# 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



November 29, 2018



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Attachment A

**Figures** 

Attachment B

**Estimated Costs** 

Alternatives 1, 2 and 3

Operations & Maintenance Cost Estimates

Life Cycle Cost Estimates

Attachment C

Alternative 3 Estimated Costs

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

Attachment D

Trip Report

Attachment E

System and Pump Curves

#### **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. I 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

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

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.

#### NEED FOR PROJECT 4

#### 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.

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



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

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 Sewer service separating from the arctic box. Glaciation maintain the aged services in the Pilcher View



also apparent on the ground.

Subdivision. The operator plans on one to two major repairs per year.



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

Phase 9 Water and Sewer

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

Phase 9 Water and Sewer

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	70 gal/capita/day (Smith, et al., 1979)
Consumption	
Per Capita Wastewater	65-80 gal/capita/day (Telford, 2015)
Generation	
Current HUD Loop	~3540 gal/day (ANTHC-DEHE, 2012)
Water Consumption	$\sim$ 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  $\frac{1}{2}$  x 2  $\frac{1}{2}$  - 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.

Phase 9 Water and Sewer

# 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.

 Site
 Capital Costs (\$)

 Alternative 1
 4,782,800

 Alternative 2
 4,516,100

 Alternative 3
 3,565,600

 Alternative 4
 0

**Table 5-5 Construction Cost Estimates** 

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

O&M Costs (\$)	
\$93,453	
\$93,453	
\$93,453	
\$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:

- 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

<sup>\*</sup>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.

Phase 9 Water and Sewer

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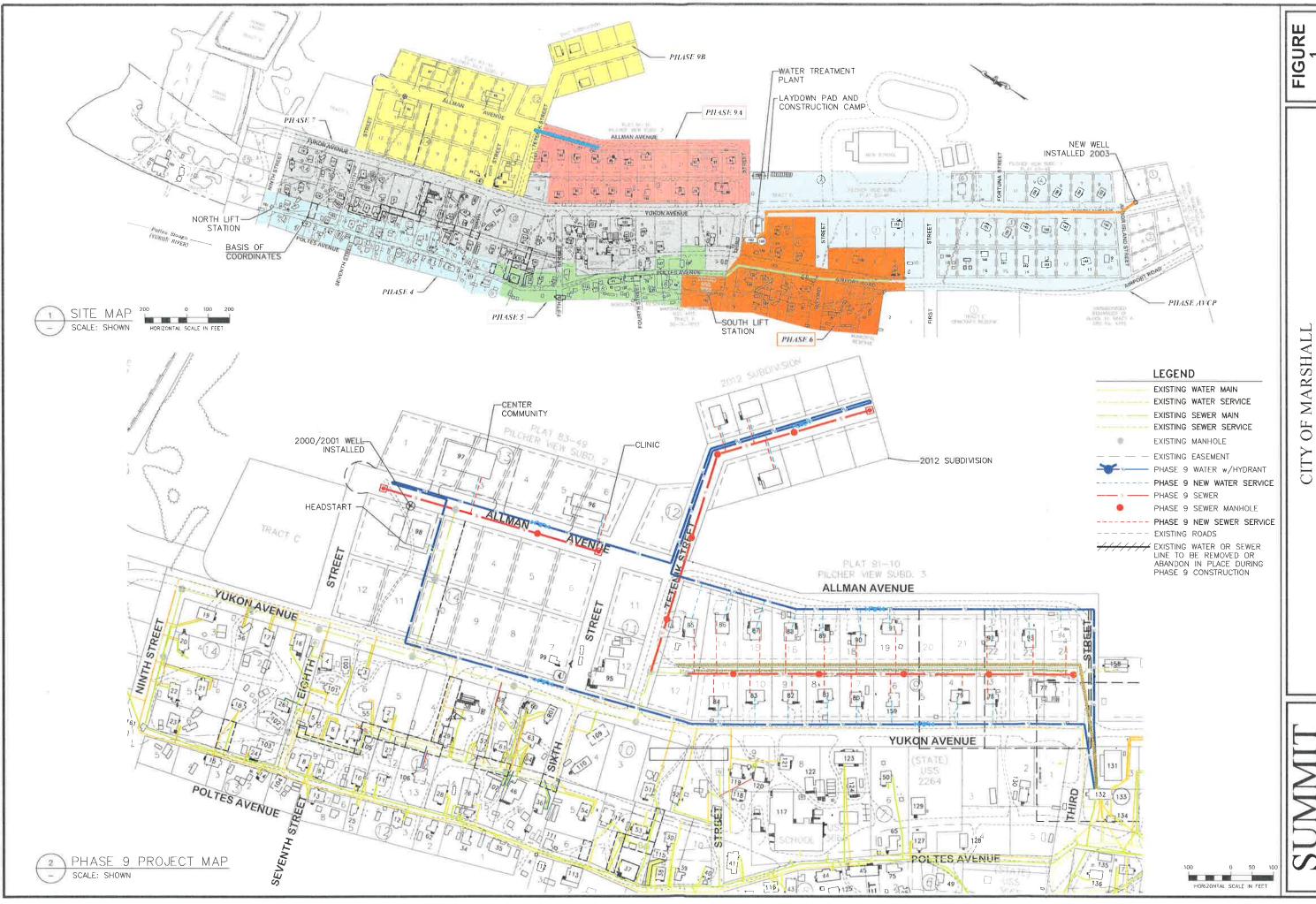
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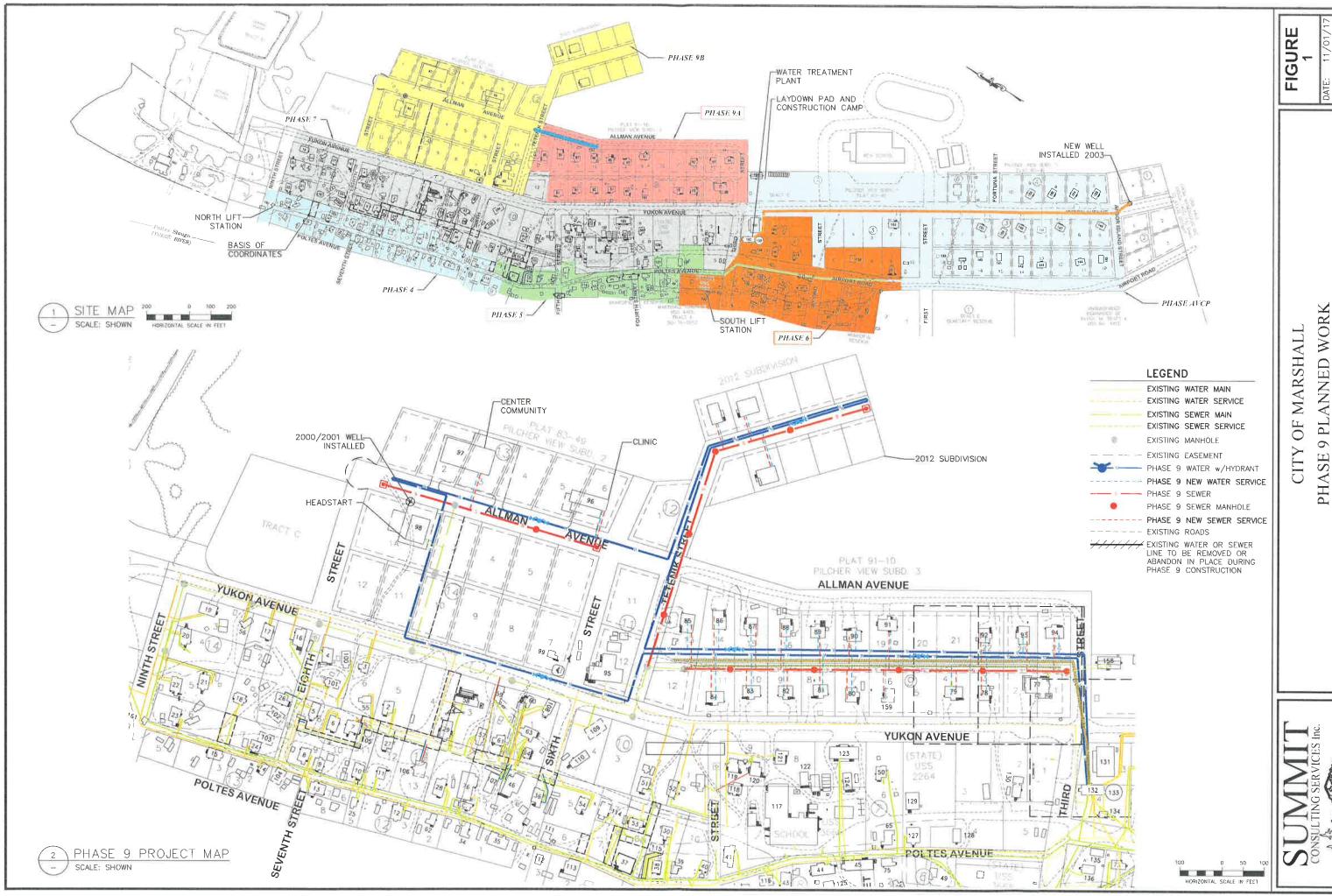
# Attachment A Figures



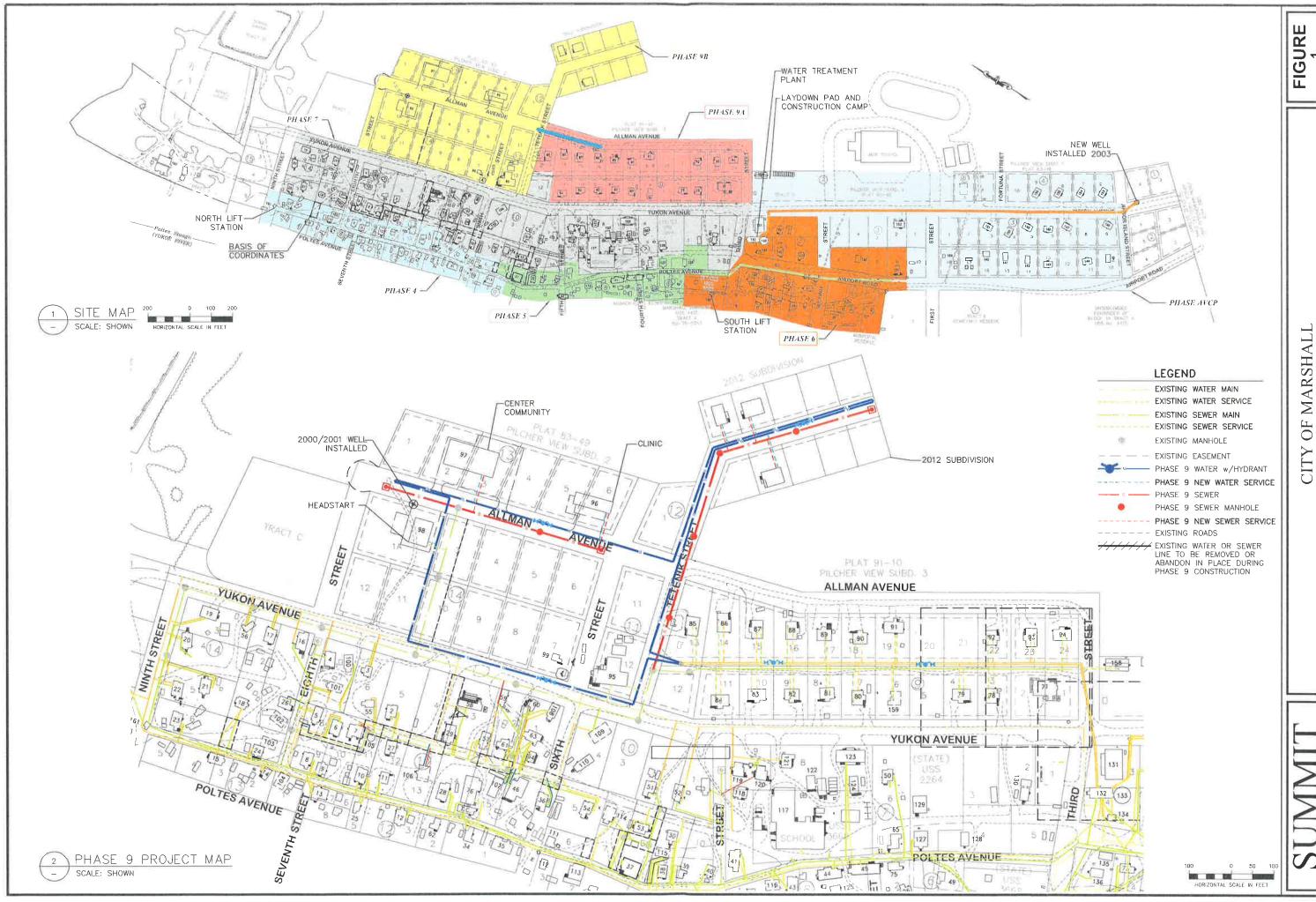
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CITY OF MARSHALL
PHASE 9 PLANNED WORK
ALTERNATIVE 1



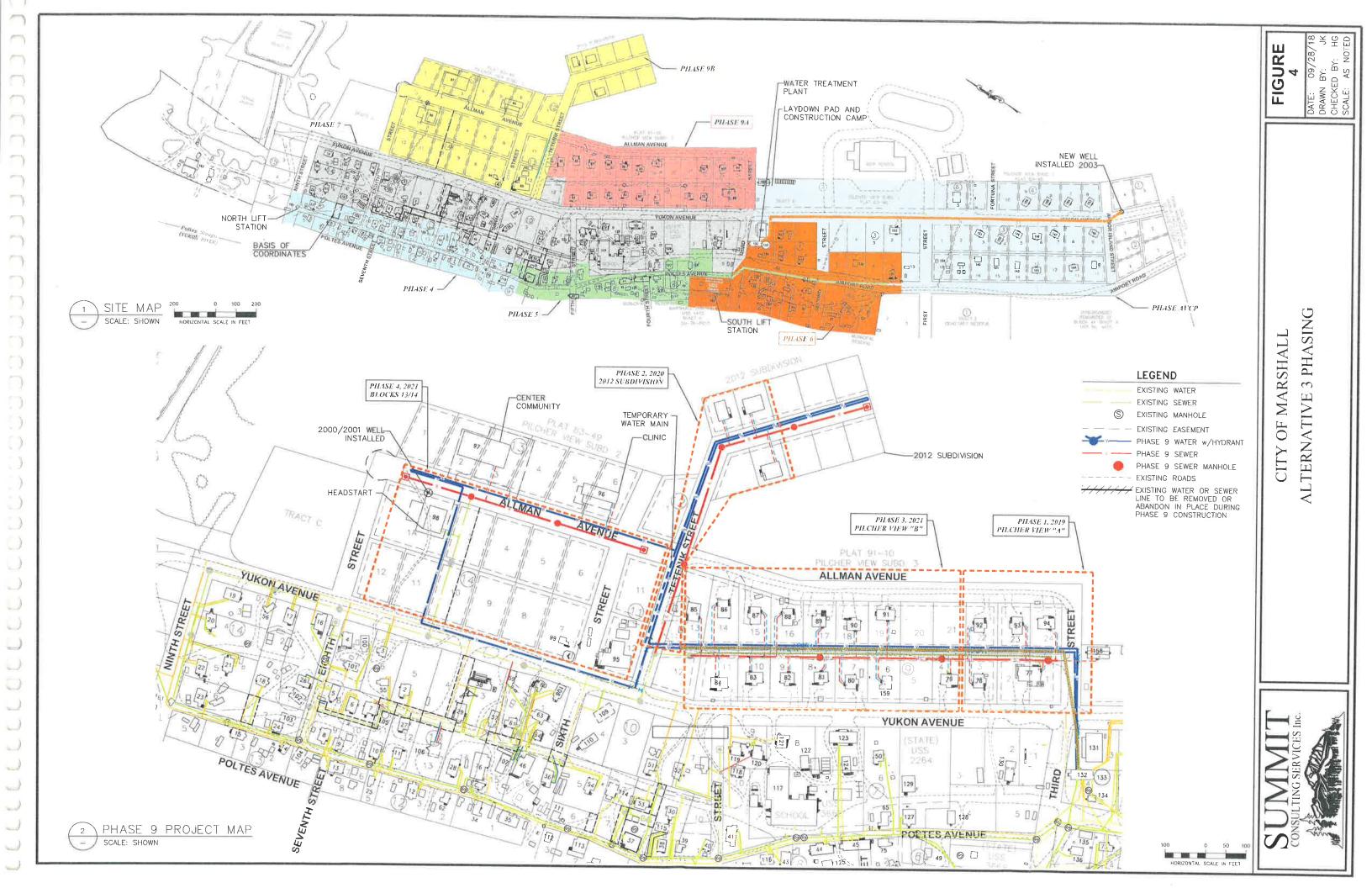


ALTERNATIVE



CITY OF MARSHALL
PHASE 9 PLANNED WORK
ALTERNATIVE 3





### Attachment B Cost Estimates

Alternatives 1, 2 and 3

Operations & Maintenance Cost Estimates

Life Cycle Cost Estimates

# 2018 Phase 9 Cost Estimate - PER Alternative 1

Extended Cost	\$647,178	\$528,743	\$505,997	\$378,585
Unit Cost	\$112	\$294	\$215	\$189
Quantity Unit	5,770 Lft.	1,800 Lft.	2,350 Lft.	2,000 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	78-S
Item #		2	4	85

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	\$604,000	\$200,000	\$334,662	\$1,269,339	\$112,258	\$202,000	\$2,722,259	\$4,782,762	\$4,974,073
Other Direct Costs	Construction Management, Supervision & Engineering Support, Amendment #	Engineering & Design Services	Mobilization / Demobilization	General Conditions	Miscellaneous Utilities	Equipment Procurement	Other Direct Cost Subtotal:	2018 Total Cost:	plus 4% 2019 Total Cost:
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### Assumptions

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

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	TOTAL	930	830
	TOTAL DIRECT COSTS	\$0	\$10,109
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ver Rej	EQUIP HOURS		0
& Sev	MAN	166	166
Water	MHRS/ UNIT	7	
City of Marshall ~	WEIGHT /UNIT	10	
f Mars	COST \$/UNIT	\$25	
City o	BID	Ea	
	QUANTITY	83	
	DESCRIPTION	Arctic Box Hardware	Sheet 'Fotals.
	CSL	5012	
	VSW Scope Code	C-IM	

	TOTAL	3.320		3,320
		\$38.24 <b>6</b> \$38.24 <b>6</b> \$0.0 \$0.0 \$0.0 \$0.0 \$0.0 \$0.0 \$0.0 \$0.	\$0 \$0	\$38,246
	T TOTAL	66 66 66 66 66 66 66 66 66 66 66 66 66	, 4, 4,	\$38
	CONTRACT TOTAL DIRECT LABOR COSTS			2.0
	COST IYPE 6 PERMANENT MATERIALS	000E,88	0.50	\$8,300
2018	COSTTYPES SM TOOLS EXPNDBLS	∃ W 2530 9.00	0.5	\$730
				20
Cost Estin				80
Sewer Replacement ~ Project Cost Estimate ~	COST TYPE 2 EQUIPMENT MAINT.			80
cement	COST IYPE1 BURDENED LABOR	\$29,216	08	829,216
r Repla	EQUIP HOURS			0
Sewe	MAN	0 0		664
ater &	MHRS/ UNIT	( <b>x</b> )		
City of Marshall ~ Water &	WEIGHT /UNIT	9.60		
Marsh	COST \$/UNIT	\$100,000		
ty of	BID	Б		
Ü	QUANTITY	88		
	DESCRIPTION	House A., Box - Lumber & Related		Sheet Totals
	C.S.I.	6082		
	VSW Scope Code	E C		

TOTAL	83 0 0	
TOTAL DIRECT COSTS	55,403 529,100	
CONTRACT LABOR		
COSTTYPE b PERMANENT MATERIALS	\$1,660 \$6,640	
COST-TYPE 5 SM 'FOOLS EXPNDBLS	SS48 SS48	
COSTITYPE3 COSTITYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		
COSTITYPE 3 COSTITYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		
COST IYPEZ EQUIPMENT MAINT		
COSTTYPE1 BURDENED F	3.3.5.2 ≥ 3.3.5.2 ± 3.2.2 ± 3	
EQUIP 1		
MAN	□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	
MHRS/ UNIT	9	
WEIGHT /UNIT	0.11	
COST s/UNIT	880	
GIID		
QUANTITY	83.33	
DESCRIPTION	House A. Boxes WA Stripping House A. Boxes Insulation & Scalauts	
CSL	2010	
VSW Scope Code	C-111	20

