

City of Columbia

701 East Broadway, Columbia, Missouri 65201



Agenda Item Number: (A)

Department Source: Public Works

To: City Council

From: City Manager & Staff

Council Meeting Date: December 15, 2014

Re: Public Hearing - Upper Merideth Branch (University Park) Streambank Stabilization Sewer Project

Documents Included With This Agenda Item

Council memo, Resolution/Ordinance

Supporting documentation includes: Maps, Plats and Plans, Photo, Contact Log, Consultant Report

Executive Summary

Setting a public hearing for January 20, 2015, for the construction of streambank stabilization and sanitary sewer improvements in the University Park addition and Oak Cliff subdivisions in the upper portion of Merideth Branch, as shown on the attached location map. The purpose of the project is to preserve the sanitary sewer collection system that has been undermined by the creek, and to protect public health and water quality. The resolution estimate for this project is \$600,000 which includes construction and design costs.

Discussion

The existing sanitary sewer main for University Park addition and Oak Cliff subdivisions, follows the upper portion of the Merideth Branch above and below Chapel Hill Road. In many locations the sanitary sewer main and laterals have become undermined due to stream channel incision and degradation. Most of the exposed sewer pipes are aerial and more subject to debris impacts that can potentially damage the pipes which could cause raw sewage to enter the creek and create the need for emergency operations repair and sewer overflow cleanup. City sewer maintenance crews have performed many hours of repairs on the sewer in the past to prevent these type of sewer pipe failures and routinely must inspect this sewer on a regular basis, after heavy rains, to ensure this type of damage has not occurred. The City is also aware of property owners that have replaced their laterals through the creek more than once due to debris damage.

The focus of this project is to protect existing infrastructure and prevent future damage, thereby reducing future operations and health issues. The primary solution is to install rock riprap grade control and streambank stabilization techniques at the sewer crossing locations to protect the existing infrastructure. There is one location where 80% of the sewer manhole, and three of four sewer mains from the manhole, are completely exposed to the creek and associated debris (see attached site photo). In this location, it is proposed to relocate the sewer manhole and mains away from the creek channel. There are other locations where, due to maintenance concerns or to lower the pipes, the sewer main will be replaced; although the horizontal location of the replaced sewer pipes will not

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change. Since the sewer main is located in backyard areas, access will be difficult. Proposed construction and access areas are shown on the attached proposed project diagram. Specific access areas will be negotiated during the easement acquisition process. Due to project budget constraints, three areas noted on the plan, may be bid as additional alternatives and completed based on final bid amounts.

This project is located in an area that was developed over 25 years ago. There are numerous mature trees located in the access and work areas. The City arborist is scheduled to walk the project with staff to discuss tree removal; however, sewer relocation and project access will be designed to minimize the number of trees removed. As with any type of improvement project, impact to trees and the property can be considered in the easement acquisition negotiations. At a minimum, temporary construction easements will be required from impacted property owners. Some of the stabilization techniques will include plantings to stabilize the disturbed stream areas.

An Interested Parties (IP) meeting was held on August 12, 2014 to discuss the proposed improvements, with seventeen (17) people from thirteen (13) properties in attendance. Property owners directly affected by the project, that did not attend the IP meeting, have been contacted multiple times with opportunities to meet on site or discuss the project over the phone. A few owners did not respond to contact attempts. The contact log is attached.

A consultant, Wildhorse Riverworks, Inc, qualified in both design and installation of soil bioengineering, streambank stabilization and riparian restoration techniques, was hired to provide expert recommendations. City staff met with the consultant on October 16, 2014 to walk the site and discuss potential streambank stabilization solutions. A copy of the consultant's report with recommendations is attached.

Fiscal Impact

Short-Term Impact: This project is estimated to cost \$600,000, and funding shall come from sewer utility funds, specifically, bonds approved in the November 2013 election that are anticipated to be issued in January 2015.

Long-Term Impact: Sewer maintenance cost for upkeep of the sewer will continue, but emergency repairs at this location should be significantly reduced.

Vision, Strategic & Comprehensive Plan Impact

Vision Impact: Community Facilities and Services, Environment

Strategic Plan Impact: Health, Safety and Wellbeing, Infrastructure

Comprehensive Plan Impact: Environmental Management, Infrastructure

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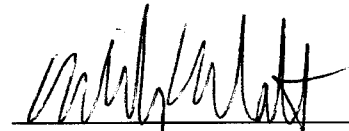
Suggested Council Action

Following public input and Council discussion at the public hearing, Council should make a motion directing staff to proceed with final plans, specifications and construction of the Upper Merideth Branch Streambank Stabilization Sewer project.

