95% FIRST SERVICE WATER & SEWER DIOMEDE, ALASKA REV1

Enhanced Preliminary Engineering Report

ANTHC DO 23-D-200815/DOWL PO 50290.01

Prepared for:
Alaska Native Tribal Health Consortium
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March 2024

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ABBREVIATIONS

A::B	Agnew::Beck
ADEC	Alaska Department of Environmental Conservation
ADLWD	Alaska Department of Labor and Workforce Development
AHRS	Alaska Heritage Resource Survey
ANCSA	Alaska Native Claims Settlement Act
ANTHC	Alaska Native Tribal Health Consortium
ASCE	American Society of Civil Engineers
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CMP	Corrugated Metal Pipe
DCRA	Division of Community and Regional Affairs
EPA	Environmental Protection Agency
ePER	Enhanced Preliminary Engineering Report
FEMA	Federal Emergency Management Agency
fps	Feet Per Second
FY	Fiscal Year
GAC	Granular Activated Carbon
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallon per Minute
HBH	Honey Bucket Haul
HDPE	High-Density Polyethylene
IHS	Indian Health Service
kWh	Kilowatt-hour
MCL	Maximum Contaminant Level
MLLW	Mean Lower Low Water
MSL	Mean Sea Level
MWTU	Mechanized Wastewater Treatment Unit
NEPA	National Environmental Protection Act
NHPA	National Historic Protection Act
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Registry of Historic Places
NSEDC	Norton Sound Economic Development Corporation
NSHC	Norton Sound Health Corporation
O&M	Operation and Maintenance
OHA	Office of History and Archaeology
ONAP	Office of Native American Programs
PASS	Portable Alternative Sanitation System
PCE	Power Cost Equalization
PER	Preliminary Engineering Report
RO	Reverse Osmosis
ROW	Right-of-Way
SDMS	Survey Data Management System
SF	Square Foot
SNAP	Scenarios Network for Alaska and Arctic Planning
UAF	University of Alaska Fairbanks
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WST	Water Storage Tank
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

*******Capital costs have not been updated to include the construction of a new WTP*********

Introduction

DOWL in coordination with the Norton Sound Health Corporation (NSHC) and Alaska Native Tribal Health Consortium (ANTHC), has entered into an agreement with the City of Diomede to produce this enhanced Preliminary Engineering Report (ePER) to provide an engineering analysis of piped water and sewer service alternatives for the community. The ePER follows the guidance provided by the U.S. Department of Agriculture Rural Utilities Service Bulletin 1780-2 for water and wastewater.

The current water system consists of a surface water intake, raw water transmission main to the community, a water treatment plant (WTP), an above-ground treated water storage tank (WST), and a service line to the school, NSHC Clinic, and washeteria. A project is proposed for Summer 2024 construction to rehabilitate the WTP within the existing building because the surface water source has high levels of nitrates and arsenic that exceed the maximum contaminant levels (MCLs) and current treatment is not adequate to remove it. The WTP is not located high enough in elevation to protect it from the design storm; therefore, the rehabilitation to upgrade treatment is a short-term repair. The existing WST will be replaced as part of a separate project. The sewer system is a honey bucket haul (HBH) system. HBH waste is disposed of on the beach in the summer and out on the sea ice in the winter. The washeteria wastewater flows to an above-ground septic tank, adjacent to the washeteria. The school and clinic have piped wastewater systems that flow to Lifewater Sewage Treatment Units.

Statement of the Deficiencies

Residents rely on self-haul from the community watering point or untreated water sources, which causes health risks related to limited water usage and untreated water quality. The HBH system leads to a high risk of contact with human waste in homes and throughout the community. These conditions and lack of existing water and sewer infrastructure make piped water and sewer vital for public and environmental health.

Alternatives Considered

DOWL, ANTHC, and NSHC have worked with the community since February 2023 to evaluate different alternatives for piped water and sewer. These alternatives take into consideration completed past studies, the scheduled community projects, and initial input from the Diomede Tri-Org Council (representatives from City of Diomede, Native Village of Diomede, and Diomede Village Corporation) as well as the community. The four alternatives discussed in this ePER include:

- **Alternative 1** – No Action
- **Alternative 2** – Piped Water and Wastewater
- **Alternative 3** – Satellite Delivery and Collection Stations
- **Alternative 4** – Piped Wastewater and Satellite Water Delivery

Preferred Alternative.
A life cycle cost analysis and an evaluation of non-monetary factors based on the community engagement discussions led to the selection of Alternative 2 – Piped Water and Wastewater as the preferred alternative. The alternative includes the following components:

- Water Source: Construct a seawater well on the beach for raw water intake; upgrade the existing surface-water intake; construct snow fencing.
- Water Treatment: Remove existing treatment process; install reverse osmosis (RO) treatment system to treat seawater; replace WTP building.
- Water Distribution: Above ground mains and services following the existing boardwalk alignment where possible.
- Wastewater Collection: Above ground gravity sewer mains and services.
- Wastewater Treatment: Remove the existing Washeteria aboveground septic system; install community mechanized wastewater treatment unit (MWTU); upgrade existing seepage pit for effluent outfall; and construct a septage dewatering container to dewater the accumulated septage from the MWTU.

The Diomede Tri-Org council agreed with this evaluation, and a resolution of support has been signed. The capital cost for this alternative is $43,186,870.

1.0 PROJECT PLANNING

1.1 Location

The community of Diomede (Figure 1) is located on the western coast of Little Diomede Island in the Bering Strait. Little Diomede Island is approximately 135 miles northwest of Nome and 2.5 miles east of Big Diomede Island, Russia (Figure 2). The international boundary lies offshore between the islands. The community of Diomede is located at approximately 65.7589° North Latitude, 168.9515° West Longitude (Sec. 07, T004N, R049W, Kateel River Meridian). The island is 2.1 miles long and 1.8 miles wide with a total area of 2.8 square miles.

The Native Village of Diomede is the Tribal government of the traditional Ingalikmiut Eskimo community.

Figure 1: Photo of community taken from the helicopter (2/14/2023)

Due to a lack of flat ground (Figure 3), Little Diomede Island does not have an airstrip. Weekly flights by helicopter are available, but accessibility is often limited due to consistent inclement weather. In 2012, Diomede was awarded grant funds to participate in the Essential Air Services Program. The community of Wales is 28 miles away by sea and residents travel by small skiff in the summer. Cargo barge stops are irregular due to sea ice but do deliver to Diomede annually. A network of pedestrian boardwalks and trails connect the residences to the public buildings and infrastructure (Figure 4).

Vicinity Map

Little Diomede 95% ePER

Date: June 2023

Figure 2

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Topographic Map

Little Diomede 95% ePER

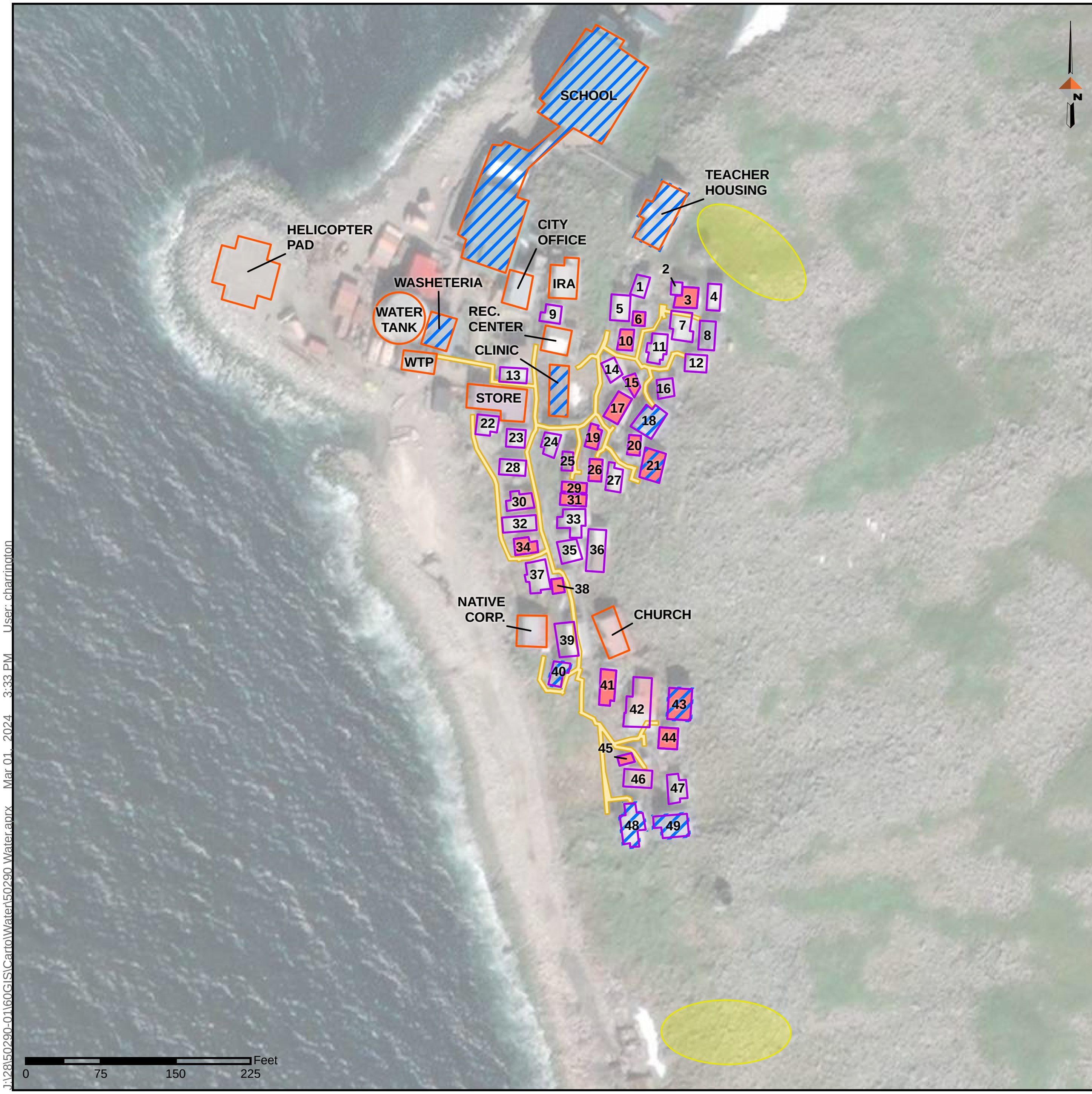
- Existing Sewer Utility Infrastructure
- Existing Water Utility Infrastructure
- Contour (10ft)
- Building Outline

Note: Contours and Building Outlines from Department of Community and Regional Affairs (DCRA) Community Mapping (2004).

DOWL

Date: March 2024

Figure 3



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Community Map

Little Diomede 65% ePER

- Community Building
- Residential Home
- Unoccupied Building
- Existing Plumbing
- Possible Residential Expansion
- Boardwalk

ID	Owner	ID	Owner
1		26	
2		27	Robert Soolook, Jr
3	Cassandra Ahkvaluk	28	Peter Ozenna
4	Ronald Ozenna	29	
5		30	Edward Soolook
6		31	
7	Vernon Ozenna	32	Samantha Ozenna
8	Carla Ahkvaluk	33	Henry Soolook
9	Just n Akinga	34	
10	Reuben Ozenna	35	Louis Ozenna
11	Robert Umiak	36	Patrick Umiak
12		37	John Iyapana Jr.
13	Marty Ozenna	38	
14	Cynthia Snowball	39	Kevin Ozenna
15	Bobby Ahkinga	40	Edwin Kiminock
16		41	
17		42	Mary Menadelook
18	Gerald Ozenna	43	
19		44	
20		45	
21		46	Joeseph Ozenna
22	John Ahkvaluk	47	Carla Milligrock
23	Edwin Kiminock	48	Marlene Akinga
24	Just n Akinga	49	Frances Ozenna
25	Sue Steinnecker		

DOWL

Date: March 2024

Figure 4

1.2 Environmental Resources Present

1.2.1 Land Use/Ownership

The Alaska Native Claims Settlement Act (ANCSA), enacted into law on December 18, 1971, intended to settle outstanding land claims and establish clear title to Alaska's land and resources. Regional and village corporations were created through ANCSA. Village corporations largely received title to surface land and regional corporations received title to subsurface resources. Surface land is largely owned by the City of Diomede and the Inalik Native Corporation, and subsurface lands are owned by the Bering Straits Native Corporation.

Diomede is composed of an area of primarily residential buildings on the hillside, a barge landing area, heliport, and other community facilities. Community maps of Diomede show future planned parcel and road infrastructure development. Land use in the community is predominately residential with limited area for commercial services and community (or institutional) facilities. See Figure 5 for a map of ownership.

1.2.2 Wetlands

The U.S. Fish and Wildlife Service National Wetland Inventory has not mapped the island for wetlands (USFWS, 2023). Most of the island is composed of talus slopes covered with boulders and is mostly barren of vegetation. Vegetation that does exist is considered alpine tundra. Wetlands are likely not present as Little Diomede Island consists largely of boulder fields, cliffs, and rocky spires, and the near shore area where the community is located is steep and covered with boulders and talus.

1.2.3 Climate

Diomede is located in a transitional climate zone with weather patterns characterized as continental climate when the sea is frozen and maritime climate when the sea is thawed. Nome, Kotzebue, and Wales, Alaska, are the closest communities with available historical climate data. Wales is expected to be most similar to Diomede given their proximity. The climatological data presented below for Wales and vicinity was taken from the Western Regional Climate Center and the National Oceanic and Atmospheric Administration (NOAA).

Table 1: Climate Summary

Mean Annual Precipitation	11.9 inches
Mean Annual Snowfall	38.1 inches
Mean Maximum Temperature July	51.5 °F
Mean Maximum Temperature January	5.3 °F
Mean Minimum Temperature July	42.7 °F
Mean Minimum Temperature January	-8.0 °F
Average Annual Temperature	21.7 °F

Bering Strait Regional Housing Authority Lease sites

City of Diomede

Bering Strait School District

City of Diomede Lease site - Tank Farm & Water Tank Site

SOA DOT&PF Diomede Heliport

Surface - Inalik Native Corporation Subsurface - Bering Straits Native Corporation

Ownership Map

Little Diomede PER

DOWL

Date: October 2023

Figure 5

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Service Layer Credits: ahri_2020_rgb_cache:
World Imagery: Maxar

Mean monthly temperatures and precipitation for Wales and vicinity for the period between 1981 and 2010 from the Western Regional Climate Center are shown in Table 2.

