	0	k-ft

Distribution Factors are Per Truck per AASHTO 3.23.2.3.2

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = 3S2

	Interior		Exterior			
	LIVE	L + Ped	LIVE	L + Ped		
0.6 f'_c =	4.20	4.20	4.20	4.20	ksi	
0.4 f'_c =	2.80	2.80	2.80	2.80	ksi	
$f_{Prestress}$ =	-0.60	-0.60	-0.60	-0.60	ksi	
f_{DL} =	2.05	2.05	1.98	1.98	ksi	
f_{SDL} =	0.14	0.14	0.14	0.14	ksi	
f_{Ped} =	0.00	0.00	0.00	0.00	ksi	
f_{LL+I} =	0.27	0.27	0.26	0.26	ksi	
RF =	9.64	12.86	10.53	14.04	ksi	Full Loading
RF =	7.41	9.88	8.01	10.68	ksi	Live + 0.5(pre + D)

RF_{min} = 7.41

	Interior		Exterior		
	LIVE	L + P	LIVE	L + P	
6 $(f'_c)^{1/2}$ =	0.50	0.50	0.50	0.50	ksi
$f_{Prestress}$ =	-3.30	-3.30	-3.30	-3.30	ksi
f_{DL} =	1.95	1.95	1.87	1.87	ksi
f_{SDL} =	0.21	0.21	0.21	0.21	ksi
f_{Ped} =	0.00	0.00	0.00	0.00	ksi
f_{LL+I} =	0.83	0.83	0.79	0.79	ksi
RF =	**1.97**	**2.62**	**2.18**	**2.90**	ksi

RF_{min} = 1.97

RF_{min} = 1.97
Inventory = **72.0** Ton

	Int.	Ext.	
RF =	3.43	3.68	Both are done with Pedestrian Loading
Operating =	**125.5**	Ton	
Posted =	**108.0**	Ton	

3S2 Truck		
Inventory =	**72.0**	Tons
Operating =	**125.5**	Tons
Posted =	**108.0**	Tons

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = MO5

Material Properties:

Concrete:			Prestressing Steel:		
f 'c* =	7000	psi	f_s' =	270	ksi
f 'ci* =	5500	psi	E_s' =	28000	ksi
f 'c =	4000	psi			
Ec* =	5072	ksi	Reinforcing Steel		
Eci* =	4496	ksi	f_y =	60	ksi
Ec =	3834	ksi	E_s =	29000	ksi
n =	5.52		n =	7.56	

Girder Geometry and Strand Locations:

Girder Properties from Conspan:

A =	696	in^2
Y_b =	10.5	in
I =	34529	in^4
d =	21	in
b_{top} =	48	in
b_{eff} =	68	in
t_s =	7.5	in
$A_{smidspan}$ =	0.248	in^2/ft

Area of Slab Steel / ft

Strands:

# of Strands =	30	
$A_{s/strand}$ =	0.217	in^2
Y_{center} =	3.62	in
Y_{ends} =	3.62	in

Haunch Heights:

Mid Span =	1.00	in
End =	3.25	in

Prestressing Pattern:

d (in)	Str. @ Center	Str. @ Ends
1.75	14	14
3.75	14	14
5.75	0	0
7.75	0	0
9.75	0	0
11.75	0	0
13.75	0	0
15.75	2	2
20	0	0
22	0	0
24	0	0
26	0	0
28	0	0
30	0	0
32	0	0
34	0	0
Total	30	30

Prestress Loss =	25.90%	
Fi =	43.9	k
Ff =	975.897	k
ec =	6.88	in

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Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = MO5

Section Properties for Girder Only near Mid Span (For Dead Load):

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.732	1.75	24.032	8.47	-	985.36	985.36
14	13.732	3.75	51.497	6.47	-	574.99	574.99
0	0.000	5.75	0.000	4.47	-	0.00	0.00
0	0.000	7.75	0.000	2.47	-	0.00	0.00
0	0.000	9.75	0.000	0.47	-	0.00	0.00
0	0.000	11.75	0.000	1.53	-	0.00	0.00
0	0.000	13.75	0.000	3.53	-	0.00	0.00
2	1.962	15.75	30.898	5.53	-	59.98	59.98
Girder	696	10.5	7308.0	0.28	34529	54.26	34583
P. Steel	29.427		106.4			1620.3	1620
Σ	725.43		7414.4				36204

Y_b = 10.22 in
Y_t = 10.78 in
I = 36204 in^4
S_b = 3542.2 in^3
S_t = 3358.6 in^3

Section Properties for Girder and Slab near Mid Span:

n = 1.32
n = 5.72

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	14.11	-	2734.329	2734.329
14	13.73	3.75	51.497	12.11	-	2014.154	2014.154
0	0.00	5.75	0.000	10.11	-	0	0
0	0.00	7.75	0.000	8.11	-	0	0
0	0.00	9.75	0.000	6.11	-	0	0
0	0.00	11.75	0.000	4.11	-	0	0
0	0.00	13.75	0.000	2.11	-	0	0
2	1.96	15.75	30.898	0.11	-	0.024069	0.024069
Girder	696.00	10.50	7308.00	5.36	34529.0	20001.5	54530.5
Haunch	36.28	21.50	780.12	5.64	3.02	1153.9	1156.9
Slab Steel	6.63	27.06	179.39	11.20	-	831.5	831.5
Slab	385.52	25.75	9927.24	9.89	1807.14	37703.0	39510.2
P. Steel	29.43	-	106.43	-	-	4748.5	4748.5
Σ	1153.86		18301.2				100778

Y_b = 15.86 in
Y_t = 5.14 in
Y_{tslab} = 13.64 in
I = 100778 in^4
S_b' = 6353.9 in^3
S_t' = 19609.5 in^3

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = MO5

Section Properties for Girder and Slab near Mid Span:(Creep Considered - 3n)

n = 1.32 concrete
n = 5.72 steel

# Strands	A (in^2)	y (in)	Ay (in^3)	d (in)	I_o (in^4)	Ad^2 (in^4)	I (in^4)
14	13.73	1.75	24.032	11.04	-	1674.305	1674.305
14	13.73	3.75	51.497	9.04	-	1122.706	1122.706
0	0.00	5.75	0.000	7.04	-	0	0
0	0.00	7.75	0.000	5.04	-	0	0
0	0.00	9.75	0.000	3.04	-	0	0
0	0.00	11.75	0.000	1.04	-	0	0
0	0.00	13.75	0.000	0.96	-	0	0
2	1.96	15.75	30.898	2.96	-	17.16669	17.16669
Girder	696.00	10.50	7308.00	2.29	34529.0	3655.9	38184.9
Haunch	12.09	21.50	260.04	8.71	1.01	917.2	918.2
Slab Steel	6.63	27.06	179.39	14.27	-	1349.6	1349.6
Slab	128.51	25.75	3309.08	12.96	602.38	21578.2	22180.6
P. Steel	29.43	-	106.43	-	-	2814.2	2814.2
Σ	872.66		11162.9				65447

Y_b = 12.79 in
Y_t = 8.21 in
Y_{tslab} = 16.71 in
I = 65447 in^4
S_b" = 5116.3 in^3
S_t" = 7973.5 in^3

Ultimate Strength Analysis:

d = 25.88 in

ρ^* = 0.00370

β_1 = 0.7

f_{su}^* = 231.55 ksi f'_c = 4 ksi

ϕM_n = 2833.69 k-ft Impact = 0.278

	Interior	Exterior	
M_{DL} =	574.5	553.1	k-ft
M_{SDL} =	90.8	90.8	k-ft
M_{LL+I} =	520	490	k-ft
M_{PED} =	0	0	k-ft
RF(w/o Ped) =	1.75	1.88	
RF(w/ Ped) =	2.33	2.51	
	RF_{min} =	1.75	

Trk Wt = 36.64 Ton
M_{LL+I} = 779.4 k-ft

*M_{LL+I} per Consys * Impact*

	Interior	Exterior
DF =	0.6666	0.6286
Mped =	0	k-ft

Distribution Factors are Per Truck per AASHTO 3.23.2.3.2

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: 3/31/2011

Project: 1100110
Sheet No: _____ of _____
Checked by: TDL
Date: 3-31-11

Prestressed Girder Ratings - Load Factor Method

MODOT Bridge Inspection Rating Manual - Section 4

Truck Type = MO5

	Interior		Exterior			
	LIVE	L + Ped	LIVE	L + Ped		
0.6 f'_c =	4.20	4.20	4.20	4.20	ksi	
0.4 f'_c =	2.80	2.80	2.80	2.80	ksi	
$f_{Prestress}$ =	-0.60	-0.60	-0.60	-0.60	ksi	
f_{DL} =	2.05	2.05	1.98	1.98	ksi	
f_{SDL} =	0.14	0.14	0.14	0.14	ksi	
f_{Ped} =	0.00	0.00	0.00	0.00	ksi	
f_{LL+I} =	0.32	0.32	0.30	0.30	ksi	
RF =	8.20	10.94	8.96	11.94	ksi	Full Loading
RF =	6.30	8.40	6.81	9.08	ksi	Live + 0.5(pre + D)

RF_{min} = 6.30

	Interior		Exterior		
	LIVE	L + P	LIVE	L + P	
6 $(f'_c)^{1/2}$ =	0.50	0.50	0.50	0.50	ksi
$f_{Prestress}$ =	-3.30	-3.30	-3.30	-3.30	ksi
f_{DL} =	1.95	1.95	1.87	1.87	ksi
f_{SDL} =	0.21	0.21	0.21	0.21	ksi
f_{Ped} =	0.00	0.00	0.00	0.00	ksi
f_{LL+I} =	0.98	0.98	0.93	0.93	ksi
RF =	**1.67**	**2.23**	**1.85**	**2.47**	ksi

RF_{min} = 1.67

RF_{min} = 1.67
Inventory = **61.3** Ton

	Int.	Ext.	
RF =	2.91	3.13	Both are done with Pedestrian Loading
Operating =	**106.8**	Ton	
Posted =	**91.8**	Ton	

MO5 Truck		
Inventory =	**61.3**	Tons
Operating =	**106.8**	Tons
Posted =	**91.8**	Tons

HORNER & SHIFRIN, INC.
ENGINEERS

Subject: Fenton Creek
LFD Girder Rating
Authored by: KLH
Date: ~~4/1/2011~~ 3.31.11

Project: 1100110
Sheet No: _____ of _____
Checked by: TPL
Date: 3.31.11

Prestressed Girder Ratings - Load Factor Method - Summary

MODOT Bridge Inspection Rating Manual - Section 4

HS20 Truck:

Inventory Rating =	51.7	Tons	>	36	Tons	**OKAY**
Operating Rating =	90.1	Tons				
Posting =	77.5	Tons	>	40	Tons	**No Posting Req'd**

H20 Truck:

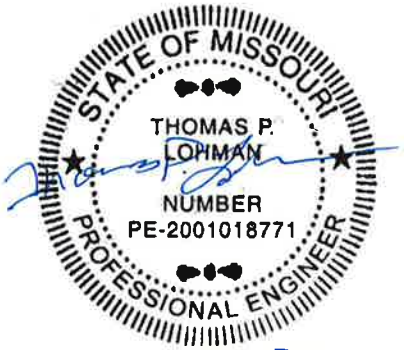
Inventory Rating =	41.3	Tons	>	20	Tons	**OKAY**
Operating Rating =	72.0	Tons				
Posting =	61.9	Tons	>	23	Tons	**No Posting Req'd**

3S2 Truck:

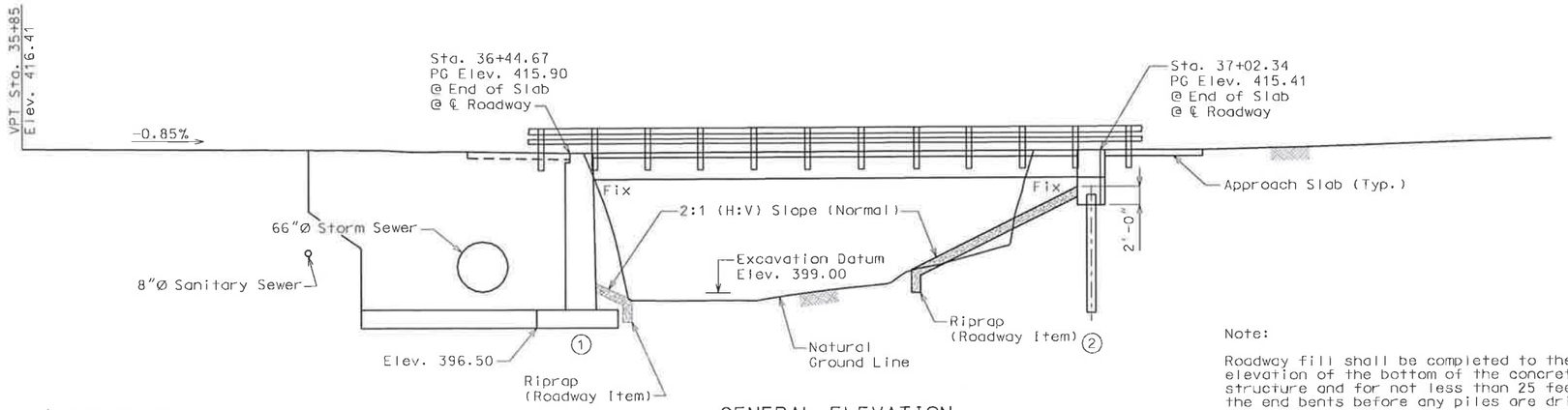
Inventory Rating =	72.0	Tons	>	36.64	Tons	**OKAY**
Operating Rating =	125.5	Tons				
Posting =	108.0	Tons	>	40	Tons	**No Posting Req'd**

MO5 Truck: *(Commercial Zones Only)*

Inventory Rating =	61.3	Tons	>	36.64	Tons	**OKAY**
Operating Rating =	106.8	Tons				
Posting =	91.8	Tons	>	70	Tons	**No Posting Req'd**



3.31.2011



GENERAL ELEVATION

Note:

Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete 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.

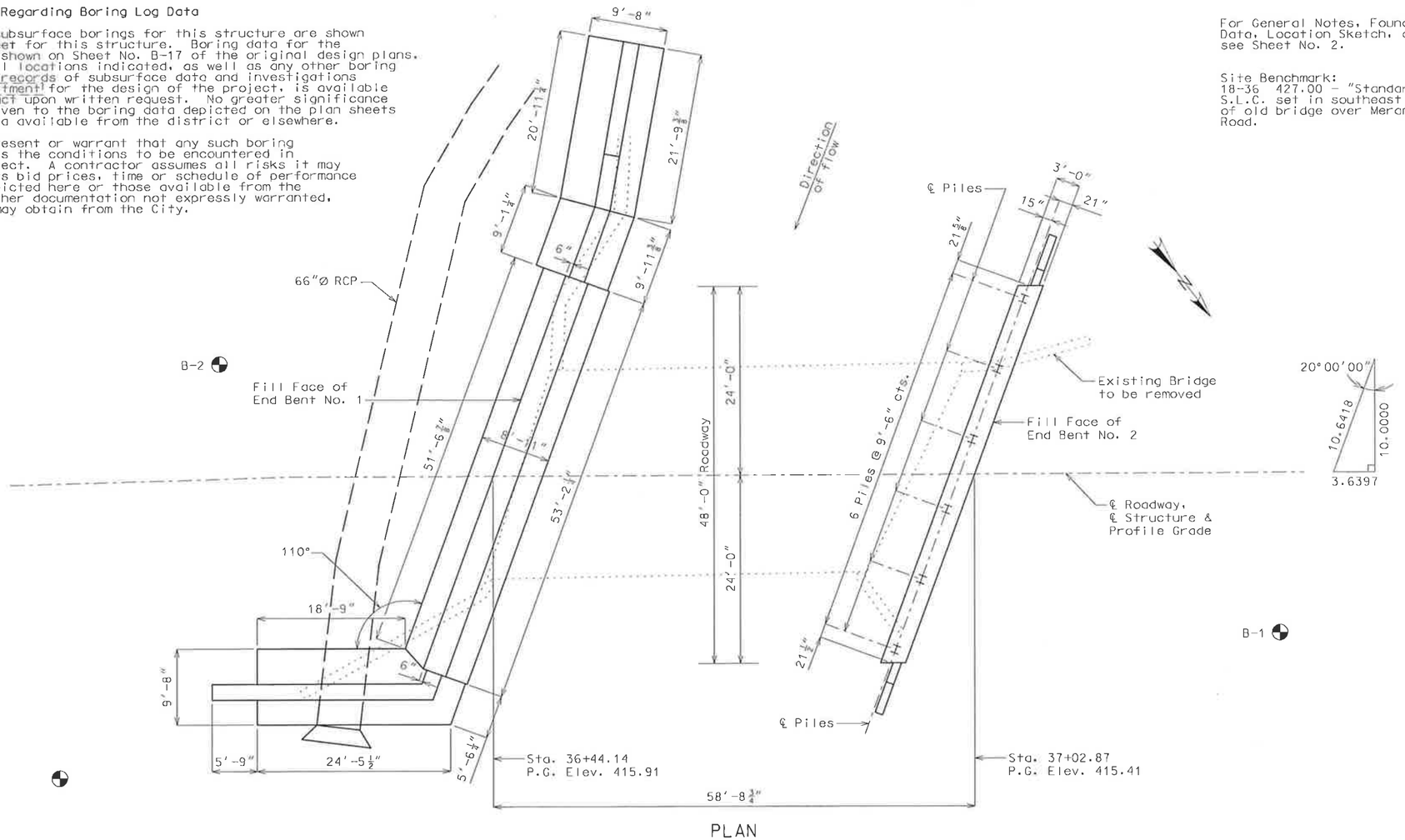
⚠ City of Fenton

"⊕" 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 for this structure. Boring data for the numbered locations is shown on Sheet No. B-17 of the original design plans. 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. 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 City 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 City.



PLAN

GENERAL PLAN AND ELEVATION

For General Notes, Foundation Data, Hydrologic Data, Location Sketch, and Estimated Quantities see Sheet No. 2.

Site Benchmark:
18-36 427.00 - "Standard Tablet" stamped 75-75 S.L.C. set in southeast end of north abutment of old bridge over Meramec River along Gravois Road.

Designed: TPL
Detailed: CAB
Checked: TPL

STATE OF MISSOURI
THOMAS P. LOHMAN
NUMBER PE-2008037171
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED 3/21/2011
ROUTE | STATE MO
DISTRICT | SHEET NO. 1
CITY FENTON
JOB NO. 1100110
FED.-AID PROJECT NO. BRM-4989(606)
PROJECT NO. N/A
BRIDGE NO. 1420013

DATE	DESCRIPTION
4/05/11	⚠ Revised Note

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

GENERAL PLAN AND ELEVATION

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Estimated Quantities

Item		Substr.	Superstr.	Total
Class 1 Excavation	cu. yard	640	–	640
Class 1 Excavation in Rock	cu. yard	10	–	10
Class 2 Excavation	cu. yard	101	–	101
Class 2 Excavation in Rock	cu. yard	19	–	19
Removal of Bridges	lump sum	–	–	1
Bridge Approach Slab (Bridge)	sq. yard	–	267	267
66" Precast Concrete Pipe, Storm Sewer Adjustment	lump sum	–	–	1
Structural Steel Piles (12 in.)	linear foot	120	–	120
Pile Point Reinforcement	each	6	–	6
Class B Concrete (Substructure)	cu. yard	252.1	–	252.1
Slab on Prestressed Concrete Box Beam	sq. yard	–	308	308
Prestressed Concrete Box Beam (21")	linear foot	–	390	390
Reinforcing Steel (Bridges)	pound	18,380	–	18,380
Reinforcing Steel (Epoxy Coated)	pound	1,410	–	1,410
Bridge Guardrail	linear foot	–	117	117
Plain Neoprene Bearing Pad	each	–	14	14
Vertical Drain at End Bents	each	–	–	2

△1 18,140

△1 18,140

All concrete above the construction joint in the end bents is included in the Estimated Quantities for Slab on Prestressed Concrete Box Beam.

All reinforcement in End Bent No. 2 is included in the Estimated Quantities for Slab on Prestressed Concrete Box Beam.

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 (12 in.).

The Estimated Quantities for Slab on Concrete Box Beam are based on skewed precast prestressed end panels.

△1 Added

Estimated Quantities for Slab on Prestressed Concrete Box Beam

Item		Total
Class B-2 Concrete	cu. yard	81.2
Reinforcing Steel	pound	2,900
Reinforcing Steel (Epoxy Coated)	pound	9,650

The table of Estimated Quantities for Slab on Prestressed Concrete Box Beam 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, 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.

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.

Class B-2 Concrete quantity is based on minimum top flange thickness and minimum joint material thickness.

The prestressed panel quantities are not included in the table of Estimated Quantities for Slab on Prestressed Concrete Box Beam.

Foundation Data

Bent No.		1	2
Driven Pile	Type	–	Foundation
	Pile Type and Size	–	HP12x53
	Number	–	6
	Approximate Length foot	–	20
	Pile Driving Verification Method	–	Modified Gates Formula
	Design Bearing kip	–	129
	Hammer Energy Required foot-pound	–	14,500
Spread Footing	Foundation Material	Rock	–
	Design Bearing ksf	9.1	–

Manufactured pile point reinforcement shall be used on all piles in this structure.

GENERAL NOTES:

Design Specifications:
2002 - AASHTO 17th Edition
Load Factor Design
Seismic Performance Category B
Acceleration Coefficient = 0.11

Design Loading:
HS20 Modified
35#/Sq. Ft. Future Wearing Surface
Lateral Earth Pressure - Ph = 55h+0.45q
where: Ph = lateral earth pressure per foot of wall, psf
h = depth below grade at wall, ft.
q = surcharge load, psf
Vertical Earth Pressure = 120 pcf
Superstructure: Simply-supported, non-composite for dead load. Composite for live load.

Reference:
All construction shall be in accordance with the current editions of the Missouri Standard Specifications for Highway Construction and Missouri Bridge Standard Drawings.

Design Unit Stresses:

Class B Concrete (Substructure)	f'c = 3,000 psi
Class B-2 Concrete (Superstructure, except Prestressed Box Beams)	f'c = 4,000 psi
Reinforcing Steel (Grade 60)	fy = 60,000 psi
Steel Pile (ASTM A709 Grade 36) fb = 9,000 psi	fy = 36,000 psi
Anchor Rods (ASTM F1554 Grade 36)	fy = 36,000 psi

For precast prestressed panel stresses, see Sheet No. 14.
For prestressed box beam stresses, see Sheet No. 13.

Neoprene Pads:
Plain Neoprene Bearing Pads shall be in accordance with Sec 716.
Bearings shall be 60 durometer neoprene pads.

△1 Added

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

Reinforcing Steel:
Minimum clearance to reinforcing steel shall be 1½", unless otherwise shown.

Protective Coat:
Protective Coating: System H in accordance with Sec 1081.

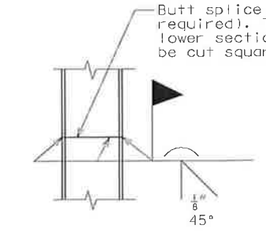
Hydrologic Data Table:
See original design plans for this bridge, included as an information sheet at the end of these plans, for Hydrologic Data.

△1 Deleted

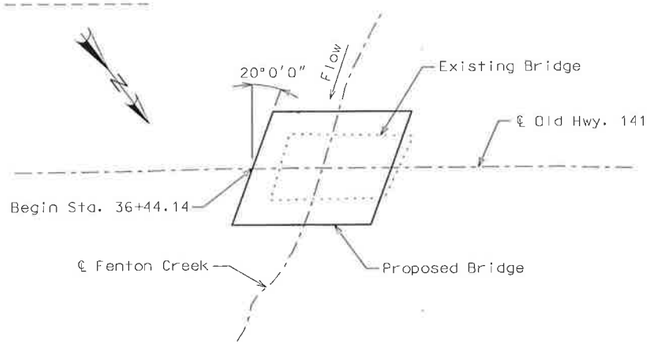
Backfill:
The backfill at End Bent No. 1 shall be granular to match the assumed design loading.

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

△1 Added



STEEL PILE SPLICE



LOCATION SKETCH

HYDROLOGIC DATA

Drainage Area	= 4.32 sq. miles (Rolling)
Design Discharge	= 4,050 cu. ft./second (100 years)
Design H.W. Elevation	= 420.55 feet (100 years)
Estimated Backwater	= 9.5 feet *

* Controlled by backwater from Meramec River

The Hydrologic Data Table is taken from Drawing B-2 of the original design plans and is included here for information only.

