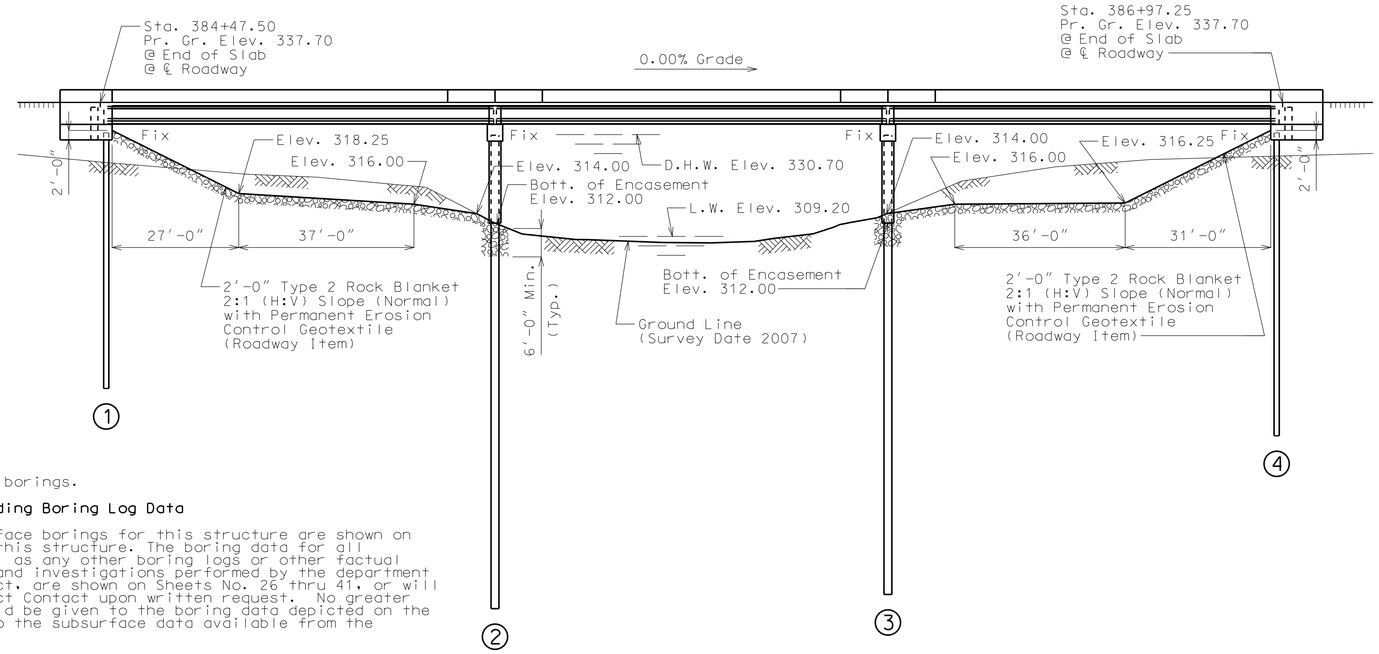
SEC/SUR 36 TWP 24N RGE 5E

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

(83'-83'-83') PRESTRESSED CONCRETE I-GIRDER SPANS



GENERAL ELEVATION

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

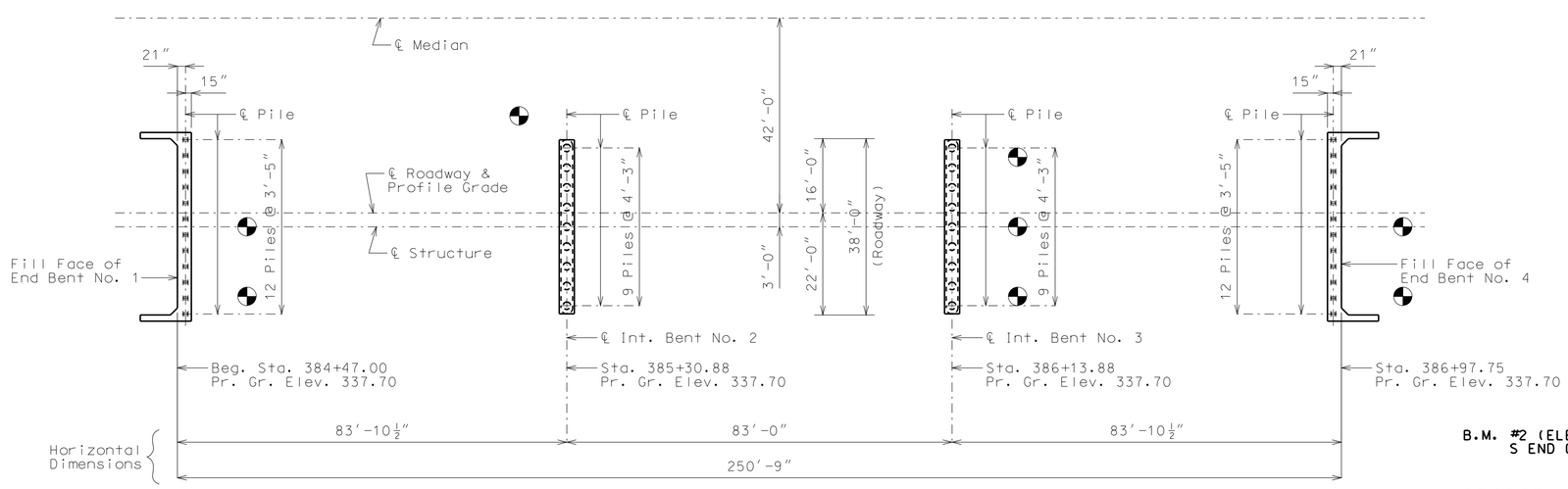
Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete beam within the limits of the structure and for not less than 25 feet in back of the fill face of the end bents before any piles are driven for any bents falling within the embankment section.

"⊕" 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 sheets 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 Sheets No. 26 thru 41, 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.



SPAN (1-2) SPAN (2-3) SPAN (3-4)

PLAN

B.M. #2 (ELEV. 340.073) CHISLED SQUARE TOP CNTR
S END OF W CONC BARRIER BR# A3867

BRIDGE: RTE. 67 SB OVER CANE CREEK (OVERFLOW)

STATE ROAD FROM RTE. 67(BUS) TO RTE. 160

ABOUT 2.7 MILES SOUTH OF RTE. 67(BUS)

STA. 384+47.00

STD. 609.00
STD. 617.10
STD. 706.35

Designed July 2011
Detailed July 2011
Checked Oct. 2011

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

Sheet No. 1 of 41

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

DATE PREPARED	2/17/2012
ROUTE	67SB
STATE	MO
DISTRICT	BR
SHEET NO.	1
COUNTY	BUTLER
JOB NO.	J0P0959
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	A7669

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
Bridge Approach Slab (Bridge)	sq. yard		219	219
Structural Steel Piles (14 in.)	linear foot	1296		1296
Cast-In-Place Concrete Piles (20 in.)	linear foot	1737		1737
Dynamic Pile Testing	each	4		4
Dynamic Pile Restrike Testing	each	4		4
Class B Concrete (Substructure)	cu. yard	157.0		157.0
* Safety Barrier Curb	linear foot		534	534
Slab on Concrete I-Girder	sq. yard		1129	1129
Type 4 (45 in.) Prestressed Concrete I-Girder	linear foot		1236	1236
Reinforcing Steel (Bridges)	pound	24,060		24,060
Steel Intermediate Diaphragm for P/S Concrete Girders	each		12	12
Slab Drains	each		42	42
Vertical Drain at End Bents	each			2
Plain Neoprene Bearing Pad	each		10	10
Laminated Neoprene Bearing Pad	each		20	20

* Safety 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 I-Girder.

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

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

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

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 (14 in.).

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 I-Girder

Item		Total
Class B-2 Concrete	cu. yard	339.8
Reinforcing Steel	pound	10,900
Reinforcing Steel (Epoxy Coated)	pound	87,090

The table of Estimated Quantities for Slab on Concrete I-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 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.

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

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

GENERAL NOTES:

Design Specifications:

2010 - AASHTO LRFD Bridge Design Specifications and 2010 Interim Revisions

2011 - AASHTO LRFD 2nd Edition for Seismic Design
Seismic Design Category C
Seismic Peak Horizontal Ground Acceleration = 0.32g
(7% probability of exceedance in 75 years)

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 & Safety Barrier Curb)	f'c = 4,000 psi
Class B-1 Concrete (Safety Barrier Curb)	f'c = 4,000 psi
Reinforcing Steel (Grade 60)	fy = 60,000 psi
Steel Pile (ASTM A709 Grade 50)	fy = 50,000 psi

For cast-in-place concrete pile stresses, see Sheets No. 7 & 9.
For prestressed girder stresses, see Sheet No. 12.

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:

Existing Route 67 to remain open to traffic during construction.

Miscellaneous:

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

Foundation Data

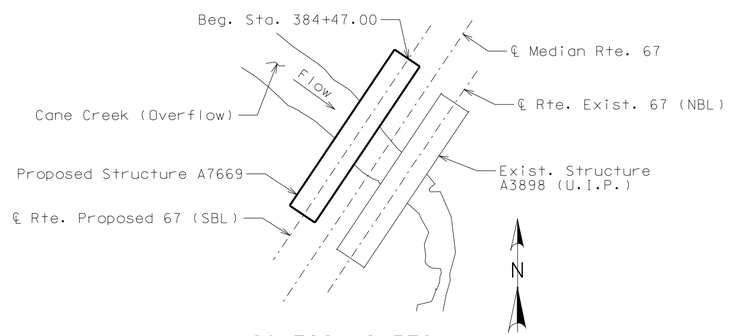
Bent No.		1	2	3	4
Driven Pile	Pile Type and Size	HP14 x 73	20" CIP	20" CIP	HP14 x 73
	Number	12	9	9	12
	Approximate Length (foot)	53	96	97	55
	Pile Driving Verification Method	**	**	**	**
	Minimum Nominal Axial Compressive Resistance (kip)	168	387	387	168
	Min. Tip Penetration	290	265.00	265.00	290
	Criteria for Minimum Tip Penetration	***	Scour	Scour	***
	Hammer Energy Required (foot-pound)	11,600	30,000	30,300	12,000

** Dynamic Pile Testing.

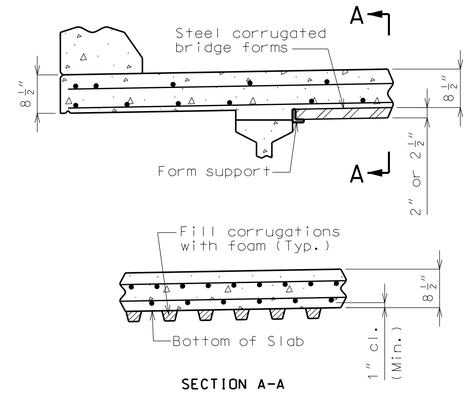
*** Minimum Embedment into natural ground.

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

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



LOCATION SKETCH



SECTION A-A

OPTIONAL STAY-IN-PLACE FORM DETAILS

Notes:
Corrugated steel forms, supports, closure elements and accessories shall be in accordance with grade requirement and coating designation G165 of ASTM A653. Complete shop drawings of the permanent steel deck forms shall be required in accordance with Sec 1080.

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

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

If metal straps are used for installation of form supports for placement of stay-in-place forms, the straps shall lay as flat as possible with top of girder. For girder details, see Sheet No. 12.