Table 2: Average Monthly Temperatures and Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature (°F)	-1.4	-0.2	-1.5	10.9	28.1	38.2	47.1	46.9	41.0	29.4	16.0	4.4
Precipitation (inches)	0.56	0.61	0.69	0.35	0.49	0.72	1.36	2.45	1.83	1.32	0.69	0.89

1.2.4 Geology, Vegetation, and Soils

Little Diomede is within the northern section of the Bering Platform physiographic division just west of the Seward Peninsula. Topographically, the island steeply rises to elevations of 1,000 to 1,500 feet above sea level with rolling highlands at the top. Geologically, the island consists of steep talus slopes and bedrock of Cretaceous-age, porphyritic granites and biotite-hornblende quartz monzonites. Most of the island is composed of talus slopes covered with boulders and is mostly barren of vegetation. Vegetation that does exist is considered alpine tundra.

The near shore area where the community is located is not as steep as the rest of the island. Slopes are roughly 25 to 40 degrees above the beach covered with boulders and talus. Active landslides have not been observed above the village (R&M Consultants, 1979). Given the steep slopes and talus, rockfall may be present at some locations.

Little is known about the subsurface conditions under the community and upslope from the beach. Boulders in a matrix of sand and fines were observed just offshore of the school to 40 feet deep (PN&D Inc., 2002). Community members who have worked on constructing buildings, such as the Diomede Health Clinic and Diomede High School, encountered boulders and sand while excavating for the foundations. Foundations have typically been hand excavated and are composed of post and pad or resting on boulders.

The proposed project area is mapped as generally underlain by continuous permafrost (R&M Consultants, 2010). Permafrost is assumed to be present nearly everywhere except in areas close to the coastline where there is potential permafrost thaw due to wave run-up, in drainages or below seeps, and in areas disturbed by human development. The active layer thickness is unknown and will be highly variable depending on the surface cover (boulders vs vegetation) but is suggested to be about four to six feet (R&M Consultants, 1979). It may be deeper given the recent climatic warming trends. A detailed geotechnical desktop study was performed as part of this project and is included in Appendix 1.

1.2.5 Erosion, Flood, Seismic, and Tsunami Hazards

The community of Diomede is impacted periodically by erosion and flooding as many facilities are located within 100 feet of the shoreline, including residences, water tanks, fuel tanks, boat launches, and the school. The community has also experienced damage due to seismic hazards; however, tsunami hazards are not considered to exist (Diomede, 2019).

1.2.5.1 Erosion and Flooding

Diomede does not participate in the National Flood Insurance Program; therefore, the Federal Emergency Management Agency (FEMA) has not mapped flood hazard in the community. A detailed desktop study of flooding and erosion was performed in 2023 and is included in Appendix 2.

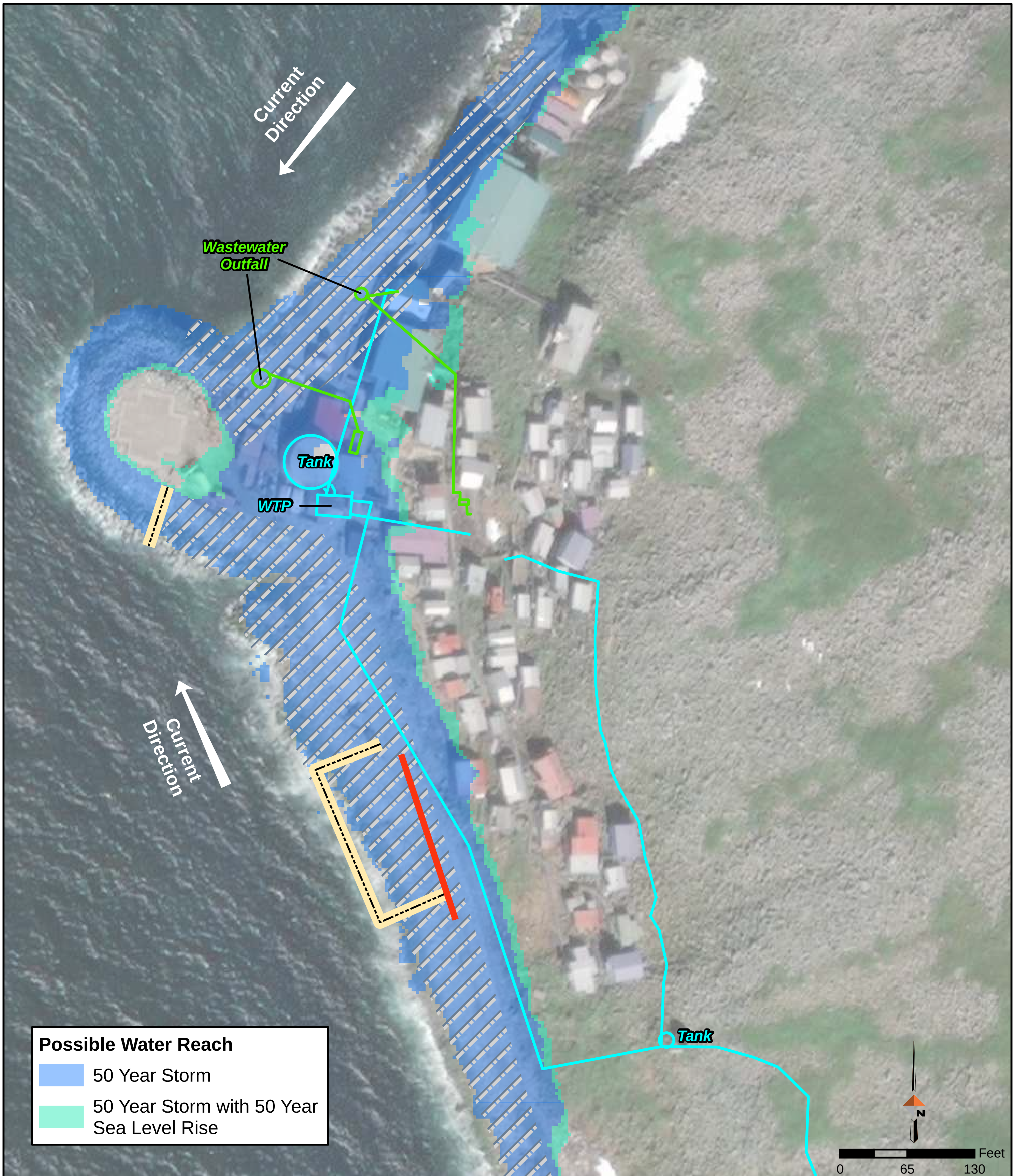
The community experiences floods from runoff, storm surge, stream overflows, and spring snowmelt (Diomede, 2019). Flooding generally occurs throughout the year but is heaviest in the spring (Figure 6). The community has been part of disaster declarations due to severe weather in 1990, 2004, and 2013 (Alaska DCCED, 2022). A 2011 flood assessment by the United States Army Corps of Engineers (USACE) noted a flood of record was in December 1977 when wind-driven waves caused flooding to a depth of 15 to 20 feet. Between 1977 and 2022, seven documented flood events have been observed by the community. The water level during storms can reach 14 to 20 feet above Mean Lower Low Water (MLLW) (the average height of the lowest daily tide) based on data collated from the existing reports. This elevation range represents both the flooding elevation and the estimated maximum elevation in which infrastructure is exposed to the force of breaking waves and can be seen in Figure 7.

Figure 6: Storm surge reaching water treatment plant building, 2018 (Photo provided by ANTHC)

1.2.5.2 Liquefaction and Seismicity

Liquefaction is assumed to be low risk in frozen grounds and bonded permafrost; however, areas with deep thaw or no permafrost may be susceptible, such as areas by the beach that are regularly exposed to seawater. It is unclear how shallow the groundwater table is underneath the community. It is assumed that any groundwater flow will follow the top of the permafrost or bedrock layers.

Diomede is in an area of low to moderate seismicity. Assuming a seismic site class C (very dense soil and soft rock), the American Society of Civil Engineers' (ASCE) 7 online hazard calculator provides a PGA_M of 0.18g. The United States Geological Survey (USGS) Unified Hazard Tool that evaluates the 2,500-year return period provides a mean magnitude of M6.1 at 10.6 miles due to shallow crust seismicity. The nearest mapped seismic sources are the Kigluaik and Bendeleben normal fault systems approximately 120 and 150 miles away, respectively.



Existing Water Utility Infrastructure

Existing Wastewater Utility Infrastructure

USACE Proposed Breakwater (2014)[1]

USACE Erosion Assessment (2007)[2]

DCRA Erosion (2004)[3]

[1]*USACE. (2014). Navigation Improvements Diomede, Alaska; Final Interim Feasibility Report Environmental Assessment and Finding of No Significant Impact*

[2]*USACE. (2007). Alaska Baseline Erosion Assessment Erosion Information Paper - Diomede, Alaska*

[3]*DCRA. (2004). Diomede Community Map prepared by Kawerak Inc.*

Flooding and Erosion Overview

Little Diomede PER

DOWL

Date: March 2024

Figure 7

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1.2.5.3 History and Culture

Little Diomede Island (Ignaluk) is located in the center of the Beringia region between Asia and North America, which suggests that it may have been occupied by several successive cultures as a hunting and trading center. Early Inupiat in this region worked on the ice and sea. The Inupiat of Diomede had a culture of elaborate whale hunting ceremonies and would trade with both North America and Asia. The Inupiat on Big and Little Diomede would go back and forth and were closely related. The islands were named in 1728 by Vitus Bering in honor of Saint Diomede and in 1880 the census counted 40 Ingalikmiut Inupiat in the Village of Diomede (Inalet).

Diomede is a traditional Ingalikmiut Eskimo village with a subsistence lifestyle hunting oogruk (seal), polar bear, blue crab, and whale. Alaska Natives sometimes come to Little Diomede to hunt polar bears. Seal and walrus hides are used to make parkas, hats, mukluks, furs, and skins for trade.

During World War II, Big Diomede became a Soviet military base and the “Ice Curtain” was formed between the islands. Travel between the islands was officially forbidden and residents caught in Soviet waters were taken captive. Eventually all native residents of Big Diomede were moved to mainland Russia. After the Cold War, residents of Little Diomede attempted to reunite with families across the Bering Strait, but many were unsuccessful. Diomede (Figure 8) was incorporated in 1970 as a second-class city.

Figure 8: Photo of community from helicopter pad (2/14/2023)

1.2.6 Cultural Resources

1.2.6.1 Cultural Resources Compliance

A variety of federal, state, and local regulations govern how an agency considers and addresses a proposed activity's effects on places of historic and/or cultural importance. In addition to consideration under National Environmental Protection Act (NEPA), historic properties are afforded special consideration by Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (NHPA; 36 CFR §800). Historic properties (i.e., districts, sites, buildings, structures, or objects) are cultural resources that are listed on, or determined eligible for, inclusion on the National Register of Historic Places (NRHP).

Both NEPA and NHPA Section 106 require well-defined, collaborative processes that involve consultation between agencies and key stakeholders (including, but not limited to, the State Historic Preservation Officer, tribal and municipal governments, Alaska Native corporations, and members of the public) and afford a reasonable opportunity for parties to comment on potential adverse effects.

Section 106 of the NHPA (54 USC 306108) and its implementing regulations (36 CFR 800) require the federal agency responsible for permitting, funding, or authorizing the proposed project to identify historic properties within the area of potential effect, assess the project's potential impacts on historic properties, and mitigate adverse impacts.

1.2.6.2 Cultural Resources Present

To appropriately plan for the location of new infrastructure and construction activities associated with the project, cultural resources near and within the community were identified based on a review of the Alaska Heritage Resource Survey (AHRS); the Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs (DCRA) Community Database; the Alaska Department of Natural Resources RS2477 Historic Transportation Routes database; and the Bureau of Land Management (BLM) Survey Data Management System (SDMS).

Proposed sites for water and wastewater infrastructure developed as part of the ePER will attempt to avoid areas containing identified cultural resources or with higher potential to contain cultural resources, where applicable. It is our understanding that previous construction projects have had success moving forward through avoidance of known cultural resources and monitoring performed by qualified cultural resources professionals.

Figure 9 presents a composite of the cultural resources identified within the study area.

Study Area
Cultural Site *(as identified on DCRA Area Map, 2004)*

Cultural Overview

Little Diomede 95% ePER

DOWL

Date: June 2023

Figure 9

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1.2.6.3 Recorded Sites

Alaska Heritage Resource Survey (AHRS)

According to the AHRS database maintained by the Alaska Office of History and Archaeology (OHA), there are 11 AHRS sites, two archaeological sites, and nine buildings located within or intersecting with the study area. Three sites have been formally evaluated for eligibility on the NRHP but should not impede the water and sewer project.

Alaska Division of Community and Regional Affairs (DCRA)

The DCRA Community Database maps for Diomede identify several potential cultural resource areas. These include historic sites, a berry-picking area, the cemetery located east of the community, and two cultural sites: one on the east side of the island and the other southeast of the community (DCRA, 2022).

BLM

A plat map from 1931 shows the village in its current location with 11 houses, the old Bureau of Indian Affairs (BIA) school, and a workshop (BLM, 2023). Oral history and previous surveys suggest that current buildings in the community were likely built atop older features, ruins, or artifacts, suggesting a moderate potential for encountering cultural resources within the community in these locations. There is also potential for encountering cultural materials outside of disturbed areas within the community. These moderate to high potential areas are typically devoid of modern residences, have sediment and vegetation accumulation, and/or are areas where artifacts had been found within the community.

1.2.7 Wildlife and Marine Species

1.2.7.1 Terrestrial Life

The terrestrial habitat on Little Diomede Island consists largely of boulder fields, cliffs, and rocky spires. Nesting seabirds are the dominant animal life on land. The rocky cliffs, rich waters, and relatively low predator pressure create important breeding habitat for millions of seabirds, including auklet, kittiwake, puffin, murre, and cormorant. Other non-seabird species may be present during various times of year, including the black guillemot, sandhill crane, and snowy owl.

The arctic fox is the only mammal on the island. Foxes are present in spring and summer because of the abundance of eggs and ground nesting birds.

1.2.7.2 Marine Life

The shoreline, intertidal, and near-shore habitat is characterized by large boulders and cobbles. Sea ice formation and movement cause ice-scouring as deep as 10 feet below the surface and discourage multiyear growth. Offshore and at depths where the boulders are not subjected to ice scouring there are dense growths of anemones and other epilithic organisms. There are more than 300 species of fish found in the Bering Sea that surrounds Little Diomede Island. These species include Pacific herring, cod, and Pacific sand lance. Marine mammals traveling through the Bering Strait include minke and beluga whales, Pacific walrus, and ringed, spotted, and bearded seals. Gray whales pass through in the spring, summer, and fall months.