TOTAL		021
CONTRACT TOTAL DIRECT LABOR COSTS	0\$ 598'25 598'25	
COST TYPE 7 CONTRACT LABOR	1	
COST TYPE 6 PERMANEN'T MATERIALS	0.05,18	
M TOOLS KPNDBLS	S125 S0	
YPE 4 L'AL I'DE		
COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL OWNED   OUTSIDE		
COST TYPE 2 EQUIPMENT MAINT.	is a second of the second of t	
TITY BID COST WEIGHT MHRS/ MAN EQUIP BURDENED EQUIPMENT EQUIPMENT REN UNIT S/UNIT /UNIT HOURS HOURS LABOR MAINT, OWNED OUTS	\$0 \$0 \$0	
EQUIP HOURS		
MAN		
MHRS/ UNIT		-
WEIGHT /UNIT	5	
SOSI	8120	
Brid UNIT		
QUANTITY	9	
DESCRIPTION	House Rehalo & Plumbing  Circ. Pumps	
C.S.L.	15100	
VSW Scope Code		

	TOTAL		192
	CONTRACE TOTAL DIRECT LABOR COSTS	50 \$23,894	\$23,894
	CONTRACT LABOR		80
	COST TYPE 6 PERMANENT MATERIALS	87.800 84.800	\$4,800
2018	COST TYPES SM TOOLS EXPNDBLS	\$374 \$374	5374
ost Estin	COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		
Project C	COST TYPE 2 QUIPMENT MAINT.		
City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~	COSTTOPE COSTTOPE COSTTOPE COSTOPE BURDENE EQUIPMENT EQUIPMENT RENTAL LABOR MAINT, OWNED OUTSIDE	\$18,720	\$18,720
Repla	EQUIP		0
Sewer	MAN	240	240
ater &	MHRS/ UNIT	- 2 2 - 3	
M ~ III	WEIGHT /UNIT		
Marsha	COST	\$200	
ty of I	BID	Ed.	
Ü	QUANTITY	24	
	DESCRIPTION	House Rehab & Plumbing Bouse Service H.T., Electrical	Sheet Totals
	CSL	00191	
	VSW Scope Code	5	

			Cit	y of M	arshall	~ Wa	ter & §	Sewer	Replace	ment ~ Pr	oject Co	City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~ 2018	te ~ 2018				
CSL	DESCRIPTION	QUANTITY	BID	COST \$/UNIT	WEIGHT MHRS/		MAN EQUIP HOURS HOURS		GOST IYPE1 GOST IYPE2 BURDENED EQUIPMENT LABOR MAINT.	COSTTYPE 2 EQUIPMENT MAINT.	COST LYPE 3  EQUIPMEN  OWNED	EQUIPMENT RENTAL OWNED OUTSIDE	COST LYPES SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	COSTTYPE 7 CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL
1000	GENERAL CONDITIONS	<u>100</u>	%	90	0	ō	11,708	80	\$673,863	\$106,509	\$200,000	\$55,000	\$856,887	20	\$830,000	\$2,722,259	97,160
2000	SITE WORK	100	6°	20	0	01	15,275	6,704	\$683,047	<u>\$0</u>	80	80	\$17,087	<u>\$1,245,752</u>	<del>8</del> 0	\$1,945,886	211,607
3000	CONCRETE & RELATED	001	%	05	91	2)	O	01	30	80	80	80	09	<del>80</del>	0\$	0\$	01/
5000	MISCELLANEOUS METALS	100	3%	0\$	0	91	166	0)	\$7,304	<u>80</u>	\$0	80	\$730	\$2,075	200	\$10,109	830
0009	WOOD & PLASTICS	100	%	05	01	0	999	0	\$29,216	08	80	08	\$730	\$8,300	0	\$38,246	3,320
7000	THERMAL & MOISTURE PROTECTION	100	9/	05	0	0	185	0	\$25,564	80	<del>\$</del> 0	08	8639	88,300	9	\$34,503	747
8000	DOORS & WINDOWS	001	38	\$0	01	01	ol	01	05	0\$	<u>80</u>	<del>2</del> 0	<del>\$</del> 0	80	80	80	08
3000	FINISHES FLOOR & WALL	100	%	0\$	01	©]	ol	0	80	95	80	80	80	80	\$0	80	0
15000	MECHANICAL	0017	9 <sup>8</sup>	20	0	0	081	oi	<u>56,240</u>	30	80	08	\$125	\$1,500	05	\$7,865	150
16000	ELECTRICAL	<u>1000</u>	6%	0\$	01	0	240	0	\$18,720	80	<u>\$0</u>	80	\$374	<u>\$4,800</u>	08	\$23,894	192
	CUMULATIVE PAGE TOTALS:					CI	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

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

Extended Cost	\$680,701	\$531,043	\$505,997	\$378,585
Unit Cost	\$117	\$295	\$202	\$189
Quantity Unit	5,840 Lft.	1,800 Lft.	2,500 Lft.	2,000 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	S-BL
Item #	$\vdash$	7	4	65

\$2,096,326	
Construction Subtotal:	

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

7 8 8 9 9 11 11 11 12

### Assumptions

- Primary project materials are procured and mobilized in 2019.
- Construction occurs in 2019 and 2020
- Archeological monitoring will be required for portions of Phase 9 in areas near gravesites. ŝ
- 5840 LF of new water main, 1800 LF of new water service, and 24 new water services are constructed. 4
- 2500 LF of new sewer main, 2000 LF of new sewer service, and 23 new sewer services are constructed.
- Upgrades to the water treatment plant equipment are not required. 9
- No in home plumbing is required.
- Existing arctic boxes to be replaced. 90
- 6
- 11

State   Cold   Stat			_	_	_	_	_	_		_	_	_	_	_	_	_		_	_	_	_		_	_	_	_	_	_	_	_	_		_	_	_	_	_	_	_			_	_	_	_	$\neg$
CSS   Distribution   Communication   CSS   Distribution   CSS   Distri		TOFAL													300	300									200	500		2,035		16,741	į	67/9			70,000											97,160
CSA   Discription   Correct   Corr		TOTAL DIRECT COSTS	\$400,000	\$140,000	\$25,000	\$4,000	\$291,372	\$14,318	\$205,920	\$156,000	\$26,880	\$5,600	\$40,320	210,080	000′1\$	000'1\$	\$20,000	84,500	\$2,000	\$9,280	\$20,400	836,590	\$40,000	\$32,000	\$20,000	\$5,000	\$50,000	\$14,938	\$22,821	891,706	5103,795	\$203,520			\$202,000					\$56,685	\$30,000	\$6,000	\$109,044	\$18,000		\$2,419,771
CSC   CSC		CONTRACT LABOR	8400,000	\$140,000	\$25,000																																									\$565,000
Color   Colo		COSTTYPE6 PERMANENT MATERIALS																																												
CLASS   DNS-KRPTION   CC-NTTY   IDD   CC-NTT		COSTTYPES SM TOOLS EXPNDBLS				\$4,000	\$272,042					\$2,000	\$40,320	810,080	91,000	\$1,000	\$20,000	\$4,500	\$2,000	84,800	510,000	835,000	\$35,000	\$16,000	\$20,000			\$14	\$27	\$122		\$162,816			\$2,000	42,000				\$56,685	\$30,000	\$1,000	\$109,044	818,000		\$857,450
CSA    DISCRIPTION   QUANTITY   BID   COST   WHIGH   MIRRS   MAN   Right   DUDRONG   LABOR		COST TYPE 4 I RENTAL OUTSIDE																								85,000	\$50,000																			\$55,000
CSA    DISCRIPTION   QUANTITY   BID   COST   WHIGH   MIRRS   MAN   Right   DUDRONG   LABOR	ct Cost E	COSTTYPES EQUIPMEN OWNED																																	\$200 000	2200,000										\$200,000
C.S.I.         DESCRIPTION         QUANTITY         BID         COST         WEGITI         WHEST           1003         ANALOGOE         100         %         100         %         101         WEGITI         WHIST           1010         ANALOGOE & Eng. Support         100         %         100         %         101         WEGITI         WHIST         WHIST         WHIST         101         0.1 <t< td=""><td>~ Proje</td><td>COSTIYPE2 EQUIP MAINT.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>4</td><td>0</td><td></td><td></td><td></td><td></td><td>\$14,925</td><td></td><td>\$91,584</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>8106,509</td></t<>	~ Proje	COSTIYPE2 EQUIP MAINT.																				4	0					\$14,925		\$91,584																8106,509
C.S.I.         DESCRIPTION         QUANTITY         BID         COST         WEGITI         WHEST           1003         ANALOGOE         100         %         100         %         101         WEGITI         WHIST           1010         ANALOGOE & Eng. Support         100         %         100         %         101         WEGITI         WHIST         WHIST         WHIST         101         0.1 <t< td=""><td>acement</td><td>COSTIYPET BURDENED LABOR</td><td></td><td></td><td></td><td></td><td>\$19,329</td><td>\$14,318</td><td>\$205,920</td><td>8156,000</td><td>526,880</td><td>83,600</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>54,480</td><td>810,400</td><td>\$1,591</td><td>\$5,000</td><td>816,000</td><td></td><td></td><td></td><td></td><td>\$22,794</td><td></td><td>\$103,795</td><td>\$40,704</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>25,000</td><td></td><td></td><td></td><td>\$635,812</td></t<>	acement	COSTIYPET BURDENED LABOR					\$19,329	\$14,318	\$205,920	8156,000	526,880	83,600								54,480	810,400	\$1,591	\$5,000	816,000					\$22,794		\$103,795	\$40,704										25,000				\$635,812
C.S.I.         DESCRIPTION         QUANTITY         BID         COST         WEGITI         WHEST           1003         ANALOGOE         100         %         100         %         101         WEGITI         WHIST           1010         ANALOGOE & Eng. Support         100         %         100         %         101         WEGITI         WHIST         WHIST         WHIST         101         0.1 <t< td=""><td>r Repl</td><td></td><td></td><td></td><td></td><td></td><td>30</td><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>joh</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>80</td></t<>	r Repl						30	30														20									joh															80
C.S.I.         DESCRIPTION         QUANTITY           CODE.         1025         100           CODE.         100         100           1037         Engineering & Design         100           1039         Archeological Services         100           1039         Archeological Services         100           1036         Maternal Handling & Inventory         2,864           1040         Field Superintendent         40           1042         Field Superintendent         40           1043         Field Superintendent         40           1044         Field Superintendent         40           1055         Subsistance         2,864           1066         Subsistance         1,120           1070         Office Equipment         1,120           1070         Freight Scontract Labor         1,0           1070         Air Charters         1,0           1070         Travel – Suprement         1,0           1071         Air Travel – Suprement         1,0           1070         Air Travel – Cuprement Rent         1,0           1150         Air Travel – Cuprement Rent         1,0           1160         Air Travel – Cuprement Rent <td>Sewe</td> <td>MAN</td> <td></td> <td></td> <td></td> <td></td> <td>430</td> <td>318</td> <td>2,640</td> <td>2,400</td> <td>096</td> <td>08</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>64</td> <td>160</td> <td>32</td> <td>100</td> <td>400</td> <td></td> <td></td> <td></td> <td></td> <td>407</td> <td></td> <td>2,076</td> <td>814</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>100</td> <td></td> <td></td> <td></td> <td>186'01</td>	Sewe	MAN					430	318	2,640	2,400	096	08								64	160	32	100	400					407		2,076	814										100				186'01
C.S.I.         DESCRIPTION         QUANTITY           CODE.         1025         100           CODE.         100         100           1037         Engineering & Design         100           1039         Archeological Services         100           1039         Archeological Services         100           1036         Maternal Handling & Inventory         2,864           1040         Field Superintendent         40           1042         Field Superintendent         40           1043         Field Superintendent         40           1044         Field Superintendent         40           1055         Subsistance         2,864           1066         Subsistance         1,120           1070         Office Equipment         1,120           1070         Freight Scontract Labor         1,0           1070         Air Charters         1,0           1070         Travel – Suprement         1,0           1071         Air Travel – Suprement         1,0           1070         Air Travel – Cuprement Rent         1,0           1150         Air Travel – Cuprement Rent         1,0           1160         Air Travel – Cuprement Rent <td>ater &amp;</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0,15</td> <td>0,1</td> <td>99</td> <td>09</td> <td>57</td> <td>80</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>91</td> <td>16</td> <td>0.1</td> <td>10</td> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td>0.3</td> <td></td> <td>0.34</td> <td>0.03</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td>	ater &						0,15	0,1	99	09	57	80								91	16	0.1	10	10					0.3		0.34	0.03	_									_				
C.S.I.         DESCRIPTION         QUANTITY           CODE.         1025         100           CODE.         100         100           1037         Engineering & Design         100           1039         Archeological Services         100           1039         Archeological Services         100           1036         Maternal Handling & Inventory         2,864           1040         Field Superintendent         40           1042         Field Superintendent         40           1043         Field Superintendent         40           1044         Field Superintendent         40           1055         Subsistance         2,864           1066         Subsistance         1,120           1070         Office Equipment         1,120           1070         Freight Scontract Labor         1,0           1070         Air Charters         1,0           1070         Travel – Suprement         1,0           1071         Air Travel – Suprement         1,0           1070         Air Travel – Cuprement Rent         1,0           1150         Air Travel – Cuprement Rent         1,0           1160         Air Travel – Cuprement Rent <td>nall ~ W</td> <td>WEIGHT /UNIT</td> <td></td> <td>3</td> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(M)</td> <td>10</td> <td></td> <td>m</td> <td></td> <td>2,7419</td> <td></td> <td>0,25</td> <td></td>	nall ~ W	WEIGHT /UNIT													3	8									(M)	10		m		2,7419		0,25														
C.S.I.         DESCRIPTION         QUANTITY           CODE.         1025         100           CODE.         100         100           1037         Engineering & Design         100           1039         Archeological Services         100           1039         Archeological Services         100           1036         Maternal Handling & Inventory         2,864           1040         Field Superintendent         40           1042         Field Superintendent         40           1043         Field Superintendent         40           1044         Field Superintendent         40           1055         Subsistance         2,864           1066         Subsistance         1,120           1070         Office Equipment         1,120           1070         Freight Scontract Labor         1,0           1070         Air Charters         1,0           1070         Travel – Suprement         1,0           1071         Air Travel – Suprement         1,0           1070         Air Travel – Cuprement Rent         1,0           1150         Air Travel – Cuprement Rent         1,0           1160         Air Travel – Cuprement Rent <td>of Marsl</td> <td>COST \$/UNIT</td> <td></td> <td></td> <td></td> <td>10.08</td> <td>565</td> <td></td> <td></td> <td></td> <td></td> <td>52,000</td> <td>\$36</td> <td>\$36</td> <td>210</td> <td>\$10</td> <td>\$2,000</td> <td>\$450</td> <td>\$200</td> <td>\$1,200</td> <td>000'15</td> <td>SHIO</td> <td>83,500</td> <td>2400</td> <td>\$200</td> <td>920</td> <td>\$5,000</td> <td>527</td> <td></td> <td>SIS</td> <td></td> <td>0.98</td> <td>\$100</td> <td></td> <td>6300 000</td> <td>2200,000</td> <td></td> <td></td> <td></td> <td>80</td> <td>83,000</td> <td>\$10</td> <td><u>\$</u></td> <td>51,800</td> <td></td> <td></td>	of Marsl	COST \$/UNIT				10.08	565					52,000	\$36	\$36	210	\$10	\$2,000	\$450	\$200	\$1,200	000'15	SHIO	83,500	2400	\$200	920	\$5,000	527		SIS		0.98	\$100		6300 000	2200,000				80	83,000	\$10	<u>\$</u>	51,800		
CODE.  1025 CM Svcs & Eng. Support. 1039 Small Material Procurement. 1036 Matural Handling & Irverse. 1036 Matural Handling & Irverse. 1036 Matural Handling & Irverse. 1045 Job Clerk 1056 Subsist. & Contract Lab. 1066 Subsistence 1066 Subsistence 1066 Office Equipment 1080 Telephone & Star Band Svcs. 1130 Air Charters 1130 Air Travel-Super 1145 Air Travel-Coutract Labor. 1150 Air Freight-Mobilization 1160 Small Tools Small Tools Small Tools Small Tools Equipment Parts & City owned 1300 Equipment Parts & City owned 1300 Equipment Parts & Project 1310 Equipment Parts & Project 1320 Equipment Parts & Project 1330 Equipment Parts & Project 1345 Froight-MaintLabor - Project 1356 Jacobs. 1366 Jacobs. 1376 Equipment Purchase (30-35 ton excavat) 1366 Jacobs. 1376 Froight-Animal Accounting Services 1379 Project Accounting Services 1499 Project Accounting Services	City		0/0	ō <sup>Q</sup>	<sub>96</sub>	en-	Cwt	Cwl	Wks.	Wks.	Wks.	Ea.	Dys	Dys	2,0	÷0	Mo.	Mo.	Mo.	RL.	RL	Cwt	Mo.	Wks.	ò	ò	Mo.	Eqhrs	Eqhrs	Eghrs	Eghrs	Gal.	%		þ	r.a.				Lbr\$	Mo.	8º2	Lbr§	Mo.		
C.S.I. (20DE) 1025 1030 1030 1030 1034 1045 1065 1065 1066 1066 1066 1066 1066 106		QUANTITY	001	100	100	400,000	2,864	3,182	40	40	04	F	1,120	280	100	1001	10	10	01	7	01	318	10	40	100	100	01	829	1,357	6,106	6,106	27,136				-				1417.132	10	100	1,417,132	10		
		DESCRIPTION	CM Svcs & Eng. Support	Engineering & Design	Archeological Services	Small Material Procurement	Mobilization - Barge - Truck	Material Handling & Inventory	Field Superintendent	Field General Fureman	Job Clerk	Project Office/Quarters Setup&Supply	Subsist @ Contract Lab.	Subsistence	Office Supplies	Office Equipment	Temporary Power	Telephone & Star Band Svcs.	Air Charlers	Air Travel - Super	Air Travel-Contract Labor	Air Freight - Mobilization	Air Freight - Course of const.	Safety & Cleanup	Small Tools	Small Tools/Equipment Rent	Equipment Rent ~ City owned	Equipment Parts @ City owned	Equip. MainLlabor @ City equip.	Equipment Parts @ Project	Equip Maint Labor ~ Project	FOC	Special Equipment & Tools		(20 ) 25 (20	Equipment Purchase (50-55 ton excavat				General Liability, Insurance	Insurance @ Rental Equipment	Demobilization/Inventory	Workers Compensation Estimated	Project Accounting Services		Sheet Totals
Soprate			1025	_		1030	1035	1036	1040	1042	1045	1050	1055	1060	1065	1070	1080	1090	1130	1140	1145	1150	1160	1180	1190	1200	1210	1300	1305	1310	1315	1320	1322	1325	1345	1545	1355	1360	1365	1425	1435	1475	1490	1492	1494	
		VSW Scope Code	G-CM	M-DS	J9-9	G-CM	F-RT	39-9	39-9	39-9	D5-5	D9-9	29-9	00-5 0	20-9	D-0C	MUI	MUL	C-GC	DD-D	DD-9	F-RT	9-GC	39-9	DD-9	35-5	C-CC	35-5	.39-9	C-CC	0-00	0.00	J9-9	099	0-CL	) d	FOP	E-0.P	E-QP	MUI	MUI	F-RT	35-5	J9-9	39-9	

