



**WESTWOOD ESTATES/ST.
MARY'S/STEEPLECHASE/ST. PETERS
ESTATES SPECIAL SERVICE AREA
SANITARY SEWER IMPROVEMENT
PROJECT**

Alignment Design Memorandum

January, 2016

TABLE OF CONTENTS

| | |
|---|----------|
| Preliminary Design Memorandum..... | 1 |
| A. Introduction..... | 1 |
| B. Record Data Search | 3 |
| C. Utility Service Provider Coordination | 3 |
| D. Schematic Design | 4 |
| 1. Ingress-Egress | 4 |
| 2. Easements and Property Owners | 5 |
| E. Creek Evaluation | 5 |
| F. Additional Considerations | 5 |
| 1. St. Peters Golf Course..... | 5 |

FIGURES

Figure 1 Project Area

ATTACHMENTS

ATTACHMENT 1 - UTILITY COORDINATION LOG

ATTACHMENT 2 - LIST OF POTENTIALLY AFFECTED PROPERTY OWNERS

ATTACHMENT 3 – SIPHON LOCATION CREEK NOTES

ATTACHMENT 4 – PRELIMINARY ALIGNMENT

ATTACHMENT 5 - PRELIMINARY ENGINEER'S ESTIMATE OF PROBABLE COST AND
QUANTITY TAKEOFFS

PRELIMINARY DESIGN MEMORANDUM

A. Introduction

This Alignment Design Memorandum discusses and transmits work performed to date for the Westwood Estates/St. Mary's/Steeplechase/St. Peters Estates Special Service Area Sanitary Sewer Improvement Project. The project is located in a residential area south of I-70, east of Highway 79 and the St. Peters Golf Course.

George Butler Associates, Inc. (GBA) completed a Sanitary Sewer Evaluation Study (SSES) of this area in July 2015 and developed recommendations for sewer improvements. The recommended improvements include several larger diameter sewer pipes and a new inverted siphon where the sewer crosses Dardenne Creek to relieve basement backups and sanitary sewer overflows (SSOs) within the system. GBA has been assigned the task of completing the design of recommended improvements for the project.

The project area is located in a residential area outside of city limits and is shown on Figure 1. The project reach is generally bounded by Westwood Estates Drive to the north, Hialeah Drive to the east, St. Peters Golf Course to the west, and common ground to the south.

The majority of the project area development was built in the 1960's and 1970's as part of the Westwood Estates, St. Mary's, Steeplechase and St. Peters Estates Subdivisions. This watershed has limited potential for additional development.

