STATE OF ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

REQUEST FOR INFORMATION (RFI)

22-VSW-MLL-038

Marshall Phase 9 Redesign
RFI 22-VSW-MLL-038

General Information about the RFI:
The State of Alaska, Department of Environmental Conservation, Division of Water, Village Safe Water (department) is issuing public notice that the department intends to enter into a single source contract with Bristol Engineering Service Company, LLC (Bristol) for a revised design plan set developed by Bristol Engineering Services LLC in 2011, to extend and repair the water and sewer system in Marshall, Alaska.

Background:
The department entered into a design and construction management contract with prime contractor Summit Consulting Service, Inc. (Summit) in 2002. Subcontractor Bristol designed the sanitation improvements, which included the Marshall Phase 9 sanitation improvements, under this contract. The Marshall Phase 9 plan set was issued for construction in 2011. The senior design engineer working on Marshall Phase 9 left around 2017

In 2018, Summit released a Preliminary Engineering Report for Marshall Phase 9, supporting a project consisting of 3,100 feet of new water main, 1,175 feet of new sewer main, 6 new water services, 45 new sewer services, 18 repaired water services, 18 repaired sewer services, 5 hydrants, and 8 manholes. The project was configured to be designed and built as four independent one-million-dollar phases to fit limited funding.

Funding was not available to construct the Marshall Phase 9 at the time plans were originally completed in 2011. In 2021, funding for construction of the entire Marshall Phase 9 scope was released and available to construct the project. The design portion of the project consists of making a video inspection of the existing mains and service lines, incorporating the necessary repairs into the 2011 plan set, verifying the remainder of the design adequately reflects the scope of the construction funding, and obtaining current permits.

The 2018 PER estimated the cost for a new design at $285,000. Cost of Bristol revising the design is estimated to be $150,000.00. This does not include the construction administration phase. The department may amend the contract if construction administration services are needed.

Factual Evidence:
The department has identified the following points that are in the State's best interest to enter into a single source with Bristol.

- Bristol completed the design of the Marshall Phase 9.
- The original plans Bristol produced can be updated without the additional re-work of field verifying underlying data or developing new drawings or repeating calculations. The work would be performed on a time and materials basis.
- The department estimates that design review will take 10 months to complete. The department

believes another firm cannot complete in this time frame.

Determination:
For the above reasons the department believes that competitively soliciting the designing services is contrary to the public's interest and that award of this single source contract is in the State's best interest.

RFI Contact Information and Deadline:
Interested parties must submit a written response by April 4, 2022, at 2 p.m. AST. Responses may be sent via email to:

Procurement Officer: April Akers Email: april.akers@alaska.gov

From 2018 PER for MARSHALL PHASE 9 (attached)

Table 7-2 from the 2018 PER shows the estimated cost assuming funding of $1,000,000 became available each year.
Table 7-1 from the 2018 PER shows the total estimated quantities.

Important Notice:
The information provided in the RFI is subject to change and is not binding. This RFI is not a contract, and a contract may not result from this RFI. All costs associated with responding will be solely at the interested party's expense. Not responding to this RFI does not preclude participation in any future RFP, if any is issued. DEC may or may not choose to meet with potential offerors to get further clarification of potential capability to meet requirements. All submissions become DEC property and will not be returned.

Preliminary Engineering Report

Phase 9 Water and Sewer Improvements

Marshall, Alaska

Prepared for: Village Safe Water

Prepared by: Summit Consulting Services

SUMMIT
CONSULTING SERVICES
Remote Project Construction
Management & Design

November 29, 2018

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ATTACHMENTS

ABBREVIATIONS

ATVs - All Terrain Vehicles

VSW - Village Safe Water

EPA - Environmental Protection Agency

FAA- Federal Aviation Administration

RAA - Rolling Annual Average

RUBA - Rural Utilities Business Advisor

O&M - Operations and Maintenance

USEPA - United States Environmental Protection Agency

ADEC - Alaska Department of Environmental Conservation

AAC - Alaska Administrative Code

ANTHC - Alaska Native Tribal Health Consortium

US - United States

SAAP - Special Appropriation Act Projects

USDA-RD - United States Department of Agriculture Rural Development

PER – Preliminary Engineering Report

PWSID – Public Water System Identification

WTP – Water Treatment Plant

WTS – Water Treatment System

WST – Water Storage Tank

ADOL – Alaska Department of Labor

DCCED – Department of Community, Commerce, and Economic Development

SNC – Significant Non-Compliance

USACE – United States Army Corps of Engineers

DAR – Design Analysis Report

CIP – Clean In Place

GVJ&A – GV Jones & Associates

BV – Bed Volume

USFS - United States Forest Service

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

1 INTRODUCTION

Functioning water and sewer are an integral part of protecting human health and supporting community life and commerce. The majority of homes in Marshall have piped water and sewer services, however there are three homes in the 2012 Subdivision that have not yet been served and are still hauling water and using honeybuckets. Extension of the existing water and sewer system is required to serve these homes and other housing scheduled for construction by AVCP Housing Authority in 2021. The useful life of portions of the existing systems in Pilcher View Subdivision has been exceeded. Due to freeze/thaw settlement and possible permafrost degradation, many services in this area require repair or replacement. The state of the existing systems poses risks to human health with exposure to raw sewage where leaks have occurred in addition to interruptions of service and significantly increased operation and maintenance costs incurred by both the City and the homeowners.

The community, in cooperation with Alaska Department of Environmental Conservation (ADEC) Village Safe Water Program (VSW), has retained Summit Consulting Services to prepare a Preliminary Engineering Report (PER) in order to obtain financial assistance for the Phase 9 Water and Sewer Improvements. Three alternatives for extension to unserved areas and for repair of the system in the Pilcher View Subdivision have been examined. The selected alternative was further broken down to propose a method of phasing the work within the project budget constraints.

This PER has been prepared in accordance with USDA-RD Rural Utilities Service's Bulletin 1780-2, dated April 4, 2013.

2 PROJECT PLANNING

2.1 Location

Marshall is located on the north bank of Poltes Slough, north of Arbor Island, on the east bank of the Yukon River in the Yukon-Kuskokwim Delta. It lies on the northeastern boundary of the Yukon Delta National Wildlife Refuge. The community lies at approximately 61.877780° North Latitude and -162.081110° (West) Longitude. (Sec. 27, T021N, R070W, Seward Meridian.) Marshall is located in the Bethel Recording District. The area encompasses 4.7 sq. miles of land and 0.0 sq. miles of water. The climate of Marshall is maritime with temperatures ranging between -54 and 86. Average annual rainfall measures 16 inches.

The proposed project lies within the Pilcher View subdivision located on the northeast side of the community. The site is developed and runs between Yukon and Allman Avenues. This PER will also include the newer 2012 subdivision which is east of the Pilcher View subdivision on Tetenik Avenue.

2.2 Environmental Resources Present

Marshall belongs to the Yukon-Kuskokwim Delta ecoregion (USGS, 2001). The following are the common characteristics for this ecoregion.

2.2.1 *Vegetation*

The primary type of vegetation found around the village of Marshall is moist tundra and dwarf shrubs. The tundra varies from nearly continuous and uniformly developed cotton grass tussocks, sometimes interspersed with sparse growth of other sedges and dwarf shrubs, to stands where tussocks are scarce or absent and dwarf shrubs dominate. Wet tundra communities consisting primarily of sedge mats, moss, and low growing shrubs predominate. Alder, willows, and scattered, stunted spruce and birch grow along the major streams (USFS, 1994).

2.2.2 *Geology, Soil conditions, Wetlands, and Hydrology*

Geomorphology:

Marshall lies within the Yukon-Kuskokwim River Delta and the topography is representative of an alluvial landmass. The region is mostly flat, with the exception of small permafrost-impacted hills interspersed between wetlands. It is situated on the boundary of two physiographic divisions: the Nulato hills to the north and the Yukon-Kuskokwim Delta to the south. The former is

characterized by rolling upland and the latter is characterized by flat, lake dotted lowland. The village is built on a high ledge on Poltes Slough. Elevation is less than 400 feet (USFS, 1994).

Lithology and Stratigraphy:

The area is considered to be blanketed by a layer of stiff, highly frost-susceptible, silt and sandy silt of varying thickness. The lowland is underlain by post–accreted Quaternary sands and silts to unknown depth. Basalt flows and cinder cones of Tertiary and Quaternary age exist. Other bedrock consists of Cenozoic sedimentary rocks with inclusions of various other assemblages (USFS, 1994).

Soil Taxa:

Dominant soils are Histic Pergelic Cryaquepts and pergelic Cryofibrists. Soils are shallow over permafrost and consistently wet (USFS, 1994). Discontinuous permafrost exists in the region, and was found to be present in land that the village is built upon.

Surface Water Characteristics:

Marshall is located on the banks of the Yukon River and extends to the east. There are no stream crossings within the village limits, rainfall intensity is low for most of the year, and individual drainage areas are small. The area surrounding the village experiences periodic flooding during the combination of spring breakup, rain and strong southerly winds. Wetlands occupy over 78 percent of the Yukon-Kuskokwim Delta area (USFS, 1994).

Wetlands: US Fish and Wildlife Service classification of wetlands in the National Wetlands Inventory excludes Marshall. Regions south of Marshall are classified with extensive areas of riverine, freshwater emergent wetland, and freshwater forested/shrub wetland (USFWS, 2017). It is likely that Marshall is comprised of these wetland types as well. U.S. Army Corps of Engineers permits will not be necessary as all alternatives include construction within the existing footprint of the roads and water/sewer mains that are existing. It is assumed any construction outside of established facilities would impact wetlands of the US and would require a Section 404 permit from the U.S. Army Corps of Engineers (USACE). A full wetland delineation would be required if impacted acreage outside the existing footprint meets Section 404 thresholds for impact.

2.2.3 *Endangered Species and Critical Habitat*

According to the US Fish and wildlife Service (USFWS) online portal, there are no endangered species, threatened species, or migratory birds expected to occur at this location. On April 2, 2018, USFWS was contacted through their electronic consultation system (consultation code: 07CAFB00-2018-SLI-0096, event code: 07CAFB00-2018-E-00281) to confirm these results. No critical habitats were identified.

2.2.4 *Fauna*

The lakes, streams, and tidal flats interspersed with tundra and sedge flats make this Section exceptional habitat for waterfowl, shorebirds, and furbearers. Tundra swans, emperor swans, black brant, Canada geese, and spectacled eiders are common to the Yukon-Kuskokwim Delta. River otters are abundant; short-tailed and least weasels are common. Limited numbers of caribou can be seen in this area. Anadromous, resident stream, and resident lake Arctic char, Sheefish, and all species of North American Pacific salmon are indigenous here on the Yukon River. Wood frogs have also been reported in the area (USFS, 1994).

2.2.5 *Cultural, Archeological, and Historic Sites*

This community has been known by several names since it was first recorded in 1880. After gold was discovered in a nearby creek in 1913, the settlement quickly became a placer mining camp and riverboat landing known as Fortuna Ledge. Later the village was named Marshall's Landing for Thomas Riley Marshall, vice president to Woodrow Wilson from 1913-1921.

Marshall is a traditional Yup'ik Eskimo village. Subsistence and fishing-related activities support most residents. Members of the Village of Ohogamiut also live in Marshall. Sale, importation, possession of alcohol are banned in the village. Marshall has a seasonal economy with most activity during the summer. Fishing, fish processing, and BLM fire-fighting positions are available seasonally. Subsistence activities supplement income. Salmon, moose, bear, and waterfowl are harvesting. Trapping provides some income.

In a report from 2007, Northern Land Use Research (NLUR) advised that there have been previous reports of graves in two locations within the community (NLUR, 2007). One of these potential grave sites lies to the east of Yukon Avenue at the corner of Yukon Avenue and Eighth Street. NLUR also recommended, while there is a low likelihood of encountering cultural resources during construction, any construction near these sites may warrant further archeological

monitoring during excavation. This would likely impact excavation near Blocks 13 and 14 of the Pilcher View Subdivision. An archeological clearance from the State Historic Preservation office (SHPO) will be obtained before any state or federally funded project is undertaken.

2.3 Population Trends

Alaska Department of Labor (ADOL) reported an estimated population of 449 in 2017 and a projected population growth of 0.9% in Bethel Census Region thus leading to a projected population of 603 persons by the end of a 30-year design life (2015)(2017).

Table 2-1 Marshall Historical Population

Year	Population	Year	Population
1880	120	**1970**	175
1890	36	**1980**	262
1900	0	**1990**	273
1910	0	**2000**	349
1920	0	**2010**	414
1930	0	**2015**	438
1940	91	**2016**	445
1950	95	**2017**	449
1960	166	**2050**	603

2.4 Community Engagement

Summit Consulting Services employees, Heather Gross and Bridget Eckhardt visited Marshall January 8-10, 2018. They met with the mayor (Joe Fitka) as well as the water treatment plant operator (Michael Duny) who both fully support this project. They also visited 11 homes and spoke with residents about improvements that they would like to see as well as to discuss Summit's preliminary plans. The residents showed full support for the project.

3 EXISTING FACILITIES

3.1 Location Map

The project area consists of two subdivisions. The older Pilcher View Subdivision spans the area of the project to the north and south; between Eighth Street and Third Street. The 2012 Subdivision was built to the east of the Pilcher View Subdivision and extends to Tetenik Street. The existing water and sewer mains and services are depicted in Attachment A of this report. A photograph log of the existing water and sewer mains and services can be found in Attachment D, Trip Report.

3.2 History

The present water and sewer mains and services in the Pilcher View Subdivision were constructed between 1990 and 1991. The water and sewer serving the rest of the community have been updated and improved throughout a 9-phase process, Pilcher View Subdivision planned for the 9th phase. Design of the water and sewer improvements was previously completed by Bristol Engineering and construction management was provided by Summit. Table 3-1 displays Summit's obligated costs for each phase of the project completed.

Table 3-1 Obligated Project Costs for All Phases

Phase	Description	Total Project Costs
1	Constructed a new landfill and acquired landfill heavy equipment	N/A
2	Lift station rehabilitation, sewer improvements, and equipment acquisition	N/A
3	Equipment storage building, water and sewer service connections to homes and heavy equipment	N/A
4	2002. Replaced 1,600 ft of water/sewer mains and rehabilitated the water treatment plant.	W/S - $825,858 S/B - $64,227 Total - $890,085
5	2003/2004. ~2000 ft of sewer main, 19 sewer services, 11 manholes	$1,420,798
6A	2004/2005/2006/2007/2008. 1675 ft water main, 10 water services, 735 ft sewer main, 7 sewer services, 4 manholes	$119,416
6B	2005. 1 new well and raw water line, replacement of 1500 ft of existing raw water line, water treatment plant improvements	$282,238
7	2670 ft of water main 35 water services, 2740 ft of sewer main and 34 sewer services, 16 manholes	7 -$1,982,217 7B - $1,686,669
8	Service to the school and teacher housing – not completed. A new school was constructed.	N/A
AVCP	3260 ft of water main and 9 water services, 2700 ft of sewer main and 9 sewer services, 9 manholes	'06 - $1,333,873 '07 - $2,241,294 Total - $3,575,167

3.3 Condition of Existing Facilities

The Pilcher View Subdivision water and sewer mains and services are maintained by the City water treatment plant operators. The Pilcher View Subdivision is served by the HUD water main loop which is 4" x 12" arctic pipe. There are currently no hydrants for flushing within the subdivision. Existing water service lines consist of 1" PEX. In-home plumbing consists primarily of copper but has been replaced with PEX where AVCP water heaters have been installed. The sewer line for the subdivision is 8" x 15" arctic pipe with 4 manholes. The manholes consist of 4 ft corrugated steel culverts with concrete bottoms insulated with spray foam (see Attachment D Trip Report). They are set above grade with concrete lids and manhole covers. The existing water and sewer mains run through the corridor between the houses of Block 9 of the Pilcher View Subdivision. The sewer line is was previously run between Lots 11 and 12 of Block 9 to connect with sewer main on Yukon Avenue. During Phase 7, a section of sewer main was installed on the west side of Tetenik Street connecting to Phase 7 sewer mains on Yukon Avenue; the sewer main from Pilcher View subdivision was connected to the new sewer main, bypassing old sewer main that runs between Lots 11 and 12 of Block 9.

3.4 Financial Status of Existing Facilities

The water and sewer utility is operated by the City of Marshall who employs an operator (Michael Duny) and a back-up operator (Thomas Fitka). A crew of additional City employees can be hired as needed for repair work. The City's fiscal year 2018 budget for the water and sewer utility is as follows (City of Marshall, 2018):

Table 3-2 City of Marshall 2018 FY Budget

Line Item	Budget Amount
Salaries	$27,600
Payroll Taxes	$2,388
Workers Compensation	$1,062
Per Diem	$558
Electricity	$23,465
Heating Fuel	$13,586
Annual Water Testing Fees	$20,000
Office Supplies/Materials	$500
Postage Supplies	$750
Water Treatment Chemicals	$1,600
Gas/Oil (Vehicles)	$500
Equipment Maintenance	$1,000

Waste Water Discharge Permit	$940
DEC Tank Farm User Fee	$725.99
SOC/OOC/Water rights Fee	$340
Operator Certification	$200
Plant Certification/Inspection	$250
Insurance/Bonding	$112.90
Miscellaneous Operating Expense	$679
Total Operating Expenses	**$96,256.89**

Total budgeted operating expenses are $96,256.89 for the fiscal year 2018 (City of Marshall, 2018). User fees are:

- Residents less than 65 years of age = $60 per month
- Residents greater than 65 years of age = $30 per month
- School = $3,500 per month
- Commercial services = $120 per month

The FY 2018 budget assumes water and sewer revenues will be $90,000. As of January, $47,137 has been paid in user fees or approximately 50% of the annual revenue seven months through the fiscal year. This supports the annual revenue assumed by the budget.

Based on this information, water and sewer revenues are short of covering projected expenses by approximately $6,000. The City also maintains a reserve account for repair and replacement expenses related to the water and sewer utility.

3.5 Water/Energy/Waste Audits

To our knowledge, water and waste audits have not been conducted. An energy audit was recently completed by the Alaska Native Tribal Health Consortium (ANTHC) in 2012. The audit includes recommendations to reduce energy consumption. Portions of these recommendations have been implemented. It is recommended that the City of Marshall continue working with the ANTHC-DEHE group and their RMW to progress on energy improvements. Implementing energy improvements is not a part of this PER.

4 NEED FOR PROJECT

4.1 Health, Sanitation, Security

Six homes and buildings within the project area have not yet been served which poses numerous health risks to residents and occupants. Residents living in these homes are required to haul water for drinking, cooking, and washing. They are also required to use honeybuckets to contain and dispose of human waste. Marshall does not operate a honeybucket haul system. Residents are therefore required to haul them by hand to a disposal pit near the wastewater lagoon. These practices pose great risk for cross contamination and increase the spread of disease.

Sewer service line separating at the 45 joint - a common issue in the Pilcher View Subdivision.

The Pilcher View subdivision is currently experiencing challenges with their water and sewer system related to the age of the system and permafrost degradation. Homes that have experienced settlement or jacking are at risk for damaged services which could lead to unreliable service as well as unsanitary conditions.

4.2 Aging Infrastructure

The Pilcher View water and sewer mains and services are approaching 30 years in age and are being impacted by a changing thermal regime. As a result the majority of service entrances are out of alignment likely due to thaw settlement or jacking. Several water services are leaking and glaciating. The operator reports grading issues resulting in reverse grade and potential jacking of at least one manhole. Video inspection of the sewer main lines and manholes is recommended to identify extent of damage. The City must respond to multiple freeze-ups and repair and an annual basis to maintain the aged services in the Pilcher View Subdivision. The operator plans on one to two major repairs per year.

Sewer service separating from the arctic box. Glaciation also apparent on the ground.

A homeowner repair to a service line that is pulling away from the arctic box.

A water leak in an arctic box causing significant glaciation.

4.3 Reasonable Growth

Phase 9 Water and Sewer Improvements will take into consideration the need to serve empty lots within the Pilcher View subdivision and the new 2012 subdivision. Within Pilcher View subdivision, there are currently 17 empty lots that may need to be served in the future. Within the 2012 subdivision there are 7 lots available. AVCP Housing authority intends to construct the next round of homes for Marshall in 2021. Per housing authority representatives, they will focus on the 2012 subdivision or lots within Blocks 11-14 of Phase 9 (AVCP, 2018). The population of Marshall is expected to rise over the next 25 years, making it likely that there will be new homes built.

5 ALTERNATIVES CONSIDERED

5.1 Description

Section 5.1.1 describes Alternative 1 which includes the construction of new water and sewer mains on Allman and Yukon Avenues (Attachment A Figure 1). Section 5.1.2 describes Alternative 2 which includes the construction of new water and sewer mains within the existing corridor between the houses in the subdivision (Attachment A Figure 2). Both Alternatives 1 and 2 include the expansion of water and sewer to the 2012 subdivision and Blocks 11 through 14 of the Pilcher View Subdivision. Section 5.1.3 deals with repairing the existing water and sewer mains in the subdivision and expanding new water and sewer mains in the remainder of the subdivision and the 2012 subdivision (Attachment A Figure 3). A no action alternative is included in Section 5.1.4.

5.1.1 *Alternative 1: New Mains and Services on Allman and Yukon Avenues*

In this alternative, existing water and sewer mains within the corridor between the Pilcher View housing would be either removed or abandoned in place. Approximately 910 LF of new sewer main would be constructed within this corridor and new services would be connected to the sewer mains on the back side of the houses. Approximately 2,520 LF of water mains would be installed on the east and west sides of the subdivision (Allman and Yukon Avenue). The main installed on Yukon Avenue would be installed parallel to existing water main from Phase 7 that serves the North loop. Water mains would be extended approximately 3,250 LF to serve the 2012 Subdivision along Tetenik Street and Blocks 11-14 of the Pilcher View subdivision. Sewer mains would be extended approximately 1,440 LF to serve the 2012 subdivision and the remaining unserved portion of the Pilcher View subdivision. This alternative would include replacing 18 service lines and providing 6 new water service lines and 5 new sewer service lines. The water services within Pilcher View Subdivision would be provided from the front of the building rather than the back.

Two flushing hydrants would be installed in the Block 9 of the Pilcher View Subdivision, one would be installed in the 2012 subdivision, and two would be installed in Blocks 11-14 of the subdivision. Ten manholes would be installed including those at corners, angle points, and, otherwise, every 200 feet. Three cleanouts will be installed at the beginning of each sewer line. Twenty-four blind sewer wyes will be installed to serve future homes.