			City	of M	City of Marshall ~	Water	& Sev	ver Re	placen	nent ~ Pro	nject Cost	Water & Sewer Replacement $\sim$ Project Cost Estimate $\sim$	2018					
VSW Scope Code	CODE	S.L DESCRIPTION	QUANTITY	ON TINS	COST	WEIGHT	MHRS/ UNIT	MAN	FQUIP		COST 1YPE 2 FQUIPMENT MAINT	SURDENED COSTTYPE2 COSTTYPE3 COSTTYPE3 BURDENED FQUIPMENT EQUIPMENT RENTAL.  LABOR MAINT OWNED OUTSIDE		SM TOOLS P	GOSTITYPES GOSTITYPES SM TOOLS PERMANENT EXPUDBLS MATTERIALS	CONTRACT LABOR	TOTAL DIRECT	TOLAL
M-IM	2010	01					+			1_					90		80	0
M-IM	2012	12						0		90			· ·	90	9.0		920	c
M-1M	2014	4-1						0		950				0.0	20		205	Ð :
N-IK	2016							0		20		_		50	20000		0.00	0 0
W-BL	2018	<ol> <li>Water Serv - Curb Stops</li> <li>Water Main - Charle Charleton A- Achindred</li> </ol>	24	Ea.	\$2,500	150	20	08+	92	\$21,120			ini ir	5317 cucs	560,000		SS1,457 S14,255	300
W-BD	2020		01110	i =	19g			200	188	526.884			n' o'h	5403	518,330		545,617	0
W-BD	2024		6,110		55	0.75	0.25	1,528	009	\$67,210			- S	800/18	\$24,440		\$92,658	4,583
W-BD	2026		6,110	13			0.02	122	00	\$5,377				20			\$5,377	0
W-BD	2028		6,110	9	548	2	0.25	1,528	9009	015'295			115	800,18	\$293,280		5361,498	001,10
W-BD	2030	-	22	Ea.	0068	45	01	280	100	512,600			90	6818	525,200		837,989	1,250
W-BD	2032		0,110	3				В		05				60	20		950	0
W-BI)	2034		iso.	Ea.	25,000	000′1	30	150	R	\$6,750			SP (	\$101	525,000		531,851	5,000
W-BI)	2036		380	E .	\$170	25	_ {	380		\$17,100				5257	\$64,600		766,186	005,8
W-BD	2038	38 Water Marr - Lest & Santisze 10 Notes: Comp. Combined to the International	0.11.0	i :	505	70.0	7000	7 2		84 KGI			i ir	2472	2000		\$9,459	> %
W-BL	2040		000		15		0.25	450	450	\$20,250			9 66	\$304	51,800		\$22,354	. 0
W-B1	2044		008,1	3	. 3.	0.75	0.25	450	200	\$20,250			¥6	\$304	\$7,200		527,754	1,350
W-BL	2046	_	1,800	9	80.50		0.05	06	4(1	\$4,050			¥6	006\$			84,950	0
W-BI	2048		24	Ed	81,000	001	9	240	100	510,800			. SI	51,080	\$24,000		\$35,880	2,400
W-BI	2050	50 Water Serv Camor - 4" HDPB	1,800	3	545	20	0.49	882	400	069'68\$			35	\$595	581,000		\$121,285	14,400
W-BI	2052	52 Water Serv - 4" arctic pipe fittings & related	100	Ea	2800	30	21	200	09	89,000			55	5135	880,000		\$89,135	3,000
W-BL	2054	54 Water Serv - Pipe Joint Kits	200	Ea	0115	01		200		59,000			ūΑ.	5135	\$21,952		\$31,087	2,000
W-B1	2056	_	3,600	3	51.25	0.2	0.05	180		58,100			56 -	5122	54,500		\$12,722	720
W-BI	2058		2,300	T.	87.00	0,05	0.047	801		54,865			ue :	573	\$16,100		\$21,037	611
W-BI	2000		24	Ea	2400	22	in -	2 3		55,400			in 5	581	29,600		180,514	000
W-BI	2062		100	aR (	55	70.0	_ = =	000		54,500			i i	2000	2000		92,000	2 2
)8-6 08-7	2064	54 Device Main - Cirade checking & as building	7 350	g £	23.10	cnin	0.13	300	000	523,265			-	5349	87,050		530,664	0
S-BC	2008	-	2,350	3	- <del></del>	0,75	0,25	8,800	300	\$26,438			.5	5397	89,400		\$36,234	1,763
S-BC	2070		2,350	5			0.05	811	98	\$5,288				579	0\$		\$5,367	D
S-BC	2072	-	2,350	3	870	Ū	0.7	1,645	700	\$74,025			SI,	51,110	\$164,500		\$239,635	35,250
S-B(	2074	74 Sewer Main - 8" x 4" Serv Wyes	47	Ea.	51,000	09	30	376	001	\$16,920			55	\$254	\$47,000		\$64,174	2,820
S-8C	2076	_	215	a .	5150	20	~ f	215	5	59,675			A U	\$145	\$32,250		542,070	40.000
3-18-2	2078	/8 Sower Main - Manholes, Access & Insulation	ים מי	g (	55,000	150	71.0	004	07 J	000/12¢			i un	541	\$4.500		\$7.241	450
3-0-C	C80/C	_	9 00	j 38		3	97	98	Š	53,600			- dri	2900	20		\$4,500	C
S-81	2084		1,725	L.	50.10	0.05	90"0	104		\$4,658			36 -	5326	\$173		\$5,156	86
S-B1	2086		1,725	Я	15		0,25	431	200	519,406			25	1628	\$1,725		\$21,422	0
S-BI.	2088		1,725	3	75	0,75	0.25	164	300	90+'615			-5	5291	\$6,900		\$26,597	1,294
5-81	2090		1,725	귈	80.50		0.05	380	09	53,881			đř	59863			54,744	0
S-BI.	2092	5ewer Senice Line - 4" HDPE	1,725	3	545	70	61-0	245	400	538,030			¥6	5571	577,625		5116,232	13,800
S-BL	2094	9.	120	Ea	2800	39	7	240	100	\$10,800			SO (	5162	296,000		5100,962	3,600
S-BL	20%		300	Ea,	0115	2	-	500		\$9,000			Ā	60.05	522,000		551,120	0,000
S-81	2098	-	33	5 6	ŭ		1(02	) <u>:</u>		55 175			· 9r	578	51.035		Sh.288	276
S-BL	2102	D2 Sewer Service - Testing	001		C.	Į.	0.0	9		\$2,700			. 20	541	90		52,741	0
2	1	1						15530	6284	5694,276	08	08 08	t	\$17,246	51,270,186	20	802,186,18	215,779

	TOTAL	0.88	0.50
	TOTAL DIRECT COSTS	\$10,109 810,103	510,109
	CONTRACT CONTRACT LABOR	$\widetilde{x}$	20
	COSTITYER 6 PERMANENT MATERIALS	\$2,075 === \$2,075	\$2,075
2018	COST TYPES SM TOOLS EXPNDBLS	\$73 <b>0</b>	5730
timate ~	COSTTYPE3 COSTTYPE4 EQUIPMENT RENTAL OWNED OUTSIDE	S	20
t Cost Es		SK = SK	\$0
Water & Sewer Replacement ~ Project Cost Estimate ~	COSTTYPE 2 EQUIPMENT MAINI,	0.5	\$0
lacemen	COSTITYTE1 BURDENED LABOR	57.304	\$7,304
er Rep	EQUIP		0
& Sew	MAN	0 = 01	166
<i>N</i> ater	MHRS/ UNIT	2	
	WEIGHT	10	
City of Marshall ~	COST S/UNIT	\$25	
City o	SILO	Ea	
	QUANTITY	55 23	
	DESCRIPTION	Archic Box Hardware	Sheet Totals
	C.S.L.	5012	
	VSW Scope Code	С-П	

	TOTAL	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3,320
		m`	3,5
	TOTAL DIRECT COSTS	\$38,246 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$38,246
	COST TYPE 7 CONTRACT LABOR		\$0
	COST TYPE 6 PERMANENT MATERIALS	\$8,300 6.8 6.0 8.0 8.0 8.0 8.0	\$8,300
2018	COST TYPES SM TOOLS EXPNDBLS	85.30 8.50 9.50 9.50 9.50	\$730
	COST TYPE3 COST TYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		20
Cost Esti			\$0
City of Marshall $\sim$ Water & Sewer Replacement $\sim$ Project Cost Estimate $\sim$	COST TYPE 2 EQUIPMENT MAINT.		0.\$
cement ~	COST TYPE 1 BURDENED LABOR	\$ 8.0 \$ 5.0 \$ 5.0	\$29,216
Repla	EQUIP		0
Sewer	MAN HOURS	0	664
ıter & S	MHRS/ UNIT	99	
all ~ Wa	WEIGHT /UNIT	04	
Marsh	COST \$/UNIT	\$100.00	
ty of	BID UNIT	Бэ,	
Ü	QUANTITY	83	
	DESCRIPTION	House A., Box - Lumber & Related	Sheel Totals
	C.S.I.	6082	
	VSW Scope Code	C.H	

	TOTAL	88 88 90 0	747
	TOTAL DIRECT COSTS	55,403 529,100	534,503
	CONTRACT  CABOR		20
	COSTTYPE 6 PERMANENT MATERIALS	S1,660 S6,640	88,300
18	COSTTYPE 5 SM TOOLS EXPNDBLS	S 591 S 5 7 E 1 E 1 E 1 E 1 E 1 E 1 E 1 E 1 E 1 E	5639
rate ~ 2018	-		90
ost Estin	COSTTYPE3 COSTTYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		80
Project C	COSTITYPE 2 EQUIPMENT MAINT,		9:0
cement ~	COSTTYPE1 BURDENED 1 LABOR	\$3,652 \$21,912 # # # # # # # # # # # # # # # # # # #	\$25,564
City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~	EQUIP		0
	MAN HOURS	= = = 8	581
	MHRS/ UNIT	Í-3 40.	
ıall ~ V	WEIGHT /UNIT	8.0	
Marsh	COST	S20 S80	
ity of	CIND	E P P P E	
	QUANTITY	85 33 33 33	
	DESCRIPTION	House A. Boxes WA Stripping House A. Boxes Insulation & Sealants	Sheet Totals
	C.S.L.	7012	
	VSW Scope Code		

POTAT	0 0 0 0 0 0 0 0 0	150
Parent Ivacor	\$0 \$0 \$0 \$0	57,865
COST TYPE 7	LABOR	05
COSTUTYPE		\$1.500
COSTAYES	\$0 \$0 \$0 \$0	\$125
SI ESTIMATE ~ ZULO COSTTYPE3 COSTTYPE4 C	OWNED OUTSIDE	
ESTITION TO BE STITION TO BE S		
Lity of intarshall $\sim$ water $\infty$ Dewer Neplacement $\sim$ Froject Cost Estimate $\sim$ rose interest cost of the particular value of the particular value of the particular value of the particular continuation of the particular value of the particular	MAINT	
COST TYPE 1		%6 240
Nepia		0
Sewer		089
arer &	LDNO	
MEICHN	7NN/ 151	
Coer		Ī
J. MANAGER	9	
INCENTIFICATION OF THE PROPERTY OF THE PROPERT	House Rehab & Plumbing Circ. Pumps	olety I mod 2
19.0	15116 15116	†
	Coll.	T

	TOTAL	0	192
	CONTRACT TOTAL DIRECT LABOR COSTS	\$23.894	\$23,894
	CONTRACT LABOR		90
	COSTTYPE 6 PERMANENT MATERIALS	\$4,800 = 84,800	54,800
2018	COST.TYPE 5 SM TOOLS EXPNDBLS		5374
Cost Estir	COST TYPE3 EQUIPMEN		
Project (	COSTITYPE 2 EQUIPMENT MAINT.		
'ater & Sewer Replacement ~ Project Cost Estimate ~	COSTTYPE1 COSTTYPE2 COSTTYPE3 COSTTYPE4 BURDENED EQUIPMENT EQUIPMENT RENTAL. LABOR MAINT: OWNED OUTSIDE	\$18,720	\$18,720
Repla	EQUIP		0
Sewer	MAN	0 = = = 570	240
ater & S	MHRS/ UNIT	- 1 - 1 2 - 1	
II ~ W	WEIGHT	) = w: = = ±	
City of Marshall ~ W	COST	900ZS	
ty of I	CIN		
Ü	QUANTITY	24	
	DESCRIPTION	House Service H.T. Electrical	Sheet Fotals
	CSL		
	VSW Scope Code		

MAN         EQUIP HOURS         COSTITIVE HOURS         COSTITIVE HOURS
80         5635,812         \$106,509         \$200,000         \$55,000         \$587,450         \$50           0.704         \$694,276         \$0         \$0         \$0         \$12,2346         \$1,270,186           0         \$0         \$0         \$0         \$0         \$0         \$20           0         \$0         \$0         \$0         \$0         \$20,736         \$20           0         \$23,216         \$0         \$0         \$20         \$20         \$20           0         \$20         \$0         \$0         \$20         \$20         \$20           0         \$0         \$0         \$0         \$20         \$20         \$20           0         \$0         \$0         \$0         \$20         \$20         \$20           0         \$0         \$0         \$0         \$20         \$20         \$20           0         \$0         \$0         \$0         \$0         \$20         \$20           0         \$0         \$0         \$0         \$0         \$20         \$20           0         \$0         \$0         \$0         \$0         \$20         \$20           0         \$0 <td< th=""></td<>
0.704         5694,276         50         50         50         51,270,186           0         \$0         \$0         \$0         \$0         \$0         \$0           0         \$0.304         \$0         \$0         \$0         \$0         \$0           0         \$2.304         \$0         \$0         \$0         \$2.075         \$0           0         \$2.524         \$0         \$0         \$0         \$2.075         \$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         \$0         \$0         \$0         \$0         \$0           0         \$0
0         SO         SO </td
0         \$27,304         \$20 </td
0         \$229,216         \$20<
0         \$25,564         \$0         \$0         \$0         \$639         \$85,300           0         \$20         \$20         \$20         \$20         \$20         \$20           0         \$20,340         \$20         \$20         \$20         \$20         \$20           0         \$26,240         \$20         \$20         \$20         \$21,500         \$21,500           0         \$218,720         \$20         \$20         \$20         \$24,800         \$24,800
0         \$62.40         \$60.2
0         \$6.240         \$0         \$0         \$6.240         \$0         \$0         \$15.00           0         \$18,720         \$0         \$0         \$6.374         \$4,800
0         \$6.240         \$0         \$0         \$0         \$125         \$1500           0         \$18,720         \$0         \$0         \$374         \$4,800
0.08,720 5.0 5.0 5.0 5.0 5.74 5.00
28,241,56 6,784 \$1,417,132 \$106,509 \$200,000 \$555,000 \$877,296 \$1,295,161 \$565,000

## 2018 Phase 9 Cost Estimate PER, Alternative 3

Extended Cost	\$416,271	\$378,072	\$338,515	\$243,558
Unit Cost	\$117	\$945	\$235	\$541
Quantity Unit	3,560 Lft.	400 Lft.	1,440 Lft.	450 Lft.
Description	Water Distribution Main	Water Service Line	<u>Sewer Main</u>	Sewer Service Line
Scope	W-BD	M-BL	S-BC	S-BL
Item #	_	2	4	33

J. Lucia	
7	5
HOT	1
Trib	
one	
•	,

Other Direct Costs

Engineering & Design Services Mobilization / Demobilization General Conditions Miscellaneous Utilities EQP Equipment Procurement
M-UI EQP

### Assumptions

- Primary project materials are procured and mobilized in 2019.
- Construction occurs in 2019 and 2020
- Archeological monitoring will be required for portions of Phase 9 in areas near gravesites.
- 3560 LF of new water main, 400 LF of new water service, and 6 new water services are constructed.
- 1440 LF of new sewer main, 450 LF of new sewer service, and 5 new sewer services are constructed.
- Assume further investigation (excavation) verifies water mains and most of water service lines are competent. 9
- Assume further video investigation of sewer system verifies sewer mains and most of sewer service lines are competent.
  - Assume hydrants are installed on existing water main and manholes on existing sewer main are replaced. 00
- Upgrades to the water treatment plant equipment are not required.
- No in home plumbing is required. 10
- Existing arctic boxes to be replaced.

	TOTAL													300	300									200	0000		1,337/	000	10,994	A 400	4,433			70,000											58,385
	TOTAL DIRECT COSTS	\$400,000	\$140,000	\$30,000	\$4,000	\$213,210	\$10,477	\$205,920	5156,000	\$26,880	\$5,600	\$40,320	510,080	000'15	21,000	\$20,000	34,500	52,000	59,280	\$20,400	\$26,775	\$40,000	\$32,000	\$20,000	\$5,000	000,004	59,810	534,945	\$60,223	+12,0%;	000000			8202,000					545,254	\$30,000	26,000	865,488	818,000	100	\$2,189,135
	CONTRACT CONTRACT LABOR	\$400,000	\$140,000	\$30,000																																									\$570,000
	COSTTYPE6 PERMANENT MATERIALS																																												
~ 2018	COST TYPES SM TOOUS EXPNDBUS				24,000	\$199,066					\$2,000	\$40,320	210,080	\$1,000	\$1,000	\$20,000	005,44	\$2,000	\$4,800	\$10,000	\$25,611	\$35,000	\$16,000	\$20,000			65	20	084	0000000	\$106,920			\$2,000					\$45,254	830,000	\$1,000	\$84,598	518,000		\$683,255
stimate	COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL OWNED OUTSIDE																								85,000	\$50,000																			\$55,000
Sewer Replacement ~ Project Cost Estimate ~																																		8200,000											\$200,000
~ Projec	COSTTYPE2 EQUIP MAINT.																										89,801		\$60,143																\$69,944
acement	COST TYPET BURDENED LABOR					\$14,144	510,477	\$205,920	\$156,000	\$26,880	23,600								\$4,480	\$10,400	51,164	\$5,000	\$16,000					\$34,927	10000	\$12,000	\$26,730										85,000				\$610,936
r Repl	EQUIP HOURS					30	30														20								i	Jop															80
Sewe	MAN					314	233	2,640	2,400	096	80								64	091	23	100	400					624		1,8(1	535										001				10,437
ater &	MHRS/ UNIT					0,15	1,0	99	09	24	80								16	91	0,1	10	01					0,7		0.45	0.03										_				
iall ~ W	WEIGHT /UNIT													60	ers.									2	2		m		2,7419		0,25														
City of Marshall ∼ Water &	COST S/UNIT				10 0%	265					\$2,000	536	836	210	015	\$2,000	2450	8200	\$1,200	81,000	S110	53,500	202	8200	\$20	\$5,000	\$22		\$15		S6.U	0016		8200.000					90	53,000	810	95	008'15		
City o	BID	32	,0 <sub>0</sub>	>€	99	Š	Cwl	Wks.	Wks	Wks.	Ea.	Dys	Dys	96	98	Mo.	Mo.	Mo.	Rt.	Rt	Cwt	Mo.	Wks.	,0/ 0/	ŝę	, Mo	Eghrs	Edhrs	Eghrs	Edhrs	Gal.	32		12					Chr\$	Mo.	%	1.br\$	Mo.		
	QUANTITY	001	100	100	400,000	2,095	2,328	40	40	0†	_	1,120	280	100	000	0 :	01	10	7	10	233	10	40	100	100	10	446	168	4,010	4,010	17,820			_					1,131,339	01	001	1,131,339	1.0		
	DESCRIPTION	CM Svrs & Eng. Support	Engineering & Design	Archeological Services	Small Material Procurement	Mobilization - Barge - Truck	Material Handling & Inventory	Field Superintendent	Field General Foreman	Job Clerk	Project Office/Quarters Setup&Supply	Subsist, @ Contract Lab	Subsistence	Office Supplies	Office Equipment	Temporary Power	Telephone & Star Band Svcs,	Air Charlegs	Air Travel - Super	Air Travel-Contract Labor	Air Freight - Mobilization	Air Freight - Course of const.	Safely & Cleanup	Small Tools	Small Tools/Equipment Rent	Equipment Rent ~ City owned	Equipment Parts @ City owned	Equip. Maint Labor @ City equip	Equipment Parts @ Project	Equip Maint Labor ~ Project	FOG	Special Equipment & Tools		Frantismant Purchase (30-35 Ion excavall					General Liability Insurance	Insurance & Rental Equipment	Demobilization/Inventory	Morkers Compensation Estimated	Project Accounting Services		Sheet Totals
	C.S.I.	1025	-	_	_	1035	1036	1040	1042	1045	1050	1055	1060	1065	1070	1080	1090	1130	1140	1145	1150	1160	1180	1190	1200	_	_	1305	1310	1315	1320	1322	1330	1345	1350	1355	1360	1365	1425	1435	1475	1490	1492	1494	
	VSW Scope Code	G-CM	M-DS	)9 <del>-</del> 9	G-CM	F-RT	0-00	09-9	59-9	D9-9	O-6C	29-9	70-5	C-CC	)     	MUI	MCI	JD-5	0-CC	J9-9	F-RT	35-5	0-00	39-9	JD-D	0-0	J9-9	J9-9	39-9	50-5	0-00	79-5	ر د د	F-OP	E-OP	E-QP	E-QP	E-QP	MUI	MUI	F-RT	J9-9	25-5	0-60	