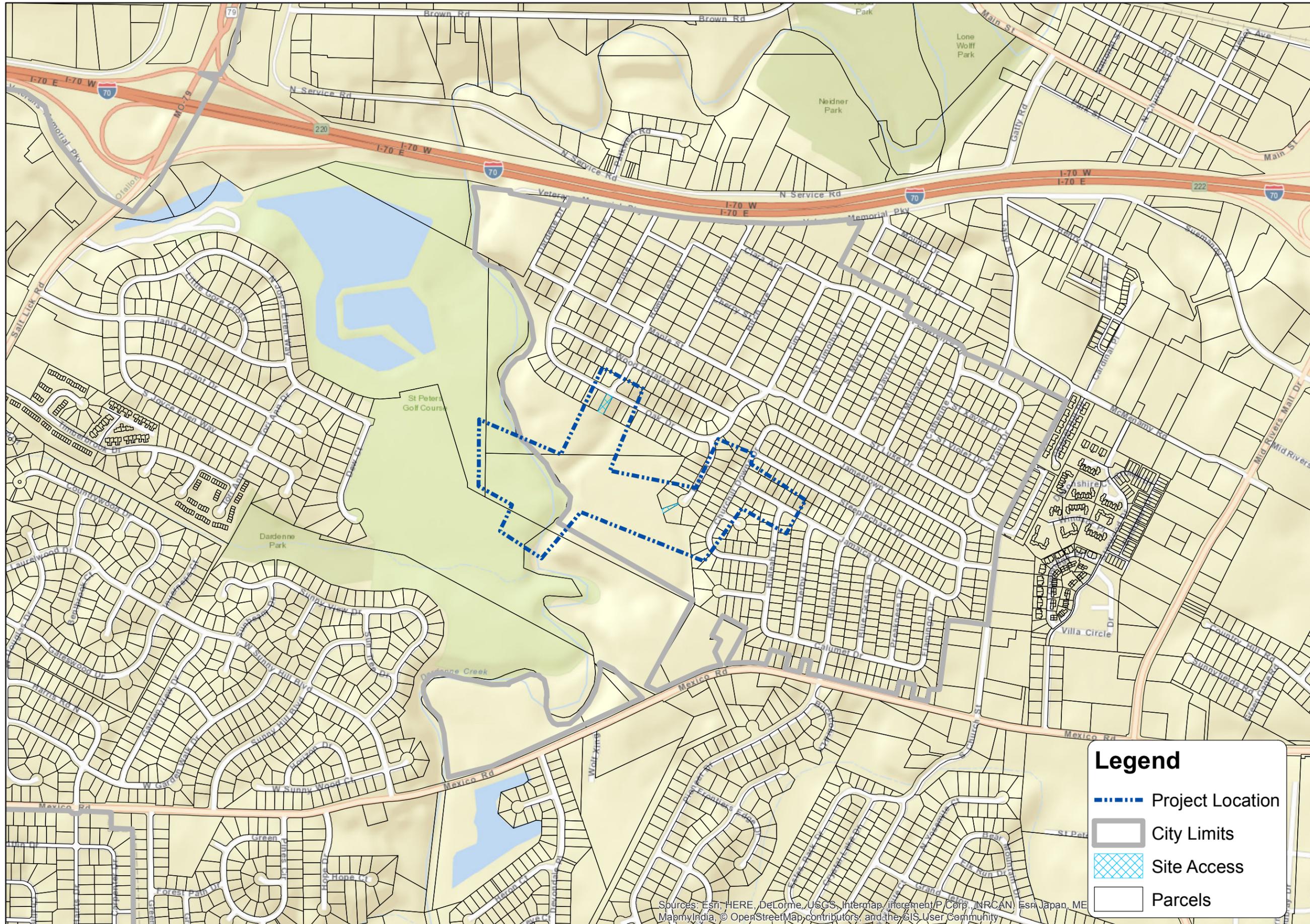


FIGURE 1
PRELIMINARY MEMORANDUM
PROJECT AREA MAP

PROJECT NUMBER
13347

NOV. 2015



Westwood Estates/
St. Mary's/
Steeplechase/ St.
Peters Estates Special
Service Area Sanitary
Sewer Improvement
Project

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, ME, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

GBA's project approach entails increasing the capacity of the siphon and select sewers to accomplish the project goals. This submittal includes the following attachments:

- Utility Coordination Log
- List of Potentially Affected Property Owners
- Siphon Location Creek Notes
- Preliminary Alignment Sketch
- Preliminary Engineers Estimate of Probable Cost and Quantity Takeoffs

B. Record Data Search

Preliminary investigations were performed to assist in the preliminary design. Existing information was reviewed and field investigations were performed. The field investigations focused on constructability issues and an evaluation of stream impacts at the siphon location.

