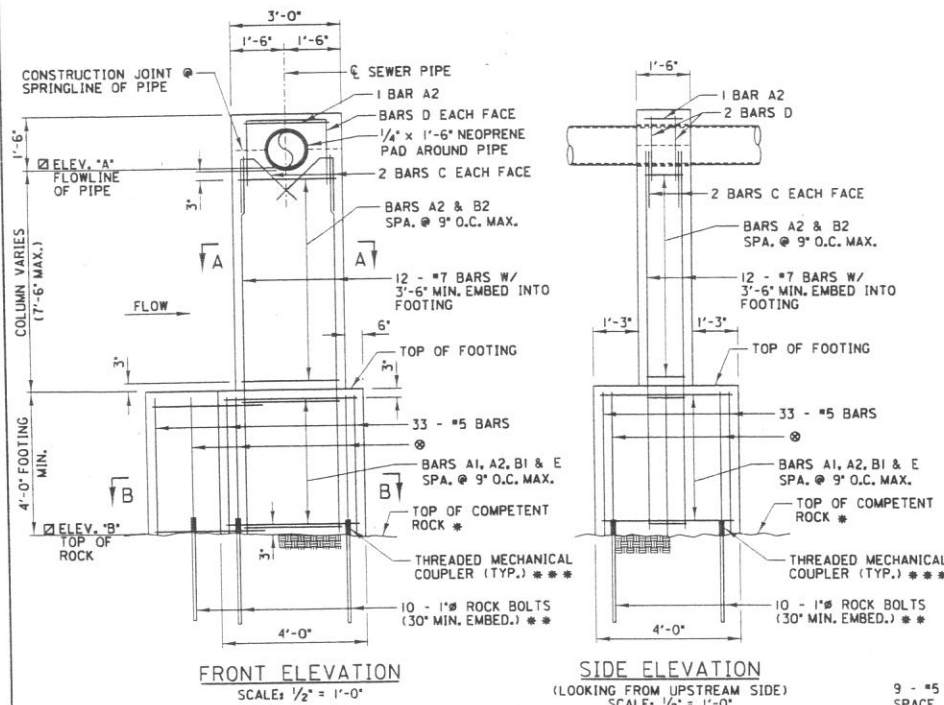


LOCATION	ELEV. "A"	ELEV. "B"	"C"
NEW PIER NO. 1	630.84	621.00	10'-1"
NEW PIER NO. 2	630.95	620.00	11'-2"

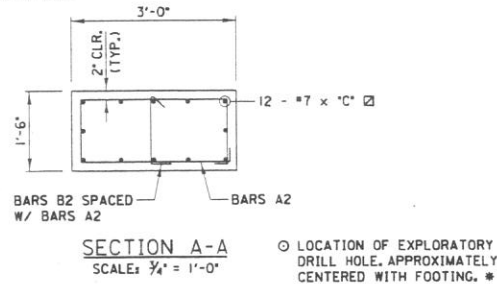
PLAN VIEW
SCALE: N.T.S.



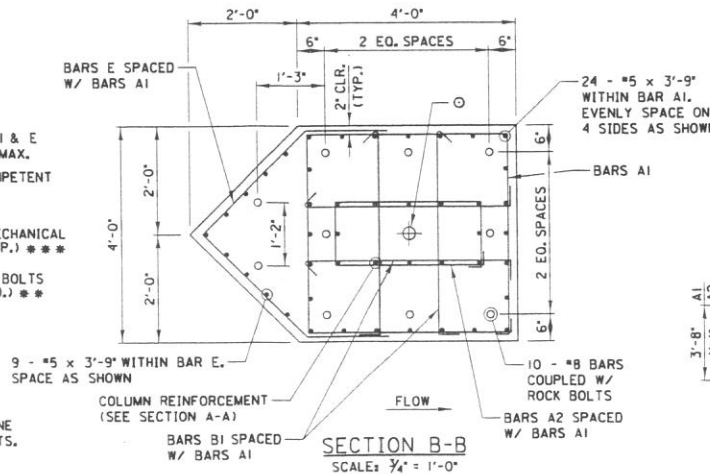
FRONT ELEVATION
SCALE: 1/2" = 1'-0"