QUANTITY         BID         COST         WEIGHT         MAN         FOURS         ANA         A
2052         Water Serv - Prop Joint Kits         80         Ea.         \$800         30         2         160         50           2054         Water Serv - Prop Joint Kits         100         Ea.         \$110         1         1         100         50           2056         Water Serv - Prop Joint Kits         510         Li.         \$125         0.2         10,15         2.3         5           2058         Water Serv - Hear Trace         510         Li.         \$500         0.05         2.4         1         100           2060         Water Serv - Abox Count Buttings & Boots         24         Ea.         \$500         0.05         0.047         24         1           2064         Water Serv - Abox Count Buttings & Boutton         Li-40         Li.         \$510         0.05         0.13         187         1           2064         Sewer Main - Repark (rill & pipe alignin, Li-40         Li.         \$6         50         0.25         360         300           2070         Sewer Main - Repark (rill & pipe alignin, Li-40         Li.         \$54         0.75         1.008         400         20           2071         Sewer Main - Right of way prep         Li.40         Li.         \$54         0.
2020         Whater Mann - Regroady (III)* epip - dilgam,         35-60         LL         \$4         Q75         Q1         70           2020         Water Mann - Regroady (III)* epip - dilgam,         35-60         LL         \$4         Q75         Q25         \$90         70           2020         Water Mann - Gratter per litting & Fabric/Roam         35-60         LL         \$48         Q75         Q25         \$90         200           2030         Water Mann - Gratter per litting & Fabric Roam         35-60         LL         \$48         Q         \$90         \$20         \$40         \$40         \$10         \$20         \$40         \$40         \$10         \$10         \$20         \$40         \$40         \$10         \$10         \$20         \$40         \$40         \$10         \$10         \$20         \$40         \$40         \$10         \$20         \$40         \$40         \$40         \$10         \$20         \$40         \$10         \$20
2010         School Sever Serve Regards, expair exesting sycs.         18         Ea         22,300         100         40         720         670           2011         Sever Serve Regards, repair exesting sycs.         18         Ea         22,300         100         40         720         670           2010         Waker Serve - Regards, repair exesting sycs.         24         Ea         82,300         100         40         720         670           2020         Waker Main - Grade Checking & As-building         3,560         L.I.         \$1         0,75         0,13         570         100           2020         Waker Main - Pipe Rode Checking & Retery Fram         3,560         L.I.         \$4         1,0         0,2         71         10           2020         Waker Main - Pipe Rode Greek Retery Fram         3,560         L.I.         \$4         1,0         0,2         71         10           2021         Waker Main - First Checking & Fabricy Fram         3,560         L.I.         \$4         1,0         0,2         2,0         4,0         1,0         0,2         2,0         1,0         0,0         1,0         0,0         1,0         0,0         1,0         0,0         1,0         0,0         1,0         <
CODE     2010     2011     2012     2013     2014     2015     2015     2015     2016     2017     2017     2018     2018     2018     2018     2018     2018     2018     2018     2018     2018     2018     2018     2018     2018     2020     2021     2022     2022     2023     2024     2024     2024     2025     2024     2025     2025     2026     2026     2027     2027     2028     2028     2029     2029     2020     2
CODII         DESCRIPTION         QUANTITY         BID         COST         WHIGH           2013         2013         CODII         CONT         SQUANT         AUNIT           2014         Stower-Kere - Regarde, repair existing svics.         18         E.a.         22,500         100         40           2015         Water-Kere - Regarde, repair existing svics.         18         E.a.         22,500         100         40           2018         Water-Kere - Curd solge Checking & As-building         3,560         11         \$31         0,05         0,05           2020         Water Water - Regarde / The Pipe Aughan.         3,560         11         \$4         0,75         0,02           2024         Water Water - Regarde / The Pipe Aughan.         3,560         11         \$4         0,02           2024         Water Water - Regarde / The Pipe Aughan.         3,560         11         \$4         10           2024         Water Water - Regarde / The Pipe Aughan.         3,560         11         \$4         10           2024         Water Water - Regarde / The Pipe Aughan.         3,560         11         \$4         10           2024         Water Start Charles of Chaestrage & Charles and Aughan.         11         \$4
CODIT         DUSCRIPTION         QUANTITY         BIT         CODIT         WHICH           2010         2010         Character         CAPACTER         CAPACTER         PART         AUNIT
CGS41         DISSCRIPTION         QUANTITY         BID         COST         WHERTON           2010         2010         2010         2010         2010         2010         2011         2011         2011         2011         2011         2011         2011         2011         2012
CSJ, 2010         DUSCRIPTION         QUANTITY BID         COST           2010         2010         2010         2010         2010           2011         2011         2011         2011         2011         2011         2011           2015         2016         Water Serv - Regrade, repair existing sves, 2011         18         Ea. 25,200           2018         Water Main - Crade Checking & As-building 3,560         L. 50,1         50,1           2022         Water Main - Pipe Bedding & Fabric/Foam 3,560         L. 548         23,200           2023         Water Main - Pipe Bedding & Fabric/Foam 3,560         L. 548         20,0           2024         Water Main - Pipe Bedding & Fabric/Foam 3,560         L. 548         50,0           2025         Water Main - Pipe Bedding & Fabric/Foam 3,560         L. 548         50,0           2033         Water Main - Pipe Bedding & Geore, Fabric Foam 3,50         L. 50,0         50,0           2034         Water Main - Pipe Bedding & Geore, Fabric Foam 3,50         L. 54,0         50,0           2035         Water Main - Fapr Sex Regions & Search and 3,50         L. 54,0         50,0           2036         Water Serv - Crade Cheering & Search and 3,50         L. 54,0         51,2           2046         Water Serv - Pre Joint
C.S.L         DESCRIPTION         QUANTITY           2010         2012         18           2014         Seveer Serv - Regrade, repair existing swis.         18           2016         Water Serv - Curb Stops         24           2020         Water Main - Chade Checking & As-building         3,560           2022         Water Main - Right of way prep         3,560           2023         Water Main - Right of way prep         3,560           2034         Water Main - Fight of way prep         3,560           2035         Water Main - Fight of way prep         3,560           2036         Water Main - Fight of way prep         3,560           2037         Water Main - Fight of way prep         3,560           2038         Water Main - Fight of way prep         3,560           2044         Water Serv - Right of way prep         3,560           2048         Water Serv - Prep Bodding & Geotex, Fabric         400           2049         Water Serv - Prep Intil Rise         400           2040         Water Serv - Prep Intil Rise pape alignm.         430           2040         Water Serv - Prep Intil Rise pape alignm.         440           2050         Water Serv - Prep Intil Rise pape alignm.         440           2066 </td
CODE  2010  2010  2010  2014  Sever Serv - Regrade, repair existing svis. 2016  Water Serv, - Curb Stops  2020  Water Main - Crade Checking & As-building 2022  Water Main - Grade Checking & Fabric/Fram 2023  Water Main - 6" HIPPE 2039  Water Main - 6" HIPPE 2039  Water Main - 10" HiPPE 2040  Water Serv - 10" HiPPE 2050  Water Serv - 10" Hing & Sanitze 2060  2060  Sewer Main - 10" HipPE 2070  Sewer Main - 10" HipPE 2070
2010 2010 2010 2010 2010 2010 2010 2010
V-SAM  M-1/M  M-1/M  M-1/M  M-1/M  W-1/M  W-

	TOTAL	0	6590	830
	TOTAL DIRECT COSTS	08	510,109	510,109
	CONTRACT LABOR		5	\$0
	COSFTYPE 6 PERMANENT MATERIALS	80	52,075	\$2,075
2018	COST TYPE 5 SM TOOL S EXPNIDBLS	0\$	27.30	\$730
timate ~	COSTITYES COSTITYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE	8:0	<b>3</b>	20
t Cost Es		980	OF	20
Water & Sewer Replacement ~ Project Cost Estimate ~	COST'TYPE1  BURDENED EQUIPMENT  LABOR MAINT.	08	05	80
olacemen	COST PYFE1 BURDENED LABOR	80	27,304	\$7,304
rer Rej	EQUIP HOURS			0
& Sew	MAN	0	166	166
Vater	MHRS/ UNIT		2	
City of Marshall ~ V	WEIGHT		10	
f Mars	COST S/UNIT		S25	
City 0	DIS		Eg	
	QUANTIFY		<del>***</del>	
	DESCRIPTION		Arctic Box Hardware	Sheet Fotals
	CODE		5012	
	VSW Scope Code			

	City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~	- James	COST TYPE1	COST TYPE 2   COST TYPE	,	COSTTYPES	COST 1YPE 6 COST 1YPE 7	YPE 7
COST \$/UNIT	WEIGHT MHRS/ /UNIT UNIT	MAN EQUIP HOURS HOURS		EQUIPMENT EQUIPMED MAINT, OWNED			5 10	NACT TOTAL DIRECT OR COSTS
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LOSEA	WEIGHT	83 0 0	747
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COST TYPE 7			0.5
COSTITYPES	MATERIALS	S1,660 S6,640	000000
COSTITYPES	EXPNDBLS	S91 8548 = S948 = S948	0000
E4	-		
COSTITYPE3 COSTITYPE4	OWNED OUTSIDE		
COSTTYPE2	MAINT.		
COST TYPE1		\$3,652 \$21,912	
Sewer Replacement ~ ITOJect Cost Estimate ~ COSTIVES   COSTIVES	$\rightarrow$		-
	HOURS		1
Action of	UNIT		1
тиласти		8.0	1
LILY OF THE MANCHET WINES		\$200 \$80	1
III III	UNIL		1
VITTER	ZUANDIT	88 89	
Discontinue		House A. Boxes WX Stripping House A. Boxes Insulation & Scalants	
190	$\rightarrow$	7012	
VSW	Code	19 E	

	TOTAL WEIGHT	0 0	150
	TOTAL DIRECT COSTS	87,865 80 80	\$7,865
	CONTRACT LABOR		20
	COSTEYPE 6 PERMANENT MATERIALS	05 005,14 <del>2</del> 08	\$1,500
00	COST LYPE 5 SM TOOLS EXPNDBLS	\$50 \$7.25	\$125
late ~ 2018	COSTIYES COSTIYES  EQUIPMENT RENTAL  OWNED OUTSIDE		
ost Estin			
City of Marshall ~ Water & Sewer Replacement ~ Project Cost Estimate ~	COST TYPE 2 EQUIPMENT MAINT.		
ement ~ ]	COSTITYFE1 BURDENED LABOR	\$6.240 \$6.240	56,240
Replac	EQUIP		0
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all ~ W	WEIGHT	ī.	
Marsh	COS1	# 15 W 218	
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Ü	QUANTITY		*
	DESCRIPTION	House Rehab & Plumbing Cre. Pumps	Sheet Totals
	C.S.I.	15104 (15116	
	VSW Scope Code	House the second	

	TOTAL	0 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	197
	CONTRACT TOTAL DIRECT LABOR COSTS	50.	NO 000
	CONTRACT LABOR		0
	COST TYPE6 PERMANENT MATERIALS	50.84,800	
2018	COST TYPES SM TOOLS EXPNDBLS	S374	- FICT
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ost Estin	COSTITYPE3 COSTITYPE3 EQUIPMENT RENTAL OWNED OUTSIDE		
Project C	COSTTYPE2 COSTTYPE3 COSTTYPE4 EQUIPMENT EQUIPMENT RENTAL MAINT: OWNED OUTSIDE	A	
Sewer Replacement ~ Project Cost Estimate ~	COSTITYPE1 BURDENED E LABOR	\$18,720	0.00
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Sewer	MAN	9 = 1 = -240	07.0
ater &	MHRS/ UNIT	- 1 4 1 2 - 3	1
<b>≥</b>	WEIGHT /UNIT		Ī
City of Marshall	COST	2500	T
ty of I	STD	- 1 - 1 - E	T
C	QUANTITY	24	
	DESCRIPTION	House Service H.T. Electrical	and the state of t
	CSL	10103	1
	VSW Scope Code		T

L			C <u>i</u>	y of N		~ Wa	ter &	Sewer	Replace	City of Marshall $\sim$ Water & Sewer Replacement $\sim$ Project Cost Estimate $\sim~2018$	oject Co	st Estima	ite ~ 2018				
9 8	C.S.I. DESCRIPTION CODE	QUANTIITY		BID COST	WEIGHT MHRS/ /UNIT UNIT	MHRS/ UNIT	MAN EQUIP HOURS HOURS			COSTITYE 1 COSTITYE 2  BURDENED EQUIPMENT  LABOR MAINT.	COST-TYPE 3  EQUIPMEN  OWNED	COSTITYES COSTITYES EQUIPMENT RENTAL OWNED OUTSIDE	COSTTYPES SM TOOLS EXPNDBLS	COST TYPE 6 PERMANENT MATERIALS	CONTRACT CONTRACT LABOR	TOTAL DIRECT COSTS	TOTAL WEIGHT
=	1000 GENERAL COMPITIONS	100	9,9	03	ō	ō	10,437	80	5610,936	\$69,944	\$200,000	\$55,000	\$683,255	20	8570,000	\$2,189,135	88,385
21	2000	100	%	080	01	2)	9,726	4,375	\$433,359	808	<u>\$0</u>	<u>80</u>	\$10,546	\$817,894	\$0	\$1,261,798	139,2112
<u>E</u>	3000 CONCRETE & RELATED	001	36	<u>S</u>	01	01	9	φľ	0%	80	05	<u>S0</u>	20	0\$	805	20	01
īħ	5000 MISCELLANEOUS METALS	100	95	03	01	DI	166	01	\$7,304	9	80	80	\$730	\$2,075	08	\$10,109	830
79	6000 HOOD & PLASTICS	001	9-e	80	01	οl	664	OI	\$29,216	08	<u>S0</u>	05	8730	88,300	08	\$38,246	3,320
70	Z000 THERMAL & MOISTURE PROTECTION	100	82	08	e)	01	185	01	\$25,564	0.5	\$0	80	\$639	88,300	<u>80</u>	\$34,503	747
8	8000 DOORS & WINDOLVS	001	3.g	080	SI.	01	<b>9</b> 1	01	98	80	20	80	20	9:0	0\$	0\$	ISI
51	9000 EINISHES - FLOOR & WALL	100	şe	20	0	0]	0	О	30	<u>8</u>	<u>S0</u>	<u>80</u>	20	05	08	08	01
151	15000 MPCHANICAL	001	28	0	01	0	80	Ol	86,240	얾	981	80	\$125	\$1,500	80	<u>\$7,865</u>	150
161	Tenno.	000	2,q	08	01	DI	240	Ol	\$18,720	80	80	80	5374	84,800	<u>05</u>	\$23,894	192
	CUMULATIVE PAGE TOTALS:	3:					21,893.87	4,455	\$1,131,339	\$69,944	\$200,000	\$55,000	8696,400	5842,869	8570,000	\$3,565,551	232,826
L																	

# Water and Sewer Utility Operations & Maintenance Expenses

Line Item	Budget Amount		
Salaries	\$27,600		
Payroll Taxes	\$2,388		
Workers Compensation	\$1,062	Cost of Service Line Repair	Repair
Per Diem	\$558		
Electricity	\$23,465	<u>Employee</u>	Wage/hr
Heating Fuel	\$13,586	Operator	\$19
Annual Water Testing Fees	\$20,000	Alt. Operator	\$17
Office Supplies/Materials	\$500	Laborer	\$12
Postage Supplies	\$750		
Water Treatment Chemicals	\$1,600	Assume 3 employees for 3 days.	or 3 days.
Gas/Oil (Vehicles)	\$500	Each Repair is	\$1,152
Equipment Maintenance	\$1,000	Two repairs/yr is	\$2,304
Waste Water Discharge Permit	\$940		
DEC Tank Farm User Fee	\$725.99	Materials	\$500
SOC/OOC/Water rights Fee	\$340		
Operator Certification	\$200	Total Annual Cost	\$2,804
Plant Certification/Inspection	\$250		
Insurance/Bonding	\$112.90		
Miscellaneous Operating Expense	8679		
Total Operating Expenses	\$96,256.89		

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:

### 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 engineering econonics reference

(for "real" discount rate = 0.8% for 20 years)

(for formula of USPW =  $(((1+i)^n)^1)$ ) notation for this factor is (P/A,i,N)

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

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)

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

### 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

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

Extended Cost	\$13,550	\$39,061	\$32,211	\$61,774
Unit Cost	\$4	86\$	\$22	\$137
Quantity Unit	3,560 Lft.	400 Lft.	1,440 Lft.	450 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	S-BL
Item #	$\vdash$	2	↔	3

\$146,596	
Construction Subtotal:	Other Direct Costs

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

### Assumptions

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

		TOTAL													300	300									200	9000	243	Ť	2,345		1,069			20 000	000/07									
Column   C		TOTAL DIRECT	\$150,000	2150,000		84,000	604'625	53,902	541,184			\$5,600	51,440	\$2,160	81,000	81,000	\$4,000	0068	2400	52,320	\$4,080	\$9,972	28,000	\$6,400	\$20,000	55,000	010,010	57,188	\$17,121	\$25,656	530,253			000 000	2202,000				\$7,136	56,000	\$5,000	\$13,281	\$5,400	
Second   Column   C		CONTRACT LABOR	\$150,000	5150,000																																								
Color   Colo		COSTTYPE 6 PERMANENT MATERIALS																																										
See   Col.   Discourted   Col.   Discourted	5019	COST TYPE S SM TOOLS EXPNDBLS				\$4,000	574,141					\$2,000	51,440	52,160	000′1\$	\$1,000	\$4,000	0068	8400	\$1,200	\$2,000	\$9,539	22,000	53,200	\$20,000		6	ž 75	517		525,656			000 63	25,000				\$7,136	86,000	\$1,000	513,281	\$5,400	
Sape   Color   DisCRIPTION   QUANTITY   BID   COST   WEIGHT   MINS   MAN   LOUIS   L	}	COST TYPE 4 [ RENTAL OUTSIDE																								55,000	0/10/01#																	
Sape   Color   DisCRIPTION   QUANTITY   BID   COST   WEIGHT   MINS   MAN   LOUIS   L	cher Pha	COSTTYPES   LQUIPMENT OWNED																																000 000	3200,000									
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Name	placeme	COST-TYPE 1 BURDENED LABOR					\$5,268	53,902	541,184			83,600								81,120	52,080	\$23	\$1,000	53,200				57,184		\$25,656	\$4,597										24,000			
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Name	& Se						117	87	528			80								91	32	6	70	80				128		513	92										80			
Name	Water	MHRS/ UNIT					0.15	1.0	99	09	24	80								91	16	1.0	10	01				9.0		9,0	0,0215	-									8.0			
Support         CSL         DESCRIPTION         QUANTITY         B           G-CM         CODE         DESCRIPTION         QUANTITY         B           G-CM         1025         CN Sves & Eng. Support         100         100           G-CC         1028         Archeological Services         400,000         100           G-CC         1028         Archeological Services         400,000         100           G-CC         1038         Mobilization Barge - Thusk         780         C           G-CC         1049         Field Sepentanded         87         W           G-CC         1049         Field Sepentanded         87         C           G-CC         1049         Field Sepentanded         87         C           G-CC         1049         Field Sepentanded Services         100         87           G-CC         1049         Field Separated Services         100         87           G-CC         1050         Subsistence         60         10         10           G-CC         1050         Subsistence         2         M         M           G-CC         1140         Air Flexight - Subriband Services         2         M         M		WEIGHT /UNIT													80	ю									in (	(0	c	n	2,7419		0.25													
VSW         DUSCRIPTION         QUANTITY         B           Sorpe         CODE         DUSCRIPTION         QUANTITY         B           G-Code         CODE         CODE         100         100           M-D3         1370         Engineering & Design         100         100           G-GC         1028         Archeological Services         100         100           G-GC         1039         Find Landling & Inventor         86         W           G-GC         1040         Find Caperal Foreman         87         W           G-GC         1049         Find General Foreman         87         W           G-GC         1049         Find General Foreman         87         W           G-GC         1049         Find General Foreman         87         W           G-GC         1050         Find General Foreman         87         G           G-GC         1050         Find General Foreman         87         G           G-GC         1050         Find General G	y of Mar	COST S/UNIT				50.01	269					\$2,000	530	\$36	210	Sio	82,000	\$450	\$200	\$1,200	81,000	S110	\$3,500	\$400	\$200	S50	000,65	777	\$20		0.95	\$100		Control Control	22,00,000				0\$	53,000	910	0\$	008'15	
VSW         CSL         DDESCRIPTION           Cude         CODE         CODE           G-CM         1025         CM Svess & Eng. Support           M-DS         1370         Brighneering & Design           G-CC         1028         Archeological Services           G-CC         1038         Malerial Handling & Inventory           G-GC         1049         Field Caneral Foreman           G-GC         1049         Field Caneral Foreman           G-GC         1049         Field Caneral Foreman           G-GC         1059         Project Office/Quarters Setup/& upper           G-GC         1050         Subsistence           G-GC         1060         Subsistence           G-GC         1076         Supplies           G-GC         1140         Air Travel - Super           G-GC         1150	<u>ב</u>	BRID	50	.01	30	S	Cwt	Cwt	Wks.	Wks.	Wks.	Ea.	Dys	Dys	9,	o <sup>O</sup>	Mo.	Mo.	Mo.	Rt.	RI.	(wt	Mo.	Wks.	96	3° -	, NO.	Eqnis	Eqhrs	Eqhrs	Gal.	ė		3	E.G.				Lbrs	NIo,	3ª	2 Pig	Mos	
VSW         CSd.         DDESCRIPTION           Coule         CODE         CODE           G-CM         1025         CM Sves & Eng. Support           M-DS         1370         Brighneering & Design           G-CM         1030         Small Material Procurement           G-GC         1040         Field Supernation - Bage - Truck           G-GC         1042         Field Caneral Enrenant           G-GC         1049         Field Caneral Forenant           G-GC         1049         Field Caneral Forenant           G-GC         1050         Project Office/Quarters Setup/& upply           G-GC         1050         Subsistence           G-GC         1050         Subsistence           G-GC         1070         Subsistence           G-GC         1070         Subsistence           G-GC         1140         Air Travel - Super           G-GC         1140         Air Travel - Contract Lab		QUANTITY	100	100	001	400,000	780	867	30			-	40	09	001	100	6	2	ct	-	2	87	r)	30	001	8 6		214	855	855	4,276			82					178,411	2	001	178,4111	3	
VSW           Stope         C.S.L.           G-Cade         CODDI           G-CM         1025           M-DS         1370           G-GC         1036           G-GC         1045           G-GC         1046           G-GC         1049           G-GC         1040           G-GC         1040           G-GC         1040           G-GC         1040           G-GC         1040           G-GC         1050           MUI         1080           MUI         1080           G-GC         1145           G-GC         1149           G-GC         1149           G-GC         1149           G-GC         1149           G-GC         1180           G-GC         1180           G-GC         1180           G-GC         1180           G-GC         1180           G-GC         1180           G-GC         1300           G-GC         1300           G-GC         1300           G-GC         1300           G-GC         1325		DESCRIPTION	CM Svcs & Eng. Support	Engineering & Design	Archeological Services	Small Material Procurement	Mobilization - Barge - Truck	Material Handling & Inventory	Field Superintendent	Field Gaueral Foreman	Job Clerk	Project Office/Quarters Setup&Supply	Subsist @ Contract Lab.	Subsistence	Office Supplies	Office Equipment	Temporary Power	Felephone & Star Band Sves	Air Charlets	Air Fravel - Super	Air TravelContract Labor	Aŭ Freight - Mobilization	Air Freight - Course of const.	Salety & Cleanup	Small Tools	Small Tools/Equipment Rent	Equipment settle City owned	Equipment Faris 98 c. 1ty owned Equip Maint Labor 99 C.1ty equip	Equipment Parts @ Project	Equip Maint Labor ~ Project	F.O.G.	Special Equipment & Tools		T 000	squipment cutchase cotto for excavar				Ceneral Lability Insurance	Insurance @ Rental Equipment	Demobilization/Inventory	Workers Compensation Estimated	Project Accounting Services	
			-	_	-	_	-	_	_	1042	1045	1050	_	-	1065	1070	1080	1090	1130	_	_	1150	1160	1180	0611	1200	_	_	1310	1315		1322	1325	1945	1350	1355	1360	1365	1425	1435	1475	1490		1494
		VSW VSW Grant Stope # Code	G-CM	M-DS	39-5	G-CM	FRI	35-5	0-00	0-9	29-9	29-5	0-00	29-5	39-9	55-5	MUI	MUI	59-5	20-0	39-9	I-RT	9-00	JS-5	50-0	00-5	10-0	9 6	39-9	39-5	D9-9	D9-9	0-9-9	20-01 0 0 0	FOP	104	E-UP	150P	MUI	MUI	FRI	39-5	C-CC	35-5