△1 Added

Designed: TPL
Detailed: CAB
Checked: KLH

GENERAL NOTES, ESTIMATED QUANTITIES, AND PILE DATA

STATE OF MISSOURI
THOMAS P. LOHMAR
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	2

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

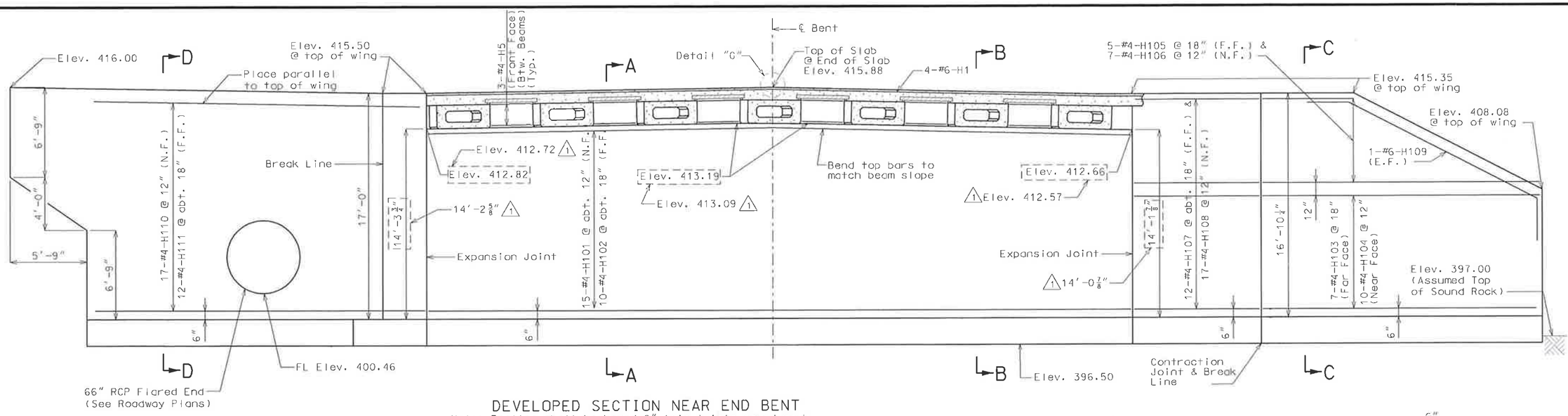
DATE	DESCRIPTION
4/05/11	△1 Revised Notes

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-931-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000139
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

ESTIMATED QUANTITIES, FOUNDATION DATA, AND GENERAL NOTES



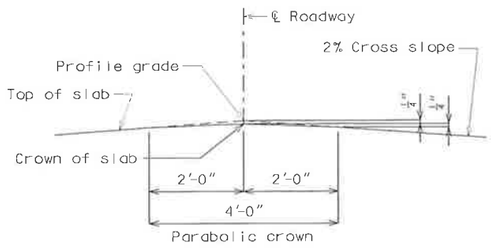
DEVELOPED SECTION NEAR END BENT

Note: Footing shall be keyed 6" (min.) into sound rock.

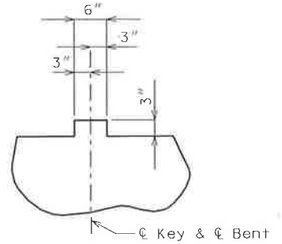
Footing Elevation may differ from that shown.

See Sheet No. 5 for vertical wall reinforcement.

66" RCP shall be adjusted as specified for construction of the bridge. All costs associated with the RCP adjustment shall be considered completely covered by the contract unit price for 66" Precast Concrete Pipe, Storm Sewer Adjustment.



DETAIL "G"



TYPICAL SECTION
THRU KEY

PLAN OF BEAM SHOWING DIMENSIONS

DETAILS OF END BENT NO. 1

Designed: TPL
Detailed: CAB
Checked: KLH

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LORENZ
NUMBER PE-2001018371
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	3

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

DATE	DESCRIPTION
3/28/11	1 Revised Beam Elevations
4/05/11	2 Revised Note

HORNER & SHIFRIN, INC.
ENGINEERS
5400 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-1321 FAX: 314-531-1966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT NO. 1
SHEET 1 OF 5

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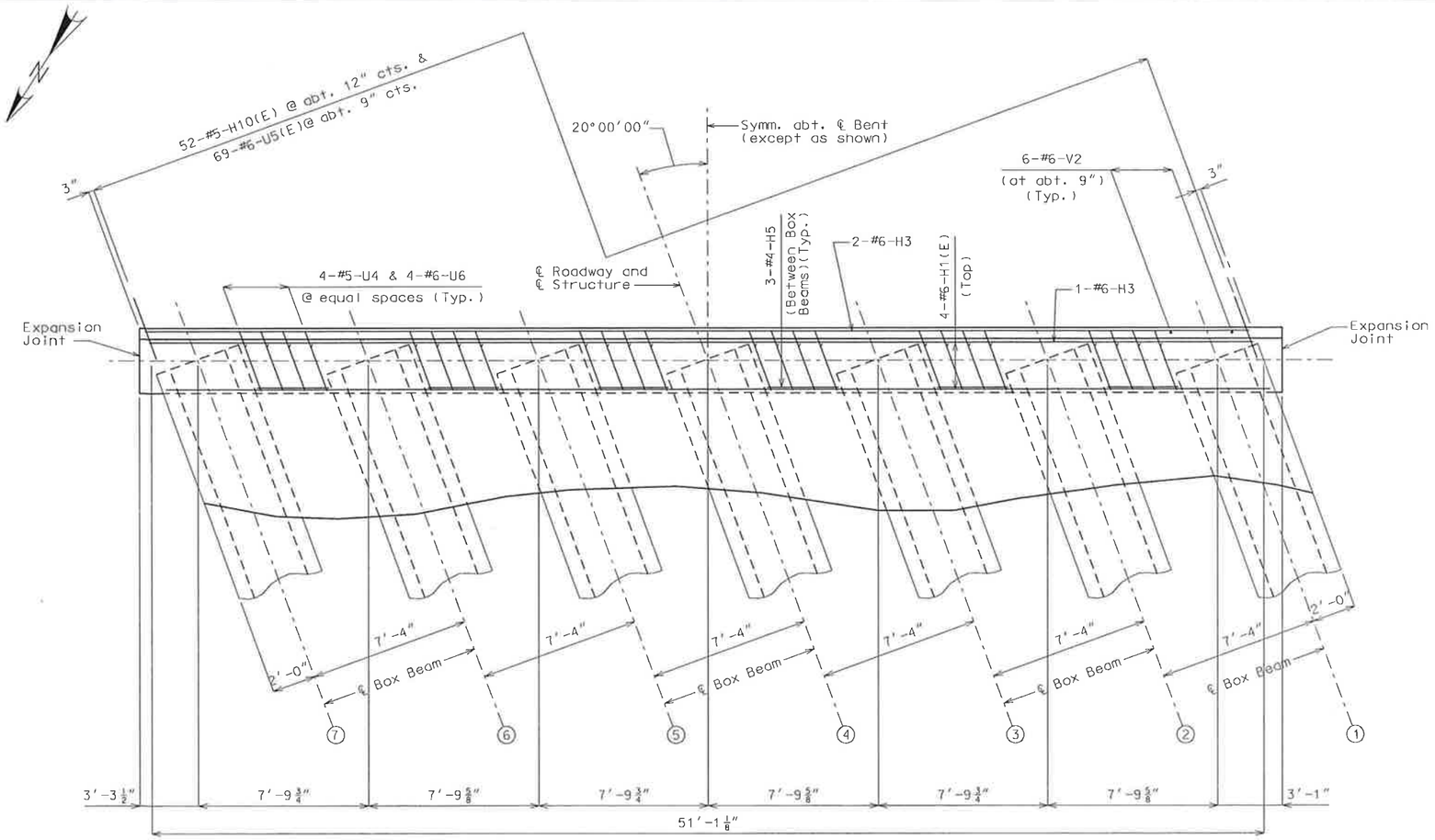
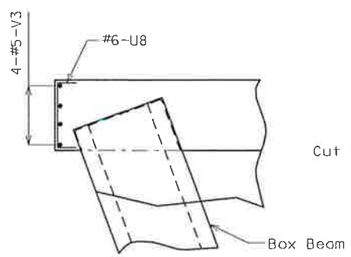
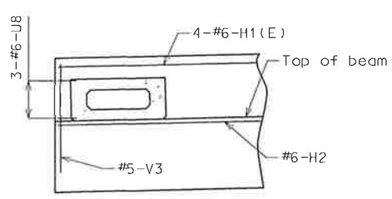


PART PLAN
(Wing walls not shown)



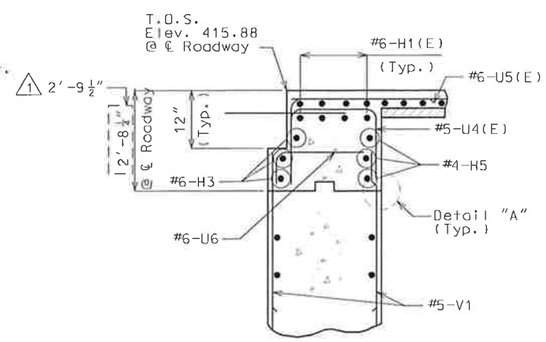
PART PLAN

Cut or bend U8 bars to fit.

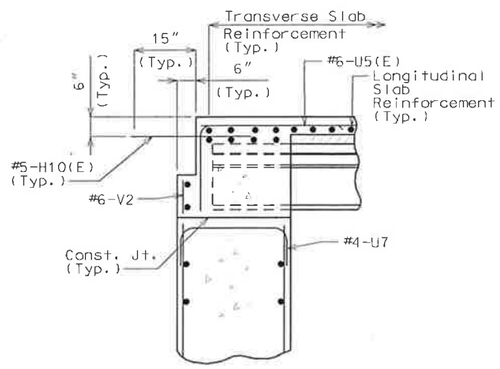


PART ELEVATION

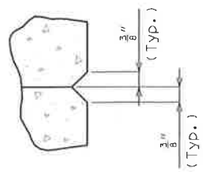
END REINFORCEMENT DETAIL



PART
SECTION A-A



PART
SECTION B-B



DETAIL "A"

Notes:
Place U4, U5, U6, U7, H20 and V1 bars parallel to centerline of roadway.

DETAILS OF END BENT NO. 1 DIAPHRAGM

Designed: TPL
Detailed: CAB/KLH/MAB
Checked: TPL

STATE OF MISSOURI
THOMAS P. LIGMAN
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
3.28.2011

DATE PREPARED	3/21/2011
ROUTE	STATE: MO
DISTRICT	SHEET NO.: 4
CITY	FENTON
JOB NO.	1100110
FED.-AID PROJECT NO.	BRM-4989(606)
PROJECT NO.	N/A
BRIDGE NO.	1420013

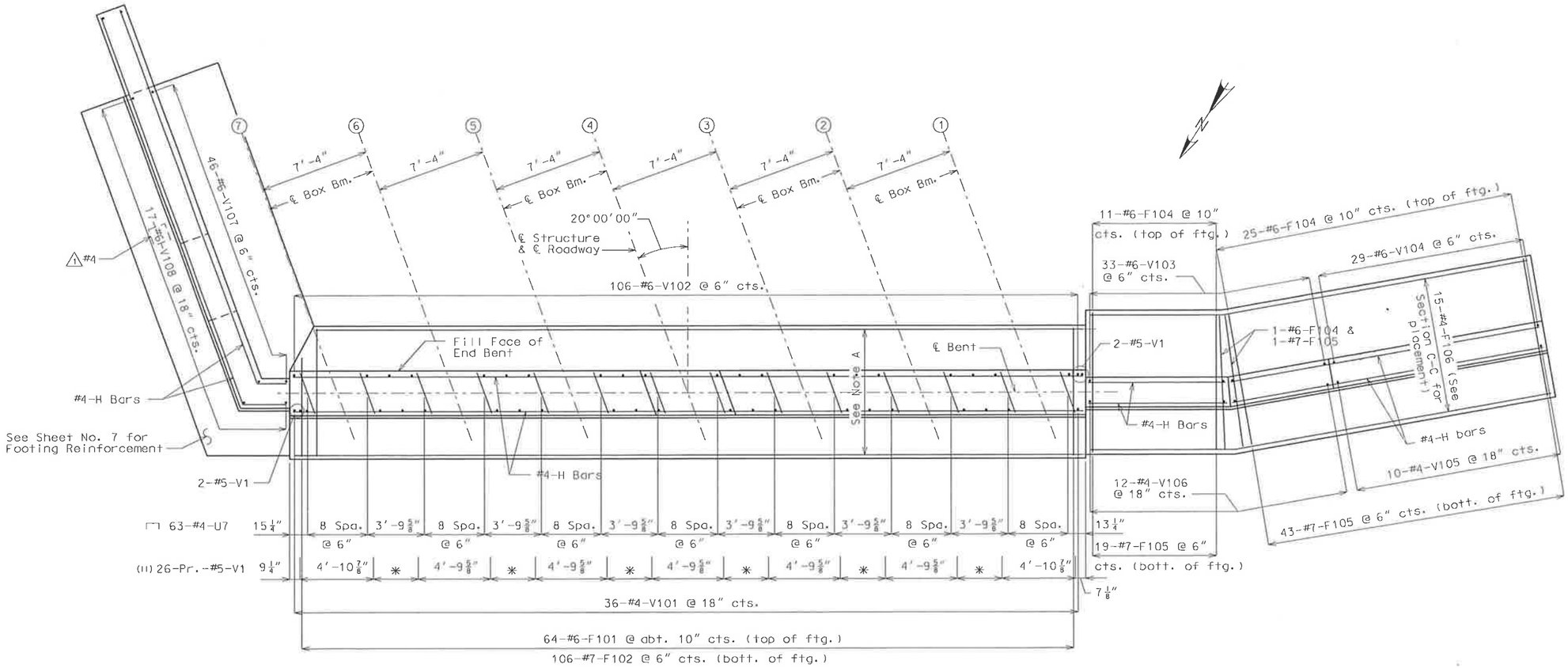
DATE	DESCRIPTION
3/28/11	⚠ Revised Beam Elevations

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE., ST. LOUIS, MO 63110-1490
314-531-1538 FAX 314-531-1566 www.hornershifrin.com
Disciplines: Professional Engineering
Certificate of Authority: 000139
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

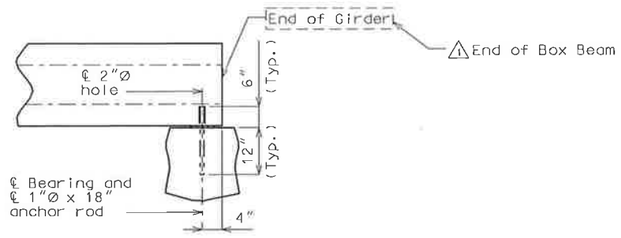
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT NO. 1
SHEET 2 OF 5



PLAN OF BEAM SHOWING REINFORCEMENT

Note A: 15-#4-F103 @ 12" (See Section A-A for bar placement)
✳ 3 Spa. @ 12"



ANCHOR ROD DETAIL

Notes:
Hole (2" Ø) to be grouted with expansive type mortar meeting the requirements of Section 1066 of Standard Specifications.

The cost of the anchor rods, complete-in-place, shall be considered completely covered by the contract unit price of other items.

Notes:
Place U4, U5, U6, U7, H10 and V1 bars parallel to centerline of roadway.

Field cut or bend F-bars as required to fit.

DETAILS OF END BENT NO. 1

Designed: TPL
Detailed: CAB/KLH/MAB
Checked: TPL

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LOWRY
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED: 3/21/2011
ROUTE: —
STATE: MO
DISTRICT: —
SHEET NO.: 5
CITY: FENTON
JOB NO.: 1100110
FED.-AID PROJECT NO.: BRM-4989(606)
PROJECT NO.: N/A
BRIDGE NO.: 1420013

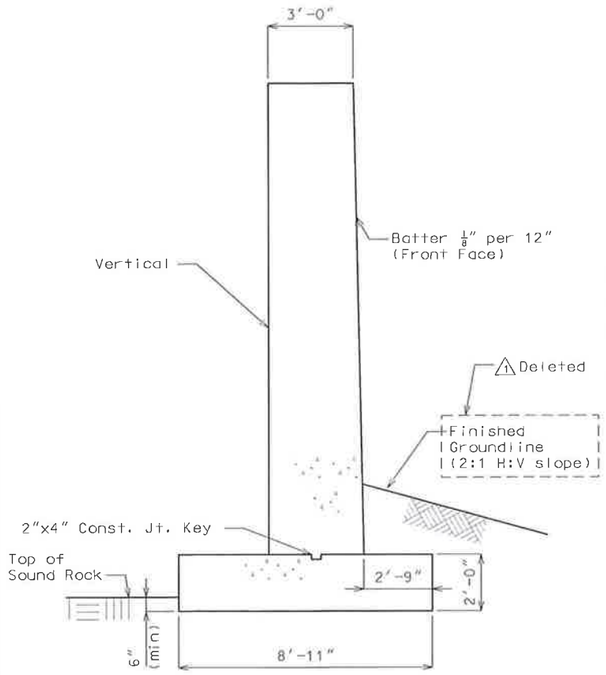
DATE	DESCRIPTION
4/05/11	⚠1 Revised Details

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.hornershifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Dates December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

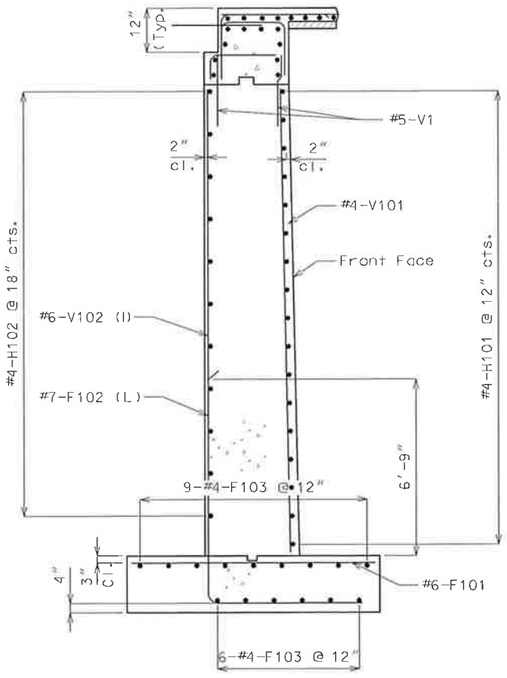
DETAILS OF END BENT NO. 1
SHEET 3 OF 5

s:\1100110\cad\s\05-End Bent 1 R1.dgn 10:24:37 AM 4/7/2011



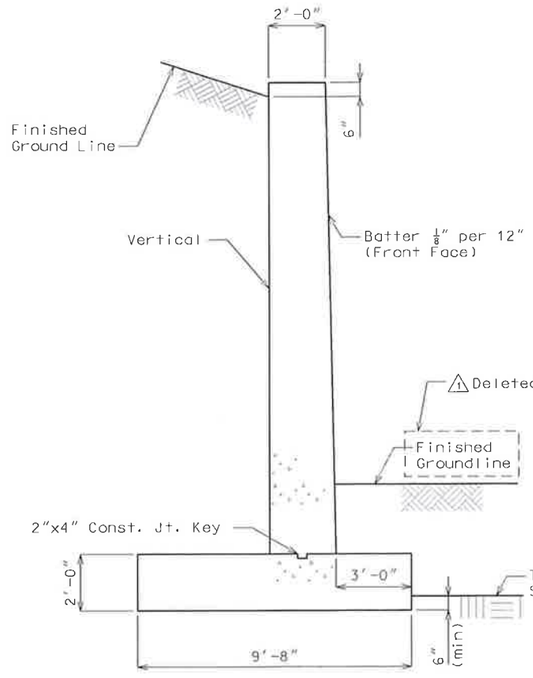
SECTION A-A
DIMENSIONS
AT BRIDGE

Section B-B similar



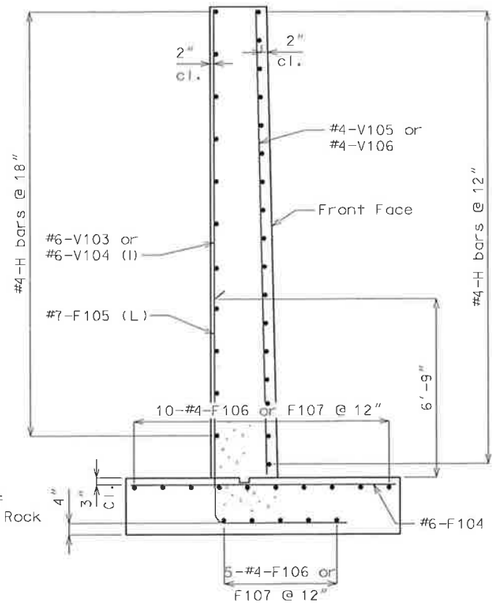
SECTION A-A
REINFORCEMENT
AT BRIDGE

Section B-B similar



SECTION C-C
DIMENSIONS
AT WING WALL

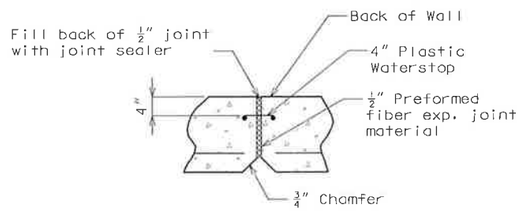
Section D-D similar



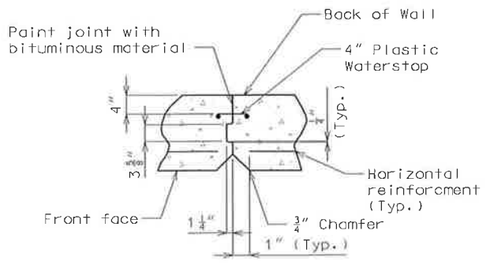
SECTION C-C
REINFORCEMENT
AT WING WALL

Section D-D similar

Note: Finished groundline in front of wall shall be the same elevation as existing conditions.



EXPANSION JOINT
DETAIL



CONTRACTION JOINT
DETAIL

Note: Backfill shall be a granular material.

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

Designed: TPL
Detailed: KLH
Checked: KLH

DETAILS OF END BENT NO. 1

STATE OF MISSOURI
THOMAS P. LOHMAR
NUMBER PE-2001018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	6

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

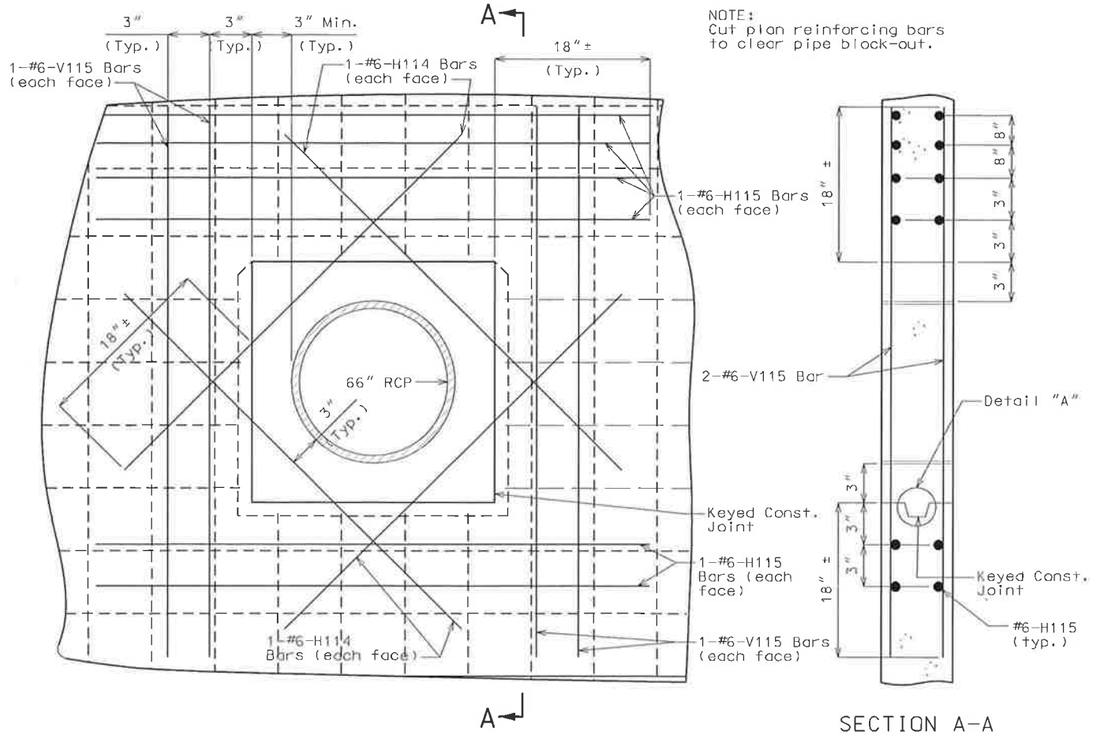
DATE	DESCRIPTION
4/05/11	⚠1 Revised Notes

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE., ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Disciplines: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT NO. 1
SHEET 4 OF 5

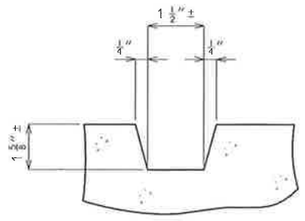
s:\1100110\cad\s\06-End Bent 1 R1.dgn 10:24:38 AM 4/7/2011



PART ELEVATION OF EXTERIOR WALL
SHOWING BLOCK-OUT FOR 66" RCP

NOTE:
Cut plan reinforcing bars to clear pipe block-out.

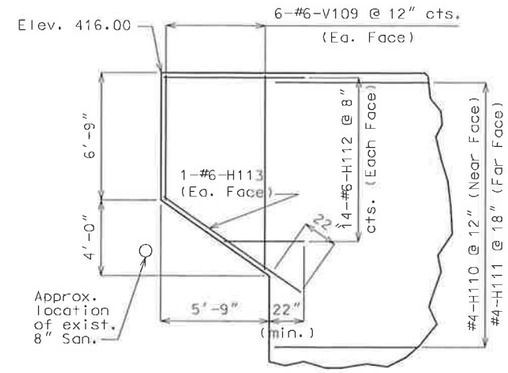
SECTION A-A
(Plan bars not shown)



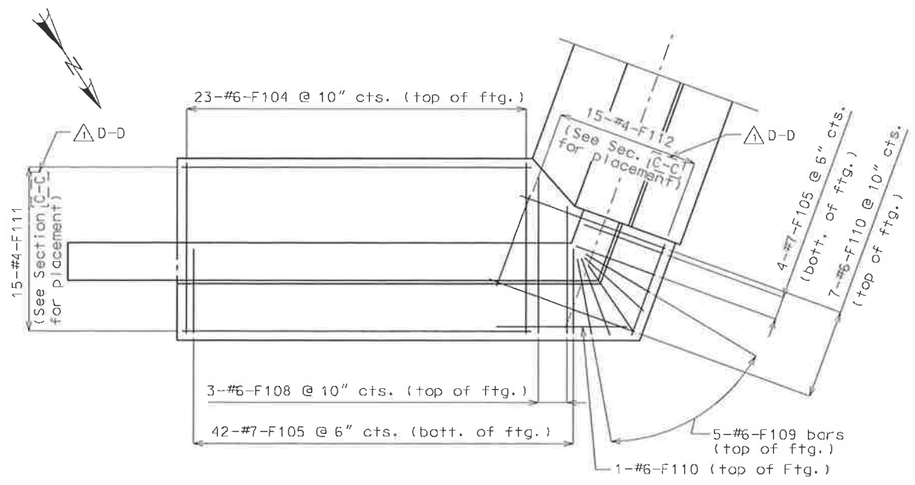
DETAIL "A"
(Keyed Joint)

NOTE:
Place $\frac{5}{16}$" joint filler around reinforced concrete pipe at block-out.

