DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
3701 Bell Road
NASHVILLE, TENNESSEE 37214

November 14, 2013

SUBJECT: File No. 2011-00100; Request for Reinitiation of Formal Consultation for a Proposed Modification of Municipal Sewer Line Crossing on Piers at Limestone Creek Mile 16.9, A Tributary to Tennessee River Mile 310.7, Right Bank, Limestone County, Alabama

Mr. Dan Everson
U.S. Fish and Wildlife Service
1208-B Main Street
Daphne, Alabama 36526

Dear Mr. Everson:

The Corps of Engineers (Corps), as lead federal action agency, and the Tennessee Valley Authority (TVA), as cooperating federal agency, are submitting this request for reinitiating formal consultation with the US Fish and Wildlife Service (USFWS) as required under Section 7(a)(2) of the Endangered Species Act (as amended).

Your office provided a Biological Opinion dated December 13, 2011, concerning the three federally listed endangered freshwater snails (Armored snail, Slender campeloma, and Anthony's riversnail) that may occur within the vicinity of the project and may be adversely affected by the proposed action.

The Corps, after consultation with your office, issued an Individual Permit for a sewer line crossing of Limestone Creek on March 29, 2012. In April 2013, the City of Huntsville notified the Corps that the newly constructed piers had shifted. The Corps met onsite with the applicant to discuss replacing the existing crossing. Subsequently, the applicant submitted plans of the proposed new piers. They propose to replace the existing piers with a modified design that would withstand the anticipated forces during high flow events. This construction method would require installation of 10' x 10' coffer dams for the removal and construction of concrete piers. Underwater concrete would be used to seal the cofferdams.

As described in the previous biological survey (enclosed), the applicant conducted stream surveys (pre-coordinated with your office) for the snail species in May 2011. The survey reach extended 100 yards upstream and 300 yards downstream from the proposed stream crossing. According to the survey, while no protected species were found directly within the project footprint or the immediate area, twelve Armored snails and three Slender campeloma snails were found within the survey reach. In addition, the survey finds suitable habitat for the species within the reach and project footprint.

Therefore, based upon this information, we have determined that the proposed project is likely to adversely affect suitable substrate for the federally listed snail species and request your concurrence with this determination. Please find enclosed the modified plans for this proposed project. With the submittal of these plans, the Corps and TVA have provided the USFWS with all of the best scientific and commercial data available concerning the impact of the proposed project on listed species.

We await your evaluation of the potential impacts of this project upon the listed species. If you have questions or need additional information, please contact Mr. Gary Davis of my staff at (256) 350-5620 or Ms. Samantha Strickland of TVA at (256) 386-2643.

Sincerely,

Bradley N. Bishop
Chief, Western Regulatory Section
Operations Division

Enclosure (Modified Plans and Biological Survey)

Copy Furnished:

City of Huntsville
ATTN: Mr. Shane Davis
320 Fountain Circle
Huntsville, Alabama 35801

Garver, LLC
5125A Research Drive
Huntsville, Alabama 35805

TVA
ATTN: Ms. Samantha Strickland
Reservoir Land Use and Permitting
1010 Reservation Road
Muscle Shoals, Alabama 35662-1010

ADEM
P.O. Box 301463
Montgomery, Alabama 36130-1463

HUNTSVILLE

Kathy Martin, P.E.
Director
City Engineer

Urban Development Department
Engineering Division

September 25, 2013

Department of the Army
Mr. Bradley N. Bishop
Chief, Operations Division
Western Regulatory Field Office
2042 Beltline Road SW
Building C Suite 415
Decatur, AL 35601-9990

RE: File No. LRN-2011-00100; Proposed Aerial Sewer Line Crossing at Limestone Creek Mile 16.9, a Tributary to Tennessee River Mile 310.7LB, Huntsville, Limestone County, Alabama

Dear Mr. Bishop,

The City of Huntsville sincerely appreciates your consideration regarding the above referenced permit modification. As a follow-up to our meeting at the site on August 30, 2013 with Garver Engineers and Water Pollution Control (WPC), please accept the attached documents for your review and file.

- Update plans dated 9/9/13
- Engineering calculations for pier design from Garver Engineers dated 3/6/2013 consisting of 3 pages.
- Specification for Spin Lock Rock Bolts.
- Construction Method for installation of the sewer crossing.

An additional package has been included per the request of Ms. Samantha Strickland at TVA based on a telephone conversation on September 4, 2013. Per her request for a new TVA permit to be issued on the project, she requires the attached documentation upon your review:

- Updated plans dated 9/3/13.
- TVA Permit Land Use Application
- TVA Applicant Disclosure Form
- $250 permit fee
- Construction Method for installation of sewer crossing
- Maintenance Letter provided by WPC

It was truly our pleasure to finally meet you and your staff. We would welcome any opportunity to provide you with any additional information. Thank you in advance for your consideration.

Sincerely,

Kathy Martin, PE
Director of Engineering

Cc: Gary Davis, Corps
Shane Cook, WPC
Scott Leach, Garver

Attachments

OMB No. 3316-0060

JOINT APPLICATION FORM
Department of the Army/TVA

The Department of the Army (DA) permit program is authorized by **Section 10 of the Rivers and Harbors Act of 1899** and **Section 404 of the Clean Water Act (P.L. 95-217)**. These laws require permits authorizing structures and work in or affecting navigable waters of the United States and the discharge of dredged or fill material into waters of the United States. **Section 26a of the Tennessee Valley Authority Act,** as amended, prohibits the construction, operation, or maintenance of any structure affecting navigation, flood control, or public lands or reservations across, along, or in the Tennessee River or any of its tributaries until plans for such construction, operation, and maintenance have been submitted to and approved by the Tennessee Valley Authority (TVA).

Name and Address of Applicant:	Name, Address, and Title of Authorized Agent:
City of Huntsville 320 Fountain Circle Huntsville, AL 35801	Kathy Martin, City Engineer 320 Fountain Circle Huntsville, AL 35801
Telephone Number: Home _____ Office (256) 427-5300	Telephone Number: Home _____ Office (256) 427-5300

Location where activity exists or will occur *(include Stream Name and Mile, if known):*

Limestone Creek mile 16.9, in Limestone County 40' south of HW 72 bridge.

Application submitted to ☑ DA ☐ TVA

Date activity is proposed to commence: _____ Date activity is proposed to be completed: _____

Describe in detail the proposed activity, its purpose and intended use *(private, public, commercial, or other)*. Describe structures to be erected including those placed on fills, piles, or floating platforms. Also describe the type, composition, and quantity of materials to be discharged or placed in the water; the means of conveyance; and the source of discharge or fill material. Please attach additional sheets if needed.

Repair existing piers supporting public sanitary sewer line across Limestone Creek. Two existing concrete piers will be re-constructed to support the 12" ductile iron sanitary sewer line. Both piers are located in the channel and the others piers will be outside the top of bank.

Application is hereby made for approval of the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. **I agree that, if this application is approved by TVA, I will comply with the attached terms and conditions and any special conditions that may be imposed by TVA at the time of approval. Please note the U.S. Army Corps of Engineers may impose additional conditions or restrictions.**

9/12/13
Date

Kathy Martin
Signature of Applicant

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both. The appropriate DA fee will be assessed when a permit is issued.

Names, addresses, and telephone numbers of adjoining property owners, lessees, etc., whose properties also join the waterway:

Lynn Holladay, 12999 Bryan Hill Road, Madison AL 35756, (256) 771-0727
Kyle Holladay, PO Box 55524, North Pole AK 99705, (907) 488-6569

List of previous DA/TVA permits/approvals ☑ DA 2011-00100 PN 11-12 (*Permit Number*) ☐ TVA _____ (*Date*)

Is any portion of the activity for which authorization is sought now complete? ☐ Yes ☑ No *(If "Yes" attach explanation)*
Month and year the activity was completed: _____ . Indicate the existing work on the drawings.

List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval

Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?
☐ Yes ☑ No *(If "Yes" attach explanation)*

Privacy Act Statement

This information is being requested in accordance with Section 26a of the TVA Act as cited on the front page of this form. Disclosure of the information requested is voluntary; however, failure to provide any required information or documents may result in a delay in processing your application or in your being denied a Section 26a permit. An application that is not complete will be returned for additional information. TVA uses this information to assess the impact of the proposed project on TVA programs and the environment and to determine if the project can be approved. Information in the application is made a matter of public record through issuance of a public notice if warranted. Routine uses of this information include providing to federal, state, or local agencies, and to consultants, contractors, etc., for use in program evaluations, studies, or other matters involving support services to the program; to respond to a congressional inquiry concerning the application or Section 26a program; and for oversight or similar purposes, corrective action, litigation or law enforcement.

