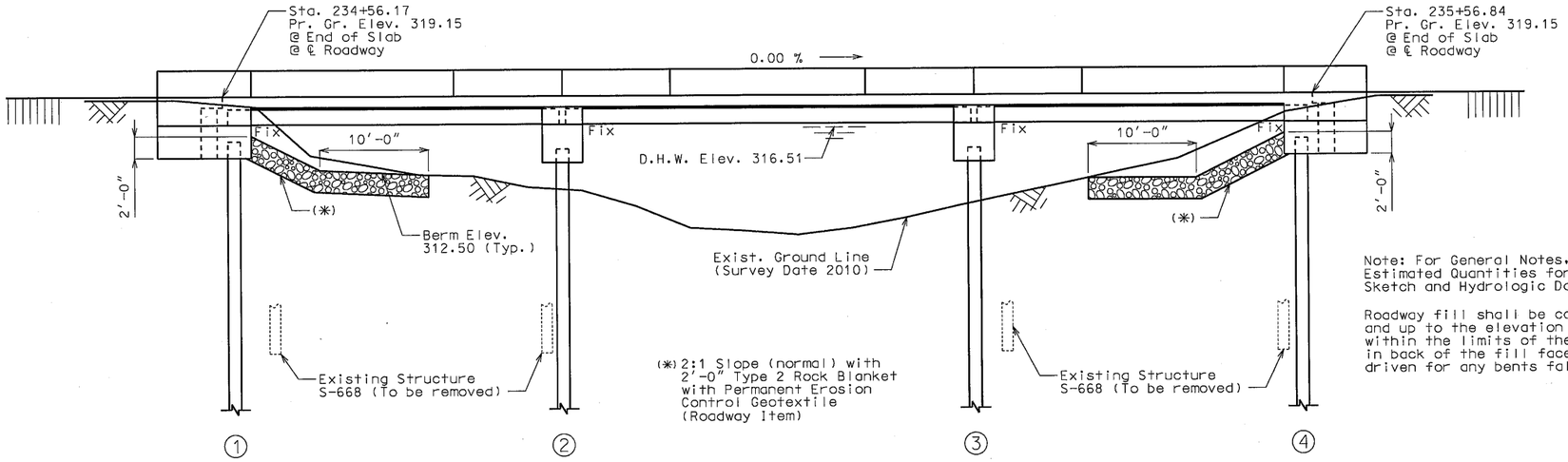
SEC/SUR 36 TWP 28N RGE 13E

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

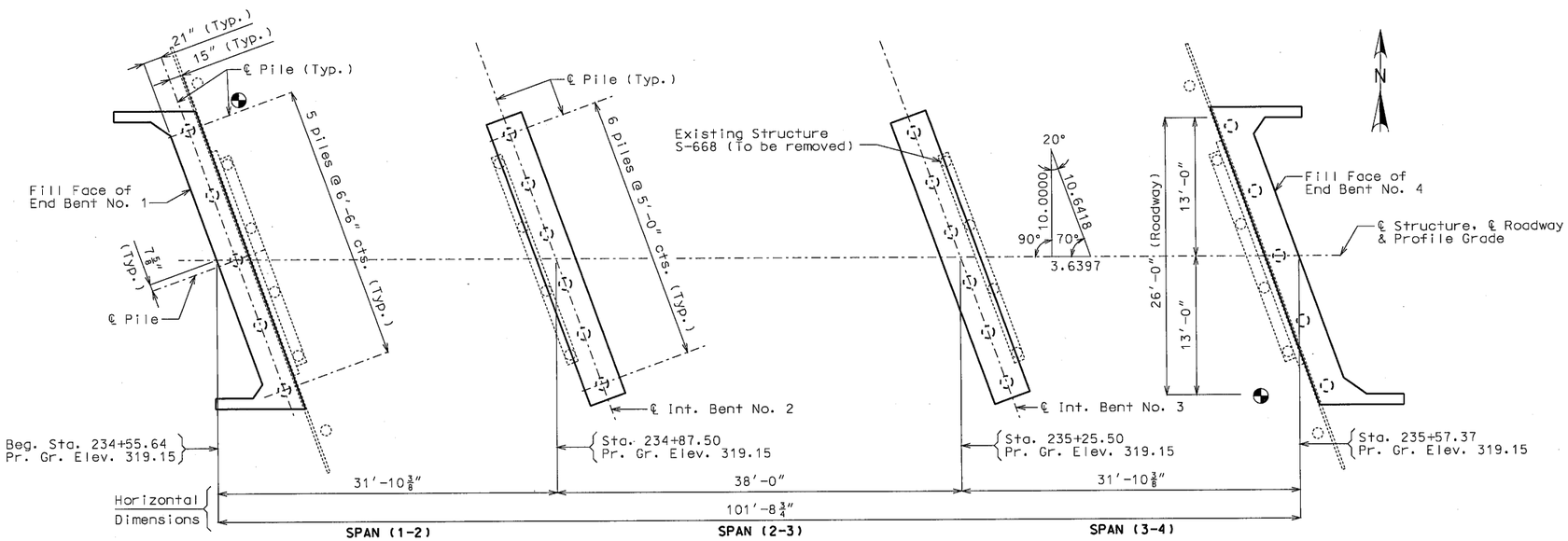
(30'-38'-30') PRESTRESSED CONCRETE BOX GIRDER SPANS



GENERAL ELEVATION

Note: For General Notes, Foundation Data, Estimated Quantities, Estimated Quantities for Slab on Concrete Box Girder, Location Sketch and Hydrologic Data, see Sheet No. 2.

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.



PLAN

"⊕" Indicates location of borings.

Notice and Disclaimer Regarding Boring Log Data

The locations of all subsurface borings for this structure are shown on the bridge plan sheet(s) for this structure. 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, are shown on Sheet(s) No. 22-34 or will be 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 given to the subsurface data available from the district or elsewhere.

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

B.M. #2 - ELEV. 318.92 □ IN CONCRETE, NW COR BRIDGE STA 234+55.12 OFF 10.33' LT.

BRIDGE OVER DRAINAGE DITCH NO. 2

STATE ROAD FROM STODDARD CO. TO RTE. 61

ABOUT 3 MILES WEST OF RTE. 61

STA. 234+55.64

STD. 617.10

STD. 706.35

Designed Oct. 2011
Detailed Oct. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026810
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE	STATE
91	MO
DISTRICT	SHEET NO.
BR	1
COUNTY	
SCOTT	
JOB NO.	
J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	
A7956	

DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Estimated Quantities

Item		Substr.	Superstr.	Total
Class 1 Excavation	cu. yard	85		85
Removal of Bridges (S-668)	lump sum			1
Cast-In-Place Concrete Piles (14 in.)	linear foot	1,220		1,220
Dynamic Pile Testing	each	4		4
Static Load Test	lump sum			1
Class B Concrete (Substructure)	cu. yard	39.4		39.4
* Barrier Curb	linear foot		224	224
Slab on Concrete Box Girder	sq. yard		313	313
17 in. Prestressed Concrete Box Girder Beam	linear foot		293	293
Reinforcing Steel (Bridges)	pound	3,280		3,280
Slab Drain	each		14	14
Vertical Drain at End Bents	each			2
Plain Neoprene Bearing Pad	each		6	6
Laminated Neoprene Bearing Pad	each		12	12

* Barrier curb shall be cast-in-place option or slip-form option.

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

All reinforcement in the end bents is included in the Estimated Quantities for Slab on Concrete Box Girder.

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

All concrete above the intermediate beam cap is included in the Estimated Quantities for Slab on Concrete Box Girder.

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

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

Estimated Quantities for Slab on Concrete Box Girder

Item		Total
Class B-2 Concrete	cu. yard	86.2
Reinforcing Steel	pound	5,160
Reinforcing Steel (Epoxy Coated)	pound	17,010

The table of Estimated Quantities for Slab on Concrete Box Girder 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 slab 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.

The estimated quantities for Slab on Concrete Box Girder are based on skewed precast prestressed end panels.

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 Concrete Box Girder.

GENERAL NOTES:

Design Specifications:
2010 AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions
Load and Resistance Factor Design
2002 AASHTO 17th Edition (Seismic Details)
Seismic Design Category B

Design Loading:
HL-93
35#/Sq. Ft. Future Wearing Surface
Earth 120 #/Cu. Ft., Equivalent Fluid Pressure 45#/Cu. Ft.
Superstructure: Simply-supported, non-composite for dead load. Continuous composite for live load.

Design Unit Stresses:

Class B Concrete (Substructure)	f'c = 3,000	psi
Class B-2 Concrete (Superstructure, except Prestressed Girders & Barrier Curb)	f'c = 4,000	psi
Class B-1 Concrete (Barrier Curb & Pile)	f'c = 4,000	psi
Reinforcing Steel (Grade 60)	fy = 60,000	psi
Steel Pipe Pile (ASTM A252 Grade 3)	fy = 45,000	psi

For precast prestressed panel stresses, see Sheet No. 12.
For prestressed girder stresses, see Sheets No. 8 & 9.

Neoprene Pads:
Bearings shall be 60 durometer neoprene pads.