Total Section 1																
Scupe C.S.I.	DESCRIPTION	QUANTITY	BID	COSI	WEIGHT	MIRS/	MAN	EQUIP	COST'INPEL BURDINED	COST 1YPE 2 EQUIPMENT	 COST TYPES COST TYPES EQUIPMENT RENTAL	COST TYPES SM TOOLS	COST-TYPE 6 PERMANENT	CONTRACT	TOTAL DIRECT	TOTAL
Ť			LIND.			_	so.	_	LABOR	MAINT	OWNED   OUTSIDE	_		LABOR	COSTS	WEIGHT
_																
_																
S-BL 2014		4 -	Ea r:	52,500	001	9 9	091	120	57,040			\$106	510,000		517,146	400
-		+	5 G	000,75	00	9 8	091	071	27,040			5106	000,0012		517,146	00+
		Š	Fa.	52,500	061	20	o -		3			25	Q (		20	o -
_	Water Main - Grade C necking & Ass-building	8 8	50 3	- ne	cn:n	co o	- (	c	# 505			V £	74		547	- 0
_		30	3 3	à 5	75 0	1,0	7 11	7 (	886			Ā 5	095		5149	- L
		20	3 3	r D	7/0	0 0	n c	4	213			C G	0000		CNCC	2 =
		0.7	3.5	548	91	0.02			016			R 55	9		916	0 0
_			Ea	0068	45	0 0	. 0		200			08	3 05		90	
W-BD 2032			)]				0		0.5			20	0\$		80	0
W-BI) 2034		-	Ea	\$5,000	1,000	30	30	15	\$1,350			\$20	\$5,000		\$6,370	000′1
W-BD 2036	Water Main - Pipe Joint Kits	7	E S	\$170	25	_	-4		\$180			83	8680		\$863	100
_	Water Main - Test & Sanilize	2,000	3	0,18		0,02	40		81,800			\$2,000	2000		85,800	0
_			91	1:05	0.05	90.0	0		0.5			90	\$0		\$0	0
_				S)		0.25	0		80			05	\$0		20	c
_			(i ]	Ž	0.75	0.25	0	-	20			20	20		20	- ·
-		300	i,	80.50		50.0	<u>.</u>	10	\$675			\$150			5825	0 :
_			Eac	900,18	001	01	0		25			95	05		20	<b>-</b>
			F.	545	oo ;	0.49	0 0	_	08			0%	9		20	0 0
_			Ed	2800	30	c1	0 :		05			S 8	S \$		20	0 0
			F.a.		01	- 0	0 0		DS 8			2 8	95		0.5	<b>&gt;</b> 5
_			3	51.25	0.2	0.05	0		3			92	D. 1		20	n ·
W-BI 2058	Water Serv - Heal Trace		T G	56,00	25.0	0.047	4 5 -		0814 0815			55	5510		269c	2000
_		9 (2)	20, 20	3 5	1	· -	9 9		2,500			\$500	00-10-1		\$5,000	9 0
_	- 01	250	797	80.10	0,05	0,13	33		\$1,463			\$22	525		605,18	13
-		250	97	23		0,22	55	0+	\$2,475			\$37	\$750		\$3,262	0
S-BC 2068		250	3	75	0.75	0.25	63	20	52,813			\$42	\$1,000		53,855	881
S-BC 2070	- 11	250	7			0.05	13	0.1	\$563			85	90		5571	0
		950	LIE	870	12	2.0	35	10	\$1,575			\$24	\$3,500		660'58	750
_			FIG.	\$1,000	0.9	S	0	0	20			905	05		90	0
S-BC 2076		김 ,	Ed.	5150	20	- 8	21 8	0	5540			SS [	\$1,800		52,348	240
_	Sewer Main - Manhous, Access, & Insulation Sewer Main - Changante & Rolaton		P. T.	000,00	150	20	20	07	009,55			+C¢	\$1 500		57.414	00000
		001	700			8:0	08 1 08		\$3,600			0068	80		84,500	: 0
		320	Lf.	80110	50.0	90.0	19		5864			960	\$32		8956	91
_	-	320	97	15		0,25	80	7.0	83,600			554	\$320		53,974	0
		320	3	\$	0,75	0.25	08	50	\$3,600			\$54	\$1,280		54,934	240
_	-	320	3	50,50		0.05	91	01	\$720			8160	1		5880	0
S-BI 2092		112		545	∞ <sup>2</sup>	0 49	CC Y	30	52,470			537	55,040		57,547	896
	Sewel Service table - 4 (1007) Fittings Savice - Joint Kita	2 ه	F.d.	2000	20	4 -	9 2		5/20			I SS	51,320		898.18	120
		4	T.	2	2	_	7 0		90			305	80		08	0
_		×	I.d.	8300	12	ιΩ	40		51,800			\$27	52,400		\$4,227	96
S-Bt 2102	Sewer Service - Testing	100	00			0.0	09		\$2,700			7.	90		52,741	0
	Shoot Potals															

	TOTAL	160	160
	TOTAL DIRECT COSTS	SI,949	51,949
	CONTRACT LABOR		\$0
	COST TYPE 6 PERMANENT MATERIALS	008S	2400
2019	COSTIYPES SM TOOLS EXPNDBLS	5141	\$141
1	COSTITYES COSTITYES EQUIPMENT RENTAL OWNED OUTSIDE	75 - S	\$0
cher Phas	COST LYPE 3  EQUIPMEN  OWNED	G - 93	20
~ Water & Sewer Replacement ~ Pilcher Phase A	COST TYPE 2 EQUIPMENT MAINT.	R □ R	20
Replacen	COST TYPE 1 BURDENED LABOR	51,408	\$1,408
sewer l	EQUIP		0
ter & S	MAN	37 = 0	32
	MHRS/ UNIT	0	
City of Marshall	WEIGHT /UNIT	01	
y of M	COST	95.25	
ŧ	BID	E a	
	QUANITIY	16	
	DESCRIPTION	Arctic Box Hardware	Sheet Fotals
	CODE	5012	
	VSW Scope Code	С-ІН	

	TOTAL	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	01-9
	TOTAL DIRECT COSTS	\$0\$ \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	\$7,373
	COST TYPE 7 CONTRACT LABOR		80
	COST TYPE 6 PERMANENT MATERIALS	\$1,600 \$0 \$0 \$0 \$0 \$0 \$0	\$1,600
6	COST TYPE 5 SM TOOLS EXPNDBLS	\$141 80 80 80 80 80 80	1713
A~ 2019	COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		08
ıer Phase			9
ıt ~ Pilch	COST TYPE 2 EQUIPMENT MAINT		03
City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase A	COST TYPE 1 BURDENED LABOR	\$5,632 \$0 \$0 \$0 \$0 \$0	©E 427
wer Re	EQUIP		C
& Se	MAN HOURS	1128	961
Wate	MHRS/ UNIT	ob	
shall ~	WEIGHT /UNIT	40	
of Mar	COST \$/UNIT	\$100.00	
City	BID	Ea	
	QUANTITY	16	
	DESCRIPTION	House A. Box - Lumber & Related	1.1-13.7-113
	C.S.I. CODE	6082	
	VSW Scope Code	C-IB	

	rotal Weight	1128 0 0 0	144
	TOTAL DIRECT COSTS	S1,042 S5,610	56.651
	CONTRACT CONTRACT LABOR		9
	COST TYPE 6 PERMANENT MATERIALS	S320 \$1,280	007 135
	COSPTYPES SM TOOLS EXPNDBLS	S18 S106	\$173
~ 2019			0.00
r Fnase A	COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		0.0
Water & Sewer Keplacement ~ Pilcher Phase A	COST TYPE 2 SQUIPMENT MAINT.		000
olacement	COSTTYPE1  BURDENED EQUIPMENT  LABOR MAINT.	S4,224 S4,224	200
wer Rej	EQUIP HOURS		,
r & se	MAN	= = = 119	
~ Wate	MHRS/ UNIT		T
Sildil	WEIGHT	8.0	1
City of Marshall	COST V	085	1
	BID	e a a	1
	QUANITIY	16	Ī
	DESCRIPTION	House A. Boxes WX Stripping House A. Boxes Insulation & Sealants	
Ì	C.S.L.	7010 H 7012 H	1
	VSW Scope Code		T

TOTAL		
TOTAL DIRECT COSTS	05 98.25 98.25	
COST TYPE 7 CONTRACT LABOR		
COST 1YPE 6 PERMANENT MATERIALS	S) S	
COST TYPE 5 SM TOOLS EXPNDBLS	\$1.2 \$1.2	
COSTTYPE3 COSTTYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		
COSTITYPE3  EQUIPMEN  OWNED		
COST TYPE 2 EQUIPMENT MAINT:		
COSTTYPE1 COSTTYPE2 BURDENED EQUIPMENT LABOR MAINT.	\$6.0 \$	
EQUIP 1		
MAN	ēs anjaijā ∞	
MHRS/ UNIT	11 1 pt 2 cm 12 cm	
WEIGHT /UNIT	15	
COST	8150	
BID	Ball Ball Ball Ball Ball Ball Ball Ball	
QUANTITY	··	
DESCRIPTION	House Rehah & Plumbing Circ. Pumps	
C.S.I.	15100	
VSW Scape Code	THE FILE PROPERTY.	

IOIAL	3.2	
TOTAL DIRECT	\$33,982 83,982	
CONTRACT		
COSTLYPE6 PERMANENT	S800 S800	
COSTTYPES SM FOOLS	8 - R - R - R - R - R - R - R - R - R -	
SETTYPE 4		
COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL		
COST TYPE 2 EQUIPMENT		•
COSTIYET COSTIYES COSTIYED COSTIYES CONTAIN CONT	53,120	•
EQUIP		
MAN		
T MHRS/ MA	=======================================	
WEIGHT		•
BID COST WEIGH	25200	
QIA		
QUANTITY	ч	•
DESCRIPTION	House Service H.T. Electrical	
C.S.L.		
VSW Scope	H H	

	TOTAL	75,655	890'01	01	160	640	[41	9	9	ISI	27	86,715
	TOTAL DIRECT COSTS	\$834,511	\$125,854	80	51,949	\$7,373	\$6,651	20	80	\$786	\$3,982	\$981,107
	CONTRACT CONTRACT LABOR	\$300,000	83	80	050	08	200	950	08	05	9	\$300,000
	COST TYPE 6 PERMANENT MATERIALS	08	\$61,899	05	S400	\$1,600	81,600	80	08	8150	2800	\$66,449
2019	COST TYPE 5 SM TOOLS EXPNDBLS	\$194,479	<u>\$4,480</u>	0\$	\$141	5141	\$123	20	20	\$12	\$62	\$199,439
Water & Sewer Replacement ~ Pilcher Phase A ~ 2019	COSTTYPE3 COSTTYPE4 EQUIPMENT RENTAL OWNED OUTSIDE	815,000	80	08	80	80	80	08	30	9	-08	\$15,000
Pilcher		\$200,000	<u>\$</u>	20	9	80	80	<del>\$0</del>	98	200	9	\$200,000
zement ~	COST-TYPE1 COST-TYPE2 BURDENED EQUIPMENT LABOR MAINT.	\$27,808	20	80	80	80	30	0\$	<u>\$0</u>	80	<u>0</u>	\$21,808
er Replac		\$103,224	\$59,475	20	\$1,408	\$5,632	<u>\$4,928</u>	0\$	20	\$624	\$3,120	\$178,411
& Sew	EQUIP	80	686	0	0)	0	ા	0	01	0	0	1,069
~ Water	MAN	1,782	<u>1,329</u>	9	32	128	112	0	ol	ωI	40	3,430.76
shall	MHRS/ UNIT	oi	ol	01	0	0	0	0	ol	01	ol	
City of Marshall ~ \	WEIGHT MHRS/	0	0	0	ol	0	9	01	٥	ol	Ö	
City	BID COST UNIT \$/UNIT	ß	3	08	9	<u>S0</u>	31	80	80	80	OSI	
		38	9%	à	%	%	3°?	3%	69	300	,°,	
	QUANTITY	100	100	100	100	100	100	100	700	100	001	
	DESCRIPTION	GENERAL CONDITIONS	SITELVORK	CONCRETE & RELATED	MISCELLANEOUS METALS	WOOD & PLASTICS	THERMAI & AIOISTURE PROTECTION	DOORS & WINDOWS	FINISHES - FLOOR & WALL	MECHANICAL	ELECTRICAL	CUMULATIVE PAGE TOTALS:
	C.S.I.	0001	2000	3000	2000	0009	2000	8000	0006	15000	00091	

## City of Marshall

## PER Cost Estimate, Alternative 3 - Phase 2, 2020, 2012 Subdivision

Extended Cost	\$153,092	868,069	\$144,571	\$45,402
Unit Cost	\$43	\$170	\$100	\$101
Quantity Unit	3,560 Lft,	400 Lft.	1,440 Lft.	450 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	S-BL
Item #	П	2	4	8

\$411,134	
Construction Subtotal:	

Other Direct Costs

\$999,375	plus 2.4% 2020 Total Cost:	
\$975,952	2018 Total Cost:	
\$564,818	Other Direct Cost Subtotal:	
\$27,320	Miscellaneous Utilities	M-UI
\$325,046	General Conditions	
\$73,452	Mobilization / Demobilization	
\$35,000	Engineering & Design Services	
\$104,000		

7 8 9 9 10 11

## Assumptions

- No EMT or Contingency is included.
- 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.
- 675 LF of new sewer main, 225 LF of new sewer service, and 3 new sewer services are constructed. 00
- 9 Water and sewer mains do not extend to the end of 2012 Subdivision.
- 10 No blind wyes are installed for future services.

MSA			-						COSTITYPE1	COSTIYPE2	COSTIYPES	COST TYPE 2 COST TYPE 3 COST TYPE 4	COST TYPE 5	COSTTYPE6	COST TYPE 7		
Scope CC	C.S.L. DESCRIPTION CODE	QUANTITY	BID	COST S/UNIT	WEIGHT /UNIT	MIRS/ UNIT	MAN	EQUIP E	BURDENED		EQUIPMEN OWNED	EQUIPMENT RENTAL OWNED   OUTSIDE	SM TOOLS EXPNDBLS	PERMANENT MATERIALS	CONTRACT	TOTAL DIRECT COSTS	TOTAL
G-CM 1	1025 CM Sycs & Eng. Support	100	,0/ /0												\$100,000	\$100,000	
		001	% %												\$35,000	\$35,000	
_	_	001	6R 1														
_	_	400,000	so (	50.01			S	C	0				\$4,000			8+,000	
_	_	860	<u>.</u>	262		0,15	06	30	54,034				856,781			\$60,815	
	1036 Material Flandling & Inventory	÷99	W ( M )			1.0	99	30	52,988							\$2,988	
-	_	7	VAVI.			00	76/		0///100							9///195	
	1042 Field General Foreman 11145 Tob Clork		W KS			2.4											
	_		Ed	\$2,000		t 08	80		83.600				\$2.000			55.600	
_		20	Dys	\$36									8720			5720	
G-GC 11	1060 Subsistence	75	Dys	\$36									\$2,700			\$2,700	
G-GC 10	1065 Office Supplies	001	0/	210	3								\$1,000			\$1,000	300
G-GC 10	1070 Office Equipment	001	30	210	8								\$1,000			81,000	300
_	1080 Temporary Power	8	Mo	52,000									\$6,000			\$6,000	
-	_	ń	Mo	8450									\$1,350			81,350	
-	÷	3	Mo	8200									2600			8600	
_	_	-	Rt	\$1,200		91	91		\$1,120				\$1,200			\$2,320	
_	÷	ći.	Rt	\$1,000		91	32		52,080				\$2,000			84,080	
_	_	99	Cwl	8110		1.0	7	20	\$332				\$7,305			\$7,637	
_		m !	Ma	53,500		01	30		\$1,500				\$10,500			\$12,000	
	1160 Safety & Cleanup	2 5	W.KS	2700	Ц	0	120		24,800				24,800			\$9,600	200
		001	300	850	, ru							85,000				\$5,000	200
_		m	Mo	\$5.000								\$15,000				\$15,000	
_		219	Eghrs	\$22	co					84,827			\$4			\$4,831	829
G-GC 13	1305 Equip. Maint Labor @ City equip.		Eqhrs			0,25	011		\$6,143				68			\$6,152	
C-GC 13	1310 Equipment Parts @ Project		Eqhrs	210	2,7419					\$17,552			\$35			\$17,587	4,813
_	1315 Equip Maint Labor Project		Eghrs			0.24	421	doj	\$21,062							\$21,062	
_		8,776	Gal	0.98	0,25	0.012	105		\$5,266				\$52,656			\$57,922	2,194
_	1322   Special Equipment & Tools		, o	8100		_											
	1325		_														
-	1345																
	1350																
E-QP 13	1355																
_	1360																
-	_																
		2/4,248	. brS	50									976,018			510,970	
10 M	1455 Insurance & Rental Equipment	0	MO.	55,000		80	08		64 000				000/64			95,000	
_		50	Lbrs	900		2	3						\$19,107			2016118	
G-GC 14	1492 Project Accounting Services	30	Mo	\$1,800									\$54,000			\$54,000	
G-GC 14	1494																
	Shoot Totale																