Legislative History

08/12/2014 - Interested Parties Meeting

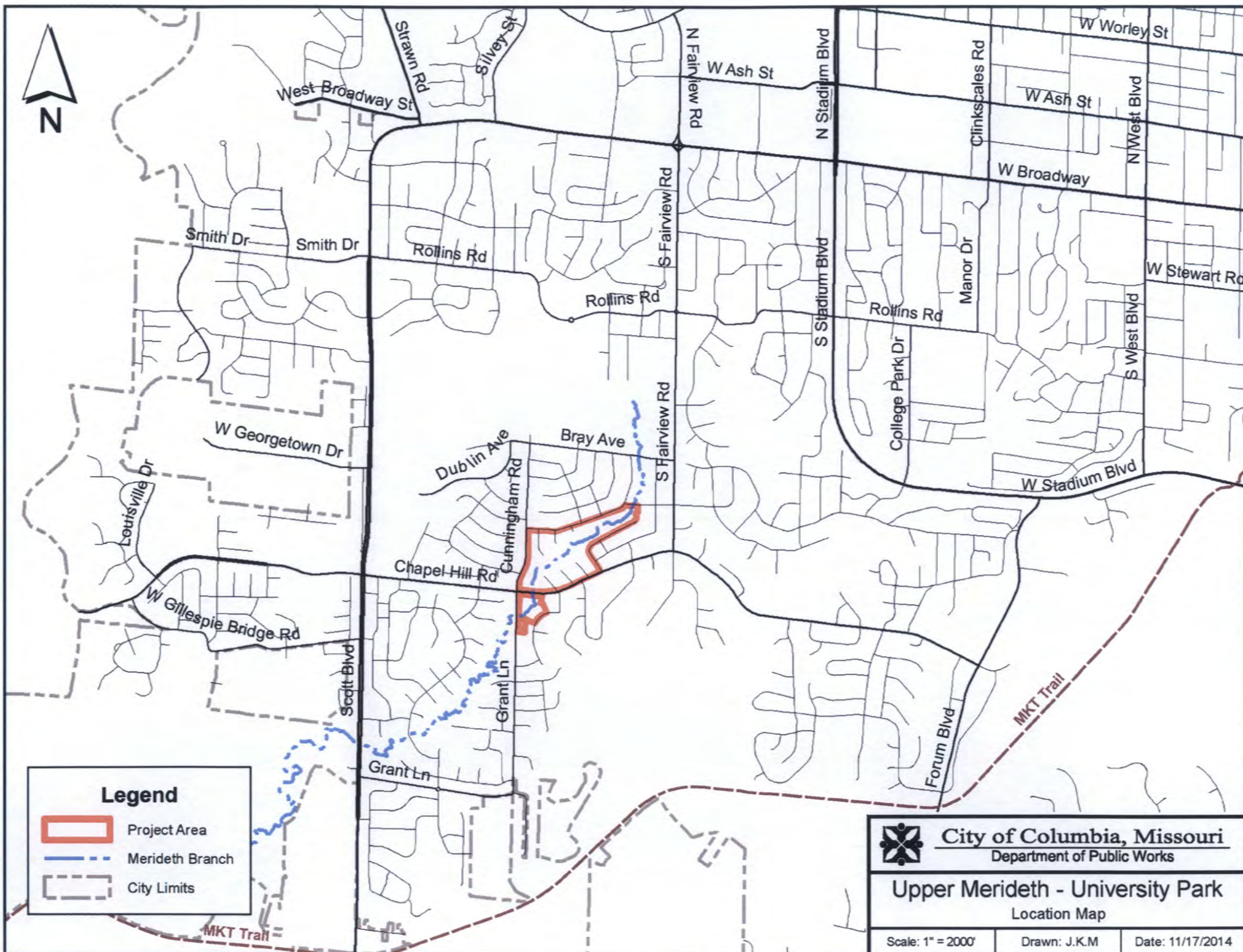

Department Approved


City Manager Approved



SUPPORTING DOCUMENTS INCLUDED WITH THIS AGENDA ITEM ARE AS FOLLOWS:

Maps, Photo, Plans, Contact Log, Consultant Report



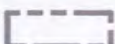
Legend



Project Area



Merideth Branch



City Limits



City of Columbia, Missouri
Department of Public Works

Upper Merideth - University Park

Location Map

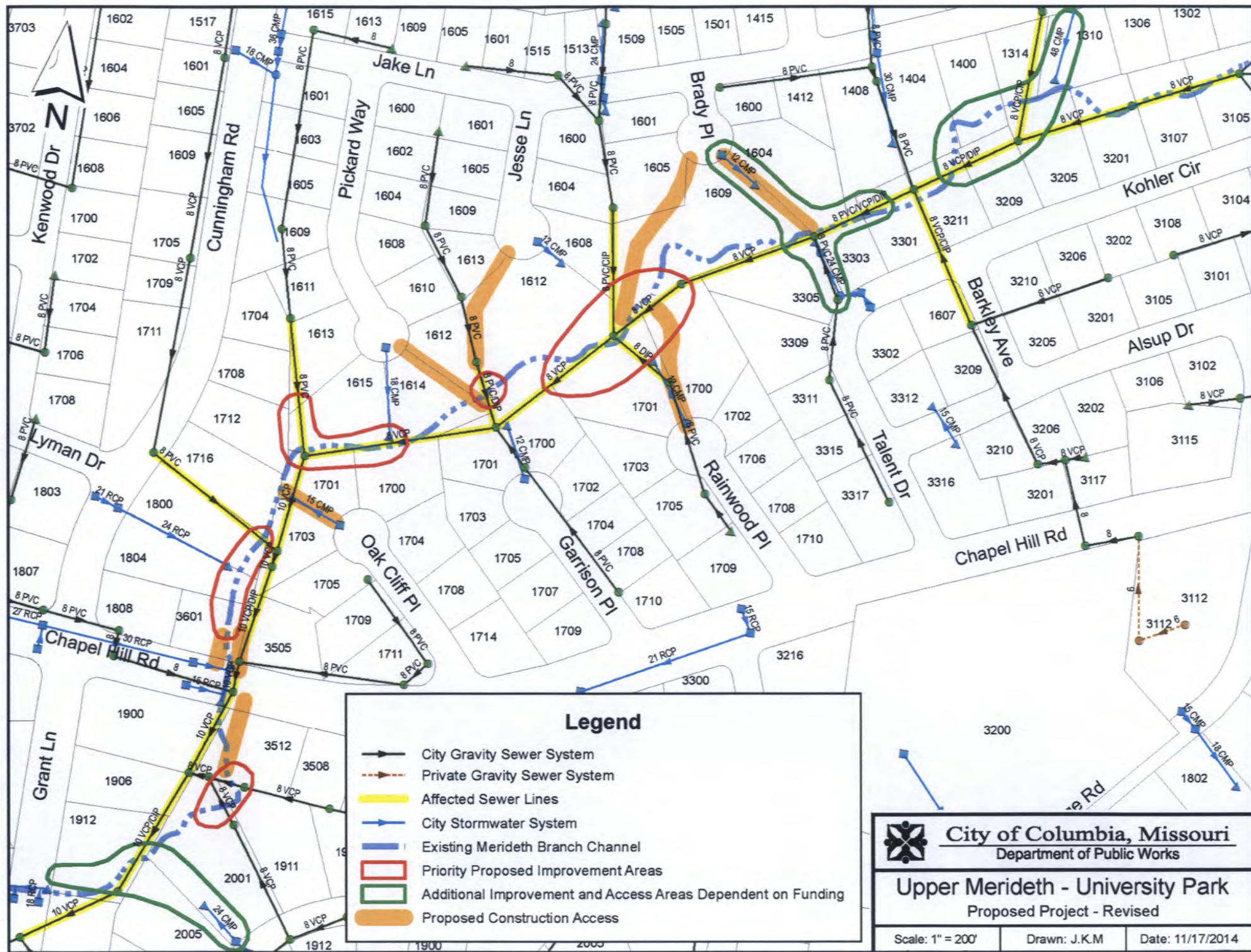
Scale: 1" = 2000'