1.2.7.3 Threatened and Endangered Species and Critical Habitat

Three species listed under Section 7 of the Endangered Species Act are present in the proposed project area: polar bear (*Ursus maritimus*), spectacled eider (*Somateria fischeri*), and Steller’s eider (*Polysticta sterlleri*) (USFWS, 2023). Additionally, the project area overlaps polar bear critical habitat, which includes the entire island and a one mile “no disturbance zone” surrounding the island. Informal consultation with USFWS to determine potential effects will be necessary during project development under NEPA.

1.2.8 Contaminated Sites

There is one site identified by the Alaska Department of Environmental Conservation (ADEC) as an active contaminated site. Hazard ID 3249—AKARNG Little Diomede FSA (Alaska Army National Guard Federal Scout Armory) is associated with contaminated soils under an above ground storage tank, see figure 10. Hazard ID 3249 is located near the existing clinic, and if construction activities require the transportation of soil or groundwater offsite, then advance approval from ADEC will be required (ADEC, 2023).

1.2.9 Climate Change Considerations

Diomede is located in a transitional climate zone with weather patterns characterized as continental climate when the sea is frozen and maritime climate when the sea is thawed. Severe weather, increasing temperatures, decreasing snowpack, and sea ice and ground failure (permafrost and landslide impacts) are increasing in intensity due to climate change effects (Diomede 2019).

Annual average temperatures have risen 2.6° F over the last 35 years in the region, and warmer temperatures have reduced sea ice extent and duration leading to increased vulnerability to extreme weather events. Sea ice decline increases wave height during winter storm events. Average annual ice cover in the Bering Strait declined 23 percent during the period of 1975 to 2021 (University of Alaska Fairbanks [UAF], 2023). Coastal areas once sheltered by shore fast ice during fall storms are now exposed to powerful waves. Infrastructure should be designed to account for projected increases in flooding and wave energy during storms under the assumption that sea ice concentration will continue to decline.

Sea level rise is also a consideration when assuming a flood level elevation. The USACE evaluated three climate change scenarios and the resulting impact on sea level rise rates: low (baseline), intermediate, and high. The baseline, intermediate, and high sea level rise values at the end of the 50-year period of analysis were projected to be 0.54 feet, 1.2 feet, and 2.5 feet, respectively. Figure 7 shows the contribution of sea level rise on water levels based on the high climate change scenario.

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Water storage and availability is highly dependent on the high flows associated with melting snowpack. The future snowpack projections on Little Diomede were studied with the Scenarios Network for Alaska and Arctic Planning (SNAP) model (UAF, 2022). Based on the SNAP model, the snowpack totals are predicted to decrease by 10% to 12% by 2039 and 1% to 12% by 2069 due to an increase in temperatures. Precipitation and temperature are both projected to increase. The increase in temperature has conservatively been interpreted as a change in precipitation falling as snow to falling as rain for the month of October for all scenarios and October and May for the 2060 to 2069 projected scenarios. An increase in summer temperatures will melt the decreased snowpack more rapidly. An upsized intake basin should be considered to capture as much snowmelt as possible.

1.3 Population Trends

The 2020 population of Diomede was 83 people according to the U.S. Census (U.S. Census Bureau, 2020). An unofficial counting of the population in early 2021 verified U.S. Census numbers estimating 84 people. The 84 people are described as being part of 35 households, 12 large families and 23 smaller families, and single men (ANTHC, 2021).

Diomede has lost population at a rate of approximately 2% each year since its high of 178 people in 1990 (U.S. Census Bureau, 2020) (Table 3). In comparison, the Nome Census District, which Diomede is a part of, has grown at a steady rate of approximately 0.6% (USA Facts, 2022).

An estimate of growth rates from the Alaska Department of Labor and Workforce Development (ADLWD) was published in 2022 for the Nome Census District and estimates population trends for the Nome Census District to decrease by an average of 0.2% by 2045 (ADLWD, 2022); however, an estimate of moderate growth (0.5% per year) has been assumed for planning purposes or a projected population of 93. Growth is possible in the community in the next 20 years if piped water and sewer service is provided to the community. Current community development projects include repair and replacement of houses, harbor improvements, bulk fuel tank replacement, repairs to the water transmission main, and rehabilitation of the WTP process that will improve drinking water quality to within federal and state regulations.

Table 3: Summary of Historic Population (DCRA, 2022)

Census Year	Population
1950	103
1960	88
1970	84
1980	139
1990	178
2000	146
2010	115
2020	83
2040 – Projected	***93***

1.3.1 Housing

A total of 32 homes are assumed “serviceable” based on documented discussions with community leaders, surveys capturing resident responses to questions related to Indian Health Service (IHS) eligibility criteria, and cursory visual observations by DOWL staff. There are a total of 49 housing structures; 17 were identified by the community leaders as unoccupied (Figure 4) for a total of 32 serviceable structures. The additional surveys and observations by DOWL staff did not unequivocally identify additional homes as being unserviceable. Instead, 13 of the 32 homes have been identified as priority for further assessment (Figure 13) as the project progresses based on resident’s response to the question of structural stability. In most cases, the homes identified by the resident as not structurally stable were visually observed by DOWL to have qualities of instability and confirmed by the Diomede Tri-Org Council. Visual qualities included leaning or a foundation that had obvious temporary repairs such as piling of rocks to level a vertical foundational support or to add additional support under a cross member. Please note that 8 of the 32 occupied homes were not surveyed because no one was available to grant entry or residents declined the survey.

Additional information documented included the presence of a reliable heating source in the home (all surveyed had thermostatically controlled heating) and the preferred location of a bathroom should it be added. Pictures of both the inside and outside of the home in the location of the preferred bathroom space is provided in Appendix 3. A 360-camera survey was also performed during the 65% community engagement site visit in August 2023. The information was provided to ANTHC separate from this report.

The information collected matches the information reported in the 2020 census (2023). Based on the 2020 population, the average housing density is 2.8 people per house. The majority of housing is privately owned but on Village Corporation land.

Additional information of note:

- A total of five homes were described as having freezing floors and walls in the winter. These houses were also described as being structurally unstable by the resident surveyed. They are houses 3, 13, 18, 27, and 39 in Figure 13.

- All but 4 of the 32 occupied homes, do not have existing plumbing and will require installation of kitchen and bathroom sinks, toilet, tub/shower, water heater, laundry hose connection, and all associated piping, fittings, and valves.

- Survey results suggest 9 out of the 27 homes surveyed (3 unoccupied homes were surveyed and included in Appendix 3) have space constraints for the assumed five-foot by eight-foot ANTHC standard bathroom size. It is our understanding that smaller versions are available based on conversations with ANTHC. Space in the home may also be limited for installation of a washer and dryer or other appliances.

- There is a community effort to increase the quality of available housing over the next few years. Community leaders expect that all remodeled and replaced homes will have plumbing installed and be ready for piped water and sewer hookups. The potential locations of replaced homes and residential expansion are available in Figure 4. The community has secured funding to replace/remodel 11 homes through the Bering Straits Regional Housing Authority (BSRHA), BIA, Housing and Urban Development office of Native American Programs and a Community Development Block Grant. The community is actively looking for opportunities to secure funding for the remodel or replacement of 22 additional homes. Twelve to 15 homes are scheduled for upgrades or replacements in the next few years through the following programs: BSRHA, BIA, block grants, and Office of Native American Programs (ONAP). Upgraded and replaced homes are presumed to have plumbing installed.

Homes Identified as Priority for Future Assessment

Little Diomede 95% ePER

RCS Completed
RCS Not Completed
Priority for future assessment based on resident's response to structural stability.
Community Building
Unoccupied Building
Boardwalk

Note: Structural stability of homes were identified based on the response of residents to the RCS survey and brief observations by DOWL staff that included, obvious leaning of the structure or foundation. It was not based on a survey performed by a professional structural engineer.

Feet 0 60 120 180

N

DOWL

Date: March 2024

Figure 11

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1.4 Community Engagement

1.4.1 Completed Community Engagement

1.4.1.1 Initial Community Engagement and Home Survey

A team that included representatives from DOWL, Agnew::Beck (A::B), Alaska Native Tribal Health Consortium (ANTHC), and Norton Sound Health Corporation (NSHC) visited Diomede February 14 to 16, 2023, to introduce the purpose of the water and sewer ePER and discuss potential alternatives for water and sewer service. This was accomplished by organizing and facilitating a community meeting (Figure 12), facilitating a meeting with the community tri-organizational leadership (City, Tribe, and Village Corporation), and conducting home visits with willing community members. A detailed trip report is provided in Appendix 4.

In response to the introduction of the alternatives, in general, the community will like to upgrade their services to a level where they do not have to haul water and wastewater. Concerns were expressed about cost, the space available in homes, and the ability to operate and maintain an upgraded system in a harsh environment. The leadership believed that a preliminary estimated service fee of $250/residence/month is a hurdle that the community can overcome.

Figure 12: Community meeting, February 2023

Additional time was spent talking with Frances Ozenna (tribal administrator) and Robert Larson (WTP operator) to learn more about and document the current conditions in the community associated with sanitation.

1.4.1.2 65% Community Engagement and Home Assessment Survey

After the 65% ePER alternatives were developed, a community meeting was organized to communicate and discuss alternatives on August 29, 2023 (Figure 13). Representatives from DOWL and A::B conducted a Home Assessment Survey to further assess the eligibility of each residence. The Assessment survey included a GoPro 360 video of the inside of the home, conditional on homeowner consent. Also included in the visit was a leadership meeting with the Diomede Tri-Org Council and further investigation of existing facilities during summer conditions. A detailed trip report can be found in Appendix 5.

During the community meeting, attendees were asked to identify criteria that they believe to be the most important to evaluate each alternative. The brainstormed list included:

- End user cost
- Ease of maintenance – cost of shipping materials
- Longevity
- Corrosion resistance
- Replacement cost
- Ground instability
- Water conservation
- Energy savings
- Small footprint or vertical construction, given limited space
- Homeowner maintenance/burden

During the tri-org leadership meeting the following morning, community leaders selected the four main factors that all alternatives should be judged based off. The four factors chosen were end user costs, environmental concerns, ease of maintenance, and homeowner responsibility. Residents expressed concern about the high cost of operating any of the alternatives. The Diomede Tri-Org Council strongly expressed that federal and local subsidies for operations need to be considered through further development of the project.

Figure 13: Tri-Org Meeting, August 2023

1.4.1.3 Project Website

A project website (https://diomedewaterandsewer.com/) has been developed in coordination with DOWL, A::B, and ANTHC to inform the community of the ePER process. The website includes ePER process information, alternative explanations, published documents relating to the project, and contact information. The website link is posted on the Diomede Facebook page. The website will be updated before and after each community engagement event.

1.4.1.4 95% Community Engagement

On October 19, 2023, DOWL representatives called into a Tri-org leadership teleconference to discuss a resolution pertaining to community support for a preferred alternative. The leaders expressed concern about subsidy availability for the expensive Operation and Maintenance (O&M). The leadership group concluded they support the preferred alternative (Alternative 2) and they wish to continue on with the ePER process, contingent on receiving more information regarding available funding sources and further design refinement.

1.4.2 Proposed Effort

Additional community engagement is proposed in Spring 2024 before the final ePER is submitted. The proposed visit will include an in-person community meeting to communicate the outcome of the ePER, next steps, and schedule.

2.0 EXISTING FACILITIES

2.1 Location

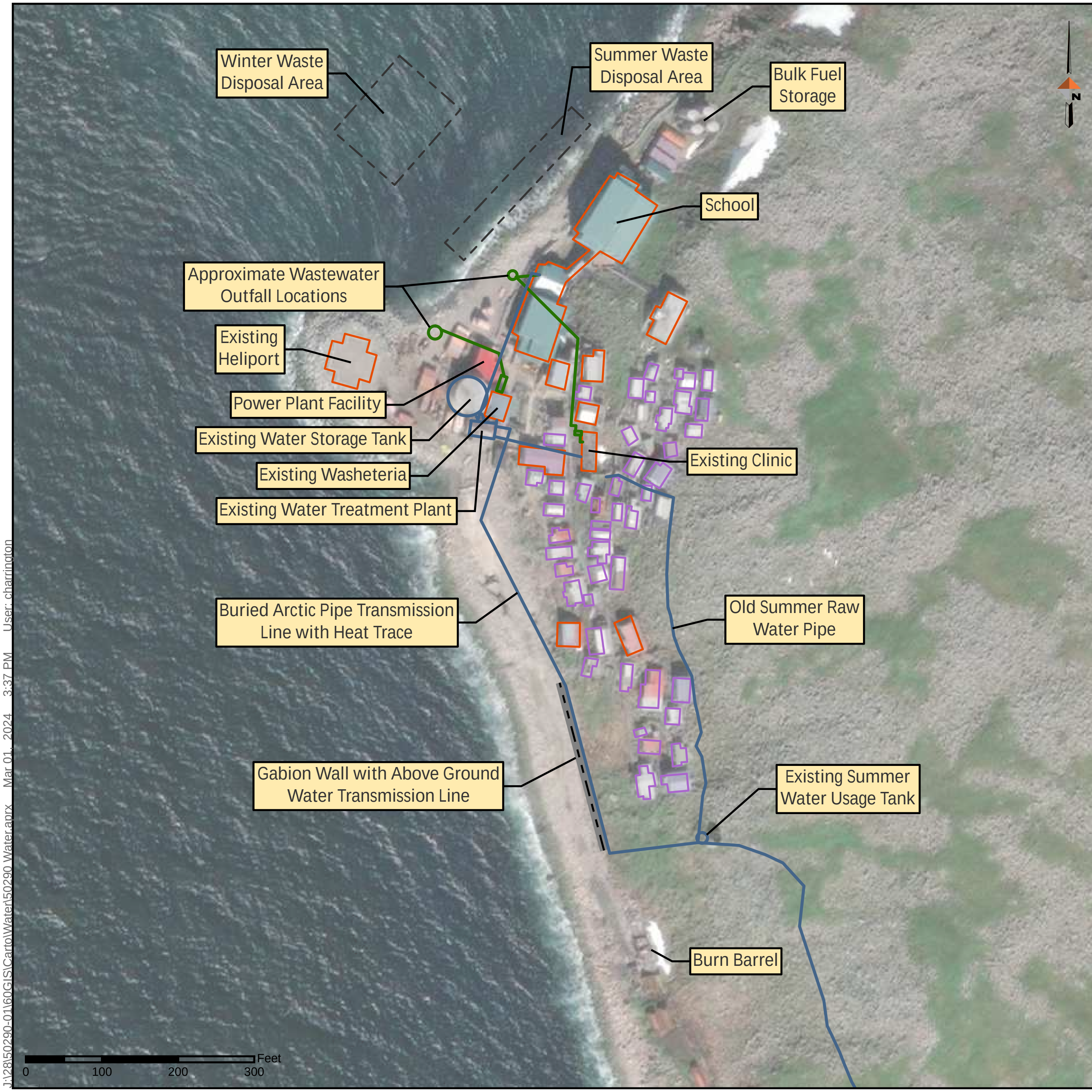
The majority of the existing sanitation facilities are concentrated just east of the helipad within 90 feet of the coast and 6 to 30 feet above MLLW. These facilities can be seen in Figure 14 and include:

- A 1,941-foot raw water transmission main that extends from the surface water intake manifold located at approximately 315 feet of elevation and drops to the beach running north to the WTP.
- A smaller three-inch diameter transmission main (old summer raw water pipe) that tees off the main transmission main south of the community at an approximate elevation of 94 feet. The purpose of the pipe is to supply water to multiple untreated water spigots in the community for both summer firefighting and access to water for household activities. A 2,000-gallon wood stave tank that serves as additional storage and a pressure break is located just after the old summer raw water pipe leaves the main raw water transmission main (CRW 2012).
- A 515-square-foot (SF) WTP containing a 48-inch granulated activated carbon (GAC) filter, a 48-inch diameter pH neutralizer filter, fluoride feed, and chlorine disinfection that serves as a watering point for residents.
- A 424,000-gallon treated WST.
- ~315 feet of insulated water distribution pipe to the school and clinic from the WST.
- A washeteria equipped with a laundry facility and a 1,500-gallon septic tank that releases water to a seepage pit located on the beach that is designed for 500 gallons per day (gpd).
- ~100 feet of insulated effluent pipe from the washeteria to the seepage pit.