Project plans or drawings should accompany the application. These should be on paper suitable for reproduction no larger than 11 x 17 inches or contained on a 3-1/2 inch floppy computer disc in "dxf" format, and should be submitted to the appropriate TVA and U.S. Army Corps of Engineers offices. An application that is not complete will be returned for additional information

Department of the Army Offices

U.S.Army Engineer District, Nashville
Corps of Engineers
Attention: Regulatory Branch
3701 Bell Road
Nashville, Tennessee 37214
Phone: (615) 369-7500

U.S. Army Corps of Engineers
Eastern Regulatory Field Office
501 Adesa Blvd, Suite 250
Lenoir City, TN 37771
Phone: (865) 986-7296

U.S. Army Corps of Engineers
Western Regulatory Field Office
2042 Beltline Road, SW
Bldg. C, Suite 415
Decatur, AL 35601
Phone: (256) 350-5620

TVA Office Locations

(Boone Dam Vicinity)
106 Tri-Cities BusinessPark Drive
Gray, TN 37615

(Cherokee, Douglas, Nolichucky)
3726 E. Morris Blvd
Morristown, TN 37813

(Watts Bar, Melton Hill, Norris)
Watts Bar-Clinch Watershed Team
260 Interchange Park Dr
Lenoir City, TN 37772

(Ft. Loudoun, Tellico)
Little Tennessee Watershed Team
260 Interchange Park Dr.
Lenoir City, TN 37772

(Ocoee 1,2,3)
221 Old Ranger Road
Murphy, NC 28906

(Chickamauga, Nickajack)
1101 Market Street, PSC 1E-C
Chattanooga, TN 37402-2801

(Guntersville, Tims Ford Normandy)
3696 Alabama Hwy 69
Guntersville, AL 359

(Pickwick, Wheeler, Wilson Bear Creek)
P.O. Box 1010
Muscle Shoals, AL 35662

(Kentucky)
2835-A East Wood Street
Paris, TN 38242

Construction Method for Sanitary Sewer Crossing Over Limestone Creek

1) The existing sewer line pipe will be saw-cut on each side of the pier and removed.
2) The contractor will construct a 10 ft x 10 ft cofferdam and underwater concrete will be used to seal the cofferdam.
3) A crane will be used to lower the cofferdam into the creek at the location where the first pier will be re-constructed.
4) A pump will be lowered into the cofferdam and the water will be pumped out of the cofferdam and discharged into a location where it can be treated by overland flow, a series of sediment barriers, or a temporary sediment trap.
5) The existing pier will be demolished.
6) A Vactor truck suction pipe will be ran to 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.
7) Exploratory holes will be drilled to a minimum of 4' 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.
8) Rock bolt anchors will be installed and tested as specified in the rock bolt anchor note on Sheet S-1 in the contract plans.
9) The forming for the 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.
10) 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.
11) The crane will be used to remove all construction equipment.
12) The crane will be used to remove the cofferdam.
13) The crane will be used to place the cofferdam at the location of second pier.
14) Repeat the procedure to construct the second pier.

There will be two piers reconstructed within the normal flow of the creek. A third pier is located in the overbank area of the creek that will not require a cofferdam for construction. The total disturbed area of the streambed will be less than 500 square feet. This is based on the maximum area of the cofferdam plus a couple of feet buffer around the dam at both pier locations.

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 approve prior to construction of the crossing.

15. You must install and maintain a warning sign upstream of pipeline crossing which may be 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, cabling, 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.

GARVER

STATE OF ALABAMA
SCOTT C. LEE
LICENSED
PROFESSIONAL ENGINEER
Scott C. Lee
License#20

REV	DATE	DESCRIPTION	BY
1	05/09/13	New Revisions	SCL

CITY OF HUNTSVILLE
WATER POLLUTION CONTROL
HUNTSVILLE, ALABAMA

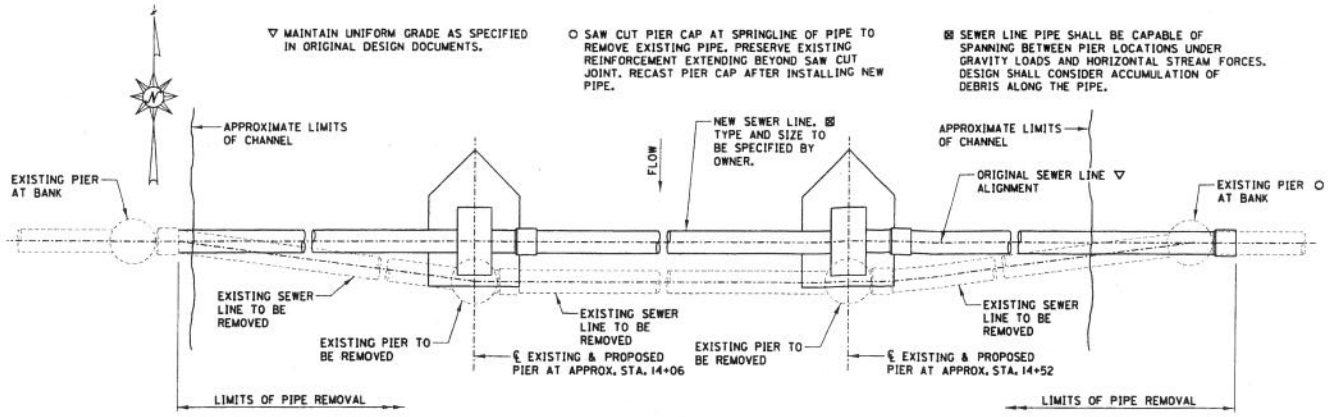
LIMESTONE CREEK AERIAL CROSSING REPAIRS

JOB NO.: 11058030
DATE: APRIL 2013
DESIGNED BY: SCL
CHECK BY: SCL
DRAWN BY: KMT

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWING NUMBER
PN-1

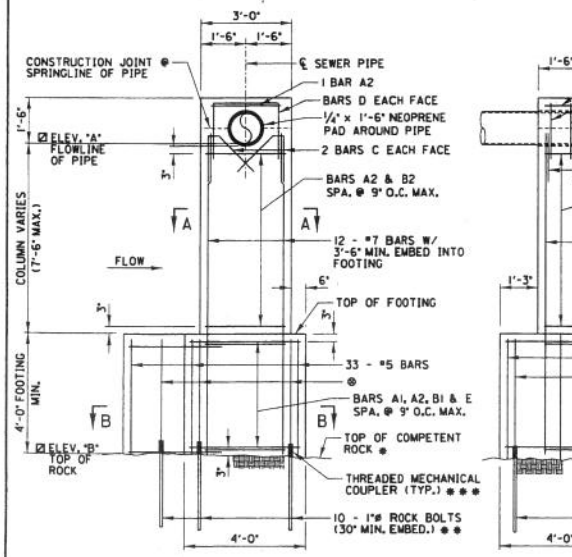
SHEET NUMBER 1



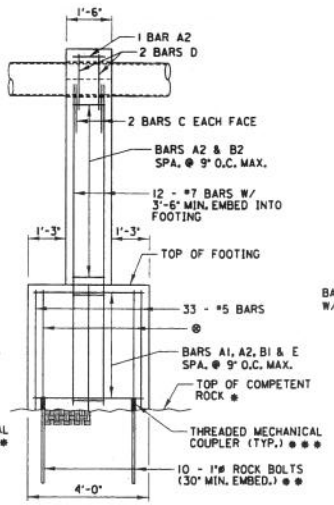
PLAN VIEW
SCALE: N.T.S.

TABLE OF VARIABLES ⊠			
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"

⊠ 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.



FRONT ELEVATION
SCALE: ½" = 1'-0"



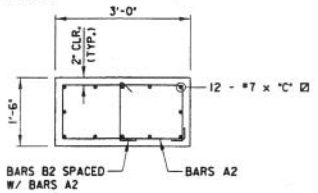
SIDE ELEVATION
(LOOKING FROM UPSTREAM SIDE)
SCALE: ½" = 1'-0"

✱ SEE "ROCK SURFACE PREPARATION & EXPLORATION NOTE" FOR FURTHER REQUIREMENTS.

✱✱ SEE "ROCK BOLT ANCHOR NOTE" FOR FURTHER REQUIREMENTS.