SIDE ELEVATION
(LOOKING FROM UPSTREAM SIDE)
SCALE: 1/2" = 1'-0"

THE ELEVATIONS AND REBAR LENGTHS SHOWN HAVE BEEN APPROXIMATED BASED ON INFORMATION FROM EXISTING PLANS. THE CONTRACTOR SHALL VERIFY ALL ELEVATIONS & REBAR LENGTHS PRIOR TO CONSTRUCTION OF NEW PIERS. FINAL ELEVATIONS & REBAR LENGTHS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO CONSTRUCTION FOR REVIEW & APPROVAL.



SECTION A-A
SCALE: 3/4" = 1'-0"



SECTION B-B
SCALE: 3/4" = 1'-0"

GENERAL NOTES:

- SPECIFICATIONS: ALABAMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 2012.
- NO CHANGE OF PLANS WILL BE PERMITTED EXCEPT BY WRITTEN APPROVAL OF THE ENGINEER. MINOR CHANGES IN DETAILS OF DESIGN OR CONSTRUCTION PROCEDURE MAY BE AUTHORIZED BY THE ENGINEER.
- REINFORCING STEEL SHALL BE AASHTO M31 GRADE 60 IN ACCORDANCE WITH SECTION 502 OF THE SPECIFICATIONS.
- CONCRETE SHALL BE CLASS "D" (3000 PSI) PROPORTIONED AND TESTED IN ACCORDANCE WITH SECTION 501 OF THE SPECIFICATIONS.
- THE FOLLOWING SUBMITTALS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO COMMENCING RELATED WORK: CONCRETE MIX DESIGNS, MATERIAL CERTIFICATES, MATERIAL TEST REPORTS, ROCK BOLT SPECIFICATIONS AND LOAD TEST RESULTS.
- CHAMFER ALL CORNERS 3/4" UNLESS NOTED OTHERWISE.
- PIER DESIGN IS BASED ON A MAXIMUM STREAM VELOCITY = 10 FT./SEC.

ROCK SURFACE PREPARATION & EXPLORATION NOTE:

THE CONTRACTOR SHALL REMOVE SEDIMENT, LAITANCE, AND WEAK ROCK WITHIN THE FOOTPRINT OF THE PIER FOOTING PRIOR TO DRILLING ANCHORS. THE AREA BENEATH THE FOOTPRINT OF THE PIER FOOTING SHALL BE LEVELED SUCH THAT THERE IS NO MORE THAN 1" FALL FROM ONE SIDE TO THE OTHER. THE CONTRACTOR SHALL DRILL AN EXPLORATORY HOLE BELOW THE BOTTOM OF EACH PIER TO DETERMINE IF ANY VOIDS OR CREVICES ARE PRESENT. THE EXPLORATORY HOLES SHALL BE TAKEN TO A MINIMUM DEPTH OF 4 FEET. THE OWNER'S GEOTECHNICAL ENGINEER SHALL BE NOTIFIED PRIOR TO DRILLING EXPLORATORY HOLES AND SHALL BE PRESENT DURING THE DRILLING OPERATION. FURTHER CONSTRUCTION SHALL NOT COMMENCE UNTIL THE OWNER'S GEOTECHNICAL ENGINEER DELIVERS JUDGEMENTS ON THE COMPETENCY OF THE UNDERLYING ROCK AND REQUIRED EMBEDMENT DEPTH OF ROCK ANCHORS.