The block-out may be eliminated at contractors election. If block-out is eliminated, reinforcement shall be as shown except plan reinforcement may be bent to clear pipe.



PART ELEVATION SHOWING END BENT NO. 1 NORTH WING TIP
(See other sheets for reinforcement in rest of wing wall.)



FOOTING PLAN OF NORTH WING
SHOWING REINFORCEMENT
Field cut or bent F-bars as required to fit.

Substructure Quantity Table for Bent No. 1		
Item		Quantity
Class 1 Excavation	cu. yard	595
Class 1 Excavation in Rock	cu. yard	10
Class 2 Excavation	cu. yard	101
Class 2 Excavation in Rock	cu. yard	19
Class B Concrete (Substructure)	cu. yard	231.7
Reinforcing Steel (Bridges)	lbs.	18,380
Reinforcing Steel (Epoxy Coated)	lbs.	1,410
		18,140

Note: These quantites are included in the estimated quantities table on Sheet No. 2.

Designed: TPL
Detailed: CAB/MAB
Checked: TPL

DETAILS OF END BENT NO. 1

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LORMAN
NUMBER PE-2001018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	7

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

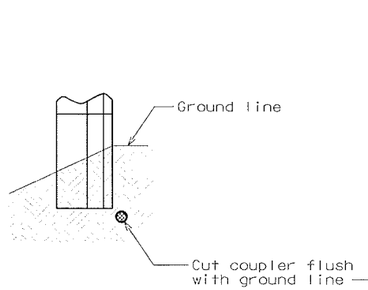
DATE	DESCRIPTION
4/05/11	1 Revised Quantities

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-5966 www.HornerShifrin.com
Disciplines: Professional Engineering
Certificate of Authority No. 000158
Expiration Date: December 31, 2012

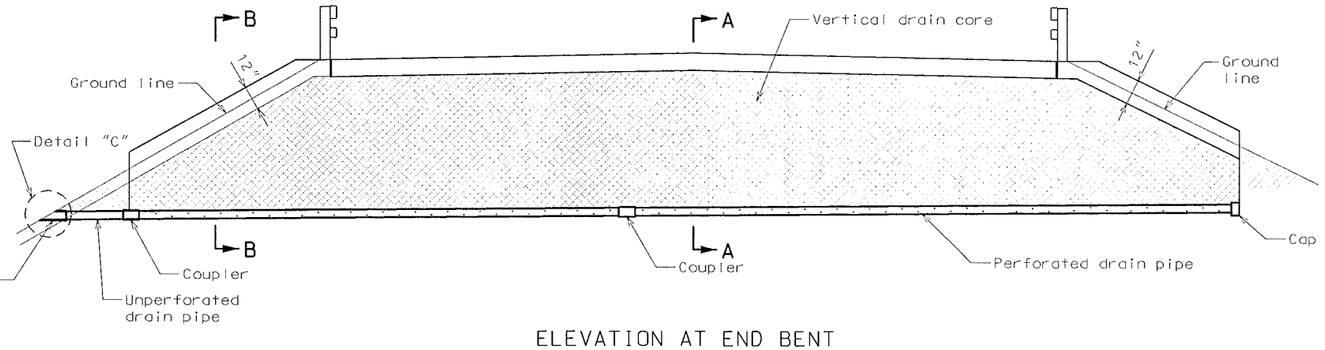
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT NO. 1
SHEET 5 OF 5

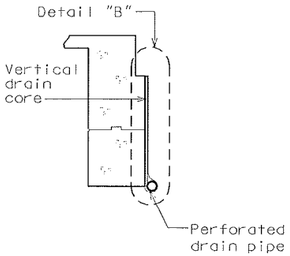
s:\1100110\cad\s\07-End Bent 1 R1.dgn 10:24:38 AM 4/7/2011



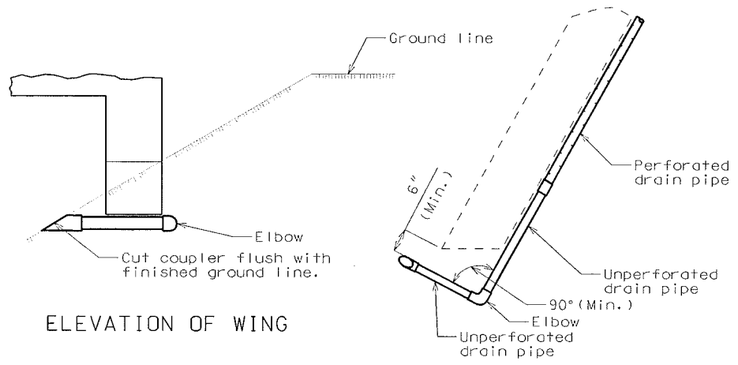
ELEVATION B-B



ELEVATION AT END BENT

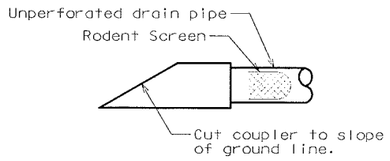


SECTION A-A

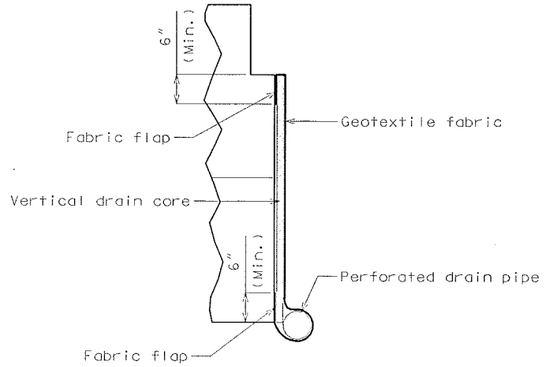


ELEVATION OF WING

PART PLAN



DETAIL "C"



DETAIL "B"

OPTIONAL BENT DRAIN (*)

(*) Only if rock is encountered at outside of wing.

Note:
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.

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.)

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.

Vertical drain at End Bent 1 shall daylight to the North.

Vertical drain core shall extend to bottom of walls at End Bent 1.

Vertical drain core shall extend to the ends of wing walls at both end bents, except may be omitted for the short section of North wing at End Bent No. 1.

Designed: TPL
Detailed: KLH
Checked: KLH

STATE OF MISSOURI
THOMAS P. LOHMAN
NUMBER 2001018743
PROFESSIONAL ENGINEER
3.21.2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	8

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

DESCRIPTION	DATE

HORNER & SHIFRIN, INC.
ENGINEERS
5900 OAKLAND, SUITE 100 St. Louis, MO 63110-1490
314-531-1820 FAX 314-531-1895 www.hornershifrin.com
Disciplines: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

- VERTICAL DRAIN DETAILS

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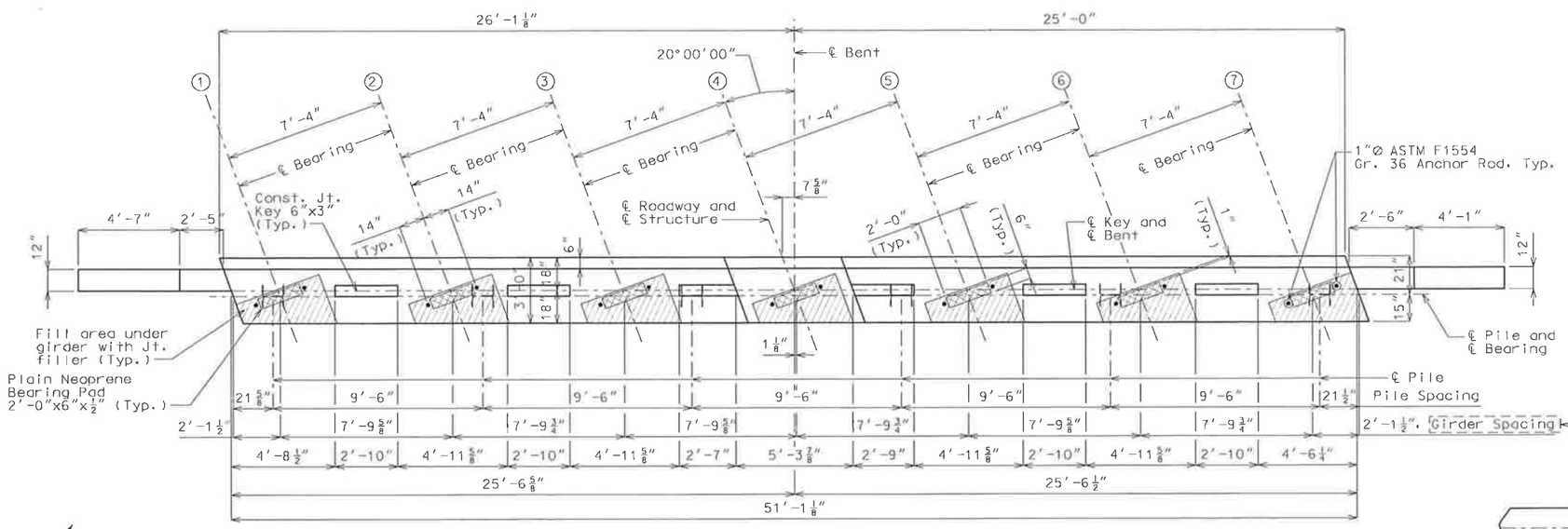
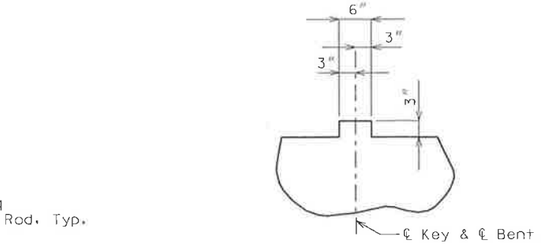
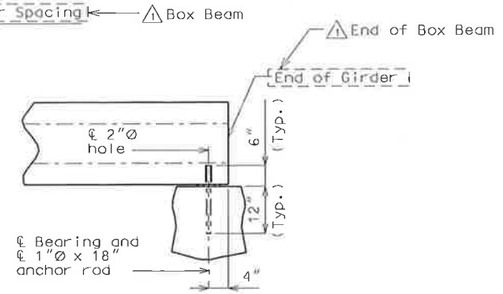


PLAN OF BEAM SHOWING DIMENSIONS



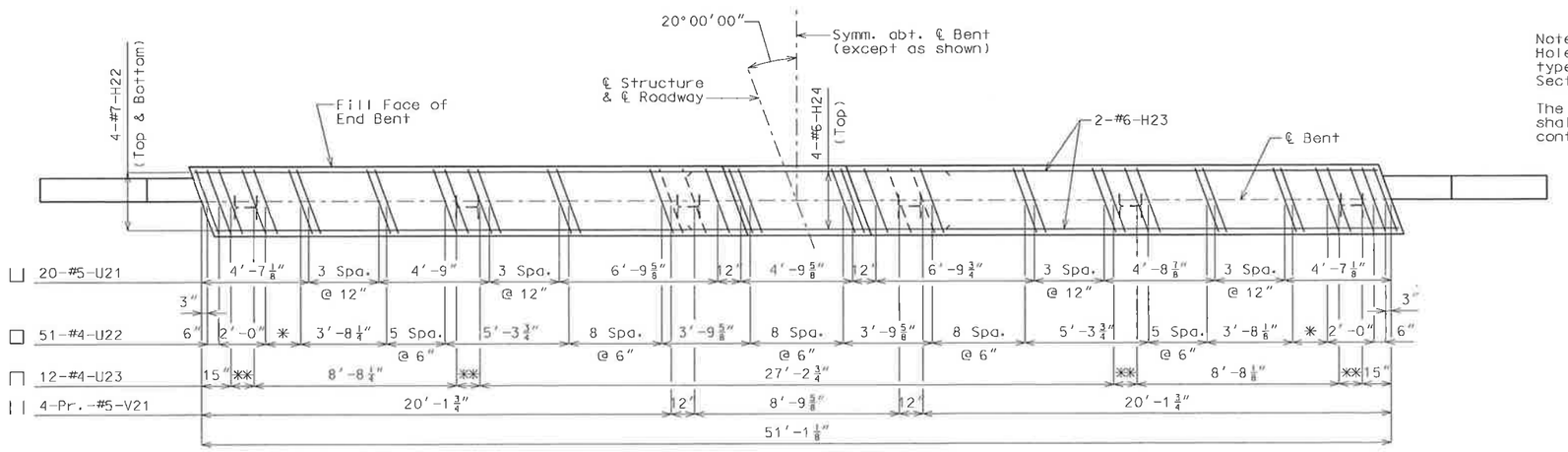
TYPICAL SECTION THRU KEY



ANCHOR ROD DETAIL

Notes:
Hole (2" Ø) to be grouted with expansive type mortar meeting the requirements of Section 1066 of Standard Specifications.

The cost of the anchor rod, complete in-place, shall be considered completely covered by the contract unit price of other items.



PLAN OF BEAM SHOWING REINFORCEMENT

* 3 spaces @ 6"
** 2 spaces @ 6"

Notes:
Place U21, U22, U23, U24, U25, U26, U27, H30 and V21 bars parallel to centerline of roadway.

Cut or bend U1 and V1 bars to fit.

⚠ Cut or bend U21 and V21 bars to fit.

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF END BENT NO. 2

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LOHVAN
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED 3/21/2011
ROUTE | STATE MO
DISTRICT | SHEET NO. 9
CITY FENTON
JOB NO. 1100110
FED.-AID PROJECT NO. BRM-4989(606)
PROJECT NO. N/A
BRIDGE NO. 1420013

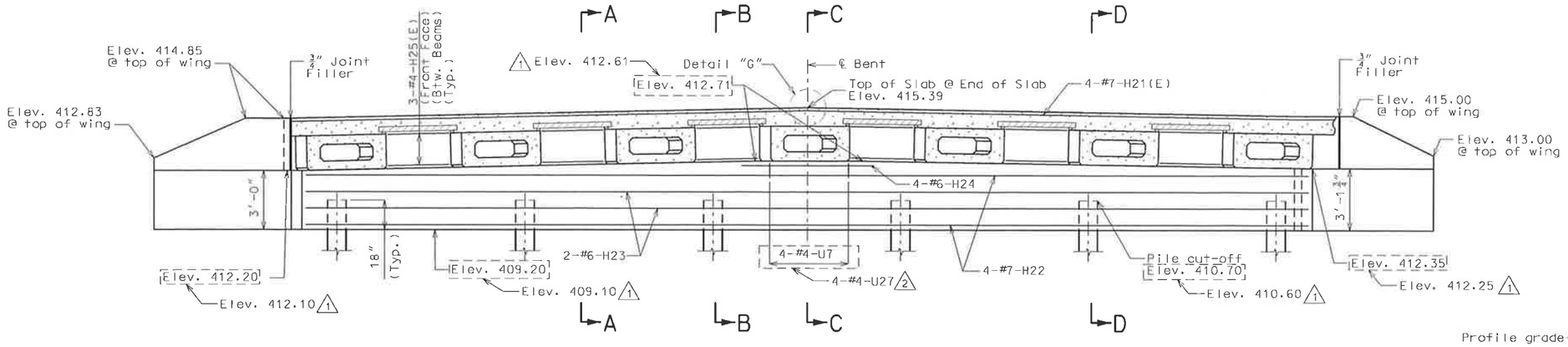
DATE	DESCRIPTION
4/05/11	⚠ Revised Notes

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.hornershifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

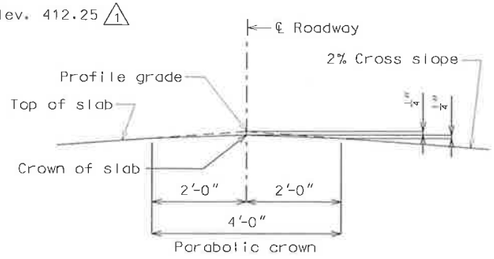
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT 2
SHEET 1 of 3

s:\1100110\cad\s\09-End Bent 2 R1.dgn 10:24:39 AM 4/7/2011



SECTION NEAR END BENT



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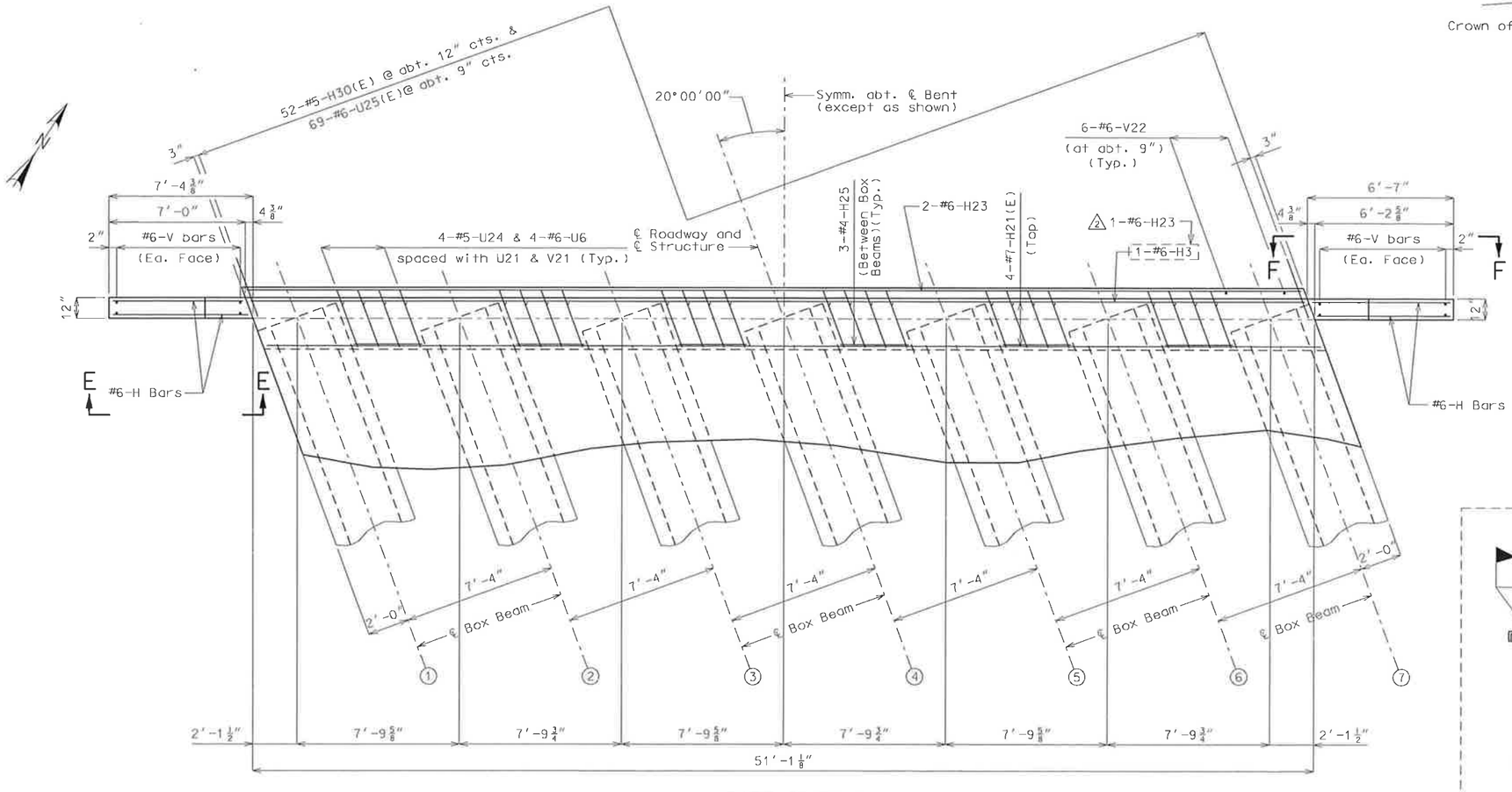
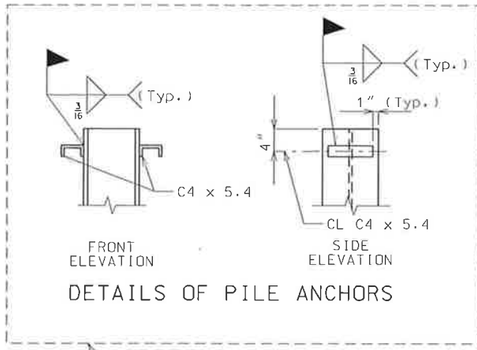


PART PLAN



DETAILS OF PILE ANCHORS

DETAILS OF END BENT NO. 2

Designed: TPL
Detailed: CAB
Checked: KLH

STATE OF MISSOURI
THOMAS P. LOGAN
NUMBER PE-2001018771
PROFESSIONAL ENGINEER

4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	10

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

DATE	DESCRIPTION
3/28/11 2	Revised Beam Elevations
4/05/11 1	Added Pile Detail

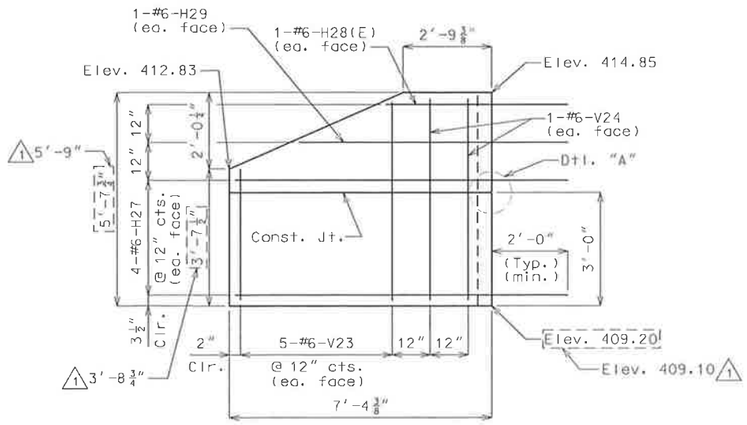
HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

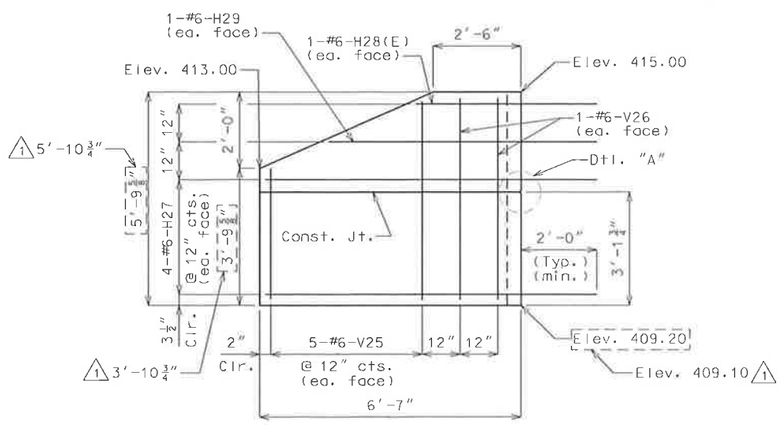
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT 2
SHEET 2 OF 3

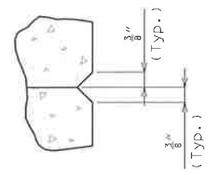
s:\1100110\cad\s\10-End Bent 2 R2.dgn 10:24:40 AM 4/7/2011



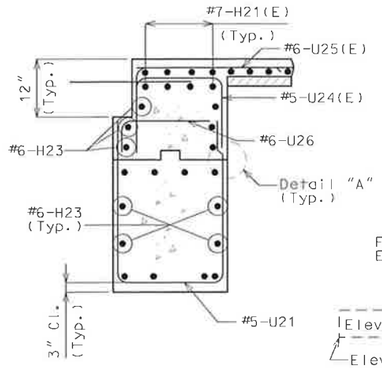
ELEVATION E-E



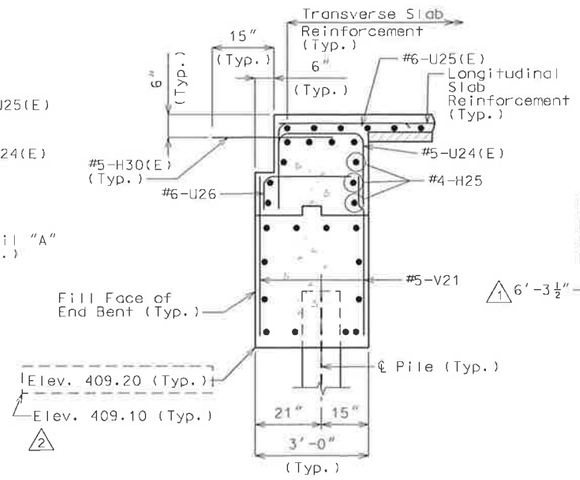
ELEVATION F-F



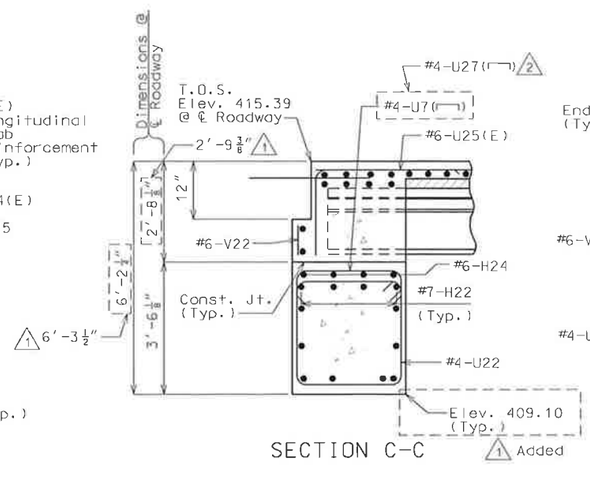
DETAIL "A"



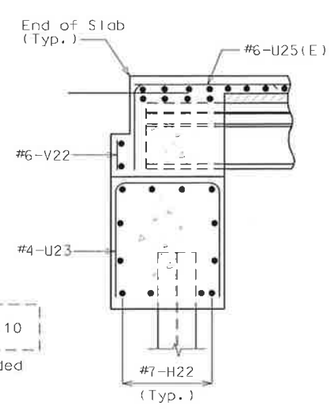
SECTION A-A



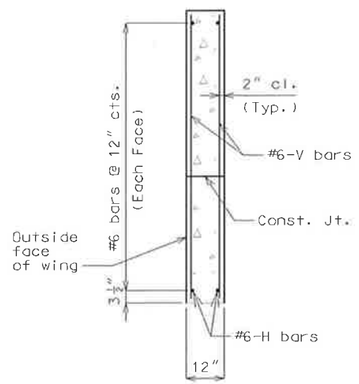
SECTION B-B



SECTION C-C



SECTION D-D



TYPICAL SECTION THRU WING

* Placed with grade

Substructure Quantity Table for Bent No. 2		
Item		Quantity
Class 1 Excavation	cu. yard	45
Structural Steel Piles (12 in.)	linear foot	120
Pile Point Reinforcement	each	6
Class B Concrete (Substructure)	cu. yard	20.4

Note: These quantites are included in the estimated quantities table on Sheet No. 2.