Plain Neoprene Bearing Pads and Laminated Neoprene Bearing Pads shall be in accordance with Sec 716.

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 1 1/2", unless otherwise shown.

Traffic Control:
Road closed during construction (See roadway plans for traffic control).

Miscellaneous:
Outline of old work is indicated by light dashed lines. Heavy lines indicate new work.

HYDROLOGIC DATA

Drainage Area = 10.73 (sq. mi.)

Backwater/Base Flood Data (100 year)

High Water Elev. = 316.59

Design Discharge = 1,400 (cfs)

Estimated Backwater = 0.12 (ft)

Average Velocity thru Opening = 2.68 (ft/sec)

Freeboard

Design Frequency = 50 (year)

Design Discharge = 1,200 (cfs)

Freeboard = 0.10 (ft)

Design High Water (DHW) Elev. = 316.51

Roadway Overtopping

Design Elevation (1' below shoulder) = 317.86

Design Discharge > 1,700 (500 year)(cfs)

Design Frequency > 500 (year)

Foundation Data

	Bent No.	1	2	3	4
Driven Pile	Type	Foundation	Trestle	Trestle	Foundation
	Pile Type and Size	CIP 14" Ø	CIP 14" Ø	CIP 14" Ø	CIP 14" Ø
	Number	5	6	6	5
	Approximate Length (foot)	50	60	60	50
	Pile Driving Verification Method	**	**	**	**
	Minimum Nominal Axial Compressive Resistance (kip)	157	181	181	157
	Hammer Energy Required (foot-pound)	8,200	9,900	9,900	8,200
	Minimum Tip Penetration	303.00	285.00	285.00	303.00
	Criteria for Minimum Tip Penetration	***	Scour	Scour	***

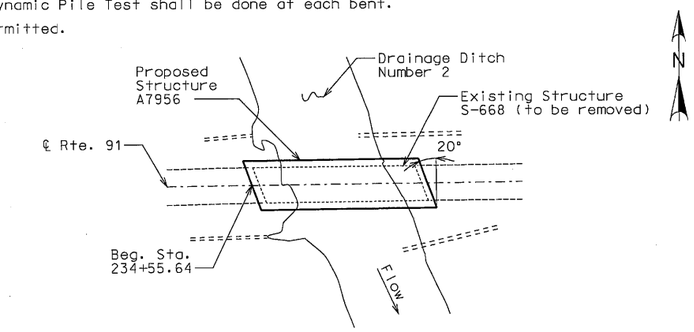
** Dynamic Pile Testing

*** Minimum Embedment

Minimum Nominal Axial Compressive Resistance = Maximum Factored Loads / Resistance Factor.

Dynamic Pile Testing shall be performed during pile installation to ensure pile integrity and capacity (see Special Provisions). A minimum of one Dynamic Pile Test shall be done at each bent.

Fluted type cast-in-place pile will not be permitted.



LOCATION SKETCH

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED 2/14/2012
ROUTE 91 | STATE MO
DISTRICT BR | SHEET NO. 2
COUNTY SCOTT
JOB NO. J0P2239
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7956

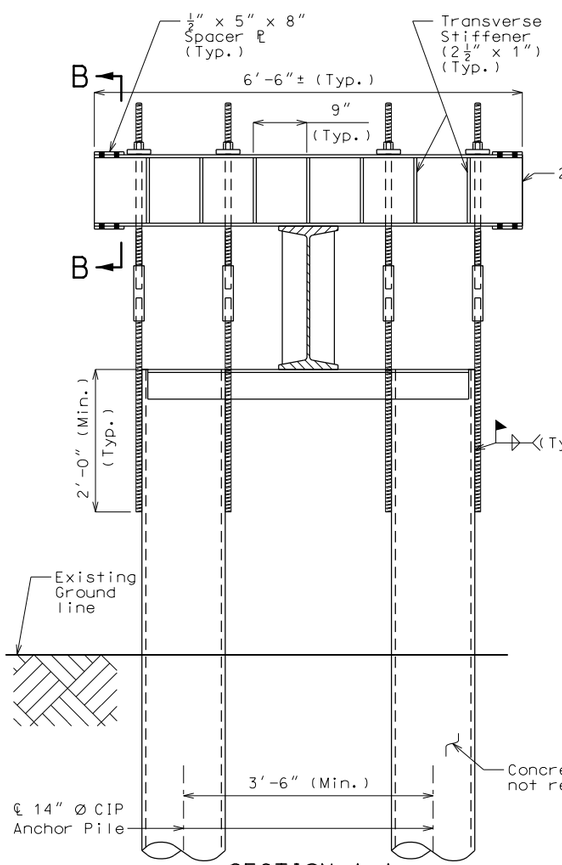
DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

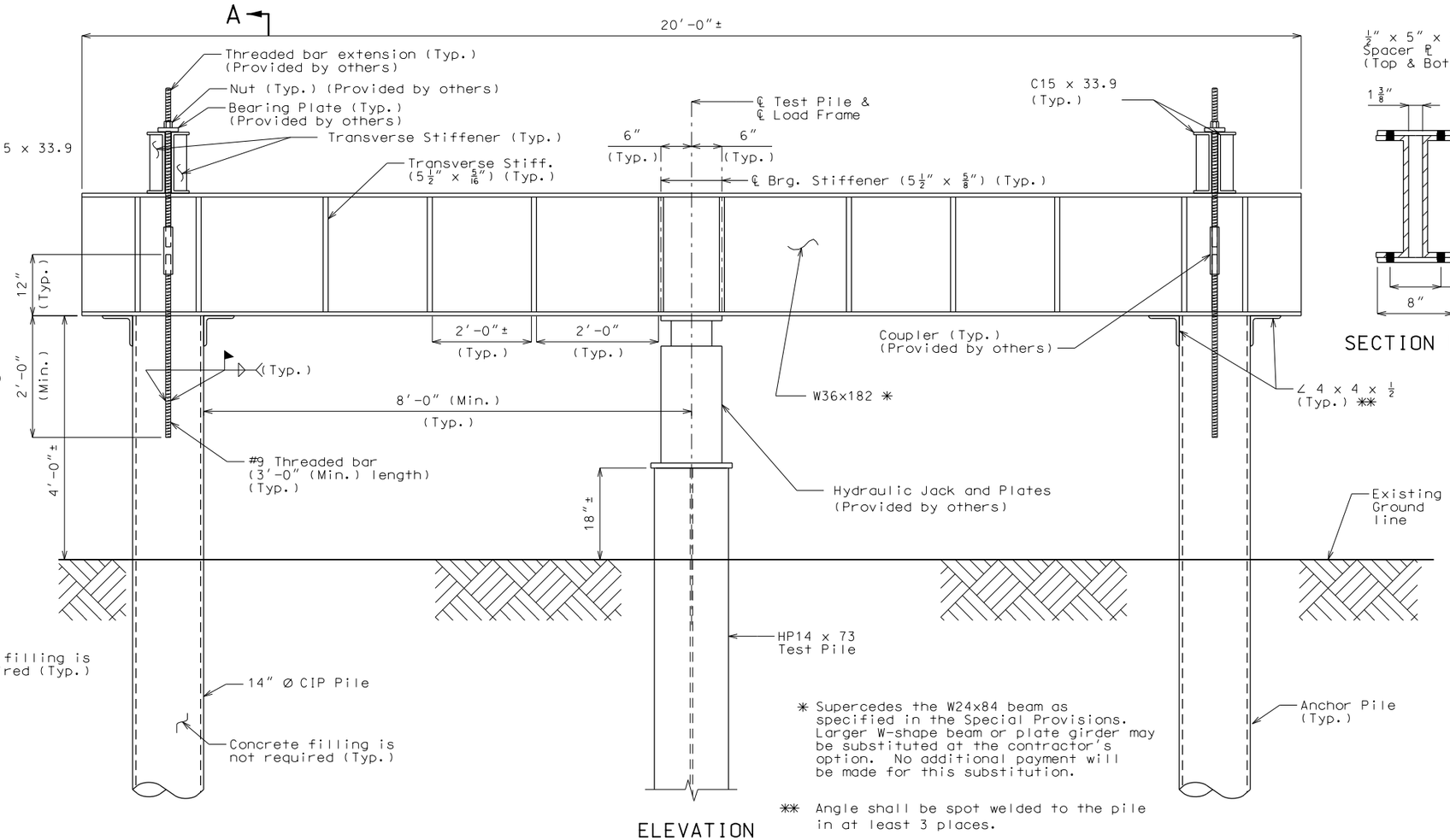
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Detailed Oct. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.



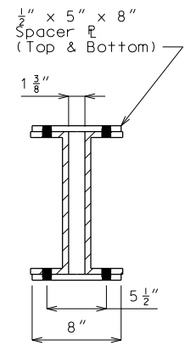
SECTION A-A



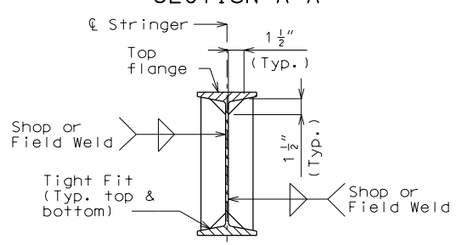
ELEVATION

✱ Supercedes the W24x84 beam as specified in the Special Provisions. Larger W-shape beam or plate girder may be substituted at the contractor's option. No additional payment will be made for this substitution.

