

# RECEIPT OF ADDENDUM

I received addendum No. 02, Dated November 18, 2014 for

Washington Co. Bridge BRO-B110(9)  
Project Job #13-3281

This addendum involves 11 pages including this sheet.

---

Vendor's Name

---

---

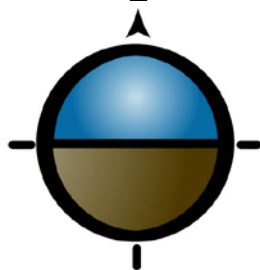
Vendor's Address

---

Signature / Date

**Return completed acknowledgment to  
Great River Engineering ASAP  
@**

**Fax. #. 417-886-7591  
Attention: Angie Buckley  
Or  
cclopton@greatriv.com**



**GRE**  
GREAT RIVER  
ENGINEERING

**ADDENDUM NO. 2**

**ISSUED BY:** Great River Associates  
2826 S Ingram Mill Road  
Springfield, Missouri 65804  
(417) 886-7171  
(417) 886-7591 --- FAX

**DATE:** November 18, 2014

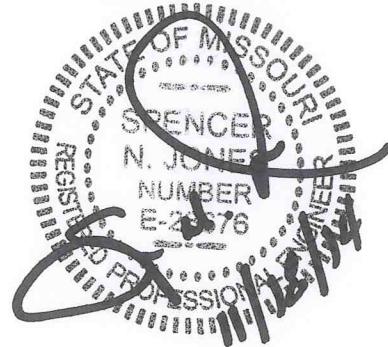
**FOR:** Washington County Bridge No. 06100321  
BRO – B110(9) over Furnace Creek

The attached revisions hereby supersede any and all data with which they may conflict as indicated on the Drawings, Specifications and related documents issued in the original set. Each trade is responsible for changes in its work caused by changes in the work of other trades. This addendum is a part of and shall be attached to the original set of plans and specifications for the work.

**Construction Plans**

- Sheet C3 Water Gate Detail has changed to eliminate the pile in the creek. A note was also added stating if rock was encountered, prebore is considered incidental to the Watergate bid item cost.
- Sheet S19 has been changed to a MoDOT accepted crashworthy end terminal, therefore effecting the following pages:
  - C6
  - C7
  - C12
- Sheet S18 shows the additional guardrail required and C4 reflects the changed quantity of "Type A Guard Rail"
- Bid Form has been revised to show the change in Type A Guard Rail

**Attachments:** Revised Sheet C3, C4, C6, C7, C12, S18, S19 and Bid Form



**END OF ADDENDUM No. 2**



CONTRACTOR NAME: \_\_\_\_\_

ADDRESS LINE 1: \_\_\_\_\_

ADDRESS LINE 2: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

EMAIL: \_\_\_\_\_

WASHINGTON COUNTY  
BRIDGE 06100321 OVER FURNACE CREEK  
BRO-B110(9)

DATE: \_\_\_\_\_

### Bid Form

| LINE                 | ITEM    | DESCRIPTION                                | UNITS | QUANTITY | UNIT PRICE | AMOUNT |
|----------------------|---------|--|-------|----------|------------|--------|
| <b>ROADWAY ITEMS</b> |         |  |       |          |            |        |
| 1                    | 618     | MOBILIZATION                               | L.S.  | 1        | _____      | _____  |
| 2                    | 201     | CLEARING & GRUBBING                        | AC.   | 0.62     | _____      | _____  |
| 3                    | 203     | EXCAVATION FOR ROADWAY - UNCLASSIFIED      | C.Y.  | 184      | _____      | _____  |
| 4                    | 203     | EMBANKMENT IN PLACE W/ COMPACTION          | C.Y.  | 274      | _____      | _____  |
| 5                    | 407     | TACK COAT                                  | S.Y.  | 815      | _____      | _____  |
| 6                    | 401     | 2" ASPHALT SURFACE                         | S.Y.  | 815      | _____      | _____  |
| 7                    | 401     | 4" PLANT MIX BITUMINOUS BASE COURSE        | S.Y.  | 815      | _____      | _____  |
| 8                    | 304     | 6" COMPACTED TYPE 1 AGGREGATE BASE         | S.Y.  | 815      | _____      | _____  |
| 9                    | 310     | 5" AGGREGATE ROAD SURFACE (FIELD ENTRANCE) | S.Y.  | 44       | _____      | _____  |
| 10                   | 310     | 6" COMPACTED TYPE 1 AGGREGATE BASE (BEHIND | S.Y.  | 44       | _____      | _____  |
| 11                   | 801/805 | FERTILIZING AND SEEDING                    | AC.   | 0.40     | _____      | _____  |
| 12                   | 802     | TYPE 1 MULCH                               | AC.   | 0.40     | _____      | _____  |
| 13                   | 616     | MOVEABLE BARRICADES                        | EA.   | 4        | _____      | _____  |
| 14                   | 616     | CONSTRUCTION SIGNS                         | EA.   | 6        | _____      | _____  |
| 15                   | 611     | TYPE 2 ROCK BLANKET                        | C.Y.  | 625      | _____      | _____  |
| 16                   | 607     | FENCING                                    | L.F.  | 63       | _____      | _____  |
| 17                   | 607     | WATER GATE (35')                           | L.S.  | 1        | _____      | _____  |
| 18                   | 713     | 6'-3" TRANSITION SECTION                   | EA.   | 4        | _____      | _____  |
| 19                   | 606     | TYPE "A" GUARD RAIL                        | L.F.  | 87.50    | _____      | _____  |
| 20                   | 606     | CRASHWORTHY END TERMINAL                   | EA.   | 4        | _____      | _____  |
| 21                   | 606     | END SHOE ANCHOR                            | EA.   | 2        | _____      | _____  |
| 22                   | 607     | EROSION CONTROL FENCE OR SOCK              | L.F.  | 328      | _____      | _____  |
| 23                   | 607     | BERM (TYPE 2 ROCK BLANKET)                 | L.F.  | 193      | _____      | _____  |

ROADWAY ITEMS SUBTOTAL \_\_\_\_\_

**BRIDGE ITEMS**

|    |     |   |      |        |       |       |
|----|-----|---|------|--------|-------|-------|
| 24 | 216 | REMOVAL OF EXISTING STRUCTURE           | L.S. | 1      | _____ | _____ |
| 25 | 206 | EXCAVATION FOR STRUCTURE - UNCLASSIFIED | L.S. | 1      | _____ | _____ |
| 26 | 702 | STEEL PILES                             | L.F. | 115.0  | _____ | _____ |
| 27 | 702 | PREBORE FOR PILE                        | L.F. | 100.0  | _____ | _____ |
| 28 | 705 | NU 35 CONCRETE I GIRDERS                | EA.  | 3      | _____ | _____ |
| 29 | 705 | PRE-STRESSED DECK PANELS                | S.Y. | 70.4   | _____ | _____ |
| 30 | 716 | LAMINATED BEARING PADS                  | EA.  | 6      | _____ | _____ |
| 31 | 706 | REINFORCING STEEL (SUBSTRUCTURE)        | LBS. | 6,482  | _____ | _____ |
| 32 | 706 | REINFORCING STEEL (SUPERSTRUCTURE)      | LBS. | 12,574 | _____ | _____ |
| 33 | 703 | CLASS B1 CONCRETE (SUBSTRUCTURE)        | C.Y. | 43.0   | _____ | _____ |
| 34 | 703 | CLASS B2 CONCRETE (SUPERSTRUCTURE)      | C.Y. | 67.0   | _____ | _____ |
| 35 | 713 | CORRAL RAIL                             | L.F. | 128.6  | _____ | _____ |

BRIDGE ITEMS SUBTOTAL \_\_\_\_\_

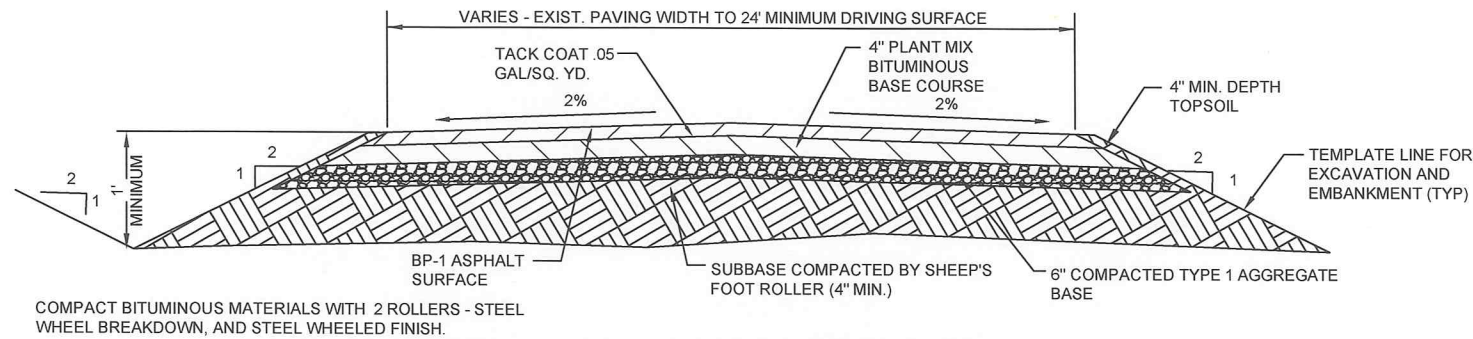
**CULVERT ITEMS**

|    |     |   |      |        |       |       |
|----|-----|---|------|--------|-------|-------|
| 36 | 216 | REMOVAL OF EXISTING STRUCTURE           | L.S. | 1      | _____ | _____ |
| 37 | 206 | EXCAVATION FOR STRUCTURE - UNCLASSIFIED | L.S. | 1      | _____ | _____ |
| 38 | 706 | REINFORCING STEEL (SUBSTRUCTURE)        | LBS. | 15,659 | _____ | _____ |
| 39 | 703 | CLASS B1 CONCRETE (SUBSTRUCTURE)        | C.Y. | 77     | _____ | _____ |