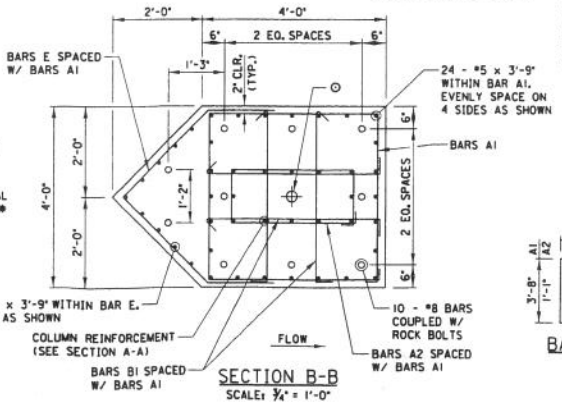
✱✱✱ SEE "MECHANICAL SPLICE NOTE" FOR FURTHER REQUIREMENTS.

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

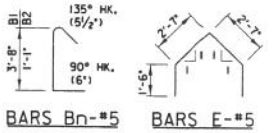


SECTION A-A
SCALE: ¾" = 1'-0"

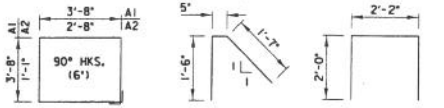
○ LOCATION OF EXPLORATORY DRILL HOLE, APPROXIMATELY CENTERED WITH FOOTING. ✱



SECTION B-B
SCALE: ¾" = 1'-0"



BARS Bn-#5 BARS E-#5



BARS An-#5 BARS C-#5 BARS D-#5

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

GENERAL NOTES:

1. SPECIFICATIONS: ALABAMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 2012.
2. 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.
3. REINFORCING STEEL SHALL BE AASHTO M31 GRADE 60 IN ACCORDANCE WITH SECTION 502 OF THE SPECIFICATIONS.
4. CONCRETE SHALL BE CLASS "D" (3000 PSI) PROPORTIONED AND TESTED IN ACCORDANCE WITH SECTION 501 OF THE SPECIFICATIONS.
5. 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.
6. CHAMFER ALL CORNERS ¾" UNLESS NOTED OTHERWISE.
7. 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 RIH 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.

GARVER

ALABAMA LICENSED NO. 32952-E PROFESSIONAL ENGINEER JAKE W. STATON 9/9/13

REV.	DATE	DESCRIPTION	BY
1	09/09/13	NOTE MODIFICATIONS	BWS

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
0 1" 2"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DRAWING NUMBER
S1

SHEET NUMBER 1

GARVER

Sheet No. 1 Of 3

Project Limestone Creek Aerial Crossing Job No. 11058030 Made By BWS Date 3/6/13

Subject Pier Design Chkd. By AJK Date 9/9/13

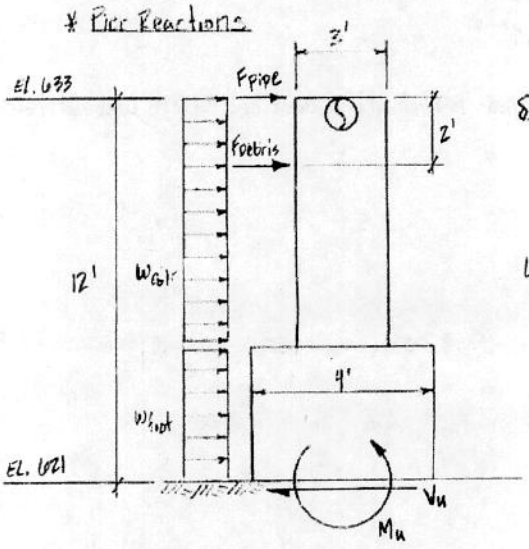
* Stream Pressures [AASHTO 3.7.3]

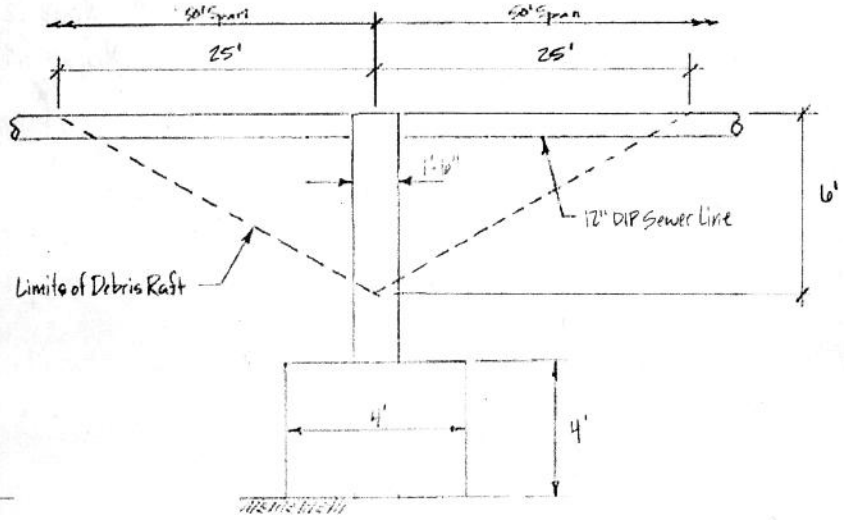
- V = 10.0 ft/s

Surface	C_D	P
Pier	1.4	0.140 ksf
Pipe	0.7	0.070 ksf
Debris Raft	0.5	0.050 ksf

* $P = \frac{C_D V^2}{1000}$

* Pier Reactions





* $F_{pipe} = 0.070 ksf (1')(50') = 3.5^k$

* $F_{Debris} = 0.050 ksf \left(\frac{1}{2}\right)(50')(6') = 7.5^k$

* $w_{col} = 0.140 ksf (1.5') = 0.21 klf$

* $w_{foot} = 0.140 ksf (4') = 0.56 klf$

* $W_{pier} = \left(0.150 ksf - 0.062 ksf\right)\left[4'(4')(4') + 3(1.5')(8')\right] = 8.7^k$

* $\Sigma F_X = 0 \rightarrow$ (Load Factor)

$\left[3.5^k + 7.5^k + 0.21 klf (8') + 0.56 klf (4')\right](1.0) - V_u = 0$

$V_u = 14.9^k$

* $\Sigma M_{Base} = 0$ (+)

$M_u + \left[-3.5^k(12') - 7.5^k(10') - 0.21 klf (8')(8') - 0.56 klf (4')(2') + 8.7^k(2')\right](1.0) + \left[8.7^k(2')\right](0.9)$ (Load Factors)

$M_u = 119.3^{k\cdot ft}$

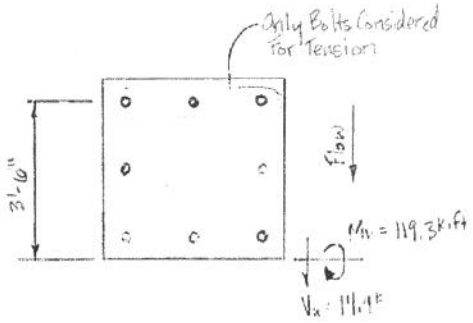
GARVER

Sheet No. 2 Of 3

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

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

* Rock Bolt Anchor Analysis



* $\Sigma M_{TOE} = 0$

$119.3^{k\cdot ft} - T_{req'd}(3)(3.5') = 0$

$T_{req'd} = 11.4^{k}$ ∴ Require Anchors To Resist 25^{k} In Tension (2.0 F.S.)

Set Tension @ 15^{k}

* $\Sigma F_x = 0$

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

$V_{req'd} = 1.9^{k}$

← Shear is Minimal and Combined Effects will not Control

* $V_{prov'd} = 0.6\, A_s\, f_{uta}$

$= 0.6\,(0.532\,in^2)(124\,ksi)$

$V_{prov'd} = 39.6^{k}$

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

$\frac{11.4^{k}}{25^{k}} + \frac{1.9^{k}}{39.6^{k}} \leq 1.0$

$0.504 \leq 1.0$ ∴ OK ⟶ Equivalent F.S. ≈ 2.0

GARVER

Sheet No. 3 Of 3

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

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

* Flexure In Column

* $\Sigma M_{top} = 0$ ↻

$M_u + [-3.5^k(8') - 7.5^k(6) - 0.21^{klf}(8')(4')](1.0) = 0$

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

* Define f_s in terms of A_s

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

$a = 1.307 A_s$

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

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

$A_s \geq 0.545in^2$

∴ Use 3-#7 ($A_s = 1.8in^2$)

* Shear In Column

* $\Sigma F_x = 0$ →

$[3.5^k + 7.5^k + 0.21^{klf}(8')](1.0) - V_u = 0$

$V_u = 12.7^k$

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

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

$V_c = 64.8^k$

$\phi V_c = 58.3^k \geq 2V_u = 25.4^k$ ∴ Use Minimum Trans. Reinforcement

* $A_{v\,min} \geq 0.0316\sqrt{f_c'}\,\frac{b_v s}{f_y}$

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

$A_{v\,min} \geq 0.148in^2$

∴ Use #5 @ 9" O.C. ($A_v = 0.62in^2$)

* Minimum Embedment Lengths

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

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

HUNTSVILLE

Tommy Battle
Mayor

September 4, 2013

Samantha J. Strickland
Watershed Representative
Central and West Region
Reservoir Land Use and Permitting

Re: Maintenance Information for Proposed Holladay Sanitary Sewer Aerial Crossing at Limestone Creek in Huntsville Alabama.