Additional wastewater facilities owned by others include:

- A Lifewater MWTU capable of treating 1,200 gpd generated by the school. The school is responsible for the O&M of the unit. Effluent is discharged to the beach just west of the school at regular intervals.

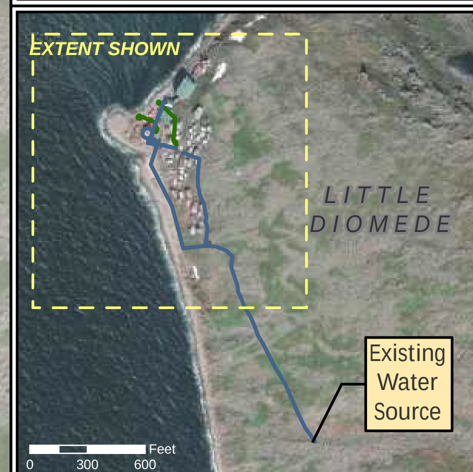
- A Lifewater MWTU capable of treating 300 gpd generated by the health clinic. The NSHC is responsible for the O&M of the unit. Effluent is discharged to the beach just west of the school near the school Lifewater discharge at regular intervals.



Existing Facilities

Little Diomede 65% ePER

- Building Outline
- House Outline
- Disposal Area
- Existing Sewer Utility Infrastructure
- Existing Water Utility Infrastructure
- Gabion Wall



DOWL

Date: March 2024

Figure 14

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2.2 History

Timeline of Construction for Community Water and Wastewater Infrastructure

1970s	Intake structure, original transmission main, and 2,000-gallon wood stave were built (CRW 2012)
1978	Original WTP built
1983	School built
1988	424,000-gallon WST constructed
	New WTP with new building and 48-inch GAC, pH neutralizer, fluoride feed, and chlorine disinfection
	Washeteria and original health clinic constructed
1991	Community fire, WTP and WST destroyed
1992	Rebuilt WST and WTP adding Fulflo brand filters (ANTHC 2018)
2005	New intake manifold constructed with arctic pipe from wood stave to WTP and aide in earlier raw water collection (CRW 2012)
	Diomede exceeded allowable nitrate and arsenic levels (ongoing issue)
2006	New intake manifold constructed at water source
2009	Community boardwalks constructed
2012	School addition and renovation (assumed to include Lifewater system; system was manufactured in 2011)
	School Lifewater solids removed (Lifewater 2023) and treated WST cleaned (ADEC, 2017)
2018	Large storm damaged transmission main and WST
	New clinic constructed
2019	Lifewater system installed at the clinic
2021	First and only WST cleaning
2022	Repair of transmission main damaged in 2022 storm
2024	*Anticipated* – Rehabilitation of WTP facility

2.3 Condition of Existing Facilities

2.3.1 Water Supply

The community's water supply is seasonal surface water captured by an open-ended, high-density polyethylene (HDPE) pipe set into a shallow, approximately 40-foot-wide channel that has formed in the bottom of a talus-filled ravine (Figure 15). The source is located approximately 1,500 feet south of the community at an elevation of 314 feet and reportedly runs from June through October. Higher flows up to 50 gallons per minute (gpm) are estimated from June to July due to snowmelt and periodic rain on snow events. After snow melt, the flow is sustained at approximately five gpm from August through September with periodic increases from rain events. The flow stops around the end of September once temperatures are consistently below freezing. The capacity of the stream has not been gauged. Prior to the 2000s, the water stored by the WST was depleted before the water source started to produce again. Supply has not been an issue in recent years, ascribed to the decline in population.

At approximately 40 acres, the watershed above the collection point is estimated to be the largest on the west side of the island; however, improved topographic information was not acquired to delineate the limits. The area is reported to fill with multiple feet of drifted snow for an estimated total discharge of 12 million gallons, 90% of which is estimated to flow from June to July; however, accurate precipitation, temperatures, and snow depths are not available for a more refined estimate (Golder Associates , 1998)

It is estimated that only a fraction of the water that flows through the talus-filled ravine is being captured. Capturing surface water requires small adjustments by the operator to maintain a pool of water in the ravine. A significant amount of maintenance is conducted by the operator while the water is running to clean and unplug the screens. During the February 2023 site visit, the City Administrator commented that the operator removed the screens the previous year because he could not keep up with removal of the blockages.

Figure 15: Current surface water source near intake, 2019 (Photo provided by ANTHC)

ANTHC has been collecting and testing raw water samples of the current surface water source since 2003. Results show significant variance year to year in the individual parameter values. Arsenic and nitrate levels in the raw water increased significantly after a raw water main project was completed in 2005 (ANTHC, 2018). It is likely that these parameters are changing due to natural processes and should not be expected to improve by changing the location or type of intake structure. Primary drinking water MCLs exceeded include arsenic, nitrate, lead, selenium, and pH levels. Secondary standards exceeded are aluminum, manganese, and silver.

A more detailed description of the source is available in the Water Source Study in Appendix 6.

Raw Water Transmission System

The original intake, wood stave tank, and transmission main were constructed in the 1970s. The intake was improved, and a new transmission main was built in 2005. A new wood stave tank was installed summer 2023. The new tank is eight feet by eight feet with a corrugated metal roof and a 3,000-gallon capacity.

The transmission main is above-grade 3-inch to 4-inch HDPE pipe until approximately 350 LF from the WTP, where it transitions to buried 4"X15" arctic pipe. The transmission main does not flow into the stave, it instead turns at the wood stave tank, goes down the hill and then runs along the beach to the WTP. A valve vault is located at this transition and is used to drain the above ground piping in the fall. The buried section of the transmission main is equipped with heat trace and glycol circulation loop. The heat trace system was reported as being damaged, and ANTHC is expected to fund the repair, anticipated summer 2023. The gabion wall that the transmission main runs along was damaged in the 2018 and 2022 storm seasons. The City of Diomede has applied for FEMA funding to repair the gabion wall and above ground transmission main. Repairs on the transmission main, heat trace, and gabion wall are expected to be completed in 2023.

The original three-inch, exposed HDPE old raw water transmission main runs into the wood stave tank and then above the community. The transmission main is connected to spigots on the boardwalks. There are four known spigots that are intended for summer fire protection. These spigots are often used for drinking water.

Rainwater Catchment and Snow

The community also uses rainwater catchment systems on residential roofs. Gutters channel rainwater into buckets and containers for storage. In winter, snow is collected and melted for drinking water. Snow collection is labor intensive and requires valuable fuel to melt.

2.3.2 Water Treatment

The WTP is located near the helicopter pad, adjacent to the WST and washeteria. The treatment process and building will be upgraded/rehabilitated to meet the requirements for potable water. Construction is expected to be completed summer 2024. The new treatment system will be housed in the existing building, originally constructed in 1988 and rebuilt in 1992 after a community fire. DOWL WTP observations were performed in August 2023. After the completion of the WTP rehabilitation, it is expected that there will be no treatment deficiencies. After rehabilitation, however, the WTP building will not be at an elevation higher than the design storm. The rehabilitation is therefore considered to be a short-term repair.

The rehabilitated WTP configuration is designed as a three-step filtration process that includes greensand filters, granular activated carbon (GAC) filters, and ion exchange vessels followed by a calcite contactor and chlorine injection. A graphic representation of the process is provided as Figure 16. The surface water will first undergo potassium permanganate and ferric chloride injection before going through the greensand filters. There will be two greensand filters operating in parallel. Next, water will pass through two GAC filters, operating in series while alternating the lead filter. GAC filtration protects the ion exchange resin from excessive organics. There are two sets of two ion exchange vessels in alternating configuration so treatment continues during regeneration. Ion exchange is necessary for the removal of arsenic and nitrates, both of which are present in the source water. The calcite contactor buffers the pH, and chlorination deactivates viruses and giardia lamblia. Backwash will continue to be disposed of in a shoreside outfall, per ANTHC WTP plans. This direct discharge to surface waters is subject to an Alaska Pollutant Discharge Elimination System (APDES) permit. The treatment plant will require an operator to be trained to level 2 operator, per ADEC system classification system.

The WTP design treatment rate is 30 gpm and will require approximately 150 days to treat enough water for the design population (assuming an eight-hour treatment day). A detailed analysis of the capacity can be found in Appendix 6, Water Source Desktop.

2.3.3 Water Storage and Distribution

WST

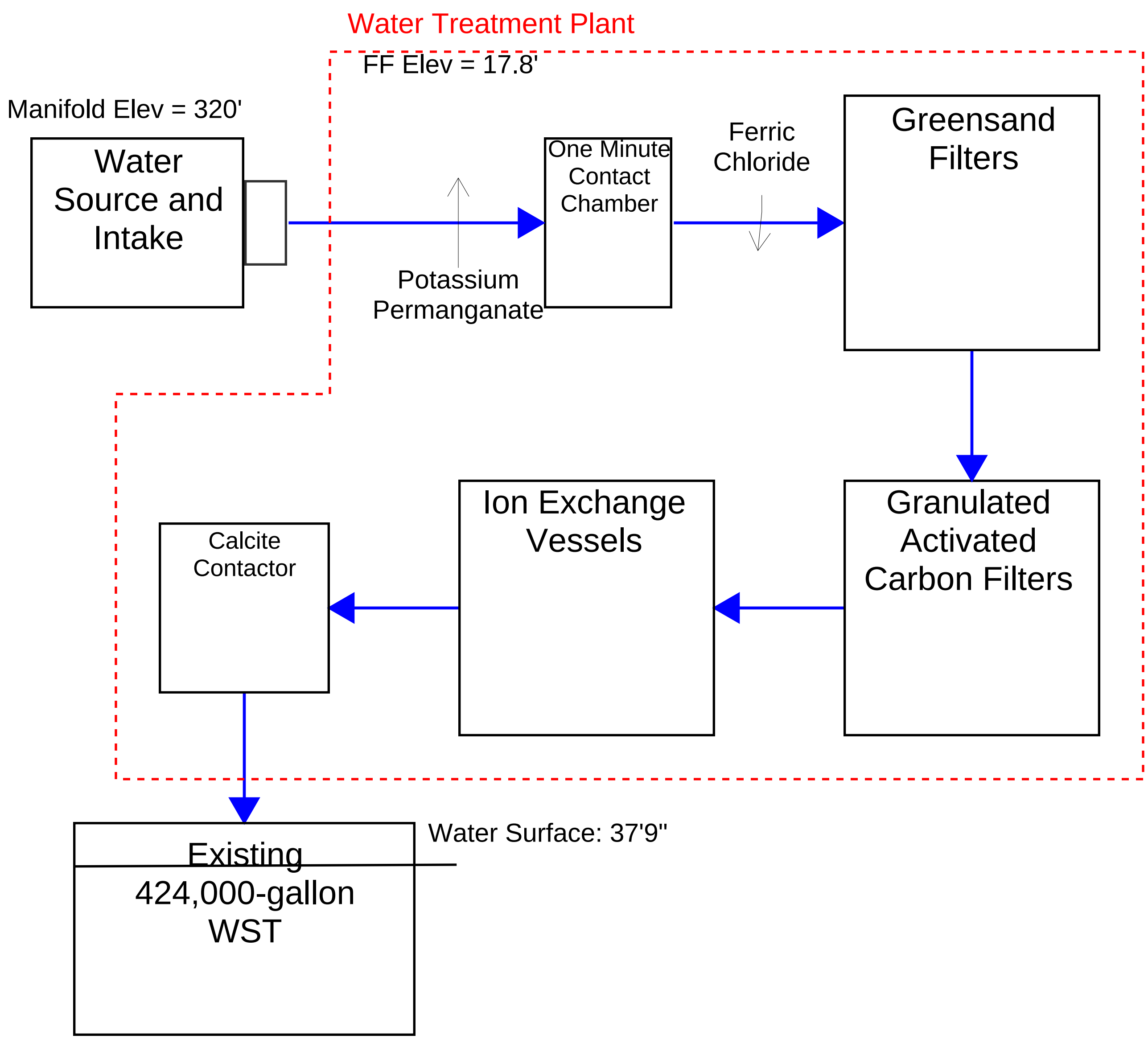
The existing 424,000-gallon treated WST was constructed in 1988 and re-insulated in 1991 after a fire damaged the exterior. The WST has a diameter of 47.5 feet, and a height of 32 feet. The tank foundation is approximately 12 feet above mean sea level (MSL), making it vulnerable to storm waves, like in 2018 when the lower insulation was damaged by waves and ice. Record drawings indicate that the overflow is at 30 feet above MSL. As of 2018, the lower band of the insulation package has been damaged/removed, leaving polystyrene and steel exposed (ANTHC, 2018). If the intake is able to capture 30 gallons per minute consistently, the existing 424,000-gallon WST will take approximately 10 days to fill. ANTHC has identified funding and is scheduling construction to replace this tank, due to its previous damage and deteriorating structure.

The construction of a new 340,000-gallon WST to increase the total treated water storage to 764,000 gallons is on hold pending the results of this PER. This new tank is planned to be built 22 feet above MSL (out of the flood zone), directly north of the school. The new foundation will be a 1,764-SF, pre-cast, post-tensioned concrete slab. The tank will be 42 feet tall with a 39-foot diameter. The overflow of the new WST will be approximately 60 feet above MSL. Both tanks will store treated water from the WTP.