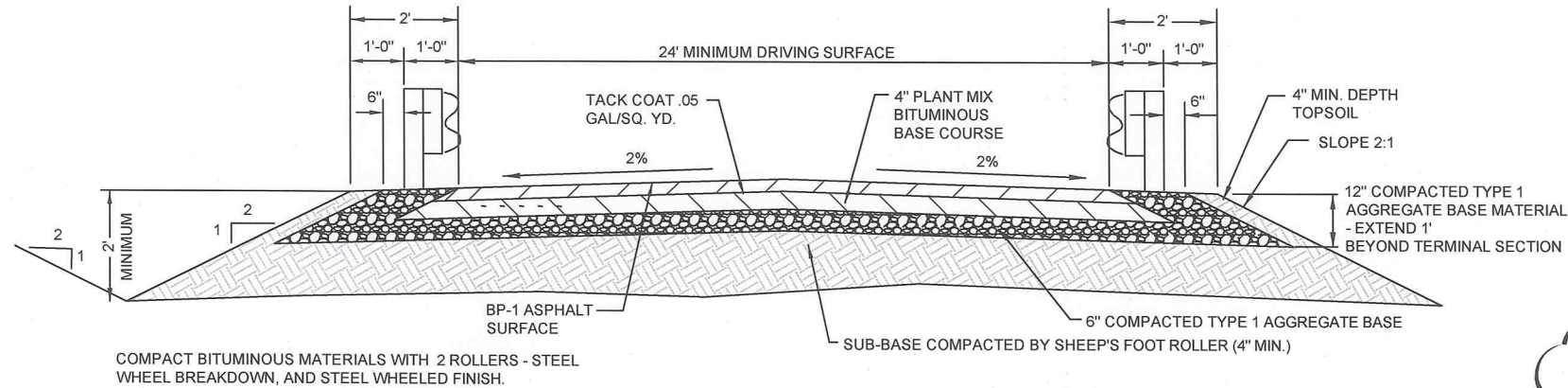
CULVERT ITEMS SUBTOTAL \_\_\_\_\_

CONTRACT TOTAL \_\_\_\_\_

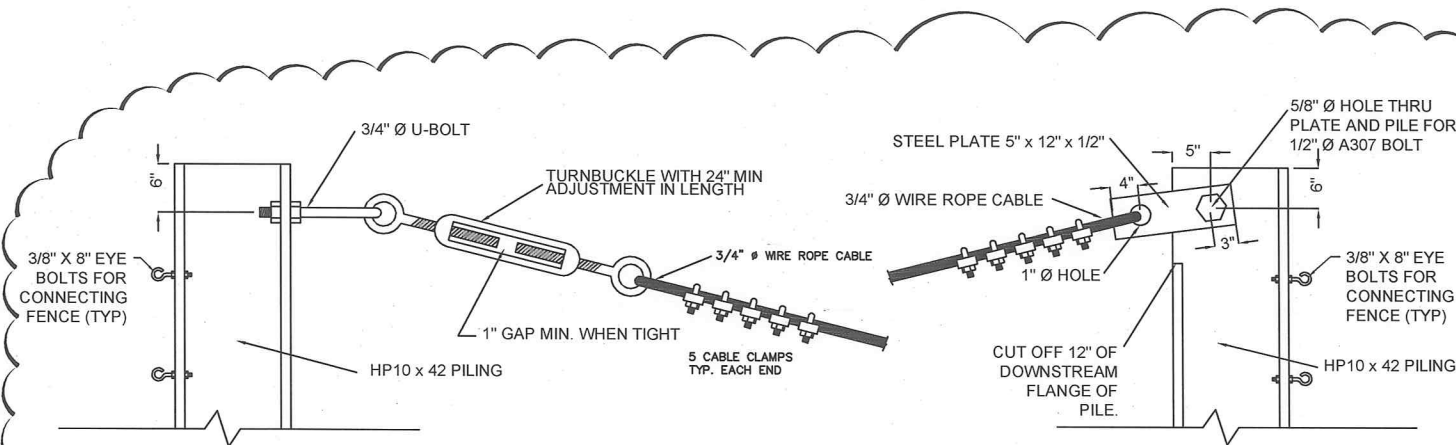




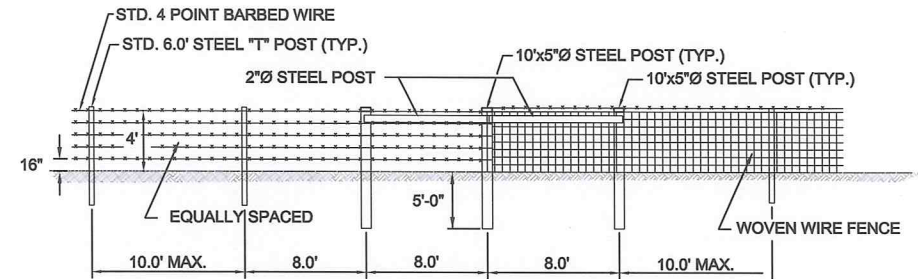
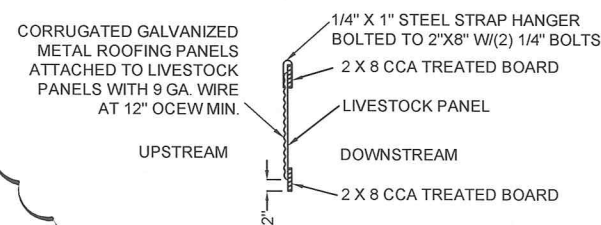
**TYPICAL ASPHALT PAVEMENT SECTION**



**TYPICAL ASPHALT PAVEMENT SECTION W/ GUARDRAIL**



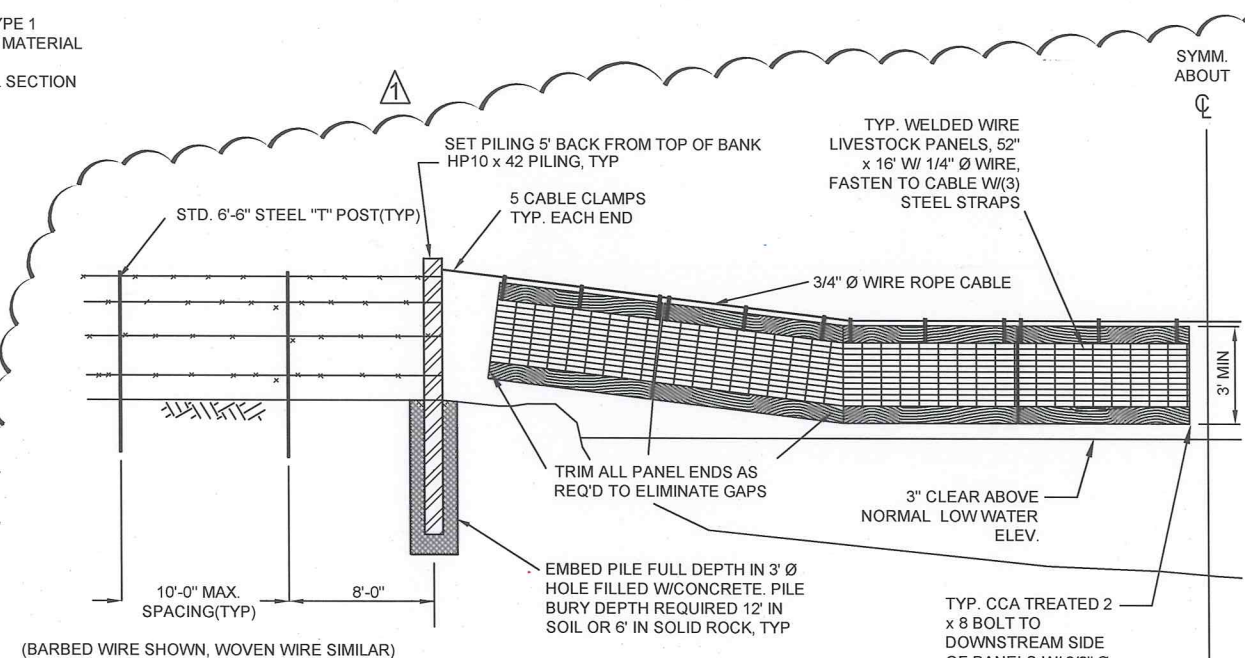
**BANK CONNECTIONS**



**TYPICAL CORNER AND BRACING**  
(FOR BARBED WIRE & WOVEN WIRE FENCING)

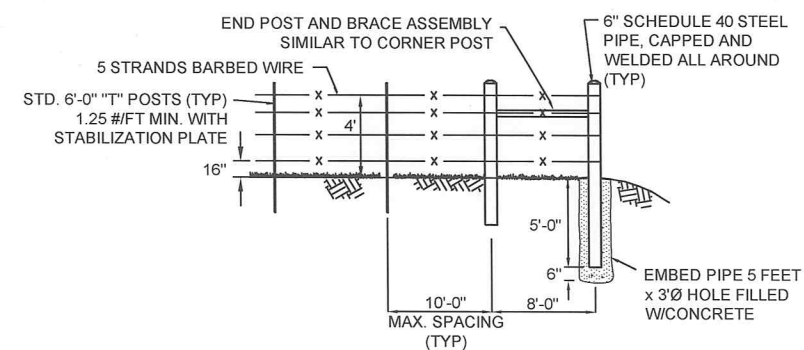
\* CONTRACTOR SHALL MATCH EXISTING FENCE TYPE (I.E. 5 STRAND BARBED WIRE OR WOVEN WIRE FENCE)

- NOTES:
1. FENCING SHOWN IN THIS DETAIL IS THE MINIMUM REQUIRED BY THE ENGINEER.
  2. TIES TO EXISTING FENCE REQUIRE THE SAME LAYOUT AS FENCE CORNERS (I.E. CORNER POSTS WITH BRACING).
  3. CORNER AND BRACING POST SHALL BE BURIED A MINIMUM OF 5 FEET.
  4. ALL 10' x 5" Ø STEEL PIPE MUST HAVE WELD ON DOME CAP. PLASTIC CAP WILL NOT BE ACCEPTED.
  5. 3 STRAND BARBED WIRE TO BE USED FOR TEMPORARY FENCE, 5 STRAND BARBED WIRE TO BE USED FOR PERMANENT FENCE.
  6. TEMPORARY GATES FOR TEMPORARY FENCE AND CORNER POSTS, TERMINAL POSTS AND GATE POSTS ARE INCIDENTAL TO THE FENCING BID ITEM COST.