Dear Ms. Strickland:

This letter is in response to your inquiry of scheduled maintenance on the proposed sanitary sewer aerial creek crossing over Limestone Creek in Huntsville, AL. This particular aerial crossing will fall into our Annual Maintenance Schedule for the Sanitary Sewer Collection System. This maintenance will be performed by a designated crew who also maintains the sewer easements, manholes, and air relief valves on an annual basis. Our standard maintenance procedures include an annual visual inspection on all sewer infrastructures. If at that time, any debris is conflicting the normal flow of the creek, our crews will mobilize equipment to the site for clearing and maintenance.

If possible, our crews will attempt to remove the debris with hand devices from the banks of the creek. If these attempts are unsuccessful, the crews will mobilize a Long Arm Trachoe to the site. This particular trachoe has a reaching span of approximately 40 LF; therefore, we will be able to access the entire aerial crossing from the banks of the creek. By using these maintenance techniques, we can avoid any disturbances within the limits of the creek.

Although our maintenance of sewer infrastructure is scheduled on an annual basis; maintenance crews are on-call at all times and can dispatch immediately to issues that may arise and need immediate attention.

If you have any questions or need additional information, please contact me at the Department of Water Pollution Control at 256-650-4704.

Sincerely,

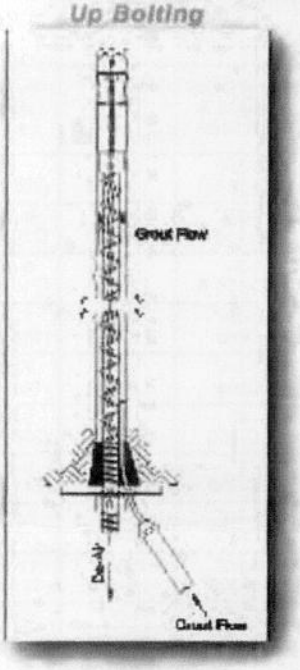
Matt Reynolds
Sanitary Engineer
City of Huntsville – Department of Water Pollution Control

CC: Kathy Martin – COH Engineering

R1H Hollow-Core Spin-Lock Rock Bolt

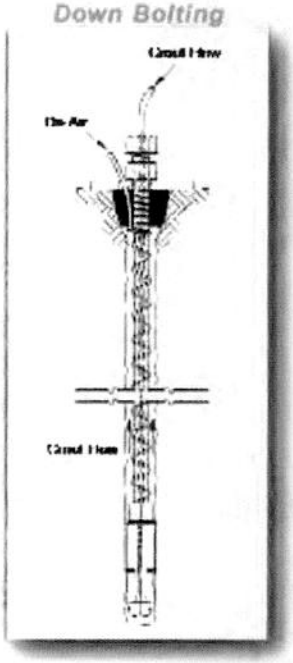
Pre-Stressable • Positive Grouting • Permanent

Up Bolting



Though years of development Williams has produced and patented the Pre-stressable, Hollow-Core, Groutable Spin-Lock Rock Bolting Systems. The hollow-core allows the bolt to always be grouted from the lowest gravitational point. In an up-bolting situation, the grout is pumped in through the plastic grout tube and begins to fill the drill hole from the plate. The grout rises until the entire hole is filled and the grout returns through the hollow bar. In down grouting situations, the grout is pumped through the hollow bar and starts at the bottom of the hole. Grout rises and returns through the de-air tube when the hole is filled. Improperly or incomplete grouted bolts are subjected to relaxation and corrosion. Pre-measured capsule systems cannot properly account for unknown fissures and voids and often leave the bolt vulnerable to deterioration. The Williams Hollow-Core Grouting System spreads grout through the rock fissures creating a completely protected monolithic section including rock, grout and bolt. Because the Spin-Lock head assembly provides 300° perimeter expansion anchorage and develops the full strength of the rod, the hollow-core rock bolt may be pre-stressed to the desired load and tested prior to grouting. The 1" diameter Hollow-Core is also available in an All-Thread design of identical capacities.

Down Bolting



R1H Structural Properties

Yield Stress	Ultimate Stress	Elongation in 2" (51 mm)	Reduction of Area
91 KSI (627 MPa)	124 KSI (854 MPa)	15% min.	40% min.

R1H High Grade Hollow-Core Anchor - ASTM A615 Deformation Pattern

Dia & Threads per In.	Recomm. Design Load at Approx. 2:1 Safety Factor	Maximum Working Load to Yield	Average Ultimate Strength (6)	Rock Type	Drill Hole Diameter (1)	Type Head Ass'y	Torque Ft.-Lbs. To Expand Shell (2)	Torque Ft.-Lbs. On Nut for Tension (7)	Part Number
1" - 8 (25 mm)	33 kips (147 kN)	47 kips (209 kN)	66 kips (294 kN)	Hard & Medium Medium & Weak Weak Rock & Concrete Rock & Concrete	1-5/8" - 41 mm) 1-3/4" - (44 mm) 1-3/4" - (44 mm) 2" - (51 mm)	A 13 B 14 C 14 B 16	250 ft.-lbs. (450*)	400	R1H08A13 R1H08B14 R1H08C14 R1H08B16
1-3/8" - 8 (35 mm)	69 kips (307 kN)	100 kips (445 kN)	138 kips (614 kN)	Rock & Concrete Rock & Concrete	2-1/2" - 63 mm) 3" - (76 mm)	B 20 B 24	750 ft.-lbs. (1200*)	Note (3)	R1H11B20 R1H11B24
2" - 6 (51 mm)	150 kips (667 kN)	219 kips (974 kN)	300 kips (1334 kN)	Rock & Concrete	3-1/2" - (89 mm)	C 28	1000 ft.-lbs. (3700*)	Note (3)	R1H16C28

(*) Do not exceed these numbers

(1) Care should be taken to drill a straight and properly sized hole.

(2) A function of strata strength. More torque may be required on long bolts or in special rock conditions. Consult your Williams Representative for more specific details.

(3) Stress to desired tensile load using a hollow ram hydraulic jack. Consult your Williams Representative.

(4) WILLIAMS reserves the right to ship full length or coupled units as necessary.

(5) ACI 355.1R section 3.2.5.1 indicates an ultimate strength in shear has a range of .6 to .7 of the ultimate tensile strength. Designers should provide adequate safety factors for safe shear strengths based on the condition of use.

(6) Inconsistencies in rock from site to site and even from hole to hole may affect anchor performances. Fissures, voids, seams, rock psi, drilling through clay or bentonite and direction of bedding planes are all possible variables. Should problems occur, consult Williams for troubleshooting.

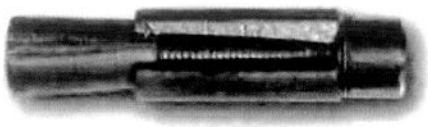
(7) All above torque values greased (MolyKote GN) threads.

Spin-Lock Head Assembly

The Williams Spin-Lock anchor assembly gives full 300 degree bearing area. The smooth shell design allows for maximum shell to rock contact and eliminates "point of contact" created by serrated designs. The cone design supports the shell 300°, thereby eliminating any possible collapse of the shell under high load conditions. The thrust ring stop in front of the shell prevents any possible rebound of the expanded shell down the cone when subjected to nearby blasting. The Williams Spin-Lock anchor has been field proven on the world's largest projects to far exceed in tension capacity any other mechanical anchor on the market.