Drawn: J.K.M

Date: 11/17/2014



Site Photo
Manhole 5P4
Between Jesse Lane & Rainwood Place



Upper Merideth Streambank Stabilization and Sewer Project Contact Log

OWNERS	ADDRESS	Ltr IP Mtg 8/12/14	IP Mtg Attendee 8/12/14	MTG ON SITE	PHONE CONTACT	door notice 10/6-8/2014	Ltr PH	NOTES
OLSON EVAN A & CHELSEA M	1310 JAKE LN	x		10/6/2014			x	okay with project and access through yard; plans to put house on the market in Jan 2015
TARWATER DOUGLAS J	1701 OAK CLIFF PLACE	x	x	8/20/2014			x	Sprinkler heads in yard; Ok with project; wants reimbursed for tree loss
BETTIS ERIC	1703 OAK CLIFF PL	x	x	10/3/2014	9/30/14 left phone msg		x	okay with project; discussed tree removal and back fence line
GILLILAND MARK A & CAMILLA	1712 CUNNINGHAM DR	x	x				x	attended IP meeting
HOPKINS OLIVIA & NICHOLAS	3303 TALENT DR	x				x	x	
HOLMES DREW N	3505 CHAPEL HILL RD	x	x2	9/8/2014			x	okay with project; discussed alternate access on his side instead of Cowherd; discussed cleaning the culvert; discussed stabilizing side slopes above and below lateral crossing
THREAT JANICE DAWSON	3512 CHAPEL HILL RD	x	x	8/22/2014			x	okay with project; discussed alternate access point, avoiding shed, property boundaries, ok with tree loss on edge of channel
COWHERD KATHY G	3601 CHAPEL HILL RD	x	x2	8/29/2014			x	okay with project; discussed losing two bradford pear trees; discussed her property line; discussed stabilizing the bank above and below the actual lateral crossing
DIEKMANN JOHN H & MARILYN	2008 GRANT LN	x			9/29/14 left phone msg 9/30/14 phone conversation		x	Okay with project. Discussed access and restoration. She asked about MH lid elevations.
JONES CHARLES K	1900 GRANT LN	x		10/6/2014; 10/20/2014	9/30/14 wrong number		x	Unhappy about moving access to their property; not feeling well, so will discuss another time. Met onsite again, discussed pros and cons of two different access point. Staff leaning toward not accessing thru this property. She has many annuals and perennials in the way.
DAVIS JEFFREY B	1314 JAKE LN	x			9/29/14 left phone msg 10/7/2014 phone conversation	x	x	okay with project and any access; consider access on west side (with Turners) if need it
TURNER SETH ASHBY & ARIANA	1400 JAKE LN	x			9/29/2014		x	Phone conversation with Mr. Turner about project. Concerned about yard being torn up. To call on 10/10/14 to set up appt. 10/10/2014 called and phone no longer working; called multiple times to set up mtg, unable to connect
BULLOCK LUTHER G & PAULA C	1404 JAKE LN	x	x				x	attended IP meeting

OWNERS	ADDRESS	Ltr IP Mtg 8/12/14	IP Mtg Attendee 8/12/14	MTG ON SITE	PHONE CONTACT	door notice 10/6-8/2014	Ltr PH	NOTES
HEATH STEVE R & SUSAN R ELHADI ABDELRAHMAN A & ELIZABETH D MILLER JOHNSON CARLA & DAVID	1408 JAKE LN 3205 KOHLER CIR 3209 KOHLER CIR	x x x			9/29/14 left phone msg 9/30/14 phone conversation 9/29/14 wrong number 9/29/14 left phone msg	 x x	x x x	Okay with project. Discussed proeprty boundaries and project timeline. Odd hydrant in middle of back yard is a "yard hydrant" (left msg 10/1/14).
FORREST CRAIG & DALLAS	3211 KOHLER CIR	x	x				x	Spoke with owner at IP meeting about her area being a low priority, but Operations work may take place in the area.
LINDAHL EVERETT	1911 OAK CLIFF DR	x			9/29/14 wrong number 10/14/2014 phone call from Mr. Lindahl	x	x	new owners as of July 2014; okay with work in back corner, will wait for easement acquisition to have an onsite mtg
HANSEN LONNIE P & KATHLEEN A RINEHART-HANSEN	2001 OAK CLIFF DR	x			9/29/14 wrong number 9/30/014 called - no answer	x	x	
BERNHARDT ALAN C & DEBORAH W	2005 OAK CLIFF DR	x		7/29/2014			x	Okay with project; would like to consider extending side yard storm pipe system to address severe erosion. Okay with some tree removal and access in his yard.
ZHAO RU J & XUE M SUN	3301 KOHLER CIR	x				x	x	
CECIL MICHELLE A	1700 OAK CLIFF PL	x	x2	8/20/2014			x	Okay with project; concerned about lateral connection; preserve big sycamore if possible
MCENTYRE MICHAEL W & CAROL STEVENSON JAMES W & MARGARET H	1604 BRADY PL 1605 BRADY PL	x x		8/20/2014	9/29/14 wrong number	x	x x	Probably unable to attend PH; slightly concerned; thinks better access from Garrison Place
WEIR JAMES R DEVINE JAMES R & SHARON J	1609 BRADY PL 1604 JESSE LN	x x	x	8/26/2014			x x	Very agreeable to project and whatever access we need. Great if we remove failing RR tie wall and shrubs and grade back. May be selling in Summer 2015. attended IP meeting
BERMUDEZ ELIZABETH T	1608 JESSE LN	x	x	8/20/2014			x	Better access from Brady Place where there was recent tree clearing; advice on dry rock channel erosion
GRAVES JOHN W & LINDA A MATOOQ AHLAM AL & LENA	1612 PICKARD WAY 1614 PICKARD WAY	x x			9/29/2014	x	x x	Okay with project. Owner does not have much going on in that corner of the yard. okay with project
PORTER MICHAEL & ROSEMARY	1615 PICKARD WAY	x	x2	8/18/2014			x	Understands project need; concerned about tree loss and disturbance
MEYER RONALD & COLLEEN	1716 CUNNINGHAM RD	x		8/27/2014			x	Okay with project. Don't want top of bank to encroach on property any further.
WEN DENNIS Y & VALERIE WEN	1800 CUNNINGHAM RD	x		8/27/2014			x	Okay with project. Concerned about fence for dogs and some tree loss. How far into property will we need to be. Concerned that temporary stabilization will not be adequate.