**TYPICAL WATER GATE DETAIL**

NOTE: IF ROCK IS ENCOUNTERED, PREBORE IS CONSIDERED INCIDENTAL TO THE WATERGATE BID ITEM COST.



**TYPICAL TERMINAL POST**

BRO-B110(9)

STATE OF MISSOURI  
REGISTERED PROFESSIONAL ENGINEER  
SPENCER N. JONES  
NUMBER E-28676

Spencer N. Jones  
MO# PE-28676

**GRA GREAT RIVER ASSOCIATES**  
208 S. MAIN ST. SUITE 100, SPRINGFIELD, MO 65804  
PHONE: (417) 886-7771 FAX: (417) 886-7591  
www.grainrivers.com

Great River Associates, Inc. - Missouri State Certificate of Authority Number: Engineering: 2000150895, Land Surveying: 2001011476, Landscape Architecture: 2007015873

| Date     | Revision/Issue | Details  |
|----------|----------------|--|
| 11-17-14 | 1              | REVISE WATER GATE DETAILS AND CONNECTIONS PER COMMENTS |

FURNACE CREEK ROAD BRIDGE #06100321  
WASHINGTON COUNTY, MISSOURI

**TYPICAL DETAILS**

CHECKED BY: SJ  
DRAWN BY: KFT  
JOB NUMBER: 13-3281  
FILE NAME: 13-3281\_Civil  
SCALE: NTS  
ISSUE DATE: 08.08.2014  
SHEET NUMBER: C3



| ROADWAY QUANTITIES                                    |        |       |
|---|--------|-------|
| ITEM  | TOTAL  | UNITS |
| MOBILIZATION  | 1      | L.S.  |
| CLEARING AND GRUBBING                                 | 0.62   | ACRES |
| EXCAVATION FOR ROADWAY-UNCLASSIFIED                   | 184    | C.Y.  |
| EMBANKMENT IN PLACE W/ COMPACTION                     | 274    | C.Y.  |
| TACK COAT   | 815    | S.Y.  |
| 2" ASPHALT SURFACE                                    | 815    | S.Y.  |
| 4" PLANT MIX BITUMINOUS BASE COURSE                   | 815    | S.Y.  |
| 6" COMPACTED TYPE 1 AGGREGATE BASE                    | 815    | S.Y.  |
| 5" AGGREGATE ROAD SURFACE (FIELD ENTRANCE)            | 44     | S.Y.  |
| 6" COMPACTED TYPE 1 AGGREGATE BASE (BEHIND GUARDRAIL) | 44     | S.Y.  |
| FERTILIZING AND SEEDING                               | 0.40   | ACRES |
| TYPE 1 MULCH  | 0.40   | ACRES |
| MOVEABLE BARRICADES                                   | 4      | EACH  |
| CONSTRUCTION SIGNS                                    | 6      | EACH  |
| TYPE 2 ROCK BLANKET                                   | 625    | C.Y.  |
| FENCING   | 63     | L.F.  |
| WATER GATE (35')                                      | 1      | L.S.  |
| 6'-3" TRANS. SECTION                                  | 4      | EACH  |
| TYPE "A" GUARD RAIL                                   | 87'-6" | L.F.  |
| CRASHWORTHY END TERMINAL                              | 4      | EACH  |
| END SHOE ANCHOR                                       | 2      | EACH  |
| EROSION CONTROL FENCE OR SOCK                         | 328    | L.F.  |
| BERM (TYPE 2 ROCK BLANKET)                            | 193    | L.F.  |

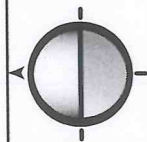
| BRIDGE QUANTITIES                     |              |                |              |      |
|---------------------------------------|--------------|----------------|--------------|------|
| ITEM                                  | SUBSTRUCTURE | SUPERSTRUCTURE | TOTAL        | UNIT |
| REMOVAL OF EXISTING STRUCTURE         | _____        | _____          | 1            | L.S. |
| EXCAVATION FOR STRUCTURE-UNCLASSIFIED | _____        | _____          | 1            | L.S. |
| STEEL PILES                           | 115          | _____          | 115          | L.F. |
| PREBORE FOR PILE                      | 100          | _____          | 100          | L.F. |
| NU 35 CONCRETE I-GIRDERS              | _____        | 3              | 3            | EACH |
| PRE-STRESSED DECK PANELS              | _____        | 70.4           | 70.4         | S.Y. |
| LAMINATED BEARING PADS                | _____        | 6              | 6            | EACH |
| REINFORCING STEEL (SUBSTRUCTURE)      | 6,482        | _____          | 6,482        | LBS. |
| REINFORCING STEEL (SUPERSTRUCTURE)    | _____        | 12,574         | 12,574       | LBS. |
| CLASS B1 CONCRETE (SUBSTRUCTURE)      | 43           | _____          | 43           | C.Y. |
| CLASS B2 CONCRETE (SUPERSTRUCTURE)    | _____        | 67             | 67           | C.Y. |
| CORRAL RAILING                        | _____        | 128'-7 1/2"    | 128'- 7 1/2" | L.F. |

| BOX CULVERT QUANTITIES                |        |      |
|---------------------------------------|--------|------|
| ITEM                                  | TOTAL  | UNIT |
| REMOVAL OF EXISTING STRUCTURE         | 1      | L.S. |
| EXCAVATION FOR STRUCTURE-UNCLASSIFIED | 1      | L.S. |
| REINFORCING STEEL (SUB)               | 15,659 | LBS. |
| CLASS B1 CONCRETE                     | 77     | C.Y. |

| PILE DATA       |                                   |         |         |
|-----------------|-----------------------------------|---------|---------|
| BENT NO.        |                                   | 1       | 2       |
| BEARING<br>PILE | PILE TYPE AND SIZE                | HP10x42 | HP10x42 |
|                 | NUMBER                            | 5       | 5       |
|                 | APPROXIMATE LENGTH (FT.)          | 11.5    | 11.5    |
|                 | DESIGN BEARING (TONS)             | 62      | 62      |
|                 | HAMMER ENERGY REQUIRED (FT.-LBS.) | 13,888  | 13,888  |
|                 | PREBORE (FT.)                     | 10      | 10      |
|                 | ESTIMATED TIP ELEVATION           | 862.50  | 862.50  |

- | HYDRAULIC SUMMARY DATA TABLE               |              |
|--|--------------|
| DESIGN FLOOD DATA                          |              |
| DRAINAGE AREA                              | 4.49 SQ. MI. |
| DESIGN FREQUENCY                           | 10 YR.       |
| DESIGN DISCHARGE                           | 2,013 CFS    |
| DESIGN HIGH WATER ELEVATION AT STRUCTURE   | 877.45 FEET  |
| 100 YEAR DISCHARGE                         | 4,165 CFS    |
| 100 YEAR HIGH WATER ELEVATION AT STRUCTURE | 880.76 FEET  |
| 100 YEAR BACKWATER                         | 881.11 FEET  |
| APPROACH ROADWAY OVERTOPPING FREQUENCY     | 10 YR.       |

| HYDRAULIC SUMMARY DATA TABLE               |              |
|--|--------------|
| DESIGN FLOOD DATA                          |              |
| DRAINAGE AREA                              | 4.49 SQ. MI. |
| DESIGN FREQUENCY                           | 10 YR.       |
| DESIGN DISCHARGE                           | 2,013 CFS    |
| DESIGN HIGH WATER ELEVATION AT STRUCTURE   | 877.45 FEET  |
| 100 YEAR DISCHARGE                         | 4,165 CFS    |
| 100 YEAR HIGH WATER ELEVATION AT STRUCTURE | 880.76 FEET  |
| 100 YEAR BACKWATER                         | 881.11 FEET  |
| APPROACH ROADWAY OVERTOPPING FREQUENCY     | 10 YR.       |



Great River Associates, Inc. - Missouri State Certificate of Authority Numbers:  
Engineering: 2000156885, Land Surveying: 2001011476,  
Landscape Architecture: 2007013673