Table 5-1 Alternative 1 New Construction Items

Item	Quantity	Unit
Water Main	5,770	LF
Sewer Main	2,350	LF
Water Services	24	EA
Sewer Services	23	EA
Blind Sewer Services	24	EA
Hydrants	5	EA
Manholes	8	EA

This alternative would allow the existing water and sewer mains to remain in operation during construction to minimize the amount of time between disconnecting services and connecting new services. This alternative would also ease the congestion of having both water and sewer running through the corridor and allow for greater distance between water and sewer mains. However, this alternative would have a greater construction footprint, require road closures, and would limit driveway access.

5.1.2 *Alternative 2: New Mains within Existing Corridor*

In this alternative, existing water and sewer mains within the corridor between the Pilcher View housing would be either removed or abandoned in place. Approximately 910 LF of new sewer main would be constructed within this corridor and new services would be connected to the sewer mains on the back side of the houses. Approximately 2,810 LF of water mains would be installed within the same corridor. The water services for this portion of the Pilcher View subdivision would be provided from the back of the house. Water mains would be extended approximately 3,300 LF to serve the 2012 Subdivision along Tetenik Street and Blocks 13 and 14 of the Pilcher View subdivision. Sewer mains would be extended approximately 1,440 LF to serve the 2012 subdivision and the remaining unserved portion of the Pilcher View subdivision. This alternative would include replacing 18 service lines and providing 6 new water service lines and 5 new sewer lines. The water services in the 2012 subdivision and Blocks 13 and 14 of the Pilcher View subdivision would be provided from the front of the building.

Two flushing hydrants would be installed in the Block 9 of the Pilcher View Subdivision, one would be installed in the 2012 subdivision, and two would be installed in Blocks 11-14 of the

subdivision. Ten manholes would be installed including those at corners, angle points, and, otherwise, every 200 feet. Three cleanouts will be installed at the beginning of each sewer line. Twenty-four blind sewer wyes will be installed to serve future homes.

Table 5-2 Alternative 2 New Construction Items

Item	Quantity	Unit
Water Main	6,110	LF
Sewer Main	2,350	LF
Water Services	24	EA
Sewer Services	23	EA
Blind Sewer Services	24	EA
Hydrants	5	EA
Manholes	8	EA

This alternative would minimize the construction impact by minimizing affected roads. It would also maintain the water and sewer services at the back of the house. However, this alternative requires approximately 340 LF more water main than Alternative 1. Constructing in this corridor between the houses in Block 9 will also be much more crowded and require precise placement of new water and sewer mains to maintain sufficient separation. Finally, this alternative will also require that the distribution and collection systems be out of service for a longer period of time.

5.1.3 *Alternative 3: Repair and Extend Existing System*

In this alternative, existing water and sewer systems would be repaired to the extent possible within the Pilcher View Subdivision and extended to the unserved area and 2012 Subdivision.

Mr. Duny, the operator, reports that consumption from the HUD water loop has been consistent for years at around 3,000 to 4,000 gallons per day. He does not believe that the 4 inch water main is leaking. The water service lines do have operational problems and require frequent repair—either from freeze-ups at the arctic box that damage the valves or due to settlement/jacking of the service line. Issues typically occur at the fitting where the service line enters the ground and changes grade.

One of the manholes has reverse grade and backs up. The integrity of the manholes and the remaining sewer main is otherwise unknown. A camera could be used to identify areas of

subsidence or breakage, however, it is likely that repair of the service lines and regrading would require excavation of most of the line anyway. The same style of manhole (culvert manholes with a poured concrete bottom) was encountered during construction of sewer upgrades in previous phases. Some of the decommissioned manholes were found to be heavily damaged including complete separation of the culvert from the concrete base. These systems were functioning as far as moving wastewater from the homes but were also leaking and prone to failures.

Based on the feedback from the operator, the January 2018 site investigation, and previous upgrade work in Marshall, it is not possible to accurately quantify the scope of work necessary to repair the Pilcher View Subdivision system. It is apparent that the arctic boxes and the service lines require repair to include a new design that will allow for the movement of the houses. It is assumed that the sewer main and services will require re-grading to include new bedding. And, it is recommended that flush hydrants be installed on the water main. The cost estimate for Alternative 3 includes an assumption that 20% of the pipe will need to be replaced. A camera survey of the sewer system could provide a more accurate estimate of the extent of repair required.

Alternative 3 also includes the extension of water mains approximately 3,560 LF to serve the 2012 Subdivision along Tetenik Street and Blocks 13 and 14 of the Pilcher View subdivision. Sewer mains would be extended approximately 1,440 LF to serve the 2012 subdivision and the remaining unserved portion of the Pilcher View subdivision.

This alternative would include repairing or replacing 18 service lines and provide 6 new water service lines and 5 new sewer service lines. The water services in the 2012 subdivision and Blocks 13 and 14 of the Pilcher View subdivision would be provided from the front of the building.

Two flushing hydrants would be installed in the Block 9 of the Pilcher View Subdivision, one would be installed in the 2012 subdivision, and two would be installed in Blocks 11-14 of the subdivision. Five new manholes would be installed including those at corners, angle points, and, otherwise, every 200 feet. Three cleanouts will be installed at the beginning of each sewer line. Twenty-four blind sewer wyes will be installed to serve future homes.

Table 5-3 Alternative 3 New Construction Items

Item	Quantity	Unit
New Water Main	3,560	LF
New Sewer Main	1,440	LF
New Water Services	6	EA
New Sewer Services	5	EA
Blind Sewer Services	24	EA
Hydrants	5	EA
Manholes	8	EA
Repaired Water Services	18	EA
Repaired Sewer Services	18	EA

This alternative would require the smallest construction footprint and have the least impact on access during construction. It would also require the shortest interruption in service to the homes. However, this alternative will require physical investigation of the existing mains to ensure they will function with minimal repair and require minimal replacements.

5.1.4 *Alternative 4: Do Nothing*

This alternative would include no repair or replacement work for the services and mains in Pilcher View Subdivision. This aging system will continue to deteriorate until repairs can no longer be made locally. Settlement and heaving of services will continue to damage lines increasing the frequency of freeze-ups and leakage. The 2012 subdivision and empty lots of the expansion area would remain unserved. Existing homes would continue to use honeybuckets and haul water. Future planned homes constructed by AVCP would also be on a honeybucket haul system. This alternative does not improve the health and welfare of the residents and is not recommended.

5.2 Design Criteria

Design criteria applicable to the water and sewer improvements include expected water use and wastewater generation on the HUD loop. The design also requires consideration of the distribution pump that serves the HUD loop and ensuring that each alternative does not exceed the capacity of the pump.

5.2.1 *Capacity Demands*

Table 5-4 identifies water consumption and wastewater production rates.

Table 5-4 Marshall Water Consumption and Wastewater Production Assumptions

Assumptions	
Per Capita Water Consumption	70 gal/capita/day (Smith, et al., 1979)
Per Capita Wastewater Generation	65-80 gal/capita/day (Telford, 2015)
Current HUD Loop Water Consumption	~3540 gal/day (ANTHC-DEHE, 2012) ~3,000 – 4,000 gal/day (Mike Duny, WTP Operator)
Household Size	2.83 people per household in Alaska (2012-2016) (US Census Bureau, 2016)
# of New Homes	30 Homes (there are 24 empty lots that could be developed and 6 new services to be installed)

Using the assumptions above, if homes were built on all empty lots within Picher View and 2012 Subdivisions, the water distribution system needs to be capable of handling a demand of approximately 10,000 gallons/day of potable water. The proposed sewer system would need to be capable of handling flows of approximately 10,000 gallons/day of wastewater.

5.2.2 *Distribution Pump Capacity*

The existing distribution pump that serves the HUD Loop is a Goulds 4SF 1 ½ x 2 ½ - 6 1 HP End Suction Centrifugal Pump. The system curves and the pump curves are shown in Attachment E for each alternative. The impeller size of the pump is unknown and therefore both options for the pump curves are included. Alternatives 1 and 2 will not impose additional head on the current pump. Alternative 3 will slightly increase the system head curves; however, they are still within the range of the existing circulation pumps. These pumps will be sufficient for all alternatives.

5.2.3 *Permafrost*

The design and construction of water and sewer improvements in the Pilcher View Subdivision must take into consideration the presence of permafrost and ways to mitigate permafrost degradation. Permafrost has been encountered during well drilling and other excavations in the area. Some encounters to the south of the subdivision have reported permafrost between 3 and 7 feet to the top of permafrost extending as deep as 135 feet. During wetland delineation work completed for permitting of the new wastewater lagoon, hand pits were dug on the hillside near the existing multipurpose facility and in the vicinity of the 2012 Subdivision. The active layer identified during this work was 14.5 inches.

5.3 Map

The proposed alternatives and specifications for the water and sewer improvements can be found in Attachment A.

5.4 Environmental Impacts

Precautions will be taken to minimize any potential impacts on the environment through all stages of the project. All necessary ADEC permits and archaeology permits for the proposed water and sewer improvements will be obtained during the design development stage of the project. This project will occur within the existing footprint of the Pilcher View subdivision which has already been developed; therefore, no adverse impacts on the environment are expected.

5.5 Land Requirements

The proposed water and sewer improvement site is located on the land owned by the City of Marshall. No unique land requirements exist.

5.6 Potential Construction Problems

Infrastructure construction in Marshall poses similar challenges as other remote communities in Alaska, including remote location, challenging procurement and mobilization issues, and a limited workforce. The existing EX220 excavator is in poor shape and will require significant repair. An additional excavator is required for efficient construction, preferably an EX300 class with reach and capacity for setting manholes and mainline work. The smaller excavator can be used for service lines. Onsite dump trucks are adequate.

All proposed alternatives may temporarily limit access to homes, buildings, and roads within the discussed subdivisions.

5.7 Sustainability Considerations

5.7.1 *Water and Energy Efficiency*

Replacement of water mains would likely increase water efficiency by eliminating any leaks that may exist in the current mains. New arctic pipe installation would also likely increase energy efficiency by limiting the duration of time for which heat tape is needed to keep the lines from freezing.

5.7.2 *Green Infrastructure*

Not applicable.

5.7.3 *Other*

New water and sewer mains and services will encourage local residents to maintain their plumbing and services.

5.8 Cost Estimates

The following describes estimated construction and O&M costs for Alternatives 1 through 4. These costs are tabulated by considering the most efficient course of action for equipment procurement and repair as well as project scheduling. This method allows a straightforward comparison between alternatives.

5.8.1 *Construction Cost Estimate*

The estimated construction costs for Alternatives 1 through 4 are listed in Table 5-6.

Table 5-5 Construction Cost Estimates

Site	Capital Costs ($)
Alternative 1	4,782,800
Alternative 2	4,516,100
Alternative 3	3,565,600
Alternative 4	0

Refer to Attachment B for a detailed breakdown of the costs listed above.

5.8.2 *Annual O&M*

Estimates for annual O&M costs are included in table 5-6. These costs are based on the existing budget for the water and sewer utility. As discussed in the financial section of this report, it appears the community closely tracks and projects utility costs which nearly balances with revenue. An estimate of the annual expenses for repair to water and sewer services in the Pilcher View subdivision was made by consultation with the operator and Mayor. The projected O&M costs for Alternatives 1 through 3 assume the utility no longer pays for multiple service line repairs every year.

Table 5-6 O&M Cost Estimates

Site	O&M Costs ($)
Alternative 1	$93,453
Alternative 2	$93,453
Alternative 3	$93,453
Alternative 4	$96,257

6 SELECTION OF AN ALTERNATIVE

6.1 Life Cycle cost Analysis

Life cycle analyses were developed for the "No-Action" Alternative 4, however, this alternative is not recommended because it does not protect public health, and does not provide for an operable or safe water distribution or sewage collection system. For a life cycle cost analysis on Alternative 4, refer to Attachment B. For more information on the life cycle analyses for Alternatives 1 through 3, also refer to Attachment B.

Table 6-1 Life Cycle Cost Estimates

Alternative	Annual O&M Cost	Life Cycle Cost (Present Value)
Alternative 1	$93,453	**$7,266,500**
Alternative 2	$93,453	**$7,000,000**
Alternative 3	$93,453	**$6,049,300**

Based on this analysis, Alternative 3 is the lowest cost alternative of the three considered.

6.2 Non-Monetary Factors

The location of service lines may have an impact on how space around the buildings is used. Other considerations include ease of access and maintenance of new water and sewer mains. The proximity of the installation of new water and sewer mains to other mains will impact the ease of installation, access, and repair in the future. Proximity of installation of water mains to sewer mains will also be taken into consideration in order to comply with 18 AAC 80.020(f)(3).

7 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

The recommendation of this report is to proceed with Alternative 3, which entails repairing the existing water and sewer main and services, and extending the water and sewer mains to Blocks 11 through 14 of the Pilcher View Subdivision and to the 2012 subdivision. This recommendation has been made based on the knowledge Summit has gathered thus far and would require further investigation before proceeding. The extent of mains and services needed to be replaced is unknown at this time and would require excavation and video of the sewer main to confirm the state of the existing mains. This alternative is recommended due to its low cost compared to Alternatives 1 and 2 and due to the expectancy that existing water and sewer mains have been well maintained and will continue to function and serve the Pilcher View subdivision for another 30 years.

We conservatively assume this project will be impacted by the presence of permafrost in the parts of the subdivision that are newly served and will take into consideration design and repair of services such that the services will withstand movement due to settlement and jacking. Reasonable precautions will be taken to minimize further degradation of permafrost.

7.1 Preliminary Project Design

A preliminary design of the proposed water and sewer improvements are provided in Attachment A Figure 3 and includes extending water and sewer service to the 2012 Subdivision and Blocks 13/14, replacing services in the Pilcher View Subdivision, and repairing the existing sewer mains.

Funding for this project is available from USDA/RD in $1,000,000 increments. Essentially, each year the project is funded, it must design, permit, procure, and construct a completed and functional system. Modifications to the extent of service (design) and scheduling is needed to accommodate this requirement. Reference Section 7.2 for proposed phasing. Two modifications were required to the design:

1. The 2012 Subdivision is served in a different phase than Blocks 13/14. Therefore, a 230 LF section of water main that will be later abandoned is required to complete the loop for a year.
2. Preliminary design included an extension of the water and sewer mains and blind wyes in the 2012 Subdivision to serve future homes. This has been removed and this phase of work includes only the main required to serve the existing homes. Blind wyes for empty lots will not be installed. Other funds will be required for extension when the Housing Authority places homes on these lots (scheduled for 2021).

A preliminary calculation of the quantities needed to install the new water and sewer mains and services are provided in the cost estimate in Attachment C and re-tabulated in Table 7-1.

Table 7-1 Alternative 3 New Construction Items

Item	Quantity	Unit
New Water Main	3,100	LF
New Sewer Main	1,175	LF
New Water Services	6	EA
New Sewer Services	5	EA
Repaired Water Services	18	EA
Repaired Sewer Services	18	EA
Blind Sewer Services	0	EA
Hydrants	5	EA
Manholes	8	EA

7.2 Project Schedule

Each phase of construction represents one year of work. Every phase includes a separate design and permitting process. The anticipated start date for each Phase to begin design would be November of the year prior. This will allow time to complete design, permitting, and procurement for a spring barge mobilization.

Proposed phasing includes:

- Phase 1, 2019: On the ground work has not occurred in Marshall for several years. The project camp and all equipment is in need of repair before new work can begin. Therefore the first year will include increased Division 1 costs including the procurement of a 30-35 ton excavator. Also included in the first year of work will be an investigation of the sewer main in Pilcher View Subdivision to verify the assumptions made in this report. This investigation will use a camera to record the conditions of the manholes and reported reverse grade areas. This time will also be used to complete a detailed take-off of all materials required for service line replacements. Construction work will include Phase A of the Pilcher View Subdivision (see Attachment A, Figure 4). Four service lines will be replaced, 250 LF of sewer main will be re-graded, one cleanout repaired or replaced as necessary, one manhole replaced, and one hydrant installed.

- Phase 2, 2020: It is then recommended to shift work to the 2012 Subdivision to serve homes now on honeybuckets and haul water. Proposed improvements include approximately 1,400 LF of water main, 675 LF of sewer main, and 3 house services.
- Phase 3, 2021: Complete the remaining repairs with the Pilcher View Subdivision. This includes repairing the services on 14 homes, repair of 700 LF of sewer main, installation of 3 manholes, and installation of one hydrant.
- Phase 4, 2022: Extend service to Blocks 13 and 14. This will include 1,700 LF of water main, 500 LF of sewer main, 3 water services, 2 sewer services, 2 hydrant installations and one manhole installation. Phase 4 will also likely include the need for an archeological monitor during ground disturbing activities.

7.3 Permit Requirements

Plansets and sepcifications for modification and extension of the existing piped distribution system will need to submitted to ADEC Drinking Water Program for an Engineering Plan Review—in this scenario—on an annual basis. An Approval to Operate will be requested annually.

Other permit work will include:

- Work near reported gravesites in Block 13 and 14 will require a SHPO approved monitoring plan and archeological monitor onsite.
- An ACOE 401c permit will be required wetland disturbance.
- Material sales agreements from Calista will be required for access to borrow sites.
- An APDES permit will be obtained and associated SWPPP will be developed.

7.4 Sustainability Considerations

See discussion in Section 5.7.

7.5 Total Project Cost Estimate (Engineer's Opinion of Probable Cost)

Table 7-2 summarizes the costs expected to be incurred during the design and construction of the water and sewer improvements assuming the recommended alternative and required phasing. Refer to Attachment B for a detailed cost estimate of the recommended alternative.

Table 7-2. Alternative 3 Cost Estimate

Description	Phase 1, 2019	Phase 2, 2020	Phase 3, 2021	Phase 4, 2022
Water Distribution Main	$13,550	$153,092	$13,550	$195,086
Water Service Line	$39,061	$68,069	$119,186	$52,599
Sewer Main	$32,211	$144,571	$72,838	$96,646
Sewer Service Line	$61,774	$45,502	$210,093	$30,140
Construction Management	$154,000	$104,000	$119,000	$124,000
Engineering & Design	$150,000	$35,000	$50,000	$50,000
Mobilization/Demobilization	$94,381	$73,452	$50,549	$58,220
General Conditions	$216,093	$325,046	$297,070	$302,079
Miscellaneous Utilities	$18,036	$27,320	$23,879	$26,802
Equipment Procurement	$202,000			
Total Annual Cost (w/inflation)	$981,107	$999,375	$996,194	$996,384
Total Project Cost*				**$3,973,060**

**See Attachment C for assumptions. These estimates do not include EMT or contingency.*

7.6 Annual Operating Budget

7.6.1 *Income*

Section 3.4 addresses the current fees associated with water and sewer services in the City of Marshall. The City collects residential, school, and commercial fees on a monthly basis. According to the 2018 budget, these fees do not cover all costs for operation of the water treatment and distribution systems and for the sewage collection system; however, the water and sewer improvements are expected to reduce the operating budget. The budget includes, but is not limited to: salaries, electricity, heating fuel, annual water testing fees, water treatment chemicals, equipment maintenance, and operator certification. This project may increase the City's revenue by adding 3 residential and 3 commercial services, not including the planned new housing.

7.6.2 *Annual O&M Costs*

Annual O&M costs are not expected to increase substantially. Additional heat will be required to keep the longer water main thawed. However, this increase will be offset by the increase in revenue and the decrease in repair costs the City is now experiencing. O&M costs are tabulated in Table 5-6 and Attachment B.

7.6.3 *Debt Repayments*

This project is assumed to be funded by grants. Loans are not anticipated to finance these improvements. Therefore, debt repayments are not anticipated.

7.6.4 *Reserves*

Loans will not be used to finance these improvements. Existing short-lived assets are currently included in the overall City budget.

8 CONCLUSIONS AND RECOMMENDATIONS

Alternative 3, repairing the existing water and sewer mains in the Pilcher View Subdivision and extending them to the unserved portions of the subdivision, is the most feasible alternative. These improvements will also minimize alignment and grade issues, provide water and sewer to unserved homes, and allow for growth of the community.

It is strongly recommended that the condition of the existing mains is inspected thoroughly prior to design and construction. Final selection of this alternative will rely upon excavation and video inspections of the water and sewer mains to determine their integrity.