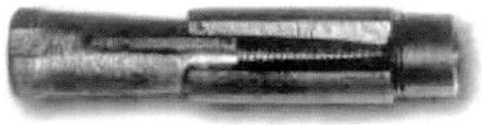
Type A - Short Shell & Cone

Head Assembly & Drill Hole Diameter	Bolt Dia. & Thread Form	Standard Cone Length & Part Num.	Standard MAL Shell Length & Part Num.	Overall Assy. Length
A10 1-1/4" (32 mm)	1/2" - 13 NC (12 mm)	1-7/8" SC-114-4	1-7/8" SS-114	4-1/4" (108 mm)
	5/8" - 11 NC (16 mm)	1-7/8" SC-114-5	1-7/8" SS-114	4-1/4" (108 mm)
A13 1-5/8" (41 mm)	1/2" - 13 NC (12 mm)	1-7/8" SC-158-4	1-7/8" SS-158	3-3/4" (95 mm)
	5/8" - 11 NC (16 mm)	1-7/8" SC-158-5	1-7/8" SS-158	3-3/4" (95 mm)
	3/4" - 10 NC (20 mm)	1-1/2" SC-158-6	1-7/8" SS-158	4-1/16" (103 mm)
	7/8" - 9 NC (22 mm)	1-1/2" SC-158-7	1-7/8" SS-158	4-1/8" (108 mm)
	1" - 8 NC (25 mm)	1-1/2" SC-158-8	1-7/8" SS-158	4-1/8" (108 mm)



Type B - Long Shell & Cone

Head Assembly & Drill Hole Diameter	Bolt Dia. & Thread Form	Long Cone Length & Part Num.	Long MAL Shell Length & Part Num.	Overall Assy. Length
B14 1-3/4" (44 mm)	3/4" - 10 NC (20 mm)	3-3/4" LC-158-6	3-3/4" LS-175	8" (203 mm)
	7/8" - 9 NC (22 mm)	3-3/4" LC-158-7	3-3/4" LS-175	8-1/4" (210 mm)
	1" - 8 NC (25 mm)	3-3/4" LC-158-8	3-3/4" LS-175	8-1/4" (210 mm)
B16 2" (51 mm)	1" - 8 NC (25 mm)	2-1/4" Cone	4" LS-200	7-1/4" (184 mm)
	1-1/8" - 7 NC (30 mm)	2-1/4" Cone	4" LS-200	7-1/2" (191 mm)
B20 2-1/2" (64 mm)	1-1/4" - 7 NC (32 mm)	4" LC-250	4" LS-250	9-3/8" (238 mm)
	1-3/8" - 8 UN (35 mm)	4" LC-250	4" LS-250	9-1/2" (241 mm)
B24 3" (76 mm)	1-3/8" - 8 UN (35 mm)	5-1/2" LC-300	5-1/2" LS-300	12-1/2" (318 mm)
	1-1/2" - 6 NC (38 mm)	5-1/2" LC-300	5-1/2" LS-300	12-5/8" (321 mm)
	1-3/4" - 5 NC (45 mm)	5-1/2" LC-300	5-1/2" LS-300	12-7/8" (327 mm)



Type C - Long Shell & Cone with Flange

Head Assembly	Bolt Dia. & Thread Form	Long Cone w/ Flange Length & Part Num.	Long MAL Shell Length & Part Num.	Overall Assy. Length
C14 1-3/4" (44 mm)	3/4" - 10 NC (20 mm)	4-1/4" LCF-175-6	3-3/4" LS-175	9" (229 mm)
	7/8" - 9 NC (22 mm)	4-1/4" LCF-175-7	3-3/4" LS-175	9-1/16" (230 mm)
	1" - 8 NC (25 mm)	4-1/4" LCF-175-8	3-3/4" LS-175	9-3/16" (233 mm)
C18 2-1/4" (57 mm)	1-1/8" - 7 NC (30 mm)	4-7/8" LCF-225-9	4" LS-225	10" (254 mm)
	1-1/4" - 7 NC (32 mm)	4-7/8" LCF-225-10	4" LS-225	10-1/4" (260 mm)
C28 3-1/2" (89 mm)	1-3/4" - 5 NC (45 mm)	7" LCF-350-16	6" LS-350	15" (381 mm)
	1-7/8" - 8 UN (48 mm)	7" LCF-350-16	6" LS-350	15" (381 mm)
	2" - 6 UN (51 mm)	7" LCF-350-16	6" LS-350	15-1/8" (384 mm)

Coupled Head Assemblies

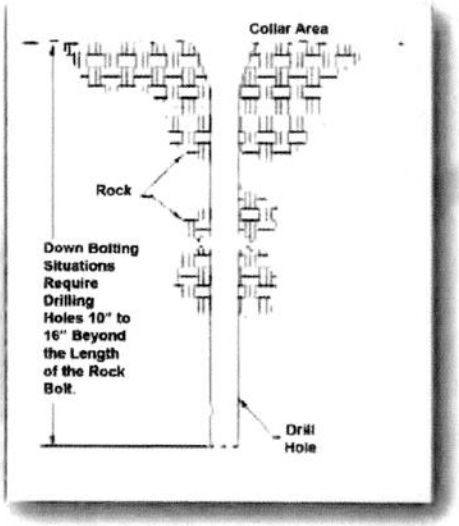
Williams can manufacture Spin-Lock Anchor Systems with the use of a transition coupling, which allows the anchor to be designed with a continuously workable thread-form. This is advantageous when the anchor length may need to be adjusted in the field due to variable site conditions. The Transition Coupling engages a continuously threaded U.N. bar into the head assembly and the All-Thread tension rod (typically Grade 75 or 150 KSI) is attached to the other end of the coupling.

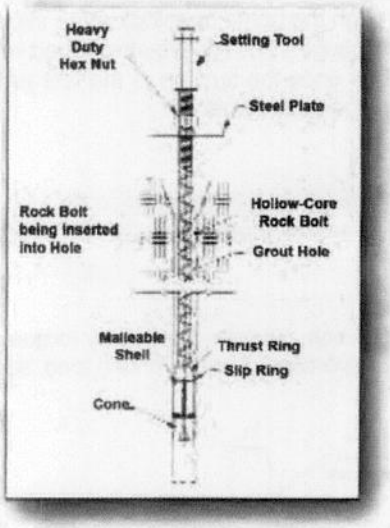
Spin-Lock Installation

Step 1: Drilling

Use Standard Rotary Percussion Equipment

Care should be taken to insure an accurate diameter and a straight hole. The depth should be over drilled to allow any debris to fall to the bottom of the hole when the anchor is inserted. Clean the drill hole by blowing air to the full depth to remove debris. Efforts should be made to prepare the collar area with a flat surface and as perpendicular to the bolt axis as possible.



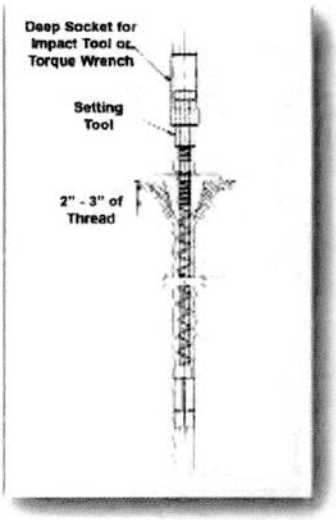


Step 2: Bolt Placement

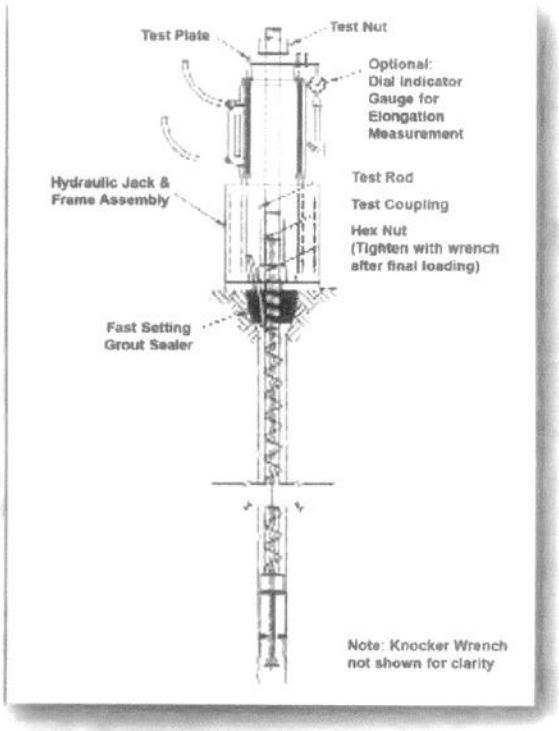
Place the nut, washer, bevel washers (if required), and plate on the rock bolt and push the bolt into the hole to the correct embedment depth. If the bolt becomes stuck in the hole, attach a setting tool to the end of the bolt and drive it into the hole with a sledgehammer.