Revision/Issue

ELIBNACE CREEK ROAD BRIDGE #06100321

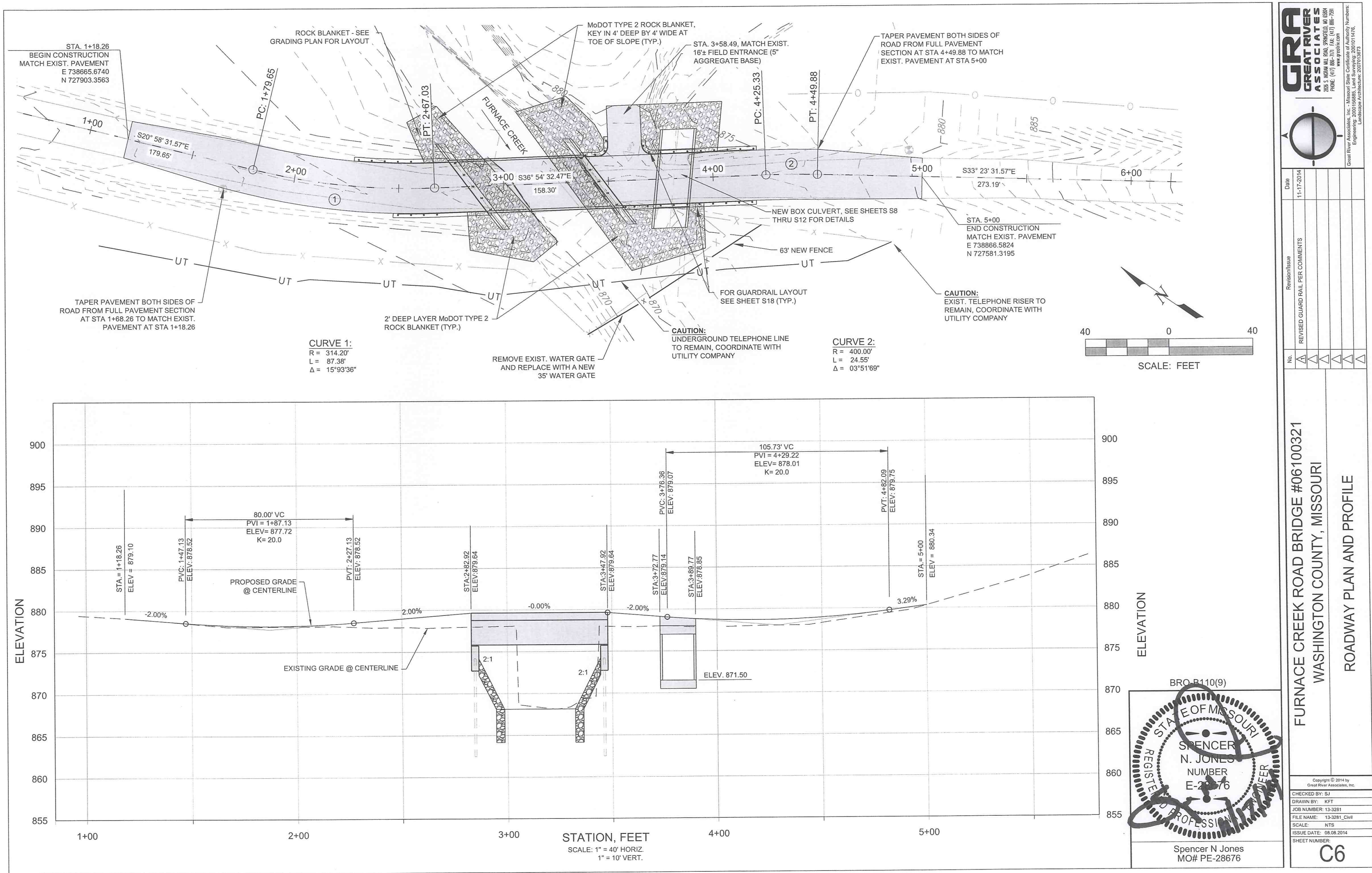
BRIDGE QUANTITIES

0

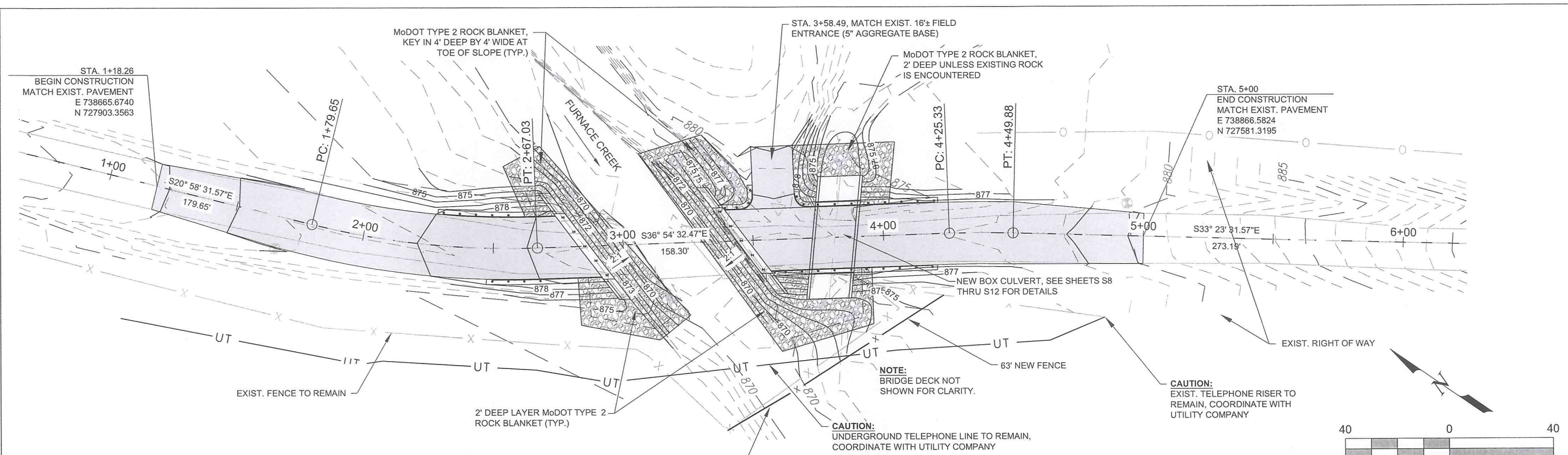
C4

Spencer N Jones  
MO# PE-28676

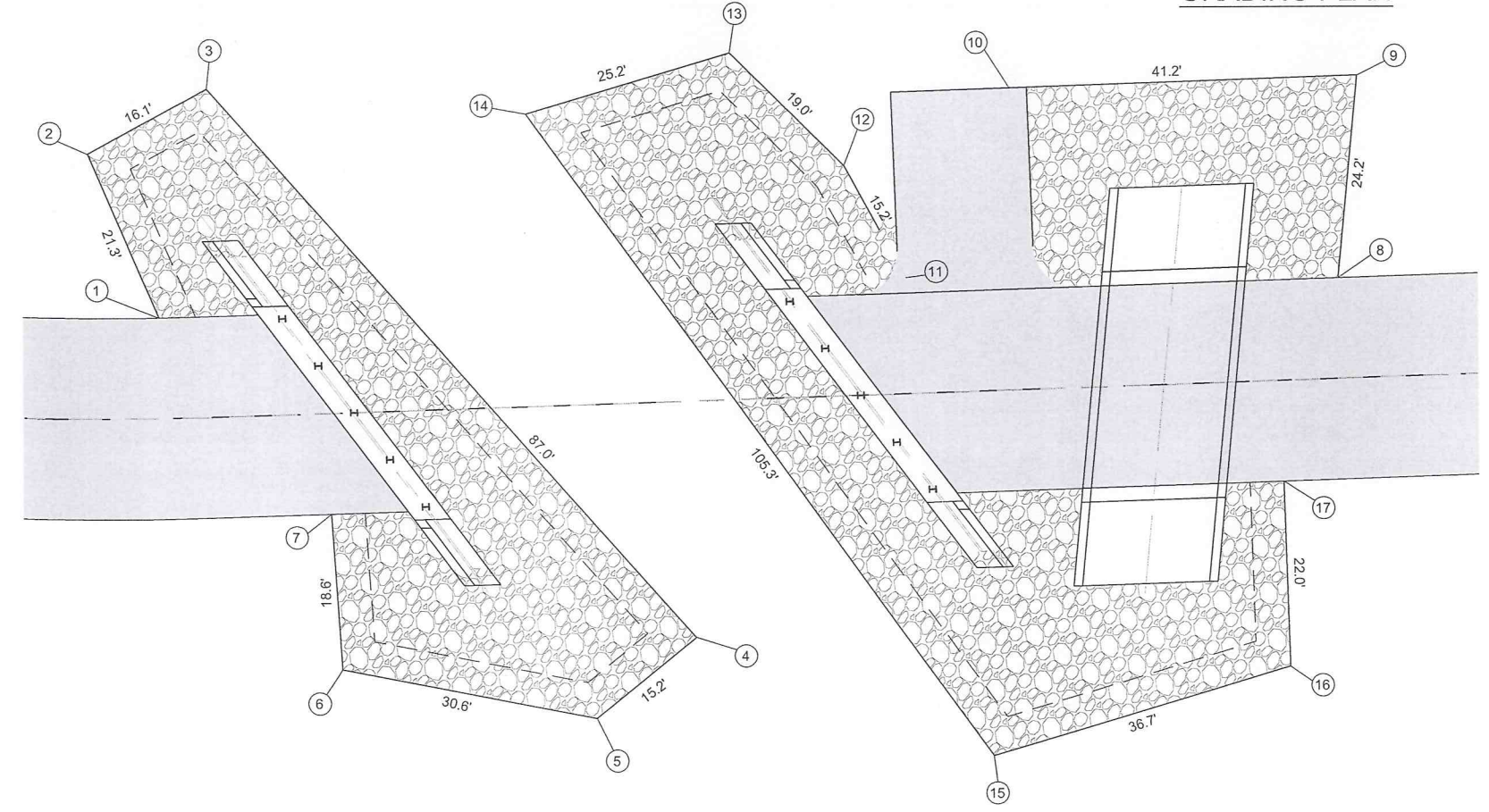








GRADING PLAN



MoDOT TYPE II ROCK BLANKET LAYOUT PLAN

| ROCK BLANKET LOCATIONS/ELEVATIONS |               |               |                        |
|-----------------------------------|---------------|---------------|------------------------|
| POINT                             | EASTING       | NORTHING      | ELEV. TOP ROCK BLANKET |
| 1                                 | E 738736.8702 | N 727780.4284 | 878.66                 |
| 2                                 | E 738748.0724 | N 727798.5341 | 872.75                 |
| 3                                 | E 738762.4993 | N 727791.3787 | 869.47                 |
| 4                                 | E 738742.0153 | N 727706.7748 | 869.82                 |
| 5                                 | E 738727.3788 | N 727710.8946 | 874.20                 |
| 6                                 | E 738714.8737 | N 727738.8802 | 874.41                 |
| 7                                 | E 738729.3094 | N 727750.4819 | 879.34                 |
| 8                                 | E 738820.7575 | N 727668.6880 | 878.14                 |
| 9                                 | E 738841.8727 | N 727680.5742 | 875.34                 |
| 10                                | E 738817.0700 | N 727713.5179 | 879.95                 |
| 11                                | E 738791.5069 | N 727710.7025 | 878.79                 |
| 12                                | E 738798.2729 | N 727724.3542 | 879.09                 |
| 13                                | E 738801.5087 | N 727743.1069 | 879.00                 |
| 14                                | E 738781.7348 | N 727758.7185 | 869.00                 |