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Attachment A

Figures

FIGURE 1

DATE: 11/01/17
DRAWN BY: JK
CHECKED BY: HG
SCALE: AS NOTED

CITY OF MARSHALL
PHASE 9 PLANNED WORK
ALTERNATIVE 1

PHASE 9B
PHASE 9A
PHASE 7
PHASE 4
PHASE 5
PHASE 6
PHASE A/CP
WATER TREATMENT PLANT
LAYDOWN PAD AND CONSTRUCTION CAMP
NEW WELL INSTALLED 2003
NORTH LIFT STATION
BASIS OF COORDINATES
SOUTH LIFT STATION
Poltes Slough (YUKON RIVER)
ALLMAN AVENUE
YUKON AVENUE
POLTES AVENUE
AIRPORT ROAD
NINTH STREET
EIGHTH STREET
SEVENTH STREET
SIXTH STREET
FIFTH STREET
FOURTH STREET
FIRST STREET
FORTUNA STREET
AIRPORT ISLAND STREET
TETONKA STREET

1 SITE MAP
SCALE: SHOWN

200 0 100 200
HORIZONTAL SCALE IN FEET

CENTER COMMUNITY
2000/2001 WELL INSTALLED
CLINIC
2012 SUBDIVISION
HEADSTART
PLAT 83-49 PILCHER VIEW SUBD. 2
PLAT 91-10 PILCHER VIEW SUBD. 3
TRACT C
(STATE) USS 2264
SCHOOL

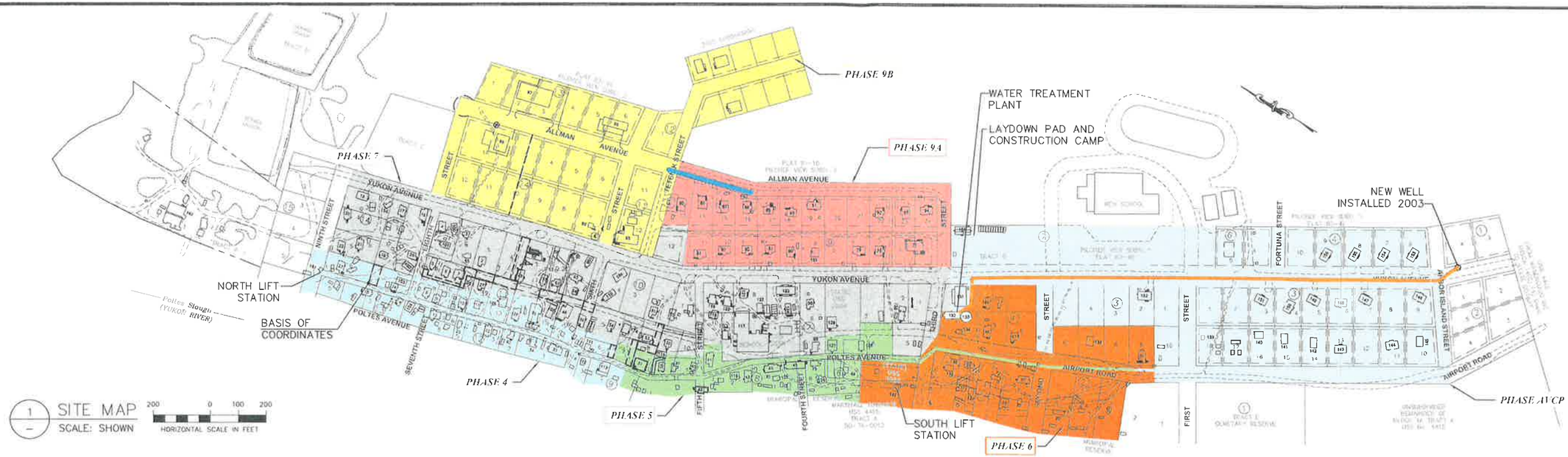
LEGEND

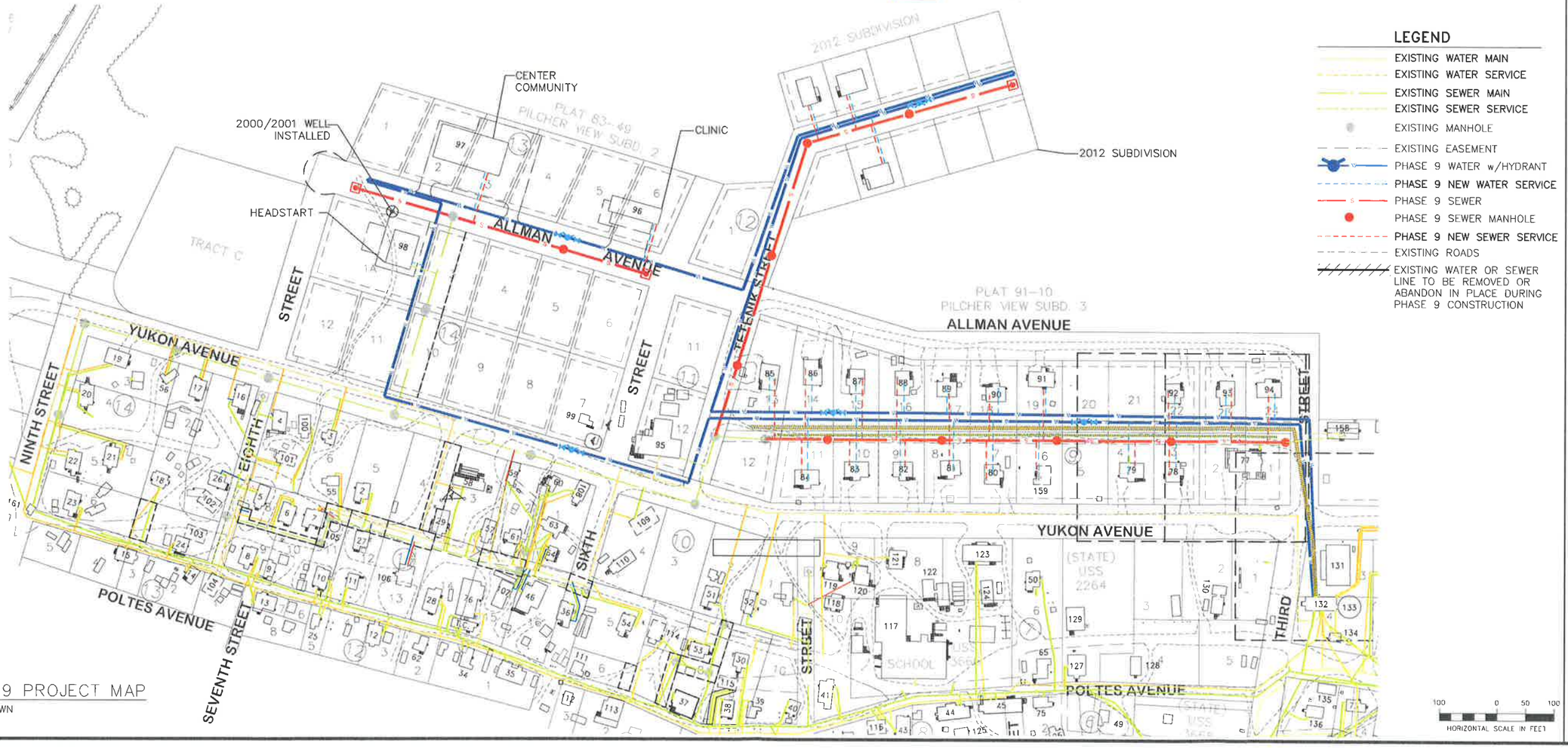
- EXISTING WATER MAIN
- EXISTING WATER SERVICE
- EXISTING SEWER MAIN
- EXISTING SEWER SERVICE
- EXISTING MANHOLE
- EXISTING EASEMENT
- PHASE 9 WATER w/HYDRANT
- PHASE 9 NEW WATER SERVICE
- PHASE 9 SEWER
- PHASE 9 SEWER MANHOLE
- PHASE 9 NEW SEWER SERVICE
- EXISTING ROADS
- EXISTING WATER OR SEWER LINE TO BE REMOVED OR ABANDON IN PLACE DURING PHASE 9 CONSTRUCTION

2 PHASE 9 PROJECT MAP
SCALE: SHOWN

100 0 50 100
HORIZONTAL SCALE IN FEET

SUMMIT
CONSULTING SERVICES Inc.





LEGEND

- EXISTING WATER MAIN
- EXISTING WATER SERVICE
- EXISTING SEWER MAIN
- EXISTING SEWER SERVICE
- EXISTING MANHOLE
- EXISTING EASEMENT
- PHASE 9 WATER w/HYDRANT
- PHASE 9 NEW WATER SERVICE
- PHASE 9 SEWER
- PHASE 9 SEWER MANHOLE
- PHASE 9 NEW SEWER SERVICE
- EXISTING ROADS
- EXISTING WATER OR SEWER LINE TO BE REMOVED OR ABANDON IN PLACE DURING PHASE 9 CONSTRUCTION

FIGURE 1

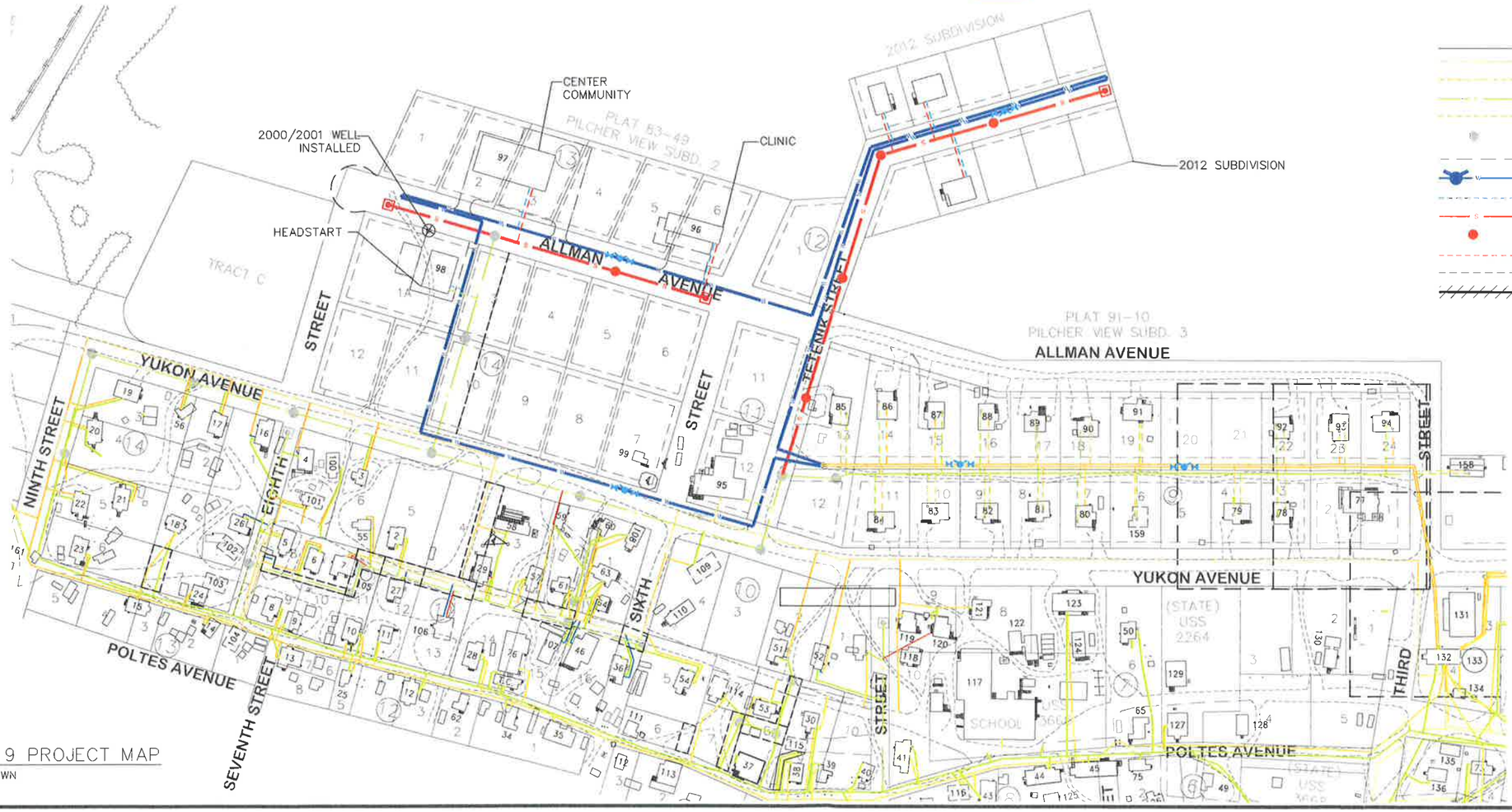
DATE: 11/01/17
DRAWN BY: JK
CHECKED BY: HG
SCALE: AS NOTED

CITY OF MARSHALL
PHASE 9 PLANNED WORK
ALTERNATIVE 2

SUMMIT
CONSULTING SERVICES Inc.

1 SITE MAP
SCALE: SHOWN

200 0 100 200
HORIZONTAL SCALE IN FEET



2 PHASE 9 PROJECT MAP
SCALE: SHOWN

100 0 50 100
HORIZONTAL SCALE IN FEET

LEGEND

- EXISTING WATER MAIN
- EXISTING WATER SERVICE
- EXISTING SEWER MAIN
- EXISTING SEWER SERVICE
- EXISTING MANHOLE
- EXISTING EASEMENT
- PHASE 9 WATER w/HYDRANT
- PHASE 9 NEW WATER SERVICE
- PHASE 9 SEWER
- PHASE 9 SEWER MANHOLE
- PHASE 9 NEW SEWER SERVICE
- EXISTING ROADS
- EXISTING WATER OR SEWER LINE TO BE REMOVED OR ABANDON IN PLACE DURING PHASE 9 CONSTRUCTION

FIGURE 1

DATE: 11/01/17
DRAWN BY: JK
CHECKED BY: HG
SCALE: AS NOTED

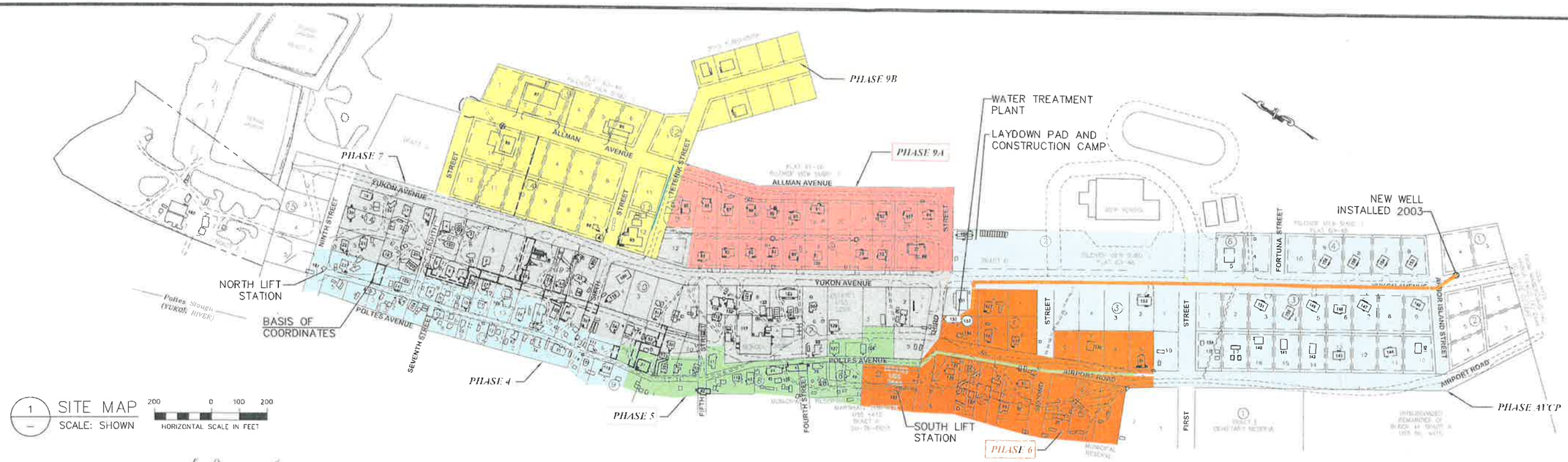
CITY OF MARSHALL
PHASE 9 PLANNED WORK
ALTERNATIVE 3

SUMMIT
CONSULTING SERVICES Inc.

FIGURE 4

DATE: 09/28/18
DRAWN BY: JK
CHECKED BY: HG
SCALE: AS NOTED

CITY OF MARSHALL
ALTERNATIVE 3 PHASING



1 — SITE MAP
SCALE: SHOWN

200 0 100 200
HORIZONTAL SCALE IN FEET

2 — PHASE 9 PROJECT MAP
SCALE: SHOWN

100 0 50 100
HORIZONTAL SCALE IN FEET

LEGEND

- EXISTING WATER
- EXISTING SEWER
- EXISTING MANHOLE
- EXISTING EASEMENT
- PHASE 9 WATER w/HYDRANT
- PHASE 9 SEWER
- PHASE 9 SEWER MANHOLE
- EXISTING ROADS
- EXISTING WATER OR SEWER LINE TO BE REMOVED OR ABANDON IN PLACE DURING PHASE 9 CONSTRUCTION

SUMMIT
CONSULTING SERVICES Inc.

Attachment B

Cost Estimates

Alternatives 1, 2 and 3

Operations & Maintenance Cost Estimates

Life Cycle Cost Estimates

City of Marshall
2018 Phase 9 Cost Estimate - PER Alternative 1

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	5,770	Lft.	$112	**$647,178**
2	W-BL	Water Service Line	1,800	Lft.	$294	**$528,743**
4	S-BC	Sewer Main	2,350	Lft.	$215	**$505,997**
3	S-BL	Sewer Service Line	2,000	Lft.	$189	**$378,585**

Construction Subtotal: **$2,060,504**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$604,000**
8		Engineering & Design Services	**$200,000**
9		Mobilization / Demobilization	**$334,662**
10		General Conditions	**$1,269,339**
11	M-UI	Miscellaneous Utilities	**$112,258**
12	EQP	Equipment Procurement	**$202,000**
		Other Direct Cost Subtotal:	**$2,722,259**
		2018 Total Cost:	**$4,782,762**
		plus 4% 2019 Total Cost:	**$4,974,073**

Assumptions

1. Primary project materials are procured and mobilized in 2019.
2. Construction occurs in 2019 and 2020
3. Archeological monitoring will be required for portions of Phase 9 in areas near gravesites.
4. 5770 LF of new water main, 1800 LF of new water service, and 24 new water services are constructed.
5. 2350 LF of new sewer main, 2000 LF of new sewer service, and 23 new sewer services are constructed.
6. Upgrades to the water treatment plant equipment are not required.
7. No in home plumbing is required.
8. Existing arctic boxes to be replaced.
9.
10.
11.

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
G-CM	1025	CM Svcs & Eng. Support	100	%												$600,000	$600,000	
M-DS	1370	Engineering & Design	100	%												$200,000	$200,000	
G-GC	1028	Archeological Services	100	%												$30,000	$30,000	
G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	2,826	Cwt	$95		0.15	424	30	$19,076				$268,475			$287,551	
G-GC	1036	Material Handling & Inventory	3,140	Cwt			0.1	314	30	$14,130							$14,130	
G-GC	1040	Field Superintendent	40	Wks.			66	2,640		$205,920							$205,920	
G-GC	1042	Field General Foreman	40	Wks.			60	2,400		$156,000							$156,000	
G-GC	1045	Job Clerk	40	Wks.			24	960		$26,880							$26,880	
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	1,120	Dys	$36									$40,320			$40,320	
G-GC	1060	Subsistence	280	Dys	$36									$10,080			$10,080	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	10	Mo.	$2,000									$20,000			$20,000	
MUI	1090	Telephone & Star Band Svcs.	10	Mo.	$450									$4,500			$4,500	
G-GC	1130	Air Charters	10	Mo.	$200									$2,000			$2,000	
G-GC	1140	Air Travel - Super	4	Rt.	$1,200		16	64		$4,480				$4,800			$9,280	
G-GC	1145	Air Travel--Contract Labor	10	Rt.	$1,000		16	160		$10,400				$10,000			$20,400	
F-RT	1150	Air Freight - Mobilization	314	Cwt	$110		0.1	31	20	$1,570				$34,541			$36,111	
G-GC	1160	Air Freight - Course of const.	10	Mo.	$3,500		10	100		$5,000				$35,000			$40,000	
G-GC	1180	Safety & Cleanup	40	Wks.	$400		10	400		$16,000				$16,000			$32,000	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent ~ City owned	10	Mo.	$5,000								$50,000				$50,000	
G-GC	1300	Equipment Parts @ City owned	678	Eqhrs	$22	3					$14,925			$14			$14,938	2,035
G-GC	1305	Equip. Maint.Labor @ City equip.	1,357	Eqhrs			0.5	678		$37,990				$27			$38,018	
G-GC	1310	Equipment Parts @ Project	6,106	Eqhrs	$15	2.7419					$91,584			$122			$91,706	16,741
G-GC	1315	Equip.Maint.Labor ~ Project	6,106	Eqhrs			0.4	2,442	job	$122,112							$122,112	
G-GC	1320	F.O.G.	27,136	Gal.	$6.0	0.25	0.03	814		$40,704				$162,816			$203,520	6,784
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345	Equipment Purchase (30-35 ton excavat	1	Ea.	$200,000							$200,000		$2,000			$202,000	70,000
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	1,443,954	Lbr$	$0									$57,758			$57,758	
MUI	1435	Insurance @ Rental Equipment	10	Mo.	$3,000									$30,000			$30,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		1	200		$10,000				$1,000			$11,000	
G-GC	1490	Workers Compensation Estimated	1,443,954	Lbr$	$0									$111,434			$111,434	
G-GC	1492	Project Accounting Services	10	Mo.	$1,800									$18,000			$18,000	
G-GC	1494																	
		Sheet Totals						11,708	80	$673,863	$106,509	$200,000	$55,000	$856,887		$830,000	$2,722,259	97,160

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010							0		$0				$0	$0		$0	0
M-IM	2012							0		$0				$0	$0		$0	0
M-IM	2014							0		$0				$0	$0		$0	0
M-IR	2016							0		$0				$0	$0		$0	0
W-BL	2018	Water Serv. - Curb Stops	24	Ea.	$2,500	150	20	480	100	$21,120				$317	$60,000		$81,437	3,600
W-BD	2020	Water Main - Grade Checking & As-building	5,770	Lf.	$0.1	0.05	0.05	289		$12,694				$190	$577		$13,461	289
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	5,770	Lf.	$3		0.1	577	384	$25,388				$381	$17,310		$43,079	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	5,770	Lf.	$4	0.75	0.25	1,443	600	$63,470				$952	$23,080		$87,502	4,328
W-BD	2026	Water Main - Right of way prep	5,770	Lf.			0.02	115	60	$5,078				$0			$5,078	0
W-BD	2028	Water Main - 6" HDPE	5,770	Lf.	$48	10	0.25	1,443	600	$63,470				$952	$276,960		$341,382	57,700
W-BD	2030	Water Main - 6" arctic pipe fittings & related	28	Ea.	$900	45	10	280	100	$12,600				$189	$25,200		$37,989	1,260
W-BD	2032	Water Main - 1.25" HDPE Heat Trace	5,770	Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	5	Ea.	$5,000	1,000	30	150	50	$6,750				$101	$25,000		$31,851	5,000
W-BD	2036	Water Main - Pipe Joint Kits	360	Ea.	$170	25	1	360		$16,200				$243	$61,200		$77,643	9,000
W-BD	2038	Water Main - Test & Sanitize	5,770	Lf.	$0.3		0.02	115		$5,193				$2,000	2000		$9,193	0
W-BL	2040	Water Serv. - Grade Checking & As-building	1,800	Lf.	$0.1	0.05	0.06	108		$4,860				$972	$180		$6,012	90
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.	1,800	Lf.	$1		0.25	450	450	$20,250				$304	$1,800		$22,354	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric	1,800	Lf.	$4	0.75	0.25	450	200	$20,250				$304	$7,200		$27,754	1,350
W-BL	2046	Water Serv. - Right of way prep	1,800	Lf.	$0.50		0.05	90	40	$4,050				$900			$4,950	0
W-BL	2048	Water Serv. - Saddles & Clam Shells	24	Ea.	$1,000	100	10	240	100	$10,800				$1,080	$24,000		$35,880	2,400
W-BL	2050	Water Serv. - Carrier - 4" HDPE	1,800	Lf.	$45	8	0.49	882	400	$39,690				$595	$81,000		$121,285	14,400
W-BL	2052	Water Serv - 4" arctic pipe fittings & related	100	Ea.	$800	30	2	200	60	$9,000				$135	$80,000		$89,135	3,000
W-BL	2054	Water Serv - Pipe Joint Kits	200	Ea.	$110	10	1	200		$9,000				$135	$21,952		$31,087	2,000
W-BL	2056	Water Serv - sup/ret lines - 1" A'pex	3,600	Lf.	$1.25	0.2	0.05	180		$8,100				$122	$4,500		$12,722	720
W-BL	2058	Water Serv - Heat Trace	2,300	Lf.	$6.00	0.05	0.047	108		$4,865				$73	$13,800		$18,737	115
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	24	Ea.	$400	25	5	120		$5,400				$81	$9,600		$15,081	600
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	2,350	Lf.	$0.10	0.05	0.13	306		$13,748				$206	$235		$14,189	118
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	2,350	Lf.	$3		0.22	517	550	$23,265				$349	$7,050		$30,664	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	2,350	Lf.	$4	0.75	0.25	588	300	$26,438				$397	$9,400		$36,234	1,763
S-BC	2070	Sewer Main - Right of way prep	2,350	Lf.			0.05	118	80	$5,288				$79	$0		$5,367	0
S-BC	2072	Sewer Main - 8" HDPE	2,350	Lf.	$70	15	0.7	1,645	400	$74,025				$1,110	$164,500		$239,635	35,250
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes	47	Ea.	$1,000	60	8	376	100	$16,920				$254	$47,000		$64,174	2,820
S-BC	2076	Sewer Main - Joint Kits	215	Ea.	$150	20	1	215		$9,675				$145	$32,250		$42,070	4,300
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	8	Ea.	$5,000	5000	60	480	120	$21,600				$324	$40,000		$61,924	40,000
S-BC	2080	Sewer Main - Cleanouts & Related	3	Ea.	$1,500	150	20	60	30	$2,700				$41	$4,500		$7,241	450
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	1,725	Lf.	$0.10	0.05	0.06	104		$4,658				$326	$173		$5,156	86
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	1,725	Lf.	$1		0.25	431	500	$19,406				$291	$1,725		$21,422	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	1,725	Lf.	$4	0.75	0.25	431	300	$19,406				$291	$6,900		$26,597	1,294
S-BL	2090	Sewer Serv. - Right of way prep	1,725	Lf.	$0.50		0.05	86	60	$3,881				$863			$4,744	0
S-BL	2092	Sewer Service Line - 4" HDPE	1,725	Lf.	$45	8	0.49	845	400	$38,036				$571	$77,625		$116,232	13,800
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	120	Ea.	$800	30	2	240	100	$10,800				$162	$96,000		$106,962	3,600
S-BL	2096	Sewer Service - Joint Kits	200	Ea.	$110	10	1	200		$9,000				$135	$22,000		$31,135	2,000
S-BL	2098	Sewer Service - Heat Trace		Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	23	Ea.	$45	12	5	115		$5,175				$78	$1,035		$6,288	276
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						15275	6284	$683,047	$0	$0	$0	$17,087	$1,245,752	$0	$1,945,886	211,607