✱✱ Angle shall be spot welded to the pile in at least 3 places.

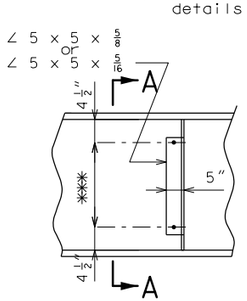


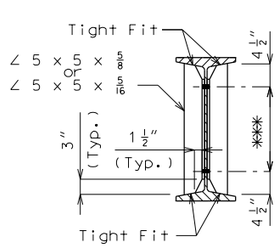
SECTION B-B



BEARING & TRANSVERSE STIFFENER WELDING DETAIL

(I-beam shown, channel details similar)



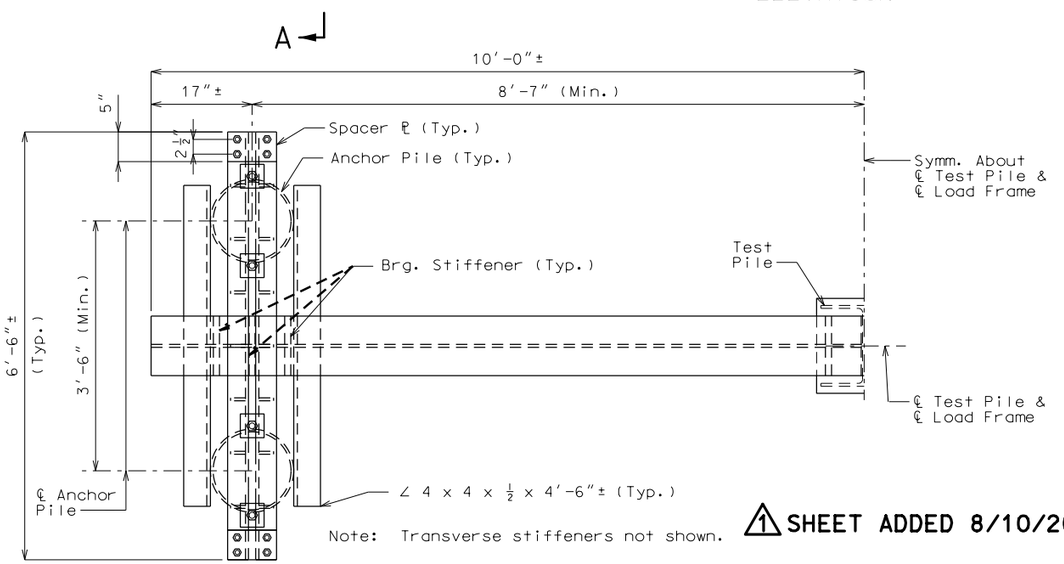


SECTION A-A

OPTIONAL BEARING & TRANSVERSE STIFFENER ANGLE DETAIL

(I-beam only)

✱✱✱ Six 13/16"Ø Holes @ abt. 5 1/2" cts. for 3/4 "Ø H.S. Bolts, nuts and washers.



Note: Transverse stiffeners not shown.

1 SHEET ADDED 8/10/2012

HALF PLAN

DETAILS OF STATIC LOAD TEST FRAME

Notes:
Fabricated structural steel for load test frame shall be ASTM A709 Grade 50W.

For details of CIP piles, see Sheet No. 9, except no reinforcing steel will be required for 14"Ø anchor piles.

Payment for materials, equipment and labor to drive and cut-off the test and anchor piles will be considered completely covered by the contract lump sum price for Static Load Test.

Payment for materials, equipment and labor to construct, disassemble and deliver the Static Load Test Frame will be considered completely covered by the contract lump sum price for Static Load Test.

After the load frame is disassembled, the contractor shall deliver the load frame members to the MoDOT storage lot on Rte. AA in Miner, Missouri.

Location of test and anchor piles will be determined in the field. See Special Provisions.

Use 3/4"Ø high strength bolts with 13/16"Ø holes.

Foundation Data for Test & Anchor Piles			
	Type	Foundation	Foundation
Driven Pile	Size	CIP 14"Ø	HP14 x 73
	Number	4	1
	Length	55'	55'

See Special Provisions for pile construction requirements.

Contractor will be paid for full length of pile regardless of length driven and cut-off.

No water jetting will be allowed on test and anchor piles.

Five feet of probore for test pile only.

Detailed Aug. 2012
Checked Aug. 2012

Note: This drawing is not to scale. Follow dimensions.

"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

DATE PREPARED	
8/10/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 2B
COUNTY BUTLER	
JOB NO. J0P0959	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7669	

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-16

Job No.:	J0P2239	County:	Scott	Route:	91
Design:	A7956	Skew:	20° R.A.	Location:	Over Drainage Ditch #2
Bent:	1	Logged By:	Easaw Thomas	Operator:	Kenny Mathews
Station:	234+63.3	Northing:	439787.9	Date of Work:	09/13/11-09/14/11
Offset:	16.0 LT	Easting:	1060112.8	Depth to Water:	13
Elevation:	317.7	Requested Northing:	439782.63	Depth Hole Open:	21
Requested Station:	234+57.5	Requested Easting:	1060118.04	Time Change:	After Drilling
Requested Offset:	16.5' LT	Equipment:	Failing 1500 ,Standard Penetration Test		
Requested Elevation:	317.8	Location Note:	Offset 7.1' @130° SE due to pavement and slope.		
Drill No.:	G-7887	Hammer Efficiency:	80%	Drilling Method:	Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
0		0-3.8' Brown, LEAN CLAY, stiff, moist	315						
5		3.8-10' Brown, SAND, dense, moist, fine grained, poorly graded	310	X		5-5-8 (17)		PP = 1.75 tsf	
10		10-20' Brown, SAND with silt, dense to medium dense, fine grained, poorly graded	305	X		11-14-18 (43)			LL = NP MC = 21.1% γ_{wet} = 129 pcf(1) Sieve Analysis Sieve # % Passing 3/4" 100.0 3/8" 99.1 #4 96.8 #10 90.0 #16 81.9 #40 60.4 #50 31.1 #100 10.6 #200 6.6
15			300	X		7-12-10 (29)			
20		20-35' Brown, SAND medium sand, dense, moist	295	X		8-9-12 (28)			MC = 23.6% γ_{wet} = 126 pcf(1) LL = NP Sieve Analysis Sieve # % Passing 3/4" 100.0 3/8" 92.5 #4 88.3 #10 80.4 #16 70.3 #40 33.8 #50 21.1 #100 7.3 #200 4.8
25			290	X		4-6-8 (17)			
30			285	X		11-10-16 (36)			
35									

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri East **Coordinate Proj. Factor:** 1.00001142110
Coordinate Datum: NAD 83 (CONUS) **Coordinate Units:** U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BOREHOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SIGN\PROJECT FILES\J0P2239.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-16

Job No.:	J0P2239	County:	Scott	Route:	91
Design:	A7956	Skew:	20° R.A.	Location:	Over Drainage Ditch #2
Bent:	1	Logged By:	Easaw Thomas	Operator:	Kenny Mathews
Station:	234+63.3	Northing:	439787.9	Date of Work:	09/13/11-09/14/11
Offset:	16.0 LT	Easting:	1060112.8	Depth to Water:	13
Elevation:	317.7	Requested Northing:	439782.63	Depth Hole Open:	21
Requested Station:	234+57.5	Requested Easting:	1060118.04	Time Change:	After Drilling
Requested Offset:	16.5' LT	Equipment:	Failing 1500 ,Standard Penetration Test		
Requested Elevation:	317.8	Location Note:	Offset 7.1' @130° SE due to pavement and slope.		
Drill No.:	G-7887	Hammer Efficiency:	80%	Drilling Method:	Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
35		35-90' Brown, SAND, dense to very dense, moist to wet, medium to coarse grained	280	X		10-11-14 (33)			
40			275	X		11-11-11 (29)			MC = 14.6% γ_{wet} = 137 pcf(1) Sieve Analysis Sieve # % Passing 3/8" 100.0 #4 95.4 #10 82.1 #16 69.5 #40 14.4 #50 8.1 #100 4.8 #200 3.3
45			270	X		10-11-13 (32)			
50			265	X		11-10-12 (29)			
55			260	X		10-14-17 (41)			
60			255	X		14-14-12 (35)			
65			250						
70									

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri East **Coordinate Proj. Factor:** 1.00001142110
Coordinate Datum: NAD 83 (CONUS) **Coordinate Units:** U.S. Survey Feet

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LETTER BOREHOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SIGN\PROJECT FILES\J0P2239.GPJ

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 22
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-16

Job No.: J0P2239 | County: Scott | Route: 91
Design: A7956 | Skew: 20° R.A. | Location: Over Drainage Ditch #2
Bent: 1 | Logged By: Easaw Thomas | Operator: Kenny Mathews
Station: 234+63.3 | Northing: 439787.9 | Date of Work: 09/13/11-09/14/11
Offset: 16.0 LT | Easting: 1060112.8 | Depth to Water: 13
Elevation: 317.7 | Requested Northing: 439782.63 | Depth Hole Open: 21
Requested Station: 234+57.5 | Requested Easting: 1060118.04 | Time Change: After Drilling
Requested Offset: 16.5' LT | Equipment: Failing 1500 ,Standard Penetration Test
Requested Elevation: 317.8 | Location Note: Offset 7.1' @130° SE due to pavement and slope.
Drill No.: G-7887 | Hammer Efficiency: 80% | Drilling Method: Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
70		35-90' Brown, SAND, dense to very dense, moist to wet, medium to coarse grained *(continued)*				16-12-12 (32)			
			245						
75									
			240						
80						38/0.4'			
			235						
85									
			230						
90		90-100' Grayish brown, SAND, very dense, coarse grained				18-22-25 (63)			
			225						
95									
			220						
100		100-100.3' Grayish brown, SAND, very dense, wet, fine grained				38/0.3'			
		Bottom of borehole at 100.3 feet.							