Distribution System

Piped water is distributed to the WTP sink, community watering point (located outside of the washeteria), the washeteria, the clinic, and the school. The distribution system is pressurized by small pressure pumps controlled by pressure regulators. The system pressure is maintained by a small hydropneumatic tank located within the WTP. There are two circulation pumps circulating the services for freeze protection. The school was renovated in 2012, the service line is 185 feet of arctic pipe between the school and the WTP. There is a flowmeter on the school's service line. The new clinic was constructed in 2018. The clinic service line is approximately 130 feet of arctic pipe. The washeteria is adjacent to the WTP and has a direct pipe from the WTP for water service.

Diomede does not have a piped residential water distribution system. The system is designed for residents to self-haul water from a watering point outside of the washeteria. During the February 2023 field visit, it was observed that the watering point was frozen and not in use. Residents fill personal tanks from inside the WTP using a hose that is in place after treatment. Because of this, residential water usage is unknown, and the utility is unable to collect residential fees. It is assumed that residents use the hose all year, even after the watering point thaws.



WTP Process

Little Diomede 95% ePER

WTP schematic is based on the WTP Process Flow Schematic found in the ANTHC Water treatment Plant Improvement Plans. (ANTHC Project No. AN-19-N7P)

DOWL

Date: March 2024

Figure 16

Washeteria

The community currently uses a washeteria facility, built in 1988 and operated by the City (Figure 17). The washeteria has two washer and dryer units, three showers, and four toilets. The original building housed a clinic on the upper level. The community watering point, when operating, is located outside of the washeteria. The City doesn't charge residents for hauled treated water because it does not meet quality standards. According to residents the city does charge for use of the laundry services and showers, though this is not reflected in the utilities operating budget. The new clinic was built in 2018 and the upper floor of the washeteria has been used as guest/worker housing since.

A distribution pipe feeds treated water to the washeteria directly from the WTP. Wastewater is piped to aboveground septic tanks, located in a connex adjacent to the washeteria building. There are two tanks in parallel, 900 and 600 gallons, housed in a building to the north of the washeteria. The system was designed to process 500 gpd. The septic effluent is piped to a seepage pit on the beach that was installed in 1987. Anecdotally, the community reports that the seepage pit has never overflowed but that the septic tank often overflows. When the septic tank overflows, the washeteria facilities back up until the city finds residents to volunteer to empty it with buckets. The aboveground septic tank structure is reported in poor condition (MK Consulting LLC, 2022), the floor is rotting due to sewage overflowing, and the structure does not have thermostatically controlled heat. Freeze protection is provided by a heat trace powered from the washeteria.

Figure 17: Photo of Washeteria, February 2023

2.3.4 Sanitary Waste Management

Diomede does not have residential wastewater service. HBH waste is disposed on the beach in a designated area in the summer and north of the helipad on the ice in the winter (Figure 14). While some residents choose to self-haul, waste is often left at the City office and brought daily to the disposal site by utility staff. Some homes dispose of graywater via direct drains to the outside and others dump outside of the home.

The community has two Lifewater systems in use and one planned. All models consist of a settling compartment, aerobic fixed-film treatment, and ultraviolet (UV) disinfection. The effluent is treated to secondary treatment standards and is piped towards the beach. There is one effluent outfall for all systems, and it is located near the school on the west side of the gabion wall.

- The school unit is a Lifewater ExtremeSTP Model SST1200A sewage treatment plant capable of treating 1200 gpd and was installed in 2012.
- The clinic unit is a Lifewater ExtremeSTP Model SST300 and has the capacity to handle 300 gpd and was installed during the clinic construction in 2018.
- A third Lifewater system is planned for the community store. The unit designed is an ExtremeSTP Model SST600-LS. The expected daily flow is 120 gpd and the unit has a capacity of 600 gpd.

Figure 18: Clinic Construction, picturing both school and clinic effluent outfalls. (Source: Lifewater)

DOWL staff performed a visual inspection of the school unit February 2023 and spoke with school staff about O&M. The system was reported to be "temperamental" and is manually "stirred" when it backs up. The specifications for the unit recommend that it be emptied of solids every one to three years or else the quality of the effluent will decrease. The current school staff have no record of the solids being removed. Lifewater has records of pumping out solids in 2012, post construction. The effluent line was extended past the gabion wall and the solids were pumped directly into the ocean.

The State of Alaska procured BIOLAN separating toilets with ventilation for Diomede as an improvement to the honey bucket system. Separating toilets are an interim upgrade, which will later be backhauled and replaced with permanent infrastructure. The community has not yet accepted the installation, but they may be installed summer of 2024 pending community approval.

2.3.5 Solid Waste Management

Due to the steep topography, lack of soil, and limited space, the community does not have a landfill. No garbage service is offered to the community and each resident is required to dispose of their own waste. There is a burn barrel on the south end of the community that is operated only when winds are blowing to the south. Residents are responsible for hauling trash and operating the burn barrel as it is not managed by the City.

The option to construct a landfill on the island has been considered economically infeasible with available community funding. Building a landfill will require blasting cells out of the hillside, something that the community has historically been opposed to. In the 1950s, military personnel blasted the east side of the island, and the shear potential was much greater than anticipated. Besides the danger of losing land, the space available for potential blasting falls within the flood zone and is inundated with seawater during large fall storms. For these reasons, Diomede is designated as a transfer site by ADEC. Back hauls of trash and recyclables from the island occur every one to five years, depending on barge availability and waste accumulation. Kawerak, Inc. is working to permit a landfill on Lost River Mine land for the community. This project is in early stages but will reduce the cost of backhauling for the community. All material waste generated from construction is required to be barged off the Island.

Material waste is burned or disposed in the ocean in the summer and on the sea ice in the winter. There are designated seasonal waste disposal sites for the community that are selected based off the currents taking the waste into the Bering Strait. The material and HBH waste are disposed in the same location. In the winter especially, this poses a public health risk because human waste and garbage remains all winter.

2.4 Current Energy Consumption

The City of Diomede owns both the electrical and water utilities operated as Diomede Joint Utilities. Available records do not separate fuel costs for the water utility from other City fuel costs and electrical sales to the water utility are not booked; because of this, all energy consumption must be estimated.

Based on the estimated electrical demand from the raw water intake, WTP, and WST, Diomede's water utility consumes 7,075 kilowatt-hours (kWh) yearly. Electricity is supplied through a diesel power system. Power outages are common on the island due to high winds and generator repairs. For fiscal year (FY) 2022, the cost of electricity was $0.65 per kWh, with a Power Cost Equalization (PCE) subsidy of $0.2164/kWh for an effective residential rate of $0.4336/kWh.

Additionally, it is estimated that the utility requires 3,370 gallons per year of heating fuel to heat the utility system. Records indicate that a heat recovery system was installed at the community's powerhouse in 2012. The system was not operational in 2023. The causes for inoperability were unknown to the operator.

This method of energy generation is expensive because fuel needs to be barged in bulk to the community every summer. The annual fuel order typically totals to 55,000 gallons between the school, privately-owned store, and City. The City typically orders between 8,000 and 12,000 gallons for operations. The bulk fuel storage has a 168,800-gallon capacity. From 2012 to 2017, Diomede Joint Utilities reported the bulk fuel capacity to be 138,190 gallons (Kawerak, Inc, 2013).

2.5 Financial Status of Existing Facilities

2.5.1 Financial Statements

The City of Diomede submits financial statements to the State of Alaska's DCRA to comply with the requirements for the Best Practices score. In the most recent period for Spring 2023, Diomede did not submit the required documentation. Due to this, the utility's financial status is based on historical data.

The City of Diomede operates the water and electric utility under a business license for Diomede Joint Utilities. The City is not required to have a certificate of public convenience and necessity (CPCN) and operates the water and sewer under a provisional certificate from the Regulatory Commission of Alaska. As such, it is not financially regulated.

In previous years, Diomede has submitted consolidated financial statements—See Appendix 7 for FY20-22. Table 4 below summarizes the reported operating revenue and expenses for the water and sewer system.

Table 4: Reported Operating Revenue and Expenses

Fiscal Year	Operating Revenues	Operating Expenses	Net Operating Revenue
2022	$24,897	$35,185	($10,288)
2021	$25,362	$19,008	$6,354
2020	$9,030	$18,335	($9,305)

While the net operating revenue may be negative for two of the three years, the City covers expenses from other sources, including the City's general fund.

The financial statements do not separate out all utility expenses, including utility administration, heating fuel, and electricity. The City's financial statement includes line items for heating fuel but it does parse the costs to the City's various functions. Similarly, the City does not include sales of electricity from the electrical utility to the water and sewer utility.

The balance sheets provide by the City from FY20 and FY21 do not show any liabilities. The only asset and equity reported by the City was a checking account. The first service design and construction project is expected to be 100% grant funded and will not impact that City's balance sheet. The City will be responsible for the O&M of the constructed facilities.

Near-term, grant-funded projects include rehabilitation to the WTP, anticipated for construction in summer 2024, and the proposed 424,000 gallon WST.

2.5.2 Utility Revenue Sources

Besides the unreported electricity and heating fuel consumption, the City uses unidentified funds to subsidize the operations of the water and sewer utility.

The utility currently has two paying customers: the local school and the NSHC Clinic. The school is charged $0.10 per gallon, which in 2021 generated $25,362.00 as seen in Appendix 7. In 2023, NSHC and the City of Diomede executed a Water Agreement for the clinic to pay two payments of $4,266.50 for a total of $8,533.00 for the year. Other community facilities and residential customers are not charged.

Anecdotally, the City receives $60,000 annually from the Norton Sound Economic Development Corporation (NSEDC) to subsidize the HBH collector.

2.5.3 Utility Expenses

The utility's WTP is scheduled to be rehabilitated in summer 2024. Due to this near-term change and the uncertainty in the historical expenses, the expenses included in Table 5 are based on PERs for the WTP (Project AN-19-N7P), WST (Project AN 03-R28), and water source (Project AN 15-U78). For each of the system components, the expected costs were brought to 2023 dollars.

The City of Diomede does not separate administrative and professional service expenses by department. It is expected that utility customers will not be responsible for these expenses.

Table 5: Utility Expenses

Expense Category	WTP	WST	Water Source	Total Expenses
Labor	$46,800	$1,350	$4,680	$52,830
Payroll taxes				$0
Consumables		$1,550	$1,550	$3,100
Cartridge Filters	$1,375			$1,375
Calcium Hypochlorite	$188			$188
Calcite	$125			$125
Soda Ash	$625			$625
Sodium Chloride	$3,750			$3,750
Electric	$1,933	$1,810	$857	$4,600
Fuel	$7,411	$14,940	$900	$23,251
Insurance	$3,125		$389	$3,514
Short Lived assets	$2,069	$775	$775	$3,619
Water Quality Testing	$1,875			$1,875
Operator Training	$625			$625
Professional Services				$0
Admin Costs				$0
Total	$69,900	$20,425	$9,151	$99,476

The current revenue sources are not sufficient to cover the expected expenses of operating the current and proposed infrastructure. Some combination of additional revenue from customers, internal subsidy from the City, or external subsidies will be required to maintain the system.

2.6 Water, Energy, and Waste Audits

No recent energy audits have been completed.

3.0 NEED FOR PROJECT

3.1 Health, Sanitation, and Security

Currently, the community of Diomede has an IHS Deficiency Level 5 defined as Deficiency Level 4 conditions for both water and sewer. The water and sewer specific deficiencies for level 4 are as follows:

> W4.1: A lack of piped drinking water to homes (i.e., no connection to a community water system, individual well, or cistern system with regulated water delivery), including appropriate interior plumbing as necessary and allowable per the Criteria Document.

S4.1: A lack of piped sewage conveyance from the home (e.g., no connection to a community sewer system, on-site treatment system, or HBH system), including appropriate plumbing appurtenances as necessary and allowable per the Criteria Document.

The community of Diomede has multiple active projects that will improve their access to a reliable source of potable drinking water that meets the Environmental Protection Agency (EPA) drinking water standards; however, after the proposed projects are in place residents still have to haul water to their homes. Residents who haul water will statistically use less water by reducing the amount used on sanitation activities. Providing improved access to water will improve the sanitation habits and overall health of the community.

Wastewater is currently disposed of by HBH creating many opportunities for residents to come in contact with harmful pathogens associated with human waste. In the winter, the HBH disposal area is maintained on top of the ice, without a barrier, creating an even greater chance for residents to come in contact with human waste.

The community needs an improved method of waste disposal to improve overall health and to improve their impact to the environment, which they rely on for subsistence, as they are routinely throwing plastic into the ocean through the use of HBH.

3.2 Aging Infrastructure

The need for water distribution and sewage collection is not a result of aging infrastructure but a lack of infrastructure.

3.3 Reasonable Growth

Diomede is constrained by its lack of infrastructure to support the existing community. According to the DCRA Community Profile, almost 40% of the current population is under the age of 15, and the population is estimated to grow in the 20-year project lifespan to 93 residents. Improving sanitation and increasing access to running water may encourage community growth.

Community growth is not driving the development of a water and sewer system but rather the immediate needs of a community with extremely limited sanitary services.

4.0 ALTERNATIVES CONSIDERED

Four alternatives have been developed, three of which increase the level of sanitation services in the community of Diomede. In the 65% ePER, six alternatives were considered including two alternatives supplying a lower level of service because of high anticipated O&M and capital costs for full piped water and sewer. During the review process, two alternatives were dismissed due to fundability issues. The two dismissed alternatives are explained in Section 4.1.6, and Appendix 10 contains the alternative sections from the 65%. The remaining alternatives considered are as follows:

- **Alternative 1** – No Action
- **Alternative 2** – Piped Water and Wastewater
- **Alternative 3** – Satellite Delivery and Collection Stations
- **Alternative 4** – Piped Wastewater and Satellite Water Delivery

4.1 Design Criteria, Assumptions, and Selection Discussion

4.1.1 Design Criteria

Table 6: Design Criteria

General Conditions	
Design Period	20 years
Design Population	93 (0.5% growth rate)
People per Household	2.8
Total Number of Houses to be Served (Does not Include Growth)	32
Environmental Conditions	
50-Year Flood Elevation	17.4 feet above MLLW
Mean Maximum Annual Temperature	26.6° F
Mean Minimum Annual Temperature	15.7° F
Mean Annual Precipitation	11.48 inches
Mean Annual Snowfall	38.1 inches
3-Second Wind Gust (ASCE7-10), Risk Cat.II	60 to 80 mph
Water Distribution	
Daily Water Demand	See Table 7
Peak Hourly Flow	15 gpm (w/fully piped)
	8 gpm (w/Satellite Stations)
Water Mains	Dual 4-inch Core Insulated Arctic Pipe (16” outside diameter)
Circulation Loop Velocity (minimum)	0.5 fps
Service Line Freeze Protection	Individual circulation pumps with heat trace

Flushing Velocity (minimum)	5 fps
Water Storage Capacity (days of storage)	60 (+) days
Wastewater Collection	
Wastewater Generation	50 gpcd (w/fully piped)
	30 gpcd (w/Satellite Station)
Sewer Mains	6"X16" Insulated arctic pipe
Cleanout - Spacing (maximum)	300 feet
Scour Velocity	3.5 - 5 fps
Pipe Slope (minimum)	2%
Pipe Slope (maximum)	15%
Service Connection Length (Maximum)	300 feet
Wastewater Treatment	
Design Treatment Rate	5,000 gpd (w fully piped) 3,000 gpd (w/Satellite Station)
Treatment Level Required	Secondary

Table 7: Design Water Use by Alternative

Alternative	Water Use (gpcd)
Alternative 1: Do Nothing	5
Alternative 2: Piped Water and Sewer	50
Alternative 3: Satellite Water and Sewer	30
Alternative 4: Satellite Water Delivery and Piped Wastewater	30

4.1.2 Deviations from ANTHC Design Standards

4.1.2.1 Water Demand

DOWL proposes a conservative maximum design value of 50 gpcd if piped water service is provided to each home. The estimate deviates from ANTHC's technical memorandum 22-1 recommendation to apply a design water use estimate of 70 to 100 gpcd for fully piped systems in Alaska. While seawater is abundant, the energy required for RO is considerably high. To minimize community O&M cost, a more pragmatic demand has been chosen based on water use for the surrounding rural Alaska communities shown in Table 8.