| 15                                | E 738750.6187 | N 727669.8240 | 869.71                 |
| 16                                | E 738779.4757 | N 727647.0830 | 874.10                 |
| 17                                | E 738797.1240 | N 727660.1909 | 878.00                 |

BRO-B110(9)

STATE OF MISSOURI  
REGISTERED PROFESSIONAL ENGINEER  
SPENCER N. JONES  
NUMBER E-28676

Spencer N Jones  
MO# PE-28676

**GREAT RIVER ASSOCIATES**  
2005 S. WISCONSIN AVE., SUITE 100, SPRINGFIELD, MO 65804  
PHONE: (417) 886-7171 FAX: (417) 886-7591  
www.grassoc.com

Great River Associates, Inc. - Missouri State Certificate of Authority Number: 000101476  
Engineering: 2000156885, Land Surveying: 200101476, Landscape Architecture: 2007013873

| Date           | 11-17-2014                      |
|----------------|---------------------------------|
| Revision/Issue | REVISED GUARD RAIL PER COMMENTS |
| No.            | 1                               |

FURNACE CREEK ROAD BRIDGE #06100321  
WASHINGTON COUNTY, MISSOURI

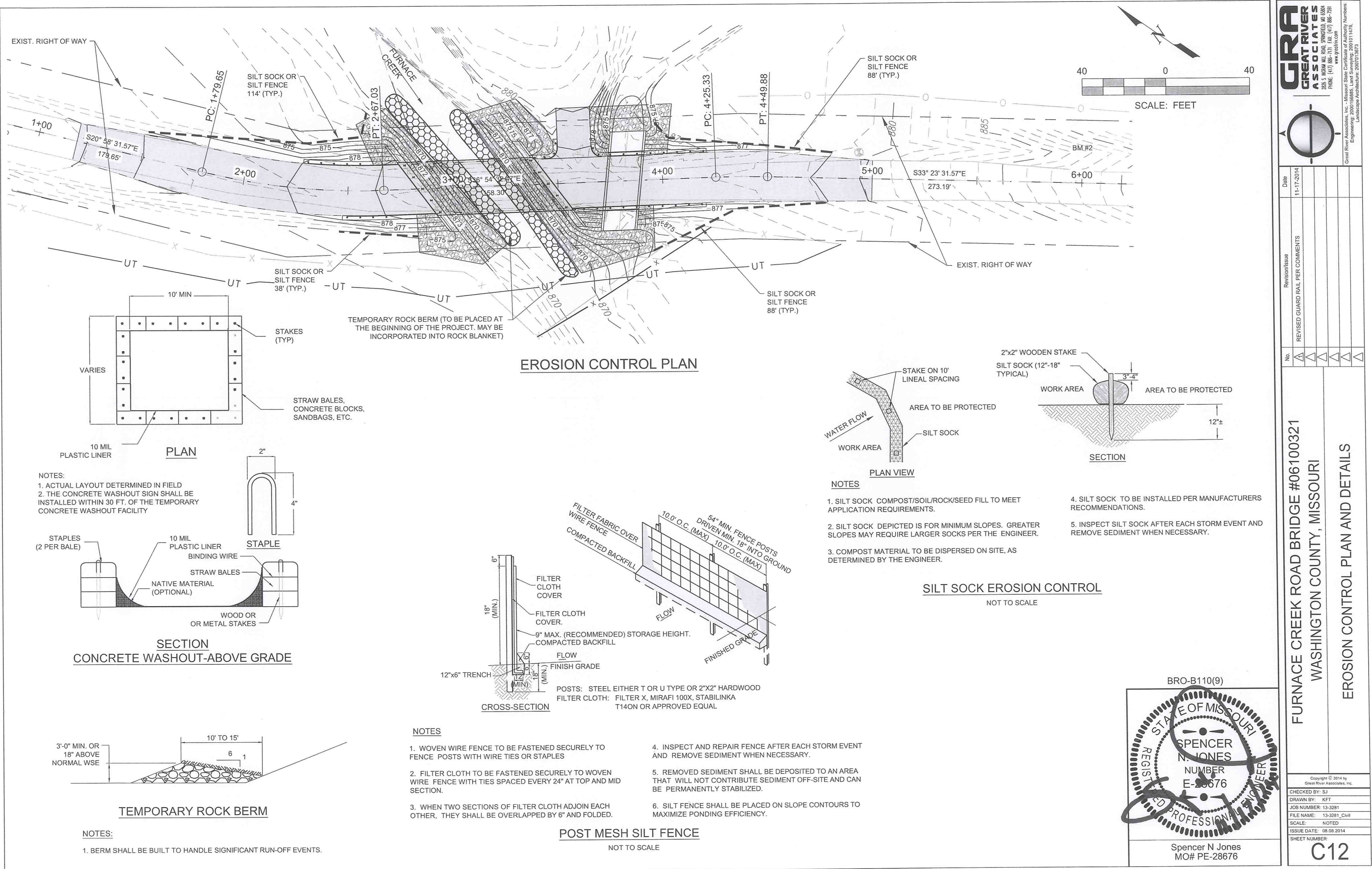
GRADING PLAN AND RIP RAP LAYOUT

Copyright © 2014 by Great River Associates, Inc.

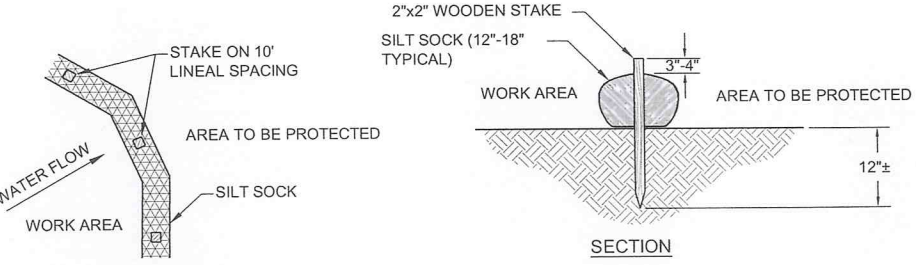
|                          |
|--------------------------|
| CHECKED BY: SJ           |
| DRAWN BY: KFT            |
| JOB NUMBER: 13-3281      |
| FILE NAME: 13-3281 Civil |
| SCALE: NOTED             |
| ISSUE DATE: 08.08.2014   |
| SHEET NUMBER:            |

C7





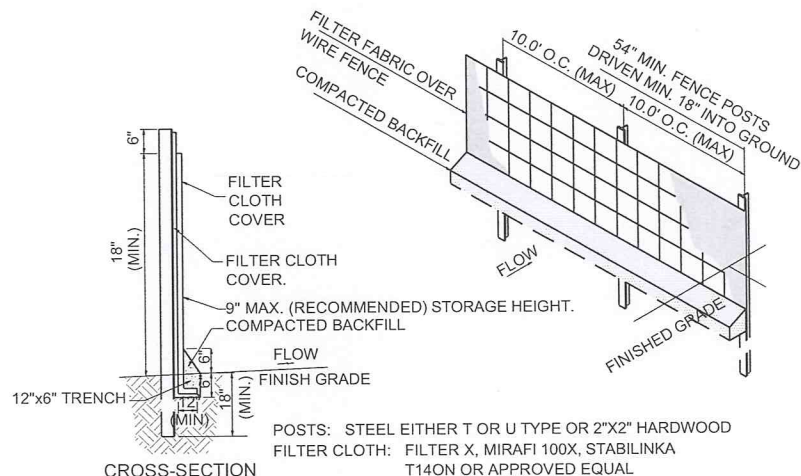
EROSION CONTROL PLAN



- NOTES
- 1. SILT SOCK COMPOST/SOIL/ROCK/SEED FILL TO MEET APPLICATION REQUIREMENTS.
  - 2. SILT SOCK DEPICTED IS FOR MINIMUM SLOPES. GREATER SLOPES MAY REQUIRE LARGER SOCKS PER THE ENGINEER.
  - 3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
  - 4. SILT SOCK TO BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
  - 5. INSPECT SILT SOCK AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.