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-III	5012	Arctic Box Hardware	83	Ea	$25	10	2	166		$7,304	$0	$0	$0	$730	$2,075		$10,109	830
		Sheet Totals						166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830

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																	$0	0
C-IH	6082	House A, Box - Lumber & Related	83	Ea.	$100.00	40	8	664		$29,216				$730	$8,300		$38,246	3,320
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

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C-IH	7010	House A. Boxes WX Stripping	83	Ea	$20	1.0	1	83		$3,652				$91	$1,660		$5,403	83
C-IH	7012	House A. Boxes Insulation & Sealants	83	Ea	$80	8.0	6	498		$21,912				$548	$6,640		$29,100	664
																		0
																		0
		Sheet Totals						581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

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	15100	House Rehab & Plumbing						0		$0				$0	$0		$0	0
C-IH	15114	Circ. Pumps	10	Ea.	$150	15	8	80		$6,240				$125	$1,500		$7,865	150
	15116									$0				$0	$0		$0	0
		Sheet Totals						80	0	$6,240				$125	$1,500	$0	$7,865	150

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

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	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-HH	16108	House Service H.T. Electrical	24	Ea.	$200	8	10	240		$18,720				$374	$4,800		$23,894	192
		Sheet Totals						240	0	$18,720				$374	$4,800	$0	$23,894	192

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	11,708	80	$673,863	$106,509	$200,000	$55,000	$856,887	$0	$830,000	$2,722,259	97,160
2000	SITE WORK	100	%	$0	0	0	15,275	6,704	$683,047	$0	$0	$0	$17,087	$1,245,752	$0	$1,945,886	211,607
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830
6000	WOOD & PLASTICS	100	%	$0	0	0	664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	50
9000	FINISHES -- FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	80	0	$6,240	$0	$0	$0	$125	$1,500	$0	$7,865	150
16000	ELECTRICAL	100	%	$0	0	0	240	0	$18,720	$0	$0	$0	$374	$4,800	$0	$23,894	192
	CUMULATIVE PAGE TOTALS:						28,714.44	6,784	$1,443,954	$106,509	$200,000	$55,000	$876,573	$1,270,727	$830,000	$4,782,762	314,006

City of Buckland
2018 Phase 9 Cost Estimate PER, Alternative 2

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	5,840	Lft.	$117	**$680,701**
2	W-BL	Water Service Line	1,800	Lft.	$295	**$531,043**
4	S-BC	Sewer Main	2,500	Lft.	$202	**$505,997**
3	S-BL	Sewer Service Line	2,000	Lft.	$189	**$378,585**

Construction Subtotal: **$2,096,326**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$404,000**
8		Engineering & Design Services	**$140,000**
9		Mobilization / Demobilization	**$333,962**
10		General Conditions	**$1,228,623**
11	M-UI	Miscellaneous Utilities	**$111,185**
12	EQP	Equipment Procurement	**$202,000**
		Other Direct Cost Subtotal:	**$2,419,771**
		2018 Total Cost:	**$4,516,097**
		plus 4% 2019 Total Cost:	**$4,696,741**

Assumptions

1. Primary project materials are procured and mobilized in 2019.
2. Construction occurs in 2019 and 2020
3. Archeological monitoring will be required for portions of Phase 9 in areas near gravesites.
4. 5840 LF of new water main, 1800 LF of new water service, and 24 new water services are constructed.
5. 2500 LF of new sewer main, 2000 LF of new sewer service, and 23 new sewer services are constructed.
6. Upgrades to the water treatment plant equipment are not required.
7. No in home plumbing is required.
8. Existing arctic boxes to be replaced.
9.
10.
11.

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

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G-CM	1025	CM Svcs & Eng. Support	100	%												$400,000	$400,000	
M-DS	1370	Engineering & Design	100	%												$140,000	$140,000	
G-GC	1028	Archeological Services	100	%												$25,000	$25,000	
G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	2,864	Cwt	$95		0.15	430	30	$19,329				$272,042			$291,372	
G-GC	1036	Material Handling & Inventory	3,182	Cwt			0.1	318	30	$14,318							$14,318	
G-GC	1040	Field Superintendent	40	Wks.			66	2,640		$205,920							$205,920	
G-GC	1042	Field General Foreman	40	Wks.			60	2,400		$156,000							$156,000	
G-GC	1045	Job Clerk	40	Wks.			24	960		$26,880							$26,880	
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	1,120	Dys	$36									$40,320			$40,320	
G-GC	1060	Subsistence	280	Dys	$36									$10,080			$10,080	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	10	Mo.	$2,000									$20,000			$20,000	
MUI	1090	Telephone & Star Band Svcs.	10	Mo.	$450									$4,500			$4,500	
G-GC	1130	Air Charters	10	Mo.	$200									$2,000			$2,000	
G-GC	1140	Air Travel - Super	4	Rt.	$1,200		16	64		$4,480				$4,800			$9,280	
G-GC	1145	Air Travel--Contract Labor	10	Rt.	$1,000		16	160		$10,400				$10,000			$20,400	
F-RT	1150	Air Freight - Mobilization	318	Cwt	$110		0.1	32	20	$1,591				$35,000			$36,590	
G-GC	1160	Air Freight - Course of const.	10	Mo.	$3,500		10	100		$5,000				$35,000			$40,000	
G-GC	1180	Safety & Cleanup	40	Wks.	$400		10	400		$16,000				$16,000			$32,000	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent ~ City owned	10	Mo.	$5,000								$50,000				$50,000	
G-GC	1300	Equipment Parts @ City owned	678	Eqhrs	$22	3					$14,925			$14			$14,938	2,035
G-GC	1305	Equip. Maint.Labor @ City equip.	1,357	Eqhrs			0.3	407		$22,794				$27			$22,821	
G-GC	1310	Equipment Parts @ Project	6,106	Eqhrs	$15	2.7419					$91,584			$122			$91,706	16,741
G-GC	1315	Equip.Maint.Labor ~ Project	6,106	Eqhrs			0.34	2,076	job	$103,795							$103,795	
G-GC	1320	F.O.G.	27,136	Gal.	$6.0	0.25	0.03	814		$40,704				$162,816			$203,520	6,784
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345	Equipment Purchase (30-35 ton excavat	1	Ea.	$200,000							$200,000		$2,000			$202,000	70,000
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	1,417,132	Lbr$	$0									$56,685			$56,685	
MUI	1435	Insurance @ Rental Equipment	10	Mo.	$3,000									$30,000			$30,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		1	100		$5,000				$1,000			$6,000	
G-GC	1490	Workers Compensation Estimated	1,417,132	Lbr$	$0									$109,044			$109,044	
G-GC	1492	Project Accounting Services	10	Mo.	$1,800									$18,000			$18,000	
G-GC	1494																	
		Sheet Totals						10,981	80	$635,812	$106,509	$200,000	$55,000	$857,450		$565,000	$2,419,771	97,160

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010							0		$0				$0	$0		$0	0
M-IM	2012							0		$0				$0	$0		$0	0
M-IM	2014							0		$0				$0	$0		$0	0
M-IR	2016							0		$0				$0	$0		$0	0
W-BL	2018	Water Serv. - Curb Stops	24	Ea.	$2,500	150	20	480	100	$21,120				$317	$60,000		$81,437	3,600
W-BD	2020	Water Main - Grade Checking & As-building	6,110	Lf.	$0.1	0.05	0.05	306		$13,442				$202	$611		$14,255	306
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	6,110	Lf.	$3		0.1	611	584	$26,884				$403	$18,330		$45,617	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	6,110	Lf.	$4	0.75	0.25	1,528	600	$67,210				$1,008	$24,440		$92,658	4,583
W-BD	2026	Water Main - Right of way prep	6,110	Lf.			0.02	122	60	$5,377				$0			$5,377	0
W-BD	2028	Water Main - 6" HDPE	6,110	Lf.	$48	10	0.25	1,528	600	$67,210				$1,008	$293,280		$361,498	61,100
W-BD	2030	Water Main - 6" arctic pipe fittings & related	28	Ea.	$900	45	10	280	100	$12,600				$189	$25,200		$37,989	1,260
W-BD	2032	Water Main - 1.25" HDPE Heat Trace	6,110	Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	5	Ea.	$5,000	1,000	30	150	50	$6,750				$101	$25,000		$31,851	5,000
W-BD	2036	Water Main - Pipe Joint Kits	380	Ea.	$170	25	1	380		$17,100				$257	$64,600		$81,957	9,500
W-BD	2038	Water Main - Test & Sanitize	6,110	Lf.	$0.3		0.02	122		$5,499				$2,000	2000		$9,499	0
W-BL	2040	Water Serv. - Grade Checking & As-building	1,800	Lf.	$0.1	0.05	0.06	108		$4,860				$972	$180		$6,012	90
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.	1,800	Lf.	$1		0.25	450	450	$20,250				$304	$1,800		$22,354	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric	1,800	Lf.	$4	0.75	0.25	450	200	$20,250				$304	$7,200		$27,754	1,350
W-BL	2046	Water Serv. - Right of way prep	1,800	Lf.	$0.50		0.05	90	40	$4,050				$900			$4,950	0
W-BL	2048	Water Serv. - Saddles & Clam Shells	24	Ea.	$1,000	100	10	240	100	$10,800				$1,080	$24,000		$35,880	2,400
W-BL	2050	Water Serv. - Carrier - 4" HDPE	1,800	Lf.	$45	8	0.49	882	400	$39,690				$595	$81,000		$121,285	14,400
W-BL	2052	Water Serv - 4" arctic pipe fittings & related	100	Ea.	$800	30	2	200	60	$9,000				$135	$80,000		$89,135	3,000
W-BL	2054	Water Serv - Pipe Joint Kits	200	Ea.	$110	10	1	200		$9,000				$135	$21,952		$31,087	2,000
W-BL	2056	Water Serv - sup/ret lines - 1"A'pex	3,600	Lf.	$1.25	0.2	0.05	180		$8,100				$122	$4,500		$12,722	720
W-BL	2058	Water Serv - Heat Trace	2,300	Lf.	$2.00	0.05	0.047	108		$4,865				$73	$16,100		$21,037	115
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	24	Ea.	$400	25	5	120		$5,400				$81	$9,600		$15,081	600
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	2,350	Lf.	$0.10	0.05	0.13	306		$13,748				$206	$235		$14,189	118
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	2,350	Lf.	$3		0.22	517	550	$23,265				$349	$7,050		$30,664	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	2,350	Lf.	$4	0.75	0.25	588	300	$26,438				$397	$9,400		$36,234	1,763
S-BC	2070	Sewer Main - Right of way prep	2,350	Lf.			0.05	118	80	$5,288				$79	$0		$5,367	0
S-BC	2072	Sewer Main - 8" HDPE	2,350	Lf.	$70	15	0.7	1,645	400	$74,025				$1,110	$164,500		$239,635	35,250
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes	47	Ea.	$1,000	60	8	376	100	$16,920				$254	$47,000		$64,174	2,820
S-BC	2076	Sewer Main - Joint Kits	215	Ea.	$150	20	1	215		$9,675				$145	$32,250		$42,070	4,300
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	8	Ea.	$5,000	5000	60	480	120	$21,600				$324	$40,000		$61,924	40,000
S-BC	2080	Sewer Main - Cleanouts & Related	3	Ea.	$1,500	150	20	60	30	$2,700				$41	$4,500		$7,241	450
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	1,725	Lf.	$0.10	0.05	0.06	104		$4,658				$326	$173		$5,156	86
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	1,725	Lf.	$1		0.25	431	500	$19,406				$291	$1,725		$21,422	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	1,725	Lf.	$4	0.75	0.25	431	300	$19,406				$291	$6,900		$26,597	1,294
S-BL	2090	Sewer Serv. - Right of way prep	1,725	Lf.	$0.50		0.05	86	60	$3,881				$863			$4,744	0
S-BL	2092	Sewer Service Line - 4" HDPE	1,725	Lf.	$45	8	0.49	845	400	$38,036				$571	$77,625		$116,232	13,800
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	120	Ea.	$800	30	2	240	100	$10,800				$162	$96,000		$106,962	3,600
S-BL	2096	Sewer Service - Joint Kits	200	Ea.	$110	10	1	200		$9,000				$135	$22,000		$31,135	2,000
S-BL	2098	Sewer Service - Heat Trace		Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	23	Ea.	$45	12	5	115		$5,175				$78	$1,035		$6,288	276
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						15530	6284	$694,276	$0	$0	$0	$17,246	$1,270,186	$0	$1,981,708	215,779

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								0		$0	$0	$0	$0	$0	$0		$0	0
C-IH	5012	Arctic Box Hardware	83	Ea	$25	10	2	166		$7,304	$0	$0	$0	$730	$2,075		$10,109	830
		Sheet Totals						166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830

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																	$0	0
C-IH	6082	House A, Box - Lumber & Related	83	Ea.	$100.00	40	8	664		$29,216				$730	$8,300		$38,246	3,320
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320

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C-III	7010	House A. Boxes WX Stripping	83	Ea	$20	1.0	1	83		$3,652				$91	$1,660		$5,403	83
C-III	7012	House A. Boxes Insulation & Sealants	83	Ea	$80	8.0	6	498		$21,912				$548	$6,640		$29,100	664
																		0
																		0
		Sheet Totals						581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747

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	15100	House Rehab & Plumbing						0		$0				$0	$0		$0	0
C-IH	15114	Circ. Pumps	10	Ea.	$150	15	8	80		$6,240				$125	$1,500		$7,865	150
	15116									$0				$0	$0		$0	0
		Sheet Totals						80	0	$6,240				$125	$1,500	$0	$7,865	150

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	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	16108	House Service H.T. Electrical	24	Ea.	$200	8	10	240		$18,720				$374	$4,800		$23,894	192
		Sheet Totals						240	0	$18,720				$374	$4,800	$0	$23,894	192

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1000	GENERAL CONDITIONS	100	%	$0	0	0	10,981	80	$635,812	$106,509	$200,000	$55,000	$857,450	$0	$565,000	$2,419,771	97,160
2000	SITE WORK	100	%	$0	0	0	15,530	6,704	$694,276	$0	$0	$0	$17,246	$1,270,186	$0	$1,981,708	215,779
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830
6000	WOOD & PLASTICS	100	%	$0	0	0	664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES – FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	80	0	$6,240	$0	$0	$0	$125	$1,500	$0	$7,865	150
16000	ELECTRICAL	100	%	$0	0	0	240	0	$18,720	$0	$0	$0	$374	$4,800	$0	$23,894	192
	CUMULATIVE PAGE TOTALS:						28,241.56	6,784	$1,417,132	$106,509	$200,000	$55,000	$877,296	$1,295,161	$565,000	$4,516,097	318,178

City of Marshall
2018 Phase 9 Cost Estimate PER, Alternative 3

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	3,560	Lft.	$117	**$416,271**
2	W-BL	Water Service Line	400	Lft.	$945	**$378,072**
4	S-BC	Sewer Main	1,440	Lft.	$235	**$338,515**
3	S-BL	Sewer Service Line	450	Lft.	$541	**$243,558**

Construction Subtotal: **$1,376,416**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$404,000**
8		Engineering & Design Services	**$140,000**
9		Mobilization / Demobilization	**$245,985**
10		General Conditions	**$1,097,396**
11	M-UI	Miscellaneous Utilities	**$99,754**
12	EQP	Equipment Procurement	**$202,000**
		Other Direct Cost Subtotal:	**$2,189,135**
		2018 Total Cost:	**$3,565,551**
		plus 4% 2019 Total Cost:	**$3,708,173**

Assumptions

1. Primary project materials are procured and mobilized in 2019.
2. Construction occurs in 2019 and 2020
3. Archeological monitoring will be required for portions of Phase 9 in areas near gravesites.
4. 3560 LF of new water main, 400 LF of new water service, and 6 new water services are constructed.
5. 1440 LF of new sewer main, 450 LF of new sewer service, and 5 new sewer services are constructed.
6. Assume further investigation (excavation) verifies water mains and most of water service lines are competent.
7. Assume further video investigation of sewer system verifies sewer mains and most of sewer service lines are competent.
8. Assume hydrants are installed on existing water main and manholes on existing sewer main are replaced.
9. Upgrades to the water treatment plant equipment are not required.
10. No in home plumbing is required.
11. Existing arctic boxes to be replaced.

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G-CM	1025	CM Svcs & Eng. Support	100	%												$400,000	$400,000	
M-DS	1370	Engineering & Design	100	%												$140,000	$140,000	
G-GC	1028	Archeological Services	100	%												$30,000	$30,000	
G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	2,095	Cwt	$95		0.15	314	30	$14,144				$199,066			$213,210	
G-GC	1036	Material Handling & Inventory	2,328	Cwt			0.1	233	30	$10,477							$10,477	
G-GC	1040	Field Superintendent	40	Wks.			66	2,640		$205,920							$205,920	
G-GC	1042	Field General Foreman	40	Wks.			60	2,400		$156,000							$156,000	
G-GC	1045	Job Clerk	40	Wks.			24	960		$26,880							$26,880	
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	1,120	Dys	$36									$40,320			$40,320	
G-GC	1060	Subsistence	280	Dys	$36									$10,080			$10,080	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	10	Mo.	$2,000									$20,000			$20,000	
MUI	1090	Telephone & Star Band Svcs.	10	Mo.	$450									$4,500			$4,500	
G-GC	1130	Air Charters	10	Mo.	$200									$2,000			$2,000	
G-GC	1140	Air Travel - Super	4	Rt.	$1,200		16	64		$4,480				$4,800			$9,280	
G-GC	1145	Air Travel--Contract Labor	10	Rt.	$1,000		16	160		$10,400				$10,000			$20,400	
F-RT	1150	Air Freight - Mobilization	233	Cwt	$110		0.1	23	20	$1,164				$25,611			$26,775	
G-GC	1160	Air Freight - Course of const.	10	Mo.	$3,500		10	100		$5,000				$35,000			$40,000	
G-GC	1180	Safety & Cleanup	40	Wks.	$400		10	400		$16,000				$16,000			$32,000	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent -- City owned	10	Mo.	$5,000								$50,000				$50,000	
G-GC	1300	Equipment Parts @ City owned	446	Eqhrs	$22	3					$9,801			$9			$9,810	1,337
G-GC	1305	Equip. Maint.Labor @ City equip.	891	Eqhrs			0.7	624		$34,927				$18			$34,945	
G-GC	1310	Equipment Parts @ Project	4,010	Eqhrs	$15	2.7419					$60,143			$80			$60,223	10,994
G-GC	1315	Equip.Maint.Labor ~ Project	4,010	Eqhrs			0.45	1,804	job	$90,214							$90,214	
G-GC	1320	F.O.G.	17,820	Gal.	$6.0	0.25	0.03	535		$26,730				$106,920			$133,650	4,455
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345	Equipment Purchase (30-35 ton excavat	1	Ea.	$200,000							$200,000		$2,000			$202,000	70,000
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	1,131,339	Lbr$	$0									$45,254			$45,254	
MUI	1435	Insurance @ Rental Equipment	10	Mo.	$3,000									$30,000			$30,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		1	100		$5,000				$1,000			$6,000	
G-GC	1490	Workers Compensation Estimated	1,131,339	Lbr$	$0									$84,598			$84,598	
G-GC	1492	Project Accounting Services	10	Mo.	$1,800									$18,000			$18,000	
G-GC	1494																	
		Sheet Totals						10,437	80	$610,936	$69,944	$200,000	$55,000	$683,255		$570,000	$2,189,135	88,385