OWNERS	ADDRESS	Ltr IP Mtg 8/12/14	IP Mtg Attendee 8/12/14	MTG ON SITE	PHONE CONTACT	door notice 10/6-8/2014	Ltr PH	NOTES
DUNCAN DOUGLAS W & MARIA ZHANG MINGYU & AIHUA LI	1804 CUNNINGHAM RD 3305 TALENT DR	x x	x2	8/27/2014		x	x	Okay with project. Concerned about how far into property project will come. Wants input on vegetation for restabilization.
BAUER-NORMAN BETTE A & FRANK L NORMAN	1700 RAINWOOD PL	x		10/7/2014 11/3/2014	9/29/14 wrong number 9/30/14 left msg	x	x	Mr. Norman okay with project; recently brought in fill and getting grass to grow. Met again with both property owners, walked down near area to be disturbed, discussed project, seemed okay with tree removal and restoration and project in general.
SCHAUMBURG TIMOTHY J & JONI	1701 RAINWOOD PL	x		10/20/2014	9/29/14 wrong number		x	to set up site meeting with both owners; concerned about tree loss; emailed part of plan; met on site; discussed plan, they understand it, concerned about disturbance and impact to their property
MAJORS MARK LEON & JULIE ANN	1700 GARRISON PL	x			9/29/14 wrong number 10/14/2014 returned call	x	x	Returned phone call, phone tag.
STERLING PETER N & TINA M	1701 GARRISON PL	x			9/29/2014		x	Okay with project, should not impact his property. Wants to be sure final grading is better than last time.
NEUMAN STEVANIE & MATTHEW	1612 JESSE LN	x		10/10/2014	10/9/2014 set up site mtg	x	x	New Owners June 2014. Seemed Ok with project. Discussed trees, timeline and easements.
GREEN MARSHALL & MICHELLE	1912 GRANT LANE	x		10/10/2014	9/30/14 left phone msg; 10/9/2014 set up site mtg		x	Attempted to meet onsite and were unable to connect.
RUPPAR TODD M & REBECCA A H RUPPAR	3201 KOHLER CIR	x			10/9/2014	x	x	Interested in City lining whole channel with rip rap to stabilize; concerned about mosquitos and spread and speed of water during an event

WILDHORSE RIVERWORKS, INC. (WRI)

REPORT FOR CITY OF COLUMBIA STREAM PROJECTS.

UPPER HINKSON CREEK SEWER PROJECT

WRI personnel performed a site visit of the project area with City of Columbia Engineers on October 15, 2014. It appeared that the left descending streambank was eroding at an excessive level for approximately 600 – 700 feet. The presence of a mid-bar indicated an excessive channel width near the downstream end of the project site. This appears to be primarily due to a past channel avulsion or channel change. WRI staff visited the site again on October 16, 2014 with John Holmes (Allstate Consultants) and City Staff. The Allstate conceptual plan and WRI recommendations, for this site, were discussed with Mr. Holmes and City Staff.



Figure 1 Upper Hinkson Creek - Looking Upstream – Mid Bar on left

Allstate Consultants Conceptual Design

The Allstate conceptual plan calls for the installation of 19 rock spurs or jetties and approximately 625 feet of Longitudinal Peaked Stone-Toe Protection (LPSTP). The LPSTP would be augmented with 6 rock Tie-Backs and be keyed into the bank at each end. The LPSTP would be constructed such that it would cut across the existing stream and through the edge of the mid bar. It was also our understanding that Allstate does not intend to fill the space between the LPSTP and existing streambank.

WRI Recommendations

We believe the length of LPSTP could be cut to approximately 500 feet and the number of rock spurs or jetties planned is more than needed. It is not necessary to extend the LPSTP past the bend where the stream channel turns back south. Installation of spurs or jetties past the downstream end of the eroding bank is not necessary and may possibly exacerbate streambank erosion on the opposite or right bank as the stream channel width narrows. Allstate tie-back number 6 should be moved from the design location at the apex of the bend to a point downstream of proposed tie-back number 4. This is the most vulnerable area and needs additional protection.