HYDROLOGIC DATA

Drainage Area = 171.80 (sq. mi.)
Backwater/Base Flood Data (100 year)
High Water Elev. = 331.30
Design Discharge = 43,600 (cfs)
Estimated Backwater = 0.80 (ft)
Average Velocity thru Opening = 7.30 (ft/sec)
Freeboard
Design Frequency = 50 (year)
Design Discharge = 34,000 (cfs)
Freeboard = 2.15 (ft)
Design High Water (DHW) Elev. = 330.70
Roadway Overtopping
Design Elev. (1' below shoulder) = 336.30
Design Discharge = 71,000 (cfs)
Design Frequency = 500 (year)

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DATE PREPARED	
2/21/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 2
COUNTY BUTLER	
JOB NO. J0P0959	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7669	

DATE	DESCRIPTION

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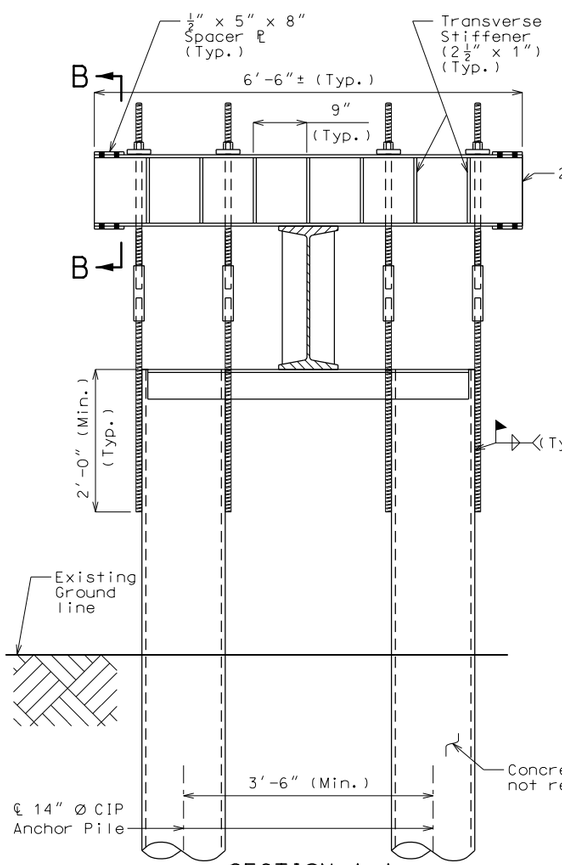
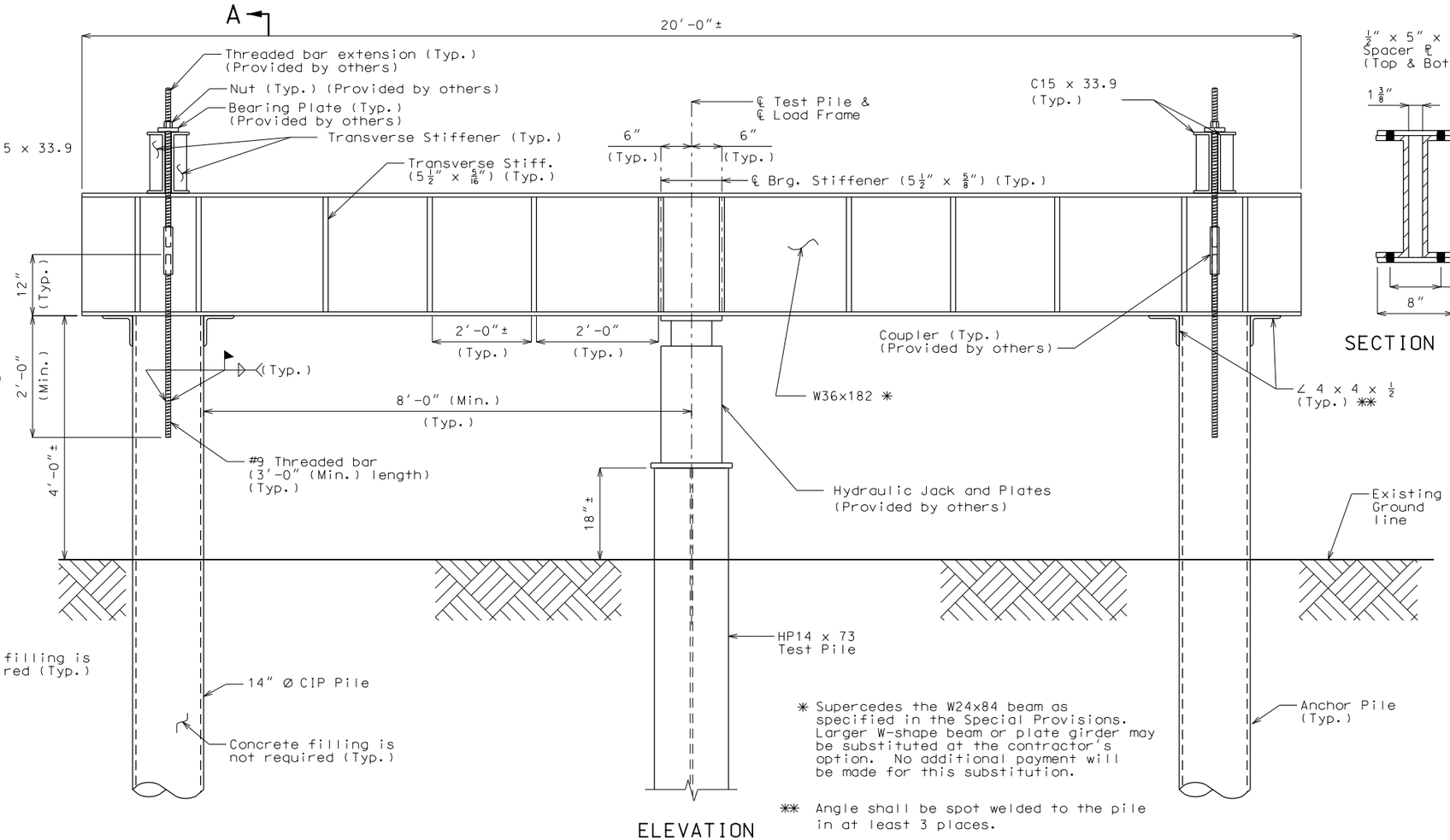
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)



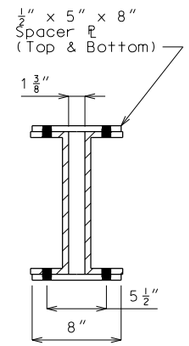
SECTION A-A



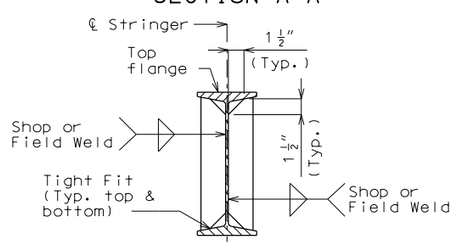
ELEVATION

✱ 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.

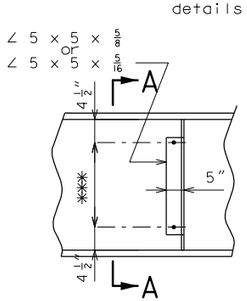


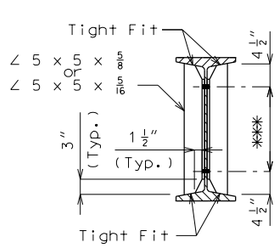
SECTION B-B



BEARING & TRANSVERSE STIFFENER WELDING DETAIL

(I-beam shown, channel details similar)



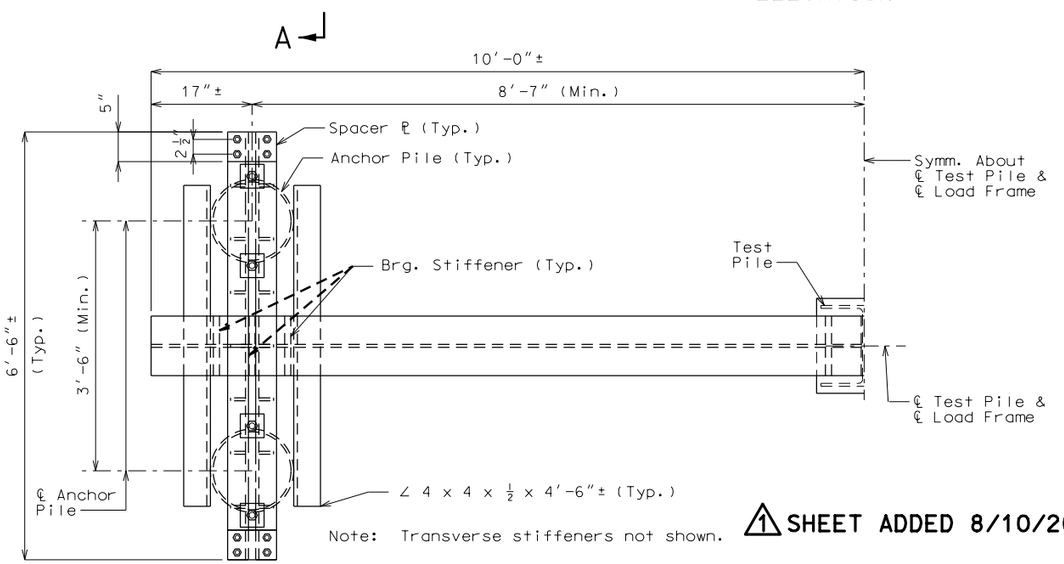


SECTION A-A

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)

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Form T-737-1RMO
Rev. 05/01

MISSOURI DEPARTMENT OF TRANSPORTATION
Construction and Materials

BORING DATA

Sheet 1 of 5

Job No.: J0P0959
County: Butler **Route:** 67 **Design:** A7669
Over: Cane Creek (Overflow) **Skew:** --
Logged by: R. Todd, E. Thomas **Operator:** Holtmeyer
Equipment: Mobile Drill B-31, 3" Augers **Date of Work:** 11/9/2010, 12/8/2010

Bent	Station	Location	Surface Elevation		Log of Materials *
	384+62 826271.6E	30.0' RT. 313204.0N	323.8		Inaccessible due to steep slope.
	384+62 826246.7E	60.0' RT. 313220.7N	324.2	0.0-16.0' 16.0-39.6' 39.6-63.5' 63.5-90.8' 90.8-91.0'	Brown lean clay, trace gravel, moist, stiff. Bluish-gray fat clay, trace sand, moist, medium stiff. Coarse grained sand and gravel. Gravel and cobbles. Dolomite, moderately hard.
	385+45 826213.1E	45.0' RT. 313143.4N	308.5		Inaccessible due to steep slope.
	385+45 826204.3E	60.0' RT. 313157.7N	309.1		Inaccessible due to steep slope.
	386+28 826166.5E	45.0' RT. 313074.5N	319.8	0.0-15.5' 15.5-47.2' 47.2-78.7' 78.7-92.4' 92.4-98.2' 98.2-99.0'	Brown lean clay, trace gravel. Bluish-gray fat clay, trace sand, moist, medium stiff. Coarse grained sand and gravel. Gravel and cobbles. Weathered dolomite. Dolomite.
	386+28 826154.3E	60.0' RT. 313083.0N	322.2	0.0-15.4' 15.4-39.4' 39.4-47.8' 47.8-61.3' 61.3-70.6' 70.6-81.1' 81.1-101.8' 101.8-103.0'	Brown lean clay, trace gravel, moist, stiff. Bluish-gray fat clay, trace sand, moist, medium stiff. Coarse grained sand and gravel. Coarse gravel and cobbles. Gray sand, scattered gravel, wet. Cobbles. Boulders, abundant gravel and cobbles. Dolomite, moderately hard.
	387+11 826132.8E	30.0' RT. 312997.4N	326.4		Inaccessible due to steep slope.
	387+11 826120.4E	45.0' RT. 313005.9N	326.4	0.0-15.2' 15.2-37.1' 37.1-76.2' 76.2-89.3' 89.3-107.2' 107.2-107.8'	Brown lean clay, trace gravel, moist. Bluish-gray fat clay, trace sand, moist, medium stiff. Coarse grained sand and gravel. Gravel and cobbles. Highly weathered dolomite. Dolomite.