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF END BENT NO. 2

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LOHMAR
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED 3/21/2011
ROUTE MO | STATE
DISTRICT | SHEET NO. 11
CITY FENTON
JOB NO. 1100110
FED.-AID PROJECT NO. BRM-4989(606)
PROJECT NO. N/A
BRIDGE NO. 1420013

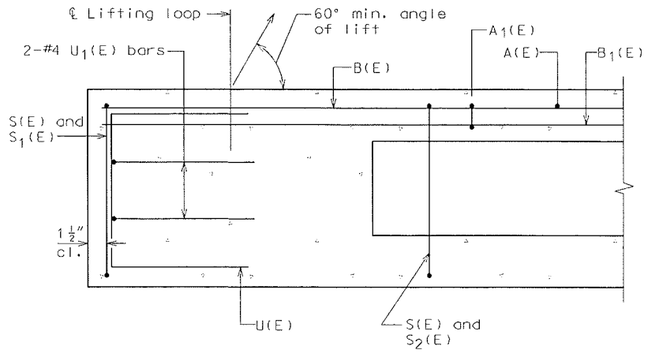
DATE	DESCRIPTION
3/28/11	1 Revised Beam Elevations
4/05/11	2 Revised Bar Mark

HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Disciplines: Professional Engineering
Certificate of Authority: 000251
Expiration Date: December 31, 2012

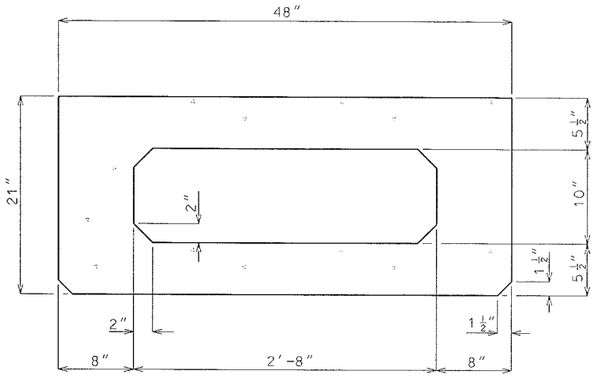
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF END BENT 2
SHEET 3 OF 3

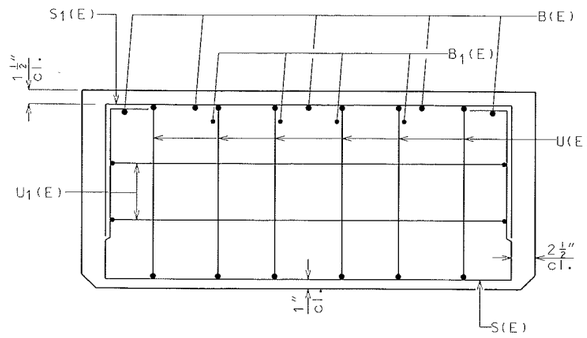
s:\1100110\cad\s\11-End Bent 2 details R2.dgn 10:24:40 AM 4/7/2011



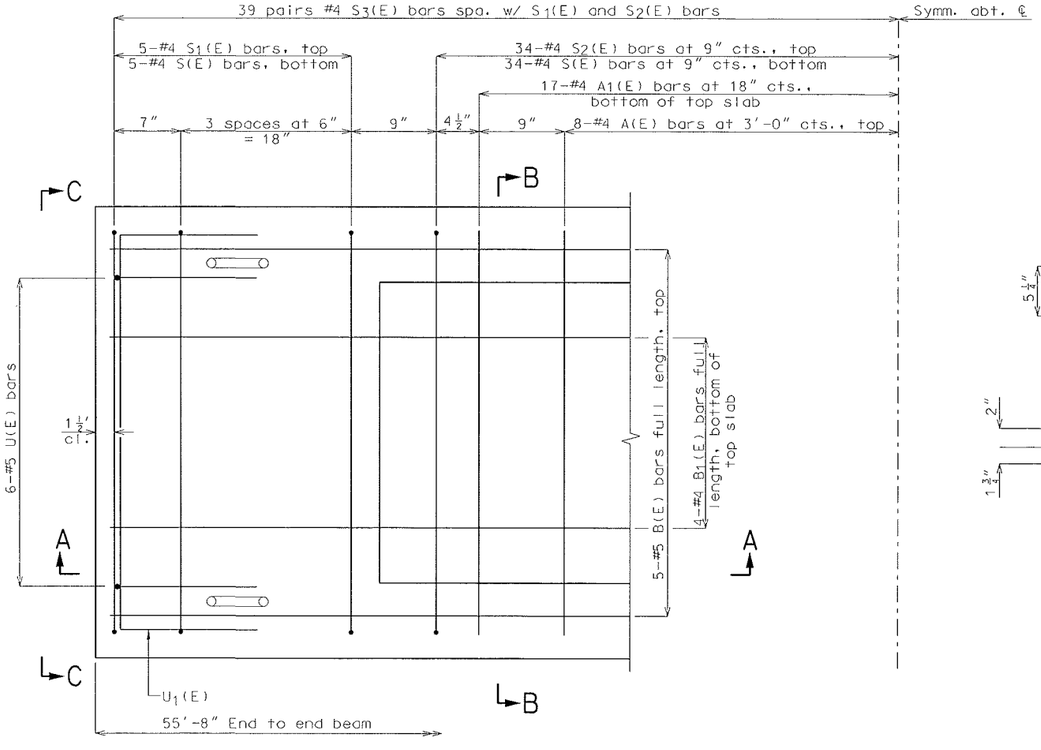
SECTION A-A



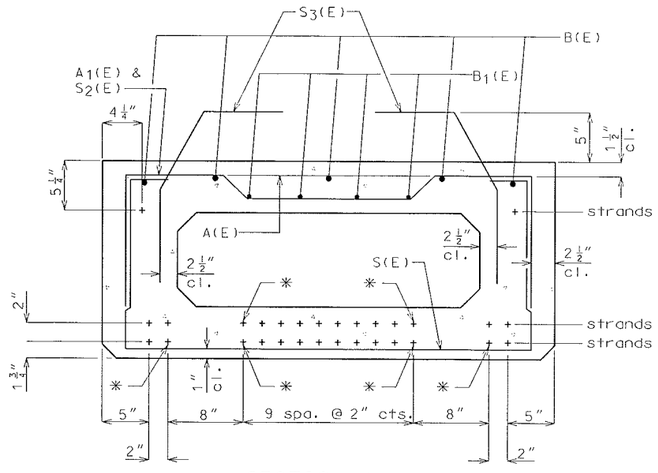
SECTION B-B
(Showing dimensions)



VIEW C-C



PLAN VIEW



SECTION B-B
(Showing reinforcement and strand locations)

* Debond strand for 16 feet from end of beam. Prestressing strands shall be cut flush with the box beam unit ends.

MINIMUM BAR LAP

#4 bar = 2'-0"
#5 bar = 2'-6"

BAR LIST
ONE BEAM ONLY
(For Information Only)

Bar	No.	Size	Length	Shape
A(E)	16	#4	3'-7"	—
A1(E)	34	#4	3'-10"	⌇
B(E)	5	#5	55'-5"	—
B1(E)	4	#4	55'-5"	—
S(E)	78	#4	7'-5"	⊓
S1(E)	10	#4	5'-11"	⊓
S2(E)	68	#4	6'-2"	⊓
S3(E)	156	#4	3'-0"	⌒
U(E)	12	#5	4'-0"	⊔
U1(E)	4	#4	6'-0"	⊓

NOTE:
See Sheet 13 for additional details and Bill of Material.

Place the number of strands specified in each row symmetrically about the centerline of beam in the permissible strand locations shown.

Finish the top surface of deck beams in accordance with Sec. 1029 for Surface Finish, I-Girders.

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF PRECAST PRESTRESSED 48" BOX BEAMS

STATE OF MISSOURI
THOMAS P. LOHMAR
NUMBER PE-2001018771
PROFESSIONAL ENGINEER
3-21-2011

DATE PREPARED	
3/21/2011	
ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	12
CITY	
FENTON	
JOB NO.	
1100110	
FED.-AID PROJECT NO.	
BRM-4989(606)	
PROJECT NO.	
N/A	
BRIDGE NO.	
1420013	

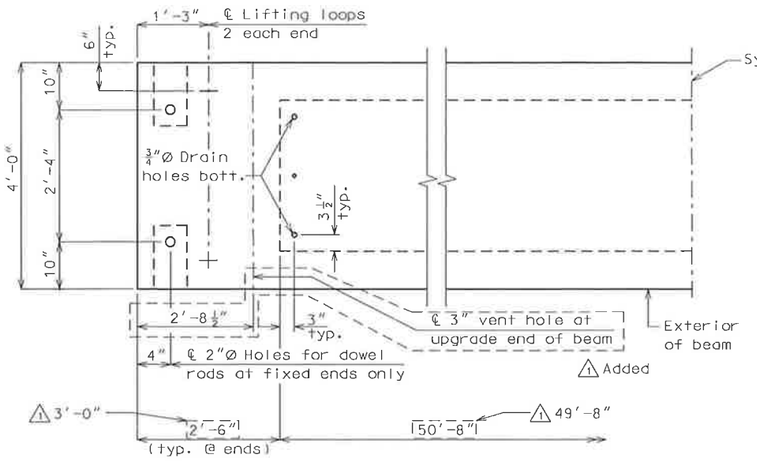
DATE	DESCRIPTION

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-8366 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

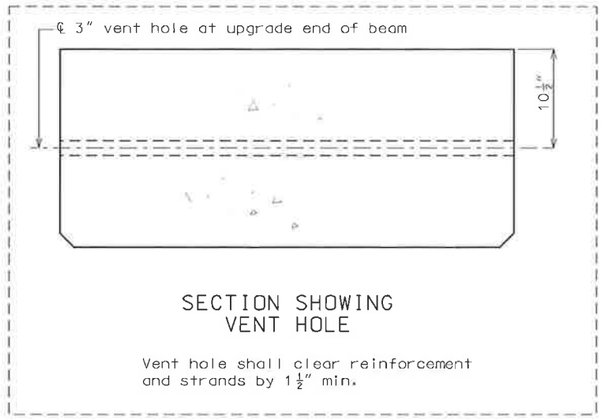
NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF PRECAST
PRESTRESSED 48" BOX BEAMS
SHEET 1 OF 2



PLAN VIEW



SECTION SHOWING
VENT HOLE

Vent hole shall clear reinforcement and strands by 1½" min.

Added

NOTES:

Concrete for prestressed girders shall be Class A-1 with f'c = 7,000 psi and f'ci = 5,500 psi.

(+) indicates prestressing strand.

Use 30 strands with an initial prestress force of 1318 kips.

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

*** At contractor's option a 1½" to 1¾" 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.

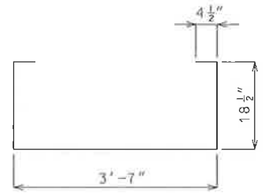
All dimensions are out to out.

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

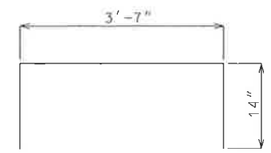
Actual lengths are measured along centerline of bar to the nearest inch.

All reinforcement shall be grade 60.

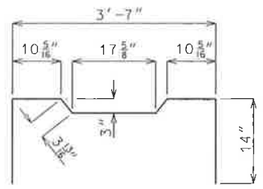
All bars shall be epoxy coated.



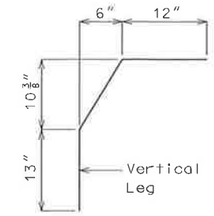
BAR S(E)



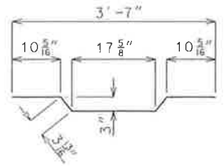
BAR S1(E)



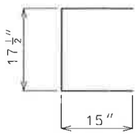
BAR S2(E)



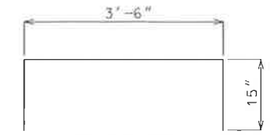
BAR S3(E)



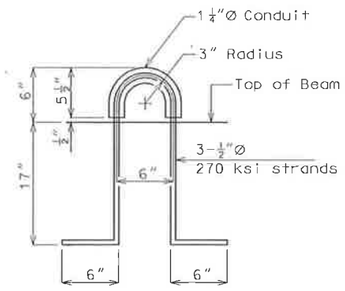
BAR A1(E)



BAR U(E)



BAR U1(E)



LIFTING LOOP DETAIL

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF PRECAST PRESTRESSED 48" BOX BEAMS

STATE OF MISSOURI
THOMAS P. LOHKAMP
NUMBER PE-2009018271
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	13

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

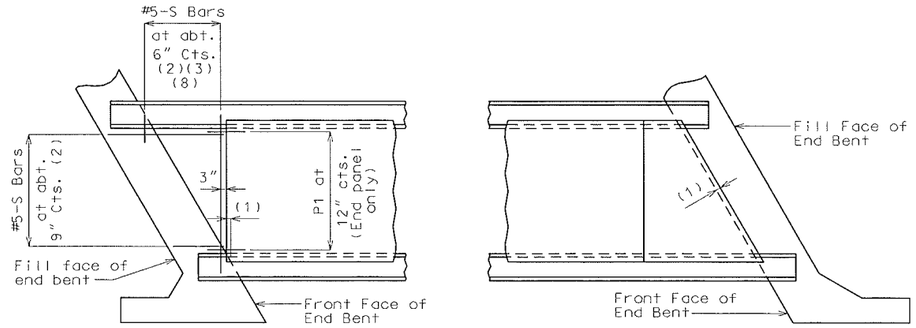
DATE	DESCRIPTION
4/05/11	⚠1 Revised Girder Details

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4421 FAX: 314-531-6986 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF PRECAST
PRESTRESSED 48" BOX BEAMS
SHEET 2 OF 2

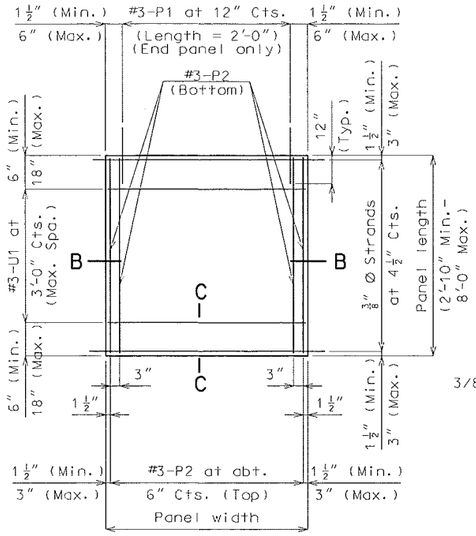
s:\1100110\cad\s\13-Prestressed Girders 2 R1.dgn 10:24:41 AM 4/7/2011



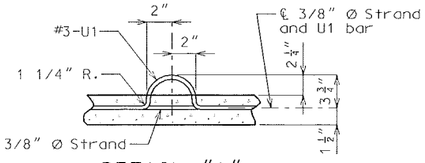
PANELS-SQUARED ENDS

PANELS-SKEWED ENDS

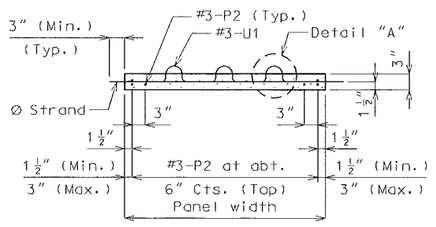
PLAN OF PRECAST PRESTRESSED PANELS PLACEMENT



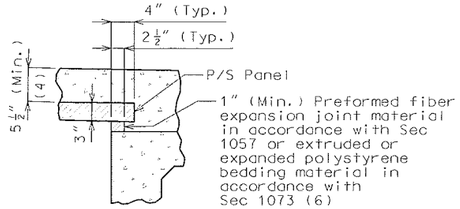
PLAN OF PRECAST PRESTRESSED PANEL



DETAIL "A"

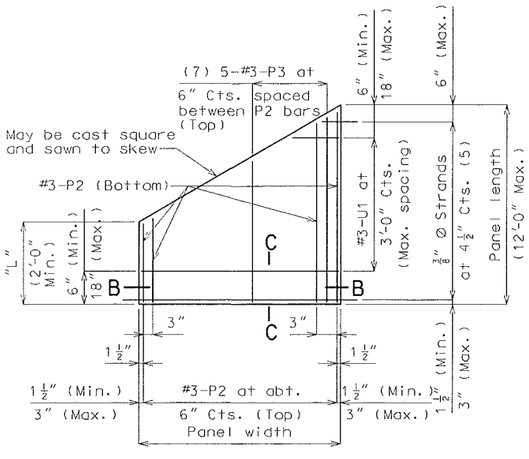


SECTION B-B

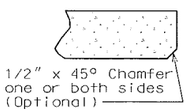


SECTION A-A

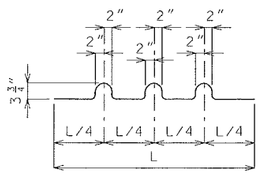
Note: Use camber and dead load deflection data on Sheet No. 15 for determining thickness of preformed fiber expansion joint material or polystyrene bedding material within the limits noted in general notes.



PLAN OF PRECAST PRESTRESSED PANEL
(SKEWED END-OPTIONAL)



SECTION C-C



BENDING DIAGRAM FOR U1 BAR
(U1 Bars may be oriented at right angles to location and spacing shown. U1 Bars shall be placed between P1 bars).

NOTES:

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 top #3-P2 bars shown. Wire or bar diameter shall not be larger than 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.

The reinforcing steel shall be tied securely to the ¾"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".

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.

All reinforcement other than prestressing strands shall be epoxy coated.

Precast panels may be in contact with stirrup reinforcing in diaphragms.

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

S-bars are not listed in the bill of reinforcing.

(1) End panels shall be dimensioned 1" min. to 1½" max. from the inside face of diaphragm.

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

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

(4) 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 additiongl labor or materials required for necessary grade adjustment.

(5) 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.

(6) All panel support pads shall be glued to the girder. When support thickness exceeds 1½inches, the pads shall be glued top and bottom. The glue used shall be the type recommended by the panel support pads manufacturer.

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

(8) Minimum reinforcement steel length shall be 2'-0".

GENERAL NOTES:

PRESTRESSED PANELS:
Concrete for prestressed panels shall be Class A-1 with f'c = 6,000 psi, f'ci = 4,000 psi.

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.

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.

Initial prestressing force = 17.2 kips/strand.

The method and sequence of releasing the strands shall be shown on the shop drawings.

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.

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.

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

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.

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.

Slab thickness over prestressed panels varies due to girder camber.

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.

REINFORCING STEEL:
All dimensions are out to out.

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

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

Actual lengths are measured along centerline of bar to the nearest inch.

The prestressed panel quantities are not included in the table of estimated quantities for slab.

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

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF PRECAST PRESTRESSED PANELS

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LOGAN
NUMBER PE-2001018771
PROFESSIONAL ENGINEER
3-21-2011

DATE PREPARED
3/21/2011

ROUTE	STATE
	MO
DISTRICT	SHEET NO.
	14

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

DESCRIPTION	DATE

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4224 FAX 314-531-8565 www.hornershifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF PRECAST
PRESTRESSED PANELS

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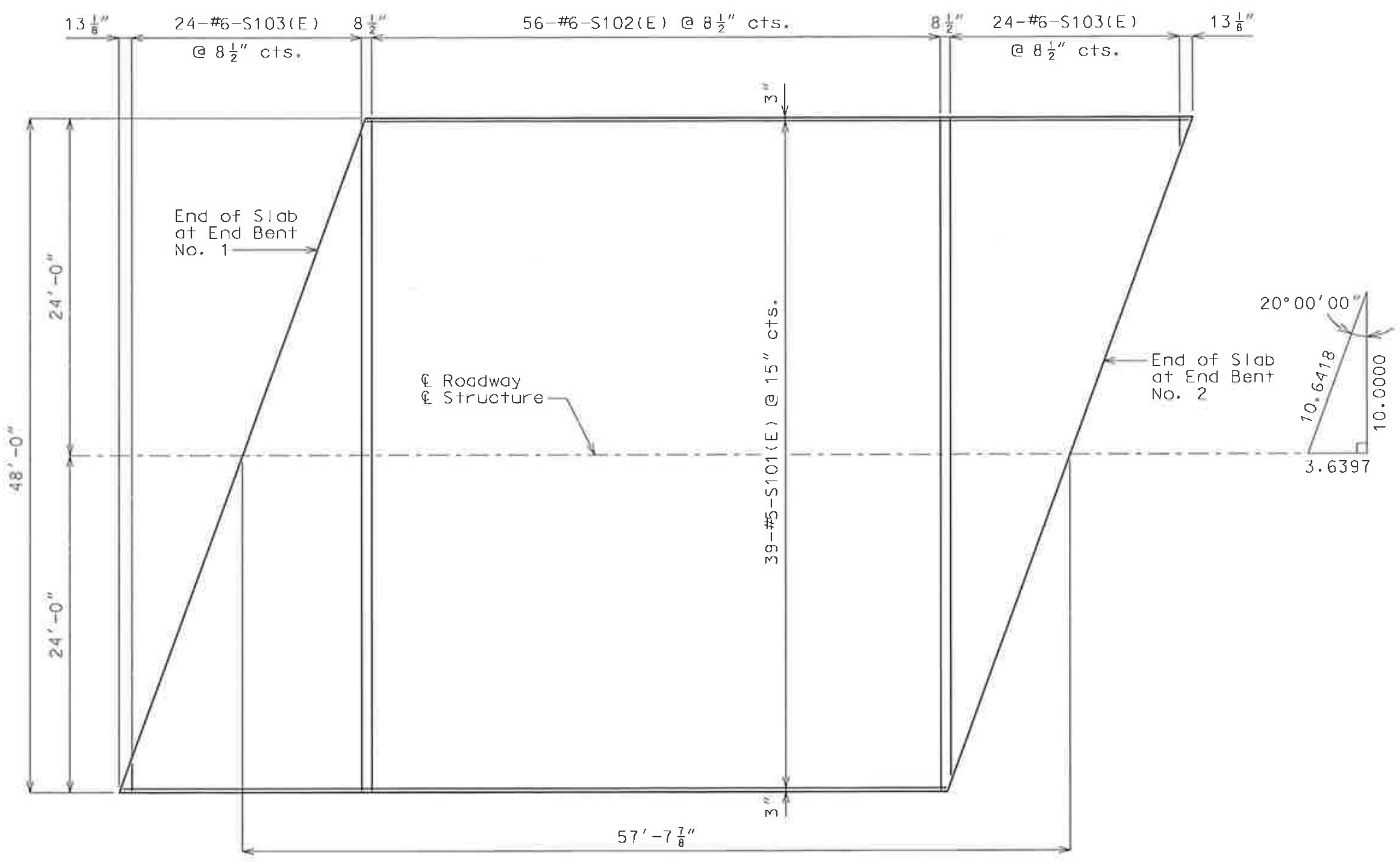
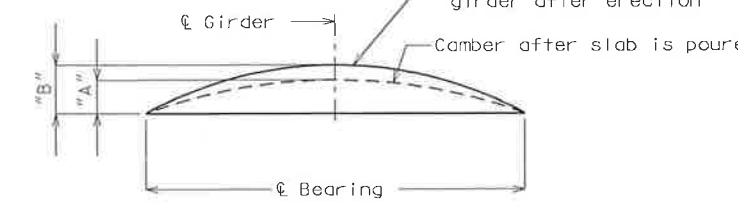


PLAN OF SLAB SHOWING REINFORCEMENT



	Span (1-2)	
	"A"	"B"
Ext. beam	1 1/16"	2 1/16"
Int. beam	15/16"	

BEAM CAMBER DIAGRAM

	Span (1-2)	
	"A"	"B"
Ext. beam	2 1/4"	3 1/8"
Int. beam	2 1/8"	

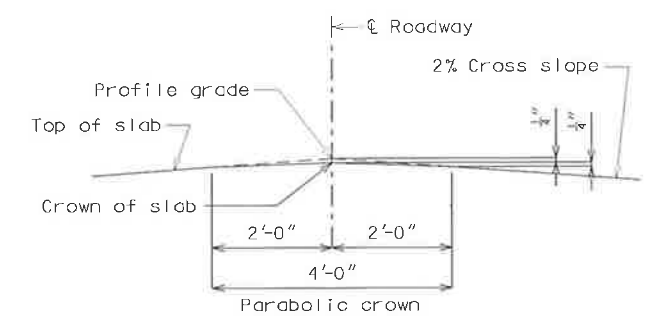
△ Revised

Notes:

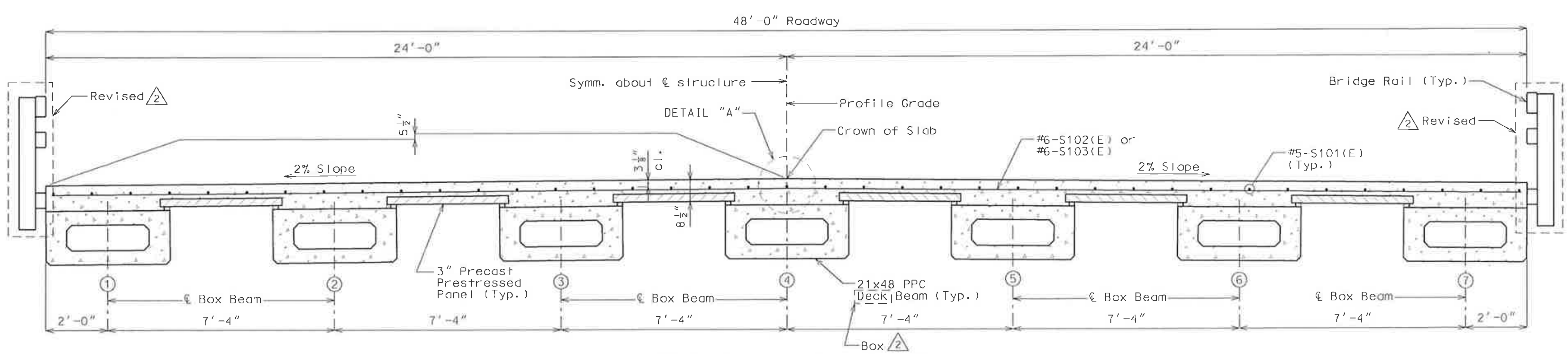
Conversion factors for girder camber
0.25 pt. = 0.7125 x 0.5 pt.