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M-IM	2010							0		$0				$0	$0		$0	0
M-IM	2012							0		$0				$0	$0		$0	0
S-BL	2014	Sewer Serv - Regrade, repair existing svcs.	18	Ea.	$2,500	100	40	720	670	$31,680				$475	$45,000		$77,155	1,800
W-BL	2016	Water Serv - Regrade, repair existing svcs.	18	Ea.	$2,500	100	40	720	670	$31,680				$475	$45,000		$77,155	1,800
W-BL	2018	Water Serv. - Curb Stops	24	Ea.	$2,500	150	20	480	100	$21,120				$317	$60,000		$81,437	3,600
W-BD	2020	Water Main - Grade Checking & As-building	3,560	Lf.	$0.1	0.05	0.05	178		$7,832				$117	$356		$8,305	178
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	3,560	Lf.	$3		0.1	356	100	$15,664				$235	$10,680		$26,579	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	3,560	Lf.	$4	0.75	0.25	890	700	$39,160				$587	$14,240		$53,987	2,670
W-BD	2026	Water Main - Right of way prep	3,560	Lf.			0.02	71	10	$3,133				$0			$3,133	0
W-BD	2028	Water Main - 6" HDPE	3,560	Lf.	$48	10	0.25	890	200	$39,160				$587	$170,880		$210,627	35,600
W-BD	2030	Water Main - 6" arctic pipe fittings & related	20	Ea.	$900	45	10	200	40	$9,000				$135	$18,000		$27,135	900
W-BD	2032	Water Main - 1.25" HDPE Heat Trace	3,560	Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	5	Ea.	$5,000	1,000	30	150	25	$6,750				$101	$25,000		$31,851	5,000
W-BD	2036	Water Main - Pipe Joint Kits	220	Ea.	$170	25	1	220		$9,900				$149	$37,400		$47,449	5,500
W-BD	2038	Water Main - Test & Sanitize	3,560	Lf.	$0.6		0.02	71		$3,204				$2,000	2000		$7,204	0
W-BL	2040	Water Serv. - Grade Checking & As-building	400	Lf.	$0.1	0.05	0.06	24		$1,080				$216	$40		$1,336	20
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.	400	Lf.	$1		0.25	100	80	$4,500				$68	$400		$4,968	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric	400	Lf.	$4	0.75	0.25	100	30	$4,500				$68	$1,600		$6,168	300
W-BL	2046	Water Serv. - Right of way prep	400	Lf.	$0.50		0.05	20	5	$900				$200			$1,100	0
W-BL	2048	Water Serv. - Saddles & Clam Shells	6	Ea.	$1,000	100	10	60	10	$2,700				$270	$6,000		$8,970	600
W-BL	2050	Water Serv. - Carrier - 4" HDPE	400	Lf.	$45	8	0.49	196	50	$8,820				$132	$18,000		$26,952	3,200
W-BL	2052	Water Serv - 4" arctic pipe fittings & related	80	Ea.	$800	30	2	160	50	$7,200				$108	$64,000		$71,308	2,400
W-BL	2054	Water Serv - Pipe Joint Kits	100	Ea.	$110	10	1	100		$4,500				$68	$10,976		$15,544	1,000
W-BL	2056	Water Serv - sup/ret lines - 1" A'pex	450	Lf.	$1.25	0.2	0.05	23		$1,013				$15	$563		$1,590	90
W-BL	2058	Water Serv - Heat Trace	510	Lf.	$6.00	0.05	0.047	24		$1,079				$16	$3,060		$4,155	26
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	24	Ea	$400	25	5	120		$5,400				$81	$9,600		$15,081	600
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	1,440	Lf.	$0.10	0.05	0.13	187		$8,424				$126	$144		$8,694	72
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	1,440	Lf.	$3		0.22	317	100	$14,256				$214	$4,320		$18,790	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	1,440	Lf.	$4	0.75	0.25	360	300	$16,200				$243	$5,760		$22,203	1,080
S-BC	2070	Sewer Main - Right of way prep	1,440	Lf.			0.05	72	10	$3,240				$49	$0		$3,289	0
S-BC	2072	Sewer Main - 8" HDPE	1,440	Lf.	$70	15	0.7	1,008	400	$45,360				$680	$100,800		$146,840	21,600
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes	29	Ea.	$1,000	60	8	232	100	$10,440				$157	$29,000		$39,597	1,740
S-BC	2076	Sewer Main - Joint Kits	130	Ea.	$150	20	1	130		$5,850				$88	$19,500		$25,438	2,600
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	8	Ea.	$5,000	5000	60	480	100	$21,600				$324	$40,000		$61,924	40,000
S-BC	2080	Sewer Main - Cleanouts & Related	3	Ea.	$1,500	150	20	60	20	$2,700				$41	$4,500		$7,241	450
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	400	Lf.	$0.10	0.05	0.06	24		$1,080				$76	$40		$1,196	20
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	400	Lf.	$1		0.25	100	30	$4,500				$68	$400		$4,968	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	400	Lf.	$4	0.75	0.25	100	40	$4,500				$68	$1,600		$6,168	300
S-BL	2090	Sewer Serv. - Right of way prep	400	Lf.	$0.50		0.05	20	10	$900				$200			$1,100	0
S-BL	2092	Sewer Service Line - 4" HDPE	400	Lf.	$45	8	0.49	196	75	$8,820				$132	$18,000		$26,952	3,200
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	46	Ea.	$800	30	2	92	30	$4,140				$62	$36,800		$41,002	1,380
S-BL	2096	Sewer Service - Joint Kits	120	Ea	$110	10	1	120		$5,400				$81	$13,200		$18,681	1,200
S-BL	2098	Sewer Service - Heat Trace		Lf				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	23	Ea.	$45	12	5	115		$5,175				$78	$1,035		$6,288	276
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						9726	3955	$433,359	$0	$0	$0	$10,546	$817,894	$0	$1,261,798	139,202

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-III	5012	Arctic Box Hardware	83	Ea	$25	10	2	166		$7,304	$0	$0	$0	$730	$2,075		$10,109	830
		Sheet Totals						166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
																	$0	0
C-IH	6082	House A, Box - Lumber & Related	83	Ea.	$100.00	40	8	664		$29,216				$730	$8,300		$38,246	3,320
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
C-III	7010	House A. Boxes WX Stripping	83	Ea	$20	1.0	1	83		$3,652				$91	$1,660		$5,403	83
C-III	7012	House A. Boxes Insulation & Sealants	83	Ea	$80	8.0	6	498		$21,912				$548	$6,640		$29,100	664
																		0
																		0
		Sheet Totals						581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	15100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-HT	**15114**	Circ. Pumps	10	Ea.	$150	15	8	80		$6,240				$125	$1,500		$7,865	150
	15116									$0				$0	$0		$0	0
		Sheet Totals						80	0	$6,240				$125	$1,500	$0	$7,865	150

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	16108	House Service H.T. Electrical	24	Ea.	$200	8	10	240		$18,720				$374	$4,800		$23,894	192
		Sheet Totals						240	0	$18,720				$374	$4,800	$0	$23,894	192

City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	10,437	80	$610,936	$69,944	$200,000	$55,000	$683,255	$0	$570,000	$2,189,135	88,385
2000	SITE WORK	100	%	$0	0	0	9,726	4,375	$433,359	$0	$0	$0	$10,546	$817,894	$0	$1,261,798	139,202
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	166	0	$7,304	$0	$0	$0	$730	$2,075	$0	$10,109	830
6000	WOOD & PLASTICS	100	%	$0	0	0	664	0	$29,216	$0	$0	$0	$730	$8,300	$0	$38,246	3,320
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	581	0	$25,564	$0	$0	$0	$639	$8,300	$0	$34,503	747
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES - FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	80	0	$6,240	$0	$0	$0	$125	$1,500	$0	$7,865	150
16000	ELECTRICAL	100	%	$0	0	0	240	0	$18,720	$0	$0	$0	$374	$4,800	$0	$23,894	192
	CUMULATIVE PAGE TOTALS:						21,893.87	4,455	$1,131,339	$69,944	$200,000	$55,000	$696,400	$842,869	$570,000	$3,565,551	232,826

Water and Sewer Utility Operations & Maintenance Expenses

Line Item	Budget Amount
Salaries	$27,600
Payroll Taxes	$2,388
Workers Compensation	$1,062
Per Diem	$558
Electricity	$23,465
Heating Fuel	$13,586
Annual Water Testing Fees	$20,000
Office Supplies/Materials	$500
Postage Supplies	$750
Water Treatment Chemicals	$1,600
Gas/Oil (Vehicles)	$500
Equipment Maintenance	$1,000
Waste Water Discharge Permit	$940
DEC Tank Farm User Fee	$725.99
SOC/OOC/Water rights Fee	$340
Operator Certification	$200
Plant Certification/Inspection	$250
Insurance/Bonding	$112.90
Miscellaneous Operating Expense	$679
Total Operating Expenses	**$96,256.89**

Cost of Service Line Repair

Employee	Wage/hr
Operator	$19
Alt. Operator	$17
Laborer	$12

Assume 3 employees for 3 days .	
Each Repair is	$1,152
Two repairs/yr is	$2,304
Materials	$500
Total Annual Cost	**$2,804**

These expenses are based on actual, budgeted expenses for Fiscal Year 2018.

Projected O&M expenses without Pilcher View Subdivision Repairs assume present operating costs less the estimated annual cost of repairs:

Projected O&M: **$93,453**

Phase 9 Water and Sewer Upgrades

Life Cycle Cost Analysis
Based on:

USDA RD Bulletin 1780-2	(for general formula)
OMB Circular a94 appendix C	(for "real" discount rate = 0.8% for 20 years)
engineering econonics reference	(for formula of USPW = (((1+i)^n)-1)/ notation for this factor is (P/A,i,N)

Alternative 1		**Alternative 2**		**Alternative 3**	
Capital Cost =	$4,782,762	Capital Cost =	$4,516,097	Capital Cost =	$3,565,551
Annual O&M =	$93,453	Annual O&M =	$93,453	Annual O&M =	$93,453
Discount rate (i) =	0.008	Discount rate (i) =	0.008	Discount rate (i) =	0.008
Planning period (n) =	30 years	Planning period (n) =	30 years	Planning period (n) =	30

Net Present Value = Capital Cost + Uniform Series Present Worth of Annual O&M - Single Payment Present Worth of the Salvage Value
(I assume that we will consider the salvage value of the system, after 30 years, as zero)

Net Present Value =	**$7,266,513**	**Net Present Value =**	**$6,999,848**	**Net Present Value =**	**$6,049,302**

Attachment C

Alternative 3 Cost Estimates

Phase 1, 2019, Pilcher View Subdivision (part 1)

Phase 2, 2020, 2012 Subdivision

Phase 3, 2021, Pilcher View Subdivision (part 2)

Phase 4, 2022, Clinic Loop

City of Marshall

PER Cost Estimate, Alternative 3 - Phase 1, 2019, Pilcher View Subdivision (part 1)

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	3,560	Lft.	$4	$13,550
2	W-BL	Water Service Line	400	Lft.	$98	$39,061
4	S-BC	Sewer Main	1,440	Lft.	$22	$32,211
3	S-BL	Sewer Service Line	450	Lft.	$137	$61,774

Construction Subtotal: **$146,596**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	$154,000
8		Engineering & Design Services	$150,000
9		Mobilization / Demobilization	$94,381
10		General Conditions	$216,093
11	M-UI	Miscellaneous Utilities	$18,036
12	EQP	Equipment Procurement	$202,000
		Other Direct Cost Subtotal:	**$834,511**
		2019 Total Cost:	**$981,107**

Assumptions

1. No EMT or Contingency is included.
2. All design, permitting, procurement, mobilization, and construction must occur in one year for a functional system.
3. Construction occurs in 2019.
4. Archeological monitoring will not be required for this phase.
5. Assume further investigation (excavation) verifies water mains and most of water service lines are competent.
6. Assume further video investigation of sewer system verifies sewer mains and most of sewer service lines are competent.
7. Assume hydrants are installed on existing water main and manholes on existing sewer main are replaced.
8. Upgrades to the water treatment plant equipment are not required.
9. No in home plumbing is required.
10. Existing arctic boxes to be replaced.

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Grant #	VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	G-CM	1025	CM Svcs & Eng. Support	100	%												$150,000	$150,000	
	M-DS	1370	Engineering & Design	100	%												$150,000	$150,000	
	G-GC	1028	Archeological Services	100	%														
	G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
	F-RT	1035	Mobilization - Barge - Truck	780	Cwt	$95		0.15	117	30	$5,268				$74,141			$79,409	
	G-GC	1036	Material Handling & Inventory	867	Cwt			0.1	87	30	$3,902							$3,902	
	G-GC	1040	Field Superintendent	8	Wks.			66	528		$41,184							$41,184	
	G-GC	1042	Field General Foreman		Wks.			60											
	G-GC	1045	Job Clerk		Wks.			24											
	G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
	G-GC	1055	Subsist. @ Contract Lab.	40	Dys	$36									$1,440			$1,440	
	G-GC	1060	Subsistence	60	Dys	$36									$2,160			$2,160	
	G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
	G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
	MUI	1080	Temporary Power	2	Mo.	$2,000									$4,000			$4,000	
	MUI	1090	Telephone & Star Band Svcs.	2	Mo.	$450									$900			$900	
	G-GC	1130	Air Charters	2	Mo.	$200									$400			$400	
	G-GC	1140	Air Travel - Super	1	Rt.	$1,200		16	16		$1,120				$1,200			$2,320	
	G-GC	1145	Air Travel--Contract Labor	2	Rt.	$1,000		16	32		$2,080				$2,000			$4,080	
	F-RT	1150	Air Freight - Mobilization	87	Cwt	$110		0.1	9	20	$434				$9,539			$9,972	
	G-GC	1160	Air Freight - Course of const.	2	Mo.	$3,500		10	20		$1,000				$7,000			$8,000	
	G-GC	1180	Safety & Cleanup	8	Wks.	$400		10	80		$3,200				$3,200			$6,400	
	G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
	G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
	G-GC	1210	Equipment Rent ~ City owned	2	Mo.	$5,000								$10,000				$10,000	
	G-GC	1300	Equipment Parts @ City owned	214	Eqhrs	$22	3					$4,704			$4			$4,708	641
	G-GC	1305	Equip. Maint.Labor @ City equip.	214	Eqhrs			0.6	128		$7,184				$4			$7,188	
	G-GC	1310	Equipment Parts @ Project	855	Eqhrs	$20	2.7419					$17,104			$17			$17,121	2,345
	G-GC	1315	Equip.Maint.Labor ~ Project	855	Eqhrs			0.6	513	job	$25,656							$25,656	
	G-GC	1320	F.O.G.	4,276	Gal.	$6.0	0.25	0.0215	92		$4,597				$25,656			$30,253	1,069
	G-GC	1322	Special Equipment & Tools		%	$100		1											
	G-GC	1325																	
	G-GC	1330																	
	E-QP	1345	Equipment Purchase (30-35 ton excavat	1	Ea.	$200,000							$200,000		$2,000			$202,000	70,000
	E-QP	1350																	
	E-QP	1355																	
	E-QP	1360																	
	E-QP	1365																	
	MUI	1425	General Liability Insurance	178,411	Lbr$	$0									$7,136			$7,136	
	MUI	1435	Insurance @ Rental Equipment	2	Mo.	$3,000									$6,000			$6,000	
	F-RT	1475	Demobilization/Inventory	100	%	$10		0.8	80		$4,000				$1,000			$5,000	
	G-GC	1490	Workers Compensation Estimated	178,411	Lbr$	$0									$13,281			$13,281	
	G-GC	1492	Project Accounting Services	3	Mo.	$1,800									$5,400			$5,400	
	G-GC	1494																	
			Sheet Totals						1,782	80	$103,224	$21,808	$200,000	$15,000	$194,479		$300,000	$834,511	75,655

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010																	
M-IM	2012																	
S-BL	2014	Sewer Serv - Regrade, repair existing svcs.	4	Ea.	$2,500	100	40	160	120	$7,040				$106	$10,000		$17,146	400
W-BL	2016	Water Serv - Regrade, repair existing svcs.	4	Ea.	$2,500	100	40	160	120	$7,040				$106	$10,000		$17,146	400
W-BL	2018	Water Serv. - Curb Stops		Ea.	$2,500	150	20	0		$0				$0	$0		$0	0
W-BD	2020	Water Main - Grade Checking & As-building	20	Lf.	$0.1	0.05	0.05	1		$44				$1	$2		$47	1
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	20	Lf.	$3		0.1	2	2	$88				$1	$60		$149	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	20	Lf.	$4	0.75	0.25	5	2	$220				$3	$80		$303	15
W-BD	2026	Water Main - Right of way prep	20	Lf.			0.02	0		$18				$0			$18	0
W-BD	2028	Water Main - 6" HDPE		Lf.	$48	10	0.25	0		$0				$0	$0		$0	0
W-BD	2030	Water Main - 6" arctic pipe fittings & related		Ea.	$900	45	10	0		$0				$0	$0		$0	0
W-BD	2032	Water Main - 1.25" HDPE Heat Trace		Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	1	Ea.	$5,000	1,000	30	30	15	$1,350				$20	$5,000		$6,370	1,000
W-BD	2036	Water Main - Pipe Joint Kits	4	Ea.	$170	25	1	4		$180				$3	$680		$863	100
W-BD	2038	Water Main - Test & Sanitize	2,000	Lf.	$1.0		0.02	40		$1,800				$2,000	2000		$5,800	0
W-BL	2040	Water Serv. - Grade Checking & As-building		Lf.	$0.1	0.05	0.06	0		$0				$0	$0		$0	0
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.		Lf.	$1		0.25	0		$0				$0	$0		$0	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric		Lf.	$4	0.75	0.25	0		$0				$0	$0		$0	0
W-BL	2046	Water Serv. - Right of way prep	300	Lf.	$0.50		0.05	15	10	$675				$150			$825	0
W-BL	2048	Water Serv. - Saddles & Clam Shells		Ea.	$1,000	100	10	0		$0				$0	$0		$0	0
W-BL	2050	Water Serv. - Carrier - 4" HDPE		Lf.	$45	8	0.49	0		$0				$0	$0		$0	0
W-BL	2052	Water Serv - 4" arctic pipe fittings & related		Ea.	$800	30	2	0		$0				$0	$0		$0	0
W-BL	2054	Water Serv - Pipe Joint Kits		Ea.	$110	10	1	0		$0				$0	$0		$0	0
W-BL	2056	Water Serv - sup/ret lines - 1"A'pex		Lf.	$1.25	0.2	0.05	0		$0				$0	$0		$0	0
W-BL	2058	Water Serv - Heat Trace	85	Lf.	$6.00	0.05	0.047	4		$180				$3	$510		$692	4
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	8	Ea.	$400	25	5	40		$1,800				$27	$3,200		$5,027	200
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	250	Lf.	$0.10	0.05	0.13	33		$1,463				$22	$25		$1,509	13
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	250	Lf.	$3		0.22	55	40	$2,475				$37	$750		$3,262	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	250	Lf.	$4	0.75	0.25	63	50	$2,813				$42	$1,000		$3,855	188
S-BC	2070	Sewer Main - Right of way prep	250	Lf.			0.05	13	10	$563				$8	$0		$571	0
S-BC	2072	Sewer Main - 8" HDPE	50	Lf.	$70	15	0.7	35	10	$1,575				$24	$3,500		$5,099	750
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes		Ea.	$1,000	60	8	0	0	$0				$0	$0		$0	0
S-BC	2076	Sewer Main - Joint Kits	12	Ea.	$150	20	1	12		$540				$8	$1,800		$2,348	240
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	1	Ea.	$5,000	5000	80	80	20	$3,600				$54	$5,000		$8,654	5,000
S-BC	2080	Sewer Main - Cleanouts & Related	1	Ea.	$1,500	150	20	20	10	$900				$14	$1,500		$2,414	150
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	320	Lf.	$0.10	0.05	0.06	19		$864				$60	$32		$956	16
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	320	Lf.	$1		0.25	80	70	$3,600				$54	$320		$3,974	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	320	Lf.	$4	0.75	0.25	80	50	$3,600				$54	$1,280		$4,934	240
S-BL	2090	Sewer Serv. - Right of way prep	320	Lf.	$0.50		0.05	16	10	$720				$160			$880	0
S-BL	2092	Sewer Service Line - 4" HDPE	112	Lf.	$45	8	0.49	55	30	$2,470				$37	$5,040		$7,547	896
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	8	Ea.	$800	30	2	16		$720				$11	$6,400		$7,131	240
S-BL	2096	Sewer Service - Joint Kits	12	Ea.	$110	10	1	12		$540				$8	$1,320		$1,868	120
S-BL	2098	Sewer Service - Heat Trace		Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	8	Ea.	$300	12	5	40		$1,800				$27	$2,400		$4,227	96
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						1329	569	$59,475	$0	$0	$0	$4,480	$61,899	$0	$125,854	10,068

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-IH	5012	Arctic Box Hardware	16	Ea	$25	10	2	32		$1,408	$0	$0	$0	$141	$400		$1,949	160
		Sheet Totals						32	0	$1,408	$0	$0	$0	$141	$400	$0	$1,949	160

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
																	$0	0
C-IH	6082	House A. Box - Lumber & Related	16	Ea.	$100.00	40	8	128		$5,632				$141	$1,600		$7,373	640
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						128	0	$5,632	$0	$0	$0	$141	$1,600	$0	$7,373	640

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
C-III	7010	House A. Boxes WX Stripping	16	Ea	$20	1.0	1	16		$704				$18	$320		$1,042	16
C-III	7012	House A. Boxes Insulation & Sealants	16	Ea	$80	8.0	6	96		$4,224				$106	$1,280		$5,610	128
																		0
																		0
		Sheet Totals						112	0	$4,928	$0	$0	$0	$123	$1,600	$0	$6,651	144

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	15100	House Rehab & Plumbing						0		$0				$0	$0		$0	0
C-III	15114	Circ. Pumps	1	Ea.	$150	15	8	8		$624				$12	$150		$786	15
	15116									$0				$0	$0		$0	0
		Sheet Totals						8	0	$624				$12	$150	$0	$786	15

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	16108	House Service H.T. Electrical	4	Ea.	$200	8	10	40		$3,120				$62	$800		$3,982	32
		Sheet Totals						40	0	$3,120				$62	$800	$0	$3,982	32

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A ~ 2019

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	1,782	80	$103,224	$21,808	$200,000	$15,000	$194,479	$0	$300,000	$834,511	75,655
2000	SITE WORK	100	%	$0	0	0	1,329	989	$59,475	$0	$0	$0	$4,480	$61,899	$0	$125,854	10,068
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	32	0	$1,408	$0	$0	$0	$141	$400	$0	$1,949	160
6000	WOOD & PLASTICS	100	%	$0	0	0	128	0	$5,632	$0	$0	$0	$141	$1,600	$0	$7,373	640
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	112	0	$4,928	$0	$0	$0	$123	$1,600	$0	$6,651	144
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES -- FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	8	0	$624	$0	$0	$0	$12	$150	$0	$786	15
16000	ELECTRICAL	100	%	$0	0	0	40	0	$3,120	$0	$0	$0	$62	$800	$0	$3,982	32
	CUMULATIVE PAGE TOTALS:						3,430.76	1,069	$178,411	$21,808	$200,000	$15,000	$199,439	$66,449	$300,000	$981,107	86,715

City of Marshall
PER Cost Estimate, Alternative 3 - Phase 2, 2020, 2012 Subdivision

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	3,560	Lft.	$43	**$153,092**
2	W-BL	Water Service Line	400	Lft.	$170	**$68,069**
4	S-BC	Sewer Main	1,440	Lft.	$100	**$144,571**
3	S-BL	Sewer Service Line	450	Lft.	$101	**$45,402**

Construction Subtotal: **$411,134**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$104,000**
8		Engineering & Design Services	**$35,000**
9		Mobilization / Demobilization	**$73,452**
10		General Conditions	**$325,046**
11	M-UI	Miscellaneous Utilities	**$27,320**

Other Direct Cost Subtotal: **$564,818**

2018 Total Cost: **$975,952**

plus 2.4% 2020 Total Cost: **$999,375**

Assumptions

1. No EMT or Contingency is included.
2. All design, permitting, procurement, mobilization, and construction must occur in one year for a functional system.
3. Construction occurs in 2020.
4. Archeological monitoring will not be required for this phase.
5. Upgrades to the water treatment plant equipment are not required.
6. No in home plumbing is required.
7. 1400 LF of new water main, 225 LF of new water service, and 3 new water services are constructed.
8. 675 LF of new sewer main, 225 LF of new sewer service, and 3 new sewer services are constructed.
9. Water and sewer mains do not extend to the end of 2012 Subdivision.
10. No blind wyes are installed for future services.