Constructing the LPSTP across the mid bar is acceptable and recommended. During construction, a stream channel should be excavated through the mid bar and vegetation (willows and sycamores) excavated from the mid bar be placed between the LPSTP and existing streambank. The area between the LPSTP and existing bank should be backfilled with soil, sloped, and planted with a mixture of native grasses, trees, and shrubs. If the soil excavation from the adjacent sewer line project does not provide enough excess soil for the backfill, soil can be obtained from the of the proposed wetland area near the project.

In our opinion, different type(s) of rock structures which would be more appropriate than the spurs or jetties; we recommend the use of rock vanes for the first 150 – 160 feet of streambank and then

convert to using bendway weirs as the stream channel widens. Both of these structures are considered a re-directive measures and will also shift the stream thalweg from the streambank to the end of the rock structures. Both types of structures are intended to have a low height and will re-direct the water flow when overtopped with high volumes of water. Rock vanes will change stream flow approximately 70 degrees to the length-wise angle of the vane. Bendway weirs will re-direct flows at a 90 degree angle to their axis. Typical design details for each type of structure are attached to this report as Appendix A (rock vane) and B (bendway weirs).

Rules of Thumb – Rock Vanes

Research has shown that rock vanes perform best when installed at a 25 – 30 degree angle in relation to the streambank. Vanes will protect 2 times their height vertically and 3 times their length along the streambank. The length of streambank protection is affected by the radius of curvature of the streambank. The top slope of 8 feet horizontally vs 1 foot vertically is the optimum slope, but we have built them as steep as 5:1 with success.

Rules of Thumb – Bendway Weirs

Bendway weirs are designed and built at angles that deviate from perpendicular to stream flow, with angles ranging from negative 5 degrees to plus 25 degrees being the typical. We very rarely build weirs at a negative angle, however a negative angle would be appropriate at the apex of the bend in the left descending bank at the downstream end of this project. Bendway weir spacing can be calculated using the following formulas: $Spacing (S) = 1.5L (R/W)^{0.8} \times (L/W)^{0.3}$ where L = Weir Length, R = Streambank Radius of Curvature, and W = Channel width at bankfull elevation. Note: bankfull elevation is not necessarily the top of streambank, but rather an elevation of the 1 – 1.5 year stream flow. The maximum weir spacing can be calculated by: $S_{max} = R(1 - (1 - L/R)^2)^{0.5}$. These formulas were developed by the U.S. Army Corps of Engineers, Waterways Experiment Station (WES) in Vicksburg, Mississippi and are rules of thumb.

High Flow Channel

The high flow channel near the downstream end of the project was not a cause for concern. It the City wishes to address the high flow channel, WRI recommends installation of a series of rock check dams across the channel. Installation of the check dams will induce sedimentation of the channel during high flow events. The rock check dams should approximate the #2 cross section B-B shown in the rock vane detail in Appendix A.

SOUTH RUSTIC ROAD – SEWER PROTECTION

WRI personnel visited this site with City of Columbia Engineer staff on October 15, 2014. The City is interested in reducing the erosion rate along approximately 325 feet of the right descending bank. The purpose of the streambank stabilization is to protect an existing sewer line which lies within approximately 30 feet of the streambank. The landowner would also like to have access to the south side on the stream. A hardened stream crossing can be constructed in the riffle area approximately 685 feet upstream of S. Rustic Road. A typical design detail for hardened crossing is attached as Appendix C. A total of 5 rock vanes should begin approximately 535 – 540 feet upstream of the road, just downstream of the point where the stream flow intersects the left descending bank. The first two vanes should be 15 to 20 feet long and built at a 30 degree angle. Additional rock vanes should be constructed along the left bank and a short section of LPSTP constructed in the bend at the downstream end of the eroding bank. As the channel widens, the

next vanes can be longer, up to 30 feet in length and be kept at the 30 degree angle to the bank. The LPSTP should tie in to the base of vane 5. All of these areas are depicted in a diagram shown in Appendix D.

UPPER MERIDETH STREAMBANKS

WRI personnel visited this site, with City of Columbia Engineering Staff on October 16, 2014. We walked the stream channel from Grant Lane through Chapel Hill Road to near the end of Kohler Circle. Numerous areas of eroding banks and exposed sewer lines exist throughout the reach. Most eroding banks can be remediated with the use of rock toes (basically $\frac{1}{2}$ LPSTP in cross section). Exposed sewer lines that cross perpendicular with the stream channel can be remediated by constructing engineered rock riffles over the lines. A typical design detail for engineered rock riffles is attached as Appendix E. Sewer lines, running parallel with the channel can be protected using the rock toe. The exception to this is in the area of the exposed manhole with 3 intersecting sewer lines, shown in figure 2. The manhole and lines or stream channel will need to be relocated. Channel relocation will require the removal of several large oaks and/or sycamore trees. Relocation of the manhole and lines may be less expensive and will cause less damage to the existing riparian vegetation.

