

Memorandum

To: Bruce Litzsinger
From: Karen Janson *KBJ*
Date: September 8, 2017
Re: Caulks Creek A Pump Station (P-750) Improvements (12248)

Attached is a preliminary study for the above referenced project. The project is located in an area north of Wild Horse Creek Road and west of Baxter Road in the City of Chesterfield within the Caulks Creek Watershed of the Missouri River Service Area. The purpose of the study was to prepare a preliminary design and cost estimate to repair and upgrade the existing pump station, P-750, and eliminate one Known SSO.

The preliminary study recommends constructing a pump station and rehabilitating the existing pump station and appurtenances. The total preliminary estimated project cost for the proposed work is \$21,500,000.

The improvements will benefit approximately 15,500 properties and the construction will affect one (1) property. It is estimated that 1 easement will be required. Priority points were not calculated for this preliminary study. When the conceptual scope for the project was developed, the conceptual project priority, with a B/C Ratio of 24.8, was utilized along with other factors to schedule the project for the Master Schedule. This is a Tier 1, Category "B" infrastructure project.

Attachments

pc: Brad Nevois
Jim Dunajcik
Bonnie Hubert
Allen Muehlher
Debra Aylsworth
Jerry Keaveny
Rob Daly
Jay Knicker
Michelle Meier
Brittnee Wilson
File – Karen Janson

Memorandum

To: Karen Janson
From: Robert Miller
Date: September 1, 2017
Re: Caulks Creek A Pump Station (P-750) Improvements (12248)

1. Introduction

A preliminary study has been completed for the above referenced project. This project is located north of Wild Horse Creek Road and west of Baxter Road in the City of Chesterfield, within the Caulks Creek Watershed of the Missouri River Service Area. The purpose of this study is to provide a preliminary design and cost estimate to repair and upgrade the existing pump station, P-750, and eliminate one known SSO.

2. History

The Caulks Creek A Pump Station was designed in 1981 and constructed in 1986 with project "Caulks Creek Pump Stations Contract Letting No C-820".

In 2012, Horner and Shrifrin, Inc. attempted an inspection of the wet well as a part of "GSA – Sewer and Process" (10623). Due to safety concerns, they could not enter the structure. They inspected as much of the wet well as was possible from the surface, and found that the portions of the wet well that they could inspect were in good condition, with one exception near a connection point. A copy of the inspection report is included in the project folder for reference.

In 2014, The Caulks Creek A Pump Station (P-750) (Caulks A) was partially rehabilitated with project "Infrastructure Repair #087P Caulks Creek "A" (P-750) Phase V" (93077D) (10655). This upgrade included new pumps, a new control building, a connection to the new force main, and a bypass pumping portal. The rehabilitation did not include any work on the wet well. Operations reports that the wet well for this station is in poor condition.

A new Caulks Creek force main is being constructed in several phases. The original Caulks Creek force main is 20-inch diameter. The new force main is 30-inch and 36-inch diameter. Once completed the new force main should increase pumping capacity and reduce the operating head required at Caulks A. The new force main was connected to Caulks A in 2014. Two additional phases of construction are necessary to complete the new force main to L-52. The completion of the new force main is anticipated to occur in 2020. The original force main is scheduled to be slip lined resulting in a reduced diameter to an approximate inside diameter of 14-inches. The rehabilitated original force main will

remain in place and is planned to be used as necessary when maintenance or repairs are necessary on the new force main.

The Corp of Engineers is planning a flood wall to protect Caulks A. A small section of sheet piling was installed; the project was then temporarily abandoned. The flood wall project is still on the Corp or Engineers' list for future consideration, but it is not currently scheduled. The Consultant should contact Mr. Jim Mills at the Corp of Engineers for more information and a status update during the design phase of the project. While the site is partially in the flood plain, Operations does not recall any flooding issues at the pump station.

3. Origin of Project

The Watershed Team identified a project to replace the Caulks Creek A (P-750) Pump Station. The conceptual scope was to demolish the existing pump station and build a new one due to deterioration.

4. Existing Conditions

The pump station is located in a residential area. The road to the pump station is curved and has steep grades. Operations reported having difficulty accessing the site with large equipment such as cranes and large boom trucks.

Operations stated that the existing wet well is in dire need of repair. This does not agree with the 2012 report by Horner and Shrifrin, Inc. However, this project does include refurbishment of the existing wet well.