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:** 1.00007882387

* 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 judgment of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

Form T-737-1RMO
Rev. 05/01

MISSOURI DEPARTMENT OF TRANSPORTATION
Construction and Materials

BORING DATA (CORE & SPT)

Sheet 2 of 5

Job No.: J0P0959
County: Butler **Route:** 67 **Design:** A7669
Over: Cane Creek (Overflow) **Skew:** --
Logged by: R. Todd **Operator:** Donahoe
Equipment: Failing 1500 **Drillers Hole No.:** A-10-29
Hole Stab. by: Drilling Fluids **Date of Work:** 11/8/2010
Automatic Hammer Efficiency: 80 % **Drill No.:** G-7887

Bent	Station	Location	Surface Elevation, ft.
1	384+62 826259.2E	45.0' RT. 313212.3N	323.5

TEST DATA

Depth, ft.	SPT Blows/6"	N_{60}	Pocket Pen., tsf	Wn%
5.0	7-12-13	33	4.00	--
10.0	5-6-5	15	2.00	24.3
15.0	2-3-3	8	1.00	--
20.0	2-4-4	11	1.25	28.8
25.0	3-1-5	8	1.00	--
30.0	1-1-2	4	0.50	40.4
35.0	1-1-1	3	--	--
40.0	17-21-16	49	--	--
45.0	10-12-11	31	--	--
50.0	16-19-28	63	--	--
60.0	13-12-13	33	--	--
70.0	6-5-6	15	1.25	38.1
80.0	31-38 in 6"	100+	--	--

SOIL CLASSIFICATION TEST DATA

Depth, ft.	LL	PI	ASTM Class.
10.0	30	9	CL
20.0	39	19	CL
30.0	54	33	CH
40.0	--	NP	SP-SM
50.0	--	NP	SW-SM
70.0	52	30	CH

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes

WATER TABLE OBSERVATIONS

Date	Time Change	Depth Hole Open	Depth To Water

LOG OF MATERIALS*

0.0-28.9'	Light bluish-grayish-brown mottled lean clay, trace to scattered sand, moist, very stiff to medium stiff.
28.9-38.9'	Bluish-gray fat clay, scattered sand, moist, medium stiff to soft.
38.9-44.2'	Gray medium grained sand, scattered gravel, moist, dense.
44.2-70.0'	Gray coarse grained sand, with gravel, moist, dense to very dense.
70.0-80.0'	Bluish-gray fat clay, moist, stiff.
80.0-94.2'	Gravel, trace cobbles, dense to very dense.
94.2-94.7'	Highly weathered dolomite.
94.7-98.6'	Dolomite, cut with rockbit, moderately hard.

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:** 1.00007882387

N_{60} = (Em/60)Nm

N_{60} - Corrected N value for standard 60% SPT efficiency.
Em - Measured transfer efficiency in percent.
Nm - Observed N-value.

* 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 judgment of the operator.
THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

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DATE PREPARED 2/17/2012
ROUTE 67SB STATE MO
DISTRICT BR SHEET NO. 26
COUNTY BUTLER
JOB NO. J0P0659
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7669

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.

Form T-737-1RMO
Rev. 05/01

MISSOURI DEPARTMENT OF TRANSPORTATION
Construction and Materials

BORING DATA (CORE & SPT)

Sheet 3 of 5

Job No.: J0P0959
County: Butler **Route:** 67 **Design:** A7669
Over: Cane Creek (Overflow) **Skew:** --
Logged by: E. Thomas **Operator:** Volkart
Equipment: Acker XLS **Drillers Hole No.:** O-10-114
Hole Stab. by: Hollow Stem Augers **Date of Work:** 11/22/2010
Automatic Hammer Efficiency: 79 % **Drill No.:** G-9462

Bent	Station	Location	Surface Elevation, ft.
2	385+45 826225.4E	30.0' RT. 313135.2N	309.6
Offset to:	385+20.6 826234.3E	21.1' RT. 313159.9N	317.6

TEST DATA

Depth, ft.	SPT Blows/6"	N_{60}	Pocket Pen., tsf	Wn%
5.0	4-2-3	7	0.75	18.6
10.0	2-1-2	4	0.75	--
15.0	3-4-5	12	1.50	25.7
20.0	3-12-20	42	0.50	--
25.0	4-3-3	8	0.50	--
30.0	1-1-1	3	0.00	44.3
35.0	9-4-3	9	--	--
40.0	4-6-10	21	--	--
45.0	10-15-19	45	--	--
50.0	4-6-7	17	--	--
55.0	8-8-6	18	No Recovery	--
60.0	3-4-4	11	1.25	31.4
70.0	6-5-7	16	0.50	--
80.0	12-38 in 6"	100+	--	--
85.0	8-38 in 6"	100+	--	--

SOIL CLASSIFICATION TEST DATA

Depth, ft.	LL	PI	ASTM Class.
5.0	30	12	CL
10.0	35	15	CL
15.0	38	18	CL
25.0	50	27	CH
35.0	--	NP	SP
40.0	--	--	GP
60.0	48	25	CL

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes
85.4	90.4	5.0	4.6	0.4	0	
90.4	95.4	5.0	0.0	5.0	0	
95.4	100.4	5.0	0.0	5.0	0	
100.4	105.4	5.0	3.5	1.5	0	
105.4	107.5	2.1	2.1	0.0	90	

WATER TABLE OBSERVATIONS

Date	Time Change	Depth Hole Open	Depth To Water
12/2/2010	22 hours	23.0'	6.0'

LOG OF MATERIALS*

Inaccessible due to steep slope.

0.0-15.0' Brown lean clay, mottled gray, trace sand and gravel, moist, medium stiff.
15.0-35.0' Grayish-brown lean to fat clay, trace sand. moist, stiff to soft.
35.0-40.0' Brown sand, trace gravel, moist, loose.
40.0-60.0' Brown-gray gravelly sand, moist, medium dense to dense.
60.0-83.0' Grayish-brown lean clay, moist, stiff to soft.
83.0-84.6' Gray sandy silt, moist, dense.
84.6-90.0' Gray fine to medium grained dolomite, thin bedded, intermittent slightly weathered cherty dolomite and scattered vertical fractures, medium to moderately hard.
90.0-100.4' Light reddish-brown clayey sand.
100.4-107.5' Gray medium grained dolomite, thin bedded, intermittent slightly weathered, scattered cherty dolomite, medium to moderately hard.

UNCONFINED COMPRESSIVE STRENGTH TEST DATA

Depth, ft.	Qu, ksf	P.P., tsf
107.1	756.0	9.00+

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:** 1.00007882387

N_{60} = (Em/60)Nm
N_{60} - Corrected N value for standard 60% SPT efficiency.
Em - Measured transfer efficiency in percent.
Nm - Observed N-value.

* 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 judgment of the operator.
THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

Form T-737-1RMO
Rev. 05/01

MISSOURI DEPARTMENT OF TRANSPORTATION
Construction and Materials

BORING DATA (CORE & SPT)

Sheet 4 of 5

Job No.: J0P0959
County: Butler **Route:** 67 **Design:** A7669
Over: Cane Creek (Overflow) **Skew:** --
Logged by: R. Todd **Operator:** Murray
Equipment: Acker XLS **Drillers Hole No.:** O-10-113
Hole Stab. by: Hollow Stem Augers **Date of Work:** 11/15/2010
Automatic Hammer Efficiency: 79 % **Drill No.:** G-9462

Bent	Station	Location	Surface Elevation, ft.
3	386+28 826179.1E	30.0' RT. 313135.2N	318.1

TEST DATA

Depth, ft.	SPT Blows/6"	N_{60}	Pocket Pen., tsf	Wn%
5.0	1-1-1	3	No Recovery	--
10.0	2-1-2	4	0.25	--
15.0	1-2-3	7	0.50	38.7
20.0	2-3-6	12	1.00	30.8
25.0	1-3-3	8	0.50	39.0
30.0	1-1-1	3	--	--
35.0	1-1-1	3	--	--
40.0	3-5-7	16	--	--
45.0	15-18-9	36	--	--
50.0	8-8-15	30	--	--
60.0	2-6-6	16	--	--
70.0	2-3-12	20	--	--
80.0	9-9-9	24	--	--
90.0	38 in 6"	100+	--	--

SOIL CLASSIFICATION TEST DATA

Depth, ft.	LL	PI	ASTM Class.
5.0	30	9	CL
15.0	28	3	ML
25.0	31	4	ML
45.0	NV	NP	SP-SM
70.0	50	28	CH

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes
97.6	101.3	3.7	2.4	1.3	0	
101.3	106.3	5.0	4.2	0.0	0	
106.3	111.3	5.0	5.0	0.0	13	
111.3	116.3	5.0	5.0	0.0	98	
116.3	121.3	5.0	5.0	0.0	0	
121.3	126.3	5.0	4.5	0.5	20	
126.3	131.3	5.0	5.0	0.0	0	
131.3	136.3	5.0	4.5	0.5	0	
136.3	141.3	5.0	5.0	0.0	0	

WATER TABLE OBSERVATIONS

Date	Time Change	Depth Hole Open	Depth To Water
11/15/2010	30 mins.	30.0'	4.0'

LOG OF MATERIALS*

0.0-15.0' Brown lean clay, trace gravel, moist, soft.
15.0-32.5' Bluish-gray to gray silt, trace sand, moist, stiff to soft.
32.5-40.0' Gray medium grained sand, moist, very loose.
40.0-70.0' Brown coarse grained sand and gravel, moist, medium dense to dense.
70.0-80.0' Gray fat clay, scattered sand, moist, stiff.
80.0-90.0' Brown coarse grained sand, with gravel, moist, medium dense.
90.0-97.6' Highly weathered dolomite.
97.6-116.3' Gray fine grained dolomite, thin bedded, cherty, slightly weathered, moderately hard to medium hard.
116.3-135.8' Gray medium grained dolomite, thin bedded, weathered, medium to moderately hard.
135.8-136.3' Clay seam.
136.3-141.3' Gray medium grained dolomite, thin bedded, weathered, cherty, medium to moderately hard.

UNCONFINED COMPRESSIVE STRENGTH TEST DATA

Depth, ft.	Qu, ksf	P.P., tsf
108.3	673.2	9.0+
113.1	357.1	9.0+

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:** 1.00007882387

N_{60} = (Em/60)Nm
N_{60} - Corrected N value for standard 60% SPT efficiency.
Em - Measured transfer efficiency in percent.
Nm - Observed N-value.

* 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 judgment of the operator.

THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

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

DATE PREPARED 2/17/2012
ROUTE 67SB STATE MO
DISTRICT BR SHEET NO. 27
COUNTY BUTLER
JOB NO. J0P0659
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7669

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.

Form T-737-1RMO
Rev. 05/01

MISSOURI DEPARTMENT OF TRANSPORTATION
Construction and Materials

BORING DATA (CORE & SPT)

Sheet 5 of 5

Job No.:	J0P0959				
County:	Butler	**Route:**	67	**Design:**	A7669
Over:	Cane Creek (Overflow)			**Skew:**	--
Logged by:	R. Todd			**Operator:**	Mathews
Equipment:	Failing 1500			**Drillers Hole No.:**	A-10-30
Hole Stab. by:	Drilling Fluids			**Date of Work:**	11/5/2010
Automatic Hammer Efficiency:			80 %	**Drill No.:**	G-7887

Bent	Station	Location	Surface Elevation, ft.
4	387+11 826108.0E	60.0' RT. 313014.1N	327.1

TEST DATA

Depth, ft.	SPT Blows/6"	N_{60}	Pocket Pen., tsf	Wn%
5.0	2-2-2	5	0.50	--
10.0	1-1-1	3	0.25	27.4
15.0	3-4-6	13	1.00	26.4
20.0	1-1-3	5	0.50	40.6
25.0	3-1-4	7	0.50	39.9
30.0	4-6-7	17	1.25	--
35.0	2-1-4	7	0.50	40.5
40.0	1-2-3	7	0.50	32.8
50.0	28-28-24	69	--	--
60.0	4-4-6	13	1.25	31.1
70.0	9-9-13	29	2.25	--
80.0	10-19-33	69	--	--
90.0	38 in 4"	100+	--	--

SOIL CLASSIFICATION TEST DATA

Depth, ft.	LL	PI	ASTM Class.
10.0	29	7	CL-ML
15.0	28	7	CL-ML
20.0	26	2	ML
25.0	41	18	CL
35.0	69	44	CH
50.0	--	NP	SP-SM
60.0	57	35	CH

CORING LOG (NX Double Tube Barrel)

From	To	Run	Rec	Loss	% RQD	Notes
94.3	99.3	5.0	3.3	1.7	0	
99.3	104.3	5.0	4.0	1.0	0	
104.3	109.3	5.0	2.8	2.2	0	

WATER TABLE OBSERVATIONS

Date	Time Change	Depth Hole Open	Depth To Water

LOG OF MATERIALS*

0.0-18.8'	Brown mottled gray lean clay, trace sand, moist, soft to medium stiff.
18.8-24.7'	Gray mottled lean clay to silt, scattered sand, trace organics, moist, medium stiff.
24.7-35.0'	Bluish-gray lean clay, trace sand, moist, medium stiff to stiff.
35.0-42.5'	Gray fat clay, moist, medium stiff.
42.5-60.0'	Gray coarse grained sand, with gravel, moist, very dense.
60.0-80.0'	Gray fat clay, scattered sand, moist, stiff to very stiff.
80.0-90.0'	Gravel, very dense.
90.0-94.3'	Highly weathered dolomite.
94.3-109.3'	Gray medium grained dolomite, thin bedded, cherty, weathered, and moderately hard.