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.

Concrete in the slab haunches is included in the Estimated Quantities for Slab on Prestressed Concrete Box Beam.



DETAIL "A"



HALF SECTION NEAR ℄ SPAN

Note:

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

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF SLAB REINFORCEMENT

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

State of Missouri, Thomas P. Lohman, Professional Engineer — 4-7-2011

DATE PREPARED 3/21/2011
ROUTE | STATE MO
DISTRICT | SHEET NO. 15
CITY FENTON
JOB NO. 1100110
FED.-AID PROJECT NO. BRM-4989(606)
PROJECT NO. N/A
BRIDGE NO. 1420013

DATE	DESCRIPTION
3/24/11	△1 Revised Beam Camber Diagram
4/05/11	△2 Revised Note

HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.hornershifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF SLAB REINFORCEMENT

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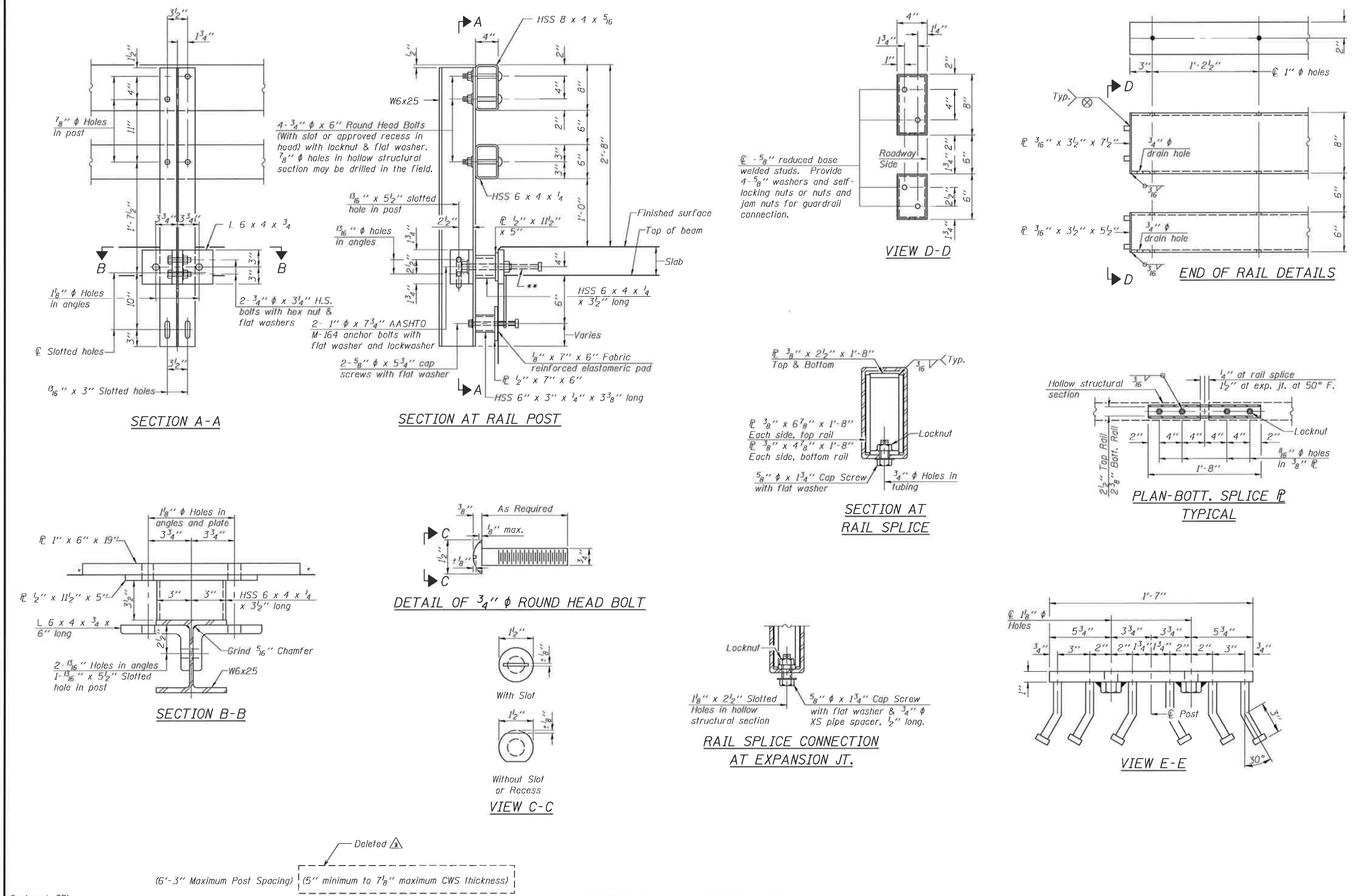


NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

DETAILS OF GUARDRAIL

Designed: TPL
Detailed: CAB
Checked: KLH

STATE OF MISSOURI — THOMAS R. LONNAY — PROFESSIONAL ENGINEER — 4.12.2011

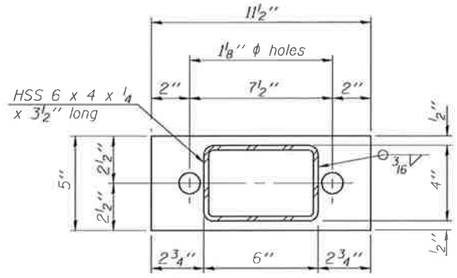
DATE PREPARED	3/21/2011
ROUTE	
STATE	MO
DISTRICT	
SHEET NO.	16
CITY	FENTON
JOB NO.	1100110
FED.-AID PROJECT NO.	BRM-4989(606)
PROJECT NO.	N/A
BRIDGE NO.	1420013

DATE	DESCRIPTION
4/5/11	△ Added Sheet
4/11/11	△ Removed Note

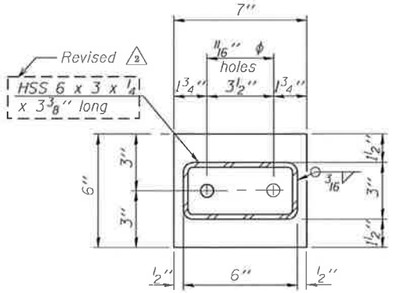
HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

OLD HIGHWAY 141 BRIDGE OVER FENTON CREEK

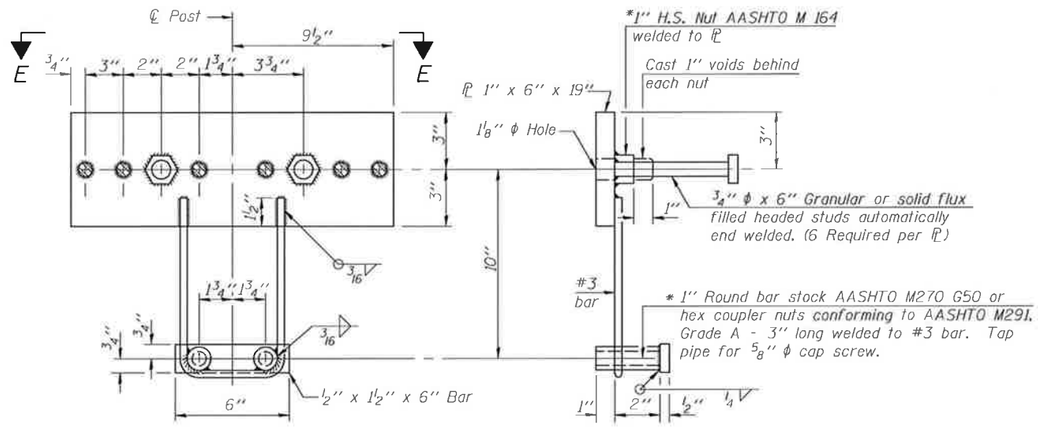
DETAILS OF GUARDRAIL SHEET 1 OF 2



℄ ½" x 11½" x 5"



℄ ½" x 7" x 6"



ANCHOR DEVICE

*Threaded areas shall be plugged or blocked off during casting of beam. Galvanized after fabrication.

Notes:

** The studs of the anchor devices shall be placed below the top reinforcement bars and the outermost longitudinal reinforcement bar shall be placed directly above the studs of the rail post anchor device.

Hollow structural sections shall conform to the requirements of ASTM designation A 500 Grade B Structural Steel Tubing and shall meet the longitudinal CVN requirements of 15 ft-lbs at 0°F.

All other steel shapes and plates shall conform to the requirements of AASHTO M270 Grade 36 except posts and angles shall conform to AASHTO M270, Grade 50.

Bolts, cap screws, and nuts shall conform to the requirements of ASTM designation A 307 except for high strength bolts, nuts, and washers noted, which shall conform to AASHTO M164.

All bolts, nuts, cap screws, washers, and lock washers shall be galvanized according to AASHTO M232.

All posts, railing, rail splices, anchor devices and angles shall be galvanized after shop fabrication according to AASHTO M111 and ASTM A385. Galvanized rail shall not be painted.

Railing will be paid for at the contract unit price per foot for Bridge Guardrail. All field drilled holes shall be coated with an approved zinc rich paint before erection.

Place ⅛" fabric bearing pads between the ½"x7"x6" plates that come in contact with concrete.

The ¾" Dia. high strength bolts used to connect the 6x4x¾" angles to the post shall be tightened according to the "Specification for Structural Joints using ASTM A325 or ASTM A 490 Bolts" for Slip Critical Connections as issued by the Research Council on Structural Connections Joints of the Engineering Foundation. The 1" Dia. high strength bolts connecting the angles to the concrete shall be tightened to a snug fit and given an additional ⅛ turn. The ⅝" Dia. cap screws in bottom of posts shall be tightened to a snug fit only.

Stud connectors shall conform to the requirements of AASHTO M169 cold drawn bars, Grade 1015, 1018, or 1020 either semi- or fully-killed. Welding and workmanship shall be according to the requirements of the Bridge Welding Code (BWC).

Designed: TPL
Detailed: CAB
Checked: KLH

DETAILS OF GUARDRAIL

s:\1100110\Cad\S\17-guardrail (open in IDOT) R1.dgn 8:30:00 AM 4/12/2011

STATE OF MISSOURI
THOMAS P. LOMAN
NUMBER
PE-2001018771
PROFESSIONAL ENGINEER

4·12·2011

DATE PREPARED
3/21/2011

ROUTE: MO
DISTRICT:
SHEET NO.: 17

CITY
FENTON

JOB NO.
1100110

FED.-AID PROJECT NO.
BRM-4989(606)

PROJECT NO.
N/A

BRIDGE NO.
1420013

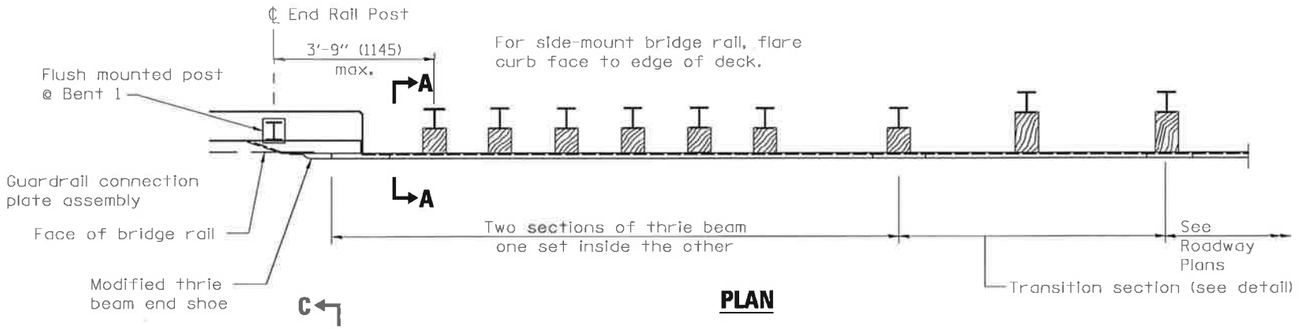
DATE	DESCRIPTION
4/5/11	2 Added Sheet
4/11/11	1 Revised Note

HORNER & SHIFRIN, INC.
ENGINEERS
5900 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

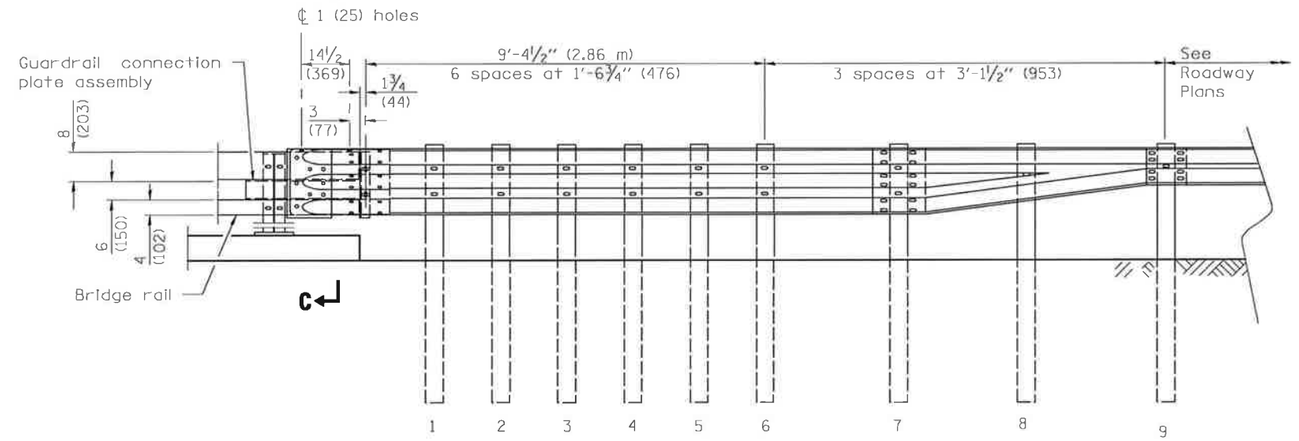
NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

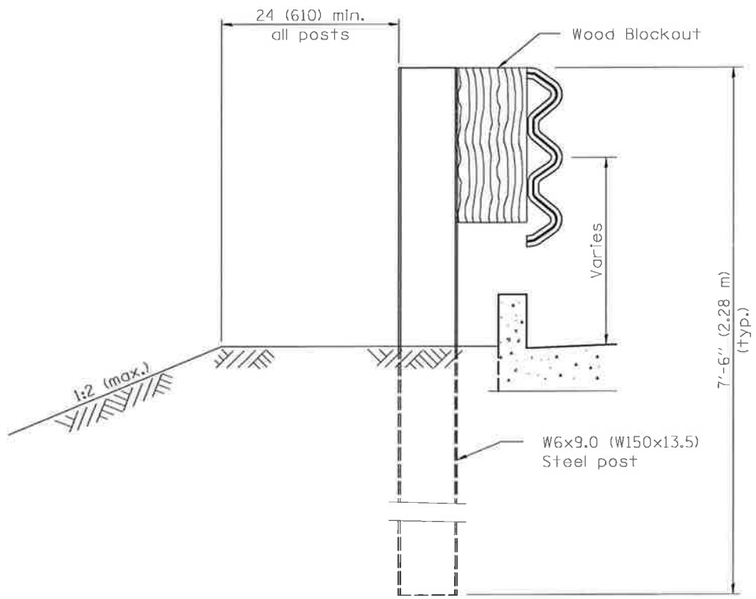
DETAILS OF GUARDRAIL
SHEET 2 OF 2



PLAN



ELEVATION



SECTION A–A

GENERAL NOTES

Attachment to curb mounted bridge rail shown. Attachment to side mounted bridge rail is similar.

Thrie beam rail shall be bolted to block-out at all posts.

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

All dimensions are in inches (millimeters) unless otherwise shown.

Designed: TPL
Detailed: CBW
Checked: TPL

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

STATE OF MISSOURI
THOMAS P. LOMAX
NUMBER PE-2001010171
PROFESSIONAL ENGINEER

4-12-11

DATE PREPARED: 3/21/2011
ROUTE: | STATE: MO
DISTRICT: | SHEET NO.: 18
CITY: FENTON
JOB NO.: 1100110
FED.-AID PROJECT NO.: BRM-4989(806)
PROJECT NO.: N/A
BRIDGE NO.: 1420013

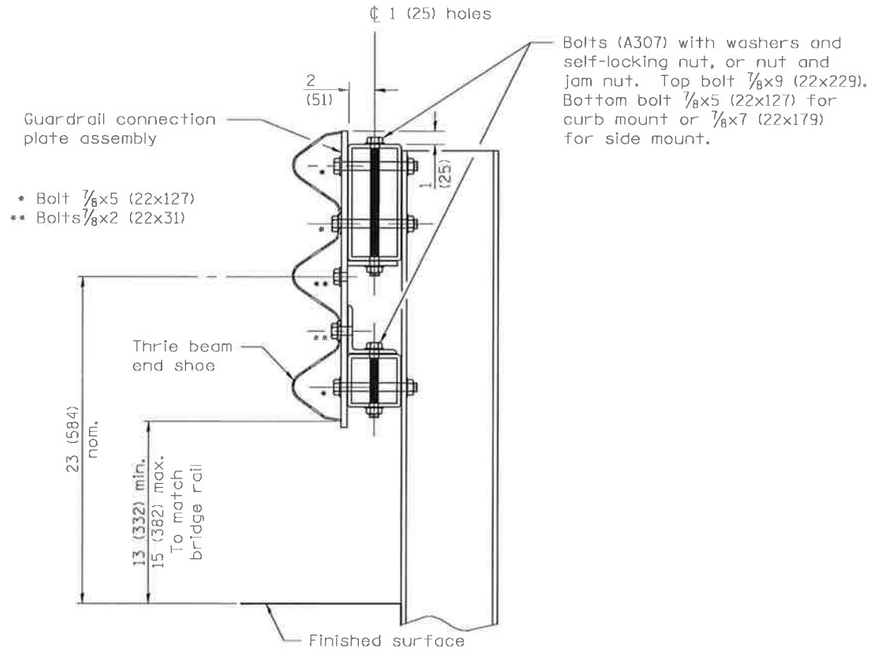
DATE	DESCRIPTION
4/5/11	⚠Added Sheet

HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-5966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

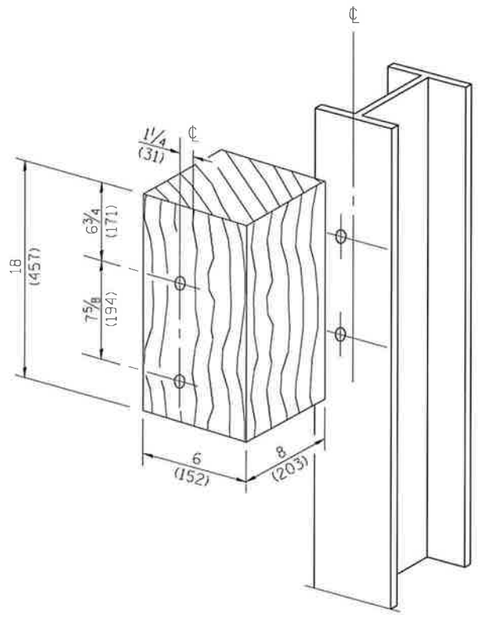
OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF GUARDRAIL TRANSITION
SHEET 1 OF 3

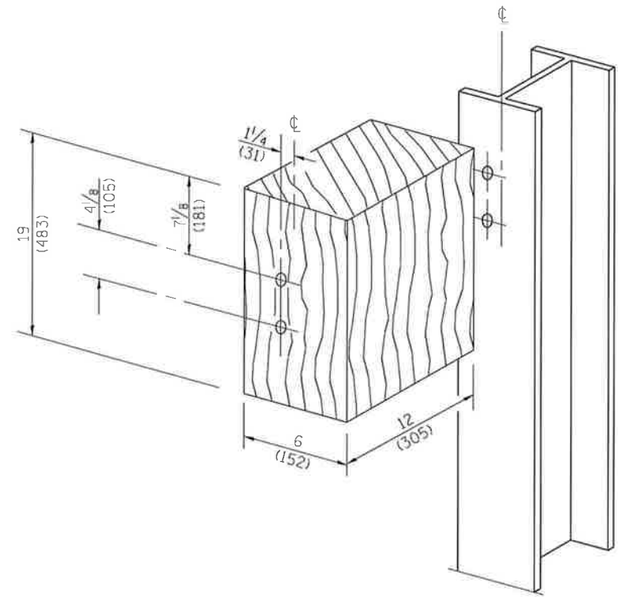
s:\1100110\Cad\S\18-guardrailplan.dan 9:53:09 AM 4/12/2011



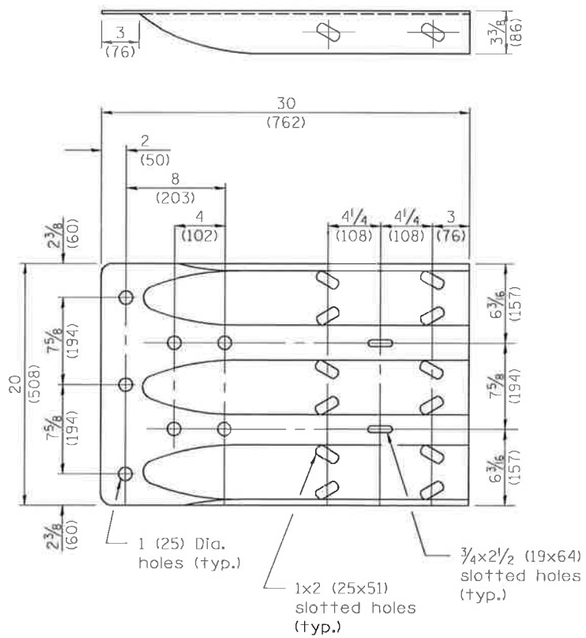
SECTION C–C



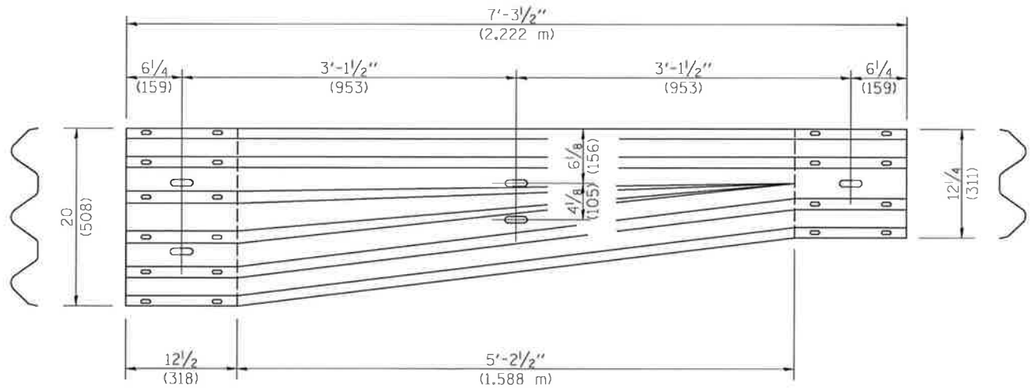
POSTS 1–7 WOOD BLOCKOUT DETAIL



POST 8 WOOD BLOCKOUT DETAIL



MODIFIED THRIE BEAM END SHOE DETAIL



TRANSITION SECTION
(10 guage (3.4) rail element)