-	-								۱.			The contraction of the contracti	207					
	CSI	DESCRIPTION	QUANTIFIY			WIJGIH	MHRS/	MAN	EQUIP	5 B	2 2			COST TYPES SM TOOLS	COST TYPE 6 PERMANENT	CONTRACT	TOTAL DIRECT	TOTAL
7	CODE			ENS.	S/UNIT	MILL	LIND	HOURS	HOURS	LABOR	MAINT	EDINADO DEL ONINE	OUTSIDE	EXPNDBLS	MATERIALS	LABOR	COSTS	WEIGHT
-	20710							0		50				20	90		80	0
-								0		20				20	20		20	0
_		sewer Serv - Regrade, repair existing sves.			\$2,500	001	0+	0		95				20	20		20	D
		Waler Serv - Regrade, repair existing sves		15.0	52,500	001	9	0		20				98	20		20	0
		Water Serv Curb Stops	3	Ea.	52,500	150	20	60)	01	52,640				240	87,500		510,180	420
W-BD	2020 W.	Water Main - Grade Checking & As-building	1,400	7	1.08	0.05	0,05	70		53,080				246	\$140		\$3,266	70
W-BD	2022 W.	Water Main - Regrade / fill @ pipe aligim.	1,400	THE	53		0_075	105	95	54,620				695	54,200		688'85	0
W-BD	2024 W.	Water Main - Pipe Bedding & Fabric/Foam	1,400	.J.l	Ā	0,75	81.0	280	150	\$12,320				5185	85,600		518,105	1,050
W-BD 3	2026 W.	Water Main - Right of way prep	1,400	Table:			0,02	28	01	\$1,232				20			\$1,232	0
W-BD	2028 W.	Valer Main - 6" HDPE	1,400	77	\$48	01	0,2	280	200	\$12,320				\$185	\$67,200		\$79,705	14,000
		Water Main - 6" arctic pape fittings & related	- 00	Ea	0068	45	( E	80	20	\$3,600				554	\$7,200		510,854	360
W-BD	2032 1V.	Water Main - 1,25" HDPE Heat Trace	1,400	3				0		80				0\$	20		80	0
-		Water Main - Hychant Packages	_	Fa	\$5,000	1,000	30	30	90	81,350				520	55,000		56,370	1,000
W-BI)	2036 IV.	Vater Mam - Pipe Joint Kits	06	Ed	\$170	25	-	06		\$4,050				561	\$15,300		\$19,411	2,250
_		Water Main - Test & Saminze	1,400		415		0,02	28		\$1,260				\$2,000	2000		\$5,260	0
_		Valer Serve - Grade Charking & Assbuilding	325	19	7	0.05	0.06	4		\$608				\$122	\$23		5752	=
-	_	Water Serv - Regnade / fill @ nine alignm.	355	<u>_</u>	ū		175	, jr	II.	52.53				838	5,525		52 794	
		Valer Serv - Pipe Bedding & Geolex, Fabric	225	7 7	Ţ,	0.75	0.25	2,0	100	\$2.531				330	2900		83,469	691
-	_	Valer Serv - Right of way prep	225	7	50.50		0.05	=	4	\$506				\$113			5619	0
		Water Serv - Saddles & Clam Shells	80	Ę	\$1.000	00.1	=	30	C)	\$1.350				S. 33	83.000		54,485	300
	_	Water Serv - Carner - 4" HOPE	225	3	5 <del>+</del> 5	50	0.49	110	. 6	24,961				\$74	\$10,125		515,161	008'7
		Vator Serv - 4" archic pine filtings & related	6	Eas	5800	30	d	60	No.	0188				-S:	57.200		58.022	270
_	_	Water Serv - Pine lont Kits	30	μ	0119	9	-	30		51.350				\$20	53,293		\$4,663	300
	,,,,,	Water Serv - sun/ret lines - 1"A'pex	450	2	51.25	20	0.05	[1 E]		51,013				515	\$563		1,590	06
W-BI	_	Water Serv - Heat Trace	225	Ξ	92,00	0,05	0,047	=		\$476				57	\$1,575		\$2,058	Ξ
W-B]	2060 We	Water Serv - A box Conn. Fittings & Boots	33	Eag	\$300	25	LS.	10		\$675				210	006\$		\$1,585	75
W-BI	_	Water Serv - Testing & Sanitize	001	35	55		_	001		\$4,500				8500			92,000	0
S-BC	2064 Ser	Sewer Main - Grade checking & as building	675	17.	80.10	50.0	0.13	SS		53,949				859	268		54,075	34
S-BC	2066 Ser	Sewer Main - Regnade/fill @ pipe alignin	675	ń	83		0.22	149	120	\$6,683				\$100	\$2,025		58,808	0
S-BC	2068 Ser	Sewier Main - Pipe Bedding & Geolex, Fabric	675	7	7.	0.75	0.25	169	150	\$7,594				5114	\$2,700		510,408	506
S-BC	2070 Sev	Sewer Main - Right of way prep	675	Tr.			0.05	34	0.1	915,18				523	05		\$1,542	0
S-BC 2	2072 Ser	Sewer Main - 8" LIDPE	675	Lfs	\$70	12	2.0	473	460	\$21,263				5319	\$47,250		\$68,831	10,125
S-BC	2074 Sex	sewer Main - 8" x 4" Serv. Wyes	6	Eas	\$1,000	99	8	24	10	080'15				516	53,000		54,096	180
S-BC	2076 Ser	bewer Main - Joint Kits	58	Eat	\$150	20	-	580		\$2,610				839	58,700		511,349	091,1
S-BC 3	2078 Sev	Sewer Main - Manholes, Access. & Insulation	च	Eas	000'98	5000	09	240	100	008'015				\$162	\$20,000		\$30,962	20,000
S-BC	2080 Sev	Sewer Main - Cleanouts & Related		Edi	81,500	150	20	0		80				\$0	80		90	0
S-BC 2	2082 Sev	Sewer Main & Manhole - Testing	100	ò <sup>0</sup> /			8"0	80		\$3,600				0068	90		54,500	0
S-81	2084 Ser	sewer Serv Grade Checking & As-building	225	40	80.10	0.05	90:0	14		8099				543	\$23		\$673	Ξ
	-	Sewer Serv - Regrade/fill @ pipe alignm	225	Lí,	UF:		0,25	56	41)	\$2,531				538	\$225		\$2,794	0
_	-	Sewer Serv Pipe Bodding & Geotex, Fabric	225	7	ま	0.75	0,25	56	30	\$2,531				\$38	006\$		53,469	169
-	-	Sewer Serv - Right of way prep	225	ij.	\$0.50		0.05	Ξ	ιO	9098				S113			8619	0
-		Sewer Service Line - 4" HDPE	225	3	543	<b>50</b>	0.49	011	80	54,961				574	510,125		\$15,161	008'1
_	94	sewer Service Line - 4" EIDPE Fittings	9	Ea	2800	30	2	12	n	\$240				°° ;	24,800		\$5,348	180
_		sewer Service - Joint Kits	24	Ed	5110	9	-	24		080/15				516	\$2,640		53,736	240
24-K	2098 564	Sewer Service - Eleat Trace	225	9	9063		L	D %		08. 13				9 5	04		50	o 5
_	-	Sewer Service - Testino	a 8	e a	nnce	4	n 2	00		90,500				370	008/15		\$2,741	₹ ⊂
	1	9	000				77177								4			

	TOTAL	0 09	09
	COSTITYET  CONTRACT TOTAL DIRECT  LABOR  COSTS		\$731
	CONTRACT LABOR		20
	COSTITYFE 6 PERMANENT MATERIALS	5150	\$150
2020	COSTTYPES SM TOOLS EXPNDBLS	SS.3	\$53
	COSTITYPE3 COSTITYPE4 EQUIPMENT RENTAL OWNED OUTSIDE	.S. ≥ S.	80
Subdivi	COST TYPE 3 EQUIPMEN OWNED	S	\$0
~ Water & Sewer Replacement ~ 2012 Subdivision ~	COSTTYREZ EQUIPMENT MAINT.	SS ≥ 0S	9:0
eplaceme	COSTTYPE1 BURDENED LABOR	92.58 855.8	\$528
wer R	EQUIP		0
r & Se	MAN HOURS	12 12	12
~ Wate	MHRS/ UNIT	2	
City of Marshall	WEIGHT /UNIT	10	
y of M	COST \$/UNIT		
±	BID	Ea	
	QUANTITIY	٥	
	DESCRIPTION	Arctic Box Hardware	Sheet Totals
	CSL	5012	
	VSW Scupe Code	C-1B	

			City o	City of Marshall ~ Water	hall ~ V	Vater (	& Sew	er Rep	Jacemen	& Sewer Replacement ~ 2012 Subdivision ~	ubdivis	ion ~ 2020	07				
DESCR	DESCRIPTION	QUANTITY	DIB	COST %	WEIGHT /	MHRS/	MAN	EQUIP	COST TYPE1 BURDENED LABOR	COST TYPE2 EQUIPMENT MAINT.	COST TYPE 3 EQUIPME OWNED	COSTTYPE3 COST TYPE4 EQUIPMENT RENTAL OWNED OUTSIDE	COST TYPES SM TOOLS EXPNDBLS	COSTITYPE 6 PERMANENT MATERIALS	COST TYPE 7 CONTRACT LABOR	COST TYPE 7  CONTRACT TOTAL DIRECT LABOR COSTS	TOTAL
							-		X				1 1	9.7		7.0	
Iouse A. Box	House A. Box - Lumber & Related	9	Ea.	\$100.00	40	90	48		\$2,112				\$53	\$600		\$2,765	240
																90	0 0
				11-11/1													
														Na.			
							0		.80 80				90	\$0 \$0		80	0 0
									0\$				0.8	\$0 \$0		\$0	0
	Sheet Totals	15.					48	0	\$2,112	80	\$0	\$0	\$53	\$600	80	\$2,765	240

	TOTAL	= 0 3 0 0	54
	TOTAL DIRECT COSTS	\$331	\$2,494
	COST TYPE7 CONTRACT LABOR		80
	COSTTYPE b PERMANENT MATERIALS	S120 S480	\$600
	COSTTYPES SM TOOLS EXPNDBLS	5. 5. 7. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	\$46
on ~ 2020	COSTTYPE3 COSTTYPE4 EQUIPMENT RENTAL OWNED OUTSIDE		90
ubdivisic	COSTTYPE3   EQUIPMEN   OWNED		80
~ 2012 S	COST TYPE 2 EQUIPMENT MAINT.		0\$
Water & Sewer Replacement $\sim$ 2012 Subdivision $\sim$	COST TYPE 1 BURDENED LABOR	\$264 \$1,584	\$1,848
rer Rep	EQUIP		0
& Sev	MAN	= = 1 9 0 0 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1	42
	MHRS/ UNIT	1 2	
City of Marshall ~	WEIGHT /UNIT	2.0	
of Mar	COST	S S S S S S S S S S S S S S S S S S S	
City	BID	7 M M M	
	QUANTITY	vo vo	
	DESCRIPTION	House A. Boxes WA Stripping House A. Boxes Insulation & Sealants	Sheet Totals
	CSL	7012	
	VSW Scope Code		

VSW Scope Code		
C.S.I.	151000 15112 15114 (5)16	
DESCRIPTION	House Rehab & Plumbing Punch list & repairs Testing © H. Plumbing Cir. Pumps	
QUANTITIY	m m m	
BID		
COST		
WEIGHT /UNIT		
MHRS/ UNIT		
MAN	0 = 7 · 0 · 0 · 5	
EQUIP		
COSTTYPE1 COSTTYPE2  BURDENED EQUIPMENT  LABOR MAINT.		
COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		
COST TYPES SM TOOLS EXPNDBLS	26 F F F F F F F F F F F F F F F F F F F	
COSTITYE6 PERMANENT MATERIALS	\$225 \$0 \$0 \$0 \$0 \$0	
CONTRACT LABOR		
TOTAL DIRECT COSTS	\$702 \$358 \$2,339 \$0	
TOTAL	0 1 2 0 0 0	

	TOTAL	0			\$			2,4
	TOTAL DIRECT COSTS	20			\$5,974	Į	ē Y	\$5,974
	CONTRACT CONTRACT LABOR							80
	COSTTYPE6 PERMANENT MATERIALS	90	ñ	1. 1	\$1,200		k ik	\$1,200
0	COST TYPES SM TOOLS EXPNDBLS	0\$	у	F 7	594	2	K F	\$94
on ~ 2020	COSTITYES COSTITYES  EQUIPMENT RENTAL  OWNED OUTSIDE							
ubdivisi								
~ 2012 S	COST 17PE 2 EQUIPMENT MAINT.							
Water & Sewer Replacement ~ 2012 Subdivision ~	COST'ITYPE J COST ITYPE 2  BURDENED EQUIPMENT  LABOR MAINT.	0\$	100	k.s	54,680	1	V Tr	54,680
er Rep	EQUIP							0
& Sew	MAN	0			09	Ī	- 1	09
Water	MHRS/ UNIT				10			
hall ~	WEIGHT/ /UNIT				95			
City of Marshall ~	COST S/UNIT				\$200	1	, į	
City o	GNIT				Ea.			
	QUANTITY				9			
	DESCRIPTION	House Rehab & Plumbing			Η		The state of the s	Sheet Totals
	CSL	16100			16108			
	VSW Scope Code				CH			

	TOTAL	9,265	56,683	01	09	240	25	08	0	09	8	66,410
		76	26,		91	2	rul	۸î		©I	4	999
	TOTAL DIRECT COSTS	<u>\$564,818</u>	5395,751	200	\$731	\$2,765	82,494	80	9	53,420	<u>\$5,974</u>	\$975,952
	COST INTE 7 CONTRACT LABOR	\$135,000	<u>\$0</u>	20	990	80	08	3	80	20	08	\$135,000
	COSTTYPE 6 PERMANENT MATERIALS	80	\$246,198	80	\$150	\$600	2600	08	<u>80</u>	\$675	<u>\$1,200</u>	\$249,423
~ 2020	COST TYPE 5 SM TOOLS EXPNDBLS	\$268,737	\$5,867	05	\$53	\$53	979	051	200	\$54	594	\$274,903
City of Marshall $\sim$ Water & Sewer Replacement $\sim$ 2012 Subdivision $\sim 2020$	COST IYPE 3 COST IYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE	\$20,000	80	80	08	OSI	0\$	20	<b>G</b>	05	80	\$20,000
012 Suk		80	0.8	90	20	98	3	98	80	20	20	20
ement ~ 20	COST TYPE 1  BURDENED EQUIPMENT  LABOR MAINT.	\$22,379	80	80	08	08	90	08	3	09	05	\$22,379
r Replace		\$118,702	\$143,687	\$0	\$528	\$2,112	\$1,848	205	05	<u>82,691</u>	<u>54,680</u>	\$274,248
Sewe	EQUIP	080	2,114	01	0	01	0	01	O	0	0	2,194
Water &	MAN HOURS	1,949	3,211	01	의	81	42	01	oj	35	79	5,356,79
hall ~	MHRS/ UNIT	01	0	0(	0	0	0	9	0	О	0	
of Mars	WEIGHT MHRS/	) a	01.	a	əl	0	이	0	의	의	0	
City 6	COST	05	91	35	050	05	3	80	80	98	8	
	GIB	%	%	ò₹	26	95	%	25	180	98	35	
	QUANTITY	100	100	100	100	100	001	100	001	100	001	
	DESCRIPTION	GENERAL CONDITIONS	SITETVORK	CONCRETE & RELATED	MISCELLANEOUS METALS	WOOD & PLASTICS	THERAJAL & AJOISTURE PROTECTION	DOORS & WINDOWS	EINISHES - FLOOR & WALL.	ALECHANICAL	EL ECTRICAL	CUMULATIVE PAGE TOTALS:
1		-	2000	3000	2000	0009	7000	0008	0006	15000	16000	$\vdash$

City of Marshall

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

Extended Cost	\$13,550	\$119,186	\$72,838	\$210,093
<u>Unit Cost</u>	\$5	\$298	\$51	\$467
Quantity Unit	3,560 Lft.	400 Lft.	1,440 Lft.	450 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	S-BL
Item #		CI	4	3

,66
nstruction Subtotal:

\$119,000	\$50,549	\$297,070	\$23,879	\$540,499	\$956,167	\$999,194
Construction Management, Supervision & Engineering Support, Amendment # Engineering & Design Services	Mobilization / Demobilization	General Conditions	Miscellaneous Utilities	Other Direct Cost Subtotal:	2018 Total Cost:	plus 4.5% 2021 Total Cost:
			M-UI			

7 8 8 9 9 10 11

## Assumptions

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

VSW         C.S.L.         DESCRIPTION         QUANTITY           Code         CODE         QUANTITY           G-CM         1025         CM Sves & Eng. Support         100           G-CM         1370         Engineering & Design         100           G-CC         1028         Archeological Services         100           G-CC         1030         Small Material Procurement         400,000           F-RT         1035         Material Handling & Inventory         398           G-GC         1036         Material Handling & Inventory         8           G-GC         1040         Field Superintendent         8           G-GC         1045         Field Superintendent         8           G-GC         1045         Field Superintendent         8           G-GC         1045         Field Superintendent         8           G-GC         1048         Field Superintendent         8           G-GC         1049         Field Superintendent         8           G-GC         1048         Field Superintendent         442           G-GC         1048         Field Superintendent         9           G-GC         1048         Subsistence         60		COST				-				ŀ			7 SIGNET BOY		
1025 CM Sves & Eng. Support 1370 Engineering & Design 1028 Archeological Services 1030 Small Material Procurement 1035 Mubilization - Barge - Truck 1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/ Quarters Setup&Supply 1055 Subsistence 1060 Subsistence	C wt C wt Wks. Wks. Wks.	S/UNIT	WEIGHT /UNIT	MHRS/	MAN EQ	EQUIP BUIL HOURS LA	COST (YPE) COST 1YPES BURDENED EQUIP LABOR MAINT.	- Julia	COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL OWNED   OUTSIDE	핵 ()	COSTTYPES SM TOOLS EXPNDBLS	COSTIYPE6 PERMANENT MATTERIALS	CONTRACT	TOTAL DIRECT COSTS	TOTAL
1370 Engineering & Design 1028 Archeological Services 1030 Small Material Procurement 1035 Mobilization - Barge - Truck 1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsista. & Contract Lab. 1060 Subsistence	Cwt Cwt Wks, Wks,			$\overline{}$	+	-	╁	+	-	-			\$115,000	St 15,000	
1028 Archeological Services 1030 Small Material Procurement 1035 Mobilization - Barge - Truck 1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsist. @ Contract Lab. 1060 Subsistence	C Vwt C Cwt W Ks. W Ks.				-	_							250,000	\$50,000	
1030 Small Material Procurement 1035 Mobilization - Barge - Truck 1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsist. & Contract Lab. 1060 Subsistence	S Cwt Wks Wks Wks								_	_					
1035 Mubilization - Barge - Fruck 1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1059 Project Office/Quarters Setup&Supply 1055 Subsista. @ Contract Lab. 1060 Subsistence	Cwt Cwt Wks Wks.	\$0.01		Į.	_			_		- 1	\$4,000			54,000	
1036 Material Handling & Inventory 1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsist. @ Contract Lab. 1060 Subsistence	Cwl Wks Wks.	595		0.15		50	52,685			P	5/,/83			7040,407	
1040 Field Superintendent 1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsist @ Contract Lab. 1060 Subsistence	Wks. Wks. Ea.			1.0	# E	_	686'15			-				686,14	
1042 Field General Foreman 1045 Job Clerk 1050 Project Office/Quarters Setup&Supply 1055 Subsist. @ Contract Lab. 1060 Subsistence	Wks. Wks. Ea.			99	528	7.	541,184		_	_				#61,14 <b>0</b>	
1045 Job Clerk  1050 Project Office/Quarters Setup&Supply 1055 Subsist. @ Contract Lab. 1060 Subsistence	Wks. Ea.			09					_						
1050 Project Office/ Quarters Setup & Supply 1055 Subsist. @ Contract Lab. 1060 Subsistence	Ľa.			77 1		-	00	-			000			45 600	
Subsist @ Contract Lab Subsistence		\$2,000		08	0,50	iń	53,600				52,000			55,600	
Subsistence	Dys	536									57 160			044,16	
	Dys.	236	,			_			_		32,100 41 000			\$1.000	300
G-GC 1065 Office Supplies 100	.6 9:	0 E	n m			_			_		000'15			51,000	300
1080 Temporary Power	Mo.	\$2,000									\$4,000			\$4,000	
Telephone & Star Band Svcs	Mo.	8450			_				_	-	8900			0068	
Air Charters	Mo.	\$200									\$400			\$400	
G-GC 1140 Air Travel - Super	Rt.	\$1,200		16	16	64	\$1,120				\$1,200			\$2,320	
	RL	\$1,000		91		_	\$2,080		_		\$2,000			54,080	
1150	Š Z	\$110		1.0	4 5	20	\$221		_		\$4,861			35,082	
1160 Air Freight - Course of const.	Mo.	33,500 e400		2 9	07	n U	31,000		_		53.200			\$6,400	
G-GC 1180 Safety & Cleanup 8	% %	5400	ļn	2	00	7	00710			9-1	\$20,000			\$20,000	200
1200 Small Tools/Equipment Rent	šº	\$50	25						\$5,	\$5,000				\$5,000	200
G-GC 1210 Equipment Rent ~ City owned 2	Mo.	85,000			_	-			\$10	\$10,000				\$10,000	900
1300 Equipment Parts @ City owned	Eghrs	\$22	m				_	\$12,650		_	21 5			25.067	07/1
1305 Equip Maint Labor @ City equip.	Eqhrs			0.25	<u>4</u>	Ã	58,050	000	_		217			30,002 \$73 046	6 306
1310 Equipment Parts @ Project	Eqhrs	210	2,7419	11	_	140	\$25	\$23,000		-	0+40			\$28,750	OAC'O
5151	Eduits	96.11	0.75	51200	247	_	\$12,363	_			\$69,000			\$81,363	2,875
G-CC 1322 Special Equipment & Tools	j 32	2000		-	:										
1325										-					
G-GC 1330					_			_		_		7000			
_						_									
E-QP 1350					_	_				_					
1355								-							
1365	_					_		_		_					3117
1425 General Liability Insurance 324,486	LbrS	80			_		_			-	\$12,979			\$12,979	
Insurance @ Rental Equipment	Mo.	53,000			7			_		_	\$6,000			56,000	
1475 Demobilization/Inventory	ă	810		8.0	80	S)	\$4,000	-			\$1,000			90000	
1490 Workers Compensation Estimated 322	Lbrs	20				_					977,776			95,400	
G-GC 1492 Project Accounting Services 3	Ö Z	21,800									23,400			O.E.O.	
+				1	1010	6	100	022 ZE0	9 11	815,000	\$214 KAS		8165 000	\$540.199	12,506