GBA received parcel and utility data from the City at the beginning of the project. These data files were reviewed and in some cases additional data was requested. In cases where data gaps were identified additional information was requested and utilized as needed. The following data was provided by the City:

- City GIS (including parcels, utilities, etc.)
- Project Aerials

C. Utility Service Provider Coordination

A list of utility providers in the project area was obtained from Missouri One Call. The utilities were contacted by GBA. Some of the utilities responded by providing utility mapping or highlighting utility conflicts between their infrastructure and the proposed project area. Based on the mapping provided, significant utility conflicts are not anticipated. GBA will provide copies of the Preliminary 60% Design Plans to the utilities for review when available. Initial contact information was recorded in a Utility Coordination Log. A copy of the Utility Coordination Log is included as Attachment 1. Information was obtained from the following utility providers:

- Ameren Missouri Electric
- AT&T
- Charter Communications
- Laclede Gas Company
- CenturyLink
- Missouri American Water
- City of St. Peters

In, addition, GBA's surveyor sub-consultant for this project, BAX Engineering, Inc. has surveyed utilities while performing the topographic survey field work. Detailed costs for potential utility conflicts are not included in the preliminary cost opinion section at this time. This includes irrigation piping and sprinklers at the City golf course which have not been surveyed at this time.

D. Schematic Design

Preliminary investigations were performed to assist in the proposed design. Existing information was reviewed and field investigations were performed. The field investigations focused on an evaluation of stream impacts at the siphon location.

The preliminary alignment was presented as the recommended alternative in GBA's July 2015 SSES Report. Adjustments were made to incorporate notes from GBA's Stream Team field investigation efforts from September 9, 2015. The proposed alignment includes upsizing several existing sewers and the inverted siphon at the creek crossing. To relieve the SSO and basement backups in the Westwood and Steeplechase areas, the sewer carrying flow from Churchill Downs Dr. to Elm Ct. will be abandoned, along with two existing manholes. Instead, new sewer will be constructed south along the rear lot lines and turn westward, connecting to an existing manhole south of 14 Elm Ct. Furthermore, the existing overloaded siphon will be replaced by a quadruple barrel (one 8-inch and three 12-inch diameter pipes) siphon to provide adequate capacity and velocity. Based on notes from the Stream Team evaluation, the new siphon crossing will be located approximately 30 feet upstream of the existing crossing, which will require construction of new manholes and abandonment of the existing siphon components. The gravity sewer will then discharge to an existing manhole in the golf course along the 42-inch Golf Course interceptor. A preliminary design alignment is included as Attachment 4.

The proposed sewer is planned to be constructed in a manner such that the existing sewers can be abandoned in place, the amount of bypass pumping can be minimized, and existing easements can be utilized as much as possible. This could be achieved by offsetting new sewers by a few feet on one side parallel to existing sewers.

1. Ingress-Egress

In the portion of the project within the golf course (west of Dardenne Creek), the City owns the access points and temporary construction easements (TCE) are not anticipated to be a significant concern.

A significant portion of the project will be constructed within subdivision common ground and existing easement along the rear property lines of parcels between Elm Ct. and Churchill Downs Dr. The upgraded existing sewers will generally follow the same alignment, while the new sewers will extend along the rear property lines to the common ground behind the properties at the end of Elm Ct. A likely access point is through the Westwood Estates common ground/existing 50-foot Missouri American

Water utility easement between 122 and 124 Oak Dr. There is also an access point to the common ground from Elm Ct. between 14 and 16 Elm Ct.

2. Easements and Property Owners

In general, it appears that sewer construction may be mostly confined within existing City property, subdivision common ground and existing utility easements. Some new permanent utility easements and TCEs are anticipated between Elm Ct. and Churchill Downs Dr. A list of potentially affected property owners is included as Attachment 2.

E. Creek Evaluation

GBA's Stream Team evaluated the reach of Dardenne Creek where the new inverted siphon is planned to cross beneath the creek. The purpose of this evaluation was to locate any existing hydraulic features and to identify possible stabilization measures to ensure the proposed crossing won't interfere with existing creek hydraulics. As a result of this evaluation, it was recommended that the proposed siphon be moved a minimum of 30 feet upstream of the existing riffle, which is located at the site of the existing sewer crossing. It was also recommended that a rock toe be placed on the right slope, upstream of the existing riffle. The existing riprap present on the right bank, 2 feet above the water surface, should not be disturbed. The Stream Team also added that the slopes should be revegetated with Zone 1 plantings following construction. Notes and sketches from the creek evaluation are included as Attachment 3.