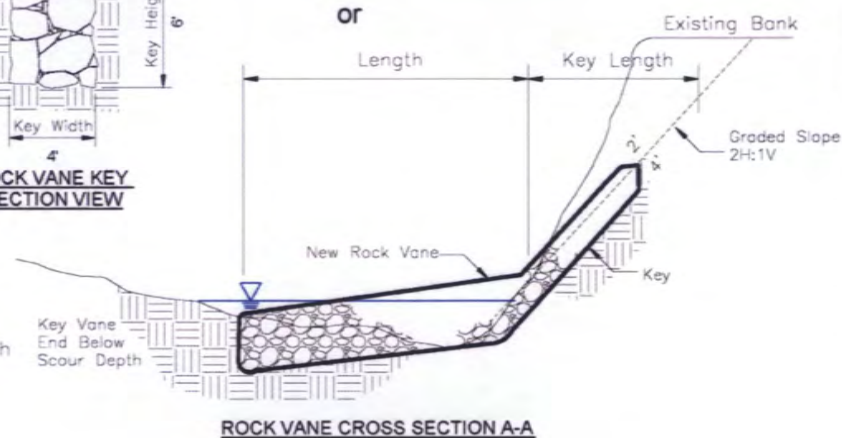
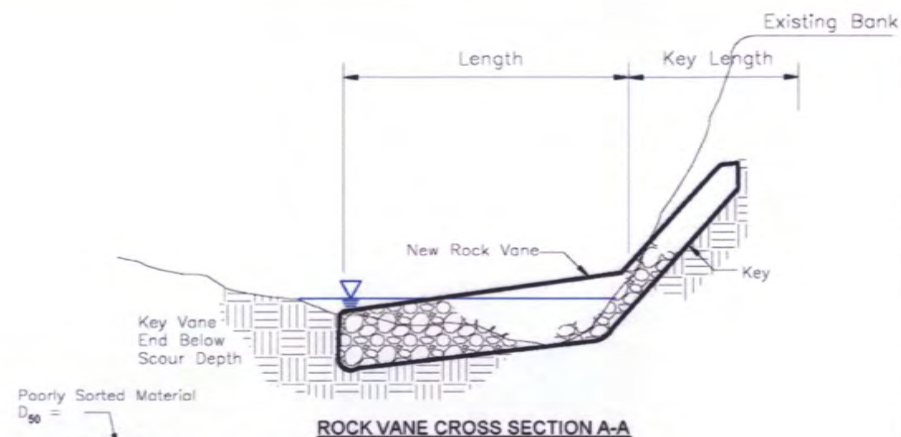
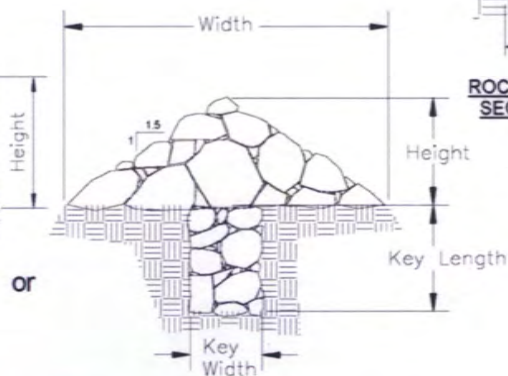
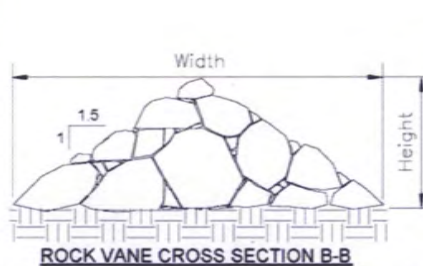
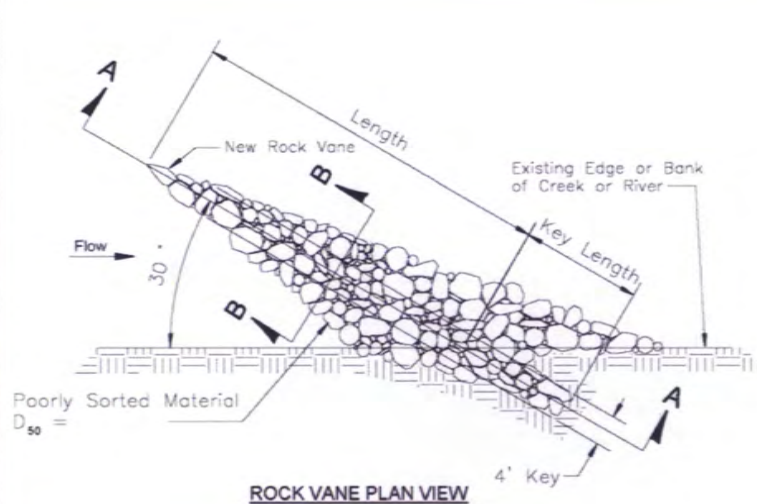


Figure 2: Manhole w/ intersecting lines

If channel relocation is chosen as the remediation method, the new channel should be the same length as the existing channel. This will help prevent further stream channel incision and will make 404 permitting easier.

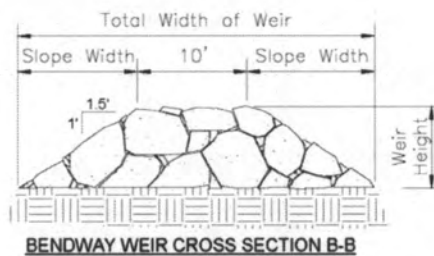
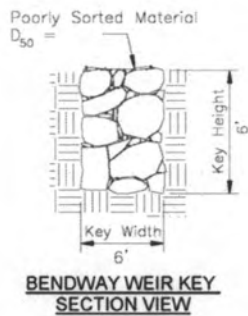
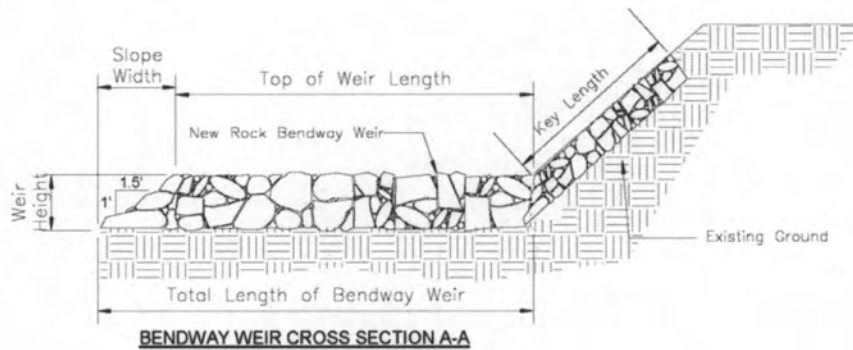
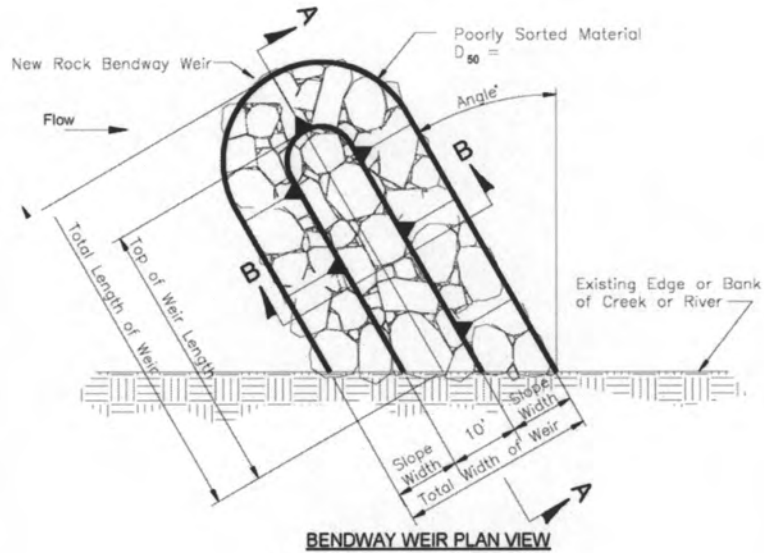
Channel Bend south of Chapel Hill Road