SILT SOCK EROSION CONTROL

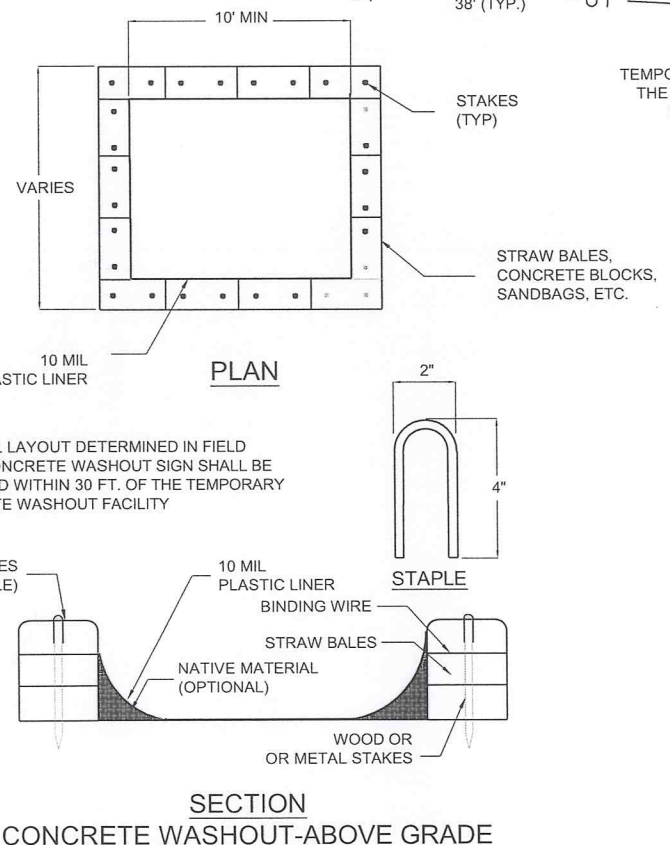
NOT TO SCALE



- NOTES
- 1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES
  - 2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
  - 3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
  - 4. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
  - 5. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
  - 6. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

POST MESH SILT FENCE

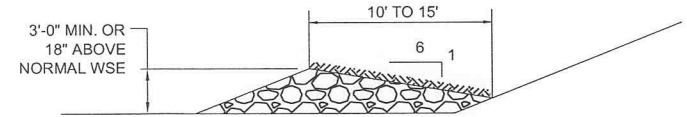
NOT TO SCALE



SECTION

CONCRETE WASHOUT-ABOVE GRADE

- NOTES:
- 1. ACTUAL LAYOUT DETERMINED IN FIELD
  - 2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY



TEMPORARY ROCK BERM

- NOTES:
- 1. BERM SHALL BE BUILT TO HANDLE SIGNIFICANT RUN-OFF EVENTS.

**GREAT RIVER ASSOCIATES**  
205 S. INGRAM MILL ROAD, SPRINGFIELD, MO 65804  
PHONE: (417) 886-1171 FAX: (417) 886-7591  
www.gra-riv.com

| Date       | Revision/Issue | Comments                        |
|------------|----------------|---------------------------------|
| 11-17-2014 | 1              | REVISED GUARD RAIL PER COMMENTS |

FURNACE CREEK ROAD BRIDGE #06100321  
WASHINGTON COUNTY, MISSOURI

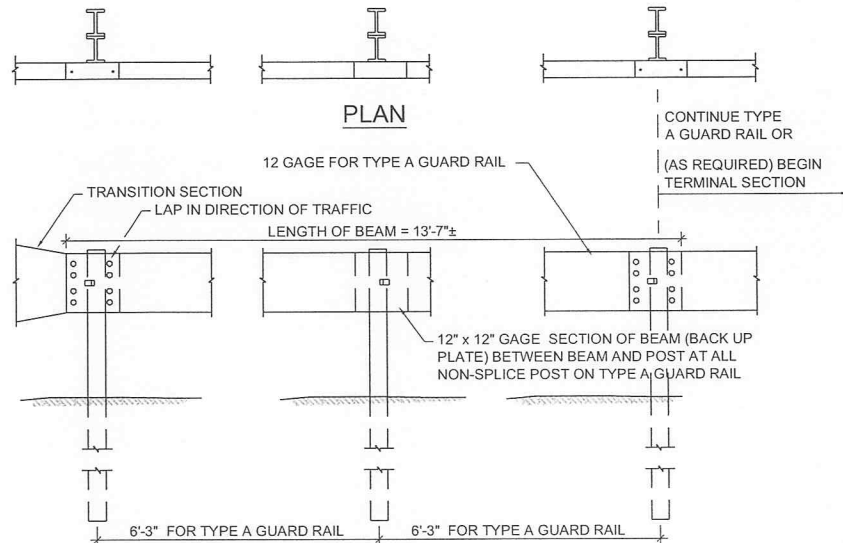
EROSION CONTROL PLAN AND DETAILS

BRO-B110(9)

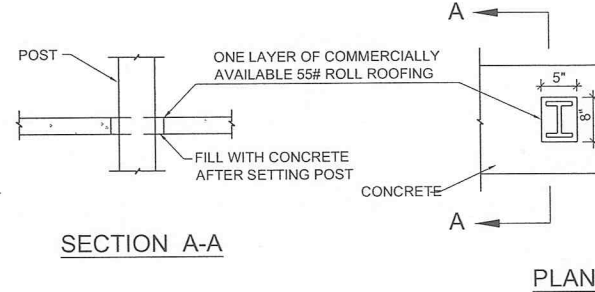
CHECKED BY: SJ  
DRAWN BY: KFT  
JOB NUMBER: 13-3281  
FILE NAME: 13-3281\_Civil  
SCALE: NOTED  
ISSUE DATE: 08.08.2014  
SHEET NUMBER: C12

Copyright © 2014 by Great River Associates, Inc.  
Spencer N Jones  
MO# PE-28676



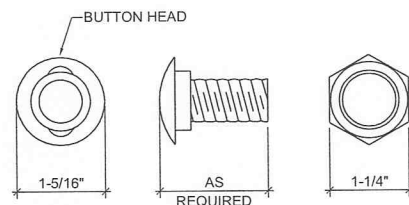


ELEVATION



SECTION A-A

SETTING POST THRU CONCRETE  
DRAIN BASINS, MEDIANS, ETC.



POST OR SPLICE BOLT  
5/8" (15.9 mm)

OVAL SHOULDERS SHALL BE OF ADEQUATE HEIGHT, LENGTH & SHAPE TO PREVENT TURNING DURING INSTALLATION OR REMOVAL OF BOLT.

GENERAL NOTES:

ALL BOLTS, NUTS, WASHERS AND PLATES ARE CONSIDERED AS PARTS OF THE RAIL FOR PAYMENT.

ALL STEEL CONNECTING BOLTS AND FASTENERS FOR POST AND RAILING AND ALL ANCHOR BOLTS, NUTS, WASHERS AND BOTTOM PLATES SHALL BE GALVANIZED AFTER FABRICATION. FOR PROTECTIVE COATING AND MATERIAL REQUIREMENT OF STEEL RAILING SEE SECTION 1040 OF THE STANDARD SPECIFICATIONS.

POST, BASE PLATES, CHANNELS AND CHANNEL SPLICE PLATES TO BE FABRICATED FROM A-36 STEEL AND GALVANIZED.

AT EXPANSION SLOTS IN BEAM RAILS AND CHANNELS, TIGHTEN BOLTS, BACK OFF ONE-HALF TURN AND BURR THREADS.

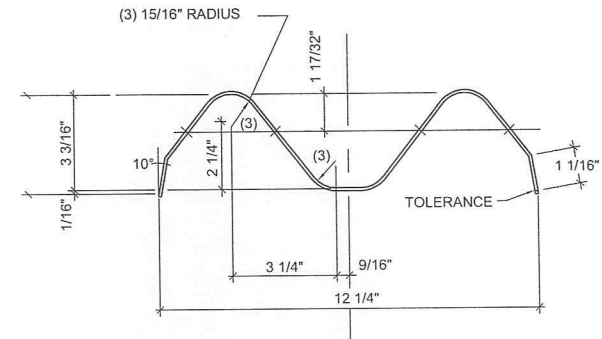
5/8 INCH x 1-1/4 INCH BUTTON HEAD OVAL SHOULDER BOLTS WITH HEX. NUTS AT ALL SLOTS. (THICKNESS OF HEX. NUTS= 1 1/4")

AT BEAM CONNECTION TO POST ON WINGS, TIGHTEN BOLTS, BACK OFF ONE-HALF TURN AND BURR THREADS.

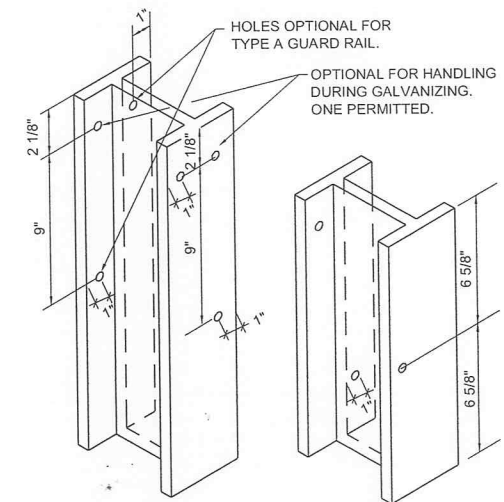
MINIMUM LENGTH OF BEAM SECTIONS IS EQUAL TO ONE POST SPACE.

WASHERS SHALL BE USED AT ALL POST BOLTS (BETWEEN BOLT HEAD AND BEAM). THEY SHALL BE RECTANGULAR IN SHAPE (3" x 1-3/4" x 3/16" MIN.) AND FLAT, OR WHEN NECESSARY OF SUCH DESIGN TO FIT THE CONTOUR OF THE BEAM. WASHERS SHALL HAVE 11/16" x 1" SLOT.