ROCK BOLT ANCHOR NOTE:

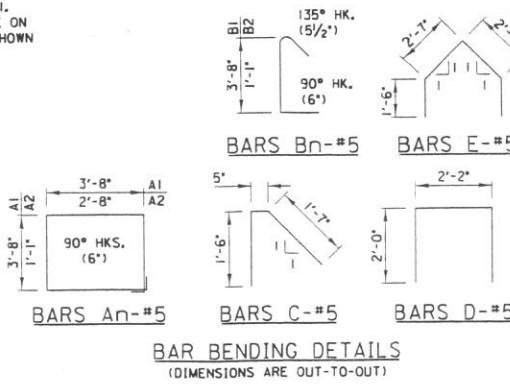
ROCK BOLT ANCHORS SHALL BE 1" DIA. WILLIAMS RH HOLLOW-CORE SPIN-LOCK ROCK BOLTS, OR EQUAL APPROVED BY THE ENGINEER. ALL ROCK BOLTS SHALL BE TENSIONED TO 15,000 LBS. ONE ROCK BOLT ON THE UPSTREAM AND DOWNSTREAM SIDE OF EACH PIER SHALL BE LOAD TESTED AND CAPABLE OF RESISTING A PULL OUT FORCE OF 25,000 LBS. THE ENGINEER SHALL BE NOTIFIED PRIOR TO LOAD TESTING AND SHALL BE PRESENT DURING THE TESTING OPERATION. THE ROCK BOLTS SHALL BE INSTALLED AND TESTED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. A REPRESENTATIVE OF THE MANUFACTURER MUST BE PRESENT FOR SUFFICIENT TIME TO ASSURE THE CONTRACTOR IS PROPERLY SCHOOLED IN THE INSTALLATION AND TESTING OF THE ROCK BOLT ANCHORING SYSTEM. GROUT EACH ROCK BOLT AFTER TENSIONING IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS USING A WIL-X CEMENT GROUT. LOAD TEST AND BOLT TENSION DATA SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL BEFORE CONTINUING WITH CONSTRUCTION.

MECHANICAL SPLICE NOTE:


THE MECHANICAL COUPLING DEVICE SHALL BE A TYPE RECOMMENDED BY THE ROCK BOLT MANUFACTURER TO BE COMPATIBLE WITH THE SPECIFIED ROCK BOLT ANCHOR SYSTEM. THE MECHANICAL COUPLING DEVICE SHALL ALSO BE CAPABLE OF RESISTING IN TENSION AT LEAST 125 PERCENT OF THE YIELD STRENGTH OF THE BAR. ALL COMPONENTS OF THE MECHANICAL SPLICING SYSTEM SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

CONSTRUCTION NOTE:

THE CONTRACTOR SHALL REMOVE THE DAMAGED EXISTING PIERS AND EXISTING SEWER LINE AS DESIGNATED PRIOR TO BEGINNING CONSTRUCTION OF NEW PIERS. DURING CONSTRUCTION AND REMOVAL ACTIVITIES, THE CONTRACTOR SHALL NOT DISTURB ANY AREAS THAT ARE OUTSIDE OF THE PERMITTED WORK ZONE AS DESCRIBED IN THE APPLICABLE PERMITS FOR THIS PROJECT. COPIES OF THESE PERMITS CAN BE OBTAINED FROM THE OWNER.



BAR BENDING DETAILS
(DIMENSIONS ARE OUT-TO-OUT)



ALABAMA
LICENSED
PROFESSIONAL
ENGINEER
NO. 32352-E
J. W. STATION
9/11/13

BY	BWS								
DESCRIPTION									
NOTE MODIFICATIONS									
DATE	08/04/13								
REV	1								

CITY OF HUNTSVILLE
WATER POLLUTION CONTROL
 HUNTSVILLE, ALABAMA
LIMESTONE CREEK AERIAL SEWER
CROSSING PIER REPAIRS

JOB NO.: 11058030	
DATE: MARCH 2013	
DESIGNED BY: BWS	
CHECKED BY: JHR	
DRAWN BY: CWT	
BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	
DRAWING NUMBER	S1
SHEET NUMBER	1

- SEE "ROCK SURFACE PREPARATION & EXPLORATION NOTE" FOR FURTHER REQUIREMENTS.
- SEE "ROCK BOLT ANCHOR NOTE" FOR FURTHER REQUIREMENTS.
- SEE "MECHANICAL SPLICE NOTE" FOR FURTHER REQUIREMENTS.