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

Designed: TPL
Detailed: CBW
Checked: TPL

STATE OF MISSOURI
THOMAS P. LOHMAR
NUMBER PE-2009037171
PROFESSIONAL ENGINEER
4-12-11

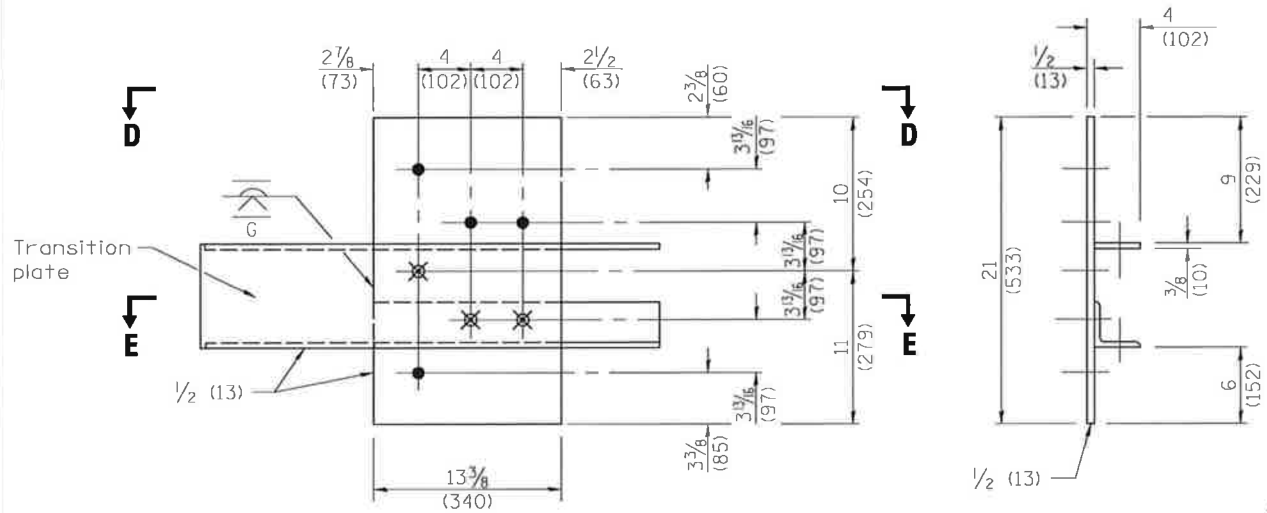
DATE PREPARED	3/21/2011
ROUTE	STATE MO
DISTRICT	SHEET NO. 19
CITY	FENTON
JOB NO.	1100110
FED.-AID PROJECT NO.	BRM-4989(606)
PROJECT NO.	N/A
BRIDGE NO.	1420013

DATE	DESCRIPTION
4/5/11	⚠1 Added Sheet

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1499
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000758
Expiration Date: December 31, 2012

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF GUARDRAIL TRANSITION
SHEET 2 OF 3



GUARDRAIL CONNECTION PLATE ASSEMBLY DETAILS

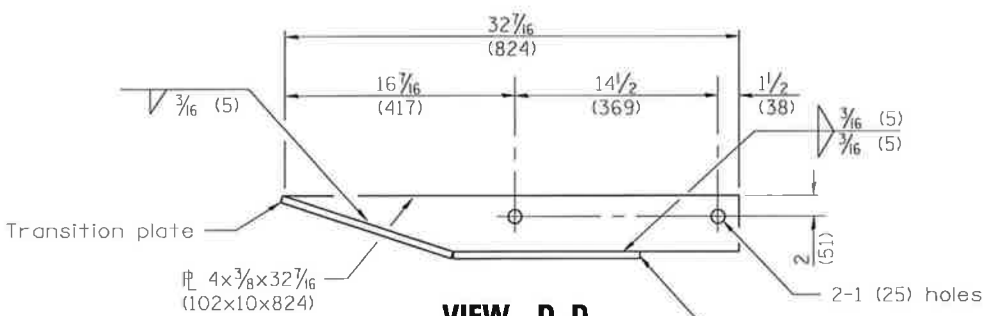
(Mirror for opposite end)

LEGEND

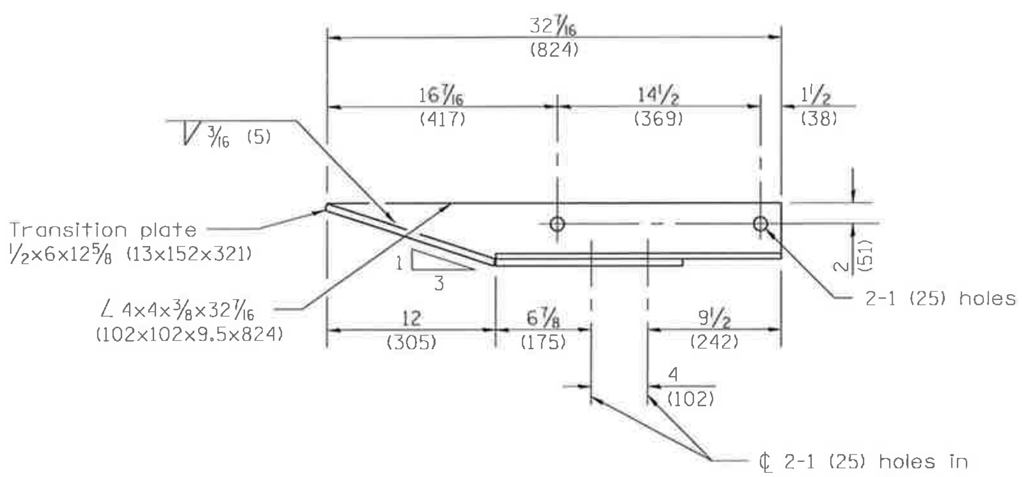
● ℄ 4-1 (25) holes for ⅞ (22) H.S. bolts and nuts

⊗ Drill and tap 3 holes for ⅞ (22) H.S. bolts.

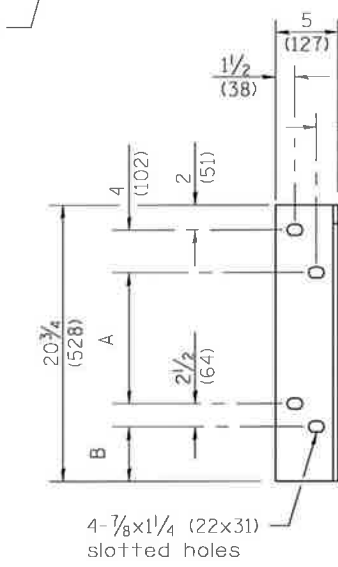
Dimensions	A	B
For Side Mounted Rail	9¾ (247)	2½ (64)



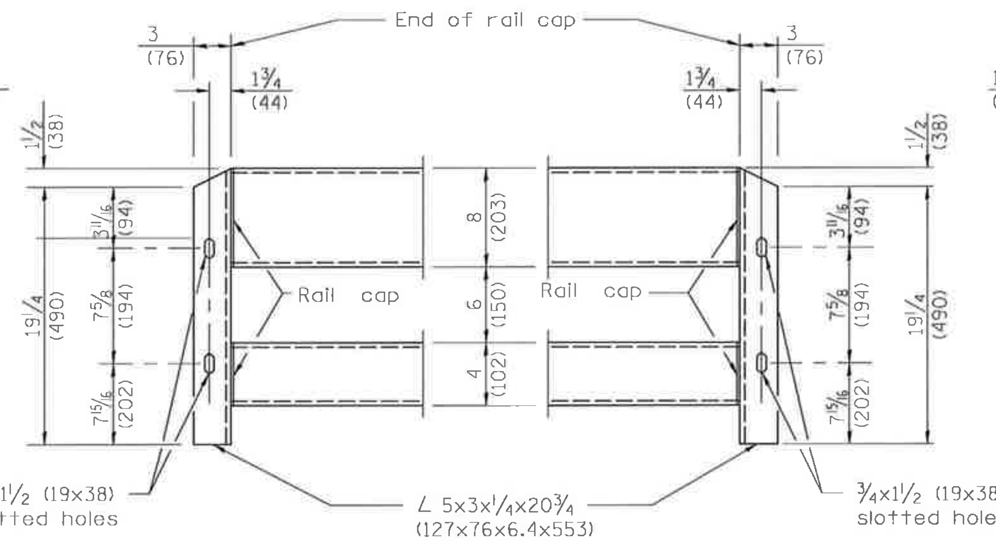
VIEW D-D



SECTION E-E

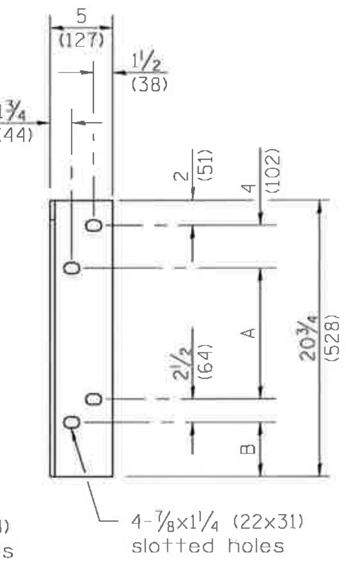


DEPARTURE END VIEW



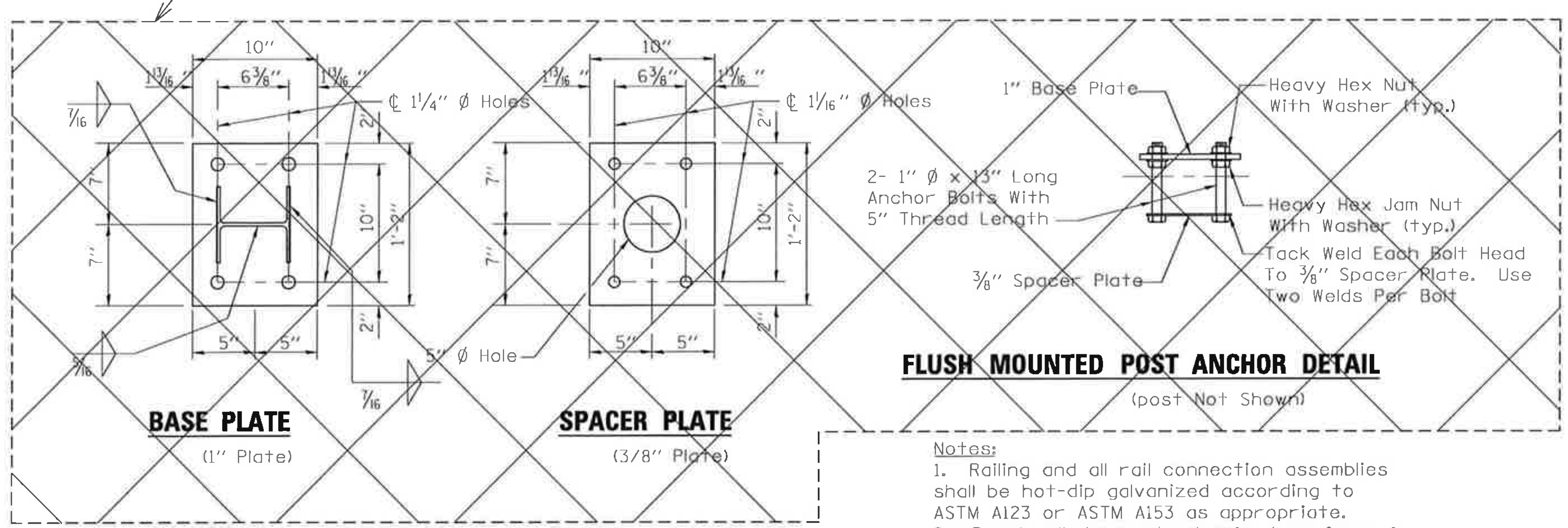
CONNECTION ANGLES

(Install angles to rail caps using ⅝ (19) washers and self-locking nuts or nuts and jam nuts, to be provided by others)



APPROACH END VIEW

Deleted 2



BASE PLATE (1" Plate)

SPACER PLATE (3/8" Plate)

FLUSH MOUNTED POST ANCHOR DETAIL (post Not Shown)

Notes:
1. Railing and all rail connection assemblies shall be hot-dip galvanized according to ASTM A123 or ASTM A153 as appropriate.
2. Repair all damaged galvanized surfaces in a manner acceptable to the engineer.

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

Designed: TPL
Detailed: CBW
Checked: TPL

STATE OF MISSOURI — THOMAS P. LOHMAN — NUMBER PE-2008018771 — PROFESSIONAL ENGINEER

4.12.11

DATE PREPARED	3/21/2011
ROUTE	
STATE	MO
DISTRICT	
SHEET NO.	20
CITY	FENTON
JOB NO.	1100110
FED.-AID PROJECT NO.	BRM-4989(608)
PROJECT NO.	N/A
BRIDGE NO.	1420013

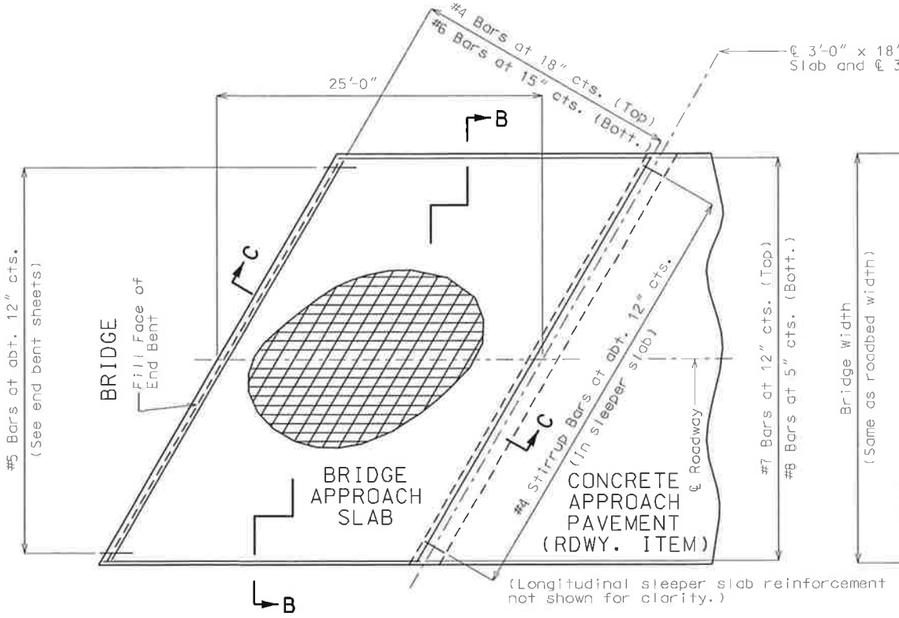
DATE	DESCRIPTION
4/5/11	1 Added Sheet
4/11/11	2 Deleted Details

HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

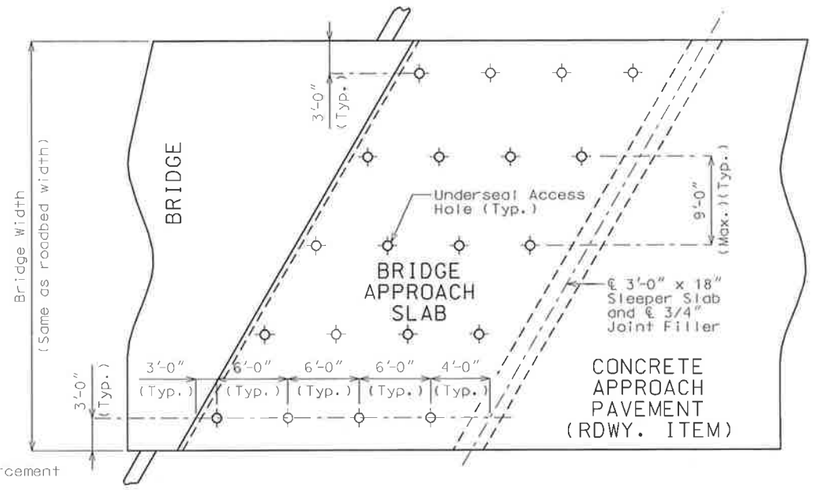
OLD HIGHWAY 141 BRIDGE OVER FENTON CREEK

DETAILS OF GUARDRAIL TRANSITION SHEET 3 OF 3

s:\1100110\Cad\S\20-guardrailconnection R1.dan 10:00:22 AM 4/12/2011

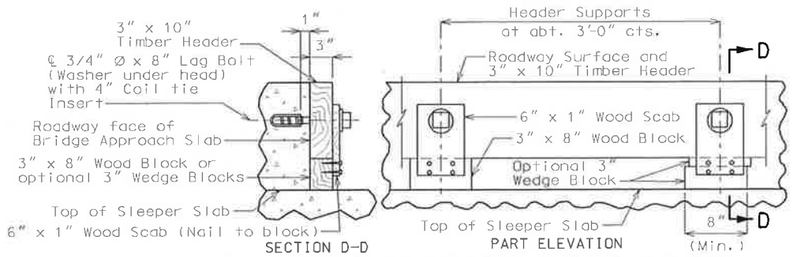


PART PLAN SHOWING REINFORCEMENT



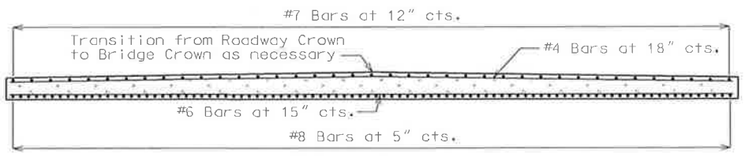
PART PLAN
(SHOWING TYPICAL UNDERSEAL ACCESS HOLE LOCATIONS)

Note: Guardrail not shown for clarity.



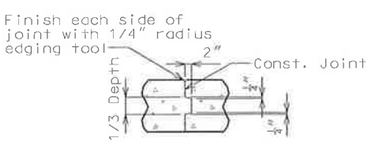
Note: Remove timber header when concrete pavement is placed.

DETAILS OF TIMBER HEADER

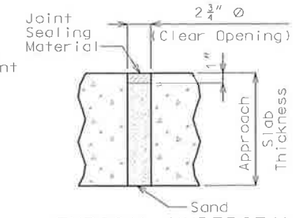


SECTION B-B

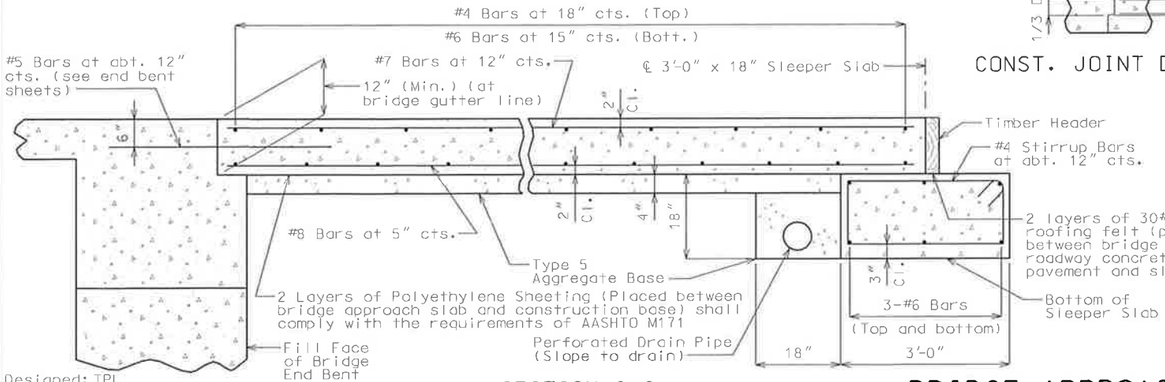
Note: With the approval of the engineer, the contractor may crown the bottom of the approach slab to match the crown of the roadway surface.



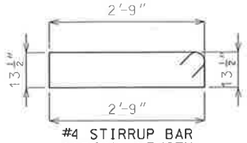
CONST. JOINT DETAIL



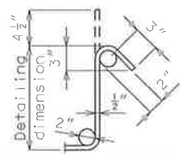
TYPICAL UNDERSEAL ACCESS HOLE DETAIL



SECTION C-C



#4 STIRRUP BAR
(ACTUAL LENGTH = 8'-3")



TYPICAL 135° STIRRUP HOOK DIMENSIONS BENDING DIAGRAM

Note:
Nominal lengths are based on out to out dimensions shown in bending diagram and are listed for fabricators use (nearest inch).

BRIDGE APPROACH SLAB (Bent 2 shown, Bent 1 similar)

Designed: TPL
Detailed: TPL
Checked: CBW

GENERAL NOTES:

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

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

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

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

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.

Mechanical bar splices shall be in accordance with Sec 706.

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

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

Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge or semi-deep slab.

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 square yard.

For Concrete Approach Pavement details, see roadway plans.

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.

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.

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.

STATE OF MISSOURI
THOMAS LOHMAR
NUMBER PE-2009018771
PROFESSIONAL ENGINEER
4-12-2011

DATE PREPARED: 3/21/2011
ROUTE: | STATE: MO
DISTRICT: | SHEET NO.: 21
CITY: FENTON
JOB NO.: 1100110
FED.-AID PROJECT NO.: BRM-4989(606)
PROJECT NO.: N/A
BRIDGE NO.: 1420013

DATE	DESCRIPTION
4/05/11	Added Sheet
4/11/11	Replaced Sh., Removed Curb

HORNER & SHIFRIN, INC. ENGINEERS
3200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-8968 www.hornershifrin.com
Daniel Thomas Professional Engineering
Certificate of Authority Number: 000158
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE. FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

DETAILS OF APPROACH SLAB

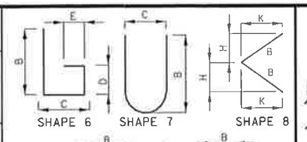
S:\1100110\Cad\S\21-Approach Slab R1.dgn 9:30:55 AM 4/12/2011

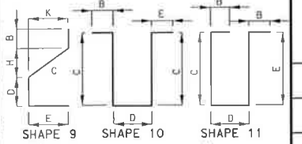
BILL OF REINFORCING STEEL

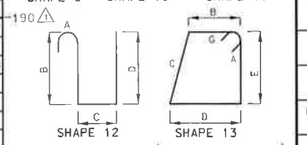
NO. REQ'D.	MARK NO. SIZE	MARK NO. MARK	LOCATION	EPOXY (E)	SHAPE NO.	STIRRUP (S)	SUBSTR. (X)	VARIES (V)	NO. EACH	DIMENSIONS B FT.	B IN.	C FT.	C IN.	D FT.	D IN.	E FT.	E IN.	F FT.	F IN.	H FT.	H IN.	K FT.	K IN.	NOMINAL LENGTH FT.	NOMINAL LENGTH IN.	ACTUAL LENGTH FT.	ACTUAL LENGTH IN.	WEIGHT LBS.
			SUBSTR.																									
			END BENT 1																									
64	6	F101	BRIDGE FTG		20					8	8.000													8	8	8	8	833
106	7	F102	BRIDGE FTG		19					8	5.000	5	8.000											14	1	13	11	3015
15	4	F103	BRIDGE FTG		20					52	11.000													52	11	52	11	530
61	6	F104	WING FTG		20					9	5.000													9	5	9	5	863
110	7	F105	WING FTG		19					8	5.000	4	11.000											13	4	13	2	2960
15	4	F106	SOUTH FTG		20					31	3.000													31	3	31	3	313
		F107	NOT USED																									
3	6	F108	NORTH FTG		20			V	1	6	10.000													6	10	6	10	
			INCREMENT =							9	5.000													9	5	9	5	37
			15.50 INCH																									
5	6	F109	NORTH FTG		20					5	6.000													5	6	5	6	41
8	6	F110	NORTH FTG		20					9	5.000													9	5	9	5	113
15	4	F111	NORTH FTG		20					18	6.000													18	6	18	6	185
15	4	F112	NORTH FTG		20					5	3.000													5	3	5	3	53
4	6	H1	DIAPHRAGM	E	20					52	11.000													52	11	52	11	318
3	6	H3	DIAPHRAGM		20					52	11.000													52	11	52	11	238
18	4	H5	DIAPHRAGM		20					3	3.000													3	3	3	3	39
52	5	H10	DIAPHRAGM	E	20					2	6.000													2	6	2	6	136
15	4	H101	BRIDGE WALL		20					52	11.000													52	11	52	11	530
10	4	H102	BRIDGE WALL		20					52	11.000													52	11	52	11	353
7	4	H103	SOUTH WING		20					21	1.000													21	1	21	1	99
10	4	H104	SOUTH WING		20					21	3.000													21	3	21	3	142
5	4	H105	SOUTH WING		20			V	1	7	1.000													7	1	7	1	
			INCREMENT =							19	1.000													19	1	19	1	44
			36.00 INCH																									
7	4	H106	SOUTH WING		20			V	1	7	3.000													7	3	7	3	
			INCREMENT =							19	3.000													19	3	19	3	62
			24.00 INCH																									
12	4	H107	SOUTH WING		20					9	3.000													9	3	9	3	74
17	4	H108	SOUTH WING		20					9	5.000													9	5	9	5	107
2	6	H109	SOUTH WING		15					2	11.750	16	1.000	2	11.750	1	4.000	2	8.000	2	8.000	1	4.000	22	1	22	0	66
17	4	H110	NORTH WING		15							22	2.000	3	0.125	2	9.875	1	0.375					25	2	25	1	285
12	4	H111	NORTH WING		15							20	10.000	1	9.875	1	8.500	0	7.500					22	8	22	7	181
28	6	H112	NORTH WING		20					7	6.000													7	6	7	6	315
2	6	H113	NORTH WING		20					8	9.000													8	9	8	9	26
8	6	H114	NORTH WING		20					5	6.000													5	6	5	6	66
12	6	H115	NORTH WING		20					9	0.000													9	0	9	0	162
24	5	U4	DIAPHRAGM	E	10							2	3.000	2	4.750									6	11	6	8	167
69	6	U5	DIAPHRAGM	E	19					2	3.000	5	6.000											7	9	7	7	786
24	6	U6	DIAPHRAGM		19					1	3.000	2	11.000											4	2	4	0	144
63	4	U7	BRIDGE WALL		10							0	6.000	2	11.000									3	11	3	9	158
6	6	U8	DIAPHRAGM		10							1	1.000	2	3.000									4	5	4	5	37
56	5	V1	BRIDGE WALL		20					3	4.000													3	4	3	4	195
42	6	V2	DIAPHRAGM		20					1	4.000													1	4	1	4	64
8	5	V3	BRIDGE WALL		20					4	3.000													4	3	4	3	35
36	4	V101	BRIDGE WALL		20					13	11.000													13	11	13	11	335
106	6	V102	BRIDGE WALL		20					13	11.000													13	11	13	11	2216
33	6	V103	SOUTH WING		20					16	7.000													16	7	16	7	822
29	6	V104	SOUTH WING		20			V	1	9	5.000													9	5	9	5	
			INCREMENT =							16	5.000													16	5	16	5	563
			3.00 INCH																									