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:	1.00007882387		

N_{60} = (Em/60)Nm

N_{60} - Corrected N value for standard 60% SPT efficiency.
Em - Measured transfer efficiency in percent.
Nm - Observed N-value.

* 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 judgment of the operator.
THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

SOIL CLASSIFICATION Elevation - 323.5	Elevation	Compressible Yes	Compressible No	Overdrig Yes	Overdrig No	Scour Yes	Scour No	Total Unit Wt γ Driven, pcf	Effective Unit Wt γ' Driven, pcf	Undrained Shear Strength, S_u or c, psf	PP, tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain ε50 or ε	Lateral Subgrade Modulus, kl, pci	Young's Modulus Frames, ms, psi	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
0.0-11.9' Stiff clay, without free water.																		
@ 5.0'			x		x			125	17.5	4000	4.00	33		0.0045	1350			
@ 10.0'			x		x			125.6	125.6	1000	2.00	15		0.006	700			
11.9-28.3' Stiff clay, with free water.	311.8'																	
@ 15.0'			x		x			110	47.6	1000	1.00	8		0.0065	250			
@ 20.0'			x		x			121.3	58.9	1250	1.25	11		0.0075	400			
@ 25.0'			x		x			110	47.6	1000	1.00	8		0.0085	250			
28.3-38.9' Soft clay.	295.2'																	
@ 30.0'			x		x			112.5	50.1	500	0.50	4		0.011	100			
@ 35.0'			x		x			105	42.6	500		3		0.01	100			
38.9-70.0' Sand.	284.6'																	

Key:
Y Water Table
c Cohesion

JOB NO.: J0P0959
COUNTY: Butler
ROUTE: 67
STATION: 384+62, 45.0' RT
BRIDGE NO.: A7669
COORDINATES: N:262959.2E: 3130212.3N

FIGURE 1 of 8
SHEET 1 of 3

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

DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 28
COUNTY BUTLER	
JOB NO. J0P0659	
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.

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.

SOIL CLASSIFICATION Elevation – 323.5		Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain ε_{50}/K_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
38.9-70.0' Sand.	@ 40.0'			x				x	135	72.6			49	40		125			
	@ 45.0'			x				x	131	68.6			31	36		125			
	@ 50.0'			x				x	135	72.6			63	42		125			
	@ 60.0'			x				x	131	68.6			33	36		125			
70.0-80.0' Stiff clay, with free water.	@ 70.0'	253.5'		x				x	114.1	51.7	1250	1.25			0.0075	400			
		243.5'																	

Key: V Water Table; c Cohesion

FIGURE 1 of 8
SHEET 2 of 3

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 384+62, 45.0' RT
BRIDGE NO.: A 7669
COORDINATES: 826259.2E, 313212.3N

SOIL CLASSIFICATION Elevation – 323.5		Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain ε_{50}/K_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
80.0-94.2' Sand.	@ 80.0'	243.5		x				x	138	75.6			100+	45		125			
94.2-94.7' Weak rock.		229.3'																	
94.7-98.6' Strong rock.		228.8'																	
Termination of boring at 98.6'		224.9'																	

Key: V Water Table; c Cohesion

FIGURE 1 of 8
SHEET 3 of 3

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 384+62, 45.0' RT
BRIDGE NO.: A 7669
COORDINATES: 826259.2E, 313212.3N

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.

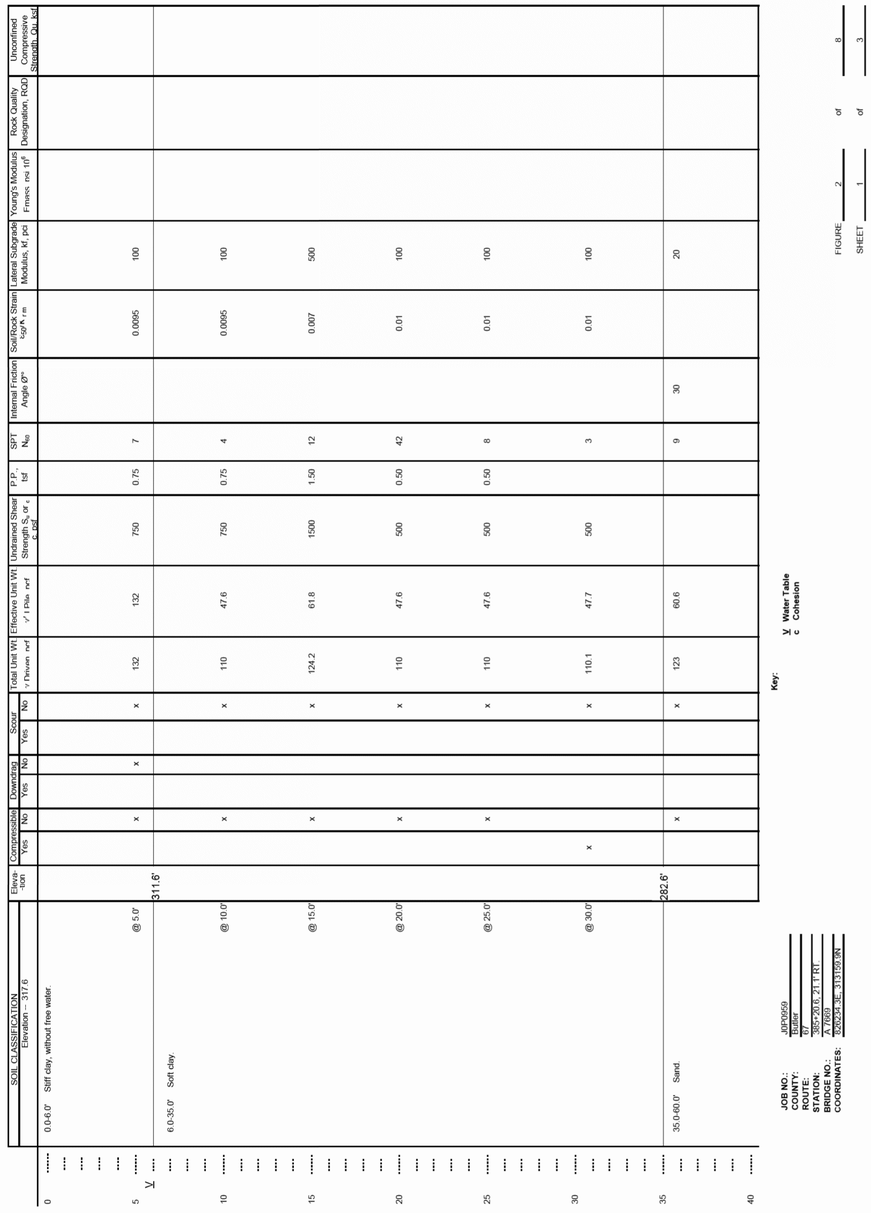
"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

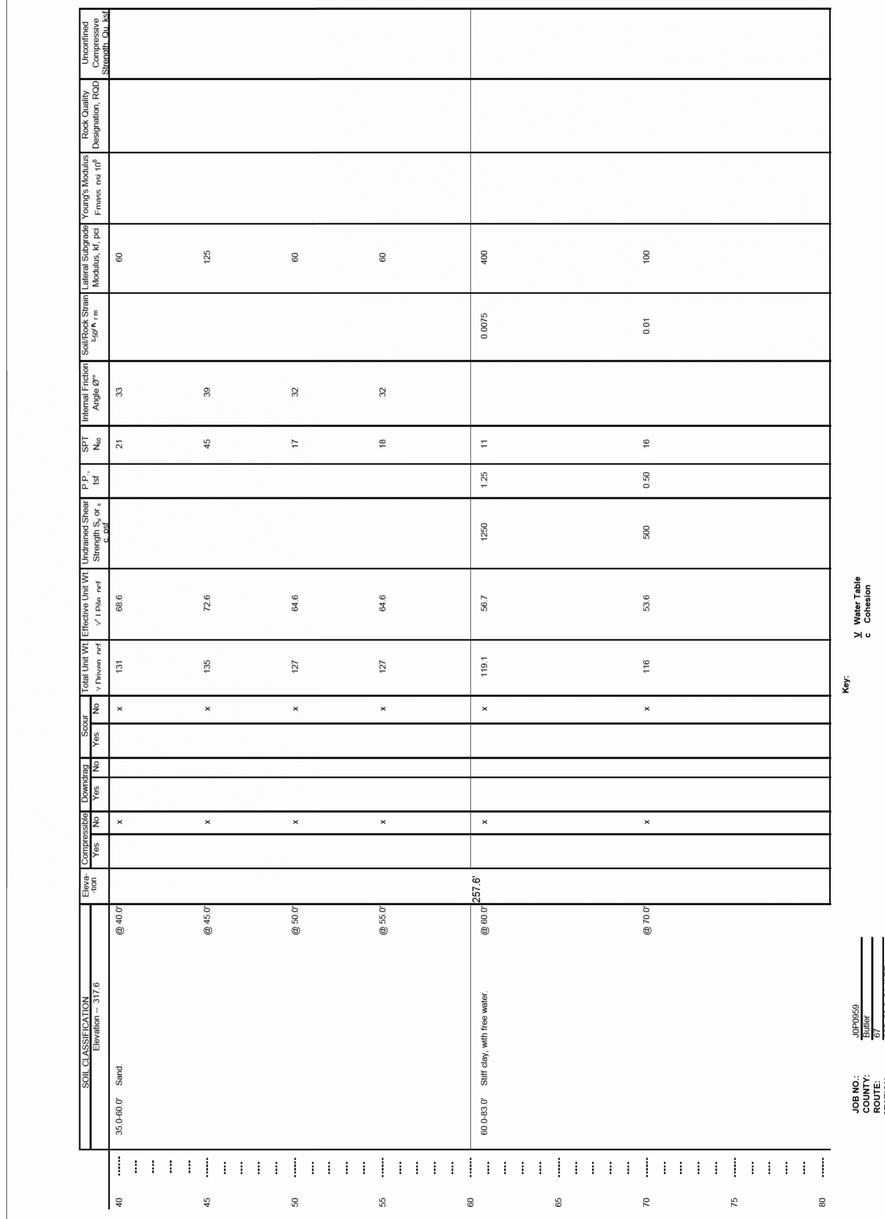
DATE PREPARED: 2/17/2012
ROUTE: 67SB
STATE: MO
DISTRICT: BR
SHEET NO.: 29
COUNTY: BUTLER
JOB NO.: J0P0659
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A7669

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
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.

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

Detailed Nov. 2011
Checked Nov. 2011

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

DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 30
COUNTY BUTLER	
JOB NO. J0P0659	
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.