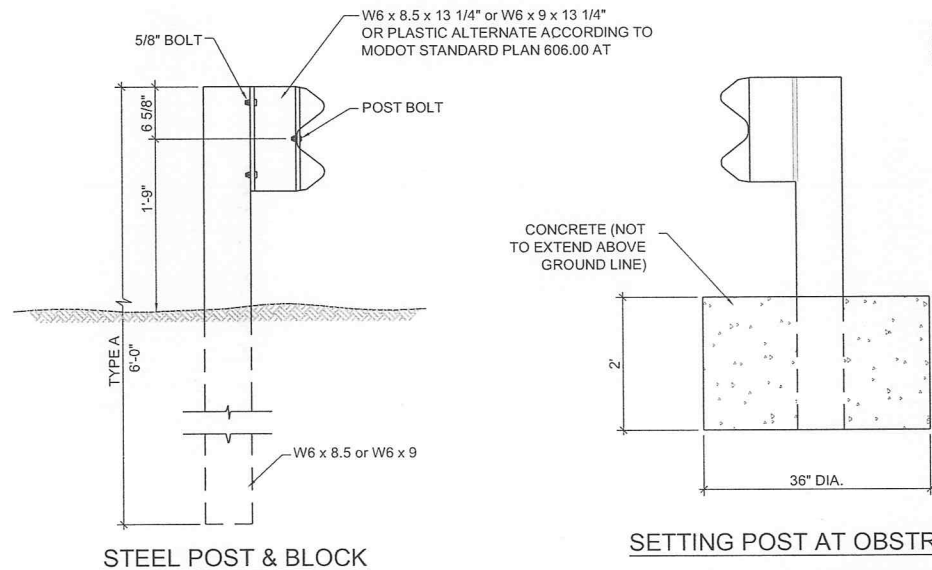
FABRICATION OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH SECTION 712 OF THE STANDARD SPECIFICATIONS.



SECTION THRU BEAM



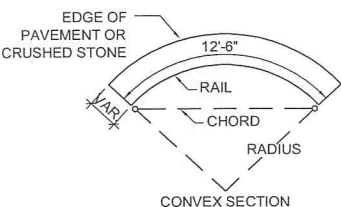
ALL HOLES 13/16" DIA.  
HOLE PUNCHING DETAILS



STEEL POST & BLOCK

SETTING POST AT OBSTRUCTIONS

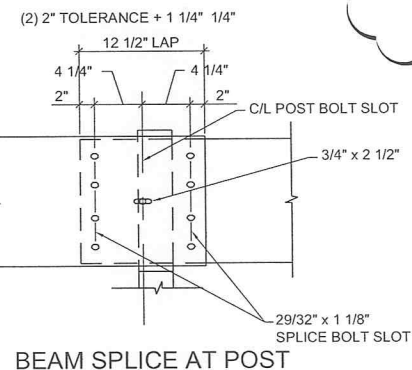
WHERE POST CANNOT BE SET TO REQUIRED DEPTH DUE TO OBSTRUCTIONS



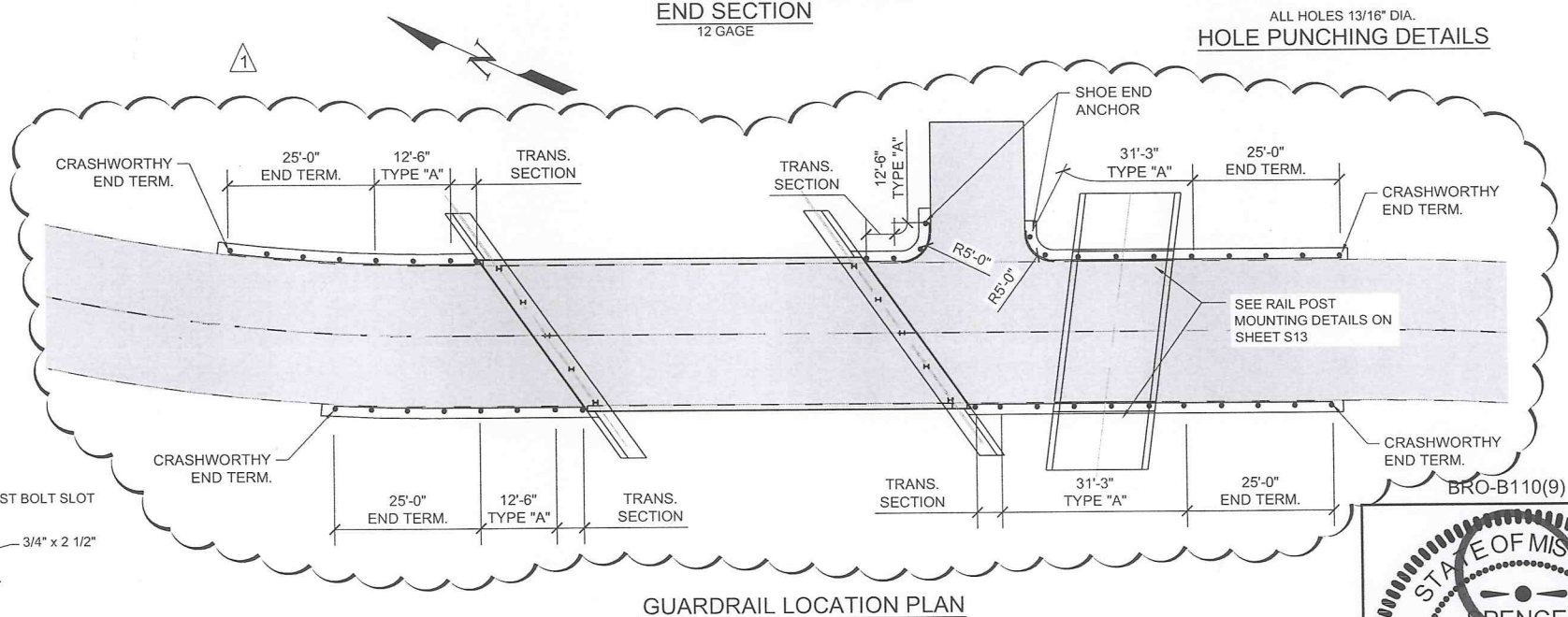
LENGTH OF CHORDS FOR 12'-6" ARC  
WITH VARIOUS RADII

NOTE: THIS DRAWING NOT TO SCALE. FOLLOW DIMENSIONS.

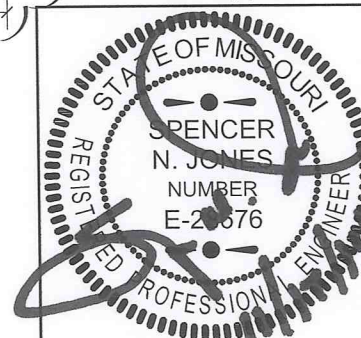
| RADIUS<br>FEET | CHORD<br>FT. - INCHES |
|----------------|-----------------------|
| 20             | 12 - 3 1/2            |
| 25             | 12 - 4 1/2            |
| 30             | 12 - 4 7/8            |
| 35             | 12 - 5 1/4            |
| 40             | 12 - 5 3/8            |
| 45             | 12 - 5 1/2            |
| 50             | 12 - 5 5/8            |
| 55-75          | 12 - 5 3/4            |
| 80-100         | 12 - 5 7/8            |
| 105-150        | 12 - 5 15/16          |



BEAM SPLICE AT POST



GUARDRAIL LOCATION PLAN



Spencer N Jones  
MO# PE-28676

FURNACE CREEK ROAD BRIDGE #06100321  
WASHINGTON COUNTY, MISSOURI

TYPE "A" GUARDRAIL

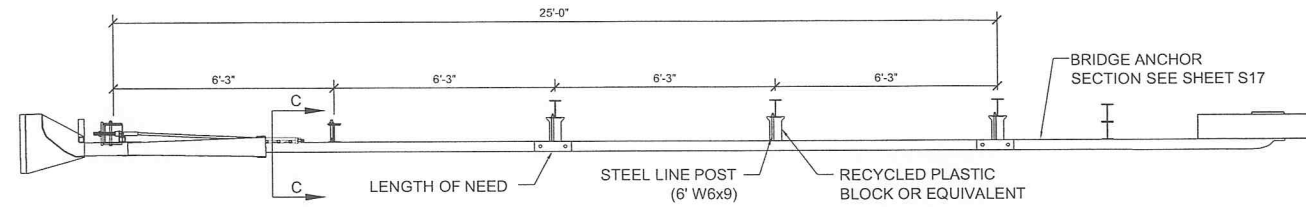


| No. | Revision/Issue                  | Date       |
|-----|---------------------------------|------------|
| 1   | REVISED GUARD RAIL PER COMMENTS | 11-17-2014 |