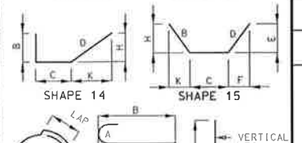
BILL OF REINFORCING STEEL

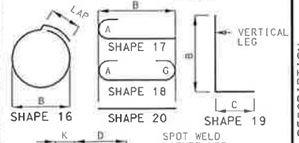
NO. REQ'D.	MARK NO. SIZE	MARK NO. MARK	LOCATION	EPOXY (E)	SHAPE NO.	STIRRUP (S)	SUBSTR. (X)	VARIES (V)	NO. EACH	DIMENSIONS B FT.	B IN.	C FT.	C IN.	D FT.	D IN.	E FT.	E IN.	F FT.	F IN.	H FT.	H IN.	K FT.	K IN.	NOMINAL LENGTH FT.	NOMINAL LENGTH IN.	ACTUAL LENGTH FT.	ACTUAL LENGTH IN.	WEIGHT LBS.
10	4	V105	SOUTH WING		20			V	1	9	5													9	5	9	5	
			INCREMENT =							16	6.000													16	6	16	6	87
			9.50 INCH																									
12	4	V106	SOUTH WING		20					16	7.000													16	7	16	7	133
46	6	V107	NORTH WING		20					16	9.000													16	9	16	9	1157
17	6	V108	NORTH WING		20					16	9.000													16	9	16	9	428
12	6	V109	NORTH WING		20			V	2	6	6.000													6	6	6	6	
			INCREMENT =							9	10.000													9	10	9	10	147
			8.00 INCH																									
8	6	V115	NORTH WING		20					9	0.000													9	0	9	0	108
			SUPERSTR.																									
			END BENT 2																									
4	7	H21	DIAPHRAGM	E	20					50	10.000													50	10	50	10	416
8	7	H22	BEAM		20					50	10.000													50	10	50	10	831
7	6	H23	BEAM & DIAPH		20					50	10.000													50	10	50	10	534
4	6	H24	BEAM		20					5	0.000													5	0	5	0	30
18	4	H25	DIAPHRAGM		20					3	3.000													3	3	3	3	39
16	6	H27	WING		20					9	3.000													9	3	9	3	222
4	6	H28	WING	E	20					5	3.000													5	3	5	3	32
4	6	H29	WING		20					7	7.000													7	7	7	7	46
52	5	H30	DIAPHRAGM	E	20					2	6.000													2	6	2	6	136
20	5	U21	BEAM		11									4	4.000	2	11.000	5	3.000					12	6	12	3	256
51	4	U22	BEAM		13					2	11.000			2	7.500	2	11.000	2	7.500					11	10	11	6	392
12	4	U23	BEAM		10									2	7.500	2	11.000							8	2	8	0	64
24	5	U24	DIAPHRAGM	E	10									2	3.000	2	4.750							6	11	6	8	167
69	6	U25	DIAPHRAGM	E	19					2	3.000	5	6.000											7	9	7	7	786
24	6	U26	DIAPHRAGM		19					1	3.000	2	11.000											4	2	4	0	144
4	4	U27	BEAM		10									1	0.000	2	11.000							4	11	4	9	13
8	5	V21	BEAM		20					4	4.000													4	4	4	4	36
42	6	V22	DIAPHRAGM		20					1	4.000													1	4	1	4	84
10	6	V23	WING		20			V	2	3	6.000													3	6	3	6	
			INCREMENT =							5	4.000													5	4	5	4	66
			5.50 INCH																									
4	6	V24	WING		20					5	6.000													5	6	5	6	33
10	6	V25	WING		20			V	2	3	9.000													3	9	3	9	
			INCREMENT =							5	8.000													5	8	5	8	71
			5.75 INCH																									
4	6	V26	WING		20					5	8.000													5	8	5	8	34
			SLAB																									
39	5	S101	SLAB	E	20					57	5.000													57	5	57	5	2336
56	6	S102	SLAB	E	20					47	9.000													47	9	47	9	4016
48	6	S103	SLAB	E	20			V	2	2	0.000													2	0	2	0	
			INCREMENT =							46	9.000													46	9	46	9	1757
			23.375 INCH																									

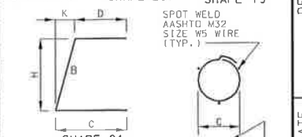


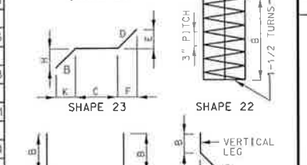


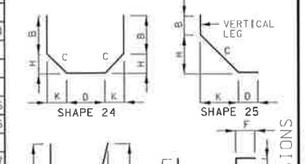


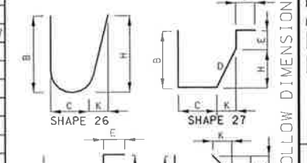


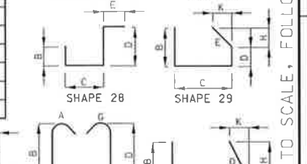


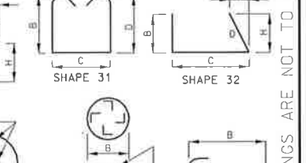


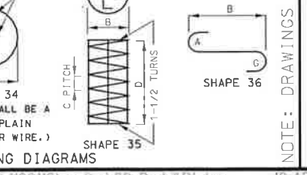






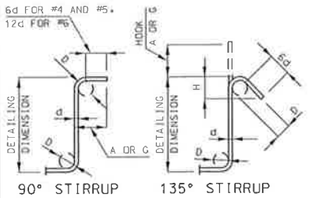






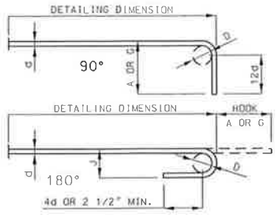
BENDING DIAGRAMS

(SHAPE 35 SHALL BE A DEFORMED OR PLAIN SPIRAL BAR OR WIRE.)



STIRRUP HOOK DIMENSIONS GRADES 40 - 50 - 60 KSI				
BAR SIZE	D (IN.)	90° HOOK	135° HOOK	
		HOOK A OR G	HOOK A OR G	APPROX. H
#4	2"	4 1/2"	4 1/2"	3"
#5	2 1/2"	6"	5 1/2"	3 3/4"
#6	4 1/2"	12"	8"	4 1/2"

NOTE: UNLESS OTHERWISE NOTED DIAMETER "D" IS THE SAME FOR ALL BENDS AND HOOKS ON A BAR.



END HOOK DIMENSIONS				
BAR SIZE	D (IN.)	ALL GRADES 180° HOOKS		90° HOOKS
		A OR G	J	A OR G
#3	2 1/4"	5"	3"	6"
#4	3"	6"	4"	8"
#5	3 3/4"	7"	5"	10"
#6	4 1/2"	8"	6"	12"
#7	5 1/4"	10"	7"	14"
#8	6"	11"	8"	16"
#9	9 1/2"	15"	11 3/4"	19"
#10	10 3/4"	17"	13 1/4"	22"
#11	12"	19"	14 3/4"	2'-0"
#14	18 1/4"	2'-3"	21 3/4"	2'-7"

NOTE:
ALL STANDARD HOOKS AND BENDS OTHER THAN 180 DEGREE ARE TO BE BENT WITH SAME PROCEDURE AS FOR 90 DEGREE STANDARD HOOKS.
HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH THE PROCEDURES AS SHOWN ON THIS SHEET.
E = EPOXY COATED REINFORCEMENT.
S = STIRRUP.
X = BAR IS INCLUDED IN SUBSTRUCTURE QUANTITIES.
V = BAR DIMENSIONS VARY IN EQUAL INCREMENTS BETWEEN DIMENSIONS SHOWN ON THIS LINE AND THE FOLLOWING LINE.
NO. EA. = NUMBER OF BARS OF EACH LENGTH.
NOMINAL LENGTHS ARE BASED ON OUT TO OUT DIMENSIONS SHOWN IN BENDING DIAGRAMS AND ARE LISTED FOR FABRICATORS USE. (NEAREST INCH)
ACTUAL LENGTHS ARE MEASURED ALONG CENTERLINE BAR TO THE NEAREST INCH.
PAYWEIGHTS ARE BASED ON ACTUAL LENGTHS.
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.
REINFORCING STEEL (GRADE 60) FY = 60,000 PSI.

Designed: TPL
Detailed: CAB
Checked: KLH

STATE OF MISSOURI
THOMAS L. LOHMAR
NUMBER PE-2001018771
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED 3/21/2011
ROUTE — STATE MO
DISTRICT △22 — SHEET NO. 16
CITY FENTON
JOB NO. 1100110
FED.-AID PROJECT NO. BRM-4989(606)
PROJECT NO. N/A
BRIDGE NO. 1420013

DATE	DESCRIPTION
4/05/11	△1 Revised V108

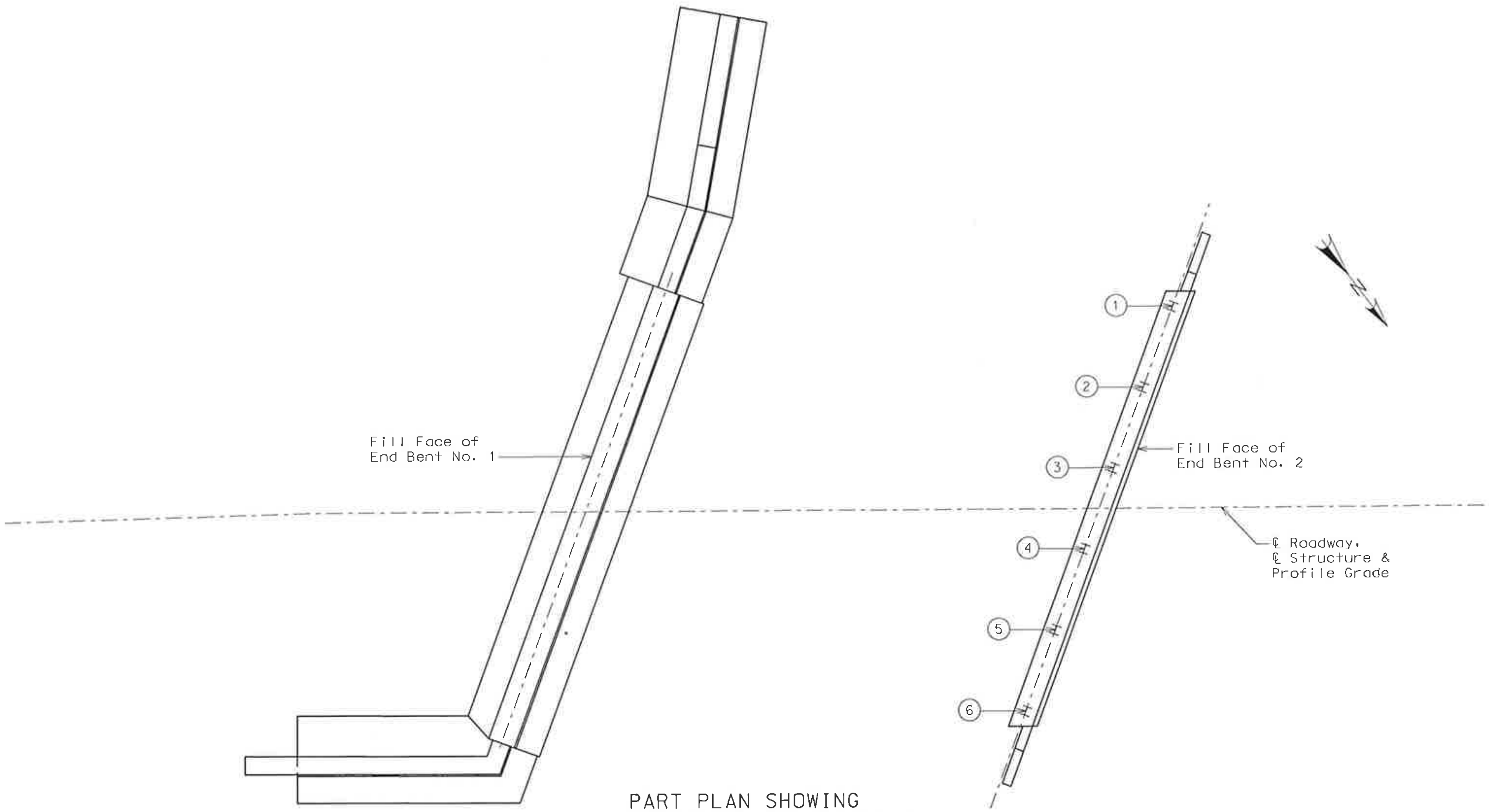
HORNER & SHIFRIN, INC. ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Disciplines: Professional Engineering
Professional Services Industry
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

BILL OF REINFORCING STEEL

s:\1100110\cad\s\22-BarBillR1.dgn 10:48:21 AM 4/7/2011



PART PLAN SHOWING
PILE NUMBERING FOR RECORDING
"AS BUILT PILE" DATA

"AS BUILT PILE" DATA			
PILE NO.	LENGTH IN PLACE (FT.)	COMPUTED AXIAL COMPRESSIVE RESISTANCE (KIPS)	REMARKS
			End Bent No. 2
1			
2			
3			
4			
5			
6			

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.

NOTE: THIS SHEET TO BE COMPLETED BY CITY CONSTRUCTION PERSONNEL.

Designed: TPL
Detailed: KLH
Checked: KLH

AS BUILT DATA SHEET

STATE OF MISSOURI
THOMAS P. LOGAN
PROFESSIONAL ENGINEER
4-7-2011

DATE PREPARED	
3/21/2011	
ROUTE	STATE MO
DISTRICT 23	SHEET NO. 18
CITY FENTON	
JOB NO. 1100110	
FED.-AID PROJECT NO. BRM-4989(606)	
PROJECT NO. N/A	
BRIDGE NO. 1420013	

DATE	DESCRIPTION
4/05/11	Revised Sheet Number

HORNER & SHIFRIN, INC.
ENGINEERS
5200 OAKLAND AVE. ST. LOUIS, MO 63110-1490
314-531-4321 FAX: 314-531-6966 www.HornerShifrin.com
Discipline: Professional Engineering
Certificate of Authority: 000159
Expiration Date: December 31, 2012

NOTE: DRAWINGS ARE NOT TO SCALE, FOLLOW DIMENSIONS

OLD HIGHWAY 141
BRIDGE OVER
FENTON CREEK

AS-BUILT DATA SHEET

PRINTED Apr 01, 2010 – 11:13am FILENAME – G:\FD\Clients\Bridge\City of Fenton, III (Old 141)\CAD\B17-S02.dwg

SOIL BORING B-1

Sta. 37+42.3125' Offset 20.25' Rt.

Old Highway 141 Bridge
Fenton, Missouri

LOG OF BORING 1

PROJECT NO. 10395 **DATE:** 3/9/04 **LOCATION:** See Figure 1

COMPLETION DEPTH 36.0 FT.
BORING METHOD CFA-RC
ROCK CORE DIAMETER IN.
SURFACE ELEVATION 412.2 FT.

Description	Stratum Depth, Ft.	SPT Blows/6 in. (three 6-in. increments)	Percent Recovery
Brown Clay and Silty Clay with trace fine gravel (FILL)		2 2 3	
Gray Clayey Silt (FILL)	7.0	5 3 3	
Gray medium stiff Clayey Silt (ML)	9.2		
Brown mottled medium stiff Silty Clay (CL) with trace gravel	12.0	2 2 3	
Brown very stiff Clay (CH) with some gravel	17.5	6 12 17	
Weathered Limestone and Chert	20.5		
Light gray and tan thin- to medium-bedded fine-grained crystalline Limestone with intermittent chert and occasional weathered partings -4.5 in. clay seam at 24.3 feet	21.0	RQD 50	93
		45	100
		37	93
Boring terminated at 36.0 feet	36.0		

Column headings: DEPTH, FT. (5, 10, 15, 20, 25, 30, 35); STRATUM DEPTH, FT.; SPT: SPLIT SPOON, BLOWS/6 in. THREE 6-in. INCREMENTS; DISTURBED SAMPLE; PERCENT RECOVERY; ROCK CORE; Shear Strength from Indicated Test, tsf (1, 2, 3, 4, 5); ○ Dry Density, pcf (80, 90, 100, 110, 120); Plastic Limit Water Content, % Liquid Limit; ⊗ Standard Penetration Resistance, Blows/Ft. (10, 20, 30, 40, 50)

WATER LEVEL OBSERVATIONS		
DURING DRILLING	17.5	FT.
AT COMPLETION		FT.
AFTER HRS.		FT.

NOTES

Hard coring: 36 minutes to advance core barrel 4 inches at 28.5 feet.

Shear Test Types - Direct Shear: ● Torvane: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

SOIL BORING B-2

Sta. 36+07.875' Offset 14.72' Lt.

Old Highway 141 Bridge
Fenton, Missouri

LOG OF BORING 2

PROJECT NO. 10395 **DATE:** 3/9/04 **LOCATION:** See Figure 1

COMPLETION DEPTH 23.0 FT.
BORING METHOD CFA-RC
ROCK CORE DIAMETER IN.
SURFACE ELEVATION 414.8 FT.

Description	Stratum Depth, Ft.	SPT Blows/6 in. (three 6-in. increments)	Percent Recovery
5 in. Asphalt 4 in. Crushed Stone Brown mottled medium stiff Silty Clay (CL)		2 3 3	
Brown medium stiff Clay (CH) with trace gravel	4.5		
Weathered Limestone and Chert	7.5		
4 in. Gray Limestone 9 in. Brown Clay with trace sand 7 in. Gray Limestone 12 in. Gray Clay with trace sand	8.0		
Light gray and tan thin- to medium-bedded fine-grained crystalline Limestone with intermittent chert and occasional weathered partings	10.7	RQD 55	83
		56	93
Boring terminated at 23.0 feet	23.0		

Column headings: DEPTH, FT. (5, 10, 15, 20, 25, 30, 35); STRATUM DEPTH, FT.; SPT: SPLIT SPOON, BLOWS/6 in. THREE 6-in. INCREMENTS; DISTURBED SAMPLE; PERCENT RECOVERY; ROCK CORE; Shear Strength from Indicated Test, tsf (1, 2, 3, 4, 5); ○ Dry Density, pcf (80, 90, 100, 110, 120); Plastic Limit Water Content, % Liquid Limit; ⊗ Standard Penetration Resistance, Blows/Ft. (10, 20, 30, 40, 50)

WATER LEVEL OBSERVATIONS		
DURING DRILLING	Dry	FT.
AT COMPLETION		FT.
AFTER HRS.		FT.

NOTES

Shear Test Types - Direct Shear: ● Torvane: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

WOOLPERT INC
4454 IDEA CENTER BLVD.
DAYTON, OHIO 45430
937.461.5660

OLD HIGHWAY 141
ROADWAY IMPROVEMENT PLANS
FENTON, MISSOURI

Prepared For:
CITY OF FENTON
525 NEW SMIZER MILL ROAD
FENTON, MISSOURI 63026
(636) 349-8110

REVISIONS: NO. | DATE

ENGINEERS AUTHENTICATION
The responsibility for professional engineering liability on this project is hereby limited to the set of plans authenticated by the seal, signature, and date hereunder attached. Responsibility is disclaimed for all other engineering plans involved in this project and specifically excludes revisions after this date unless reauthenticated.
WOOLPERT, LLP
STATE OF MISSOURI — MICHAEL A. AVELLANO — NUMBER E-28747 — PROFESSIONAL ENGINEER
4-12-10

DRAWN RACH	DATE APRIL-2010
CHECKED B.W.B.	DATE APRIL-2010
PROJECT # 061923	
TASK # 01	FIELD BOOK

OLD HIGHWAY 141
ROADWAY IMPROVEMENT PLANS
SOIL BORING LOGS
SHEET B-17

HORNER & SHIFRIN, INC.
www.hornershifrin.com

5200 Oakland Ave.
St. Louis MO 63110-1490
(314) 531-4321 • Fax: (314) 531-6966

640 Pierce Blvd., Suite 200
O'Fallon, IL 62269-2579
(618) 622-3040 • Fax: (618) 622-3070

April 6, 2011

Mr. Sean Kilian
L. Krupp Construction, Inc.
415 Old State Road
Ellisville, MO 63021

Re: Value Engineering of Fenton Creek Bridge Replacement
Project No. BRM-4989(606), Bridge No. 1420013
Response to Review Comments and Revised Final Plans

We have reviewed the comments from CDG and have provided our responses below. Our comments are in red. Revised plans based on these comments are attached.

General Comments:

1. Drawings and calculations were reviewed for general content and agreement only. A detailed check of the drawings and calculations was not undertaken. Noted.

2. The SI&A Form and Load Rating with supporting calculations were received on April 1, 2011 and are acceptable. Noted.

3. An updated cost estimate was received on April 1, 2011. The estimate will be reviewed and comments returned on or around April 6, 2011. Noted.

4. Need cost comparison of design with soldier pile wall (original Krupp VE concept) versus full-height abutment on spread footing (current Krupp VE proposal) for End Bent No. 1. This constitutes a major design change with minimal justification provided to support the change (reference March 21, 2011 letter from Horner & Shifrin to L. Krupp Construction, item 3).

   Final design for Abutment 1 showed that cantilevered soldier pile walls could not be realistically achieved due to anticipated maximum wall height. The section of the wall under the bridge could be designed as a propped cantilever with the superstructure bracing the top of the wall, but would require piles spaced at around 4'. Because the wing walls could not be reasonably designed as a soldier pile wall, it was decided to found the entire abutment on spread footings.

5. Bridge will be overtopped per the Hydraulic analysis as indicated in the Hydrologic Data Table on Sheet B-2 of the Woolpert Plans. Were buoyancy (uplift) and/or stream flow pressure considered in design? Vent holes will be added per Comment #39.

6. Verify that providing spread footings (End Bent No. 1) keyed 6" into rock with riprap placed as shown in Roadway Plans is adequate to anchor the footings and protect against scour. Are mechanical rock anchors needed? The footings are keyed 6" into sound rock. There is approximately 1'-3' of weathered rock above sound rock per the borings and rirap above that. I have attached excerpts from

a report by the University of Kentucky on the susceptibility of rock scour based on RQD values. We do not believe scour to be an issue for this project based on this research.

7. VE Submittal indicates that Woolpert Sheet Nos. B-2, B-12 (Bridge Railings & Details), B-13 (Bridge Rail Transition Details) B-15 (Bridge Approach Slab) & B-17 (Soil Boring Logs) will be re-used. The Hydrologic Data Table shown on Sheet No. B-2 should be incorporated into Sheet No. 2 as indicated in comment No. 8 below; remaining portion of Woolpert Sheet No. B-2 is not needed. It is OK to retain Sheet B-17 for information only. Other Sheets should not be re-used under Woolpert seal. The information in these drawings should be incorporated into drawings sealed by the Contractor's Engineer. Plans revised accordingly.

Drawing Review Comments:

Sheet No. 1 – General Plan & Elevation (Drawing date: 3/21/11)

8. "Notice and Disclaimer Regarding Boring Log Data" should refer to the *City of Fenton*, not *department* or *district*. Plans revised accordingly.

Sheet No. 2 – Estimated Quantities, Foundation Data & General Notes (Drawing date: 3/21/11)

9. Add Hydrologic Data table shown on Woolpert Drawing B-2 and identify this table as "taken from Drawing B-2 of the original design plans". Plans revised accordingly.

10. All excavation above the Excavation Datum (defined as Elev. 399.00 on Sheet No. 1) is Class 1 Excavation. Where is Class 1 Excavation in Rock? Is this a placeholder quantity? Quantity calculations indicate 10 CY pulled out of Class 1 with no further explanation.

    The only rock excavation is for the 6" key; and the bottom of footing elevation should be adjusted per the note on Sh. 3. The plans assume this is Class 2 Excavation in Rock. Since it is possible that sound rock could be encountered above the Excavation Datum Elevation, a placeholder quantity for Class 1 Excavation in Rock is used to facilitate construction should Class 1 Rock be encountered.

11. All excavation below the Excavation Datum is Class 2 Excavation. The quantity for Class 2 Excavation in Rock appears to cover only the removal of rock for the 6" key under the footprint of abutment and wingwall footings at End Bent No. 1. Is this the only rock excavation anticipated as Class 2? The only rock excavation is for the 6" key. Weathered rock should be measured as Class 1 or Class 2 Excavation.

12. Add note below ESTIMATED QUANTITIES table: *Cost of channel shear connectors C4x5.4 (ASTM A709 Grade 36) in place will be considered completely covered by the contract unit price for Structural Steel Piles (12 in.).* This is required per MoDOT Engineering Policy Guide (EPG), Section 751.50, Standard Note B3.2 for Seismic Performance Category B. Plans revised accordingly.

13. Add note below ESTIMATED QUANTITIES FOR SLAB ON PRESTRESSED BOX BEAM table: *The Estimated Quantities for Slab on Prestressed Concrete Box Beam are based on skewed precast prestressed end panels* (Ref. EPG, Section 750.50, Standard Note B3.40). Plans revised accordingly.

14. Add note under GENERAL NOTES, Neoprene Pads: *Bearings shall be (H&S specified durometer) durometer neoprene pads* (Ref. EPG, Section 751.50, Standard Note A3.2). Plans revised accordingly.

15. Add note under GENERAL NOTES, Miscellaneous: *"Sec" refers to the sections in the standard and supplemental specifications unless specified otherwise* (Ref. EPG, Section 751.50, Standard Note A5.5). Plans revised accordingly.

16. Remove note under GENERAL NOTES for Protective Coating. This is only required with structural steel. Plans revised accordingly.

17. Adjust reinforcing steel quantities as required for changes indicated on other sheets. Plans revised accordingly.

Sheet No. 3 - Details of End Bent No. 1 (EB No. 1, Sheet 1 of 5) (Drawing date 3/28/11)

18. Revise callout in PLAN OF BEAM SHOWING DIMENSIONS to remove reference to *Centerline Pile*. Plans revised accordingly.

Sheet No. 4 - Details of End Bent No. 1 (EB No. 1, Sheet 2 of 5) (Drawing date 3/28/11)

19. No comments.

Sheet No. 5 - Details of End Bent No. 1 (EB No. 1, Sheet 3 of 5) (Drawing date 3/21/11)

20. Callout in PLAN OF BEAM SHOWING REINFORCEMENT on right side indicates *15-#4-F106 bars (See Section C-C for placement)*. Section C-C on Sheet No. 6 indicates *10-#4-F106 @ 12"*. Which is correct? Correct BILL OF REINFORCING STEEL on Sheet No. 16 if required. 15 bars is correct – there are 10 top bars and 5 bottom bars as shown in the section.