SOIL CLASSIFICATION Elevation – 317.6	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain t_{50}/N_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Q_u, ksf
60.0-83.0' Stiff clay, with free water. @ 80.0'	237.6		x				x	129	66.6			100+						
83.0-84.6' Sand.	234.6'																	
84.6-90.0' Strong rock. @ 86.0'	233.0'													0.003		1.9	90	756
90.0-100.4' Soft clay.	227.6'																	
100.4-107.5' Strong rock.	217.2'													0.003		1.9	90	756
Termination of boring at 107.5' @107.1'	210.1'																	

Key: V Water Table; c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 385+20.6, 21.1' RT.
BRIDGE NO.: A 7669
COORDINATES: 826234.3E, 313159.9N

FIGURE 2 of 8
SHEET 3 of 3

SOIL CLASSIFICATION Elevation – 318.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain t_{50}/N_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Q_u, ksf
0.0-32.5' Soft clay. @ 5.0'		x			x		x	105	105	500		3		0.01	100			
@ 10.0'		x					x	105	42.6	250	0.25	4		0.02	50			
@ 15.0'			x				x	113.7	51.3	500	0.50	7		0.01	100			
@ 20.0'			x				x	119.6	57.2	1000	1.00	12		0.0085	250			
293.1 @ 25.0'		x					x	113.4	51	500	0.50	8		0.01	100			
@ 30.0'		x					x	105	42.6	500		3		0.02	50			
32.5-70.0' Sand. @ 35.0'	285.6'		x				x	120	57.6			3	27		20			

Key: V Water Table; c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 386+28, 30.0' RT.
BRIDGE NO.: A 7669
COORDINATES: 826179.1E, 313135.2N

FIGURE 3 of 8
SHEET 1 of 4

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.

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

DATE PREPARED 2/17/2012
ROUTE 67SB
STATE MO
DISTRICT BR
SHEET NO. 31
COUNTY BUTLER
JOB NO. J0P0659
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7669

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
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.

SOIL CLASSIFICATION Elevation – 318.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain ε_{50} or ε_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
32.5-70.0' Sand.	@ 40.0'		x				x	127	64.6			16	32		60			
	@ 45.0'		x				x	135	72.6			36	37		125			
	@ 50.0'		x				x	131	68.6			30	36		125			
	@ 60.0'		x				x	127	64.6			16	32		60			
70.0-80.0' Stiff clay, with free water.	@ 70.0'		x				x	108.7	46.3	2000		20		0.007	500			
	248.1'																	
	238.1'																	

Key: γ Water Table; c Cohesion

JOB NO.: J0P0959
COUNTY: Butler
ROUTE: 67
STATION: 384+62, 45.0' RT
BRIDGE NO.: A 7669
COORDINATES: 826259.2E, 313212.3N

FIGURE 3 of 8
SHEET 2 of 4

SOIL CLASSIFICATION Elevation – 318.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt. γ Driven, pcf	Effective Unit Wt. γ' Pile, pcf	Undrained Shear Strength S_u or c, psf	P.P., tsf	SPT N_{60}	Internal Friction Angle Ø°	Soil/Rock Strain ε_{50} or ε_{rm}	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmass, psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
80.0-90.0' Sand.	@ 80.0'		x				x			2500		24	34		60			
	238.1																	
90.0-97.6' Weak rock.	@ 90.0'											100+						
	228.1'																	
97.6-135.8' Hard rock.	@ 108.3'													1.18		0.004	13	673.2
	220.5'																	
	@ 113.1'													0.53		0.005	98	357.1

Key: γ Water Table; c Cohesion

JOB NO.: J0P0959
COUNTY: Butler
ROUTE: 67
STATION: 386+28, 30.0' RT
BRIDGE NO.: A 7669
COORDINATES: 826179.1E, 313135.2N

FIGURE 3 of 8
SHEET 3 of 4

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.

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

DATE PREPARED: 2/17/2012
ROUTE: 67SB
STATE: MO
DISTRICT: BR
SHEET NO.: 32
COUNTY: BUTLER
JOB NO.: J0P0659
CONTRACT ID.:
PROJECT NO.:
BRIDGE NO.: A7669

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
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.

SOIL CLASSIFICATION Elevation = 318.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt γ Driven, pcf	Effective Unit Wt γ' 1 Dim, pcf	Undrained Shear Strength, S_u or c c, psf	P.P. tsf	SPT N_{60}	Internal Friction Angle Φ°	Soil/Rock Strain ε_{50}/K m	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmaxs psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
97.6-135.8' Hard rock.	@ 121.3'																20	
135.8-136.3' Soft clay, with free water.	182.3'																	
136.3-141.3' Hard rock.	181.8'																	
Termination of boring at 141.3'	176.8'																	

Key:
▼ Water Table
c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 384+92' 45.0' RT
BRIDGE NO.: A7669
COORDINATES: 0.00259 2E, 313212.3N

FIGURE 3 of 8
SHEET 4 of 4

SOIL CLASSIFICATION Elevation = 327.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt γ Driven, pcf	Effective Unit Wt γ' 1 Dim, pcf	Undrained Shear Strength, S_u or c c, psf	P.P. tsf	SPT N_{60}	Internal Friction Angle Φ°	Soil/Rock Strain ε_{50}/K m	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmaxs psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
0.0-42.5' Soft clay.																		
	@ 5.0'		x				x	110	47.6	500	0.50	5		0.01	100			
	@ 10.0'	x					x	122.6	60.2	250	0.25	3		0.02	50			
	312.1																	
	@ 15.0'		x				x	123.5	61.1	1000	1.00	13		0.0085	250			
	@ 20.0'		x				x	112.4	50.0	500	0.50	5		0.01	100			
	@ 25.0'		x				x	112.9	50.5	500	0.50	7		0.01	100			
	@ 30.0'		x				x	116	53.6	1250	1.25	17		.0075	400			
	@ 35.0'		x				x	112.5	50.1	500	0.50	7		0.01	100			

Key:
▼ Water Table
c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 387+11' 60.0' RT
BRIDGE NO.: A7669
COORDINATES: 0.00108 2E, 313014.1N

FIGURE 4 of 8
SHEET 1 of 3

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DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 33
COUNTY BUTLER	
JOB NO. J0P0659	
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.

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

	SOIL CLASSIFICATION Elevation - 327.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt γ Dry, pcf	Effective Unit Wt γ' Dry, pcf	Undrained Shear Strength, S_u or c psf	P.P. tsf	SPT N_{60}	Internal Friction Angle Φ°	Soil/Rock Strain ε_{50}/K m	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmax psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
40	0.0-42.5' Soft clay. @ 40.0'			x				x	110.0	47.6	500	0.50	7		0.01	100			
45	42.5-60.0' Sand. @45.0'	284.6'		x				x	123	60.6			7	29		20			
50	@50.0'			x				x	135	72.6			69	44		125			
60	60.0-80.0' Stiff clay, with free water. @ 60.0'	267.1'		x				x	119.3	56.9	1250	1.25	13		0.0075	400			
70	@70.0'			x				x	123	60.6	2250	2.25	29		0.0055	750			
80		247.1'																	

Key:
γ Water Table
c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 387+11 60.0' RT
BENCHMARK: 7" Pine
COORDINATES: 626109.0E, 313041.1N

FIGURE 4 of 8
SHEET 2 of 3

	SOIL CLASSIFICATION Elevation - 327.1	Elevation	Compressible Yes	Compressible No	Downdrag Yes	Downdrag No	Scour Yes	Scour No	Total Unit Wt γ Dry, pcf	Effective Unit Wt γ' Dry, pcf	Undrained Shear Strength, S_u or c psf	P.P. tsf	SPT N_{60}	Internal Friction Angle Φ°	Soil/Rock Strain ε_{50}/K m	Lateral Subgrade Modulus, kf, pci	Young's Modulus Fmax psi 10^6	Rock Quality Designation, RQD	Unconfined Compressive Strength, Qu, ksf
80	80.0-90.0' Sand. @ 80.0'	247.1'		x				x	135	72.6			69	44		125			
90	90.0-94.3' Weak rock. @ 90.0'	237.1'											100+						
95	94.3-109.3' Hard rock.	232.8'																	
110	Termination of boring at 109.3'	217.8'																	
120																			

Key:
γ Water Table
c Cohesion

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 387+11 60.0' RT
BENCHMARK: 7" Pine
COORDINATES: 626109.0E, 313014.1N

FIGURE 4 of 8
SHEET 3 of 3

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

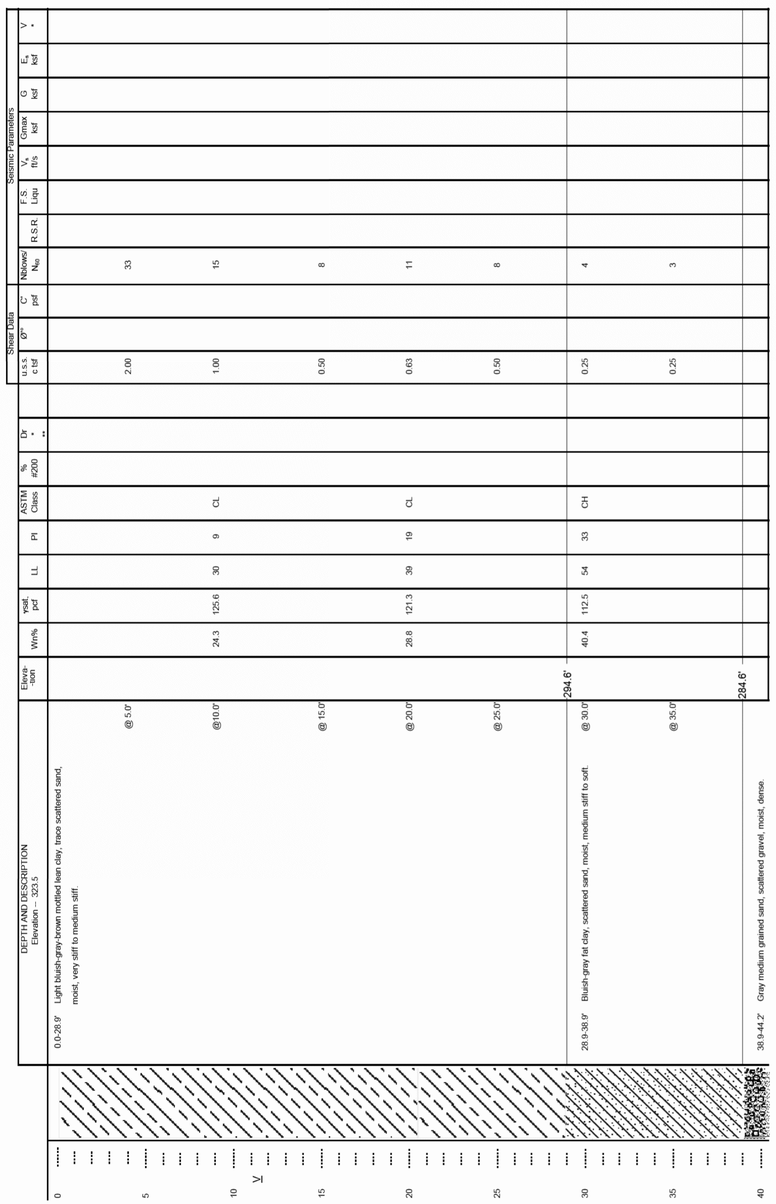
"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