5. Hydraulic Analysis

A hydraulic analysis was not completed for this project. The hydraulic models show that the Caulks A pump station needs to have a firm capacity of approximately 20 MGD to account for the 10-year peak flow rate. Caulks A receives flow from three sewers. There is a 16-inch force main from the Spirit 2 Pump Station (P-736) (Spirit 2), the Caulks Creek Trunk Sewer from the south and the Wild Horse Creek Interceptor from the northwest. There is currently no storage available at this pump station, so the peak flow rate must be pumped. Based on site geometry additional onsite storage of significant volume does not appear to be a viable solution. Offsite storage may be an option, but there are other complicating factors, including flow from multiple directions and flow controls.

6. Proposed Solution

The proposed solution is to construct a new pump station adjacent to the existing pump station and rehabilitate the existing station. The new pump station should have a capacity of approximately 10 MGD. This is more than adequate to pump dry weather and some wet weather flows. It is anticipated that this station would have three pumps, two smaller

pumps to handle the typical dry weather flows and a larger pump with a variable frequency drive (VFD) to pump larger flows. The pumps should be chosen emphasizing efficiency at anticipated normal operating points. When flow exceeds the capacity of this new station, the flows would be diverted to the existing pump station with a 36-inch gravity sewer, therefore providing the needed wet weather capacity. Valves should be installed that would allow flow to be routed to either pump station based on the flow rate, or maintenance needs. Valves should also be installed to allow either pump station to use either force main. It is not anticipated that both force mains would be used at the same time. The new pump station shall be elevated above the 100-year flood elevation.

Once the new pump station is built, flow would be diverted to the new station and the wet well on the existing pump station will be rehabilitated. Once the concrete is repaired, along with any reinforcing required, the wet well should be treated with an appropriate coating to prevent or reduce further hydrogen sulfide attack.

The Operations Department would like to have the existing building replaced. The existing building has wood shake shingles, and looks like a house. Operations stated the building may have originally been constructed in this manner to better blend in with the architecture of the area. This building requires more maintenance than most of the pump station buildings. Operations would prefer to have a building which is similar to other pump station buildings. The elevator in the existing building should be upgraded to a larger elevator if possible to facilitate the movement of parts, as well as people, to the lower level of the facility.

The preliminary study assumed a trench style pump station. The consultant should evaluate this option as well as a submersible pump station and a wet well dry well pump station. The consultant shall consider pump efficiency, construction space available, and part availability as well as construction cost when determining the type of pump station to select for the project. The structure at the pump station shall have adequate hatches or access points to remove the pumps for maintenance and replacement.

Additionally, the consultant should consider bypass pumping at the Caulks "A" and rehabbing the wet well. There are some additional risks with this solution. If the wet well is in worse than anticipated condition, the bypass pumping could be operational for an extended time period. The long term operational costs, as well as capital costs, should be considered if using this option.

The existing access road to the pump station is in good condition, but its vertical and horizontal alignment does not allow for easy access of large equipment. The consultant shall consider access road improvements to the maximum extent practical. The close proximity of the road to an existing home and a detention pond may make an alternate alignment difficult.

Flow meters need to be installed on all force mains. All flow meters shall have the ability to record and display reading in the control building on site. All controls and flow meters shall be compatible with the Districts SCADA system.

The site already has dual power supplies, but it is anticipated that some electrical improvements may be required. With the dual power supplies, 24 hour storage or back up power generation is not required.

7. Constructed SSO

There are no known constructed sanitary sewer overflows in the project area. There is one capacity related known SSO associated with this project located at manhole 17T4-011S.

8. Constructability Issues

There are several concerns that will need to be addressed in the design of this project. A portion of the property is in the flood plain and the floodway. It is anticipated that a flood plain study will be required for this project.

There are space limitations that will need to be dealt with. The existing pump station must remain in service while the new smaller pump station is being constructed.

The alignment of the access road may cause the contractor to have difficulty delivering and placing larger items.

While the wet well of the existing pump station is being rehabilitated, the pump station will not have firm 10-year capacity. Permission from The Department of Natural Resources must be obtained if the old pump station will be out of service for an extended period of time. If permission cannot be obtained, bypass pumping may be required, or the contractor may be limited to working in dry weather conditions, either of which could impact project costs.

The existing pre-grinder or “Muffin Monster” at Caulks A is not functioning. The “Muffin Monster” should be replaced with a Dimminutor or equivalent unit. This should be done early in the construction process. Once the Dimminutor is in place, the screen bypass line should be dry. This will allow the contractor to connect to the screen bypass line to construct the piping to the new pump station.

The existing 16-inch force main delivers flow from Spirit 2 to the Caulks A. “Spirit of St. Louis Pump Station (P-336) Replacement” (12207) proposes to add storage to Spirit 2. If the additional storage is available at Spirit 2 prior to the construction of this project, this storage could be utilized to switch off the pump station long enough to add the new tee and valves the force main near its current discharge into Caulks “A”.