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 | Coordinate Zone: Missouri East | Coordinate Proj. Factor: 1.00001142110
Coordinate Datum: NAD 83 (CONUS) | Coordinate Units: U.S. Survey Feet

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LETTER BOREHOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SIGNIT\PROJECT FILES\J0P2239.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239 | County: Scott | Route: 91
Design: A7956 | Skew: 20° R.A. | Location: Over Drainage Ditch #2
Bent: 4 | Logged By: Easaw Thomas | Operator: Kenny Mathews
Station: 235+48.9 | Northing: 439747.4 | Date of Work: 09/14/11-09/15/11
Offset: 14.0' RT | Easting: 1060222.2 | Depth to Water:
Elevation: 317.8 | Requested Northing: 439752.84 | Depth Hole Open:
Requested Station: 235+55.5 | Requested Easting: 1060227.66 | Time Change:
Requested Offset: 16.5' RT | Equipment: Failing 1500 ,Standard Penetration Test
Requested Elevation: 317.7 | Location Note: Offset 5.8 ft @ 292 NW due to slope, existing pavement & overhead powerline
Drill No.: G-7887 | Hammer Efficiency: 80% | Drilling Method: Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
0		0-6.5' Brown, LEAN CLAY with fine sand, stiff to very stiff, moist							
			315						
5						6-4-5 (12)		PP = 3.50 tsf	MC = 21.7% γ_{wet} = 128 pcf(1) LL = 23 PL = 20 Sieve Analysis Sieve # % Passing #10 100.0 #40 92.2 #200 65.4
		6.5-15' Brown, SAND, medium dense, moist, medium grained	310						
10						6-9-11 (27)			
			305						
15		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel				7-8-8 (21)			MC = 20.3% γ_{wet} = 130 pcf(1) LL = NP Sieve Analysis Sieve # % Passing 3/4" 100.0 3/8" 98.6 #4 97.0 #10 91.9 #40 26.7 #200 3.1
			300						
20						6-7-10 (23)			
			295						
25						5-7-7 (19)			MC = 15.3% γ_{wet} = 136 pcf(1) LL = NP Sieve Analysis Sieve # % Passing 1" 100.0 3/4" 96.7 3/8" 95.1 #4 91.2 #10 75.9 #40 13.4 #200 0.9
			290						
30						5-7-9 (21)			
			285						
35									

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 | Coordinate Zone: Missouri East | Coordinate Proj. Factor: 1.00001142110
Coordinate Datum: NAD 83 (CONUS) | Coordinate Units: U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BOREHOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SIGNIT\PROJECT FILES\J0P2239.GPJ

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED 1/6/2012
ROUTE 91 | STATE MO
DISTRICT BR | SHEET NO. 23
COUNTY SCOTT
JOB NO. J0P2239
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7956

DESCRIPTION | DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239	**County:** Scott	**Route:** 91
Design: A7956	**Skew:** 20° R.A.	**Location:** Over Drainage Ditch #2
Bent: 4	**Logged By:** Easaw Thomas	**Operator:** Kenny Mathews
Station: 235+48.9	**Northing:** 439747.4	**Date of Work:** 09/14/11-09/15/11
Offset: 14.0' RT	**Easting:** 1060222.2	**Depth to Water:**
Elevation: 317.8	**Requested Northing:** 439752.84	**Depth Hole Open:**
Requested Station: 235+55.5	**Requested Easting:** 1060227.66	**Time Change:**
Requested Offset: 16.5' RT	**Equipment:** Failing 1500 ,Standard Penetration Test	
Requested Elevation: 317.7	**Location Note:** Offset 5,8 ft @ 292 NW due to slope, existing pavement & overhead powerline	
Drill No.: G-7887	**Hammer Efficiency:** 80%	**Drilling Method:** Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
35		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel *(continued)*				7-11-12 (31)			
			280						
40						11-12-15 (38)			
			275						
45									
			270						
50						12-14-19 (44)			MC = 16.5% γ_{nat} = 135 pcf(1) LL = NP Sieve Analysis Sieve # % Passing 3/8" 100.0 #4 97.5 #10 90.1 #40 18.4 #200 3.5
			265						
55									
			260						
60						14-18-20 (51)			
			255						
65									
			250						
70									

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri East **Coordinate Proj. Factor:** 1.00001142110

Coordinate Datum: NAD 83 (CONUS) **Coordinate Units:** U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BORENOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SG\GINT\PROJECT FILES\J0P2239.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239	**County:** Scott	**Route:** 91
Design: A7956	**Skew:** 20° R.A.	**Location:** Over Drainage Ditch #2
Bent: 4	**Logged By:** Easaw Thomas	**Operator:** Kenny Mathews
Station: 235+48.9	**Northing:** 439747.4	**Date of Work:** 09/14/11-09/15/11
Offset: 14.0' RT	**Easting:** 1060222.2	**Depth to Water:**
Elevation: 317.8	**Requested Northing:** 439752.84	**Depth Hole Open:**
Requested Station: 235+55.5	**Requested Easting:** 1060227.66	**Time Change:**
Requested Offset: 16.5' RT	**Equipment:** Failing 1500 ,Standard Penetration Test	
Requested Elevation: 317.7	**Location Note:** Offset 5,8 ft @ 292 NW due to slope, existing pavement & overhead powerline	
Drill No.: G-7887	**Hammer Efficiency:** 80%	**Drilling Method:** Mud Rotary

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Shear Strength Data	Field Tests	Index Tests
70		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel *(continued)*				12-18-22 (53)			
			245						
75									
			240						
80		80.5-81.5' Shale, gray, thinly laminated, very soft, highly weathered, fine grained grained				4-8-8 (21)			
		Bottom of borehole at 81.5 feet.							

N_{60} = (Em/60)Nm N_{60} - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
(1) = Assumed, (2) = Actual

Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri East **Coordinate Proj. Factor:** 1.00001142110

Coordinate Datum: NAD 83 (CONUS) **Coordinate Units:** U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BORENOLE - MODOT_07-29-11.GDT - 10/25/11 12:45 - J:\SG\GINT\PROJECT FILES\J0P2239.GPJ

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 24
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

KEY TO SYMBOLS

CLIENT Missouri DOT Bridge Division
PROJECT NUMBER J0P2239
PROJECT NAME A7956
PROJECT LOCATION Over Drainage Ditch #2

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

- CL: USCS Low Plasticity Clay
- CL-ML: USCS Low Plasticity Silty Clay
- SHALE: Shale
- SP: USCS Poorly-graded Sand
- SP-SC: USCS Poorly-graded Sand with Clay
- SP-SM: USCS Poorly-graded Sand with Silt

SAMPLER SYMBOLS

- Grab Sample
- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

Water Level at Time Drilling, or as Shown
Water Level After 24 Hours, or as Shown

KEY TO SYMBOLS - MISSOURI DOT.GDT - 10/25/11 10:11 - J:\SG\GINT\PROJECT FILES\J0P2239.GPJ

BORING NO. H-11-16

PAGE 1 OF 3

Missouri Department of Transportation
Construction and Materials

Route: 91
County: Scott
Logged By: Eassaw Thomas
Job No.: J0P2239
Skew: 20° R.A.
Operator: Kenny Mathews
Design: A7956
Location: Over Drainage Ditch #2
Date of Work: 09/13/11-09/14/11
Bent: 1
Northing: 439787.9
Depth to Water: 13
Station: 234+63.3
Easting: 1060112.8
Time Change: After Drilling
Offset: 16.0 LT
Drilling Method: Mud Rotary
Depth Hole Open: 21
Elevation: 317.7
Hammer Efficiency: 80%
Drill No.: G-7887
Equipment: Failing 1500 Standard Penetration Test
Coordinate Units: U.S. Survey Feet
Coordinate Proj. Factor: 1.00001142110
Coordinate System: U.S. State Plane 1983
Coordinate Datum: NAD 83 (CONUS)
Coordinate Zone: Missouri East

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)(1)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Resilient Strain Ratio (R.S.R.)	Liquefaction F.S.	Vs Shear Wave Velocity (ft/sec)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E Young's Modulus (ksf)	ν Poisson's Ratio
0		0-3.8' Brown, LEAN CLAY, stiff, moist																				
		3.8-10' Brown, SAND, dense, moist, fine grained, poorly graded	310	X		5-5-8 (17)	1.75															
10		10-20' Brown, SAND with silt, dense to medium dense, fine grained, poorly graded		X		11-14-18 (43)			129.1	21	NP				7	1.2	9.4	706.6	4511	2002	5405	0.35
			300	X		7-12-10 (29)																
20		20-35' Brown, SAND medium sand, dense, moist		X		9-9-12 (28)			126.1	24	NP				5	0.2	1.3	596.6	14536	1394	3764	0.35
			290	X		4-5-8 (17)																
30				X		11-10-16 (35)																

(1) = Assumed, (2) = Actual

(Continued Next Page)

SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/25/11 12:45 - J:\SG\GINT\PROJECT FILES\J0P2239.GPJ

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 25
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DATE	DESCRIPTION

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Note: This drawing is not to scale. Follow dimensions.