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
G-CM	1025	CM Svcs & Eng. Support	100	%												$100,000	$100,000	
M-DS	1370	Engineering & Design	100	%												$35,000	$35,000	
G-GC	1028	Archeological Services	100	%														
G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	598	Cwt	$95		0.15	90	30	$4,034				$56,781			$60,815	
G-GC	1036	Material Handling & Inventory	664	Cwt			0.1	66	30	$2,988							$2,988	
G-GC	1040	Field Superintendent	12	Wks.			66	792		$61,776							$61,776	
G-GC	1042	Field General Foreman		Wks.			60											
G-GC	1045	Job Clerk		Wks.			24											
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	20	Dys	$36									$720			$720	
G-GC	1060	Subsistence	75	Dys	$36									$2,700			$2,700	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	3	Mo.	$2,000									$6,000			$6,000	
MUI	1090	Telephone & Star Band Svcs.	3	Mo.	$450									$1,350			$1,350	
G-GC	1130	Air Charters	3	Mo.	$200									$600			$600	
G-GC	1140	Air Travel - Super	1	Rt.	$1,200		16	16		$1,120				$1,200			$2,320	
G-GC	1145	Air Travel--Contract Labor	2	Rt.	$1,000		16	32		$2,080				$2,000			$4,080	
F-RT	1150	Air Freight - Mobilization	66	Cwt	$110		0.1	7	20	$332				$7,305			$7,637	
G-GC	1160	Air Freight - Course of const.	3	Mo.	$3,500		10	30		$1,500				$10,500			$12,000	
G-GC	1180	Safety & Cleanup	12	Wks.	$400		10	120		$4,800				$4,800			$9,600	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent ~ City owned	3	Mo.	$5,000								$15,000				$15,000	
G-GC	1300	Equipment Parts @ City owned	219	Eqhrs	$22	3					$4,827			$4			$4,831	658
G-GC	1305	Equip. Maint.Labor @ City equip.	439	Eqhrs			0.25	110		$6,143				$9			$6,152	
G-GC	1310	Equipment Parts @ Project	1,755	Eqhrs	$10	2.7419					$17,552			$35			$17,587	4,813
G-GC	1315	Equip.Maint.Labor ~ Project	1,755	Eqhrs			0.24	421	job	$21,062							$21,062	
G-GC	1320	F.O.G.	8,776	Gal.	$6.0	0.25	0.012	105		$5,266				$52,656			$57,922	2,194
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345																	
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	274,248	Lbr$	$0									$10,970			$10,970	
MUI	1435	Insurance @ Rental Equipment	3	Mo.	$3,000									$9,000			$9,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		0.8	80		$4,000				$1,000			$5,000	
G-GC	1490	Workers Compensation Estimated	274,248	Lbr$	$0									$19,107			$19,107	
G-GC	1492	Project Accounting Services	30	Mo.	$1,800									$54,000			$54,000	
G-GC	1494																	
		Sheet Totals						1,949	80	$118,702	$22,379		$20,000	$268,737		$135,000	$564,818	9,265

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010							0		$0				$0	$0		$0	0
M-IM	2012							0		$0				$0	$0		$0	0
S-BL	2014	Sewer Serv - Regrade, repair existing svcs.		Ea.	$2,500	100	40	0		$0				$0	$0		$0	0
W-BL	2016	Water Serv - Regrade, repair existing svcs.		Ea.	$2,500	100	40	0		$0				$0	$0		$0	0
W-BL	2018	Water Serv. - Curb Stops	3	Ea.	$2,500	150	20	60	10	$2,640				$40	$7,500		$10,180	450
W-BD	2020	Water Main - Grade Checking & As-building	1,400	Lf.	$0.1	0.05	0.05	70		$3,080				$46	$140		$3,266	70
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	1,400	Lf.	$3		0.075	105	95	$4,620				$69	$4,200		$8,889	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	1,400	Lf.	$4	0.75	0.18	280	150	$12,320				$185	$5,600		$18,105	1,050
W-BD	2026	Water Main - Right of way prep	1,400	Lf.			0.02	28	10	$1,232				$0			$1,232	0
W-BD	2028	Water Main - 6" HDPE	1,400	Lf.	$48	10	0.2	280	200	$12,320				$185	$67,200		$79,705	14,000
W-BD	2030	Water Main - 6" arctic pipe fittings & related	8	Ea.	$900	45	10	80	20	$3,600				$54	$7,200		$10,854	360
W-BD	2032	Water Main - 1.25" HDPE Heat Trace	1,400	Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	1	Ea.	$5,000	1,000	30	30	8	$1,350				$20	$5,000		$6,370	1,000
W-BD	2036	Water Main - Pipe Joint Kits	90	Ea.	$170	25	1	90		$4,050				$61	$15,300		$19,411	2,250
W-BD	2038	Water Main - Test & Sanitize	1,400	Lf.	$1.4		0.02	28		$1,260				$2,000	2000		$5,260	0
W-BL	2040	Water Serv. - Grade Checking & As-building	225	Lf.	$0.1	0.05	0.06	14		$608				$122	$23		$752	11
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.	225	Lf.	$1		0.25	56	45	$2,531				$38	$225		$2,794	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric	225	Lf.	$4	0.75	0.25	56	45	$2,531				$38	$900		$3,469	169
W-BL	2046	Water Serv. - Right of way prep	225	Lf.	$0.50		0.05	11	4	$506				$113			$619	0
W-BL	2048	Water Serv. - Saddles & Clam Shells	3	Ea.	$1,000	100	10	30	2	$1,350				$135	$3,000		$4,485	300
W-BL	2050	Water Serv. - Carrier - 4" HDPE	225	Lf.	$45	8	0.49	110	90	$4,961				$74	$10,125		$15,161	1,800
W-BL	2052	Water Serv - 4" arctic pipe fittings & related	9	Ea.	$800	30	2	18	5	$810				$12	$7,200		$8,022	270
W-BL	2054	Water Serv - Pipe Joint Kits	30	Ea.	$110	10	1	30		$1,350				$20	$3,293		$4,663	300
W-BL	2056	Water Serv - sup/ret lines - 1" Apex	450	Lf.	$1.25	0.2	0.05	23		$1,013				$15	$563		$1,590	90
W-BL	2058	Water Serv - Heat Trace	225	Lf.	$7.00	0.05	0.047	11		$476				$7	$1,575		$2,058	11
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	3	Ea.	$300	25	5	15		$675				$10	$900		$1,585	75
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	675	Lf.	$0.10	0.05	0.13	88		$3,949				$59	$68		$4,075	34
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	675	Lf.	$3		0.22	149	120	$6,683				$100	$2,025		$8,808	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	675	Lf.	$4	0.75	0.25	169	150	$7,594				$114	$2,700		$10,408	506
S-BC	2070	Sewer Main - Right of way prep	675	Lf.			0.05	34	10	$1,519				$23	$0		$1,542	0
S-BC	2072	Sewer Main - 8" HDPE	675	Lf.	$70	15	0.7	473	460	$21,263				$319	$47,250		$68,831	10,125
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes	3	Ea.	$1,000	60	8	24	10	$1,080				$16	$3,000		$4,096	180
S-BC	2076	Sewer Main - Joint Kits	58	Ea.	$150	20	1	58		$2,610				$39	$8,700		$11,349	1,160
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	4	Ea.	$5,000	5000	60	240	100	$10,800				$162	$20,000		$30,962	20,000
S-BC	2080	Sewer Main - Cleanouts & Related		Ea.	$1,500	150	20	0		$0				$0	$0		$0	0
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	225	Lf.	$0.10	0.05	0.06	14		$608				$43	$23		$673	11
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	225	Lf.	$1		0.25	56	40	$2,531				$38	$225		$2,794	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	225	Lf.	$4	0.75	0.25	56	30	$2,531				$38	$900		$3,469	169
S-BL	2090	Sewer Serv. - Right of way prep	225	Lf.	$0.50		0.05	11	5	$506				$113			$619	0
S-BL	2092	Sewer Service Line - 4" HDPE	225	Lf.	$45	8	0.49	110	80	$4,961				$74	$10,125		$15,161	1,800
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	6	Ea.	$800	30	2	12	5	$540				$8	$4,800		$5,348	180
S-BL	2096	Sewer Service - Joint Kits	24	Ea.	$110	10	1	24		$1,080				$16	$2,640		$3,736	240
S-BL	2098	Sewer Service - Heat Trace	225	Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	6	Ea.	$300	12	5	30		$1,350				$20	$1,800		$3,170	72
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						3211	1694	$143,687	$0	$0	$0	$5,867	$246,198	$0	$395,751	56,683

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-IH	5012	Arctic Box Hardware	6	Ea	$25	10	2	12		$528	$0	$0	$0	$53	$150		$731	60
		Sheet Totals						12	0	$528	$0	$0	$0	$53	$150	$0	$731	60

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
																	$0	0
C-IH	6082	House A. Box - Lumber & Related	6	Ea.	$100.00	40	8	48		$2,112				$53	$600		$2,765	240
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						48	0	$2,112	$0	$0	$0	$53	$600	$0	$2,765	240

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
C-IH	7010	House A, Boxes WX Stripping	6	Ea	$20	1.0	1	6		$264				$7	$120		$391	6
C-IH	7012	House A, Boxes Insulation & Sealants	6	Ea	$80	8.0	6	36		$1,584				$40	$480		$2,104	48
																		0
																		0
		Sheet Totals						42	0	$1,848	$0	$0	$0	$46	$600	$0	$2,494	54

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	15100	House Rehab & Plumbing						0		$0				$0	$0		$0	0
C-IH	15110	Punch list & repairs	3	Ea.	$75	5	2	6		$468				$9	$225		$702	15
C-IH	15112	Testing @ H. Plumbing	3	Ea.			1.5	5		$351				$7	$0		$358	0
C-IH	15114	Circ. Pumps	3	Ea.	$150	15	8	24		$1,872				$37	$450		$2,359	45
	15116									$0				$0	$0		$0	0
		Sheet Totals						35	0	$2,691				$54	$675	$0	$3,420	60

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	16108	House Service H.T. Electrical	6	Ea.	$200	8	10	60		$4,680				$94	$1,200		$5,974	48
		Sheet Totals						60	0	$4,680				$94	$1,200	$0	$5,974	48

City of Marshall ~ Water & Sewer Replacement ~ 2012 Subdivision ~ 2020

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	1,949	80	$118,702	$22,379	$0	$20,000	$268,737	$0	$135,000	$564,818	9,265
2000	SITE WORK	100	%	$0	0	0	3,211	2,114	$143,687	$0	$0	$0	$5,867	$246,198	$0	$395,751	56,683
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	12	0	$528	$0	$0	$0	$53	$150	$0	$731	60
6000	WOOD & PLASTICS	100	%	$0	0	0	48	0	$2,112	$0	$0	$0	$53	$600	$0	$2,765	240
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	42	0	$1,848	$0	$0	$0	$46	$600	$0	$2,494	54
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES -- FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	35	0	$2,691	$0	$0	$0	$54	$675	$0	$3,420	60
16000	ELECTRICAL	100	%	$0	0	0	60	0	$4,680	$0	$0	$0	$94	$1,200	$0	$5,974	48
	CUMULATIVE PAGE TOTALS:						5,356.79	2,194	$274,248	$22,379	$0	$20,000	$274,903	$249,423	$135,000	$975,952	66,410

City of Marshall

PER Cost Estimate, Alternative 3 - Phase 3, 2021, Pilcher View Subdivision (part 2)

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	3,560	Lft.	$4	**$13,550**
2	W-BL	Water Service Line	400	Lft.	$298	**$119,186**
4	S-BC	Sewer Main	1,440	Lft.	$51	**$72,838**
3	S-BL	Sewer Service Line	450	Lft.	$467	**$210,093**

Construction Subtotal: **$415,668**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$119,000**
8		Engineering & Design Services	**$50,000**
9		Mobilization / Demobilization	**$50,549**
10		General Conditions	**$297,070**
11	M-UI	Miscellaneous Utilities	**$23,879**

Other Direct Cost Subtotal: $540,499

2018 Total Cost: **$956,167**

plus 4.5% 2021 Total Cost: **$999,194**

Assumptions

1. No EMT or Contingency is included.
2. All design, permitting, procurement, mobilization, and construction must occur in one year for a functional system.
3. Construction occurs in 2019.
4. Archeological monitoring will not be required for this phase.
5. Assume further investigation (excavation) verifies water mains and most of water service lines are competent.
6. Assume further video investigation of sewer system verifies sewer mains and most of sewer service lines are competent.
7. Assume hydrants are installed on existing water main and manholes on existing sewer main are replaced.
8. Upgrades to the water treatment plant equipment are not required.
9. No in home plumbing is required.
10. Existing arctic boxes to be replaced.

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
G-CM	1025	CM Svcs & Eng. Support	100	%												$115,000	$115,000	
M-DS	1370	Engineering & Design	100	%												$50,000	$50,000	
G-GC	1028	Archeological Services	100	%														
G-CM	1030	Small Material Procurement	400,000	S	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	398	Cwt	$95		0.15	60	30	$2,685				$37,783			$40,467	
G-GC	1036	Material Handling & Inventory	442	Cwt			0.1	44	30	$1,989							$1,989	
G-GC	1040	Field Superintendent	8	Wks.			66	528		$41,184							$41,184	
G-GC	1042	Field General Foreman		Wks.			60											
G-GC	1045	Job Clerk		Wks.			24											
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	40	Dys	$36									$1,440			$1,440	
G-GC	1060	Subsistence	60	Dys	$36									$2,160			$2,160	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	2	Mo.	$2,000									$4,000			$4,000	
MUI	1090	Telephone & Star Band Svcs.	2	Mo.	$450									$900			$900	
G-GC	1130	Air Charters	2	Mo.	$200									$400			$400	
G-GC	1140	Air Travel - Super	1	Rt.	$1,200		16	16		$1,120				$1,200			$2,320	
G-GC	1145	Air Travel--Contract Labor	2	Rt.	$1,000		16	32		$2,080				$2,000			$4,080	
F-RT	1150	Air Freight - Mobilization	44	Cwt	$110		0.1	4	20	$221				$4,861			$5,082	
G-GC	1160	Air Freight - Course of const.	2	Mo.	$3,500		10	20		$1,000				$7,000			$8,000	
G-GC	1180	Safety & Cleanup	8	Wks.	$400		10	80		$3,200				$3,200			$6,400	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent ~ City owned	2	Mo.	$5,000								$10,000				$10,000	
G-GC	1300	Equipment Parts @ City owned	575	Eqhrs	$22	3					$12,650			$12			$12,662	1,725
G-GC	1305	Equip. Maint.Labor @ City equip.	575	Eqhrs			0.25	144		$8,050				$12			$8,062	
G-GC	1310	Equipment Parts @ Project	2,300	Eqhrs	$10	2.7419					$23,000			$46			$23,046	6,306
G-GC	1315	Equip.Maint.Labor ~ Project	2,300	Eqhrs			0.25	575	job	$28,750							$28,750	
G-GC	1320	F.O.G.	11,500	Gal.	$6.0	0.25	0.0215	247		$12,363				$69,000			$81,363	2,875
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345																	
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	324,486	Lbr$	$0									$12,979			$12,979	
MUI	1435	Insurance @ Rental Equipment	2	Mo.	$3,000									$6,000			$6,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		0.8	80		$4,000				$1,000			$5,000	
G-GC	1490	Workers Compensation Estimated	324,486	Lbr$	$0									$27,216			$27,216	
G-GC	1492	Project Accounting Services	3	Mo.	$1,800									$5,400			$5,400	
G-GC	1494																	
		Sheet Totals						1,910	80	$110,241	$35,650		$15,000	$214,608		$165,000	$540,499	12,506

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010																	
M-IM	2012																	
S-BL	2014	Sewer Serv. - Regrade, repair existing svcs.	14	Ea.	$2,500	100	40	560	550	$24,640				$370	$35,000		$60,010	1,400
W-BL	2016	Water Serv. - Regrade, repair existing svcs.	14	Ea.	$2,500	100	40	560	550	$24,640				$370	$35,000		$60,010	1,400
W-BL	2018	Water Serv. - Curb Stops		Ea.	$2,500	150	20	0		$0				$0	$0		$0	0
W-BD	2020	Water Main - Grade Checking & As-building	20	Lf.	$0.1	0.05	0.05	1		$44				$1	$2		$47	1
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	20	Lf.	$3		0.1	2	1	$88				$1	$60		$149	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	20	Lf.	$4	0.75	0.25	5	4	$220				$3	$80		$303	15
W-BD	2026	Water Main - Right of way prep	20	Lf.			0.02	0		$18				$0			$18	0
W-BD	2028	Water Main - 6" HDPE		Lf.	$48	10	0.25	0		$0				$0	$0		$0	0
W-BD	2030	Water Main - 6" arctic pipe fittings & related		Ea.	$900	45	10	0		$0				$0	$0		$0	0
W-BD	2032	Water Main - 1.25" HDPE Heat Trace		Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	1	Ea.	$5,000	1,000	30	30	15	$1,350				$20	$5,000		$6,370	1,000
W-BD	2036	Water Main - Pipe Joint Kits	4	Ea.	$170	25	1	4		$180				$3	$680		$863	100
W-BD	2038	Water Main - Test & Sanitize	2,000	Lf.	$1.0		0.02	40		$1,800				$2,000	2000		$5,800	0
W-BL	2040	Water Serv. - Grade Checking & As-building		Lf.	$0.1	0.05	0.06	0		$0				$0	$0		$0	0
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.		Lf.	$1		0.25	0		$0				$0	$0		$0	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric		Lf.	$4	0.75	0.25	0		$0				$0	$0		$0	0
W-BL	2046	Water Serv. - Right of way prep	1,050	Lf.	$0.50		0.05	53	10	$2,363				$525			$2,888	0
W-BL	2048	Water Serv. - Saddles & Clam Shells		Ea.	$1,000	100	10	0		$0				$0	$0		$0	0
W-BL	2050	Water Serv. - Carrier - 4" HDPE		Lf.	$45	8	0.49	0		$0				$0	$0		$0	0
W-BL	2052	Water Serv - 4" arctic pipe fittings & related		Ea.	$800	30	2	0		$0				$0	$0		$0	0
W-BL	2054	Water Serv - Pipe Joint Kits		Ea.	$110	10	1	0		$0				$0	$0		$0	0
W-BL	2056	Water Serv - sup/ret lines - 1"A'pex		Lf.	$1.25	0.2	0.05	0		$0				$0	$0		$0	0
W-BL	2058	Water Serv - Heat Trace		Lf.	$7.00	0.05	0.047	0		$0				$0	$0		$0	0
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	28	Ea.	$300	25	5	140		$6,300				$95	$8,400		$14,795	700
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		1	100		$4,500				$500			$5,000	0
S-BC	2064	Sewer Main - Grade checking & as building	700	Lf.	$0.10	0.05	0.13	91		$4,095				$61	$70		$4,226	35
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	700	Lf.	$3		0.22	154	140	$6,930				$104	$2,100		$9,134	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	700	Lf.	$4	0.75	0.25	175	150	$7,875				$118	$2,800		$10,793	525
S-BC	2070	Sewer Main - Right of way prep	700	Lf.			0.05	35	10	$1,575				$24	$0		$1,599	0
S-BC	2072	Sewer Main - 8" HDPE	140	Lf.	$70	15	0.7	98	95	$4,410				$66	$9,800		$14,276	2,100
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes		Ea.	$1,000	60	8	0	0	$0				$0	$0		$0	0
S-BC	2076	Sewer Main - Joint Kits	12	Ea.	$150	20	1	12		$540				$8	$1,800		$2,348	240
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	3	Ea.	$5,000	5000	80	240	150	$10,800				$162	$15,000		$25,962	15,000
S-BC	2080	Sewer Main - Cleanouts & Related		Ea.	$1,500	150	20	0		$0				$0	$0		$0	0
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,600				$900	$0		$4,500	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	1,120	Lf.	$0.10	0.05	0.06	67		$3,024				$212	$112		$3,348	56
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	1,120	Lf.	$1		0.25	280	250	$12,600				$189	$1,120		$13,909	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	1,120	Lf.	$4	0.75	0.25	280	250	$12,600				$189	$4,480		$17,269	840
S-BL	2090	Sewer Serv. - Right of way prep	1,120	Lf.	$0.50		0.05	56	10	$2,520				$560			$3,080	0
S-BL	2092	Sewer Service Line - 4" HDPE	400	Lf.	$45	8	0.49	196	190	$8,820				$132	$18,000		$26,952	3,200
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	28	Ea.	$800	30	2	56		$2,520				$38	$22,400		$24,958	840
S-BL	2096	Sewer Service - Joint Kits	42	Ea.	$110	10	1	42		$1,890				$28	$4,620		$6,538	420
S-BL	2098	Sewer Service - Heat Trace		Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	28	Ea.	$300	12	5	140		$6,300				$95	$8,400		$14,795	336
S-BL	2102	Sewer Service - Testing	100	%			0.6	60		$2,700				$41	$0		$2,741	0
		Sheet Totals						3557	2375	$158,941	$0	$0	$0	$6,813	$176,924	$0	$342,679	28,208

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-HH	5012	Arctic Box Hardware	56	Ea	$25	10	2	112		$4,928	$0	$0	$0	$493	$1,400		$6,821	560
		Sheet Totals						112	0	$4,928	$0	$0	$0	$493	$1,400	$0	$6,821	560