9. Priority Points

This is a Tier 1 project. Priority points were not calculated for this project. When the conceptual scope for the project was developed, a priority ranking score was calculated

based on SSO removals, service requests/ complaint resolution, CMOM and asset management benefits, and I/I benefits. MSD considered this priority score and other relevant information, such as relationships between projects and Consent Decree requirements, to determine logical sequencing and placement of projects into the schedule. This project has a conceptual priority (B/C Ratio) of 24.8.

Approximately 15,500 properties are estimated to benefit from this project. Construction will affect approximately 1 property.

10. Summary and Recommendations

The proposed Project consists of:

- Construction of a pump station with an approximate capacity of 10 MGD.
- Rehabilitation of the wet well of the existing pump station.
- Replacement of the elevator at the existing pump station.
- Replacement of the superstructure at the existing pump station.
- Upgrade the road to the pump station as much as possible.

The total estimated cost for this project is \$21,500,000. The project requires 1 easement. It will benefit approximately 15,500 properties and impact 1 property.

ENGINEER'S COST ESTIMATE

Project:	CAULKS CREEK A PUMP STATION (P-750) IMPROVEMENTS		
Number:	12248		
Est. By:	Robert Miller	Date:	3/17/2017
Chk. By:		Date:	
Rev. By:		Date:	

Item	Pay-Item	Estimated	Unit	Unit Price	Extended
14	AIR RELEASE VALVE	2	EA	7000	\$ 14,000
23	BOTTOM SECT. OF MANHOLE-27" PIPE - 36" PIPE	3	EA	2700	\$ 8,100
364	DRIVEWAYS-ASPHALTIC CONCRETE	1050	SY	65	\$ 68,250
408	EXCAVATION CLASS "C"	2100	CY	28	\$ 58,800
419	FENCE - 72 INCH CHAIN LINK	420	LF	25	\$ 10,500
449	FORCE MAIN 24 INCH	35	LF	325	\$ 11,375
508	INSTALL EPOXY LINER	100	LF	275	\$ 27,500
546	MANHOLE - STANDARD CONSTRUCTION	27	LF	335	\$ 9,045
566	MODULAR BLOCK WALL	300	SF	48	\$ 14,400
624	PIPE SEWER 36 INCH (SANITARY/COMBINED)	75	LF	235	\$ 17,625
665	PUMP STATION SITE WORK	1	LS	250000	\$ 250,000
674	REINFORCED CONCRETE CONSTRUCTION	500	CY	900	\$ 450,000
808	REPAIR EXISTING WET WELL	325	SY	2000	\$ 650,000
809	ELEVATOR IMPROVEMENTS	1	LS	67000	\$ 67,000
811	CONTROL PANEL IMPROVEMENTS	1	LS	500000	\$ 500,000
812	DIMMINUTOR	2	EA	200000	\$ 400,000
816	LOW FLOW PUMP	2	LS	200000	\$ 400,000
817	HIGH FLOW PUMP WITH VFD	1	LS	200000	\$ 200,000
818	16-INCH VALVE	2	EA	25000	\$ 50,000
819	36-INCH VALVE	2	EA	40000	\$ 80,000
820	24-INCH VALVE	1	EA	25000	\$ 25,000
821	16-INCH X 16-INCH TEE	1	EA	3000	\$ 3,000
822	24-INCH X 30-INCH TEE	1	EA	3000	\$ 3,000
824	EXPOXY PROTECTION OF WET WELL	325	SY	200	\$ 65,000
825	DRESSER 16-INCH	1	LS	1500	\$ 1,500
826	DRESSER 24-INCH	2	LS	2500	\$ 5,000
827	DRESSER 20-INCH	1	LS	2000	\$ 2,000
828	BACKFLOW VALVE 16-INCH	1	LS	20000	\$ 20,000
829	BACKFLOW VALVE 24-INCH	1	LS	25000	\$ 25,000
830	BACKFLOW VALVE 36-INCH	1	LS	30000	\$ 30,000
831	36-INCH SLUCE GATE	1	EA	50000	\$ 50,000
832	BUILDING FOR NEW PUMP SATION	1000	SF	200	\$ 200,000
833	REPLACE EXISTING PUMP STATION BUILDING	1300	SF	200	\$ 260,000
834	CRANE	2	EA	30000	\$ 60,000
835	FORCE MAIN 16-INCH	10	LF	325	\$ 3,250
836	FORCE MAIN 20-INCH	200	LF	325	\$ 65,000
837	BACKFLOW VALVE 20-INCH	2	LS	25000	\$ 50,000
838	20-INCH VALVE	2	LS	25000	\$ 50,000
839	20-INCH X 20-INCH TEE	1	LS	3000	\$ 3,000
840	MISC FITTINGS	1	LS	75000	\$ 75,000
841	INSTALLATION	1	LS	350000	\$ 350,000
842	FLOW METERS W/ VAULTS	3	EA	40000	\$ 120,000
843	DIMMINUTOR VAULT	1	EA	30000	\$ 30,000
844	FORCE MAIN RELOCATION	200	LF	325	\$ 65,000
845	CONTIGENCY TO REPLACE 20 MGD STATION	1	LS	8000000	\$ 8,000,000
1029	VALVE JUNCTION BOX	9	EA	2000	\$ 18,000