Detailed Nov. 2011
Checked Nov. 2011

Detailed Nov. 2011
Checked Nov. 2011

BORING DATA

Note: This drawing is not to scale. Follow dimensions.

Note: For locations of borings, see Sheet No. 1.

Sheet No. 26 of 34

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-16

Job No.: J0P2239	County: Scott	Route: 91	Logged By: Easaw Thomas
Design: A7956	Skew: 20° R.A.	Coordinate Units: U.S. Survey Feet	Operator: Kenny Mathews
Bent: 1	Location: Over Drainage Ditch #2	Coordinate Proj. Factor: 1.00001142110	Date of Work: 09/13/11-09/14/11
Station: 234+63.3	Northing: 439787.9	Coordinate System: U.S. State Plane 1983	Depth to Water: 13
Offset: 16.0 LT	Easting: 1060112.8	Coordinate Datum: NAD 83 (CONUS)	Time Change: After Drilling
Elevation: 317.7	Drilling Method: Mud Rotary	Coordinate Zone: Missouri East	Depth Hole Open: 21
Drill No.: G-7887	Hammer Efficiency: 80%	Equipment: Falling 1500 ,Standard Penetration Test	

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)(1)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Seismic Parameters: Resisting Stress Ratio (R.S.R.)	Liquefaction F.S.	V_s Shear Wave Velocity (ft/sec)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E Young's Modulus (ksf)	ν Poisson's Ratio
		35-90' Brown, SAND, dense to very dense, moist to wet, medium to coarse grained		X		10-11-14 (33)																
			280																			
40				X		11-11-11 (29)			137.4	15					3	0.2	1.3	595.3	104276	1512	4082	0.35
				X		10-11-13 (32)																
			270																			
50				X		11-10-12 (29)																
				X		10-14-17 (41)																
			260																			
60				X		14-14-12 (35)																
			250																			
70																						

(1) = Assumed, (2) = Actual

(Continued Next Page)

SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/25/11 12:45 - J:\SIGINT\PROJECT FILES\J0P2239.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-16

Job No.: J0P2239	County: Scott	Route: 91	Logged By: Easaw Thomas
Design: A7956	Skew: 20° R.A.	Coordinate Units: U.S. Survey Feet	Operator: Kenny Mathews
Bent: 1	Location: Over Drainage Ditch #2	Coordinate Proj. Factor: 1.00001142110	Date of Work: 09/13/11-09/14/11
Station: 234+63.3	Northing: 439787.9	Coordinate System: U.S. State Plane 1983	Depth to Water: 13
Offset: 16.0 LT	Easting: 1060112.8	Coordinate Datum: NAD 83 (CONUS)	Time Change: After Drilling
Elevation: 317.7	Drilling Method: Mud Rotary	Coordinate Zone: Missouri East	Depth Hole Open: 21
Drill No.: G-7887	Hammer Efficiency: 80%	Equipment: Falling 1500 ,Standard Penetration Test	

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)(1)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Seismic Parameters: Resisting Stress Ratio (R.S.R.)	Liquefaction F.S.	V_s Shear Wave Velocity (ft/sec)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E Young's Modulus (ksf)	ν Poisson's Ratio
70		35-90' Brown, SAND, dense to very dense, moist to wet, medium to coarse grained *(continued)*		X		16-12-12 (32)																
			240																			
80				X		38/0.4'																
			230																			
90		90-100' Grayish brown, SAND, very dense, coarse grained		X		18-22-25 (63)																
			220																			
100		100-100.3' Grayish brown, SAND, very dense, wet, fine grained		X		38/0.3'																
		Bottom of borehole at 100.3 feet.																				

(1) = Assumed, (2) = Actual

SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/25/11 12:45 - J:\SIGINT\PROJECT FILES\J0P2239.GPJ

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MoDOT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE	DESCRIPTION

BRIDGE NO.	PROJECT NO.	CONTRACT I.D.	JOB NO.	COUNTY	DISTRICT	ROUTE	SHEET NO.	STATE	DATE PREPARED
A7956			J0P2239	SCOTT	BR	91	26	MO	1/6/2012

THIS SEAL HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER E-25360
PROFESSIONAL ENGINEER

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Detailed Nov. 2011
Checked Nov. 2011

BORING DATA

Note: This drawing is not to scale. Follow dimensions.

Note: For locations of borings, see Sheet No. 1.

Sheet No. 27 of 34

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239
Design: A7956
Bent: 4
Station: 235+48.9
Offset: 14.0' RT
Elevation: 317.8
Drill No.: G-7887

County: Scott
Skew: 20° R.A.
Location: Over Drainage Ditch #2
Northing: 439747.4
Easting: 1060222.2
Drilling Method: Mud Rotary
Hammer Efficiency: 80%

Route: 91
Coordinate Units: U.S. Survey Feet
Coordinate Proj. Factor: 1.00001142110
Coordinate System: U.S. State Plane 1983
Coordinate Datum: NAD 83 (CONUS)
Coordinate Zone: Missouri East
Equipment: Failing 1500 ,Standard Penetration Test

Logged By: Easaw Thomas
Operator: Kenny Mathews
Date of Work: 09/14/11-09/15/11
Depth to Water:
Time Change:
Depth Hole Open:

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)(1)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Seismic Parameters: Resisting Stress Ratio (R.S.R.)	Liquefaction F.S.	V_s Shear Wave Velocity (fps)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E Young's Modulus (ksf)	ν Poisson's Ratio
0		0-6.5' Brown, LEAN CLAY with fine sand, stiff to very stiff, moist																				
				X		6-4-5 (12)	3.5		128.4	22	23	3			65							
		6.5-15' Brown, SAND, medium dense, moist, medium grained	310																			
10				X		6-9-11 (27)																
		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel		X		7-8-8 (21)			130.0	20	NP				3	0.4	2.8	682.6	4138	1881.2	5079	0.35
			300																			
20				X		6-7-10 (23)																
				X		5-7-7 (19)			136.4	15	NP				1	0.2	1.4	622.8	12610	1643.1	4436	0.35
			290																			
30				X		5-7-9 (21)																

(1) = Assumed, (2) = Actual

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SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/26/11 12:45 - J:\SIGINT\PROJECT FILES\J0P2239.GPJ

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239
Design: A7956
Bent: 4
Station: 235+48.9
Offset: 14.0' RT
Elevation: 317.8
Drill No.: G-7887

County: Scott
Skew: 20° R.A.
Location: Over Drainage Ditch #2
Northing: 439747.4
Easting: 1060222.2
Drilling Method: Mud Rotary
Hammer Efficiency: 80%

Route: 91
Coordinate Units: U.S. Survey Feet
Coordinate Proj. Factor: 1.00001142110
Coordinate System: U.S. State Plane 1983
Coordinate Datum: NAD 83 (CONUS)
Coordinate Zone: Missouri East
Equipment: Failing 1500 ,Standard Penetration Test

Logged By: Easaw Thomas
Operator: Kenny Mathews
Date of Work: 09/14/11-09/15/11
Depth to Water:
Time Change:
Depth Hole Open:

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)(1)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Seismic Parameters: Resisting Stress Ratio (R.S.R.)	Liquefaction F.S.	V_s Shear Wave Velocity (fps)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E Young's Modulus (ksf)	ν Poisson's Ratio
		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel *(continued)*		X		7-11-12 (31)																
			280																			
40				X		11-12-15 (36)																
			270																			
50				X		12-14-19 (44)			134.7	17	NP				4	0.5	4.2	697.2	46430	2033	5491	0.35
			260																			
60				X		14-18-20 (51)																
			250																			
70																						

(1) = Assumed, (2) = Actual

(Continued Next Page)

SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/26/11 12:45 - J:\SIGINT\PROJECT FILES\J0P2239.GPJ

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MoDOT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE	DESCRIPTION

BRIDGE NO. A7956
PROJECT NO.
CONTRACT ID.
JOB NO. J0P2239
COUNTY SCOTT
DISTRICT BR
SHEET NO. 27
ROUTE 91
STATE MO
DATE PREPARED 1/6/2012