Additionally, GBA performed a preliminary on-site delineation of the waters of the United States and identified impacts on the channel and anticipated permitting issues. Two potential jurisdictional waters were identified within the project corridor including 1) Dardenne Creek and 2) emergent wetland swale. Project construction is anticipated to result in only temporary fill impacts within these two waters; therefore, the project should qualify for a U.S. Army Corps of Engineers Section 404 Nationwide Permit 12 "Utility Line Activities". While agencies including U.S. Fish & Wildlife Service, Missouri Department of Conservation, and the State Historic Preservation Office have not been contacted at this phase of the project, GBA does not anticipate any potential issues with endangered/threatened species or historic resources.

F. Additional Considerations

1. St. Peters Golf Course

A new sewer line is proposed through the golf course, connecting the new siphon to the existing 42-inch golf course interceptor. Golf course sprinkler locations have not been surveyed at this time. Based on a previous project that went through the golf course, GBA understands that construction should be staged to keep the course playable, preferably during the winter months (December 1st to March 1st).

ATTACHMENT 1

UTILITY COORDINATION LOG

ATTACHMENT 2

LIST OF POTENTIALLY AFFECTED PROPERTY OWNERS

Westwood Estates/St. Mary's/Steeplechase/St. Peters Estates Special Service Area Sanitary Sewer Improvement Project