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
																	$0	0
C-IH	6082	House A. Box - Lumber & Related	56	Ea.	$100.00	40	8	448		$19,712				$493	$5,600		$25,805	2,240
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						448	0	$19,712	$0	$0	$0	$493	$5,600	$0	$25,805	2,240

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
C-IH	7010	House A. Boxes WX Stripping	56	Ea	$20	1.0	1	56		$2,464				$62	$1,120		$3,646	56
C-IH	7012	House A. Boxes Insulation & Sealants	56	Ea	$80	8.0	6	336		$14,784				$370	$4,480		$19,634	448
																		0
																		0
		Sheet Totals						392	0	$17,248	$0	$0	$0	$431	$5,600	$0	$23,279	504

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	15100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	**15114**	Circ. Pumps	4	Ea.	$150	15	8	32		$2,496				$50	$600		$3,146	60
	15116									$0				$0	$0		$0	0
		Sheet Totals						32	0	$2,496				$50	$600	$0	$3,146	60

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-IH	16108	House Service H,T, Electrical	14	Ea.	$200	8	10	140		$10,920				$218	$2,800		$13,938	112
		Sheet Totals						140	0	$10,920				$218	$2,800	$0	$13,938	112

City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B ~ 2021

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	1,910	$0	$110,241	$35,650	$0	$15,000	$214,608	$0	$165,000	$540,499	12,506
2000	SITE WORK	100	%	$0	0	0	3,557	2,795	$158,941	$0	$0	$0	$6,813	$176,924	$0	$342,679	28,208
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	112	0	$4,928	$0	$0	$0	$493	$1,400	$0	$6,821	560
6000	WOOD & PLASTICS	100	%	$0	0	0	448	0	$19,712	$0	$0	$0	$493	$5,600	$0	$25,805	2,240
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	392	0	$17,248	$0	$0	$0	$431	$5,600	$0	$23,279	504
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES -- FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	32	0	$2,496	$0	$0	$0	$50	$600	$0	$3,146	60
16000	ELECTRICAL	100	%	$0	0	0	140	0	$10,920	$0	$0	$0	$218	$2,800	$0	$13,938	112
	CUMULATIVE PAGE TOTALS:						6,591.37	2,875	$324,486	$35,650	$0	$15,000	$223,107	$192,924	$165,000	$956,167	44,190

City of Marshall

PER Cost Estimate, Alternative 3 - Phase 4, 2022, Clinic Loop

Item #	Scope	Description	Quantity	Unit	Unit Cost	Extended Cost
1	W-BD	Water Distribution Main	3,560	Lft.	$55	**$195,086**
2	W-BL	Water Service Line	400	Lft.	$131	**$52,599**
4	S-BC	Sewer Main	1,440	Lft.	$67	**$96,646**
3	S-BL	Sewer Service Line	450	Lft.	$67	**$30,140**

Construction Subtotal: **$374,471**

Other Direct Costs

7		Construction Management, Supervision & Engineering Support, Amendment #	**$124,000**
8		Engineering & Design Services	**$50,000**
9		Mobilization / Demobilization	**$58,220**
10		General Conditions	**$302,079**
11	M-UI	Miscellaneous Utilities	**$26,802**

Other Direct Cost Subtotal: **$561,100**

2018 Total Cost: **$935,572**

plus 6.5% 2022 Total Cost: **$996,384**

Assumptions

1. No EMT or Contingency is included.
2. All design, permitting, procurement, mobilization, and construction must occur in one year for a functional system.
3. Construction occurs in 2022.
4. Archeological monitoring will be required for this phase.
5. Upgrades to the water treatment plant equipment are not required.
6. No in home plumbing is required.
7. 1700 LF of new water main, 225 LF of new water service, and 3 new water services are constructed.
8. 500 LF of new sewer main, 150 LF of new sewer service, and 2 new sewer services are constructed.
9. No blind wyes are installed for future services.

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
G-CM	1025	CM Svcs & Eng. Support	100	%												$120,000	$120,000	
M-DS	1370	Engineering & Design	100	%												$50,000	$50,000	
G-GC	1028	Archeological Services	100	%												$25,000	$25,000	
G-CM	1030	Small Material Procurement	400,000	$	$0.01									$4,000			$4,000	
F-RT	1035	Mobilization - Barge - Truck	465	Cwt	$95		0.15	70	30	$3,137				$44,146			$47,282	
G-GC	1036	Material Handling & Inventory	516	Cwt			0.1	52	30	$2,323							$2,323	
G-GC	1040	Field Superintendent	12	Wks.			66	792		$61,776							$61,776	
G-GC	1042	Field General Foreman		Wks.			60											
G-GC	1045	Job Clerk		Wks.			24											
G-GC	1050	Project Office/Quarters Setup&Supply	1	Ea.	$2,000		80	80		$3,600				$2,000			$5,600	
G-GC	1055	Subsist. @ Contract Lab.	30	Dys	$36									$1,080			$1,080	
G-GC	1060	Subsistence	90	Dys	$36									$3,240			$3,240	
G-GC	1065	Office Supplies	100	%	$10	3								$1,000			$1,000	300
G-GC	1070	Office Equipment	100	%	$10	3								$1,000			$1,000	300
MUI	1080	Temporary Power	3	Mo.	$2,000									$6,000			$6,000	
MUI	1090	Telephone & Star Band Svcs.	3	Mo.	$450									$1,350			$1,350	
G-GC	1130	Air Charters	3	Mo.	$200									$600			$600	
G-GC	1140	Air Travel - Super	2	Rt.	$1,200		16	32		$2,240				$2,400			$4,640	
G-GC	1145	Air Travel--Contract Labor	2	Rt.	$1,000		16	32		$2,080				$2,000			$4,080	
F-RT	1150	Air Freight - Mobilization	52	Cwt	$110		0.1	5	20	$258				$5,680			$5,938	
G-GC	1160	Air Freight - Course of const.	3	Mo.	$3,500		10	30		$1,500				$10,500			$12,000	
G-GC	1180	Safety & Cleanup	10	Wks.	$400		10	100		$4,000				$4,000			$8,000	
G-GC	1190	Small Tools	100	%	$200	5								$20,000			$20,000	500
G-GC	1200	Small Tools/Equipment Rent	100	%	$50	5							$5,000				$5,000	500
G-GC	1210	Equipment Rent ~ City owned	3	Mo.	$5,000								$15,000				$15,000	
G-GC	1300	Equipment Parts @ City owned	393	Eqhrs	$22	3					$8,637			$8			$8,645	1,178
G-GC	1305	Equip. Maint.Labor @ City equip.	393	Eqhrs			0.33	130		$7,255				$8			$7,263	
G-GC	1310	Equipment Parts @ Project	1,570	Eqhrs	$10	2.7419					$15,704			$31			$15,735	4,306
G-GC	1315	Equip.Maint.Labor ~ Project	1,570	Eqhrs			0.3	471	job	$23,556							$23,556	
G-GC	1320	F.O.G.	7,852	Gal.	$6.0	0.25	0.0155	122		$6,085				$47,112			$53,197	1,963
G-GC	1322	Special Equipment & Tools		%	$100		1											
G-GC	1325																	
G-GC	1330																	
E-QP	1345																	
E-QP	1350																	
E-QP	1355																	
E-QP	1360																	
E-QP	1365																	
MUI	1425	General Liability Insurance	261,289	LbrS	$0									$10,452			$10,452	
MUI	1435	Insurance @ Rental Equipment	3	Mo.	$3,000									$9,000			$9,000	
F-RT	1475	Demobilization/Inventory	100	%	$10		0.8	80		$4,000				$1,000			$5,000	
G-GC	1490	Workers Compensation Estimated	261,289	LbrS	$0									$17,942			$17,942	
G-GC	1492	Project Accounting Services	3	Mo.	$1,800									$5,400			$5,400	
G-GC	1494																	
		Sheet Totals						1,995	80	$121,811	$24,341		$20,000	$199,948		$195,000	$561,100	9,047

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
M-IM	2010							0		$0				$0	$0		$0	0
M-IM	2012							0		$0				$0	$0		$0	0
S-BL	2014	Sewer Serv - Regrade, repair existing svcs.		Ea.	$2,500	100	40	0		$0				$0	$0		$0	0
W-BL	2016	Water Serv - Regrade, repair existing svcs.		Ea.	$2,500	100	40	0		$0				$0	$0		$0	0
W-BL	2018	Water Serv. - Curb Stops		Ea.	$2,500	150	20	0		$0				$0	$0		$0	0
W-BD	2020	Water Main - Grade Checking & As-building	1,700	Lf.	$0.1	0.05	0.05	85		$3,740				$56	$170		$3,966	85
W-BD	2022	Water Main - Regrade/fill @ pipe alignm.	1,700	Lf.	$3		0.1	170	150	$7,480				$112	$5,100		$12,692	0
W-BD	2024	Water Main - Pipe Bedding & Fabric/Foam	1,700	Lf.	$4	0.75	0.25	425	350	$18,700				$281	$6,800		$25,781	1,275
W-BD	2026	Water Main - Right of way prep	1,700	Lf.			0.02	34	10	$1,496				$0			$1,496	0
W-BD	2028	Water Main - 6" HDPE	1,700	Lf.	$48	10	0.25	425	200	$18,700				$281	$81,600		$100,581	17,000
W-BD	2030	Water Main - 6" arctic pipe fittings & related	7	Ea.	$900	45	10	70	10	$3,080				$46	$6,300		$9,426	315
W-BD	2032	Water Main - 1.25" HDPE Heat Trace	1,700	Lf.				0		$0				$0	$0		$0	0
W-BD	2034	Water Main - Hydrant Packages	2	Ea.	$5,000	1,000	30	60	50	$2,640				$40	$10,000		$12,680	2,000
W-BD	2036	Water Main - Pipe Joint Kits	107	Ea.	$170	25	1	107		$4,708				$71	$18,190		$22,969	2,675
W-BD	2038	Water Main - Test & Sanitize	1,700	Lf.	$1.2		0.02	34		$1,496				$2,000	2000		$5,496	0
W-BL	2040	Water Serv. - Grade Checking & As-building	225	Lf.	$0.1	0.05	0.06	14		$594				$119	$23		$735	11
W-BL	2042	Water Serv. - Regrade/fill @ pipe alignm.	225	Lf.	$1		0.25	56	40	$2,475				$37	$225		$2,737	0
W-BL	2044	Water Serv. - Pipe Bedding & Geotex. Fabric	225	Lf.	$4	0.75	0.25	56	45	$2,475				$37	$900		$3,412	169
W-BL	2046	Water Serv. - Right of way prep	225	Lf.	$0.50		0.05	11	5	$495				$113			$608	0
W-BL	2048	Water Serv. - Saddles & Clam Shells	3	Ea.	$1,000	100	10	30	5	$1,320				$132	$3,000		$4,452	300
W-BL	2050	Water Serv. - Carrier - 4" HDPE	225	Lf.	$45	8	0.35	79	40	$3,465				$52	$10,125		$13,642	1,800
W-BL	2052	Water Serv - 4" arctic pipe fittings & related	9	Ea.	$800	30	2	18	4	$792				$12	$7,200		$8,004	270
W-BL	2054	Water Serv - Pipe Joint Kits	30	Ea.	$110	10	1	30		$1,320				$20	$3,293		$4,633	300
W-BL	2056	Water Serv - sup/ret lines - 1"Apex	450	Lf.	$1.25	0.2	0.05	23		$990				$15	$563		$1,567	90
W-BL	2058	Water Serv - Heat Trace	275	Lf.	$6.00	0.05	0.047	13		$569				$9	$1,650		$2,227	14
W-BL	2060	Water Serv - A.box Conn. Fittings & Boots	3	Ea.	$300	25	5	15		$660				$10	$900		$1,570	75
W-BL	2062	Water Serv - Testing & Sanitize	100	%	$5		0.3	30		$1,320				$500			$1,820	0
S-BC	2064	Sewer Main - Grade checking & as building	500	Lf.	$0.10	0.05	0.13	65		$2,860				$43	$50		$2,953	25
S-BC	2066	Sewer Main - Regrade/fill @ pipe alignm.	500	Lf.	$3		0.22	110	100	$4,840				$73	$1,500		$6,413	0
S-BC	2068	Sewer Main - Pipe Bedding & Geotex. Fabric	500	Lf.	$4	0.75	0.25	125	50	$5,500				$83	$2,000		$7,583	375
S-BC	2070	Sewer Main - Right of way prep	500	Lf.			0.05	25	10	$1,100				$17	$0		$1,117	0
S-BC	2072	Sewer Main - 8" HDPE	500	Lf.	$70	15	0.7	350	200	$15,400				$231	$35,000		$50,631	7,500
S-BC	2074	Sewer Main - 8" x 4" Serv. Wyes	2	Ea.	$1,000	60	8	16	60	$704				$11	$2,000		$2,715	120
S-BC	2076	Sewer Main - Joint Kits	43	Ea.	$150	20	1	43		$1,892				$28	$6,450		$8,370	860
S-BC	2078	Sewer Main - Manholes, Access. & Insulation	1	Ea.	$5,000	5000	60	60	20	$2,640				$40	$5,000		$7,680	5,000
S-BC	2080	Sewer Main - Cleanouts & Related	2	Ea.	$1,500	150	20	40	10	$1,760				$26	$3,000		$4,786	300
S-BC	2082	Sewer Main & Manhole - Testing	100	%			0.8	80		$3,520				$880	$0		$4,400	0
S-BL	2084	Sewer Serv. - Grade Checking & As-building	150	Lf.	$0.10	0.05	0.06	9		$396				$28	$15		$439	8
S-BL	2086	Sewer Serv. - Regrade/fill @ pipe alignm.	150	Lf.	$1		0.25	38	30	$1,650				$25	$150		$1,825	0
S-BL	2088	Sewer Serv. - Pipe Bedding & Geotex. Fabric	150	Lf.	$4	0.75	0.25	38	30	$1,650				$25	$600		$2,275	113
S-BL	2090	Sewer Serv. - Right of way prep	150	Lf.	$0.50		0.05	8	2	$330				$75			$405	0
S-BL	2092	Sewer Service Line - 4" HDPE	150	Lf.	$45	8	0.49	74	40	$3,234				$49	$6,750		$10,033	1,200
S-BL	2094	Sewer Service Line - 4" HDPE Fittings	4	Ea.	$800	30	2	8	2	$352				$5	$3,200		$3,557	120
S-BL	2096	Sewer Service - Joint Kits	16	Ea.	$110	10	1	16		$704				$11	$1,760		$2,475	160
S-BL	2098	Sewer Service - Heat Trace	150	Lf.				0		$0				$0	$0		$0	0
S-BL	2100	Sewer Svs. A.box Fittings & Boots	2	Ea.	$300	12	5	10		$440				$7	$600		$1,047	24
S-BL	2102	Sewer Service - Testing	100	%			0.2	20		$880				$13	$0		$893	0
		Sheet Totals						2917	1463	$128,367	$0	$0	$0	$5,607	$226,113	$0	$360,087	42,183

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT RENTAL OWNED	COST TYPE 4 EQUIPMENT RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
								0		$0	$0	$0	$0	$0	$0		$0	0
C-IH	5012	Arctic Box Hardware	5	Ea	$25	10	2	10		$440	$0	$0	$0	$44	$125		$609	50
		Sheet Totals						10	0	$440	$0	$0	$0	$44	$125	$0	$609	50

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
																	$0	0
C-IH	6082	House A, Box - Lumber & Related	5	Ea.	$100.00	40	8	40		$1,760				$44	$500		$2,304	200
																	$0	0
																	$0	0
								0		$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
										$0				$0	$0		$0	0
		Sheet Totals						40	0	$1,760	$0	$0	$0	$44	$500	$0	$2,304	200

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
C-IH	7010	House A. Boxes WX Stripping	5	Ea	$20	1.0	1	5		$220				$6	$100		$326	5
C-IH	7012	House A. Boxes Insulation & Sealants	5	Ea	$80	8.0	6	30		$1,320				$33	$400		$1,753	40
																		0
																		0
		Sheet Totals						35	0	$1,540	$0	$0	$0	$39	$500	$0	$2,079	45

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	15100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-III	**15110**	Punch list & repairs	3	Ea.	$75	5	2	6		$468				$9	$225		$702	15
C-III	**15112**	Testing @ H. Plumbing	3	Ea.			1.5	5		$351				$7	$0		$358	0
C-III	**15114**	Circ. Pumps	3	Ea.	$150	15	8	24		$1,872				$37	$450		$2,359	45
	15116									$0				$0	$0		$0	0
		Sheet Totals						35	0	$2,691				$54	$675	$0	$3,420	60

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

VSW Scope Code	C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
	16100	**House Rehab & Plumbing**						0		$0				$0	$0		$0	0
C-H1	16108	House Service H.T. Electrical	6	Ea.	$200	8	10	60		$4,680				$94	$1,200		$5,974	48
		Sheet Totals						60	0	$4,680				$94	$1,200	$0	$5,974	48

City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~ 2022

C.S.I. CODE	DESCRIPTION	QUANTITY	BID UNIT	COST $/UNIT	WEIGHT /UNIT	MHRS/ UNIT	MAN HOURS	EQUIP HOURS	COST TYPE 1 BURDENED LABOR	COST TYPE 2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPMENT OWNED	COST TYPE 4 RENTAL OUTSIDE	COST TYPE 5 SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
1000	GENERAL CONDITIONS	100	%	$0	0	0	1,995	80	$121,811	$24,341	$0	$20,000	$199,948	$0	$195,000	$561,100	9,047
2000	SITE WORK	100	%	$0	0	0	2,917	1,883	$128,367	$0	$0	$0	$5,607	$226,113	$0	$360,087	42,183
3000	CONCRETE & RELATED	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
5000	MISCELLANEOUS METALS	100	%	$0	0	0	10	0	$440	$0	$0	$0	$44	$125	$0	$609	50
6000	WOOD & PLASTICS	100	%	$0	0	0	40	0	$1,760	$0	$0	$0	$44	$500	$0	$2,304	200
7000	THERMAL & MOISTURE PROTECTION	100	%	$0	0	0	35	0	$1,540	$0	$0	$0	$39	$500	$0	$2,079	45
8000	DOORS & WINDOWS	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9000	FINISHES – FLOOR & WALL	100	%	$0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	0
15000	MECHANICAL	100	%	$0	0	0	35	0	$2,691	$0	$0	$0	$54	$675	$0	$3,420	60
16000	ELECTRICAL	100	%	$0	0	0	60	0	$4,680	$0	$0	$0	$94	$1,200	$0	$5,974	48
	CUMULATIVE PAGE TOTALS:						5,091.81	1,963	$261,289	$24,341	$0	$20,000	$205,829	$229,113	$195,000	$935,572	51,632

Attachment D

Trip Report

Tok Office
HC 72 Box 850
Tok, AK 99780

Anchorage Office
4500 Business Park Blvd, Ste. C-10
Anchorage, AK 99503

Fairbanks Office
3745 Geist Road, Suite B,
Fairbanks, Alaska 99709

SUMMIT
CONSULTING SERVICES, Inc.

ph: (907) 291-2339
fax: (907) 291-2333
summitctok@aol.com

ph: (907) 563-5675
fax: (907) 563-5685
summitanchorage@aol.com

ph: (907) 458-7747
fax: (907) 458-7748
summitcfbks@aol.com

Summit Consulting Services Trip Report

DATE: 1/12/18 **REPORTER:** Heather Gross

LOCATION/PROJECT: **Marshall PER Investigation**

AIR CARRIERS/ROUTING:
1/7/18: Travel from Tok to Anchorage
1/8/18: Alaska Air Flight 41 ANC to BET
1/8/18: Renfro Charter BET to MLL
1/10/18: Ravn Flight 3190 MLL to BET
1/10/18: Alaska Flight 46 BET to ANC
1/11/18: Travel from Anchorage to Tok

PURPOSE: Preliminary Engineering Report Investigation

ACCOMPANIED BY: Bridget Eckhardt, SCS

CONTACTS: Joeseph Fitka, City of Marshall Mayor
Michael Duny, Water Plant Operator

MAJOR ACCOMPLISHMENTS:
- Visit Pilcher View Subdivision for assessment
- Visit 2012 Subdivision for assessment
- Visit water treatment plant and honeybucket disposal facility

FOLLOW-UP ITEMS:
- Complete Preliminary Engineering Report

DISCUSSION:
- Traveled to Anchorage on 1/7/18 and to Marshall on 1/8/18 arriving at approximately 4pm.
- After arriving in Marshall, we checked in at the school for lodging and met Ryan Odomin who helped us to find the operator Mike Duny. That evening, Mike accompanied us to 5 homes. We visited a further 4 homes and the store the next morning. Observations include:
  - House 94. Settling on the west side of home causes issues with the sewer line. The owner has realigned/repaired it in the arctic box. The water service line has separated at the arctic box and is protected by insulation wrapped in plastic. There have been some issues with condensation and mold. Occupants do not usually use the circ pump and when a line freezes (usually in the fall) they have been able to thaw it with the heat traces.
  - House 93. Owner uses circ pump and heat traces as needed to thaw the lines. The toyo on-demand heater installed by AVCP has an exhaust leak and they are not using it. They use an electric heater.
  - House 92. Similar report for freezing and mold issues. The water service bypass valve has been changed 2 or 3 times.
  - House 91. Similar report for freezing and mold issues. He uses the circulating pump.
  - House 81. Circulating pump is broken. Similar report for freezing and mold issues.

- Building 159 (Mass Inc Office). Plumbing and service lines constructed by STG in 2015. Mass Inc. now uses it as an office. They had the sewer line disconnected beneath the building due to a sewer smell. The water is shut off.
- Building 77 (Church). The copper plumbing in this building has frozen more than once and been repaired. The service for this building is now shut off and the community does not want to serve the building and need to heat it.
- House 87. Sewer line has been releveled 3 times. Similar report for freezing and mold issues. In-house plumbing has frozen and flooded the mechanical room. Owner typically uses the heat trace all winter. Circ pump is not operating.
- Building 95 (Store). Has a toilet and lav with copper piping. Manager was not available to speak to. Attendant did not know of any issues.
- 2012 Subdivision. We visited the 3 bedroom home on the west side. These homes have been provided with fixtures and plumbing. The water heater is placed but not connected. The sewer has been stubbed out the side of the homes with no arctic box. There are no exterior penetrations for the water.
- House 86. Same report for freezing. The circulation pump is not working. A 6 inch square of linoleum has been removed adjacent to the tub and the plywood is rotten. The owner believes the shower wall is rotten and there is mold at the back of the kitchen and bath cabinets. The owner regularly cleans the shower walls with Clorox and they are free of mold.
- House 78. A leak inside the water arctic box is causing glaciating on the outside of the arctic box.