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY

STATE OF MISSOURI
MICHAEL JAMES MADSEN
NUMBER PE-026810
PROFESSIONAL ENGINEER

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Detailed Nov. 2011
Checked Nov. 2011

Missouri Department of Transportation
Construction and Materials

BORING NO. H-11-17

Job No.: J0P2239	County: Scott	Route: 91		Logged By: Easaw Thomas	
Design: A7956	Skew: 20° R.A.	Coordinate Units: U.S. Survey Feet		Operator: Kenny Mathews	
Bent: 4	Location: Over Drainage Ditch #2	Coordinate Proj. Factor: 1.00001142110		Date of Work: 09/14/11-09/15/11	
Station: 235+48.9	Northing: 439747.4	Coordinate System: U.S. State Plane 1983		Depth to Water:	
Offset: 14.0' RT	Easting: 1060222.2	Coordinate Datum: NAD 83 (CONUS)		Time Change:	
Elevation: 317.8	Drilling Method: Mud Rotary	Coordinate Zone: Missouri East		Depth Hole Open:	
Drill No.: G-7887	Hammer Efficiency: 80%	Equipment: Failing 1500 ,Standard Penetration Test			

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N_{60})	Pocket Pen (tsf)	Torvane (tsf)	Saturated Unit Weight (pcf)	Moisture Content (%)	Liquid Limit	Plasticity Index	USCS	Shear Data	Fines Content (%)	Seismic Parameters: Resisting Stress (R.S.R.)	Liquefaction F.S.	V_s Shear Wave Velocity (ft/sec)	G_{max} Shear Modulus Max (ksf)	G Shear Modulus (ksf)	E_s Young's Modulus (ksf)	ν Poisson's Ratio
70		15-80.5' Brown, SAND, medium dense, moist, medium grained, scattered gravel *(continued)*		X		12-18-22 (53)																
			240																			
80		80.5-81.5' Shale, gray, thinly laminated, very soft, highly weathered, fine grained grained		X		4-8-8 (21)																
		Bottom of borehole at 81.5 feet.																				

SEISMIC PARAMETERS - MISSOURI DOT.GDT - 10/26/11 12:45 - J:\SGGINT\PROJECT FILES\J0P2239.GPJ

(1) = Assumed, (2) = Actual

BORING DATA

	SOIL CLASSIFICATION Elevation – 317.8	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Given, pcf	Effective Unit Wt. γ' LPile, pcf	Undrained Shear Strength S_u or c_u, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle φ**	Soft/Rock Strain ε_{50}/k r.m.	Lateral Subgrade Modulus, k_s pci	Young's Modulus Emass, psi 10^3	Rock Quality Designation, RQD	Unconfined Compressive Strength, q_u, tsf
0	0-6.5' Stiff clay.																		
5	@ 5.0'	311.2		X		X		X	128.4	128.4	3500	3.5	12	32.5**	0.007	500			
	6.5-13.0' Sand above water table.																		
10	@ 10.0'			X		X		X					27	32**		225			
		304.7																	
	13.0 - 80.5' Sand below water table.																		
15	@ 15.0'			X		X		X	130.0	67.6			21	32.**		60			
20	@20.0'			X		X		X											
25	@25.0'			X		X		X	138.4	74.0			18	32**		60			
30	@30.0'			X		X		X					21			60			
35	@35.0'			X		X		X					31			125			
40	@40.0'			X		X		X					36	35**		125			

JOB NO.:	J0P2239	Coordinate System:	Modified U.S. State Plane 1983
COUNTY:	Scott	Coordinate Zone:	Missouri East 2401
ROUTE:	91	Coordinate Datum:	NAD 83 (CONUS)
STATION:	235 + 48.9, 14.0' RT	Coordinate Units:	U.S. Survey Feet
BRIDGE NO.:	A7956	Coordinate Projection Factor:	1.00001421
		Coordinates:	1060222.2E, 439747.4N

Key:
Water Table
c Cohesion
*After Bowles, 1977
** From correlation of PI to angle of internal friction as published in navdocks DM-7. standa
This is the average value minus one standard deviation.

FIGURE 1 of 2

SHEET 1 of 2

Note: For locations of borings, see Sheet No. 1.

Sheet No. 28 of 34

Note: This drawing is not to scale. Follow dimensions.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MoDOT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE	DESCRIPTION

BRIDGE NO. A7956 | PROJECT NO. | CONTRACT ID. | JOB NO. J0P2239 | COUNTY SCOTT | DISTRICT BR | SHEET NO. 28 | ROUTE 91 | STATE MO | DATE PREPARED 1/6/2012

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER
PROFESSIONAL ENGINEER

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

SOIL CLASSIFICATION Elevation –	Elevation	Compressible Yes	Compressible No	Dewatering Yes	Dewatering No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Lift, pcf	Undrained Shear Strength, S_u or q_u psf	P.P., tsf	SPT N_{60}	Internal Friction Angle, Ø°	Soil/Rock Strain ε_{50} or ε_a	Lateral Subgrade Modulus, kf, pci	Young's Modulus Emax, csi (10^3)	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
(continued) 13.0-80.0' Sand below water table.																		
	@50.0'		X		X		X					29			125			
	@60.0'		X		X		X					41			125			
	@70.0'		X		X		X					35			125			
	@80.0'		X		X		X					98	35**		125			

Key:
Water Table
c Cohesion
*After Bowles, 1977
**From correlation of PI to angle of internal friction as published in navdocks DM-7.
This is the average value minus one standard deviation.

FIGURE 1 of 2
SHEET 2 of 2

JOB NO.: J0P2239
COUNTY: Scott
ROUTE: 91
STATION: 295+48.9, 14.0' RT
BRIDGE NO.: A7956

Coordinate System: Modified U.S. State Plane 1983
Coordinate Zone: Missouri East 2401
Coordinate Datum: NAD 83 (CONUS)
Coordinate Units: U.S. Survey Feet
Coordinate Projection Factor: 1.0000172 (Grid)
Coordinates: 1008123.2 E, 438747.8N

SOIL CLASSIFICATION Elevation – 317.7	Elevation	Compressible Yes	Compressible No	Dewatering Yes	Dewatering No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Lift, pcf	Undrained Shear Strength, S_u or q_u psf	P.P., tsf	SPT N_{60}	Internal Friction Angle, Ø°	Soil/Rock Strain ε_{50} or ε_a	Lateral Subgrade Modulus, kf, pci	Young's Modulus Emax, csi (10^3)	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
0.-10.0' Stiff clay.																		
	@5.0'		X		X		X			2109		17		0.0055	750			
	@10.0'		X		X		X	120.1	120.1			43	38**		225			
10.0.-13.0' Sand, above water table.																		
13.0-100.0' Sand, below water table.																		
	@15.0'		X		X		X	128.1	67.8			29			125			
	@20.0'		X		X		X	128.1	63.7			28	34.5**		125			
	@25.0'		X		X		X					17			60			
	@30.0'		X		X		X					25			125			
	@35.0'		X		X		X					33			125			
	@40.0'		X		X		X	137.4	75.0			29	34.5**		125			

Key:
Water Table
c Cohesion
**After Bowles, 1977

JOB NO.: J0P2239
COUNTY: Scott
ROUTE: 91
STATION: 294+83.3, 18' LT
BRIDGE NO.: A7962

Coordinate System: Modified U.S. State Plane 1983
Coordinate Zone: Missouri East 2401
Coordinate Datum: NAD 83 (CONUS)
Coordinate Units: U.S. Survey Feet
Coordinate Projection Factor: 1.0000172 (Grid)
Coordinates: 1008123.2 E, 438787.9N

FIGURE 2 of 2
SHEET 1 of 2

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 29
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

Elev. -dm	Compressible	Dry Density	Scour	Total Unit Wt. γ Elev. pcf	Effective Unit Wt. γ' Elev. pcf	Undrained Shear Strength S_u or c_u psf	P.P. tsf	SPT N$_{60}$	Internal Friction Angle Ø°	Skin/Rock Strain ε50/Rm	Lateral Subgrade Modulus, kf, pci	Young's Modulus Emass, psi (q°)	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, tsf
SOIL CLASSIFICATION Elevation = 317.7 (continued) 40.0-100.3' Sand, below water table.														
@45.0'	X	X	X	X				32			125			
@50.0'	X	X	X	X				29			125			
@55.0'	X	X	X	X				41			125			
@60.0'	X	X	X	X				35			125			
@70.0'	X	X	X	X				32			125			
@80.0'	X	X	X	X				39 in 5"			125			
								29			125			

40 45 50 55 60 65 70 75 80

Key:
Water Table
c Cohesion
** From Estimated Equivalent Qu, tsf.