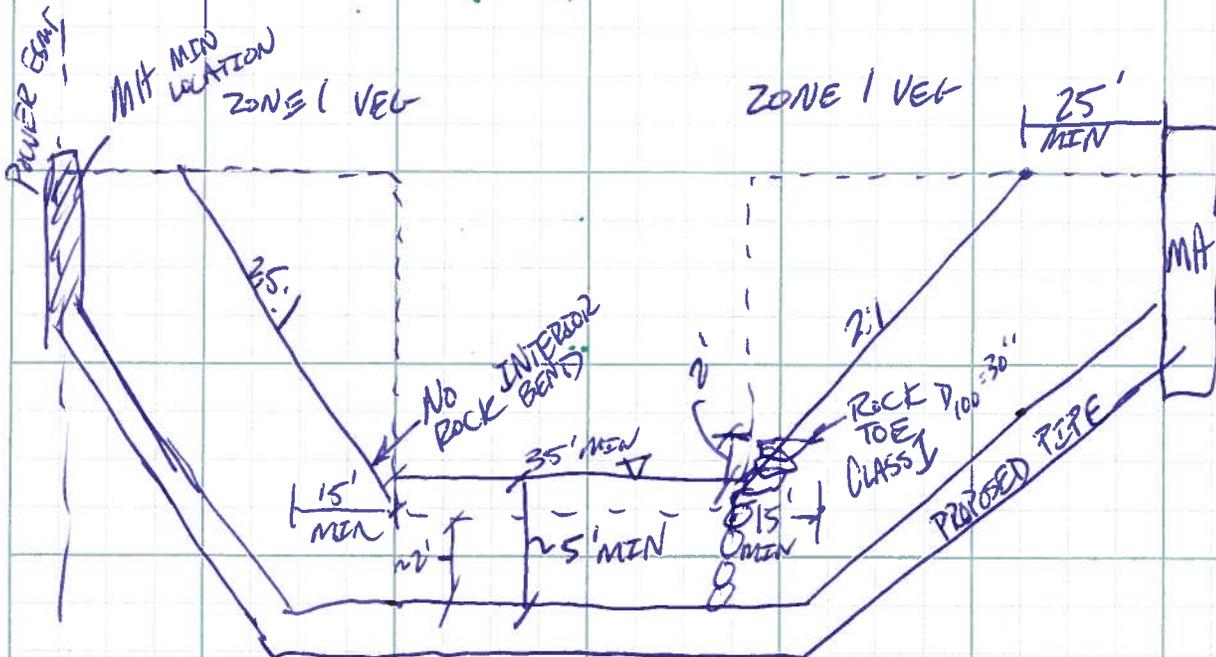
| Property Impact | | | Property Owner Information | | |
|------------------|-----|--------------------|---|--------------------------|---------------------|
| Ingress / Egress | TCE | Permanent Easement | Owner Name | Address | County Parcel ID |
| | X | X | RICHARD L CARR & AVERIL E CARR | 5 ELM COURT | 2-062A-4969-00-0108 |
| | X | X | WALTER E BOYD & MARY E BOYD | 7 ELM COURT | 2-062A-4969-00-0107 |
| | X | X | JOHN W BORGMAYER & WANZA J BORGMAYER | 9 ELM COURT | 2-062A-4969-00-0106 |
| | X | X | AARON WOOLSEY | 11 ELM COURT | 2-062A-4969-00-0105 |
| | X | X | BENJAMIN R JUNG | 13 ELM COURT | 2-062A-4969-00-0104 |
| | X | X | DOUG W HOLLINGSHEAD & DONNA S HOLLINGSHEAD | 15 ELM COURT | 2-062A-4969-00-0103 |
| | X | X | RICHARD A SCHROER & PHYLLIS A SCHROER | 17 ELM COURT | 2-062A-4969-00-0102 |
| | X | X | MATTHEW EHMAN | 14 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0311 |
| | X | X | JOHN C RAY JR | 16 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0310 |
| | X | X | S&S KELLER COMPANY IV LLC | 18 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0309 |
| | X | X | FRED J MOSES & JEAN M MOSES | 20 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0308 |
| | X | X | CITY OF ST. PETERS | 22 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0307 |
| | X | X | OLIVIA A LINDSEY & KEITH A LINDSEY & EMILY N LINDSEY | 24 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0306 |
| | X | X | STANLEY T SCHOTT & JUDY K SCHOTT, REVOC INTER VIVOS TRUSTS | 26 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0305 |
| | X | X | TARAM HERTLEIN | 28 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0304 |
| | X | X | GREGORY LARAMIE & SAVANNAH P BALTIMORE | 30 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0303 |
| | X | X | THOMAS SCHWEITZER, KATELYN NELSON, JAMES ANDREW NELSON & KELLY L NELSON | 32 CHURCHILL DOWNS DRIVE | 2-062A-4428-00-0302 |
| X | X | X | WESTWOOD ESTATES TRUSTEES OF RECORD | ELM COURT | 2-062A-4969-00-0111 |
| X | X | X | WESTWOOD ESTATES TRUSTEES OF RECORD | OAK DRIVE | 2-055D-4969-00-0112 |
| X | X | X | CITY OF ST. PETERS | GOLF COURSE/ELM CT | 2-062A-4969-00-0111 |