10 - #8 BARS THREADED AT ONE END & COUPLED W/ ROCK BOLTS.

PROJECT NOTES AND REQUIREMENTS

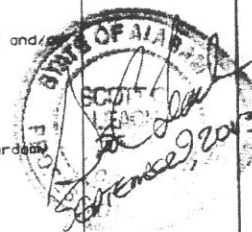


1. A preconstruction meeting with the Army Corps of Engineers (ACOE) must be arranged prior to any construction activity.
2. If changes in the location or plans of the work are necessary, revised plans should be submitted promptly to the ACOE Office located at 2042 Beltline Rd, SW, Building C, Suite 415, Decatur, AL 35601.
3. Native substrate will be placed around the two piers up to the pre-existing contour of the creek bed. Native vegetation will be used for bank stabilization on each side of the creek.
4. The activity authorized by this permit must be maintained in good condition and in conformance with the terms and conditions of the permit. The contractor is not relieved of this requirement if they abandon the permitted activity, although they must make a good faith transfer to a third party in compliance with the General Conditions of the ACOE Permit. Should they wish to cease to maintain the authorized activity, or should they desire to abandon it without a good faith transfer, they may obtain a modification of this permit from this office, which may require restoration of the area.
5. If any previously unknown historic or archaeological remains are discovered while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. ACOE will then initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
6. If a conditioned water quality certification has been issued for this project, you must comply with the conditions specified in the certification as special conditions to the permit.
7. You must allow representatives from the ACOE and FWS to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of the permit.
8. Construction activities authorized for this project are pursuant to:
 - Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C.403) &
 - Section 404 of the Clean Water Act (33 U.S.C.1344).
9. The work must be in accordance with the plans approved in the ACOE permit and any changes to the plans must be approved in advance by the ACOE.
10. You must have a copy of this permit available on-site and ensure all contractors are aware of its conditions and abide by them.
11. The permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.
12. The ACOE Permit does not authorize you to take an endangered species. In particular the Armored snail (*Marstonia pachyta*) and Slender campeloma (*Campeloma decampi*). In order to legally take a listed species, you must have a separate authorization under the ESA (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with 'Incidental take' provisions with which you must comply). The FWS BO contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with 'Incidental take' that is also specified in the BO. Your authorization under the ACOE permit is conditional upon your compliance with all the mandatory terms and conditions associated with incidental take of the BO, which terms and conditions are incorporated in ACOE permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with the ACOE permit. The FWS is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA.
13. Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service Law Enforcement Office (USFWS LE-Millbrook, AL (334)285-9600 ext. 1). Additional notification must be made to the Fish and Wildlife Service Ecological Services Field Office (251/441-5181). Care should be taken in handling sick or injured individuals and in preservation of specimens in the best possible state for later analysis of cause of death or injury.
14. You must develop a spill response plan for this pipeline crossing in the event of a rupture and spillage of raw sewage in the creek. This plan must be approved prior to construction of the crossing.