The numbers in Table 8 were estimated based on total daily production from the water plant provided by the Alaska Rural Utility Cooperative (ARUC) or referenced from a historical study by DOWL or others and divided by total population estimates around the same time. The water use range provided by ARUC is water use from just piped customers. Additional service levels other than piped do exist in some of the communities as noted. The method used estimates general water use in the community that is within the range provided by ARUC and is assumed to be an acceptable method for this application.

Table 8: Water Use for Communities near Diomede, Alaska

Community	Ambler	Gambell	Kiana	Koyuk	Newhalen	Pitkas Point	St. Michael	Savoonga	Sleetmute
Year	2022	2020	2022	2022	2022	2022	2022	2023	2022
Population*	256	640	413	312	181	121	446	833	75
Service Levels Other Than Piped	20 homes not on piped system	Assumed all piped	Piped and Haul	Assumed all piped	16 Homes on well and Septic	Assumed all piped	Assumed all piped	Assumed all piped	Assumed all piped
Daily water use based on WTP records (Gallons)	15333	25000	10240	16500	6827	4030	4154	15304	4642
Water Use (GPCD)	60	39	25	53	38	33	9	18	62
Water Use Range (GPCD)	17 to 76	-	17 to 42	-	40 to 47	28 to 38	3 to 32	17 to 24	36 to 40
Reference	ARUC Program Data FY2023	(DOWL, 2021)	ARUC Program Data FY2023	(Golder, 2019)	ARUC Program Data FY2023	ARUC Program Data FY2023	ARUC Program Data FY2023	ARUC Program Data FY2023	ARUC Program Data FY2023

*From Reference or Department of Community and Regional Affairs (DCRA) Community Database

DOWL proposes a design water use of 30 gpcd for the satellite alternatives (Alternative 3 and Alternative 4), a version of hauled water and sewer. Again, this is a deviation from ANTHC technical memorandum 22-1. The memorandum states that water use estimates between 3 and 12 gpcd should be applied to the design of haul systems in Alaska.

The elevated estimate of 30 gpcd incorporates the water use estimated by ANTHC in the Diomede Water Resource PER (2018) for the currently piped school, clinic, and washeteria and assumes an estimated water use of 12 gpcd per resident in the home. Table 9 below is modified version of Table 7 from the ANTHC Diomede Water Resource PER (2018) that includes a haul scenario with a use factor of 12 gpcd instead of the current estimated use rate. The average gpcd is then estimated to be 26 gpcd. A conservative value of 30 has been applied for design.

Table 9: Diomede Haul System Water Use (Modified from Table 7 in ANTHC Diomede Water Resource PER [2018])

Facility	Users Per Day	Use Factor, gallons	Average Daily Demand
School	34	20	680
Clinic	10	5	50
Washeteria			
Washing Machine	13	20	260
Shower	22	10	220
Toilet	44	2	88
Modified Haul	93	12	1116
Total	93	26	2414

It is worth noting that water usage could potentially be lower than 30 or 50 gpcd, depending on the utility's rate structure and how they choose to bill rate payers. If a monthly cost structure for unlimited services is considered, a demand of 30 or 50 gpcd remains reasonable.

4.1.2.2 Pipe Sizing

Per ANTHC design standards, the minimum pipe diameter for new circulating water mains is six inches. A pipe diameter of four inches is common for rural NSHC communities. Because of the small population, peak flow demand and freeze protection velocity (0.5 fps) can be met with a four-inch diameter main. Circulation pumps selected for the O&M costs include this consideration.

Per ANTHC design standards, the minimum pipe diameter for gravity sewer systems is eight inches. Because the assumed water usage has been selected below standard it is assumed that the wastewater flow will also be minimal. The choice of six-inch sewer mains was influenced by the community's limited design flow and the necessity to install pipes beneath the boardwalks. This led to the selection of an arctic pipe with a sixteen-inch external jacket.

4.1.2.3 Water Storage

Per ANTHC Technical Directive 21-2 the design storage for circulating distribution is 10 days if the water source can supply water throughout the year. Due to the remote location of Diomede and lessons learned regarding the time required for replacing and repairing water treatment equipment at other remote facilities in Alaska, DOWL proposes at least 60 days of storage and an additional 60,000 gallons for fire suppression or 340,000 gallons for a fully piped system assuming 50 gpcd. Funding has been obtained and construction has been scheduled to replace the existing 424,000-gallon tank prior to the completion of this project. The design will assume that the new 424,000 gallon will remain in place and will not be replaced as part of this project. A 424,000-gallon tank, if filled to capacity, will provide 78 days of storage assuming 50 gpcd.

4.1.3 Regulations

Pertinent regulations for drinking water systems are included in 18 Alaska Administrative Code (AAC) 80, and pertinent regulations for wastewater disposal systems are included in 18 AAC 72. Listed below are the regulations for both water and wastewater systems that are most significant for this ePER.

Drinking Water Systems:

- 18 AAC 80.205: Engineering plans for the construction of a new water source, storage, distribution system, water treatment, and related structures must be submitted to ADEC and approved prior to construction.
- 18 AAC 80.020: Water distribution mains must meet minimum separation distances from potential sources of contamination (i.e., wastewater lines).
- 18 AAC 80.210: Record drawings and supporting data are to be submitted to ADEC after construction to obtain approval to operate.
- 18 AAC 80.007: In reference to 18 AAC 74, operators must be certified at a level equal to or greater than the system classification.

Wastewater Disposal Systems:

- 18 AAC 72.010: Engineering plans for the construction of new or modified wastewater treatment or collection systems must be submitted to ADEC and approved prior to construction.
- 18 AAC 72.020: Wastewater collection systems must meet specific design requirements and meet minimum separation distances from water systems.
- 18 AAC 72.240: Record drawings and supporting data are to be submitted to ADEC after construction to obtain approval to operate.
- 18 AAC 72.065: In reference to 18 AAC 74, operators must be certified at a level equal to or greater than the system classification.

4.1.4 Other Design Considerations

Where possible, proposed infrastructure will be located to avoid areas identified as at risk from environmental threats such as erosion, flooding, slope instability, and shallow permafrost and areas with known cultural resources. Figures 7 and 9 are included to convey the location of these areas.

A map of the area that will be impacted by flooding and breaking waves and documented erosion (50-year storm) is provided in Figure 7. The area identified as having erosion is a result of seasonal storms that erode the area in the short term and can potentially damage unprotected infrastructure. Erosion has been reported by the community along most of the coastline fronting the Diomede.

Unfortunately, given the area topography, it will be difficult to get all the utility's infrastructure out of the flood zone. One hundred feet of shore protection has been included in the capital cost to account for unavoidable construction below the flood and breaking wave elevation (17.4 MLLW).

The entire community of Diomede lies within an AHRS site determined eligible for listing on the NRHP. The history of the community increases the likelihood of historic cultural materials amongst current residences. Less-disturbed areas with greater soil deposition have higher potential for subsurface cultural resources and are recommended for archeological testing.

Proposed infrastructure will attempt to avoid areas containing identified cultural resources or with higher potential to contain cultural resources, where applicable. Previous construction projects have had success with prior testing and monitoring performed by cultural specialists/monitors.

A map of areas at risk of settlement from degrading permafrost or at risk of slope instability is not available due to the lack of subsurface geotechnical data and slope observations. The initial review of geotechnical information indicates that active landslides have not been observed on the slopes above the beach; however, rockfall may be present at some locations. Little is known about the subsurface conditions upslope from the beach within the community. Boulders in a matrix of sand and fines were observed just offshore to 40 feet near the high school and permafrost was observed in the slopes during the high school construction and covered with gabions and rip rap. The elementary school experienced 18 to 24 inches of settlement likely due to thaw settlement or possibly erosion of sediments due to storms washing against the talus formation causing boulders to settle. There are a range of potential conditions that may impact structures, but there is not enough data to identify site selection based on the potential geological hazards. Additional geotechnical studies will be needed before design.

Diomede is a pedestrian-only community, so public walkways need to remain connected. Unfortunately, buried pipe is not an option for Diomede, but pipe will be placed underneath the boardwalk wherever possible (Appendix 8). The existing boardwalks in the community were built in 2009 and will need to be replaced before the construction of this project. The community is already coordinating with Kawerak for the construction of new boardwalks. More than 70% of the proposed pipe network will follow the existing boardwalk alignment. The remaining sections are necessary to maintain gravity flow and could potentially run underneath buildings. Updates to the boardwalks are not included in this project but the structural integrity of the existing boardwalks will need to be assessed prior to design. Services will need to navigate the tight space between homes. This may be accomplished by routing services under the existing homes that are on stilts.

4.1.5 Common Design Elements Amongst Alternatives

4.1.5.1 Water Source, Treatment, and Storage

Diomede relies on a seasonal surface water source to produce the water needed for the year. With climate change affecting the snowpack and the need for more water to meet the demands of piped water, every alternative will include an upgrade to the existing surface water intake. Snow fencing, a strategy to increase snowpack in the desired watershed by trapping snow that will otherwise deposit elsewhere in a wind event, has been included in planning and estimating as another method of improving the water source production. A preliminary concept for intake upgrades has been provided in Figure 19. The design assumes that the majority of the flow is maintained at the surface of the channel as stated earlier. The upgraded intake will extend no deeper than six feet in the channel and be located just downslope of where the flow is currently at the surface and has historically been maintained. The intake concept will be constructed by hand as site access for equipment and materials is limited. The upgrades to the intake will also have the added benefit of reducing current operator maintenance efforts by creating more reliable capture and reducing sediment.

The Water Source Desktop (Appendix 6) estimates that relying solely on the existing surface water source throughout the project life cycle might be feasible; however, this assertion requires support through additional data since there is a lack of flow data for the current source. While climate models and snowpack predictions suggest an adequate water supply, the uncertainty level is considered unacceptably high for a community that depends on capturing a year's worth of water within a three- to four-month period. Additionally, the extensive water storage needed for year-round supply will entail constructing storage for more than 900,000 gallons of water, effectively tripling the current storage capacity as outlined in Table 10. Spatial constraints and unstable subsurface geology make building tanks of such magnitude impractical and economically restrictive.

Table 10: Water Storage Calculations

Water use per capita day (gallons)	Total amount of water needed over year (gallons)	Total storage needed to take advantage of high flow time + fire suppression (gallons)	Additional storage requirements (gallons)
75	2,545,875	2,082,975	1,658,975
50	1,697,250	1,336,650	912,650
35	1,188,075	888,855	464,855
30	1,018,350	739,590	315,590
20	678,900	441,060	17,060

Utilizing seawater as the primary raw water source and employing desalination through RO as the treatment method offers numerous advantages for an upgraded potable water system. Access to seawater throughout the year significantly diminishes the necessity for extensive water storage capacity. According to ANTHC guidelines, communities with continuous access to raw water are obligated to maintain a minimum of 10 days' worth of treated water in storage; however, considering Diomede's isolated location and the implementation of a new treatment system, we recommend the community store at least 60 days' worth of treated water and use the planned new 424,000-gallon tank. This approach aligns with future community growth needs while satisfying the storage recommendation.

A noteworthy benefit of reduced water storage is the reduction in O&M costs associated with heating and circulating water in large tanks. Furthermore, RO-treated seawater exhibits nearly negligible total organic carbon (TOC) levels, resulting in a significantly lower risk of disinfection byproducts (DBPs). This approach ensures a safer and more efficient water treatment process, aligning with the goal of enhancing the potable water system.

A seawater source will require the installation of a seawater well near the beach. A well is the preferred intake structure because it will be protected from wave/ice interference and the subsurface material will act as a primary filtration. A well house will be constructed to protect the wellhead and raw water transmission circulation pumps. The well head will be within 100 feet of the WTP but will still require heat trace to ensure freeze protection. The well house will be elevated so the finished floor elevation is above the estimated 50-year flood elevation. The foundation will be protected by riprap 2 to 5 feet in diameter on the west and south side.

Maintaining the existing surface water source is in the best interest of the community. By changing the RO membranes in the summer to membranes suited for Diomede's surface water, the community will be able to treat surface water at a lower power input, reducing O&M costs for the summer season. Having access to surface water capture will increase resiliency in the event of a system failure in the summer, at a time when melting snow and ice is not an option.

The application of an RO skid for water treatment offers several advantages. Notably, the current infrastructure's spatial constraints will need a compact approach. The RO skid will occupy less than 20 SF, accommodating wall-mounting, thus optimizing space for essential water system components, spare parts, and a dedicated water quality testing bench. A wall-mounted RO skid could provide additional resilience by reducing the likelihood that the water treatment components will be inundated by flood waters. Building a resilient system capable of sustained operation with minimal maintenance is imperative. The RO system's ability to maintain consistent water treatment standards, albeit at a reduced rate, in the event of component failure underscores its reliability. Key among the maintenance aspects is membrane replacement, a routine task for which conveniently sized replacement membranes can be locally stocked and promptly delivered via scheduled flights. During the summer months, power consumption can be minimized by diverting surface water through the RO system, facilitated by the replacement of membranes—an operational adjustment aiding in electricity conservation. A SCADA system will be installed to run the RO unit and could be monitored by NSHC or operators outside Diomede.