- General observations include:
  - The water and sewer system in Pilcher View Subdivision was constructed in 1990 or 1991 with no upgrades since.
  - The HUD loop that serves the Pilcher View Subdivision is a 4 x 12 arctic pipe. There are no hydrants available for flushing. Each home has a shut-off valve accessed by an HDPE riser with an HDPE lid that is screwed on. Four of these risers are open and packed with snow/debris. The services are circulating 1 inch PEX lines.
  - In home plumbing was originally all copper lines. The only exceptions are where PEX was used during installation of the new water heaters.
  - The sewer line is a 6x12 arctic pipe and there are 4 old manholes. These manholes are 4 ft corrugated culvert with a concrete bottom and covered with a sprayed insulation (per the operator). They are set above grade with concrete lids and manhole covers. One of the manholes holds water and the operator believes the manhole has jacked upwards with reverse grade upstream of the manhole.
  - Most service entrances are out of alignment to some degree. The operator has to re-align a disconnected service approximately twice per year. He has replaced the fitting at the 45 where sewer service line enters the ground with a Romac fitting at 6 homes.
  - Most of the homes in this subdivision have had a ¾" sheathing placed behind the toilet and a chase built for the hydronic heat pipes to the baseboard. The purpose of these upgrades was to prevent condensation from the toilet tank and piping from further damaging the walls. We could not observe the condition of the walls behind the chase or sheathing.
  - These homes received toyo on-demand water heaters as part of an energy upgrade. Most occupants were happy with the new heaters.
- General observations at the water plant include:
  - The system has remained basically unchanged. Raw water from the wells is pumped into the plant, chlorinated and fluoride is added. The treated water is stored in the water storage tank and distributed to 3 circulating mains: North Loop, South Loop, and HUD

Loop. Per the operator the North Loop uses approximately 7 to 10 thousand gallons per day, 7,000 gpd at the South Loop, and 3 to 4 thousand gpd at the HUD Loop.
    - ANTHC upgrades (approximately one year ago) have included new lighting, tank heat exchanger, circ pumps on the tank heat, building heat, and boiler system, the pressure pumps, one pressure tank, and provided new instruments for the tank heat system.
- General observations at the honeybucket facility include:
    - The facility is currently being used by 6 homes, three of which are the new 2012 Subdivision homes.
    - Users of the facility have been consistently closing the gate and the deck was clean and free of debris or spillage. The chute and lid operated easily.
- Traveled from Marshall to Anchorage on 1/10/18 arriving at approximately 10 pm. Traveled from Anchorage to Tok on 1/11/18.

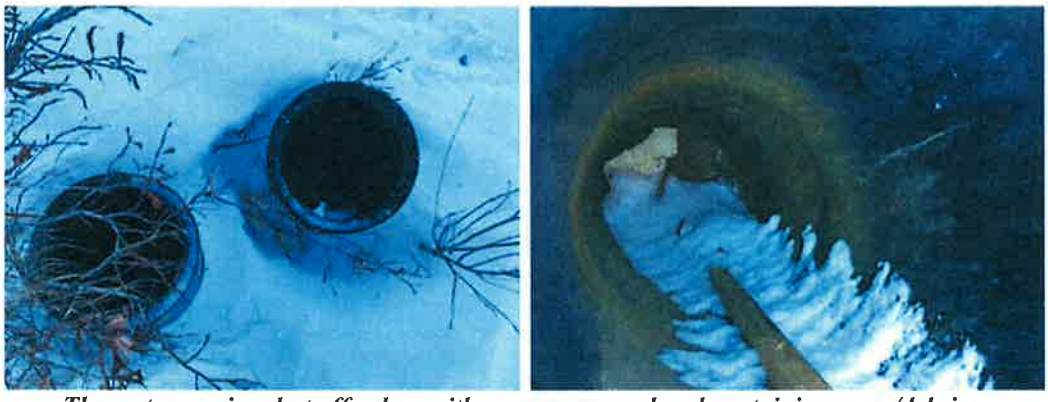
Attachments: Pictures

Cc (electronic copies): SCS Project Files - SCS Tok and Anchorage
Dave Cramer, scsdac@aol.com
Eric Cramer, ecramer@aol.com
Tok Office, summitctok@aol.com
Bridget Eckhardt, beckhardt@scsalaska.com
Donna Lee, VSW, donna.lee@alaska.gov
Joseph Fitka, City of Marshall

Marshall January 2018 Site Visit Pictures

Building 159 sewer line that has been cut below the building.

Typical of the four old manholes in Pilcher View Subdivision.

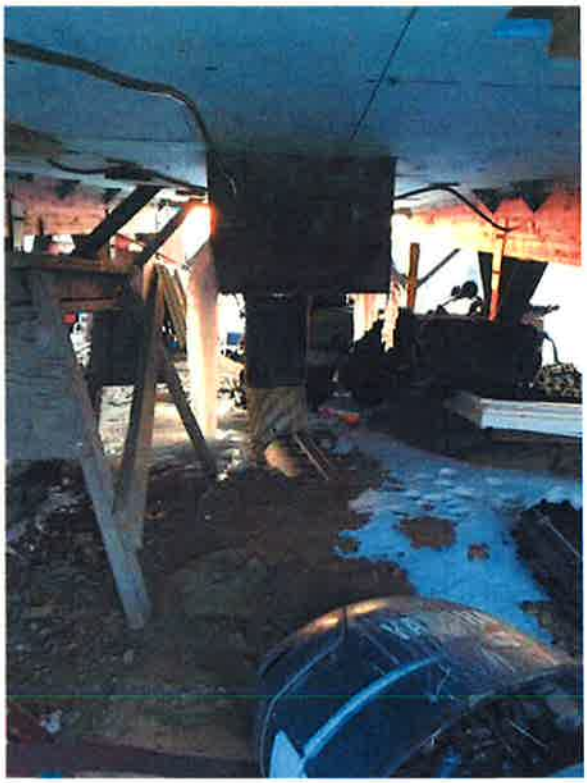


The water service shut off valves with covers removed and containing snow/debris.

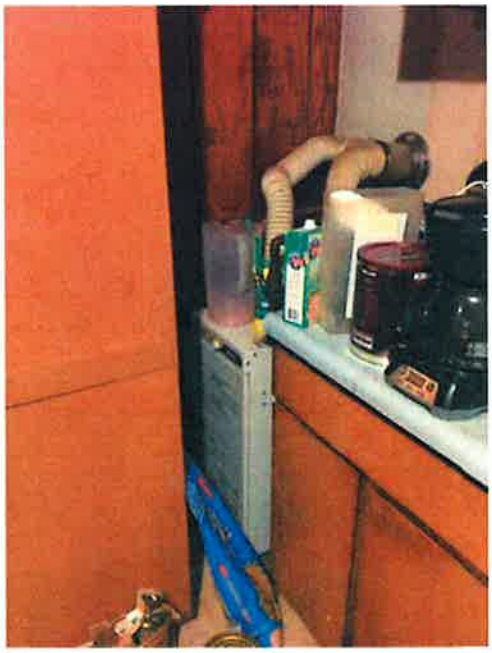
Looking south up the water and sewer main alignment in Pilcher View Subdivision.

Sewer stub out on a new home in the 2012 Subdivision.

Kitchen sink plumbing and fixtures in new subdivision homes.

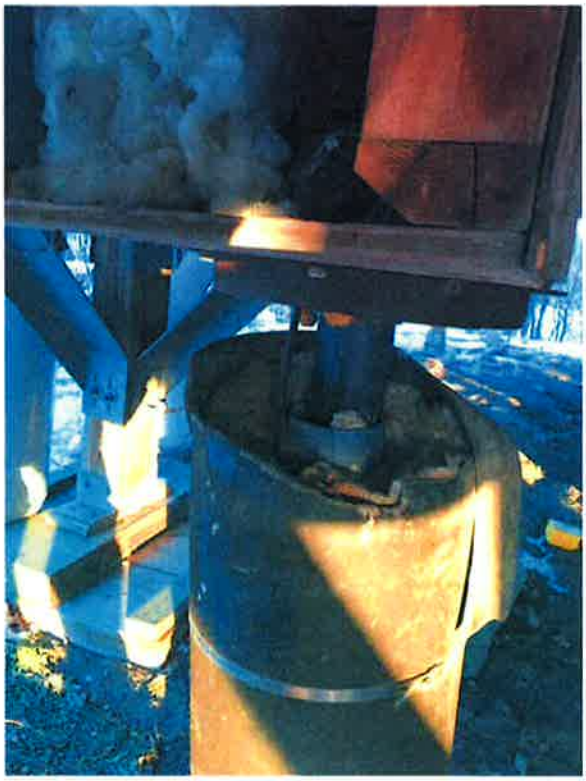


House 78 has a leak in the water arctic box that is glaciating on the sides of the box.



House 81. Mold in bathroom (typical of most Phase 9 homes) and Toyo water heater (typical of Phase 9 homes).

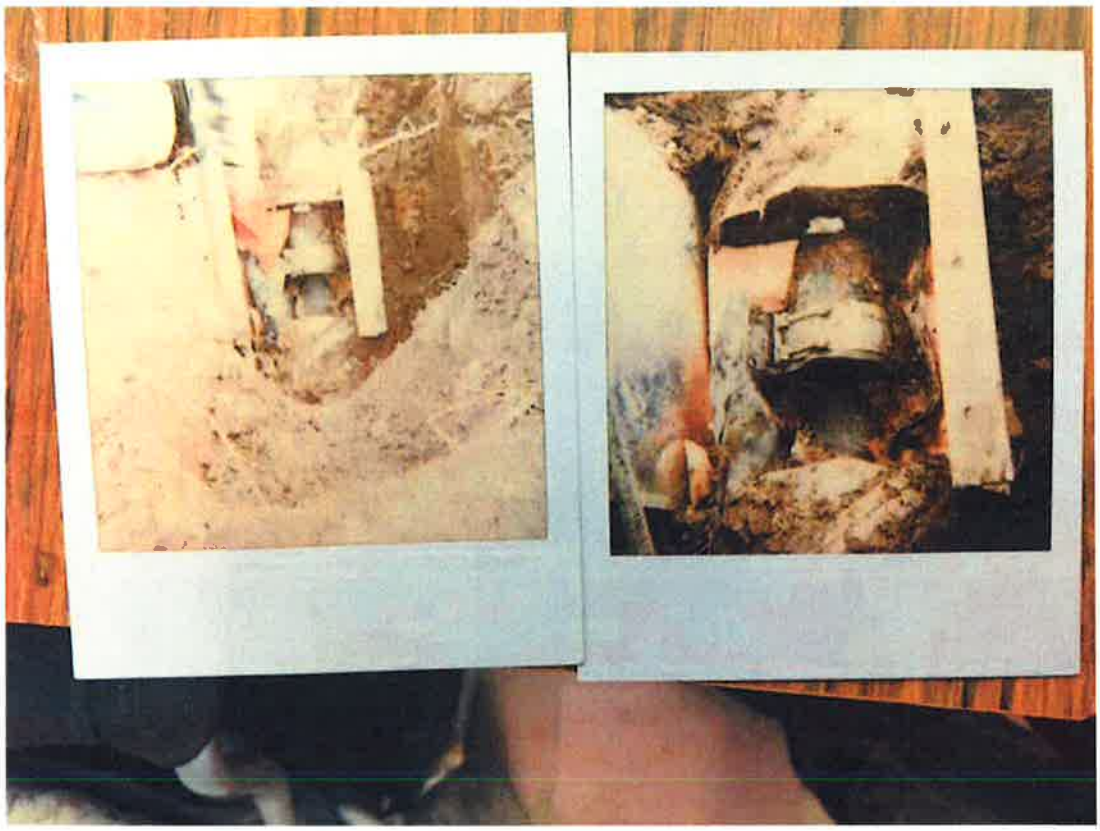
House 87. Water service entrance and heat trace switches (typical of all Phase 9 homes). No heat trace switches were labeled and most residents were unsure which were which.



House 87. Water service line is being pulled apart at the 45joint where it enters the ground. Sewer line pulling away from arctic box and exposed ABS.

House 94. Shower condensation damage. Typical under kitchen sink plumbing with copper piping.

House 94. Water service line is being pulled out of alignment. Sewer line has pulled away from the arctic box and the owner has wrapped the ABS with insulation and plastic.



Photos from the operator showing the condition of the 45 joint on one of the service lines when they excavated to repair it.

Condition of the honeybucket disposal facility and the disposal chute.

Attachment E

Pump and System Curves

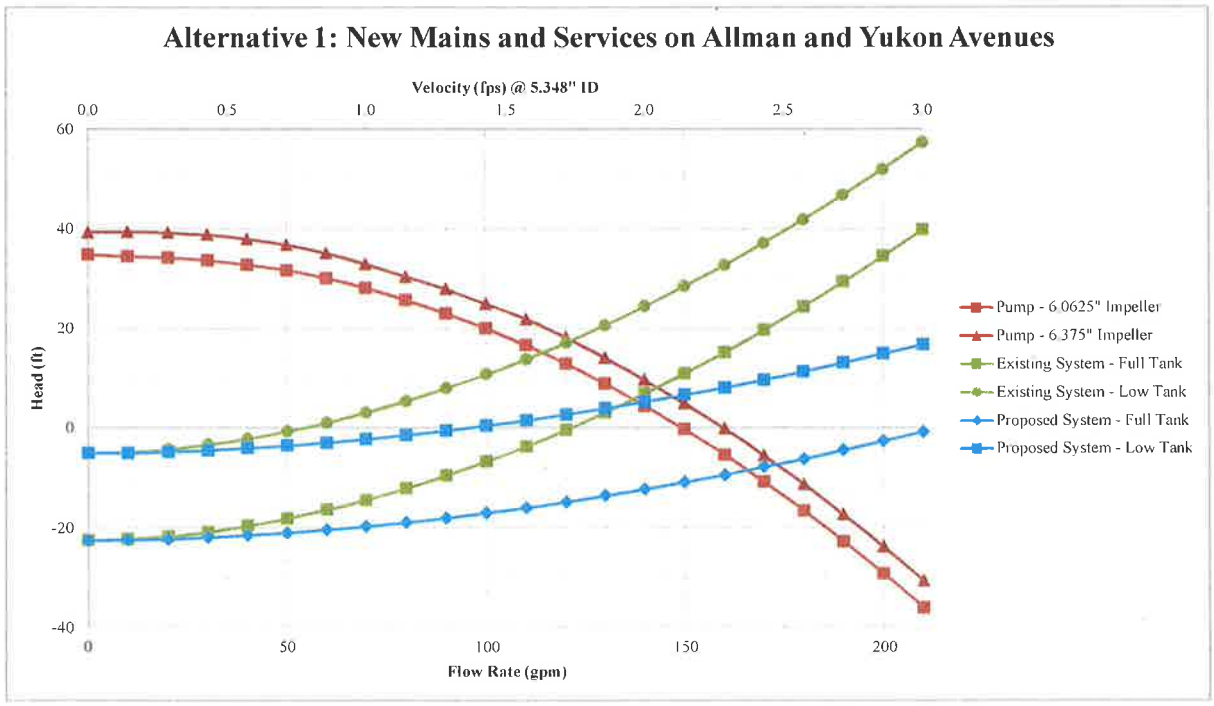
Marshall Phase 9 PER Alternative 1: New Mains and Services on Allman and Yukon Avenues

Hazen-Williams: [4.728*L/(c^1.85*D^4.87)]*Q^1.85

Goulds 4SF 1.5 x 2.5 - 6 End Suction Centrifugal Pump 1 hp

		Pump Data				Proposed Alternative				Existing System		
Roughness=120		6.0625" Impeller	6.375" Impeller	Full Tank	Low Tank	L =0 ft of 4"	L = 5770 ft of 6"	Full Tank	Low Tank	L = 2500 ft of 4"	Full Tank	Low Tank
System Flow Rate (gpm)	System Velocity (fps) - 6" Pipe	Total Head (ft)	Total Head (ft)	Static Head (ft)	Static Head (ft)	Frition Head (ft) - 3.63" ID	Friction Head (ft) - 5.348" ID	Total Head (ft)	Total Head (ft)	Friction Head (ft) - 3.63" ID	Total Head (ft)	Total Head (ft)
0	0.00	34.80	39.30	22.5	5	0.00	0.00	-22.50	-5.00	0.00	-22.50	-5.00
10	0.14	34.50	39.40	22.5	5	0.00	0.08	-22.42	-4.92	0.22	-22.28	-4.78
20	0.29	34.20	39.20	22.5	5	0.00	0.28	-22.22	-4.72	0.81	-21.69	-4.19
30	0.43	33.70	38.80	22.5	5	0.00	0.60	-21.90	-4.40	1.71	-20.79	-3.29
40	0.57	32.80	38.00	22.5	5	0.00	1.02	-21.48	-3.98	2.91	-19.59	-2.09
50	0.71	31.70	36.80	22.5	5	0.00	1.54	-20.96	-3.46	4.39	-18.11	-0.61
60	0.86	30.10	35.10	22.5	5	0.00	2.15	-20.35	-2.85	6.15	-16.35	1.15
70	1.00	28.10	32.90	22.5	5	0.00	2.86	-19.64	-2.14	8.18	-14.32	3.18
80	1.14	25.70	30.40	22.5	5	0.00	3.66	-18.84	-1.34	10.47	-12.03	5.47
90	1.29	23.00	27.90	22.5	5	0.00	4.55	-17.95	-0.45	13.02	-9.48	8.02
100	1.43	20.00	24.90	22.5	5	0.00	5.53	-16.97	0.53	15.83	-6.67	10.83
110	1.57	16.70	21.90	22.5	5	0.00	6.60	-15.90	1.60	18.88	-3.62	13.88
120	1.71	13.00	18.20	22.5	5	0.00	7.75	-14.75	2.75	22.18	-0.32	17.18
130	1.86	8.90	14.10	22.5	5	0.00	8.99	-13.51	3.99	25.71	3.21	20.71
140	2.00	4.50	9.67	22.5	5	0.00	10.31	-12.19	5.31	29.49	6.99	24.49
150	2.14	-0.24	4.95	22.5	5	0.00	11.72	-10.78	6.72	33.51	11.01	28.51
160	2.29	-5.33	-0.11	22.5	5	0.00	13.20	-9.30	8.20	37.76	15.26	32.76
170	2.43	-10.77	-5.52	22.5	5	0.00	14.77	-7.73	9.77	42.24	19.74	37.24
180	2.57	-16.56	-11.27	22.5	5	0.00	16.42	-6.08	11.42	46.95	24.45	41.95
190	2.71	-22.70	-17.37	22.5	5	0.00	18.15	-4.35	13.15	51.89	29.39	46.89
200	2.86	-29.18	-23.82	22.5	5	0.00	19.95	-2.55	14.95	57.05	34.55	52.05
210	3.00	-36.01	-30.61	22.5	5	0.00	21.84	-0.66	16.84	62.44	39.94	57.44

* Extrapolated from manufacturer's pump curve



Marshall Phase 9 PER Alternative 2: New Mains within the Existing Corridor

Hazen-Williams: [4.728*L/(c^1.85*D^4.87)]*Q^1.85

Goulds 4SF 1.5 x 2.5 - 6 End Suction Centrifugal Pump 1 hp

		Pump Data				Proposed Alternative				Existing System		
Roughness=120		6.0625" Impeller	6.375" Impeller	Full Tank	Low Tank	L =0 ft of 4"	L = 6110 ft of 6"	Full Tank	Low Tank	L = 2500 ft of 4"	Full Tank	Low Tank
System Flow Rate (gpm)	System Velocity (fps) - 6" Pipe	Total Head (ft)	Total Head (ft)	Static Head (ft)	Static Head (ft)	Frition Head (ft) - 3.63" ID	Friction Head (ft) - 5.348" ID	Total Head (ft)	Total Head (ft)	Friction Head (ft) - 3.63" ID	Total Head (ft)	Total Head (ft)
0	0.00	34.80	39.30	22.5	5	0.00	0.00	-22.50	-5.00	0.00	-22.50	-5.00
10	0.14	34.50	39.40	22.5	5	0.00	0.08	-22.42	-4.92	0.22	-22.28	-4.78
20	0.29	34.20	39.20	22.5	5	0.00	0.30	-22.20	-4.70	0.81	-21.69	-4.19
30	0.43	33.70	38.80	22.5	5	0.00	0.63	-21.87	-4.37	1.71	-20.79	-3.29
40	0.57	32.80	38.00	22.5	5	0.00	1.08	-21.42	-3.92	2.91	-19.59	-2.09
50	0.71	31.70	36.80	22.5	5	0.00	1.63	-20.87	-3.37	4.39	-18.11	-0.61
60	0.86	30.10	35.10	22.5	5	0.00	2.28	-20.22	-2.72	6.15	-16.35	1.15
70	1.00	28.10	32.90	22.5	5	0.00	3.03	-19.47	-1.97	8.18	-14.32	3.18
80	1.14	25.70	30.40	22.5	5	0.00	3.88	-18.62	-1.12	10.47	-12.03	5.47
90	1.29	23.00	27.90	22.5	5	0.00	4.82	-17.68	-0.18	13.02	-9.48	8.02
100	1.43	20.00	24.90	22.5	5	0.00	5.86	-16.64	0.86	15.83	-6.67	10.83
110	1.57	16.70	21.90	22.5	5	0.00	6.99	-15.51	1.99	18.88	-3.62	13.88
120	1.71	13.00	18.20	22.5	5	0.00	8.21	-14.29	3.21	22.18	-0.32	17.18
130	1.86	8.90	14.10	22.5	5	0.00	9.52	-12.98	4.52	25.71	3.21	20.71
140	2.00	4.50	9.67	22.5	5	0.00	10.92	-11.58	5.92	29.49	6.99	24.49
150	2.14	-0.24	4.95	22.5	5	0.00	12.41	-10.09	7.41	33.51	11.01	28.51
160	2.29	-5.33	-0.11	22.5	5	0.00	13.98	-8.52	8.98	37.76	15.26	32.76
170	2.43	-10.77	-5.52	22.5	5	0.00	15.64	-6.86	10.64	42.24	19.74	37.24
180	2.57	-16.56	-11.27	22.5	5	0.00	17.39	-5.11	12.39	46.95	24.45	41.95
190	2.71	-22.70	-17.37	22.5	5	0.00	19.21	-3.29	14.21	51.89	29.39	46.89
200	2.86	-29.18	-23.82	22.5	5	0.00	21.13	-1.37	16.13	57.05	34.55	52.05
210	3.00	-36.01	-30.61	22.5	5	0.00	23.12	0.62	18.12	62.44	39.94	57.44

* Extrapolated from manufacturer's pump curve.