15. You must install and maintain a warning sign upstream of pipeline crossing which may be easily seen from the center of Limestone Creek. Sign should state on Line 1 - Boaters Warning, Line 2 - Aerial Pipeline Crossing Ahead, Line 3 - Port Around and Line 4 City of Huntsville (256)427-5300. Lettering should be black on a white background. Line 1 should be 3 inch lettering and Lines 2-4 should be 2 inch lettering. The sign panel should not exceed 8' x 4'.
16. The permittee shall arrange a pre-construction meeting that will include the applicant, contractor and the ACOE and/or TVA representative prior to any construction activity to ensure compliance with all permit conditions.
17. The existing sewer line pipe will be saw-cut on each side of the pier and removed.
18. The contractor will construct a 10ft x 10ft cofferdam and underwater concrete will be used to seal the cofferdam.
19. A crane will be used to lower the cofferdam into the creek at the location where the first pier will be re-constructed.
20. A pump will be lowered into the cofferdam and the water will be pumped out of the cofferdam.
21. Water from the cofferdam will be discharged to a location where it can be treated by overland flow, a series of sediment barriers, or a temporary sediment trap.
22. A small excavator will be lowered into the cofferdam to excavate the demolished pier material and prepare rock surface for new pier footings. Material removed from the excavation will be placed in a bucket and removed by crane.
23. Exploratory holes will be drilled to a minimum of 4-ft depth at the center of the proposed pier. The Owner will retain a geotechnical engineer to be present to assess the competency of the rock and determine the required embedment depth for the rock bolt anchors.
24. Rock bolt anchors will be installed and tested as specified in the Rock Bolt Anchor Note on Sheet S-1.
25. The forming for the new pier will be constructed inside the cofferdam and a bucket, crane, or pump truck will be used to pour the concrete required for pier construction.
26. Fill material removed from excavation will be placed back around the bottom of each pier to return the disturbed area to its 'natural'/pre-existing conditions as close as possible.
27. The crane will be used to remove all construction equipment.
28. The crane will be used to remove the cofferdam.
29. The crane will be used to place the cofferdam at the location of the second pier.
30. Repeat notes 17 thru 29 to construct the second pier.
31. Limit the dewatered and excavated instream area to the construction area encompassed by the cofferdam at the two instream pier construction locations. This area shall minimize the square feet of disturbance to the stream bottom.
32. Implement best management practices during the proposed construction as described in the August 2011, Construction Best Management Practices Plan (ASTCC 2011).
33. Clearing and snagging should be conducted at regular intervals in order to minimize the chance of colonization on debris by listed snails (future take) and to prevent excessive debris jams which would threaten the structural integrity of the construction. If a debris jam is minor (less than 10% channel blockage), the debris can be dislodged into stream flow. Large debris jams should be removed from the stream channel.

Conditions of Operation:

Remove debris when needed.
 Methods to remove flow obstructions may include sawing, cobling, winching, lifting, or dragging.
 No heavy equipment will be permitted within the stream.
 All heavy equipment will operate from beyond the top of stream banks.
 Provide written and photo documentation of any actions to the lead action agency (ACOE) and (FWS). Document any newly observed streambed scour or bank erosion in the vicinity of the piers.



REV	DATE	DESCRIPTION	BY
1	04/09/13	Note Revisions	SCL

CITY OF HUNTSVILLE
 WATER POLLUTION CONTROL
 HUNTSVILLE, ALABAMA
 LIMESTONE CREEK AERIAL
 CROSSING REPAIRS

JOB NO.: 11058030
 DATE: APRIL 2013
 DESIGNED BY: SCL
 CHECK BY: SCL
 DRAWN BY: KMT
 THIS IS ONE INCH ON ORIGINAL DRAWING
 1" = 10' NOT ONE INCH ON THIS SHEET. ADJUST SCALES ACCORDINGLY.
 DRAWING NUMBER
 PN-1
 SHEET NUMBER
 1

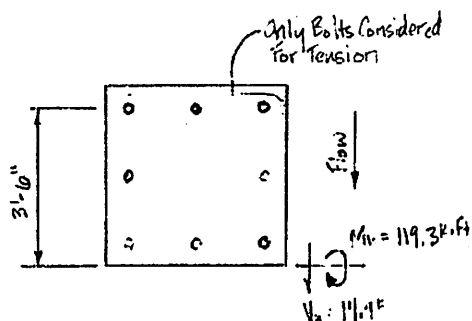


Sheet No. 2 Of 3

Project _____ Job No. _____ Made By BWS Date 3/6/13

Subject _____ Chkd. By ATK Date 9/9/13

* Deck Bolt Anchor Analysis



$$\sum M_{TOE} = 0$$

$$119.3 \text{ k-ft} - T_{req'd} (3) (3.6') = 0$$

$$T_{req'd} = 11.4 \text{ k} \quad \therefore \text{Require Anchors To Resist } 25 \text{ k Intension (2.0 F.S.)}$$