21. Should V108 bars called out on left side of PLAN OF BEAM SHOWING REINFORCEMENT be #4 bars instead of #6 bars as shown for other front face reinforcement (#4-V105 & #4-V106)? If so, revise callout and correct BILL OF REINFORCING STEEL on Sheet No. 16. V108 bars should be #4, Sh. 2, 5, 7 and 16 have been revised accordingly.

22. Revise callout to read *End of Box Beam* instead of *End of Girder* in ANCHOR ROD DETAIL. Plans revised accordingly.

Sheet No. 6 - Details of End Bent No. 1 (EB No. 1, Sheet 4 of 5) (Drawing date 3/21/11)

23. See comments for #4-F106 & F107 bars noted under Sheet No. 5. See response to note. 20.

24. See comments for #4-F111 & F112 bars noted under Sheet No. 7. See response to note. 28.

25. Revise callouts on Sections A-A & C-C to refer to *Riprap* instead of *Finished Ground Line* or remove callouts. Callouts removed.

26. Add additional dimensions for footings to clarify intent in Sections A-A & C-C. I assume you are referring to the dimensions of the bottom of stem and heel. These dimensions were intentionally not shown because they vary based on wall height due to battered stream face of stem. The wall height varies due to varying sound rock elevations. See note under Developed Section on Sh. 3.

27. Add elevation callout at bottom of footings for Section A-A & C-C. The elevations were intentionally left off because bottom of footing is tied to sound rock elevations which vary. For quantity purposes, a sound rock elevation of 397.00 was assumed as shown on Sh. 3. The elevations were not shown in sections to help reinforce that rock elevations vary.

Sheet No. 7 - Details of End Bent No. 1 (EB No. 1, Sheet 5 of 5) (Drawing date 3/21/11)

28. FOOTING PLAN OF NORTH WING SHOWING REINFORCEMENT calls out *15-#4-F111 & 15-#4-F112 (See Section C-C for placement)*. These callouts should refer to *Section D-D* (which is noted as being similar to Section C-C) on Sheet No. 6. Section C-C on Sheet No. 6 indicates *10-#4-F106 or F107 @ 12"*. This would seem to indicate that there would also be 10-#4 F111 or F112 bars. Is this correct? Correct BILL OF REINFORCING STEEL on Sheet No. 16 if required. Callout revised to Section D-D; 15 bars is correct – see response to note 20.

29. Clarify size of block-out for 66" Pipe (no size is explicitly provided). Is intent to have min. of 3" from pipe for approx. 72" square opening? Your interpretation is correct – no clarification warranted. Verify that additional reinforcement provided around block-out is adequate? . The additional reinforcement is adequate and exceeds that required by MoDOT Standard Plan 703.60.

Sheet No. 8 - Vertical Drain Details (Drawing date 3/21/11)

30. No comments

Sheet No. 9 - Details of End Bent No. 2 (EB No. 2, Sheet 1 of 3) (Drawing date 3/21/11)

31. Revise callout to read *Box Beam Spacing* instead of *Girder Spacing* in PLAN OF BEAM SHOWING DIMENSIONS. Plans revised accordingly.

32. Revise callout to read *End of Box Beam* instead of *End of Girder* in ANCHOR ROD DETAIL. Plans revised accordingly.

33. Remove or revise note below PLAN OF BEAM SHOWING REINFORCEMENT stating "*Cut or bend U1 and V1 bars to fit*". These bars are not in End Bent No. 2. Plans revised accordingly.

Sheet No. 10 - Details of End Bent No. 2 (EB No. 2, Sheet 2 of 3) (Drawing date 3/28/11)

34. Revise callout to read *4-#4-U27* instead of *4-#4-U7* in SECTION NEAR END BENT. Plans revised accordingly.

35. Revise callout to read *1-#6-H23* instead of *1-#6-H3* in PART PLAN. Plans revised accordingly.

36. Add MoDOT Standard detail showing channel shear connectors for piles (see comment No. 11 above). Plans revised accordingly.

Sheet No. 11 - Details of End Bent No. 2 (EB No. 2, Sheet 3 of 3) (Drawing date 3/28/11)

37. Revise Elevation callout at bottom of beam to read *Elev. 409.10* in SECTION B-B. Plans revised accordingly.

38. Revise bar callout to read *#4-U27* instead of *#4-U7* in SECTION C-C. Plans revised accordingly.

Sheet No. 12 - Details of Precast Prestressed 48" Box Beams (Sheet 1 of 2) (Drawing date 3/21/11)

39. Is there some way to provide a 3" diameter vent hole at or near the upgrade 1/3 point of the beams similar to that shown in EPG Section 751.22.3.16 for P/S I-girders? We do not want to fill the voids in the beams with water but could the vent hole be sleeved with PVC or other to permit trapped air between the box beams to escape as water rises above the beams and remain water tight? Vent holes were not needed with adjacent box beams but the VE redesign provides spread boxes. This bridge will be overtopped as indicated in the Hydrologic Data Table on Sheet B-2 of the original Woolpert plans. A 3" vent hole was added thru the solid section of the box near the upgrade end and the void length was modified to accommodate this.

Sheet No. 13 - Details of Precast Prestressed 48" Box Beams (Sheet 2 of 2) (Drawing date 3/21/11)

40. No comments

Sheet No. 14 – Details of Precast Prestressed Panels (Drawing date 3/21/11)

41. No comments

Sheet No. 15 – Details of Slab Reinforcement (Drawing date 3/24/11)

42. Revise callout in HALF SECTION NEAR CENTERLINE SPAN to state *21x48 PPC Box Beam (Typ.)* instead of *Deck Beam.* Plans revised accordingly.

Sheet No. 16 - Bill of Reinforcing Steel (Drawing date 3/21/11)

43. Not reviewed

Sheet No. 17

44. Not included in Plan Set. Please provide for review or renumber accordingly. Plans revised accordingly.

Sheet No. 18 – As-Built Data Sheet (Drawing date 3/21/11)

45. No comments

Sincerely,

Michael A. Banashek

Michael A. Banashek, P.E.
Structural Department Manager

L. Krupp Construction, Inc.

April 7, 2011

Dan Howard
City of Fenton
625 New Smizer Mill Road
Fenton, MO 63026

RE: Fenton Creek Bridge Replacement
Old Highway 141; Bridge #1420013
Project No. BRM-4989 (606)

Subject: **Value Engineering Proposal Pricing Answers**

Dear Mr. Howard:

As per the request of Glenn Smith, the following is a list of answers to questions submitted via e-mail on 4/5/2011:

1. **CDG COMMENT: In the Final 3/29/11 Krupp VE Estimate, Class 1 Excavation in Rock and Class 2 Excavation in Rock have the same unit price of $150/CY. (Class 1 and 2 definitions are based on an elevation datum but it doesn't matter on this project since Class 1 and 2 unit prices are equal.) Estimated quantities for both Class 1 (10 CY) and Class 2 (19 CY) rock excavations are small. The Class 2 Rock Excavation quantity is the footing area (998.4 SF) x 6" = 18.49 CY (rounded to 19 CY). There is considerable risk with spread footing on rock in that these quantities could grow in the field substantially increasing the cost during construction. These Class 1 and 2 Rock Excavation pay items are new in the 3/28/11 estimate using spread footing on rock versus original the 3/14/11 VE conceptual design of piles with a CIP wall.**
   KRUPP ANSWER: I'm not sure exactly how to "answer" this question/statement. However, I believe this would be a good opportunity to restate the inherent risk associated with proceeding with construction as currently planned. Should rock be where everyone assumes it is, we would be involved in a long and costly redesign, possibly to arrive at this exact design. The average unit prices for MoDOT from last year for these item were: Class 1 Excavation in Rock = $225.50 for an average quantity of 57.68 CY and Class 2 Excavation in Rock = $249.92 for an average quantity of 40.71 CY. As you can see, average quantities are more that double what we have, but our prices are 1/3 lower.
2. **The Class B Concrete Substructure unit price has increased twice from the original Krupp bid unit price as follows:**
   $385/CY original Krupp bid (based on 371 CY)

Asphalt Paving and Excavation

415 Old State Road • Ellisville, MO 63021
(636) 391-8844 • FAX (636) 391-7544

$516/CY 2/14/11 Krupp Conceptual VE Estimate (based on 175 CY)
$535/CY 3/29/11 Krupp Final VE Estimate (based on 252.1 CY)
It seems like the unit price should not have increased in the 3/29/11 VE FInal Estimate with a larger quantity compared to the 2/14/11 Conceptual Estimate. Please explain.

Krupp Answer: In the original bid, the footing quantity (which is the high production, low cost item) was approximately 190 CY, or 46% of the total Class B bid. In the redesign, that footing quantity has gone down to approximately 70 CY, or 28% of the total Class B item. Due to the large reduction in this item, the average unit cost increased significantly, thus increasing the unit price. For comparative reasons, I'm not going to include the conceptual VE estimate as that was based on vague assumptions of what the final product may be and not an actual set of plans. The average unit price for Class B Substructure for MoDOT last year was $552.85 for an average quantity of 175.55 CY. Our price is lower, but we also have more quantity.

3. **Unit price for Slab on Concrete I-Girder was $111/SY for a total of $33,522 in the 2/14/11 Krupp Conceptual VE Estimate. Unit price for Slab on Prestressed Concrete Box Beam is now $235/SY for a total of $72,380 in the 3/29/11 Krupp Final VE Estimate. Both of these unit prices were based on a spread box beam arrangement with 7 box beams. Why did this unit price increase, (more than doubled)?**

   Krupp Answer: As mentioned above, this is comparing a guess to an actual estimate. However, there are a couple of things to note. In the conceptual VE, all rebar and placement was under the rebar items. With the final submittal for this item, approximately 12,900 pounds of rebar plus placement were moved from the rebar items and included in this item. Additionally and more importantly, I did not account for forming, pouring, stripping, nor materials for diaphrams in the conceptual VE proposal. The average unit price for Slab on Concrete I-Girder for MoDOT last year was $246.05 for an average quantity of 1,125.65 SY. Again, our price is lower even with a quantity that is only 27% the average quantity.

4. **The Prestressed Concrete Box Beams (55' Span) were bid at $12,500 Each, for 14 adjacent box beams ($150,000 total) in the original Krupp bid. In the 2/14/11 Krupp Conceptual VE Estimate the Prestressed Concrete Box Beam (21") were estimated at $14,000 for a total of $98,000 for the 7 spread box beams. In the 3/29/11 Krupp Final VE Estimate the Prestressed Concrete Box Beam (21") were estimated at $18,150 for a total of $127,050 for the 7 spread box beams. Why did this unit price increase between the two VE estimates? It seems like the price to now provide one-half the number of box beams compared to the original Krupp bid should be lower. ($127,050 vs. $150,000)**

   Krupp Answer: There are numerous reasons for the increase in this unit price for this item. First, please note that we are not proposing to provide one-half the number of beams as compared to the original, rather 7 out of 12. Second, the new beams are heavier, have more strands, and are more costly to build. I was unable to use my original supplier for these beams, which is what the Conceptual

VE was based upon. In addition to the new beams being more expensive, I also had to add precast panels and the placement of those panels to the cost, something that was not in the original bid and something that I underestimated the cost of for the Conceptual VE. Unfortunately, MoDOT does not have an average for this size box beam.

5. **The overall projected savings in the 2/14/11 Krupp Conceptual VE Estimate was $63,304.50. The overall projected savings in the 3/29/11 Krupp Final VE Estimate is $63,148.25. These two numbers are surprisingly close. There is now more risk to the City and the projected savings with the current Final VE proposal compared with the Conceptual VE proposal. That risk is due to the uncertainty in rock elevations and possible changes to rock excavation, additional Class B concrete, rebar, etc. that may be required to field adjust the End Bent 1 spread footing to meet actual conditions.**
   Krupp Answer: I was just as surprised when I arrived at the final cost savings. However, due to the change in engineering fees this week, that savings has changed. In regards to the risk, I truly believe that this VE eliminates a huge risk for the city when considering the potential changes and delays based upon rock elevations encountered in the field.

Lastly, the new DBE info was submitted along with the revised Value Engineering form.

If you have any additional questions, please contact me at (314) 280-0353.

Sincerely,

Sean Kilian
Project Manager

HORNER & SHIFRIN, INC.
www.hornershifrin.com

5200 Oakland Ave.
St. Louis MO 63110-1490
(314) 531-4321 • Fax: (314) 531-6966

640 Pierce Blvd., Suite 200
O'Fallon, IL 62269-2579
(618) 622-3040 • Fax: (618) 622-3070

April 12, 2011

Mr. Sean Kilian
L. Krupp Construction, Inc.
415 Old State Road
Ellisville, MO 63021

Re: Value Engineering of Fenton Creek Bridge Replacement
Project No. BRM-4989(606), Bridge No. 1420013
Response to Review Comments and Revised Final Plans

We have reviewed the comments from CDG in their letter dated April 11, 2011 and have provided our responses below. Our comments are in red. Revised plans based on these comments are attached.

General Comments:

9. Linework on added drawings is light and difficult to read in PDF files we received. Please modify for appearance consistent with other drawings and provide new PDF files. Sh. 18 thru 20 were re-plotted using the correct pen table.

Added - Sheet No. 16 – Details of Guardrail (Sheet 1 of 2) (Drawing date 4/7/11)

25. Verify that location of 1" diameter x 7 ¾" AASHTO M164 Anchor Bolts shown 6" below top of beam in SECTION AT RAIL POST will work with P/S strands shown 5 ¼" below top of beam in SECTION B-B on Sheet No. 12. It appears that the anchor bolts and P/S strands may conflict. There is approximately 1.5" clearance to the strands which is adequate.

26. Revise note at bottom left that refers to "*5" minimum to 7 1/8" maximum CWS thickness*". The CWS (concrete slab) thickness provided is 8½". Note was revised.

Added - Sheet No. 17 – Details of Guardrail (Sheet 2 of 2) (Drawing date 4/7/11)

27. Callout for HSS on PL 1/2" x 7" x6" detail is unreadable. Please revise. Note was revised.

Added - Sheet No. 20 – Details of Guardrail Transition (Sheet 3 of 3) (Drawing date 4/7/11)

30. Remove or "X out" details for BASE PLATE, SPACER PLATE and FLUSH MOUNTED POST ANCHOR DETAIL or indicate where these apply. Details were X'd-out.

Added - Sheet No. 21 – Details of Approach Slab (Drawing date 4/7/11)

31. PART PLAN SHOWING REINFORCEMENT, PART PLAN and SECTION B-B show and/or callout Type A curb at the edges of the approach slabs. Remove all references and depictions of Type A curb. No curb will be provided. This sheet was modified and completely replaced to remove the Type A curb.

32. Remove section cut for Section E-E shown on PART PLAN SHOWING REINFORCEMENT. Section was removed.

Sincerely,

Michael A. Banashek

Michael A. Banashek, P.E.
Structural Department Manager

SOIL BORING B-1
Sta. 37+42.3125' Offset 20.25' Rt.

Old Highway 141 Bridge
Fenton, Missouri

LOG OF BORING 1

PROJECT NO. 10395 **DATE:** 3/9/04 **LOCATION:** See Figure 1

COMPLETION DEPTH 36.0 FT.
BORING METHOD CFA-RC
ROCK CORE DIAMETER IN.
SURFACE ELEVATION 412.2 FT.

Shear Strength from Indicated Test, tsf: 1 2 3 4 5
○ Dry Density, pcf: 80 90 100 110 120
Plastic Limit — Water Content, % — Liquid Limit
⊗ Standard Penetration Resistance, Blows/Ft.: 10 20 30 40 50

DEPTH, FT.	Description	STRATUM DEPTH, FT.	SPT: BLOWS/6 in. THREE 6-in. INCREMENTS	PERCENT RECOVERY
	Brown Clay and Silty Clay with trace fine gravel (FILL)			
5			2 2 3	
	Gray Clayey Silt (FILL)	7.0		
	Gray medium stiff Clayey Silt (ML)	9.2	5 3 3	
10				
	Brown mottled medium stiff Silty Clay (CL) with trace gravel	12.0	2 2 3	
15				
	Brown very stiff Clay (CH) with some gravel	17.5	6 12 17	
20				
	Weathered Limestone and Chert	20.5		
	Light gray and tan thin- to medium-bedded fine-grained crystalline Limestone with intermittent chert and occasional weathered partings	21.0	RQD 50	93
25	-4.5 in. clay seam at 24.3 feet			
30			45	100
35			37	93
	Boring terminated at 36.0 feet	36.0		

WATER LEVEL OBSERVATIONS		NOTES
DURING DRILLING	17.5 FT.	Hard coring: 36 minutes to advance core barrel 4 inches at 28.5 feet.
AT COMPLETION	FT.	
AFTER HRS.	FT.	

Shear Test Types - Direct Shear: ● Torvane: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

SOIL BORING B-2
Sta. 36+07.875' Offset 14.72' Lt.

Old Highway 141 Bridge
Fenton, Missouri

LOG OF BORING 2

PROJECT NO. 10395 **DATE:** 3/9/04 **LOCATION:** See Figure 1

COMPLETION DEPTH 23.0 FT.
BORING METHOD CFA-RC
ROCK CORE DIAMETER IN.
SURFACE ELEVATION 414.8 FT.

Shear Strength from Indicated Test, tsf: 1 2 3 4 5
○ Dry Density, pcf: 80 90 100 110 120
Plastic Limit — Water Content, % — Liquid Limit
⊗ Standard Penetration Resistance, Blows/Ft.: 10 20 30 40 50

DEPTH, FT.	Description	STRATUM DEPTH, FT.	SPT: BLOWS/6 in. THREE 6-in. INCREMENTS	PERCENT RECOVERY
	5 in. Asphalt 4 in. Crushed Stone Brown mottled medium stiff Silty Clay (CL)			
5		4.5	2 3 3	
	Brown medium stiff Clay (CH) with trace gravel			
	Weathered Limestone and Chert	7.5		
	4 in. Gray Limestone	8.0		
10	9 in. Brown Clay with trace sand 7 in. Gray Limestone 12 in. Gray Clay with trace sand	10.7		
	Light gray and tan thin- to medium-bedded fine-grained crystalline Limestone with intermittent chert and occasional weathered partings		RQD 55	83
15				
			56	93
20				
	Boring terminated at 23.0 feet	23.0		
25				
30				
35				

WATER LEVEL OBSERVATIONS		NOTES
DURING DRILLING	Dry FT.	
AT COMPLETION	FT.	
AFTER HRS.	FT.	

Shear Test Types - Direct Shear: ● Torvane: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

SOIL BORING LOGS

This drawing is not scale. Follow dimensions

WOOLPERT INC
4454 IDEA CENTER BLVD.
DAYTON, OHIO 45430
937.461.5660

OLD HIGHWAY 141
ROADWAY IMPROVEMENT PLANS
FENTON, MISSOURI

Prepared For:
CITY OF FENTON
525 NEW SMIZER MILL ROAD
FENTON, MISSOURI 63026
(636) 349-8110

REVISIONS: NO. | DATE

ENGINEERS AUTHENTICATION
The responsibility for professional engineering liability on this project is hereby limited to the set of plans authenticated by the seal, signature, and date hereunder attached. Responsibility is disclaimed for all other engineering plans involved in this project and specifically excludes revisions after this date unless reauthenticated.
WOOLPERT, LLP
STATE OF MISSOURI — MICHAEL A. AVELLANO — NUMBER E-28747 — PROFESSIONAL ENGINEER
4-12-10

DRAWN RACH	DATE APRIL-2010
CHECKED B.W.B.	DATE APRIL-2010
PROJECT # 061923	
TASK # 01	FIELD BOOK

OLD HIGHWAY 141
ROADWAY IMPROVEMENT PLANS
SOIL BORING LOGS
SHEET B-17

Re: BRM 4989(606) Local Roads Project Contractor Initiated FINAL VE

David M Koenig to: David J Simmons 04/14/2011 10:59 AM
Cc: Jeffrey J Aholt, Gregory G Sunde, James E Smith

History: This message has been replied to and forwarded.

We reviewed the submitted information and only have one question. Did the specifications for the project get updated as part of this VE proposal? If so, then we will need a copy of the updated specifications submitted for our records. We are okay with the project going ahead and moving forward. If you need anything else, please let me know. Thanks.

David Koenig
Structural Services Engineer
MoDOT-Bridge Division
573-526-0556

David J Simmons | Mr. Koenig, Please review the Final VECP rega... | 04/13/2011 01:22:21 PM

From: David J Simmons/D6/MODOT
To: David M Koenig/SC/MODOT@MODOT
Date: 04/13/2011 01:22 PM
Subject: BRM 4989(606) Local Roads Project Contractor Initiated FINAL VE

Mr. Koenig,

Please review the Final VECP regarding this project. I have attached all of the information I received. There was a change in the footing type from the original Conceptual Proposal.

Please let me know if you have any questions.
[attachment "BRM-4989(606)_FinalVE.pdf" deleted by David M Koenig/SC/MODOT]
Thanks,
Dave
David J. Simmons P.E.
Senior Construction Inspector
Local Roads Division
314-220-6621

David M Koenig | Bridge Division is okay with the conceptual prop... | 02/16/2011 04:11:31 PM

From: David M Koenig/SC/MODOT
To: Richard T Miller/SC/MODOT@MODOT
Cc: Andrew T Mueller/D8/MODOT@modot, David J Simmons/D6/MODOT@modot, david.morris@dot.gov, James E Smith/SC/MODOT@modot, Jeffrey J Aholt/SC/MODOT@MODOT
Date: 02/16/2011 04:11 PM
Subject: Re: Fw: BRM 4989(606) Local Roads Project Contractor Initiated VE Proposal

Bridge Division is okay with the conceptual proposal as specified in the attached documents. The contractor will need to address the items listed below for approval of the final proposal by Bridge Division. The contractor will also have to address any concerns of the engineer of record for the project as well as the city of Fenton. The updated deliverables for Items 1, 2, 3, and 4 will need to be submitted to Bridge Division. They can be submitted in an electronic PDF format provided that all of the documents are signed and sealed in accordance with State law.

1. A new Structure Inventory & Appraisal Sheets (SI&A) sheet will have to be submitted for the changed structure. The majority of the items will remain the same, but the engineer for the contractor will have to review the SI&A for the structure based on the original plans and update it accordingly.

Re: Fw: BRM 4989(606) Local Roads Project Contractor Initiated FINAL VE
Glenn Smith to: David.J.Simmons 04/15/2011 11:16 AM
Cc: "Tim Nugent", "Dan Howard", David.Koenig

David: No project specification revisions were made or needed as part of this VE. THANKS, GLENN

PS Dave Koenig: I don't know if you remember, but I was one of the guys you met at the recent TEAM conference and we exchanged cards at the Concrete Pipe social hour.

Glenn A. Smith, P.E.
CDG Engineers
1 Campbell Plaza
St. Louis, MO 63139
gsmith@cdgengineers.com
Office Direct: 314-446-3535
Mobile: 314-620-4991
>>> <David.J.Simmons@modot.mo.gov> 4/14/2011 2:35 PM >>>
Would you please help me out with this request/question?

Thanks,
Dave
David J. Simmons P.E.
Senior Construction Inspector
Local Roads Division
314-220-6621

----- Forwarded by David J Simmons/D6/MODOT on 04/14/2011 02:34 PM -----

From: David M Koenig/SC/MODOT
To: David J Simmons/D6/MODOT@MODOT
Cc: Jeffrey J Aholt/SC/MODOT@MODOT, Gregory G Sunde/SC/MODOT@MODOT, James E Smith/SC/MODOT@MODOT
Date: 04/14/2011 10:59 AM
Subject: Re: BRM 4989(606) Local Roads Project Contractor Initiated FINAL VE

We reviewed the submitted information and only have one question. Did the specifications for the project get updated as part of this VE proposal? If so, then we will need a copy of the updated specifications submitted for our records. We are okay with the project going ahead and moving forward. If you need anything else, please let me know. Thanks.

David Koenig
Structural Services Engineer

MoDOT-Bridge Division
573-526-0556

From: David J Simmons/D6/MODOT
To: David M Koenig/SC/MODOT@MODOT
Date: 04/13/2011 01:22 PM
Subject: BRM 4989(606) Local Roads Project Contractor Initiated FINAL VE

Mr. Koenig,

Please review the Final VECP regarding this project. I have attached all of the information I received. There was a change in the footing type from the original Conceptual Proposal.

Please let me know if you have any questions.
[attachment "BRM-4989(606)_FinalVE.pdf" deleted by David M Koenig/SC/MODOT]
Thanks,
Dave

David J. Simmons P.E.
Senior Construction Inspector
Local Roads Division
314-220-6621

From: David M Koenig/SC/MODOT
To: Richard T Miller/SC/MODOT@MODOT
Cc: Andrew T Mueller/D8/MODOT@modot, David J Simmons/D6/MODOT@modot, david.morris@dot.gov, James E Smith/SC/MODOT@modot, Jeffrey J Aholt/SC/MODOT@MODOT
Date: 02/16/2011 04:11 PM
Subject: Re: Fw: BRM 4989(606) Local Roads Project Contractor Initiated VE Proposal

Bridge Division is okay with the conceptual proposal as specified in the attached documents. The contractor will need to address the items listed below for approval of the final proposal by Bridge Division. The contractor will also have to address any concerns of the engineer of record for the project as well as the city of Fenton. The updated deliverables for Items 1, 2, 3, and 4 will need to be submitted to Bridge Division. They can be submitted in an electronic PDF format provided that all of the documents are signed and sealed in accordance with State law.

1. A new Structure Inventory & Appraisal Sheets (SI&A) sheet will have to be submitted for the changed structure. The majority of the items will remain the same, but the engineer for the contractor will have to review the SI&A for the structure based on the original plans and update it accordingly.

2. Because of the change in the structure, a new load rating will be required.