The bend south of Chapel Hill Road has several issues including woody debris blocking the channel, erosion on both banks, and a gully forming on the left bank due to overbank flow. The limbs and other woody debris should be removed. A rock toe should be installed along the right descending bank and tied into an engineered rock riffle. The inside bend of the meander may need to be reshaped and a gravel bar constructed in its place. On the left descending bank, a rock toe should be constructed, starting at the engineered riffle and a rock chute should replace the gully. The rock chute should be “keyed” into the surface on the top end and the bottom connected to the rock toe. A typical rock chute detail is attached as Appendix F.

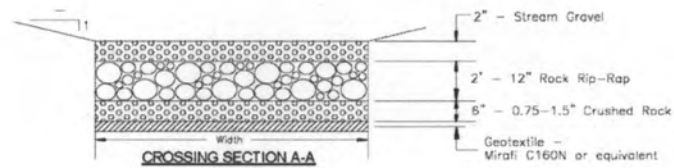
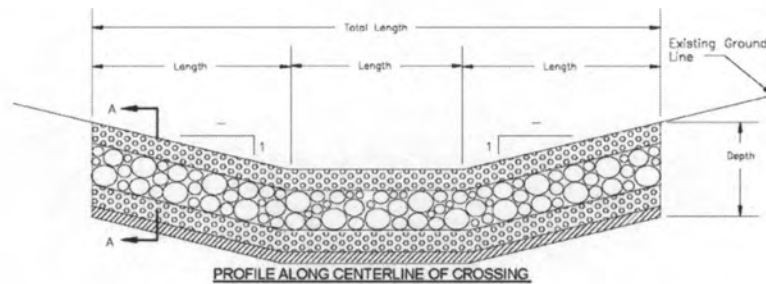
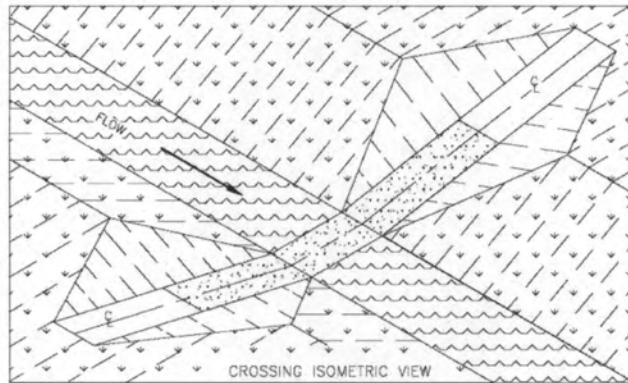