Step 3: Setting the Anchor

Install setting tool fully onto the exposed threaded end. Provide space between the setting tool and the hex nut. Initially torque the bolt to the required torque with an impact gun, pneumatic, or hydraulic torque wrench. This action migrates the cone into the shell, thus expanding the mechanical anchor into the rock. Final torque can be checked and adjusted with a manual or hydraulic torque wrench. Remove the setting tool by restraining the lower part while rotating it's upper section until the setting tool is loose. Prepare collar area with fast setting grout sealer to ensure full bearing under the plate.

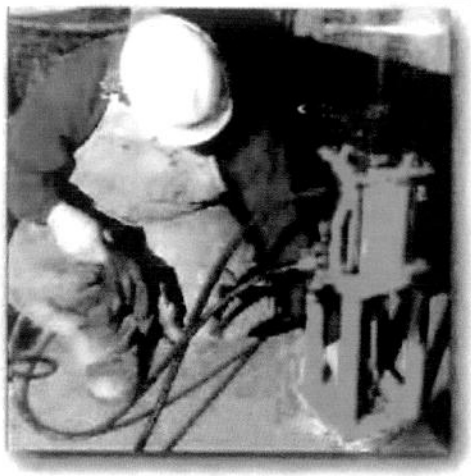


Spin-Lock Installation



Step 4a: Testing the Anchor Bolt

Method A: Tensioning with a Test Jack

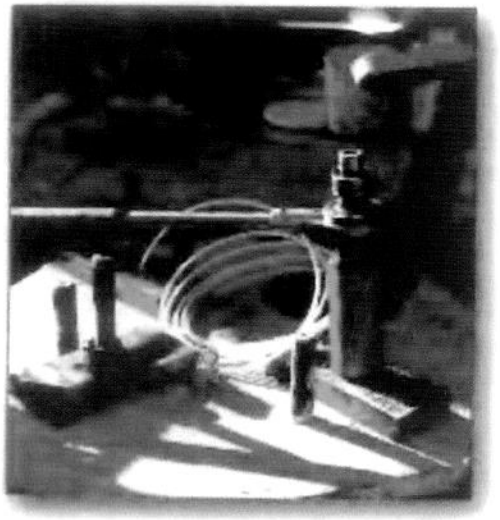


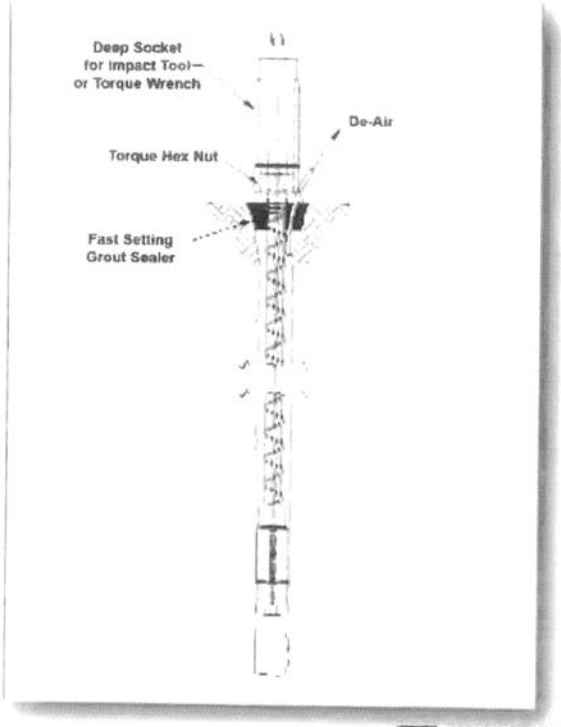
Place the jack and frame over the bolt and attach the test rod and couplings to the bolt. Attach the test nut and test plate over the test rod on top of the jack. Test the rock bolt by tensioning the jack to the required test load (usually half of the ultimate strength) but never to exceed the advertised yield strength of the anchor. Adjust the loading of the jack to the required final tension and lock in the final pre-stress load. This is done by tightening the rock bolt hex nut with a knocker wrench (through the frame opening) until a slight reduction is noticed on the jack gauge. The full pre-stress load will be transferred to the anchor bolt once the tension in the test jack has been released and test components removed.

Step 4b: Testing the Anchor Bolt

Method B: Testing by Torque Tensioning

Place plate, bevel washers (if required), hardened washer, and hex nut on the rock bolt. Tension the bolt by torquing the hex nut with a torque wrench. For the recommended torque valve to obtain the advertised tensile working load, see the "Torque On Nut" column on the Spin-Lock Bolt charts listed on pages 51-54. For other loads, see the torque tension graphs shown on pages 74 & 75. **Please Note:** The torque/tension relationship is not as accurate as direct tensioning with a hydraulic jack and should not be used where critical tension loads need to be verified. A high pressure lubricant should be used between all bearing components.



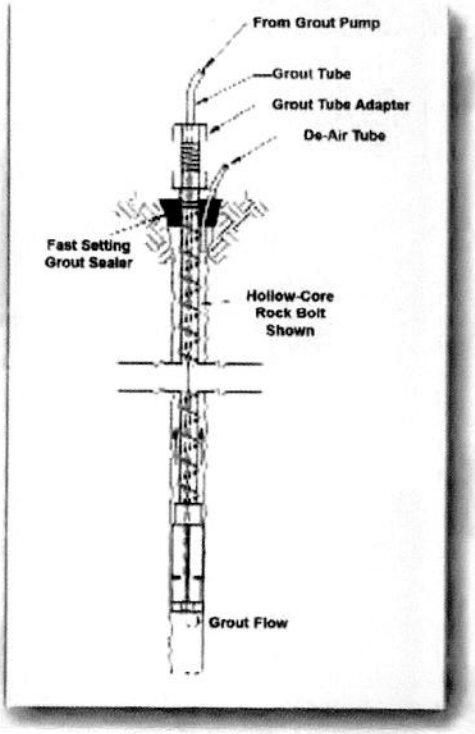


Spin-Lock Installation

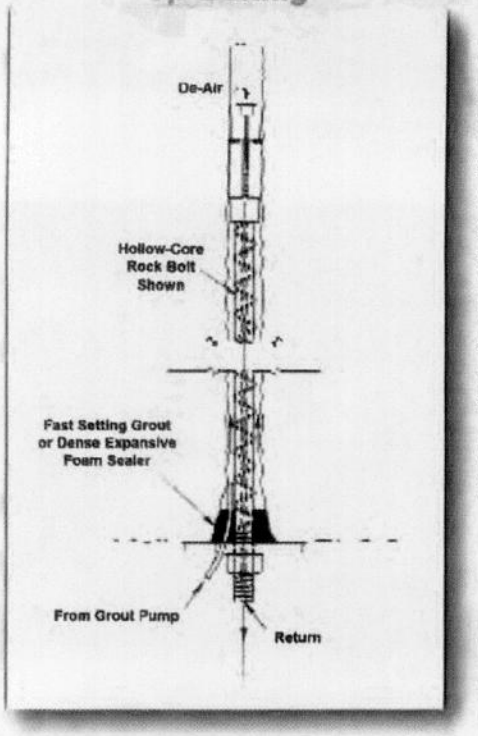
Step 5: Grouting the Anchor

Always grout from the lowest gravitation point on the anchor bolt until a steady stream of pure grout is seen coming out around the bearing plate or grout tube, and/or from the de-air tube. For solid bolts, this means that a separate grout tube must be placed in the drill hole (through an opening in the bearing plate) as deep as possible before grouting. Long length solid bolts should have the grout tube attached to the bolt before inserting and setting the anchor. Down-grouting of Hollow Core Rock Bolts can be simply grouted through the hollow core by attaching a grout tube adapter to the outer end of the tensioned bolt and grouting. When the grouting is complete, all air and standing water has been removed from the drill hole by displacement and all cracks and voids in the anchor area are filled with cement grout.