ATTACHMENT 3

SIPHON LOCATION CREEK NOTES

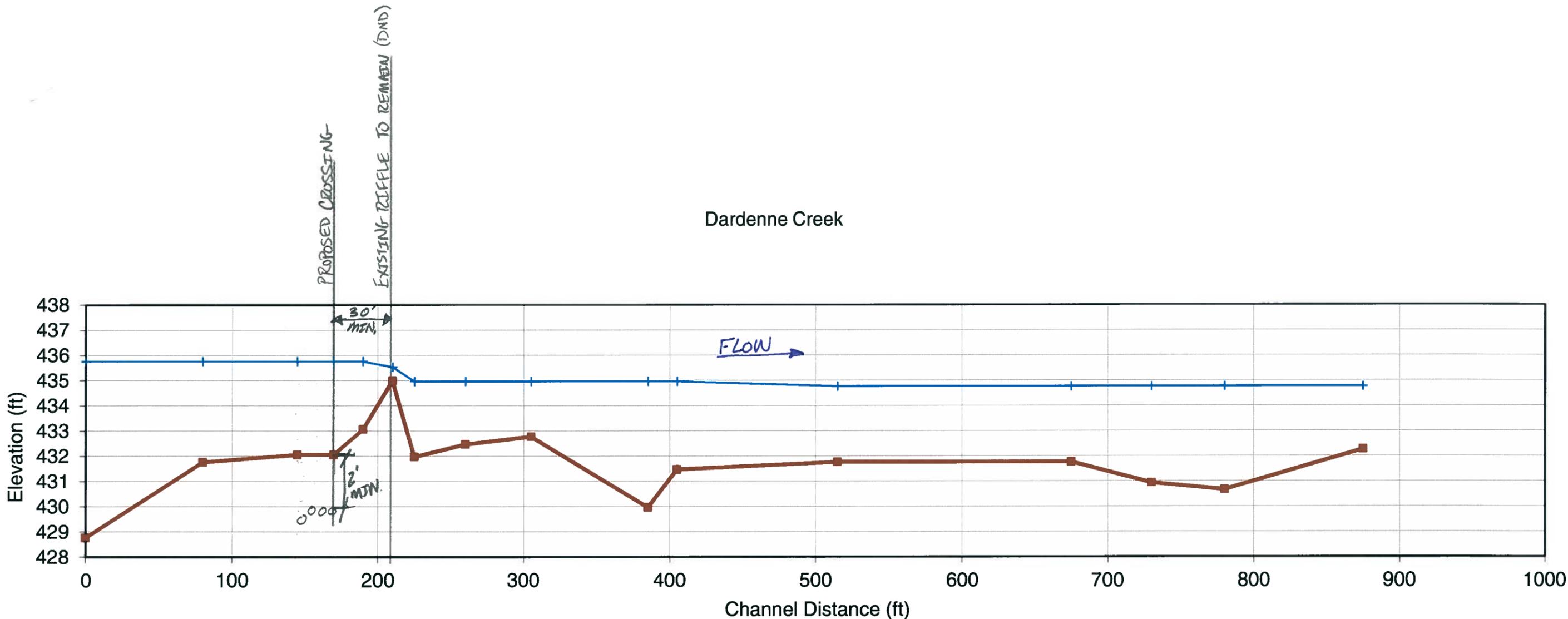
STEEL CHASE 9/9/2015

- TOE IS NOT SCOURING
- E 4/5 ROSGEN STREAM TYPE
- MAINTAIN WATER SURFACE WIDTH OF 35' MIN. \Rightarrow 40' @ 2' ABOVE H_2O
- ESTIMATE 65' PIPE \Rightarrow ELBOW 15' AWAY FROM TOE MIN
- SLOPE BACK 2:1
- EXISTING ROCK RIFFLE TO REMAIN IN PLACE
- NEW ^{UPSTREAM} UPSTREAM OF EXISTING RIFFLE 30'
- RT SLOPE PROTECTION 100% \Rightarrow ROCK 2' ABOVE H_2O
- LT SLOPE 2:1 REVEGE
- E CHANNEL ~~GET~~ VEGETATION CRITICAL \Rightarrow FORBES GRASSES
- ZONE 1 VEGETATION
- MANHOLES MIN 25' FROM NEW TOP OF SLOPE
- SANDY/SOIL BANKS \Rightarrow ROTATIONAL FAILURES \hookrightarrow SANDY/CLAY LOAM \Rightarrow MAYBE 2.5:1
- PIPE DEPTH \Rightarrow TOP PIPE 5' ~~ABOVE~~ BELOW H_2O SURFACE
- SMOOTH EXISTING GROUTED RIPPAP VS AT ELEV 24 UP