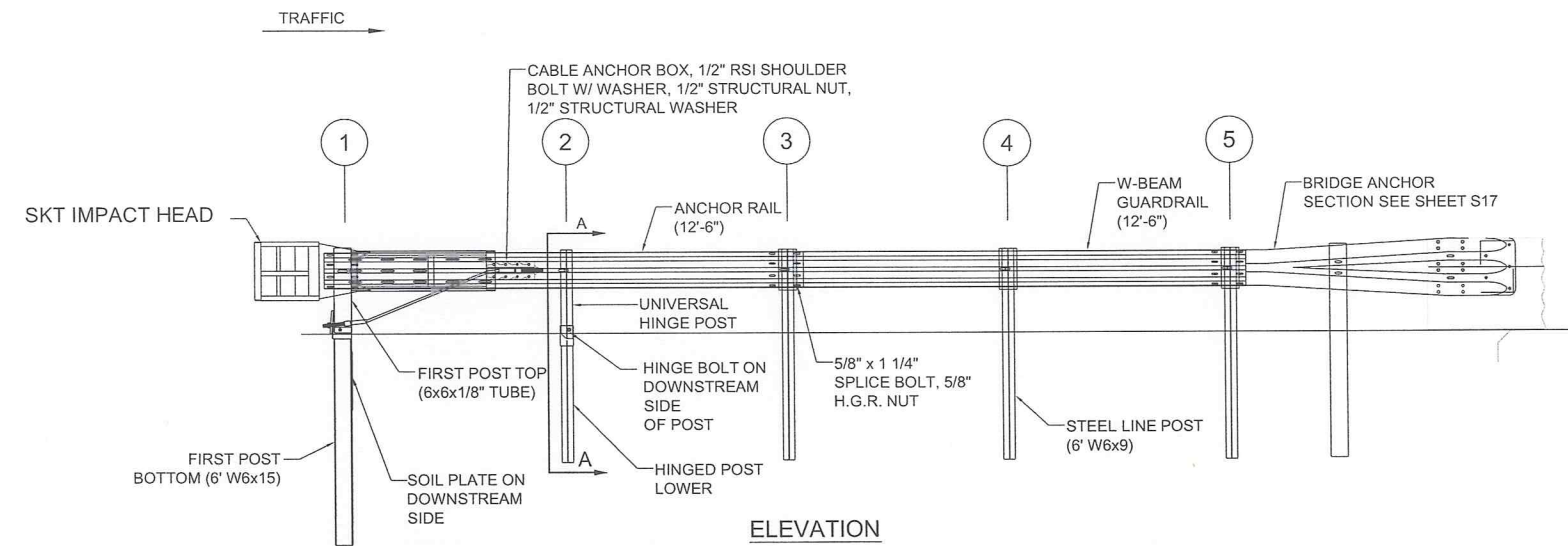
|                               |
|-------------------------------|
| CHECKED BY: SJ                |
| DRAWN BY: KFT                 |
| JOB NUMBER: 13-3281           |
| FILE NAME: 13-3281_Structural |
| SCALE: NTS                    |
| ISSUE DATE: 08.08.2014        |
| SHEET NUMBER:                 |

S18

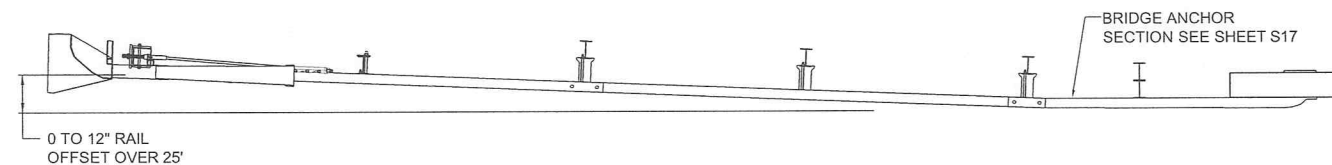




PLAN

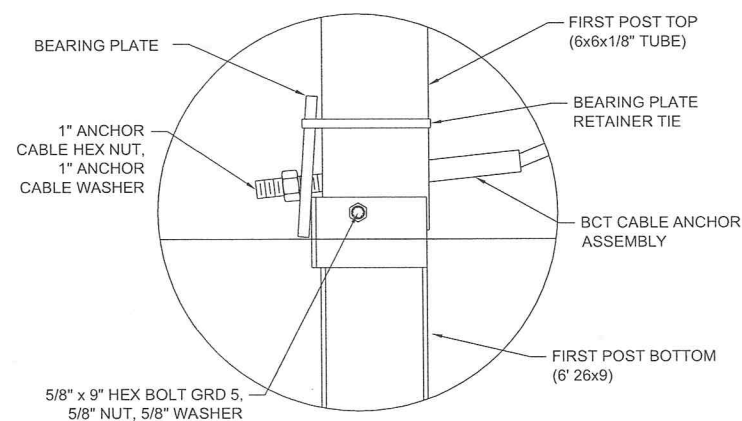


ELEVATION

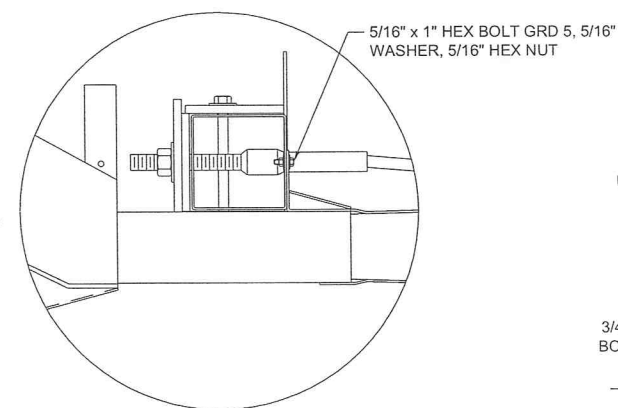


FLARED INSTALLATION

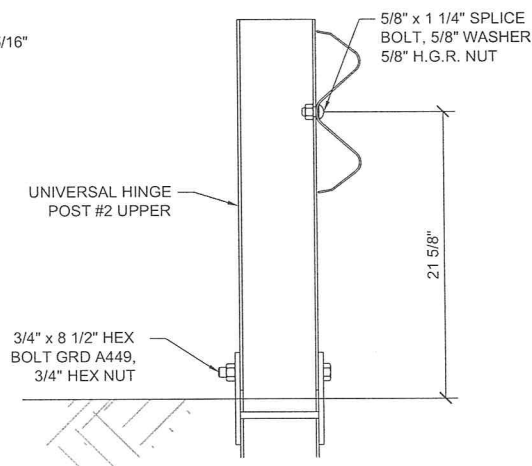
25:1 MAXIMUM FLARE RATE



POST #1 CONNECTION DETAIL

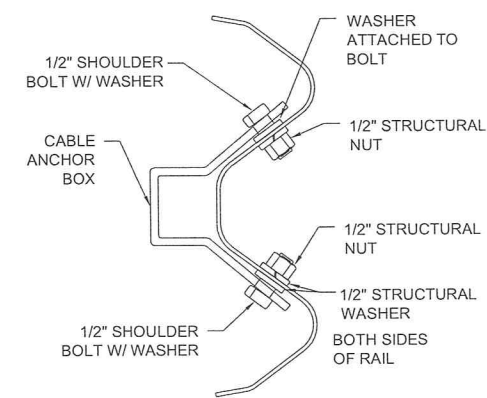


IMPACT HEAD CONNECTION DETAIL



SECTION A-A

POST #2



SECTION C-C

ANCHOR BRACKET

GENERAL NOTES:

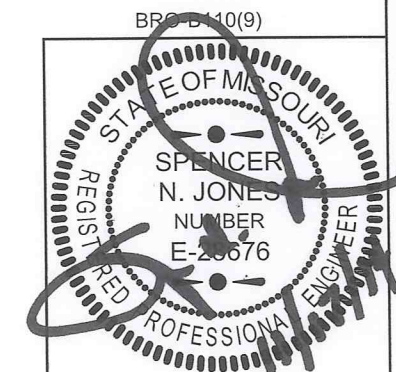
1. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.

2. THE LOWER SECTIONS OF THE POSTS 1&2 SHALL NOT PROTRUDE MORE THAN 4 IN ABOVE THE GROUND (MEASURED ALONG A 5' CORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.

3. THE LOWER SECTIONS OF THE HINGED POSTS SHOULD NOT BE DRIVEN WITH THE UPPER POST ATTACHED. IF THE POST IS PLACED IN A DRILLED HOLE, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.

4. WHEN COMPETENT ROCK IS ENCOUNTERED, A 12" Ø POST HOLE, 20 IN. DEEP CORED INTO THE ROCK SURFACE MAY BE USED IF APPROVED BY THE ENGINEER FOR POST 1. GRANULAR MATERIAL WILL BE PLACED IN THE BOTTOM OF THE HOLE, APPROXIMATELY 2.5" DEEP TO PROVIDE DRAINAGE. THE FIRST POST CAN BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH SUITABLE BACKFILL. THE SOIL PLATE MAY BE TRIMMED IF REQUIRED.

5. THE BREAKAWAY CABLE ASSEMBLY MUST BE TAUT. A LOCKING DEVICE (VICE GRIPS OR CHANNEL LOCK PLIERS) SHOULD BE USED TO PREVENT THE CABLE FROM TWISTING WHEN TIGHTENING NUTS.



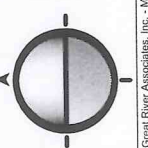
FURNACE CREEK ROAD BRIDGE #06100321  
WASHINGTON COUNTY, MISSOURI  
CRASHWORTHY END TERMINAL

CHECKED BY: SJ  
DRAWN BY: KFT  
JOB NUMBER: 13-3281  
FILE NAME: 13-3281\_Structural  
SCALE: NTS  
ISSUE DATE: 08.08.2014  
SHEET NUMBER:

S19

**GRA**  
GREAT RIVER  
ASSOCIATES

2008 S. HIGHWAY 100, SPRINGFIELD, MO 65804  
PHONE: (417) 886-7171 FAX: (417) 886-7591  
www.grainc.com



| No. | Revision/Issue                  | Date       |
|-----|---------------------------------|------------|
| 1   | REVISED GUARD RAIL PER COMMENTS | 11-17-2014 |
| 2   |                                 |            |
| 3   |                                 |            |
| 4   |                                 |            |
| 5   |                                 |            |

Great River Associates, Inc. - Missouri State Certificate of Authority Number: 2001011416  
Engineering: 2000194885, Land Surveying: 2001011416, Landscape Architecture: 2001011416