-														J.			
Scupe C.	C.S.J. DESCRIPTION	VITTINAUO	BID	COST	WEIGHT	MHRS/	MAN	EQUIP	BURDENED	COSFTYPE2 EQUIPMENT		COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL	COST TYPES	COST TYPE 6 PERMANENT	CONTRACT	TOTAL DIRECT	TOTAL
			_	S/UNIT	/UNIT	UNIT	HOURS	HOURS	LABOR	MAINT.	OWNED	OWNED   OUTSIDE			LABOR	COSTS	
M-fM 20	2010																
			Ş	1			i.	i L						i de			
S-181-0 Z()		4	Ed.	\$2,500	90	0+0	0.00	020	\$24,640				0754	535,000		560,010	004-1
		<del>†</del>	L'A	22,500	00 :	7	nac	000	324,640				0764	000/255		010,000	004,1
_		i	ra.	22,500	061	70.0			Ž .				2	25		, 20 11 11	o -
_		70	4	201	cn"0	0,05	_		5+5				5	7.7		770	_
_		20	77	\$3		1.0	2	-	\$88				51	260		\$149	÷
W-B1) 20	2024 Water Main - Pipe Bedding & Fabric / Foam	20	ä	3	0,75	0,25	ıC	+	5220				\$3	580		5303	61
W-BD 20	2026 Water Main - Right of way prep	20	3			0.02	0		818				80			\$18	0
W-B1) 20	2028 Water Main - 6" HDPE		77	848	01	0.25	0		20				80	90		80	0
W-BD 20	2030 Water Main - 6" arctic pipe fittings & related		Ea.	8900	45	9	0		80				20	950		80	0
			Lr.				0		80				SU	0\$		80	0
1	_	-	Ea.	\$5,000	000′1	30	30	121	91,350				820	\$5,000		86,370	1,000
W-BD 20	2036 Water Main - Pipe Joint Kits	ব	E.	5170	25	-	<b>→</b>		\$180				\$3	8680		5863	100
_		2,000	1.6	0.18		0.02	40		008,12				\$2,000	2000		\$5,800	0
_			P.C.	50.1	0'02	90.0	0		80				SO	08		\$0	0
W-BI 20	2042 Water Serv Regrade/fill @ pipe alignm		P.C.	<u>-</u> 59		0.25	0		90				20	20		20	0
			77	\$	0,75	0.25	0		80				80	990		80	0
W-B1 20	2046 Mater Serv Right of way prep	1,050	T.	\$0.50		0.05	53	10	\$2,363				\$525			\$2,888	0
			Ea.	21,000	100	01	0		08				80	80		20	0
-	_		1.6	545	80	0.49	0		20				0%	\$0		250	0
-	_		Ea.	2800	30	cl	0		20				98	\$0		20	0
	_		E	OT 19	0.7	_	0		0%				9.0	80		\$0	0
			1	FC 18	3	. 101			9				920	05		ns.	0
			3	\$7.00	0.05	0.047	0		- 05				0\$	\$0		20	0
-		28	Ed.	\$300	25	r.	140		86,300				\$95	58,400		514,795	700
_	_	001	38	\$5		Н	100		54,500				8500			55,000	0
		200	77	\$0.10	0.05	0.13	16		\$4,095				195	870		54,226	35
_	-	200	3	53		0.27	<u>5</u> 2	140	\$6,930				\$104	\$2,100		59,134	0
		700	ä	Ā	0,75	0.25	175	150	57,875				5118	\$2,800		\$10,793	525
	-Ui	700	Ľ.			0.05	35	10	\$1,575				524	\$0		665,18	0
_		140	Lť.	870	15	0.7	96	95	54,410				266	89,800		514,276	2,100
S-BC 20	2074 Sewer Main - 8" x 4" Sery, Myes		Ea.	\$1,000	09	20	0	0	95				0.5	\$0		80	0
S-BC 20	2076 Sewer Main - Joint Kits	12	Ed.	\$150	20		12		\$540				85	81,800		52,348	240
S-BC 20	2078 Sewer Wain - Manholes, Access. & Insulation	6	Ea.	\$5,000	5000	80	240	150	\$10,800				5162	\$15,000		\$25,962	15,000
S-BC 20	2080 Sewer Main - Cleanouts & Related		F.a.	51,500	150	20	0		80				98	80		80	0
S-BC 20	2082 Sewer Main & Manhole - Testing	001	86			8.0	80		53,600				0068	80		54,500	0
_	2084 Sewer Serv - Grade Checking & As-building	1,120	T.E.	80.10	0.05	90"0	29		53,024				5212	\$112		53,348	99
S-B1 20	2086 Sewer Serv Regrade/ iill @ pipe aligum.	1,120	T.	51		0,25	280	250	\$12,600				6815	51,120		813,909	0
-	U.S	1,120	Ä	25	0,75	0.25	280	250	\$12,600				5189	\$4,480		695'215	8+0
S-B1 20	2090 Sewer Serv Right of way prep	1,120	Ξ	\$0.50		90.0	99	2	\$2,520				2260			53,080	0
S-BI 20	2092 Sewer Service Line - 4" UDPE	400	3	SH2	\$C	0.49	196	061	\$8,820				\$132	\$18,000		526,952	3,200
	2094 Sewer Service Line - 4" HDPE Fittings	28	Ea.	2800	30	ä	36		\$2,520				\$38	\$22,400		\$24,958	8+0
	3.	4-1	Ea.	2110	0.1	-	42		068'15				\$28	\$4,620		\$6,538	420
			ij				0		0.5				05	\$0		20	0 8
_		28	Ğ.	2300	12	n )	140		\$6,300				595	58,400		514,795	350
3-151	2102 Sewer Service - Jesting	007	, 2			9			1 / / 6			_	1+0	OK:		32,/41	0

	TOTAL	0	260		560
	TOTAL DIRECT COSTS	20	86,821		\$6,821
	CONTRACT CABOR				90
	COSTTYPE 6 PERMANENT MATTERIALS	80	\$1,400		\$1,400
21	COSTITYPES SM TOOLS EXPNDBLS	0\$	\$493		\$493
se B ~ 2021	COSTIYPE3 COSTIYPE4 EQUIPMENT RENTAL OWNED OUTSIDE	0\$	80		80
cher Pha		9.0	95		0.5
$\sim$ Water & Sewer Replacement $\sim$ Pilcher Phase B $\sim$	SURDENED COST TYPE 2  BURDENED EQUIPMENT  LABOR MAINT.	0\$	80		20
Replacen		80	54,928		\$4,928
ewer ]	EQUIP HOURS				0
ter & S	MAN	0	112		112
	MHRS/ UNIT		7		
City of Marshall	WEIGHT /UNIT		10		
y of M	COST		\$25		
Cit	CINU		Ę		
	QUANTITY		99		
	DESCRIPTION		Arctic Box flardware	<b>*</b>	Sheet Fotals
	CSI		5012		
	VSW Scope Code		CIH		

	TOTAL	0 0 0	0000	2,240
		~		2,2
	COSTTYPE 7 CONTRACT TOTAL DIRECT LABOR COSTS	\$0 \$0 \$0 \$0 \$0	08 08 08	\$25,805
				80
	COSTIYPE 6 PERMANENT MATERIALS	\$5,600	0 9 9 0 0 9 0 9 0 9 0 9 0 9 9 0 9 9 0 9	\$5,600
	COST TYPES SM TOOLS EXPNDBLS	S493	\$0 80 80 80	\$493
B ~ 2021	COSTTYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE			\$0
er Phase	-			80
City of Marshall ~ Water & Sewer Replacement ~ Pilcher Phase B	COST TYPE 2 EQUIPMENT MAINT.	v ·		\$0
placeme	COST TYPE 1 BURDENED LABOR	\$19,712	20 20 80 80 80	\$19,712
wer Re	EQUIP			0
& Se	MAN	- 448	0	448
Water	MHRS/ UNIT			
rshall ~	WEIGHT /UNIT	40		
of Ma	COST \$/UNIT	5100.00		
City	BID	Eg.		
	QUANTITY	96		
	DESCRIPTION	House A. Box - Lumber & Related		Sheet Totals
	CS.I.			
	VSW Scope Code	円 C T T T T T T T T T T T T T T T T T T		

TOTAL	0 0 0	
		+
TOTAL DIRECT COSTS	53,646 519,634	
CONTRACT CONTRACT LABOR		
COST-TYPE 6 PERMANENT MATTERIALS	S1,120 S4,480	
COSTTYPES SM TOOLS EXPNDBLS	\$62 \$370 \$370	
COST TYPE 4 T RENTAL OUTSIDE		
COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		
COST TYPE 2 EQUIPMENT MAINT.		
COST TYPE1 BURDENED E	S14,784 S14,784	
EQUIP		
MAN	336	
MHRS/ UNIT	9 9 9	
WEIGHT /UNII	1,0 8.0 8.0	
COST \$/UNIT	\$250 \$80 \$80	
BID		
QUANTIFY	5.95 9.05	
DESCRIPTION	House A. Boxes WX Stripping House A. Boxes Insulation & Sealants	
C.S.I.	701.0	
VSW Scope Code	CHH CHH	

Sign   15   8   22   82-966   850	
15   8   32   \$2,496   \$50	
15   8   32   \$2,496   \$50	
15 8 32 S2496  90 MAINT HOURS HOURS OWNED OUTSIDE	
15 8 32 52496 S0 70MT UNIT HOURS HOURS LABOR MAINT.	
15 8 32 52496 S0 70MT UNIT HOURS HOURS LABOR MAINT.	
OMIT DINIT HOURS HOURS LABOR  15 8 32 82,496  50 50 60 60 60 60 60 60 60 60 60 60 60 60 60	
15 8 32 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
7UNIT HOURS 15 8 32 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
TONIT B 8 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	
JANAT 15	
000	
150 150	
4	
House Rehab & Plumbing	
Code CODE	15114   Circ. Pumps   15114   Circ. Pumps   15116   Circ. Pumps   15116   Circ. Pumps   15116   Circ. Pumps   Ci

	TOTAL WEIGHT		112
	CONTRACT TOTAL DIRECT LABOR COSTS V	856,513,	\$13,938
COST IYPE7	CONTRACT		05
COSLIYPE	PERMANENT MATERIALS	\$0 \$2,800	000 00
COSTTYPES		5218	0.00
COST TYPE 4			1
~ Water & Sewer Nephacement ~ Filterer Friase b ~ 202.	EQUIPMEN OWNED	10	
COST TYPE 2	EQUIPMENT MAINT.		
COST'TYPET	BURDIENED EQUIPMENT EQUIPMENT RENTAL LABOR MAINT, OWNED OUTSIDE	\$10,920	
ver Kep	EQUIP		1
3	MAN	0 140	1
water	MHRS/ UNIT		
) IIIaiii	WEIGHT /UNIT	5	
City of tytal Stilati	COST	2500	1
	UNIT		1
	QUANTITY	4	
	DESCRIPTION	House Service H.T. Electrical	
	CODE	10100	
NSV	Scope	E	

CONCRETE SELECTION   COAT   WEIGHT   COST   WEIGHT   COST   WEIGHT   COST   WEIGHT   COST   WEIGHT   COST   WEIGHT   COST   WEIGHT   CONTROL   COST   COST	City of Marshall ~  BID COST WEIGHT WHRS/ UNIT \$\frac{50}{2}  0 \qquad 0  0  0  0  0  0  0  0  0  0	City of Marshall ~  BID COST WEIGHT WHRS/ UNIT \$\frac{50}{2} \text{ UNIT } \text{ CONIT } \text{ UNIT }  UNI	Of Marshall ~  WEIGHT MHRS/ /CNIT UNIT  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1	1 1	Mater & Sewer  MAN EQUIP BU HOURS HOURS  3,5557 2,795 8  448 0 0 0  448 0 0 0  292 0 0  292 0 0  292 0 0	EQUIP BU 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	La la Ballana and and and and and and and and and	### Replace COST TYPE 1 ### SURDENED ### SUR	er Replacement ~         COST TYPE 1       COST TYPE 2         BURDENED EQUIPMENT LABOR       MAINT.         \$110,241       \$35,650         \$158,941       \$0         \$20       \$20         \$19,712       \$20         \$17,248       \$20         \$20       \$20         \$20       \$20	Pilcher I COSTITYPE 3 EQUIPMER SU	Pilcher Phase B ~ COSTITYRE4 EQUIPMENT RENTAL. OWNED OUTSIDE  SO SO SO  SO SO	2021 COST TYPE 5 SM TOOLS SM TOOLS SEA 13 S6.813 S6.813 S6.813 S493 S493 S493 S493 S90	COSTIYPE6 PERMANENT MATERIALS \$0 \$176,924 \$1,400 \$5,600 \$5,600	CONTRET CONTRACT LABOR S165,000 S0	### STATE DIRECT COSTS	TOTAL WEIGHT 12.506 28.208 28.208 20.40 2.240 2.04
	MECHANICAL	100	35	09	O	91	32	OI	52,496	08	90	08	850	2600	05	\$3,146	09
B	EI F.CTRICAL	700	35	80	0	a	140	Öl .	<u>\$10,920</u>	80	<u>\$0</u>	08	\$218	<u>\$2,800</u>	80	<u>\$13,938</u>	1.12
CUMI	CUMULATIVE PAGE TOTALS						6,591.37	2,875	\$324,486	\$35,650	8:0	\$15,000	\$223,107	\$192,924	\$165,000	\$956,167	44,190

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

Extended Cost	\$195,086	\$52,599	\$96,646	\$30,140
Unit Cost	\$55	\$131	29\$	299
Quantity Unit	3,560 Lft.	400 Lft.	1,440 Lft.	450 Lft.
Description	Water Distribution Main	Water Service Line	Sewer Main	Sewer Service Line
Scope	W-BD	W-BL	S-BC	S-BL
Item #	~	7	4	3

e	Construction Subtotal:	\$374,471
	Other Direct Costs	
	Construction Management, Supervision & Engineering Support, Amendment #	\$124,000
	Engineering & Design Services	\$50,000
	Mobilization / Demobilization	\$58,220
	General Conditions	\$302,079
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

7 8 8 9 9 10 110 111

## Assumptions

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

					City of Marshall	[arshall	~ Wat	er & S	ewer I	leplacen	nent ~ C	~ Water & Sewer Replacement ~ Clinic Loop ~	op ~ 2022	22				
VSW Scope Code	C.S.L.	DESCRIPTION	QUANTIFIY	BID	COST	WEIGHT /UNIT	MHRS/ UNIT	MAN	EQUIP B	COSTTYPE:1 BURDENED LABOR	COST TYPE 2 EQUIP MAINT.	_	COSTTYPE3 COSTTYPE4 SQUIPMENT RENTAL OWNED OUTSIDE	COST'TYPES SM TOOLS EXPNDBLS	COSTIYPE 6 PERMANENT MATERIALS	CONTRACT LABOR	TOTAL DIRECT	TOTAL
G-CM	1025	CM Svcs & Eng. Support	001	37			+							_		\$120,000	\$120,000	
M-DS		Bngineering & Design	100	32												\$50,000	850,000	
)9-9	_	Archeological Services	100	3€												\$25,000	\$25,000	
G-CM	1030	Small Material Procurement	400,000	\$	50,01									\$4,000			\$4,000	
F-RT		Mobilization - Barge - Truck	465	Cwt	\$95		0,15	7.0	30	53,137				544,146			\$47,282	
29-9	1036	Material Handling & Inventory	516	Cwl			0.1	52	30	\$2,323							\$2,323	
09-9		Field Superintendent	12	Wks.			99	792		922/195							561,776	
G-GC		Field General Foreman		Wks.			09											
: D9-5		Job Clerk		Wks.			24											
J9-9		Project Office/Quarters Setup&Supply	-	Ea.	\$2,000		80	08		\$3,600				\$2,000			\$5,600	
79-9	_	Subsist, @ Contract Lab.	30	Dys	929									81,080			81,080	
J 20-5	_	Subsistence	06	Dys	929									\$3,240			\$3,240	
J9-9	_	Office Supplies	001	°0,	01\$	33		_						000'15			\$1,000	300
J9-5	_	Office Equipment	100	<sup>%</sup>	\$10	3								\$1,000			\$1,000	300
MUI	1080	Tempurary Power	ю	Mo.	82,000									\$6,000			26,000	
MUI	1090	Telephone & Star Band Svcs.	3	Mo.	8450									\$1,350			\$1,350	
39-9	1130	Air Charters	3	Mo.	\$200									\$600			2600	
D-0	1140	Air Travel - Super	2	Rt.	\$1,200		91	32		\$2,240				\$2,400			\$4,640	
D9-D	1145	Air Travel-Contract Labor	2	Rl,	\$1,000		91	32	_	\$2,080				\$2,000			54,080	
F-RJ	1150	Air Freight - Mobilization	52	Cwt	\$110		1.0	II)	201	\$258				\$5,680			55,938	
G-GC	1160	Air Freight - Course of const.	60	Mo.	\$3,500		10	30		81,500				\$10,500			\$12,000	
55-5	1180	Safety & Cleanup	10	Wks.	2400		10	1001		\$4,000				\$4,000			28,000	
DD-D	1190	Small Tools	001	% <sup>0</sup> /	8200	7.								\$20,000			\$20,000	200
0 <del>-</del> 00	1200	Small Tools/Equipment Rent	100	3%	\$50	5							\$5,000				85,000	900
0-0	1210 E	Equipment Rent ~ City owned	8	Mo.	85,000								\$15,000				\$15,000	
D9-9	1300 E	Equipment Parts @ City owned	393	Eqhrs	\$22	3					\$8,637			8\$			38,645	1,178
35-5	1305	Equip, Maint Labor @ City equip	393	Eqhrs			0.33	130		\$7,255				88			\$7,263	
J9-5	_	Equipment Parts @ Project	1,570	Eqhrs	810	2,7419					\$15,704			531			\$15,735	4,306
- - - - - - - - - - - - - - - - - - -		Equip Maint Labor ~ Project	1,570	Eghrs			0.3	471	job	\$23,556							\$23,556	
25-5		FOG	7,852	Cal.	86.0	0,25	0,0155	122		56,085				¥7,112			\$53,197	1,963
J9-9		Special Equipment & Tools		32	2100		-			-								
JO-9	1325																	
ر د د د	1330																	
5 6	1250																	
5 6 2 2	1330																	
	1355																	
	1360																	
5 I	1475	General Liability Institutes	986 196	. hrs	5									\$10.452			\$10.452	
M	_	Insurance @ Runtal Equipment	(0)	N.	83.000									\$9,000			000'68	
FRI	_	Demobilization/Inventory	001	96	\$10		0.8	- 08		\$4,000				\$1,000			55,000	
0-00	_	Workers Compensation Estimated	261,289	Lbrs	208									\$17,942			\$17,942	
0-90	_	Project Accounting Services	m	Mo.	\$1,800				_					\$5,400			55,400	
05-5	_																	
		Sheet Totals						1,995	80	\$121,811	\$24,341		\$20,000	\$199,948		8195,000	8561,100	9,047
				1			1			1								