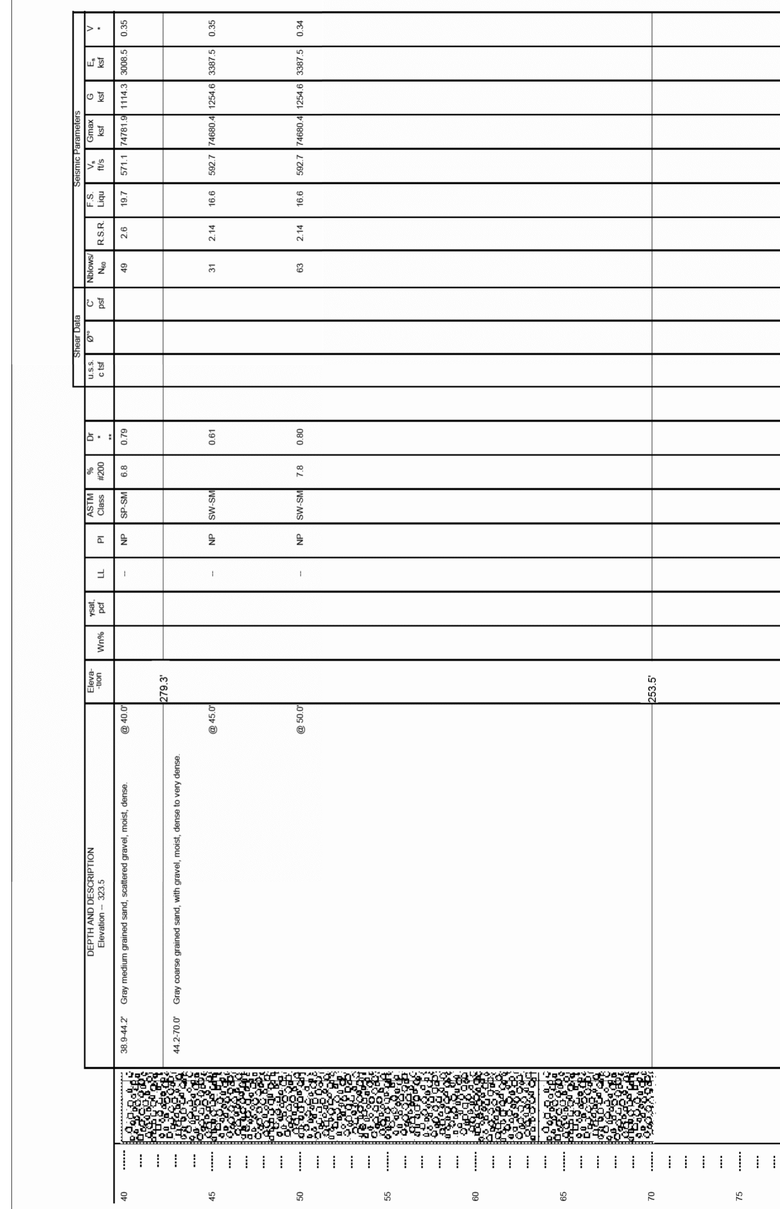
DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 34
COUNTY BUTLER	
JOB NO. J0P0659	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7669	

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.





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

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

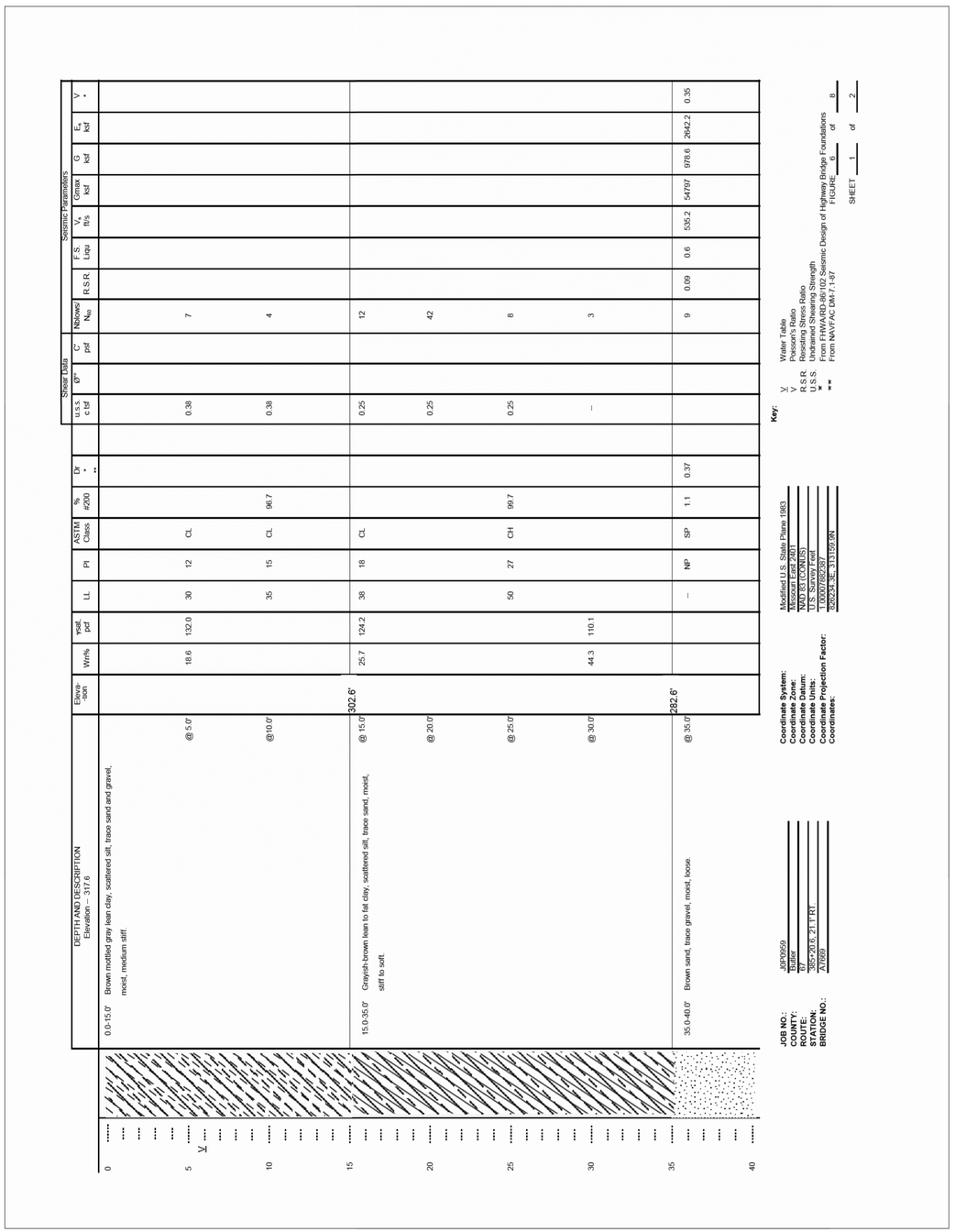
DATE PREPARED	
2/17/2012	
ROUTE	STATE
67SB	MO
DISTRICT	SHEET NO.
BR	35
COUNTY	
BUTLER	
JOB NO.	
J0P0659	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	
A7669	

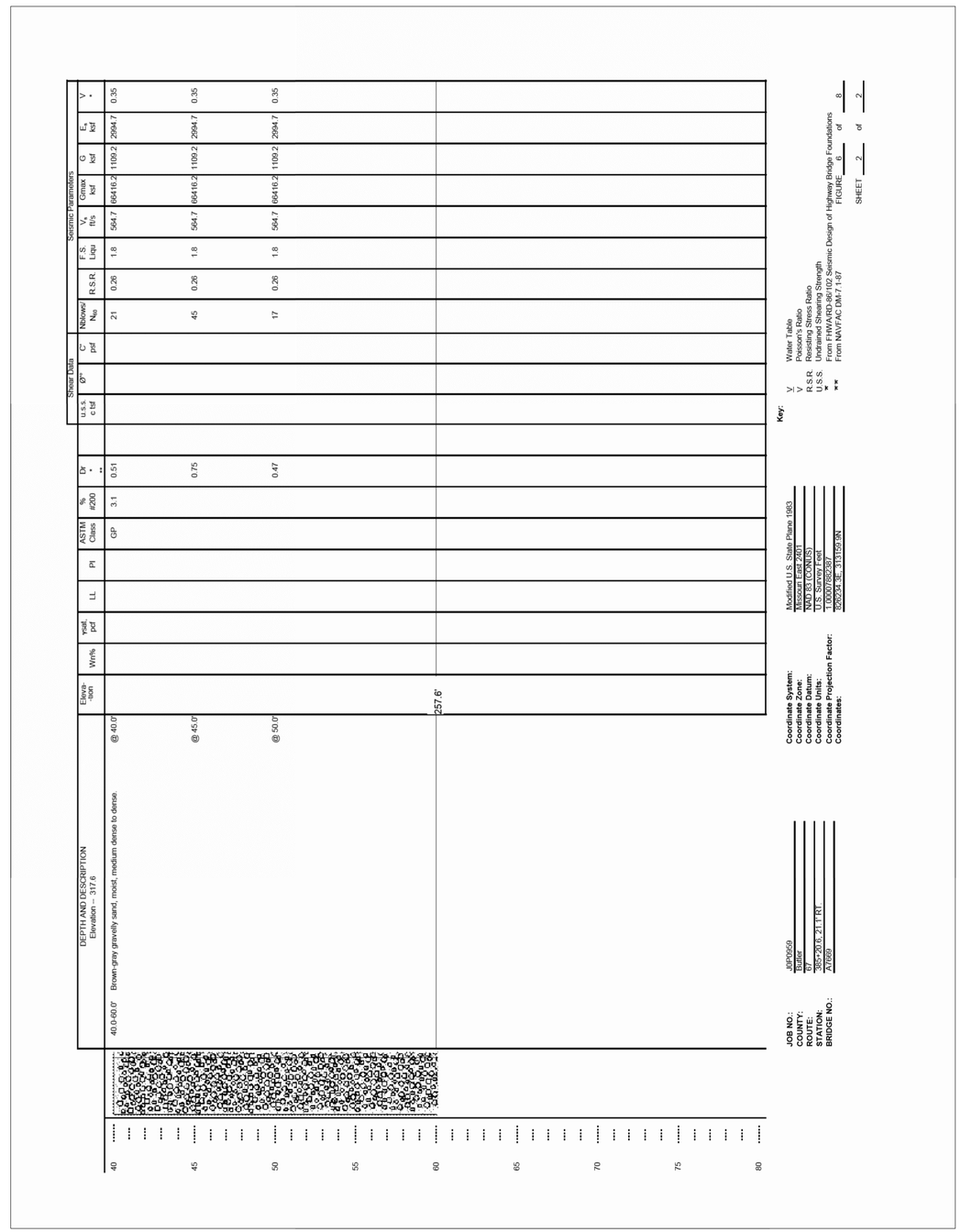
DATE	DESCRIPTION

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.





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

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

DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 36
COUNTY BUTLER	
JOB NO. J0P0659	
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.

DEPTH AND DESCRIPTION Elevation -- 318.1	Elevation	Wn%	γsat, pcf	LL	PI	ASTM Class	% #200	Dr * **	Shear Data u.s.s. c tsf	Shear Data φ°	Shear Data C' psf	Shear Data Nblows/ N_{60}	Shear Data R.S.R.	Shear Data F.S. Liqu	Seismic Parameters V_s ft/s	Seismic Parameters Gmax ksf	Seismic Parameters G ksf	Seismic Parameters E_s ksf	Seismic Parameters V *
0.0-15.0' Brown lean clay, trace gravel, moist, soft.	@ 5.0'			30	9	CL			0.13			3							
	@ 10.0'								0.13			4							
15.0-32.5' Bluish-gray silt, trace sand, stiff to soft.	303.1'																		
	@ 15.0'	38.7	113.7	28	3	ML			0.25			7							
	@ 20.0'	30.8	119.6						0.50			12							
	@ 25.0'	39.0	113.4	31	4	ML			0.25			8							
	@ 30.0'								0.13			3							
32.5-40.0' Gray medium grained sand, moist, very loose.	285.6'							0.20				3	0.052	0.3	523.9	50966.3	937.8	2532	0.35

Key:
V Water Table
V Poisson's Ratio
R.S.R. Resisting Stress Ratio
U.S.S. Undrained Shearing Strength
* From FHWA-SA-97-076
** From NAVFAC DM-7.1-87

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: 1.00000/766238/7
Coordinates: 826179.1E, 313135.2N

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 386+28, 30.0' RT.
BRIDGE NO.: A7669

Seismic Parameters: Gmax = Maximum Shear Modulus; G = Shear Modulus; E_s = Elastic Modulus