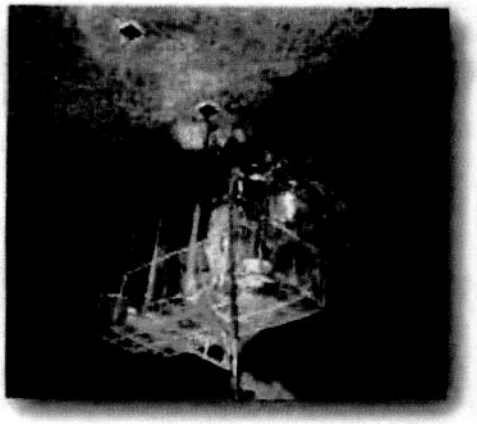
Down Bolting



Up Bolting



Up-grouting of Hollow-Core Rock Bolts can be done by grouting through a short length grout tube extending just past the drill hole sealer in the collar area thus using the hollow core at the end of the rock bolt to de-air the hole. Up-grouting of solid rock bolts involves attaching a long length grout tube to the anchor (prior to insertion, setting, and tensioning) and grouting through a separate short length tube that extends past the sealer area thus allowing the rock bolt to de-air from the longer grout tube.

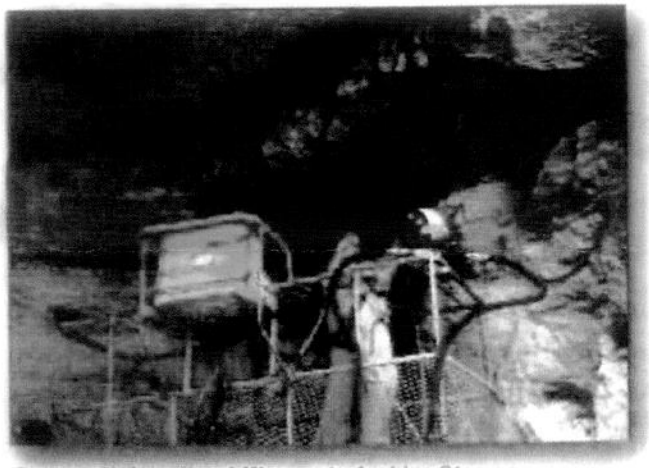


Williams offers a field installation advising service to aid contractors in the initial installation process of installing all types of anchor bolts. A Williams "Spin-Lock Anchor Installation Video" is also available online at www.williamsform.com. Contact your Williams sales representative for details.

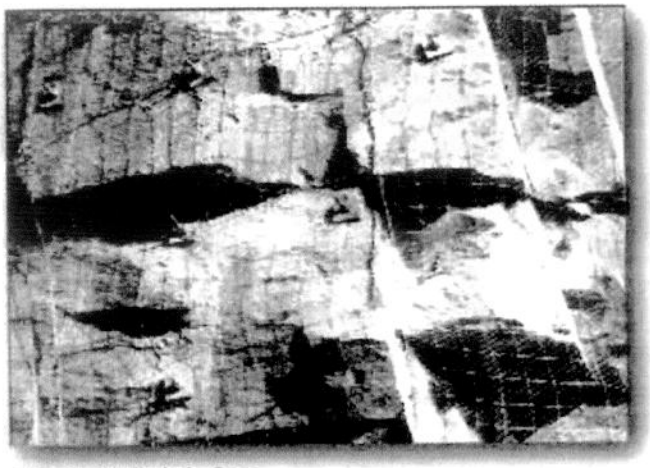
Spin-Lock Anchor Project Photos

Project: Slope Stabilization
Contractor: Yenter Companies
Location: Cheeseman Reservoir, CO

Project: LRT Minn-St. Paul Airport
Contractor: Obayashi / Johnson Brothers JV
Location: Minneapolis, MN

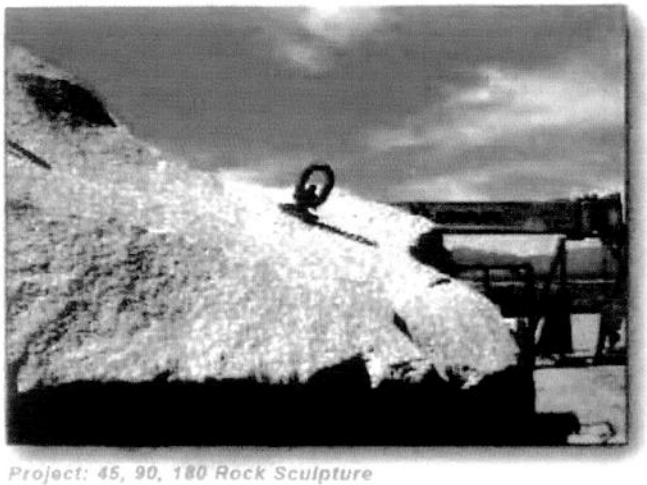


Project: University of Minnesota Archive Storage
Contractor: CS McCrossan
Location: Minneapolis, MN



Project: Nantahala Dam
Contractor: Boyles Brothers
Location: Ashville, NC

Project: NORAD - Cheyenne Mountain Air Station
Contractor: Utah Construction & Mining Company
Location: Cheyenne Mountain, CO



Project: 45, 90, 180 Rock Sculpture
Michael Heizer, Environmental Artist
Location: Elko, NV

AST Environmental

June 6, 2011 JS11-108

Attention: Scott Leach
Garver, LLC
5125A Research Drive
Huntsville, AL 35805

Reference: USFWS Reference No. 2011-CPA-0121

Subject: Limestone Creek West Sanitary Sewer Extension
Protected Species / Biological Assessment
Limestone County, Alabama

Mr. Leach:

This report of findings is in response to the United States Fish and Wildlife Service (USFWS) letter dated April 20, 2011 from Dan Everson to Gary Davis, US Army Corps of Engineers regarding the proposed sanitary sewer line aerial crossing of Limestone Creek in Limestone County, Alabama.

On May 25, 2011 AST Environmental (AST) conducted a survey in Limestone Creek for:

Anthony's riversnail (*Athearnia anthonyi*)	Endangered
Armored snail (*Pyrgulopsis (=Marstonia) pachyta*)	Endangered
Slender campeloma (*Campeloma decampi*)	Endangered

The survey was led by Dr. Terry Richardson (Federal Fish and Wildlife Permit Number TE100626-6) following USFWS protocol. The survey encompassed a stream reach extending 100 yards upstream and 300 yards downstream from the proposed stream crossing.

SITE

The survey reach ranged in depth from a few inches to about 3 ½ feet (see Site Photographs). The wetted channel ranged in width from approximately 50 to 60 feet. The substratum was approximately 70% gravel - cobble, 20% sand and 10% mud / leaf pack. A large pool with nondetectible flow extended from approximately 40 yards below the proposed crossing beyond the upstream survey boundary. The lower extent of the survey area was comprised mainly of cobble laden riffles and runs.

METHODS
AST examined the substrata within the survey reach for the presence of freshwater snails. A combination of snorkeling and wading was used to complete the survey. A 800 micron mesh kick net was used to sweep submerged roots and aquatic vegetation during the survey.

RESULTS
Appropriate substrate types for the target snail species were present within the survey reach. No protected snails were observed within the proposed project footprint or immediate area.

A total of 12 Armored marstonia were collected from large submerged root masses along the stream margins and submerged epilithic periphyton below the proposed crossing. They were not collected above the crossing.

Three live Slender campeloma snails were collected within the survey reach. One Slender campeloma was collected from a large submerged root mass downstream from the proposed crossing. Two Slender campeloma were collected from a patch of water willow (*Justicia americana*) upstream from the proposed crossing.

Large rocks and cobble were dislodged and examined for the presence of Anthony's riversnail; however this species was not found within the survey reach.

In addition to the two Federally Endangered snail species present within the survey reach *Pleurocera pyrenellum*, *Pleurocera* c.f. *currierianum*, *Elimia* c.f. *laqueata* and *Amnicola limosa* were present.