A new WTP building will be constructed as part of the project. The proposed footprint will be 815 SF or similar to the newly rehabilitated WTP. The proposed rehabilitation of the WTP is a short-term solution for WTP. The proposed WTP will be located at least four feet higher in elevation in the same location as the proposed rehabilitated structure. The foundation will be protected on one side by a rip-rap revetment. Construction sequencing will need to consider the time period in late June/early July when surface water is treated and stored for the year.

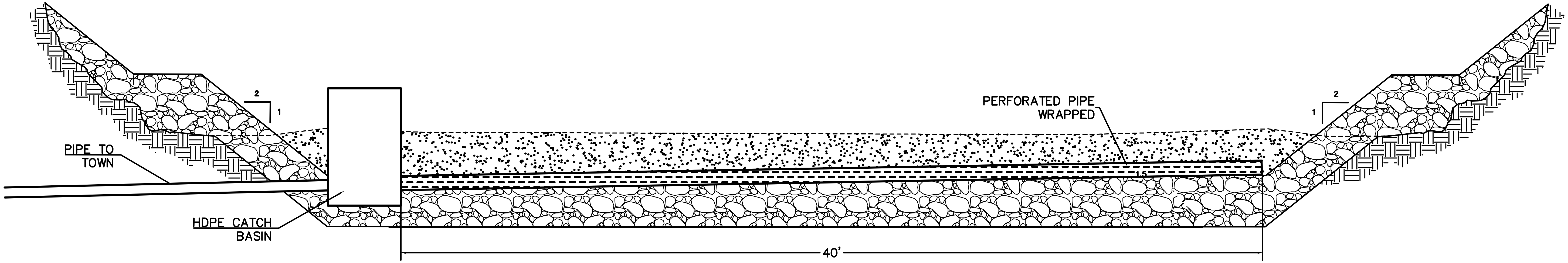
Alternatives Dismissed:

- Relying on the existing surface water source and the upgraded WTP system planned for 2023 construction has been considered as a water source and treatment solution; however, implementing this alternative will require significant improvements to the intake system to ensure adequate flow and an additional water source study to gather crucial data. To cater to year-round water supply needs, additional tanks with a capacity of approximately 900,000 gallons will need to be constructed, resulting in an extension of the construction timeline. The operation of these tanks will entail heating and circulation, significantly increasing O&M costs. Additionally, due to space constraints at the existing treatment plant, an additional 200 SF of space will be required to house the circulation pumps and other equipment associated with the pipe network.

  The WTP process that will be constructed as part of the short-term rehabilitation is designed to treat water at a rate of 30 gpm. The community will be required to store raw water and treat it throughout the year to satisfy the increased demand associated with piped water. The proposed WTP process is categorized as a level 2 facility, and the current operators are in the process of achieving that certification level.

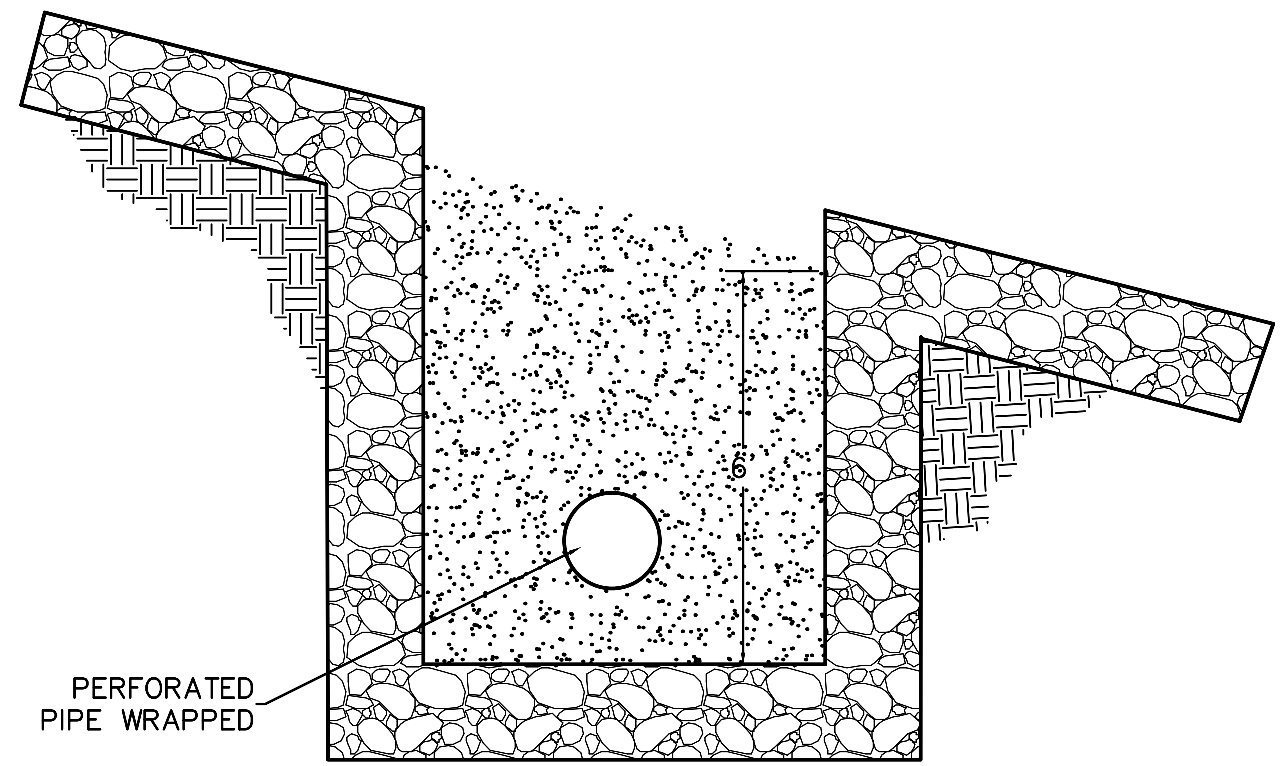
  Ultimately, this alternative has been dismissed due to the impracticality of constructing extensive tanks and the goal to enhance community resiliency through a year-round water source. Given the steep, permafrost-ladened slopes, the development of construction roads and tank platforms will be potentially dangerous in any areas that are not near the beach.

- An alternative to construct a WTP above the community has been considered and dismissed. While a WTP at a higher elevation will have a potential hydraulic advantage in the case of power outages and for the summer months when the distribution system can be pressurized solely by gravity, the overwhelming capital cost has made this alternative unfeasible. During outages, water could be gravity fed to the community but under normal operation the plant will still need to circulate the water for freeze protection, and there will be no hydraulic advantage of being at a higher elevation. From preliminary investigation, water will likely need to be pumped from the source, instead of gravity fed, to the WTP, which will negate any power savings. Construction uphill on the steep talus slopes is prohibitively expensive and will include building a road/access trail and staging area for construction equipment.



1/01 INTAKE CROSS SECTION
NTS

ASSUMPTIONS:
- FLOW IS MAINTAINED AT THE SURFACE OF THE CHANNEL.
- INTAKE CONCEPT CAN BE CONSTRUCTED BY HAND.
- INTAKE WOULD EXTEND LESS THAN 6' IN THE CHANNEL.



2/01 INTAKE PROFILE
NTS

DOWL WWW.DOWL.COM	LITTLE DIOMEDE FIRST SERVICE ePER INTAKE CONCEPT CITY OF DIOMEDE, AK	PROJECT 50290.01 DATE 05/11/2023 FIGURE 19

4.1.5.2 Washeteria Improvements

The current washeteria facility, constructed in 1988, remains unchanged since the initial construction. Even with the planned introduction of community wide piped water and sewer, the washeteria will remain a crucial sanitation facility, particularly since space constraints in most households will limit the possibility of in-home laundry. Maintaining a functional washeteria is pivotal, providing the community continued access to bathrooms in case of system complications.

In all proposed alternatives, refurbishing the existing washeteria is a fundamental component. The objective is to overhaul the existing above-ground septic tank and substituting it with a comprehensive MWTU capable of secondary treatment, similar to the Lifewater Sewage Treatment Units, serving the entire community. This ensures efficient management of wastewater from the washeteria.

4.1.5.3 Residential Plumbing Installation

Currently, only four of the 32 occupied homes have interior plumbing. This project may need to include housing renovation funds to ensure there is adequate space and insulation for the installation of pipes and fixtures. The typical in-home upgrade will require a space approximately five feet by eight feet. The space will include flushable toilet, bathroom sink, bathtub shower, and a kitchen sink. For Alternative 2 (Piped Water and Wastewater), small circulation pumps will be installed for the water service. For Alternative 4 (Piped Wastewater, Satellite Water), an additional residential WST will need to be installed and maintained. For Alternative 3 (Satellite Water and Wastewater), a WST and a wastewater holding tank will be needed. If space allows, the WST will be inside of the home and will not require an additional heat source. The wastewater holding tanks will be outside of the homes, preferably underneath the homes, and will need freeze protection.

It should be noted that the RCS surveys conducted in both February and August 2023 initiated concerns about the viability of pipes being placed within homes. At least five homes reported freezing floors and walls in the winter. The structural stability of each home will need to be assessed before adding the weight of plumbing and WSTs. Additionally, almost 30% of homeowners interviewed indicated that their home will need an extension to fit a five-foot by seven-foot bathroom. The condition of the homes will pose significant obstacles in the completion of this project.

4.1.5.4 Wastewater Collection

In all alternatives, gravity sewer has been selected as the preferred method of sewage collection. Diomede is built on a steep hillside and has a significant potential for gravity collection. The proposed pipe layouts in Figures 20 and 22 were developed so pipe slopes stay above 2%, which maintain sewage velocity above two fps, based on the existing ground surface (Alaska DCCED, 2004). Some of the greatest benefits of gravity sewer system are no additional pump installations or energy cost to the community and simple construction and maintenance.

In some areas of the community, slopes exceed 15% and have the potential for liquid and solid separation due to high velocities. The need for energy dissipation in the sewer mains is unlikely but will be assessed during design. Gravity sewer might not work at select households and a small residential grinder pump assembly will be used instead to pump to the gravity system. Prior to design work, detailed topographic survey information will be required.

Alternatives Dismissed:

- Low-pressure wastewater collection was initially explored due to its high tolerance for ground movement and the ability for maintenance on individual connections without disturbing the entire system. Maintenance efforts are greater than gravity because each house will be serviced by a residential lift station. This option for sewage collection has not been selected because of space constraints and high O&M costs to the homeowner.

- A vacuum wastewater collection system was also explored due to the low water use, smaller pipe size, and the ability to share a utilidor with a circulating water main. Capital costs as well as O&M costs are higher than gravity systems.

4.1.5.5 Wastewater Treatment

An aboveground MWTU, such as a Lifewater System, capable of 5,000 gpd will treat the incoming wastewater. Secondary treated wastewater effluent will be discharged direct a seepage pit. The unit will be elevated above the 50-year flood elevation and the foundation protected, on at least two sides, with rip rap 2 to 5 feet in diameter.

Septage will be removed from the MWTU every one to two years and pumped using a lift station and pile supported force main to an above ground septage dewatering container located 950 feet south of the community. Prior to pumping, a polymer flocking agent may be added to the primary storage tank in the MWTU. The septage dewatering container will be designed to retain the solids on a filter material such as sand or a membrane and the decanted liquid will be captured on the bottom of the container and returned by gravity to the MWTU. Valves will be installed so that the decanted liquid can return in the force main by gravity. The footprint of the unit is expected to be similar to a connex or 600 SF. Approximately 450 feet of the force main will be located below the 50-year flood elevation. Approximately 250 feet will be protected by the existing gabion wall that protects the water transmission main. The gabion wall will have to be extend on both ends for a total of 150 feet. The additional 50 feet of protection will come from the rip rap revetment proposed to protect the mains near the water treatment plant.

The dewatering container will be accessible to utility staff so that the dewatered sludge can be removed once dried and the filter material can be replaced. The container will have two compartments to allow for two years of septage dewatering. The top will be protected from the elements but designed to promote air movement over the material and also allow for solids to freeze and dry over a winter. The container will be elevated on a platform supported on the downslope side by pile supports to create a level location. The elevated platform will also allow for easier removal of the dried solids as it creates a space below the unit where barrels or watertight containers sized for movement by hand could be placed to capture the dried solids when removed. It is assumed the dried solids can then be stored on site until a landfill is identified for disposal. At this time, a facility willing to accept dried septage from Diomede has not been identified and shipping companies operating in the area have indicated they will not accept septage.

A relatively flat area 950 feet south of the community was chosen as a possible location for the dewatering container because it is separated from the community, in the same area as the current solid waste disposal and is 30 feet above the beach. There is a slightly smaller shelf in the same area that is 50 feet above the beach that is an alternative location. If the area is not sufficiently flat, the dewatering container will be founded on a platform supported by vertical members that are drilled and bonded into the talus or anchored directly into rock. See Figures 20 through 22 for the proposed location of the dewatering container.

Alternatives Dismissed:

- The existing above ground septic system with a beach seepage pit was dismissed after ADEC consultation. The project was instructed to assume that secondary treatment of effluent will be required (See Appendix 9). If primary treatment were allowed, the community will benefit from O&M cost savings and decreased power consumption.
- A septage lagoon was considered as a sub-grade solution for storing the resulting wastewater solids. This alternative is considered unrealistic to construct and, therefore, has been dismissed. Excavation would likely compromise the bonded underlying permafrost, resulting in slope destabilization.
- A facultative lagoon would eliminate the need for a septage lagoon but has been dismissed due to limited space on the island, the steep slopes, and the talus ground surface.
- Dewatering by belt press was considered but dismissed due to the effort, cost, and space requirements for dewatering the septage.
- Use of an anerobic digestor and land use application was considered but dismissed due to the experimental nature of anerobic digestors in arctic conditions.
- Applying for a permit to pump septage into a mixing zone in front of the community has been dismissed per ADEC recommendations.

4.1.6 Alternatives Dismissed

In the Alternative Memo and the 65% submittal, a comprehensive assessment was conducted, with a total of six alternatives. After feedback received from the 65% draft and engaging in dialogue with the community, two alternatives have been excluded from further analysis. For a thorough examination of Alternatives 5 and 6, please refer to Appendix 10, where a detailed analysis is provided.

4.1.6.1 Alternative 5: Portable Alternative Sanitation System (PASS)

The PASS includes a 100-gallon WST, a water treatment system, a sink, a solid separating toilet, and a urinal for effective human waste disposal. The water treatment system within PASS is equipped with a point-of-use cartridge filter and manual chlorination. PASS presents several benefits, including a cost-effective monthly solution for homeowners, water conservation, and minimal space usage impact. While PASS serves as an interim measure for various communities until the availability of piped water, it is not the preferred solution for Diomede. Additionally, homeowners bear the responsibility of maintaining the PASS system.