Looking Downstream

Dardenne Creek





RIPRAP 2' ABOVE
WATER TO REMAIN

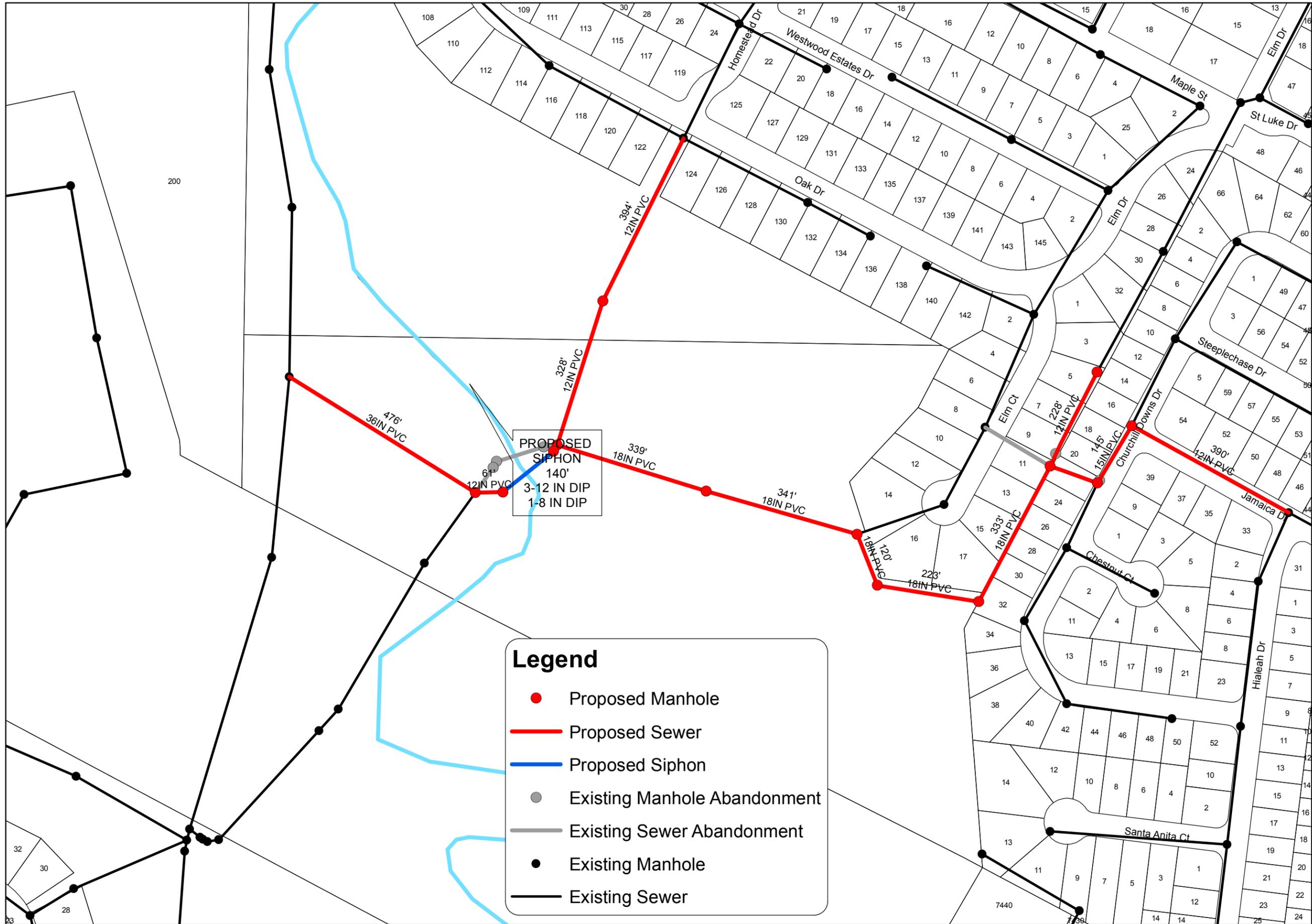
EXISTING
RIFFLE TO
REMAIN

PROPOSED ROCK TOE

PROPOSED CROSSING
30' MIN. UPSTREAM
OF RIFFLE

ATTACHMENT 4

PRELIMINARY ALIGNMENT



ATTACHMENT 4
PRELIMINARY ALIGNMENT

PROJECT NUMBER
13347

NOV. 2015



Westwood Estates/
St. Mary's/
Steeplechase/ St.
Peters Estates Special
Service Area Sanitary
Sewer Improvement
Project