Initial Subtotal: \$ 12,865,345

Construction Utility Relocation \$ 250,000
 Protection and Restoration of Site (15%) \$ 1,929,802
 Mobilization (4%) \$ 514,614

Secondary Subtotal: \$ 15,559,761

Construction Contingency/Allowances (25%) \$ 4,270,239

MSD Construction Estimate: \$ 19,830,000

Stream Mitigation \$ -
 Property Rights Acquisition/Buyouts/Railroad License \$ -
 Railroad Flagmen and Insurance \$ -
 Design Services/Hydraulic Study/Additional Survey \$ 1,670,000

Total Preliminary Estimated Cost: \$ 21,500,000

**CAULKS CREEK A PUMP STATION (P-750) IMPROVEMENTS
MSD PROJECT 12248**

ENGINEERING COST BREAKDOWN

MSD CONSTRUCTION ESTIMATE & CONTINGENCIES: \$19,830,000

TOTAL FOOTAGE:	275	
EASEMENTS REQUIRED:	1	
WORKING ROOM REQUIRED:	1	
NUMBER OF PARCELS:	1	
LINEAR FEET OF WORKING ROOM/EASEMENTS:	0	
STRIP MAP		\$2,808
COST FROM SURVEY GRAPH:	\$2,558.46	
EASEMENT SEARCH:	\$250.00	
COST PER PARCEL:	\$250.00	
SURVEY		\$99,150
PER CONSTRUCTION COST:	\$99,150.00	
PERCENTAGE:	0.50%	
PER PROJECT LENGTH:	\$1,237.50	
COST PER FOOT:	\$4.50	
EASEMENTS AND LEGAL PREPARATION		\$1,000
PER EASEMENT:	\$1,000.00	
COST PER EASEMENT:	\$1,000.00	
PER PROJECT LENGTH:	\$0.00	
COST PER ESMT. FOOT:	N/A \$0.00	
GEOTECHNICAL		\$2,000
FEET PER BORING:	250	
NORMAL ACCESS:		\$0.00
LENGTH OF NORMAL ACCESS:	0	
COST PER BORING:	\$1,800.00	
TUNNELS:	0	
DIFFICULT ACCESS:		\$2,000.00
LENGTH OF DIFFICULT ACCESS:	275	
COST PER BORING:	\$2,000.00	
TUNNELS:	0	
ENGINEERING		\$793,200
PERCENTAGE OF CONSTRUCTION COST:	4.00%	
CONSTRUCTION SERVICES		\$594,900
PERCENTAGE OF CONSTRUCTION COST:	3.00%	
OTHER		\$25,000
FLOOD PLAIN STUDY	\$25,000	
SUBTOTAL		\$1,518,058
CONTINGENCIES		\$151,806
PERCENTAGE OF SUBTOTAL:	10.00%	
TOTAL		\$1,669,864

MSD ENGINEERING, LEGAL, AND ADMINISTRATION	USE:	\$1,670,000
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**Caulks Creek A Pump Station (P-750) Improvements
Project Schedule**

Date: 9/8/2017

Project Name: Caulks Creek A Pump Station (P-750) Improvements

Project Number: 12248

Scope:

Construct a pump station and rehabilitate the existing pump station and appurtenances.

Estimated Project Cost: \$21,500,000

DESIGN		MONTHS
	PRELIMINARY DESIGN	6
	PROPOSAL/DESIGN CONTRACT	2
	DESIGN STUDY/PIRR & STRIP MAPS	6
	DESIGN PLANS/SPECIFICATIONS	6
	EASEMENT/ROW ACQUISITION	12
CONSTRUCTION		
	BID/CONSTRUCTION CONTRACT	4
	CONSTRUCTION	18

pc: Bruce Litzsinger
 Jim Dunajcik
 Bonnie Hubert
 Allen Muehlher
 File
 File (Preliminary Book)
 Service Area Lead (Meier)
 Watershed Lead (Wilson)