FIGURE 2 of 2
SHEET 2 of 2

Modified U.S. State Plane 1983
Missouri East 2401
NAD 83 (CORRAS)
U.S. Survey Feet
1.000011021
1061125.E, 450787.3N

Coordinate System:
Coordinate Zone:
Coordinate Datum:
Coordinate Units:
Coordinate Projection Factor:
Coordinates:

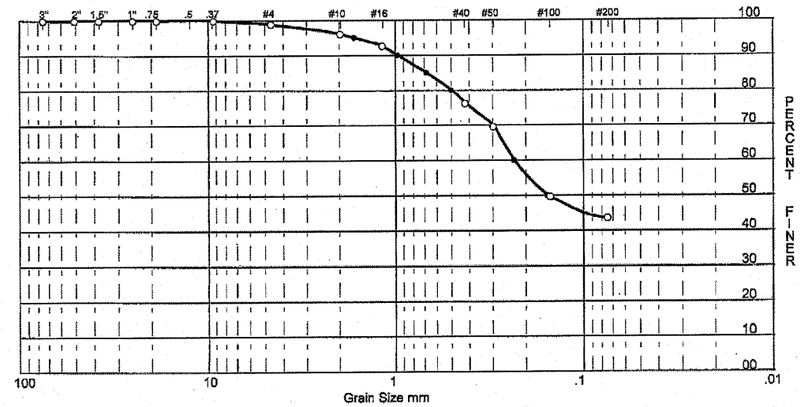
JOB NO.: J0P2239
COUNTY: Scott
ROUTE: 91
STATION: Rt 4 +83.5, 10' Lt
BRIDGE NO.: A7956

Missouri Department of Transportation
Particle Size Distribution Report
AASHTO T89/90 LL/PI and T88 Scour Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T722 Station: STREAMBED, Depth: 1.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	3.8	19.8	32.7	43.7

Sieve Size	Percent Finer
3	100.0
2	100.0
1.5	100.0
1	100.0
.75	100.0
.375	100.0
# 4	99.0
#10	96.2
#16	92.8
#40	76.4
#50	69.7
#100	49.8
#200	43.7

Coefficients	
D95	1.61
D90	0.94
D85	0.66
D80	0.49
D60	0.22
D50	0.15

Material Description
Clayey Sand

Atterberg Limits
L.L.= 30 P.L.= 21 P.I.= 9

Classification
AASHO 49 = A-4-(2)
AASHTO 87 = A-4-(1)
USCS = SC

Revision Date: 4-10-09 Tested by Nicole / Nicole Testing Date 09/21/11

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED 1/6/2012

ROUTE	STATE
91	MO
DISTRICT	SHEET NO.
BR	30

COUNTY: SCOTT
JOB NO.: J0P2239
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A7956

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA
Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

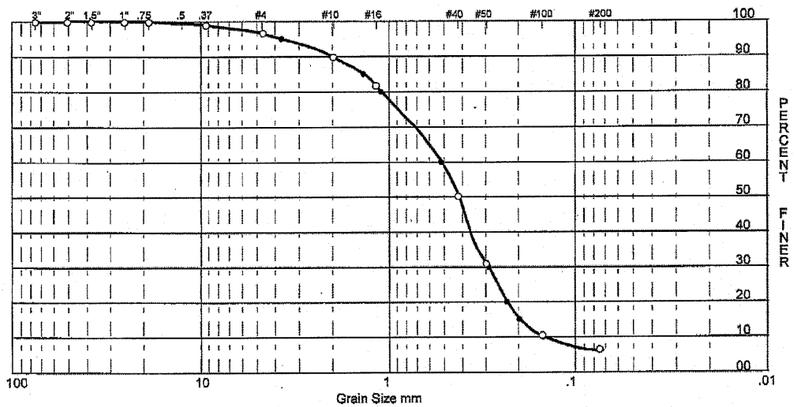
Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation
Particle Size Distribution Report
AASHTO T89/90 LL/PI and T88 Scour Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T719 Station: 234+57.5, 16.5 LT Depth: 10.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	10.0	39.6	43.8	6.6

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	3.60
2	100.0	D90	1.96
1.5	100.0	D85	1.32
1	100.0	D80	1.07
.75	100.0	D60	0.51
.375	99.1	D50	0.41
# 4	96.8	D30	0.28
#10	90.0	D20	0.22
#16	81.9	D15	0.19
#40	50.4	D10	0.14
#50	31.1		
#100	10.6		
#200	6.6		

Material Description
Poorly-Graded Sand with Silt

Atterberg Limits
L.L.= N/A P.L.= NP P.I.= NP

Classification
AASHO 49 = A-2-4-(0)
AASHTO 87 = A-2-4-(0)
USCS = SP-SM
Cu = 3.53 Cc = 1.10

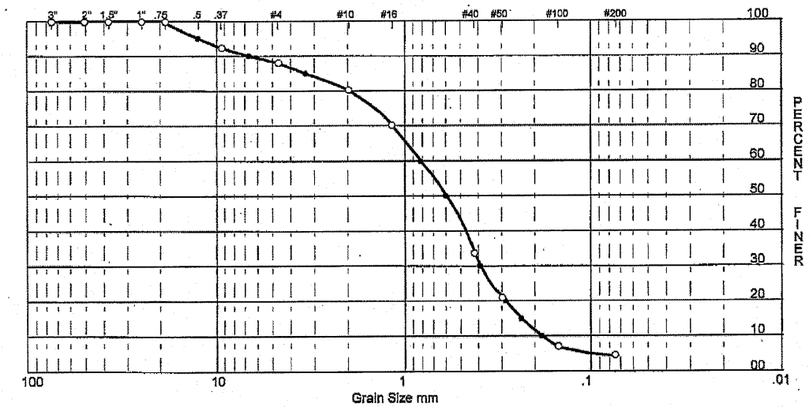
Revision Date: 4-10-09 Tested by Nicole / Nicole Testing Date 09/21/11

Missouri Department of Transportation
Particle Size Distribution Report
AASHTO T89/90 LL/PI and T88 Scour Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T720 Station: 234+57.5, 16.5 LT Depth: 20.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	19.6	46.6	29.0	4.8

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	12.24
2	100.0	D90	6.51
1.5	100.0	D85	3.25
1	100.0	D80	1.92
.75	100.0	D60	0.80
.375	92.5	D50	0.58
# 4	88.3	D30	0.38
#10	80.4	D20	0.28
#16	70.3	D15	0.23
#40	33.8	D10	0.18
#50	21.1		
#100	7.3		
#200	4.8		

Material Description
Poorly Graded Sand

Atterberg Limits
L.L.= N/A P.L.= NP P.I.= NP

Classification
AASHO 49 = A-1-b-(0)
AASHTO 87 = A-1-b-(0)
USCS = SP
Cu = 4.48 Cc = 1.01

Revision Date: 4-10-09 Tested by Nicole / Nicole Testing Date 09/21/11

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 31
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DATE	DESCRIPTION

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

BORING DATA
Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

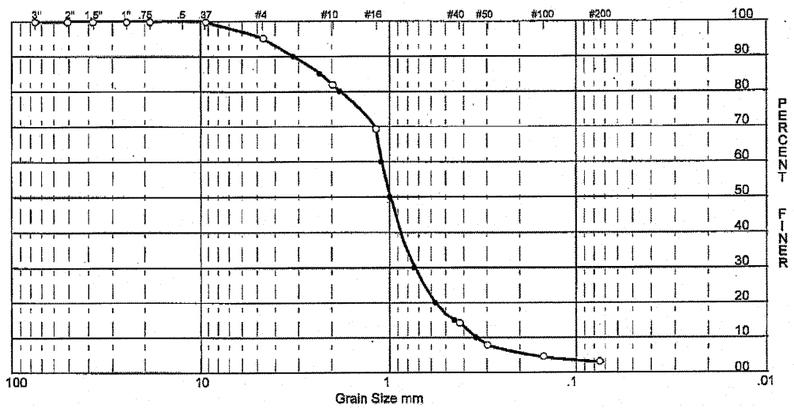
Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation
Particle Size Distribution Report
AASHTO T89/90 LL/PI and T88 Scour Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T721 Station: 234+57.5, 16.5 LT Depth: 40.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	17.9	67.7	11.1	3.3

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	4.57
2	100.0	D90	3.12
1.5	100.0	D85	2.25
1	100.0	D80	1.77
.75	100.0	D60	1.07
.375	100.0	D50	0.97
# 4	95.4	D30	0.72
#10	82.1	D20	0.56
#16	69.5	D15	0.44
#40	14.4	D10	0.33
#50	8.1		
#100	4.8		
#200	3.3		

Material Description
Poorly Graded Sand

Atterberg Limits
L.L.= N/A P.L.= NP P.I.= NP

Classification
AASHO 49 = A-1-b-(0)
AASHTO 87 = A-1-b-(0)
USCS = SP
Cu = 3.21 Cc = 1.44