ATTACHMENT 5

**PRELIMINARY ENGINEER'S ESTIMATE OF PROBABLE COST AND QUANTITY
TAKEOFFS**

| Task | Units | Quantity | Average Unit Cost | Estimated Cost | Capital Cost ⁽¹⁾ |
|---|-------|----------|-------------------|------------------|-----------------------------|
| Relief Sewers | | | | | |
| Mobilization | LS | 1 | \$25,000 | \$25,000 | \$31,250 |
| Excavation Class "C" | CY | 6116 | \$25 | \$152,900 | \$191,125 |
| Dewatering | AL | 1 | \$8,000 | \$8,000 | \$10,000 |
| Bypass Pumping | LS | 1 | \$12,000 | \$12,000 | \$15,000 |
| Seeding | SY | 547 | \$2 | \$1,094 | \$1,368 |
| Protection and Restoration of Site | LS | 1 | \$55,000 | \$55,000 | \$68,750 |
| Street Pavement - Asphaltic Concrete Remove & Replace | SY | 15 | \$67 | \$1,005 | \$1,256 |
| Street Pavement - Concrete Remove & Replace | SY | 32 | \$68 | \$2,176 | \$2,720 |
| Granular Backfill | CY | 43 | \$36 | \$1,548 | \$1,935 |
| Manhole Cover Seals | EA | 13 | \$145 | \$1,885 | \$2,356 |
| Manhole Frame Seals | EA | 13 | \$360 | \$4,680 | \$5,850 |
| Manhole-Standard Construction | LF | 155 | \$350 | \$54,250 | \$67,813 |
| Pipe Sewer 12 inch (Sanitary/Combined) | LF | 1401 | \$95 | \$133,095 | \$166,369 |
| Pipe Sewer 15 inch (Sanitary/Combined) | LF | 254 | \$105 | \$26,670 | \$33,338 |
| Pipe Sewer 18 inch (Sanitary/Combined) | LF | 1372 | \$120 | \$164,640 | \$205,800 |
| Pipe Sewer 36 inch (Sanitary/Combined) | LF | 476 | \$320 | \$152,320 | \$190,400 |
| Bentonite Plug | EA | 15 | \$250 | \$3,750 | \$4,688 |
| Abandonment-Pipe Fill | CY | 15 | \$190 | \$2,850 | \$3,563 |
| Abandon Structure | EA | 5 | \$1,100 | \$5,500 | \$6,875 |
| Siphon | | | | | |
| Ductile Iron Pipe Sewer 08 inch Class 50 | LF | 140 | \$150 | \$21,000 | \$26,250 |
| Ductile Iron Pipe Sewer 12 inch Class 52 | LF | 420 | \$190 | \$79,800 | \$99,750 |
| Junction Box | EA | 2 | \$25,000 | \$50,000 | \$62,500 |
| Encasement- Class "A" Concrete | CY | 50 | \$250 | \$12,500 | \$15,625 |
| Zone 1 Plantings | SY | 50 | \$15 | \$750 | \$938 |
| Class I Rock Toe | SY | 60 | \$95 | \$5,700 | \$7,125 |
| Total | | | | \$978,113 | \$1,222,641 |

Notes:
(1) Capital costs include 25% contingency
(2) Cost does not include property acquisition, easement preparation, rock excavation or bid period/construction phase services.