Seismic Design of Highway Bridge Foundations FIGURE 7 of 8 SHEET 1 of 2

DEPTH AND DESCRIPTION Elevation -- 318.1	Elevation	Wn%	γsat, pcf	LL	PI	ASTM Class	% #200	Dr * **	Shear Data u.s.s. c tsf	Shear Data φ°	Shear Data C' psf	Shear Data Nblows/ N_{60}	Shear Data R.S.R.	Shear Data F.S. Liqu	Seismic Parameters V_s ft/s	Seismic Parameters Gmax ksf	Seismic Parameters G ksf	Seismic Parameters E_s ksf	Seismic Parameters V *
40.0-70.0' Brown coarse grained sand and gravel, moist, medium dense to dense.	@ 40.0'			--	NP	SP-SM	10.2	0.46				16	0.324	2.2	557.4	73195.2	1061.3	2865.6	0.35
	@ 45.0'							0.66				36	0.324	2.2	557.4	73195.2	1061.3	2865.5	0.35
	@ 50.0'							0.60				30	0.324	2.2	557.4	73195.2	1061.3	2865.5	0.35
	248.1'																		

Key:
V Water Table
V Poisson's Ratio
R.S.R. Resisting Stress Ratio
U.S.S. Undrained Shearing Strength
* From FHWA-SA-97-076
** From NAVFAC DM-7.1-87

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: 1.00000/766238/7
Coordinates: 826179.1E, 313135.2N

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 386+28, 30.0' RT.
BRIDGE NO.: A7669

Seismic Parameters: Gmax = Maximum Shear Modulus; G = Shear Modulus; E_s = Elastic Modulus

Seismic Design of Highway Bridge Foundations FIGURE 7 of 8 SHEET 2 of 2

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

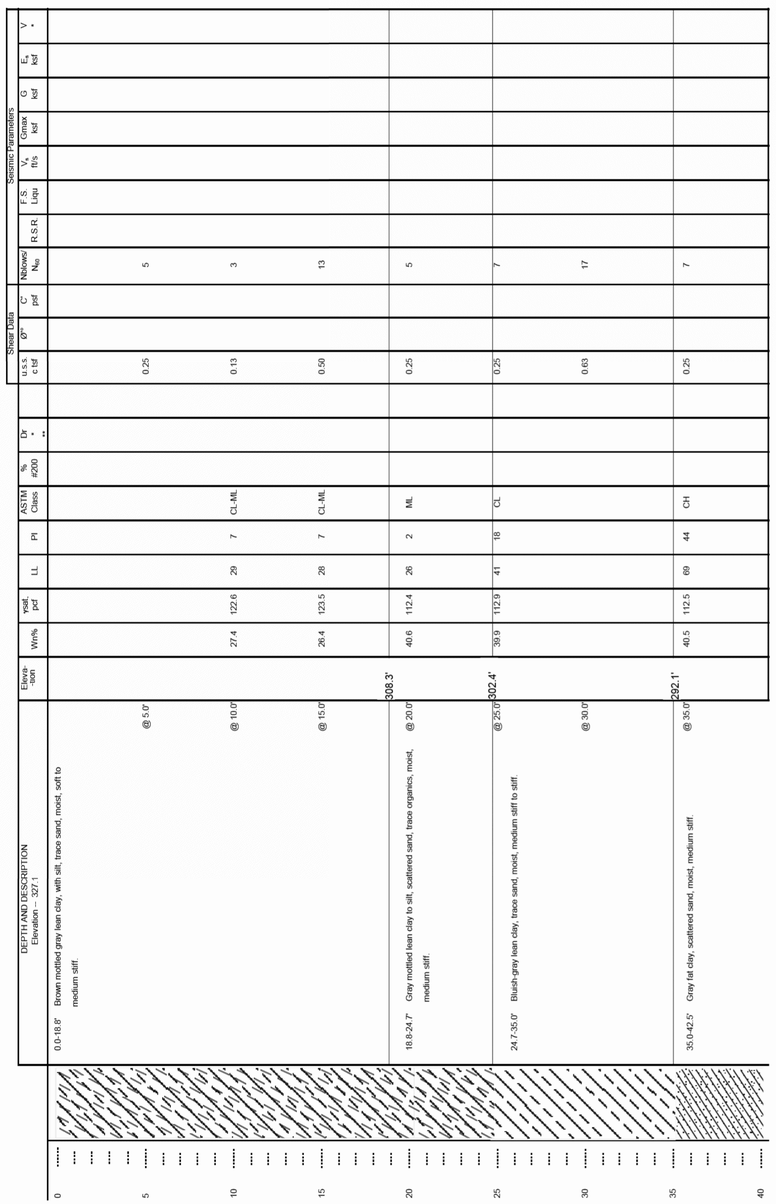
"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."

DATE PREPARED 2/17/2012
ROUTE 67SB
STATE MO
DISTRICT BR
SHEET NO. 37
COUNTY BUTLER
JOB NO. J0P0659
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.



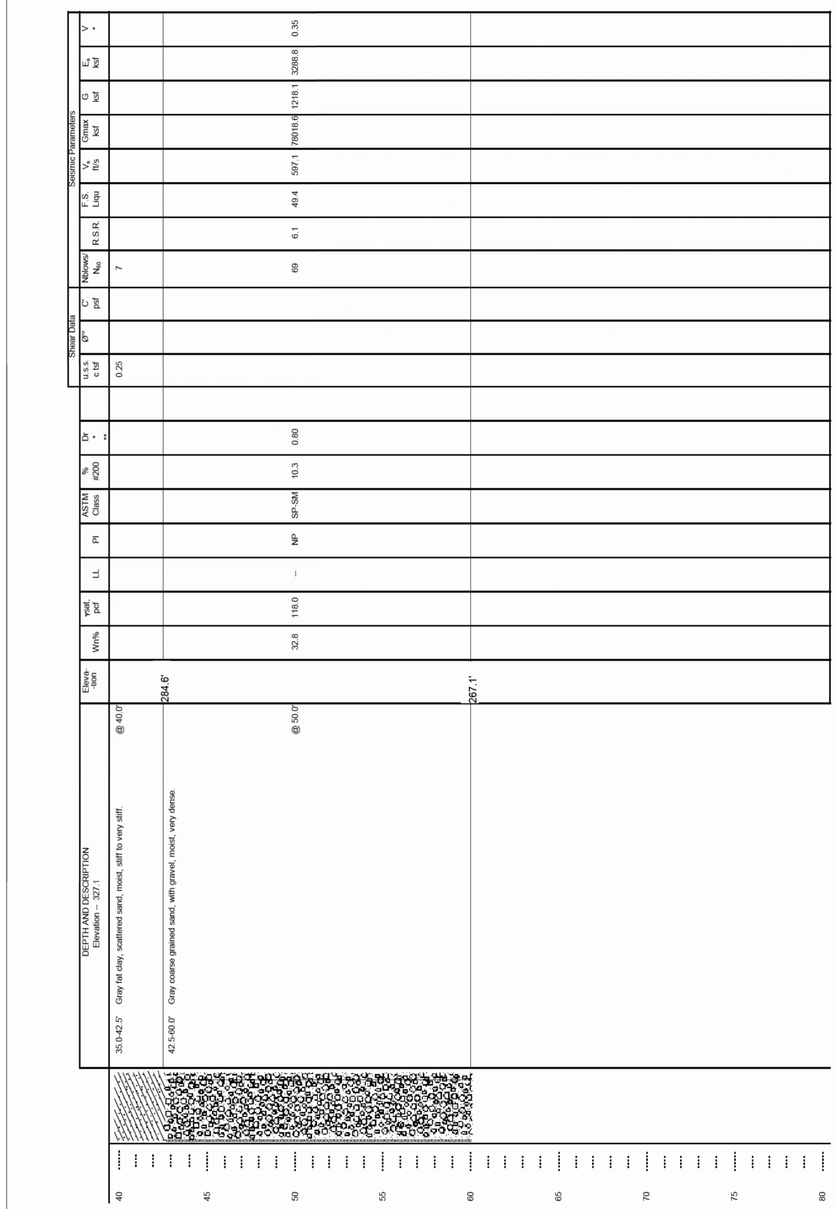
DEPTH AND DESCRIPTION Elevation – 327.1	Elevation	Wn%	γsat pcf	LL	PI	ASTM Class	% #200	Dr * **	Shear Data u.s.s. c' tsf	φ'	C' psf	Nblows/ N_{60}	Seismic Parameters R.S.R.	F.S. Liqu	V_s ft/s	Gmax ksf	G ksf	E_s ksf	V *
0.0-18.8' Brown mottled gray lean clay, with silt, trace sand, moist, soft to medium stiff.																			
@ 5.0'									0.25			5							
@ 10.0'		27.4	122.6	29	7	CL-ML			0.13			3							
@ 15.0'		26.4	123.5	28	7	CL-ML			0.50			13							
18.8-24.7' Gray mottled lean clay to silt, scattered sand, trace organics, moist, medium stiff.	308.3'	40.6	112.4	26	2	ML			0.25			5							
@ 20.0'																			
24.7-35.0' Bluish-gray lean clay, trace sand, moist, medium stiff to stiff.	302.4'	39.9	112.9	41	18	CL			0.25			7							
@ 25.0'																			
@ 30.0'									0.63			17							
35.0-42.5' Gray fat clay, scattered sand, moist, medium stiff.	292.1'	40.5	112.5	69	44	CH			0.25			7							
@ 35.0'																			

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 397+11 60.0' RT
BRIDGE NO.: A7669

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: Topography
Coordinates: 326108.0E, 313014.1N

Key:
γ Water Table
ν Poisson's Ratio
R.S.R. Resisting Stress Ratio
U.S.S. Undrained Shearing Strength
** From FHWA-HRT-06-032
* From NAVFAC DM-7.1-97

From FHWA-NHI-00-037 Seismic Design of Highway Bridge Foundations
FIGURE 8 of 8
SHEET 1 of 2



DEPTH AND DESCRIPTION Elevation – 327.1	Elevation	Wn%	γsat pcf	LL	PI	ASTM Class	% #200	Dr * **	Shear Data u.s.s. c' tsf	φ'	C' psf	Nblows/ N_{60}	Seismic Parameters R.S.R.	F.S. Liqu	V_s ft/s	Gmax ksf	G ksf	E_s ksf	V *
35.0-42.5' Gray fat clay, scattered sand, moist, stiff to very stiff.	@ 40.0'								0.25			7							
42.5-60.0' Gray coarse grained sand, with gravel, moist, very dense.	284.6'																		
@ 50.0'		32.8	118.0	–	NP	SP-SM	10.3	0.80				69	6.1	49.4	597.1	78918.6	1218.1	3388.8	0.35
	267.1'																		

JOB NO.: J0P0659
COUNTY: Butler
ROUTE: 67
STATION: 397+11 60.0' RT
BRIDGE NO.: A7669

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: Topography
Coordinates: 326108.0E, 313014.1N

Key:
γ Water Table
ν Poisson's Ratio
R.S.R. Resisting Stress Ratio
U.S.S. Undrained Shearing Strength
** From FHWA-HRT-06-032
* From NAVFAC DM-7.1-97

From FHWA-NHI-00-037 Seismic Design of Highway Bridge Foundations
FIGURE 8 of 8
SHEET 2 of 2

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.

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DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 38
COUNTY BUTLER	
JOB NO. J0P0659	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7669	

DESCRIPTION	DATE

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

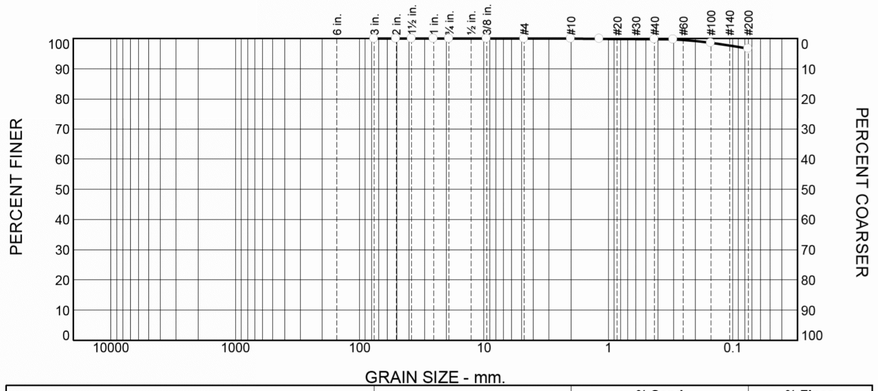
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

Particle Size Distribution Report

Project: COUNTY: BUTLER, RTE: 67 **Project No.:** J0P0959

Client: EASAW THOMAS, INT. GEOTECH. SPEC.