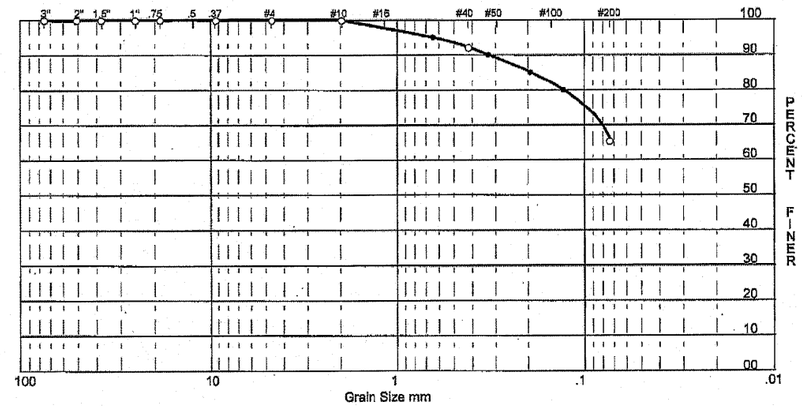
Revision Date: 4-10-09 Tested by Nicole / Nicole Testing Date 09/21/11

Missouri Department of Transportation
Particle Size Distribution Report
ASSHTO T89/90 LL/PI and T88 Gradation

Dist or Project J0P2339 Route: 91 County: SCOTT

Sample # 11ME1T724 Station: 235+55.5, 16.5 RT Depth: 5.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	.0	7.8	26.8	65.4

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	0.62
2	100.0	D90	0.32
1.5	100.0	D85	0.19
1	100.0	D80	0.13
.75	100.0		
.375	100.0		
# 4	100.0		
#10	100.0		
#40	92.2		
#200	65.4		

Material Description
Sandy Silt

Atterberg Limits
L.L.= 23 P.L.= 20 P.I.= 3

Classification
AASHO 49 = A-4-(6)
AASHTO 87 = A-4-(0)
USCS = ML

Revision Date: 4-10-09 Tested by ken / Nicole Testing Date 09/21/11

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026810
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED	
1/6/2012	
ROUTE 91	STATE MO
DISTRICT BR	SHEET NO. 32
COUNTY SCOTT	
JOB NO. J0P2239	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7956	

DESCRIPTION | DATE

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

BORING DATA
Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

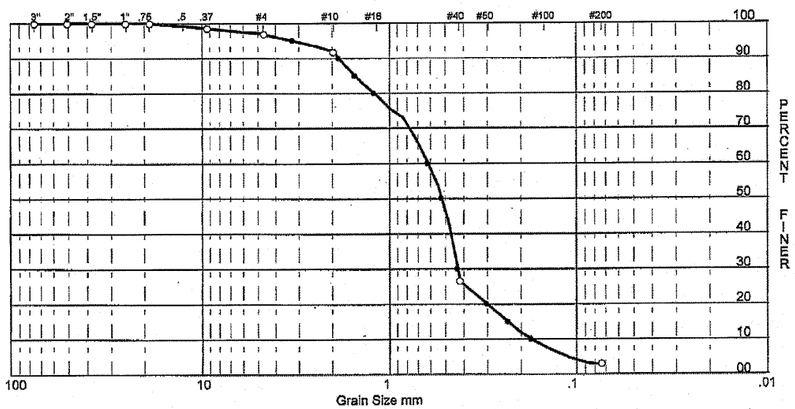
Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation
Particle Size Distribution Report
ASSHTO T89/90 LL/PI and T88 Gradation

Dist or Project J0P2339 Route: 91 County: SCOTT

Sample # 11ME1T725 Station: 235+55.5, 16.5 RT Depth: 15.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	8.1	65.2	23.6	3.1

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	3.17
2	100.0	D90	1.81
1.5	100.0	D85	1.48
1	100.0	D80	1.18
.75	100.0	D60	0.61
.375	98.6	D50	0.51
# 4	97.0	D30	0.42
#10	91.9	D20	0.30
#40	26.7	D15	0.23
#200	3.1	D10	0.17

Material Description
Poorly Graded Sand

Atterberg Limits
L.L.= N/A P.L.= NP P.I.= NP

Classification
AASHO 49 = A-1-b-(0)
AASHTO 87 = A-1-b-(0)
USCS = SP
Cu = 3.53 Cc = 1.70

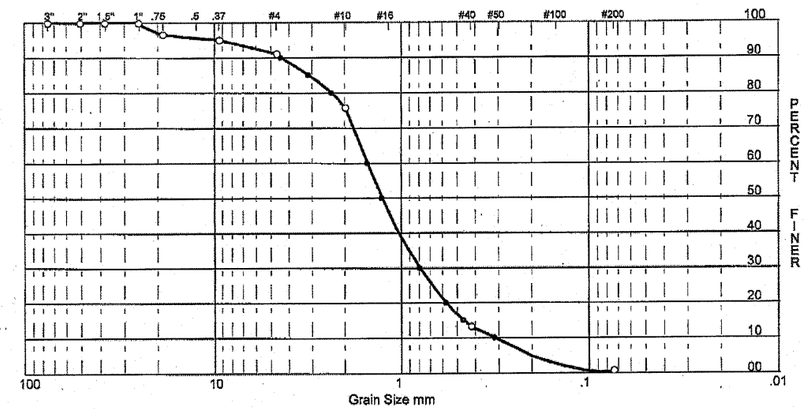
Revision Date: 4-10-09 Tested by ken Testing Date 09/21/11

Missouri Department of Transportation
Particle Size Distribution Report
ASSHTO T89/90 LL/PI and T88 Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T726 Station: 235+55.5, 16.5 RT Depth: 25.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	24.1	62.5	12.5	.9

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	9.22
2	100.0	D90	4.33
1.5	100.0	D85	3.06
1	100.0	D80	2.31
.75	96.7	D60	1.48
.375	95.1	D50	1.23
# 4	91.2	D30	0.78
#10	75.9	D20	0.56
#40	13.4	D15	0.45
#200	.9	D10	0.31

Material Description
Poorly Graded Sand

Atterberg Limits
L.L.= N/A P.L.= NP P.I.= NP

Classification
AASHO 49 = A-1-b-(0)
AASHTO 87 = A-1-b-(0)
USCS = SP
Cu = 4.82 Cc = 1.33

Revision Date: 4-10-09 Tested by ken / Nicole Testing Date 09/21/11

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED 1/6/2012
ROUTE 91 STATE MO
DISTRICT BR SHEET NO. 33
COUNTY SCOTT
JOB NO. J0P2239
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7956

DESCRIPTION
DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

BORING DATA
Note: For locations of borings, see Sheet No. 1.

Detailed Nov. 2011
Checked Nov. 2011

Note: This drawing is not to scale. Follow dimensions.

Missouri Department of Transportation

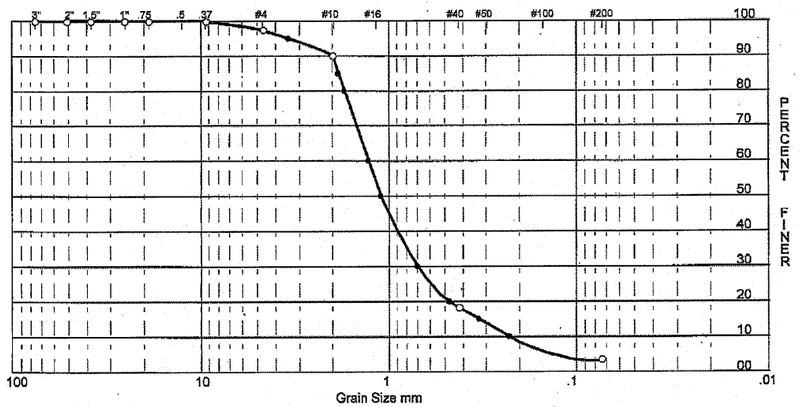
Particle Size Distribution Report

ASSHTO T89/90 LL/PI and T88 Gradation

Dist or Project J0P2239 Route: 91 County: SCOTT

Sample # 11ME1T727 Station: 235+55.5, 16.5 RT Depth: 50.0

GRADATION / CLASSIFICATION



% +3 inch	% Gravel	% Sand		% Fines
AASHTO	*Classified*	Coarse	Fine	Silt or Clay
	9.9	71.7	14.8	3.6

Sieve Size	Percent Finer	Coefficients	
3	100.0	D95	3.36
2	100.0	D90	1.95
1.5	100.0	D85	1.81
1	100.0	D80	1.68
.75	100.0	D60	1.25
.375	100.0	D50	1.07
# 4	97.5	D30	0.68
#10	90.1	D20	0.46
#40	18.4	D15	0.32
#200	3.6	D10	0.22

Material Description

Poorly Graded Sand

Atterberg Limits

L.L.= N/A P.L.= NP P.I.= NP

Classification

AASHO 49 = A-1-b-(0)
AASHTO 87 = A-1-b-(0)
USCS = SP
Cu = 5.67 Cc = 1.67

Revision Date: 4-10-09 Tested by Kenny Testing Date 09/21/11

BORING DATA

Note: For locations of borings, see Sheet No. 1.

Note: This drawing is not to scale. Follow dimensions.

Detailed Nov. 2011
Checked Nov. 2011

STATE OF MISSOURI
MICHELE ANN ATKINSON
NUMBER PE-026610
PROFESSIONAL ENGINEER

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

DATE PREPARED 1/6/2012

ROUTE	STATE
91	MO
DISTRICT	SHEET NO.
BR	34

COUNTY SCOTT

JOB NO. J0P2239

CONTRACT ID.

PROJECT NO.

BRIDGE NO. A7956

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.