Rock Vane Details

Appendix B

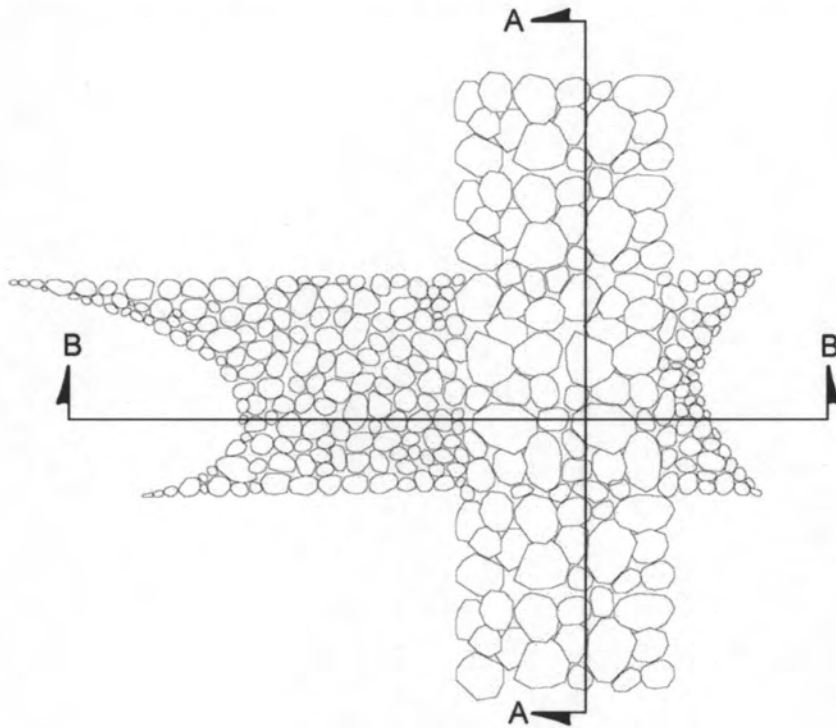


Appendix C

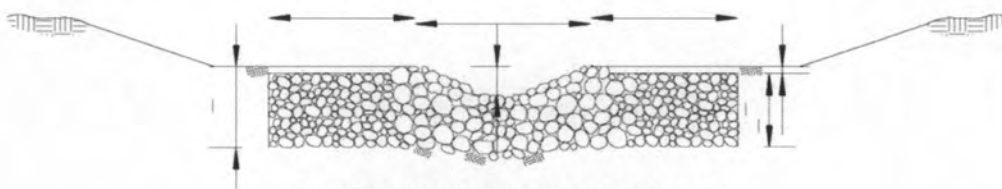




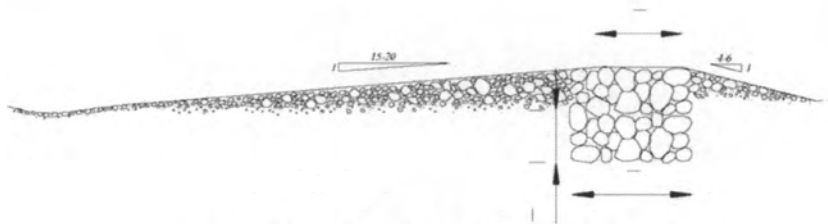
Appendix E



ENGINEERED ROCK RIFFLE PLAN VIEW



ENGINEERED ROCK RIFFLE SECTION VIEW A-A

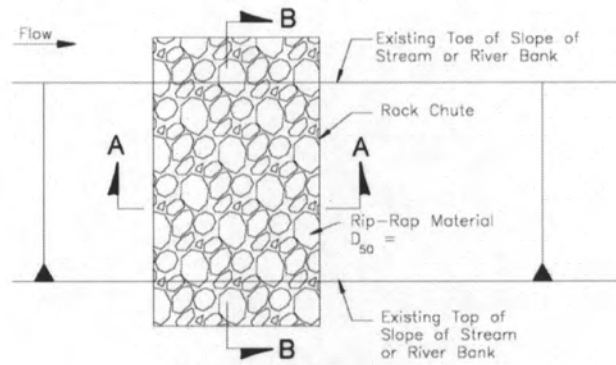


ENGINEERED ROCK RIFFLE SECTION VIEW B-B

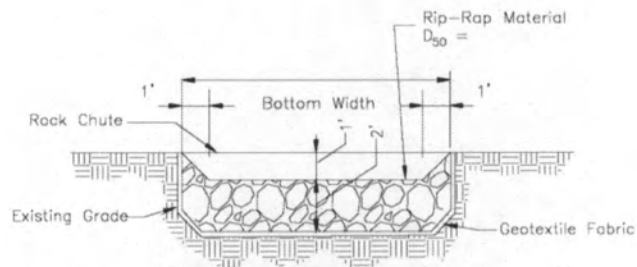


Engineered Rock Riffle Details

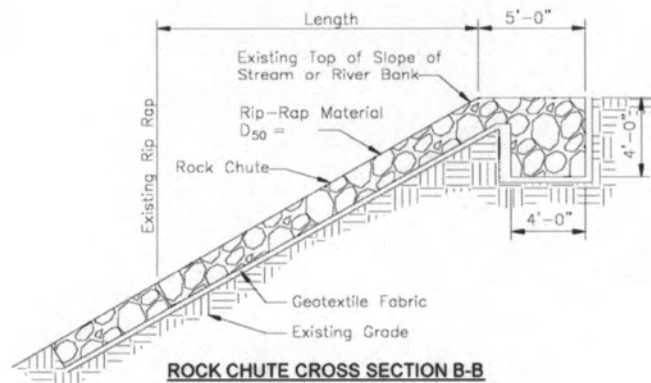
Appendix F



ROCK CHUTE PLAN VIEW



ROCK CHUTE CROSS SECTION A-A



ROCK CHUTE CROSS SECTION B-B

A RESOLUTION

declaring the necessity for construction of sanitary sewer and streambank improvements along the Upper Merideth Branch in the University Park and Oak Cliff subdivisions near the intersection of Chapel Hill Road and Cunningham Road/Grant Lane; stating the nature of and the estimate of the cost of the improvement; providing for payment for the improvement; providing for compliance with the prevailing wage law; and setting a public hearing.

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF COLUMBIA, MISSOURI, AS FOLLOWS:

SECTION 1. The City Council deems the replacement and relocation of sanitary sewers, manholes and other necessary appurtenances, construction of riprap grade control structures, various streambank stabilization measures and improvements and other miscellaneous work, all in accordance with City of Columbia Street and Storm Sewer Specifications and Standards, along the Upper Merideth Branch in the University Park and Oak Cliff subdivisions near the intersection of Chapel Hill Road and Cunningham Road/Grant Lane, more specifically described as the Upper Merideth Branch Streambank Stabilization Sewer Project, necessary to the welfare and improvement of the City.

SECTION 2. The nature and scope of the improvement shall consist of furnishing all labor, materials, transportation, insurance and all other items, accessories and incidentals thereto necessary for the complete construction of the improvements.

SECTION 3. The estimated cost of this improvement is \$600,000.00.

SECTION 4. Payment for this improvement shall be made from Sanitary Sewer Utility Funds and such other funds as may be lawfully appropriated.

SECTION 5. Any work done in connection with the construction of the improvement specified above shall be in compliance with the provisions of the prevailing wage laws of the State of Missouri.

SECTION 6. A public hearing in respect to this improvement will be held in the Council Chamber of the City Hall Building, 701 E. Broadway, Columbia, Missouri, at 7:00 p.m. on January 20, 2015. The City Clerk shall cause notice of this hearing to be published in a newspaper published in the City.

ADOPTED this _____ day of _____, 2014.

ATTEST:

City Clerk

Mayor and Presiding Officer

APPROVED AS TO FORM:

City Counselor