$$\text{Ext Tension @ } 15 \text{ k}$$

$$\sum F_x = 0$$

$$14.9 \text{ k} - V_{req'd} (8) = 0$$

$$V_{req'd} = 1.9 \text{ k}$$

Shear Is Minimal and Combined Effects will not Control

$$\begin{aligned} * V_{prov'd} &= 0.6 A_s f_{uta} \\ &= 0.6 (0.532 \text{ in}^2) (124 \text{ ksi}) \\ V_{prov'd} &= 39.1 \text{ k} \end{aligned}$$

$$\frac{T_{req'd}}{T_{prov'd}} + \frac{V_{req'd}}{V_{prov'd}} \leq 1.0$$

$$\frac{11.4 \text{ k}}{25 \text{ k}} + \frac{1.9 \text{ k}}{39.1 \text{ k}} \leq 1.0$$

$$0.504 \leq 1.0 \quad \therefore \text{OK} \rightarrow \text{Equivalent F.S.} \approx 2.0$$

Sheet No. 3 Of 3Project _____ Job No. _____ Made By BWS Date 3/6/13Subject _____ Chkd. By ASK Date 4/9/13* Flexure in Column

$$\sum M_{top} = 0 \text{ (ft)}$$

$$M_u + [-3.5^k(8') - 7.5^k(6) - 0.21k/ft(8')(4')] (1.2) = 0$$

$$M_u = 79.7 \text{ k-ft}$$

$$\sum O.R.S. \leq \sum T.R.S.$$

$$0.85(3ksi)(18")a = A_s(60ksi)$$

$$a = 1.307 A_s$$

$$\phi M_n = \phi A_s f_y (d - a/2) \geq M_u$$

$$= 0.9(A_s)(60ksi) \left[32.875" - \frac{1.307 A_s}{2} \right] \geq 79.7 \text{ k-ft} (12"/1')$$

$$A_s \geq 0.545 \text{ in}^2$$

$$\therefore \text{Use } 3\text{-}\#7 \text{ (} A_s = 1.8 \text{ in}^2 \text{)}$$

* Shear in Column

$$\sum F_y = 0 \uparrow$$

$$[3.5^k + 7.5^k + 0.21k/ft(8')] (1.0) - V_u = 0$$

$$V_u = 17.7^k$$

$$\phi V_c = 0.0316 \beta \sqrt{f_c'} b_v d_v$$

$$= 0.0316 (2) \sqrt{3ksi} (18") (32.875")$$

$$V_c = 64.8^k$$

$$\phi V_c = 58.3^k \geq 2V_u = 25.4^k \therefore \text{Use Minimum Trans. Reinforcement}$$

$$\phi A_{vmin} \geq 0.0316 \sqrt{f_c'} \frac{b_v s}{f_y}$$

$$\geq 0.0316 \sqrt{3ksi} \frac{18" (9")}{60ksi}$$

$$A_{vmin} \geq 0.148 \text{ in}^2$$

$$\therefore \text{Use } 5\text{-}\#9 \text{ o.c. (} A_v = 0.62 \text{ in}^2 \text{)}$$

* Minimum Embedment Lengths

$$\#7 \text{ Bar: } l_{dt} = \frac{1.25 (0.60 \text{ in}^2) (60ksi)}{\sqrt{3ksi}} = 25.98" \rightarrow \text{Use } 27"$$

$$\#8 \text{ Bar: } l_{dt} = \frac{1.25 (0.79 \text{ in}^2) (60ksi)}{\sqrt{3ksi}} = 34.21" \rightarrow \text{Use } 36"$$