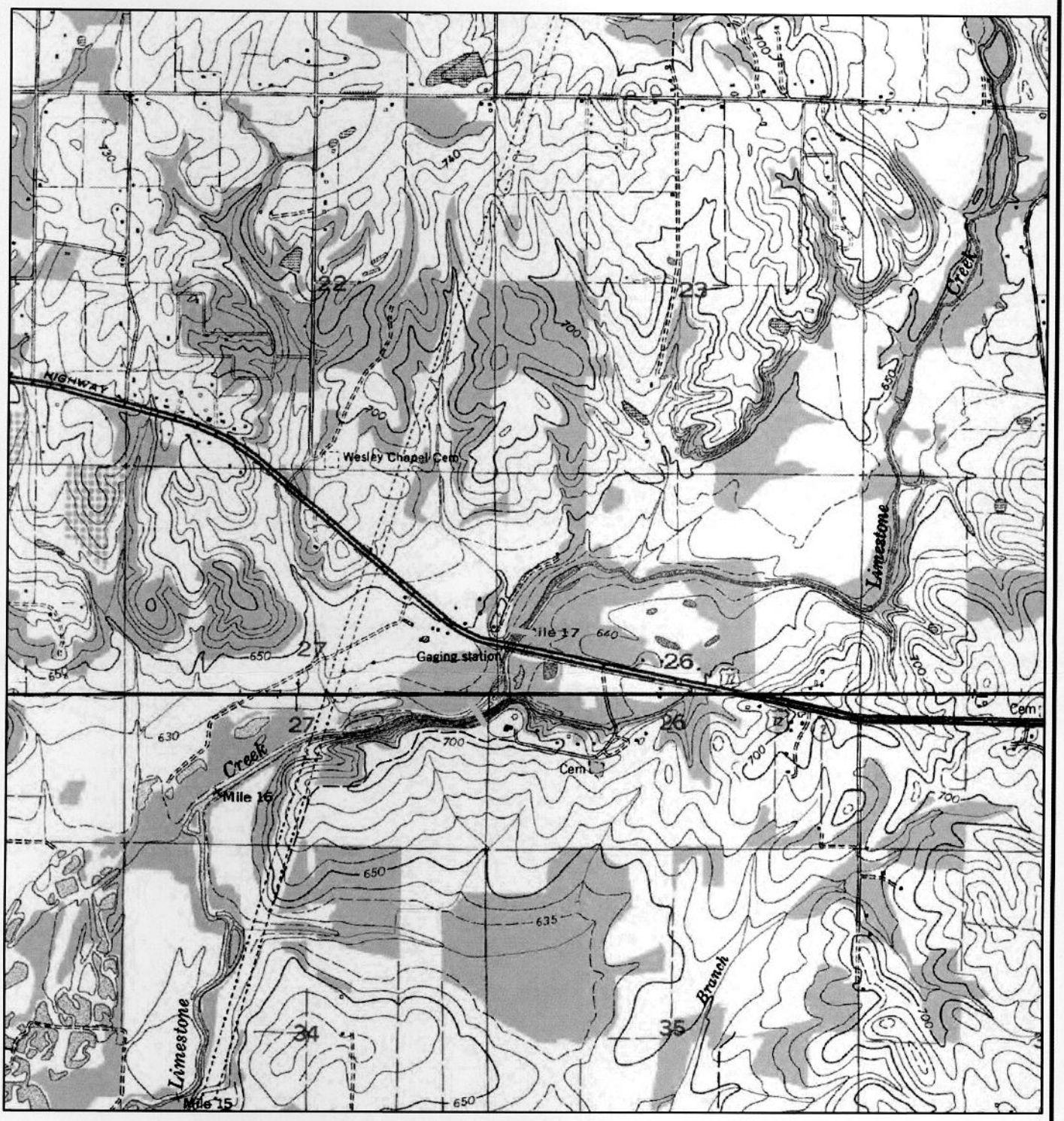
Because protected species were present within the survey reach consultation with the USFWS will be required prior to implementation of this project. If you need any additional information, please contact me at (256) 443-9165 or Jeff Selby at (256) 476-7355.

Sincerely,

Terry D. Richardson, Ph.D
Member / Senior Ecologist
AST Environmental

Jeff Selby, M.S.
Member / Senior Biologist
AST Environmental

Attachments:
Site Map
Site Photographs



0 2,500 5,000 Feet

SCALE = 1 : 24,000

N

Survey Boundaries
100 yards upstream and 300 yards downstream from proposed crossing

SOURCE: USGS Topographic Quadrangles
Capshaw, Alabama and Greenbrier, Alabama

SITE MAP JS11-108
Limestone Creek Snail Survey
Limestone County, AL

AST Environmental

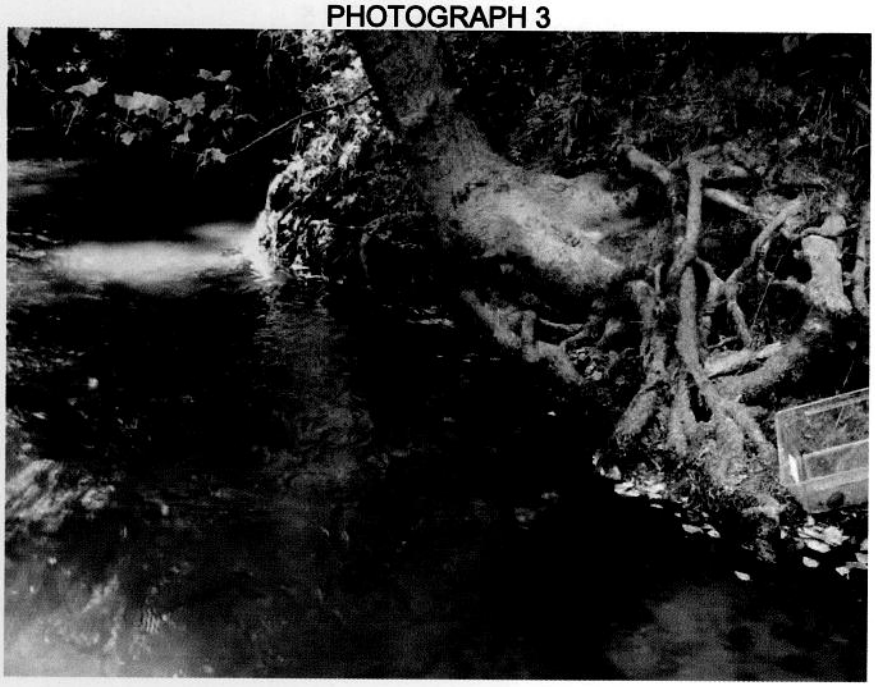
PHOTOGRAPH 1

Downstream of Alabama State Highway 72 Bridge and proposed sanitary sewer crossing facing upstream. Taken by Jeff Selby, 5-25-11.

PHOTOGRAPH 2

Typical view of run within the downstream portion of the survey reach. Taken by Jeff Selby, 5-25-11.

PHOTOGRAPH 3



Submerged root mass located near the downstream survey boundary. Taken by Jeff Selby, 5-25-11.

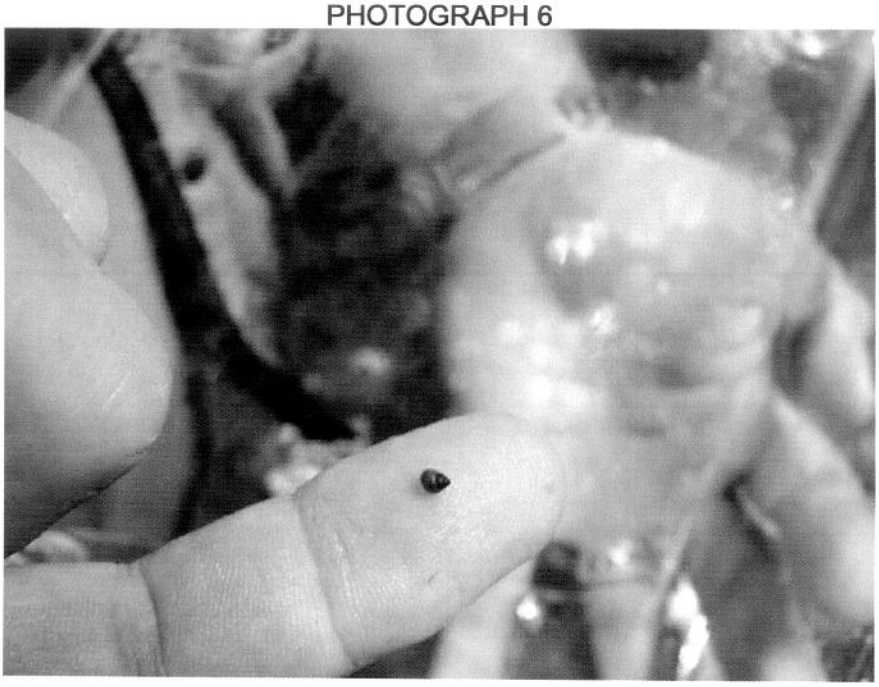
PHOTOGRAPH 4

Water willow patch located near the upstream survey boundary. Taken by Jeff Selby, 5-25-11.

PHOTOGRAPH 5

Campeloma decampi collected from the survey reach. Taken by Jeff Selby, 5-25-11.

PHOTOGRAPH 6



Pyrgulopsis pachyta collected from the survey reach. Taken by Jeff Selby, 5-25-11.