Location: STATION: 385+20.6, OFFSET: 21.1' RT.
Sample Number: 10ME1T897 **Depth:** 10.0' **Date:** 12-08-10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	0.0	0.2	3.1	96.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#16	99.9		
#40	99.8		
#50	99.7		
#100	98.6		
#200	96.7		

* (no specification provided)

Material Description

lean clay

Atterberg Limits

PL= 20 LL= 35 PI= 15

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

Remarks

ASTM M 145-49 = A-6-(10)
D90 = 0.0 , D95 = 0.0
F.M.=0.02

Figure

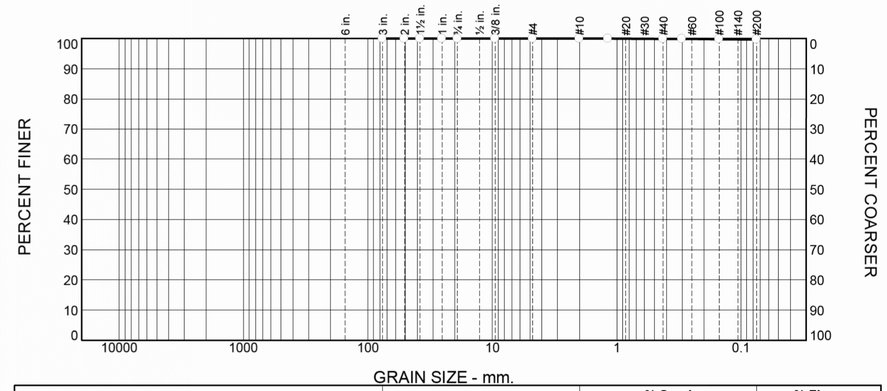
Tested By: KENNY **Checked By:** Keith E. Pigg

Particle Size Distribution Report

Project: COUNTY: BUTLER, RTE.: 67 **Project No.:** J0P0959

Client: EASAW THOMAS, INT. GEOTECH. SPEC.

Location: STATION: 385+20.6, OFFSET: 21.1' RT.
Sample Number: 10ME1T898 **Depth:** 25.0' **Date:** 12-08-10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	0.0	0.1	0.2	99.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#16	100.0		
#40	99.9		
#50	99.9		
#100	99.8		
#200	99.7		

* (no specification provided)

Material Description

fat clay

Atterberg Limits

PL= 23 LL= 50 PI= 27

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(31)

Remarks

ASTM M 145-49 = A-7-6-(17)
D90 = 0.0, D95 = 0.0
F.M.=0.00

Figure

Tested By: KENNY **Checked By:** Keith E. Pigg

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

DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 39
COUNTY BUTLER	
JOB NO. J0P0659	
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.

BORING DATA

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

Detailed Nov. 2011
Checked Nov. 2011

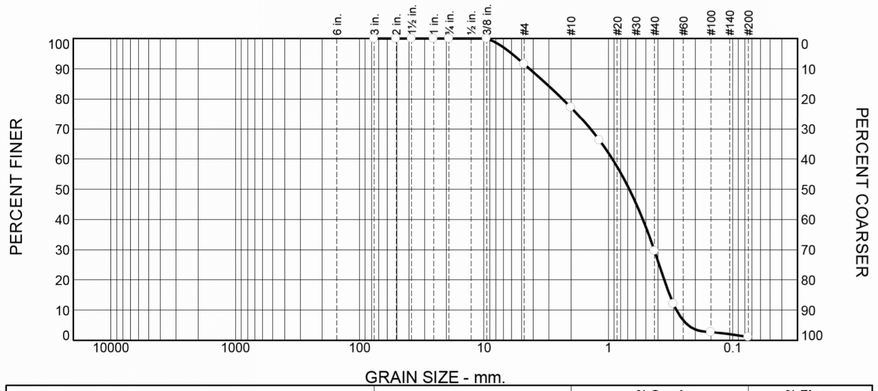
Note: This drawing is not to scale. Follow dimensions.

Particle Size Distribution Report

Project: COUNTY: BUTLER, RTE.: 67 **Project No.:** J0P0959

Client: EASAW THOMAS, INT. GEOTECH. SPEC.

Location: STATION: 385+20.6, OFFSET: 21.1' RT.
Sample Number: 10ME1T899 **Depth:** 35.0' **Date:** 12/08/10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	22.8	47.6	28.5	1.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	91.5		
#10	77.2		
#16	66.2		
#40	29.6		
#50	12.0		
#100	2.7		
#200	1.1		

* (no specification provided)

Material Description

poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 3.1461 D_{60}= 0.9280 D_{50}= 0.6785
D_{30}= 0.4285 D_{15}= 0.3214 D_{10}= 0.2836
C_u= 3.27 C_c= 0.70

Classification

USCS= SP AASHTO= A-1-b

Remarks

ASTM M 145-49 = A-1-b
D90 = 4.31, D95 = 5.97
F.M.=3.02

Figure

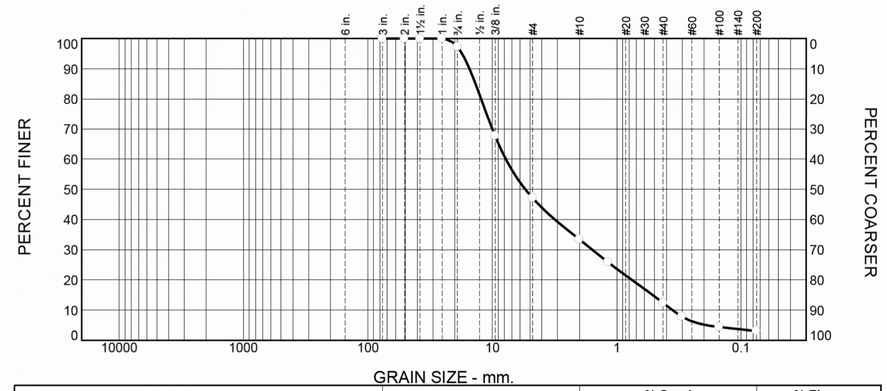
Tested By: Kenny **Checked By:** Keith E. Pigg

Particle Size Distribution Report

Project: County: Butler, Route: 67 **Project No.:** J0P0959

Client: Easaw Thomas, Int. Geotech. Spec.

Location: Station: 385+20.6, Offset: 21.1' RT.
Sample Number: 10ME1T889 **Depth:** 40.0' **Date:** 12/01/10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	66.6	21.0	9.3	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	97.2		
.375	67.7		
#4	47.1		
#10	33.4		
#16	25.8		
#40	12.4		
#50	7.8		
#100	4.4		
#200	3.1		

* (no specification provided)

Material Description

poorly graded gravel with sand

Not enough sample material to test for PI

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 13.6510 D_{60}= 7.8142 D_{50}= 5.4546
D_{30}= 1.5811 D_{15}= 0.5168 D_{10}= 0.3584
C_u= 21.80 C_c= 0.89

Classification

USCS= GP AASHTO=

Remarks

ASTM M 145-49 = Not classified, no PI
D90 = 15.27, D95 = 17.51
F.M.=4.97

Figure

Tested By: KENNY **Checked By:** Keith E. Pigg

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

DATE PREPARED 2/17/2012
ROUTE 67SB STATE MO
DISTRICT BR SHEET NO. 40
COUNTY BUTLER
JOB NO. J0P0659
CONTRACT ID.
PROJECT NO.
BRIDGE NO. A7669

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

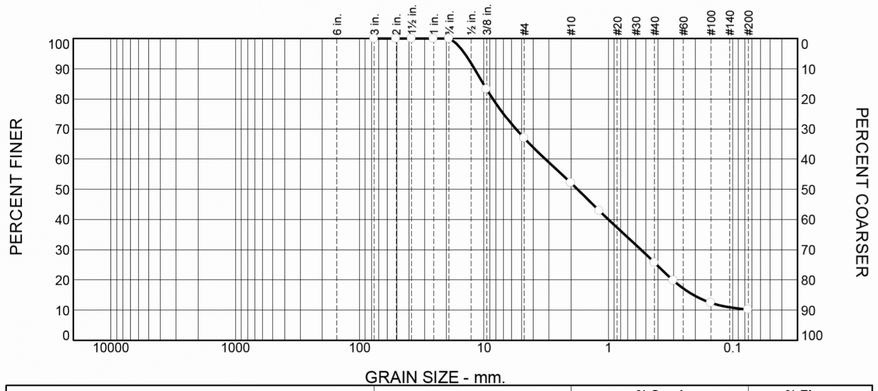
Note: This drawing is not to scale. Follow dimensions.

Particle Size Distribution Report

Project: County: Butler, Route: 67 **Project No.:** J0P0959

Client: Ricardo Todd, Int. Geotch. Spec.

Location: Station: 386+28.0, Offset: 30.0' RT.
Sample Number: 10MRNT632 **Depth:** 45.0' **Date:** 12/01/10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	47.9	26.4	15.5	10.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	83.3		
#4	66.9		
#10	52.1		
#16	42.8		
#40	25.7		
#50	19.7		
#100	12.4		
#200	10.2		

* (no specification provided)

Material Description
Poorly-Graded Sand with Silt and Gravel

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D_{85}= 10.0973 D_{60}= 3.2140 D_{50}= 1.7718
D_{30}= 0.5471 D_{15}= 0.2070 D_{10}=
C_u= C_c=

Classification
USCS= SP-SM AASHTO= A-1-b

Remarks
ASTM M 145-49 = A-1-b-(0)
D90 = 11.91, D95 = 14.24
F.M.=3.88

Figure

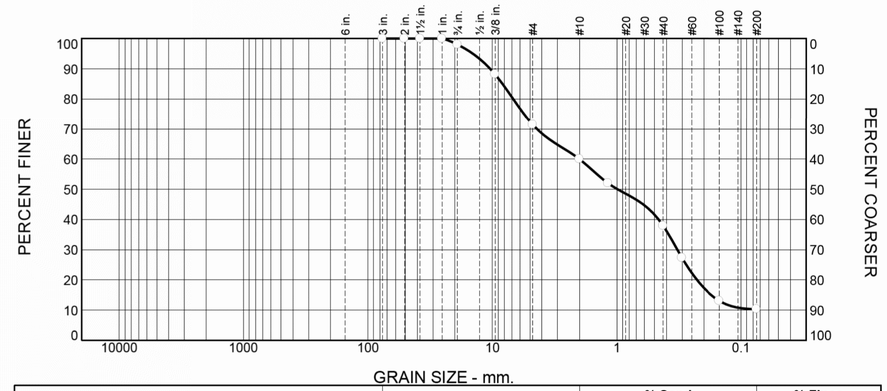
Tested By: KENNY **Checked By:** Keith E. Pigg

Particle Size Distribution Report

Project: County: Butler, Route: 67 **Project No.:** J0P0959

Client: Ricardo Todd, Int. Geotech. Spec.

Location: Station: 387+11.0, Offset: 60.0' RT.
Sample Number: 10MRNT627 **Depth:** 50.0' **Date:** 12/01/10



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0.0	40.0	22.1	27.6	10.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	98.0		
.375	88.2		
#4	71.4		
#10	60.0		
#16	52.0		
#40	37.9		
#50	27.3		
#100	13.1		
#200	10.3		

* (no specification provided)

Material Description
Poorly-Graded Sand with Silt and Gravel

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D_{85}= 8.2994 D_{60}= 2.0036 D_{50}= 0.9903
D_{30}= 0.3274 D_{15}= 0.1742 D_{10}=
C_u= C_c=

Classification
USCS= SP-SM AASHTO= A-1-b

Remarks
ASTM M 145-49 = A-1-b-(0)
D95 = 14.35, D90 = 10.42
F.M.=3.43

Figure

Tested By: KENNY **Checked By:** Keith E. Pigg

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

DATE PREPARED	
2/17/2012	
ROUTE 67SB	STATE MO
DISTRICT BR	SHEET NO. 41
COUNTY BUTLER	
JOB NO. J0P0659	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO. A7669	

DESCRIPTION

DATE

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

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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.