				•													
Code Code	CSJ.	DESCRIPTION	QUANTITY	BID	COST	WEIGHT	MHRS/ UNIT	MAN	EQUIP	COST DYFET BURDENED LABOR	COSTIYPE2 EQUIPMENT MAINT.	COST TYPE 3 COST-TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE	SM TOOLS EXPNDBLS	S COST IYPE 6 S PERMANENT S MATERIALS	CONTRACT	TOTAL DIRECT	FOTAL
M-IM	2010							0		80			+-	-	╄	80	
M-IM	2012							0		- 20			20	909		20	0 0
18-S	2014	Server Serv - Regrade, repair existing svcs.		Ede	\$2,500	100	01	0		80			20	20		80	0
W-BI	2016	Water Serv - Regrade, repair existing sves.		Ed	\$2,500	100	40	0		20			- 80	\$0		20	0
W-BI	_	Water Serv Curb Stops		Fa.	\$2,500	051	20	0		90			0\$	20		20	0
W-BD	_	Water Main - Grade Checking & As-building	1,700	4	201	0.05	0.05	85		\$3,740			\$56	\$170		53,966	C 90
W-BD		Water Main - Regrade/Illl @ pipe alignm	1,700	3	53		0,1	170	150	57,480			\$112	\$5,100		\$12,692	0
W-BD		Water Main - Pipe Bedding & Fabirc/Foam	1,700	TŲ	\$4	0.75	0.25	425	350	\$18,700			5281	86,800		\$25,781	1,275
W-BD	_	Water Main - Right of way prep	1,700	J			0.02	34	0.1	\$1,496			90			51,496	0
W-BT)	_	Water Main - 6" HDPE	1,700	E.	2+8	01	0.25	425	200	\$18,700			1828	881,600		185,0018	17,000
W-BID		Water Main - 6" arctic pipe fittings & related	7	Ea	0065	45	10	70	01	83,080			546	26,300		\$9,426	315
W-BD		Water Main - 1.25" HDPE Heat frace	1,700	771				0		80			20	20		\$0	0
-		Water Main - Hydrant Packages	CI	Ea	55,000	000′1	30	0.9	20	\$2,640			S40	\$10,000		\$12,680	2,000
-	_	Water Main - Pipe Joint Kits	107	Edi	5170	25	-	107		54,708			128	818,190		\$22,969	2,675
		Water Main - Test & Sanitize	1,700	LI,	51.2		0.02	34		\$1,496			\$2,000	2000		\$5,496	0
-		Water Serv Grade Checking & As-building	225	Life	50.1	€0°0	900	14		\$594			S119	\$23		\$735	=
-		Water Serv Regrade/fill % pipe alignm	225	TUES	<u>.</u>		0.25	56	40	52,475			537	\$275		52,737	0
		Water Serv Pipe Bedding & Geotex, Fabric	225	LT.	75	0.75	0.25	56	45	\$2,475			537	2000		\$3,412	691
-	_	Water Serv - Right of way prep	225	ä	50.50		0.05	Ξ	ίΩ	5495			5113			\$608	0
		Water Serv Saddles & Clam Shells	m	Ed	000'18	001	10	30	10	\$1,320			\$132	23,000		54,452	300
		Water Serv Carrier - 4" EIDPE	225	3	545	<b>5</b> 0	0.35	79	40	53,465			\$52	\$10,125		\$13,642	1,800
		Water Serv - 4" arctic pipe fillings & related	6	Eas	\$800	30	n)	<u>s</u>	4	5792			512	57,200		58,004	270
		Water Serv - Pipe Joint Kits	30	Ed	2110	10	_	30		\$1,320			\$20	\$3,293		54,633	300
_	2056	Water Serv - sup/ret lines - L"A'pex	450	7	51,25	0,2	50.0	23		0665			\$15	5563		\$1,567	96
		Water Serv - near Trace	2/2	± ,	26,00	cn'n	0.047	2 1		6900			6	059,14		52,227	<b>!</b>
-		Waler Serv - A box Conn. Fillings & Boots	· o	E.a.	2300	52	h !	5		2999			210	2000		51,570	75
		Water Serv - Jesting & Sanitize	001	e .	S		0.3	30		\$1,320			\$500			51,820	0
_		Sewer Main - Grade checking & as building	200	Ę.	01.0\$	0,05	0.13	65		52,860			243	850		52,953	25
_		Sewer Mam - Regrade/fill @ pipe alignm.	200	Ħ	233		0.22	011	100	54,840			573	\$1,500		56,413	0
-		Sewer Main - Pipe Bedding & Geotex, Fabric	200	5	ま	0,75	0,25	125	20	\$5,500			283	\$2,000		57,583	375
-	42	Sewer Mann - Right of way prep	200	5			0.05	25	01	\$1,100			215	20		51,117	0
		Sewer Wann - 8" FILDE	200	<b>3</b>	570	5	0,7	350	200	515,400			5231	535,000		\$50,631	7,500
_		bewer Main - 8" x 4" Serv. Wyes	FI !	Ed.	21,000	09	cc	16	99	\$704			- F	\$2,000		52,715	120
3-BC		Sewer Main - Joint Kils	7	Ed.	0513	20	- 5	<del>(</del> 3	ć	51,892			228	\$6,450		58,370	860
-		Sewer Main - Manholes, Access, or institution	- 1	5 L	000,65	nnne	0.0	09	9 9	52,640			7	55,000		0.20,763	2,000
_		Sewer Main - Cleanouts & Related	1	E.a.	011c,1¢	150	P. 6	<b>1</b>	2	21,760			\$26	\$5,000		24,786	300
3-BC	2082	Sewer Main & Manhole - Lesting	001	° .	60.10	30.0	8.0			\$5,520			2880	0\$		54,400	<b>-</b> •
_		Sewer Server Reprade / fill & most alloung	150	1 5	01-00-	CO-O	0.25	, %	311	050c			920	n (F		51.825	0 =
_		Source Control Book Book disco & Cooker Exterior	051		7 0	27.0		30	30	000/15			100	0618		250,15 270,03	2 0
_		Sewer Serv Right of way prep	120	1 5	50.50	C/n	0.05	99 ss	06 61	5330			575	0098		5405	0
-	_	Sewer Service Line - 4" HDPE	150	5	545	20	0.49	74	0+	\$3,234			846	\$6,750		\$10,033	1,200
S-B1	2094	Sewer Service Line - 4" EIDPE Fittings	4	Ea.	9800	30	2	50	ci	5352			156	\$3,200		53,557	120
S-B1	2096   5	Server Service - Joint Kils	16	Ea.	\$110	01	-	91		\$704			511	81,760		\$2,475	160
_		Service - Heat Trace	150	Lf				0		20			80	2.0		20	0
	_	Sewer Svs. A box Fillings & Boots	2	Ea	\$300	12	in	01		\$440			22	8600		51,047	24
S-BI	2102	Sewer Service - Testing	001	à <sup>0</sup>			0.2	20		2880		-	\$13	90		5893	0
		Shoot Totald															

	TOTAL	0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -	50
,	TOTAL DIRECT COSTS	88 609S	\$609
	CONTRACT CONTRACT LABOR		\$0
	COSTTYPE 6 PERMANENT MATERIALS	\$125 \$125	\$125
	COST LYPES SM TOOLS EXPNDBLS	S 244	S44
p ~ 2022	COSTITYES COSTITYES EQUIPMENT RENTAL OWNED   OUTSIDE	05	\$0
linic Loo		ङ े क	\$0
City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~	COSTTYPE 2 EQUIPMENT MAINT	S S	\$0
Replace	COSETYPE1 BURDENED	\$2.0 \$244 <b>0</b>	\$440
Sewer	EQUIP 1		0
ater &	MAN	0.	01
M ~ III	MHRS/ UNIT	2	
Marsha	WEIGHT	0.	
ity of	COST S/UNIT	525	
	CIIB	ů.	
	QUANTILY	ın	
	DESCRIPTION	Arctic Box Hardware	Sheet Totals
	CODE	5012 /	
	VSW Scope Code	E C E	

	TOTAL	0 7000	0	200
	TOTAL DIRECT T	\$2 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	09 80 80 80	\$2,304
	COST TYPE 7 CONTRACT TOT LABOR	>		50
	COST TYPE 6 PERMANENT MATERIALS	W = 0029	0\$ 80 80 80 80	\$500
	COST TYPE 5 SM TOOLS EXPNDBLS	448 448	<b>90</b>	\$44
, ~ 2022	COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE	ý.		80
nic Loop	COST TYPE 3  EQUIPME  OWNED			80
City of Marshall ~ Water & Sewer Replacement ~ Clinic Loop ~	COSTTYPE2 COSTTYPE3 COSTTYPE4 EQUIPMENT EQUIPMENT RENTAL MAINT. OWNED OUTSIDE			20
Replacen	COST TYPE1 BURDENED LABOR	81,760	80 80 80 80	\$1,760
ewer	EQUIP HOURS			0
er & S	MAN HOURS	04	0	40
~ Wat	MHRS/ UNIT	σ		П
[arshall	WEIGHT /UNIT	04		
y of N	COST \$/UNIT	\$100.00		
ti	BID	Ë		
	QUANTITY	ın		
	DESCRIPTION	House A, Box - Lumber & Related		Sheet Totals
	C.S.I.	6082 Houe		$\dashv$
				$\dashv$
	VSW Scope Code	# H5		

TOTAL	= 0 0 0	54
CONTRACY TOTAL DIRECT LABOR COSTS	5326 51,753	620 65
CONTRACT LABOR		0\$
COSTITORES COSTTORES SM'TOOLS PERMANENT EXPNDBLS MATERIALS	S = 1 × 10 = 1 × 1 = 1	4500
COSTTYPE 5 SM TOOLS EXPNDBLS	© 7 = 2 × S 3 3 ± 1 ± 1 ± 1	630
OSTTYPE4	s :	0.0
COSTITYES COSTITYES EQUIPMENT RENTAL OWNED OUTSIDE		e e
COST TYPE 2 EQUIPMENT MAINT,		
COST-TYPE 1 BURDENED 1 LABOR	5220 51,320	010
EQUIP HOURS		q
MAN		L
<b>4</b> 5	15 5 TH 9 H	
WEIGHT /UNIT		
COST WEIGHT N	≥ 2	
GIR		
QUANTITY	in us	
DESCRIPTION	House A. Boxes WX Stripping House A. Boxes Insulation & Sealants	ê
CSL	2012	
VSW Scope Code	H-0	

TOTAL	0 45	
IRECT IS	\$0 \$358 \$2,359 \$0	
CONTRACT LABOR		
COSTTYPE 6 PERMANENT MATERIALS	\$0 \$225 \$0 \$450 \$0	
PES OLS BLS	\$5 \$37 \$6	
COSTITYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE		
COST TYPE 2 EQUIPMENT MAINT.		
WED NED	\$468 \$3331 \$1,872 \$0	•
EQUIP HOURS		•
MAN	0 = = = 0 24	
MHRS/ UNIT	8 8 8	
WEIGHT /UNIT	. S	
COST \$/UNIT	875	
BID	1	
QUANTITY	о m п	
DESCRIPTION	House Rehab & Plumbing Punch list & repairs Testing @ H. Plumbing Circ. Funnps	
C.S.I.	15100 15110 15112 15114 15116 15116	
VSW Scope Code	C C III	

	TOTAL	9,047	42,183	0	20	200	45	90	0	09	48	51,632
	TOTAL DIRECT COSTS	\$561,100	\$360,087	05	6098	<u>\$2,304</u>	82,079	20	<u>\$0</u>	\$3,420	\$5,974	\$935,572
	COST TYPE 7 CONTRACT LABOR	\$195,000	80	80	205	80	98	98	05	80	80	\$195,000
	COST TYPE 6 PERMANENT MATERIALS	80	\$226,113	20	\$125	\$500	\$500	09	08	\$675	\$1,200	\$229,113
2022	COSTIYPES SM TOOLS EXPNDBLS	\$199,948	\$5,607	05	544	844	839	98	20	\$54	594	\$205,829
City of Marshall $\sim$ Water & Sewer Replacement $\sim$ Clinic Loop $\sim~2022$	COST TYPE 3 COST TYPE 4 EQUIPMENT RENTAL OWNED OUTSIDE	\$20,000	80	20	30	09	80	08	SI	20	80	\$20,000
- Clinic	COST TYPE 3 EQUIPME OWNED	\$00	\$0	\$0	09	0\$	93	0\$	3	20	0\$	0\$
acement	COST TYPE 1  BURDENED EQUIPMENT  LABOR MAINT.	\$24,341	20	<u>80</u>	80	80	20	<del>\$0</del>	80	80	<del>\$</del> 0	\$24,341
wer Repl		\$121,811	\$128,367	<u>S</u>	\$440	\$1,760	<u>\$1,540</u>	20	S	\$2,691	<u>\$4,680</u>	\$261,289
r & Se	EQUIP	80	T,883	01	01	01	0	01	Ol	9	0	1,963
l ~ Water	MAN HOURS	7,995	2,917	01	31	40	35	01	01	35	09	5,091.81
arshal	MHRS/ UNIT	0	018	01	01	01	01	э	01	미	OI .	
ty of M	WEIGHT MHRS/	0)	0)	0)	0	0	0	0	oi	9	oi	
Ü	BID COST UNIT \$/UNIT	200	95	26	56	98	20	38	05	80	<b>3</b>	
		%	9¢	96	%	/0/	96	è.º	\$2	%°	%	Ц
	QUANTITY	100	100	00]	100	100	001	001	100	100	001	
	DESCRIPTION	GENERAL CONDITIONS	SITE WORK	CONCRETE & RELATED	MISCELLANEOUS METALS	WOOD & PLASTICS	THERMAL & MOISTLIRE PROTECTION	DOORS & WINDOWS	FINISHES—FLOOR & WALL	MECHANICAL	EL ECTRICAL	CUMULATIVE PAGE TOTALS
	CSL	1000	2000	3000	2000	00009	2000	8000	0006	15000	16000	

## Attachment D Trip Report

Tok Office HC 72 Box 850 Tok, AK 99780

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

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



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

> ph: (907) 563-5675 fax: (907) 563-5685 summitanchorage@nol.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 realign 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 3/4" 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

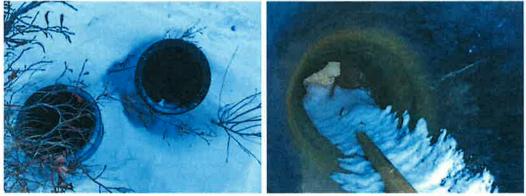
## Marshall January 2018 Site Visit Pictures



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.

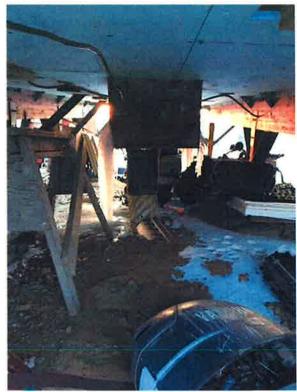


Sewer stub out on a new home in the 2012 Subdivision.



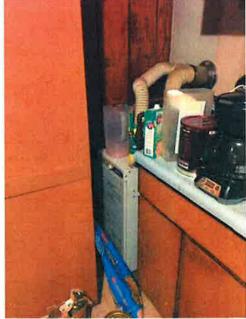


Kitchen sink plumbing and fixtures in new subdivision homes.



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





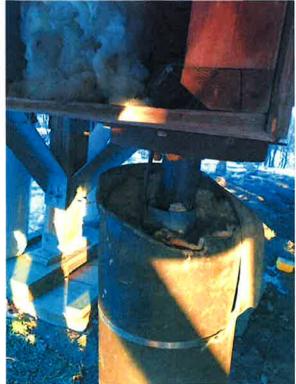
House 81. Mold in bathroom (typical of most Phase 9 homes) and Toyo water heater (typical of Phase 9 homes).





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.



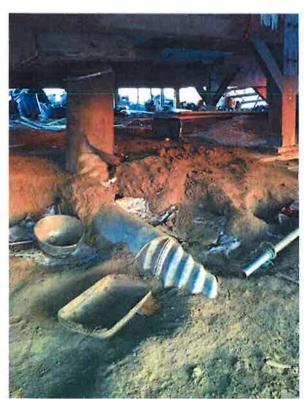


House 87. Water service line is being pulled apart at the 45joint where it enters the ground. Sewer line pulling away from arctic box and exposed ABS.





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

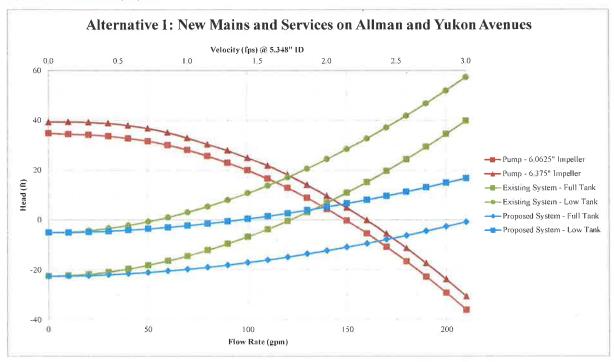
### Marshall Phase 9 PER Alternative 1: New Mains and Services on Allman and Yukon Avenues

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 A	Iternative		- B	osting Systen	
		6.0625"	6.375"				L = 5770 ft			L = 2500 ft of		
Roughness=120		Impeller	Impeller	Full Tank	Low Tank	L =0 ft of 4"	of 6"	Full Tank	Low Tank	4"	Full Tank	Low Tank
	System					Frition	Friction					
System Flow	Velocity (fps) -	Total Head	Total Head	Static Head	Static Head	Head (ft) =	Head (ft) -	Total Head	Total Head	Friction Head	Total Head	Total Head
Rate (gpin)	6" Pipe	(ft)	(ft)	(ft)	(ft)	3.63" ID	5.348" ID	(ft)	(ft)	(ft) - 3.63" ID	(ft)	(ft)
0	0.00	34.80	39.30	22,5	5	0.00	0.00	-22.50	-5,00	0.00	-22,50	-5.0
10	0,14	34.50	39.40	22.5	5	0.00	0.08	-22.42	-4,92	0,22	-22 28	-4.7
20	0.29	34.20	39.20	22.5	5	0.00	0.28	-22-22	-4.72	0.81	-21.69	-4.1
30	0.43	33,70	38,80	22,5	5	0.00	0_60	-21.90	-4.40	1.71	-20.79	-3.2
40	0,57	32.80	38.00	22,5	5	0,00	1,02	-21.48	-3,98	2,91	-19.59	-2,0
50	0.71	31.70	36.80	22.5	5	0.00	1.54	-20.96	-3.46	4,39	-18.11	-0.6
60	0.86	30.10	35_10	22.5		0.00	2.15	-20_35	-2.85	6.15	-16,35	1,1
70	1,00	28,10	32.90	22.5	5	0,00	2,86	-19.64	-2.14	8.18	-14.32	3,1
80	1.14	25.70	30.40	22.5	5	0.00	3,66	-18.84	-1.34	10,47	-12.03	5,4
90	1.29	23.00	27.90	22.5	5	0,00	4,55	-17.95	-0.45	13.02	-9.48	8.0
100	1,43	20,00	24.90	22.5	5	0,00	5,53	-16.97	0.53	15,83	-6,67	10,8
110	1.57	16.70	21.90	22.5	5	0.00	6.60	-15.90	1_60	18,88	-3,62	13,8
120	1,71	13,00	18.20	22,5	5	0,00	7.75	-14,75	2,75	22,18	-0,32	17.1
130	1.86	8.90	14.10	22.5	5	0.00	8,99	-13.51	3.99	25,71	3,21	20.7
140	2.00	4.50	9.67	22.5	5	0,00	10,31	+12.19	5,31	29,49	6.99	24.4
150	2,14	-0.24	4.95	22.5	5	0.00	11.72	-10.78	6,72	33,51	11.01	28,5
160	2.29	-5 33	-0.11	22.5	5	0,00	13.20	-9.30	8,20	37,76	15.26	32,7
170	2,43	-10.77	-5.52	22.5	5	0.00	14.77	-7.73	9,77	42,24	19.74	37.2
180	2,57	-16.56	-11.27	22.5	5	0.00	16.42	-6.08	11.42	46.95	24.45	41.9
190	2.71	-22.70	-17.37	22.5	5	0.00	18.15	-4.35	13,15	51,89	29.39	46,8
200	2,86	-29.18	-23.82	22.5	5	0.00	19.95	-2,55	14,95	57.05	34.55	52,0
210			-30.61			0.00	21.84			62.44	39.94	57,4

<sup>\*</sup> 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 A	Itemative		E	cisting System	
		6.0625"	6,375"				L = 6110 ft			L = 2500  ft of		
Roughness=1:	20	Impeller	Impeller	Full Tank	Low Tank	L=0 ft of 4"	of 6"	Full Tank	Low Tank	4"	Full Tank	Low Tank
	System					Frition	Friction					
System Flow	Velocity (fps) -	Total Head	Total Head	Static Head	Static Head	Head (ft) =	Head (ft) -	Total Head	Total Head	Friction Head	Total Head	Total Head
Rate (gpm)	6" Pipe	(ft)	(ft)	(ft)	(ft)	3.63" ID	5.348" ID	(ft)	(ft)	(ft) - 3.63" ID	(ft)	(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	-0.6
60	0.86	30_10	35.10	22.5	5	0.00	2.28	-20,22	-2.72	6.15	-16_35	131
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	5.4
90	1.29	23.00	27.90	22.5	5	0.00	4.82	-17,68	-0,18	13.02	-9 48	8,03
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	20.7
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	28.5
160	2,29	-5.33	-0.11	22,5	5	0.00	13,98	-8,52	8.98	37,76	15.26	32.70
170	2.43	-10.77	-5.52	22.5	5	0.00	15.64	-6.86	10.64	42.24	19.74	37.2
180	2.57	-16.56	-11.27	22.5	5	0.00	17.39	-5.11	12,39	46,95	24.45	41.9:
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		-29 18				0.00		-1.37	16,13	57,05	34,55	52,0
210	3.00	-36.01	-30.61		5	0.00	23.12	0.62	18.12	62,44	39.94	57.4

<sup>\*</sup> Extrapolated from manufacturer's pump curve.