The installation of PASS systems would require other community infrastructure improvements including enhancing the water source intake, implementing snow fencing, replacing the existing 424,000-gallon WST, constructing a new 350,000-gallon WST, upgrading the washeteria, and exploring options such as purchasing an advanced burn barrel or arranging for solid waste export off the island via barge.

However, this alternative has been dismissed primarily because it does not align with the purpose and requirements of this project to enhance the level of service. Furthermore, the community expressed a lack of enthusiasm for this alternative.

4.1.6.2 Alternative 6: PASS and Satellite Water Delivery/Collection Greywater

Alternative 6 integrates the PASS with a satellite station concept. Under this alternative, homes would be equipped with PASS installations and receive water delivery from the satellite delivery station. Greywater would be collected through vacuum pumps at the satellite station and flow to a centralized septic system featuring a seepage pit. Transporting dried solids from the ventilated separating toilet to a central location for incineration would be necessary or shipping dried solids off the island via barge.

The primary advantage of satellite stations for greywater collection and PASS lies in retaining the benefits of PASS while minimizing haul for water and wastewater. Notably, this alternative eliminates the requirement for a septage dewatering container, although upgrades to the seepage pit would be essential. The community has not experienced issues with their seepage pit and expanding it would be less intensive compared to constructing a dewatering container, road, and septage FM system. Moreover, satellite stations would provide a watering point, allowing residential WSTs to be filled directly, relieving community members from the burden of water hauling.

This alternative was dismissed due to the challenges of procuring funding for a project that improves water service and does not significantly improve the level of wastewater service. The solids would still require transport to a central location for incineration, the dry solids from the ventilated toilet's simplifies the haul process compared to traditional honey buckets; however people are still hauling and potentially coming in contact with human waste.

4.2 Alternative 1: No Action

4.2.1 Description

Residents will continue to self-haul drinking water and use honey buckets. This alternative will not provide improvement to the existing water and wastewater infrastructure beyond the planned ANTHC projects for the WTP and WST.

4.2.2 Map

See Figure 14 for a layout of the existing facilities.

4.2.3 Environmental Impacts

A no action alternative is not in compliance with State of Alaska wastewater regulations and may result in contamination to the ocean ecosystem and community health. Currently, HBH waste is dumped in the ocean or on the sea ice still contained in plastic bags.

4.2.4 Land Requirements

This alternative will require no new land requirements.

4.2.5 Potential Construction Problems

This alternative will not include construction.

4.2.6 Sustainability Considerations

The existing haul system requires substantial community labor by residents not captured in the financial documents. With no action, the community will continue to experience water shortages in the winter.

4.2.7 Costs

4.2.7.1 Capital

Not applicable.

4.2.7.2 Annual O&M Costs

Operating costs in Table 11 for the Do Nothing alternative are based on the O&M for the surface water source, transmission main, and WTP.

Table 11: Alternative 1 O&M Costs

Description	Annual Utility Expense
Personnel	$53,000
Insurance	$3,510
Energy Cost (Fuel)	$26,900
Energy Cost (Electrical)	$4,600
Process Chemical	$6,060
Monitoring and Testing	$1,880
Short Lived Asset Maintenance/Replacement	$3,600
Materials and Routine Maintenance	$3,100
Miscellaneous	$625
Total	$103,275

4.2.7.3 User Cost

If an assumed annual amount of $69,500 in fees was generated from the school ($25,000), clinic ($8,500), and approximately five small commercial entities ($36,000) then residential users will be expected to pay $90 per month for the Do Nothing alternative. According to ADEC's calculation of Affordability of Water and Sewer Rates in Rural Alaska, the highest fee possible to maintain the medium burden rate for residential customers is $30 per month. The annual subsidy required will be approximately $23,000 if rates were fixed at $30 per customer per month.

4.3 Alternative 2: Piped Water and Wastewater

4.3.1 Description

Alternative 2 will provide piped water and wastewater service to each home. A fully piped system will be the highest level of service possible for the community. Residents of the community will be able to have showers, washing machines, and flushing toilets in their home without sacrificing indoor space for water storage and wastewater holding tanks. A design water demand of 50 gpcd is assumed based on information provided in Section 4.1.2.1. A fully piped system is considered a gold standard when it comes to sanitation facilities in Alaska.

This alternative includes the following new infrastructure:

- Water Source
    - Construct seawater well and wellhouse near the beach with a raw water transmission main to the WTP.
    - Improve the existing surface water intake by constructing snow fencing and improving the basin.

- Water Treatment
    - Construct a new WTP.
    - Install a 15 gpm RO skid.
    - Add additional circulation pumps and distribution system hardware to the existing WTP building.
    - Backwash will continue to be disposed of in an ocean outfall, per ANTHC WTP plans.
    - Backup power source to sustain the distribution system (i.e. dedicated generator for the water circulation loops, and glycol add-heat systems.

- Water Storage
    - Additional water storage will not be constructed as part of this project. The design assumes that the 424,000-gallon tank will be replaced as a separate project.

- Water distribution and wastewater collection
    - Water and wastewater will follow the same alignment. The proposed water main will be insulated arctic pipe. The core pipes will be dual four-inch HDPE (supply and return). The outside diameter will be 16 inches. The proposed wastewater main will be 6”X16” arctic pipe. Both mains will follow the same alignment of 1,500 feet in separate insulated arctic pipe. The wastewater collection main and circulating water main will have circulating glycol for freeze protection.
    - The shared pipe network will be aboveground and supported by micropiles or hung from the boardwalk where possible to reduce conflict with pedestrian traffic.
    - Install 100 feet of rip rap protection from storm surges (protection for distribution collection and the proposed WTP.

- Service Connections
    - There will be 32 residential service connections.
    - Services are assumed to share a 15-inch diameter arctic pipe with two core pipes one housing a three-inch or four-inch HDPE wastewater service and one housing two one-inch circulating HDPE water lines. Services will include electric heat

trace as back-up freeze protection. Circulation pumps for water will be installed in the home to force continual movement of water through the water service line.
  - Install three residential lift stations for homes that are unable to be serviced by gravity sewer.

- Wastewater Treatment
  - MWTU capable of 5,000 gpd.
  - The MWTU will need to be emptied of solids every one to two years. The resulting solids will be pumped to a septage dewatering container on the south end of the community.
  - A proposed septage dewatering container with approximately 600 SF footprint will be placed on relatively flat ground or, if on a slope, on a platform with downslope posts to create a flat location.
  - A lift station and a six-inch diameter HDPE force main on piles will transport septage from the MWTU to the dewatering container. Decanted liquid will return from the dewatering container to the MWTU in the same pipe by gravity. Treating the effluent from the dewatering container will eliminate the need for an outfall. The septage force main will only operate in the summer and will not need insulation or heat trace. The line will be flushed after use to avoid freezing. The existing gabion wall will be extended by a total of 150 feet.

See Figure 20 for a concept layout of the fully piped water and wastewater system.

4.3.2 Environmental Impacts

A fully piped system will not uniquely impact floodplains, wetlands, or historical properties. The goal of ending honey buckets will stop the practice of leaving bags of sanitary waste on the sea ice.

The septage dewatering container will need to undergo ADEC Engineering Support and Plan Review before construction. The dewatering container will be above the design wave run-up height as to not impact Waters of the United States. The return line for decanted water coming from the dewatering container will be treated in the MWTU. Treating the effluent from the dewatering container will eliminate the need for an outfall.

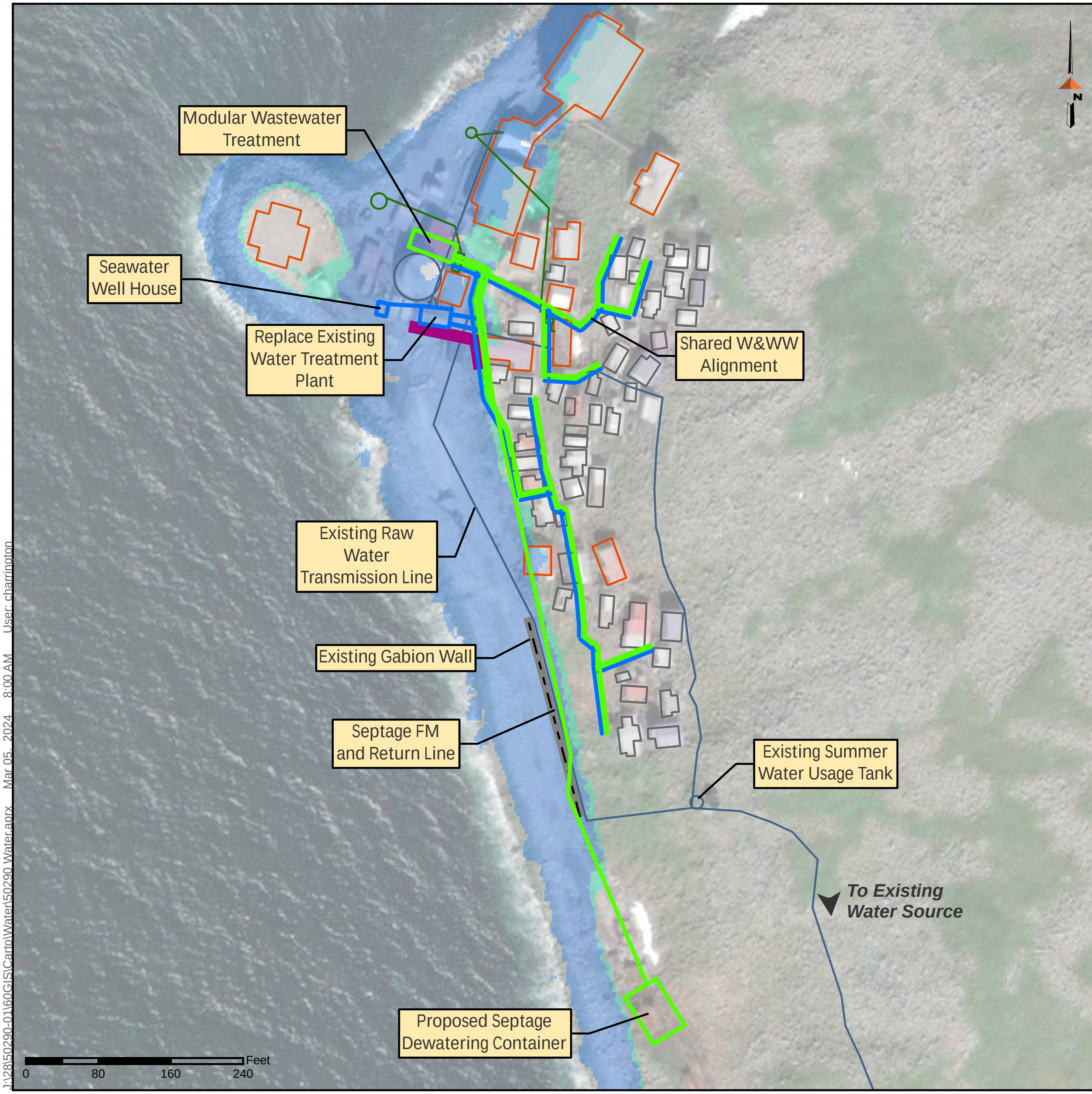
4.3.3 Land Requirements

The proposed layout follows the existing boardwalk right-of-way (ROW) as closely as possible. Construction of 1,300 feet of above-ground mains and approximately 1,000 feet of above-ground service connections may require additional land use agreements for sections that deviate from the boardwalk alignment. Record of residential property parcels was not found; therefore, services will need an agreement with the Inalik Native Corporation.

Alternative 2

Piped Water and Wastewater

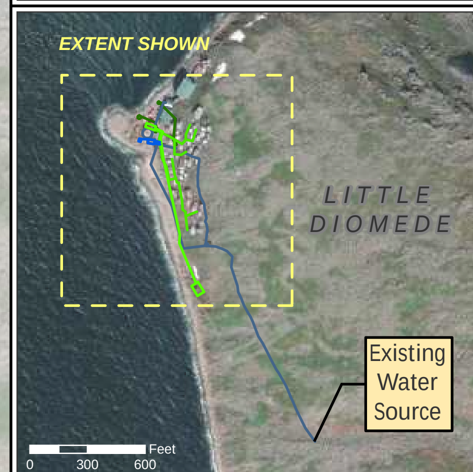
Little Diomede 95% ePER



- Proposed Sewer Utility Infrastructure
- Proposed Water Utility Infrastructure
- Proposed Riprap
- Gabion Wall
- Existing Sewer Utility Infrastructure
- Existing Water Utility Infrastructure
- Building Outline
- House Outline

Possible Water Reach

- 50 Year Storm
- 50 Year Storm with 50 Year Sea Level Rise



DOWL

Date: March 2024

Figure 20

Other components:

- Seawater well house near the beach will be located on City property.
- MWTU – The current washeteria operates an aboveground septic system in a connex that is deteriorating and will be removed completely and replaced with a community-wide MWTU located on city property.
- Septage Dewatering Container –The preferred location for the dewatering container is on the south end of the community, close to the existing burn area. An access path from the beach will be required during construction and maintenance. The septage force main will likely be supported on piles. The proposed location of the dewatering container and septage is on Inalik Corporation land. In the past, letters of non-objection have been given from the corporation for situations like this.

4.3.4 Potential Construction Problems

Potential construction challenges include the site's topography and ground surface. A survey will need to be performed to get accurate elevation of the distribution facilities, boardwalks, and ground surface.

Barge access to the island is limited and often requires a barge that is capable of dredging its own harbor. All construction waste must be shipped off the island at the completion of the project. The nearest solid waste facility will be Nome or Anchorage.

Moving heavy machinery through the community will be difficult. Most previous construction has been accomplished by hand and requires a prolonged schedule.

Home condition and proximity of houses from each other could create difficulty when installing the service connections.

4.3.5 Sustainability Considerations

4.3.5.1 Energy Efficiency and Alternative Energy

The fully piped system will be the most energy-intensive alternative. Design should evaluate using the following:

- High-efficiency pumps.
- Increased insulation thickness.
- The arctic pipe R-value.
- Repair the waste heat recovery from the power plant to the WTP. There is little documentation about the system, but it was not observed as functional during the February 2023 visit.

- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation during the summer months. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.

- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it will require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all the systems properly. Installing wind power for the sole purpose of making heat has not been shown to be cost effective in Alaska. It will also increase the complexity of the utility's heat add system as there will need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

4.3.5.2 Affordability

The greatest challenge to the fully piped water and sewer alternative is the financial burden. The O&M required is costly, and commitment to paying user fees is vital. If a failure to collect fees becomes standard, the system may become unaffordable and fall into disrepair.

The fully piped alternative will be the most expensive option, but it will provide the greatest level of service. Labor by customers will be reduced, access to clean water will be improved, and people will come into contact with human waste less often.

4.3.5.3 Operations

The operations of a fully piped system will be the more labor-intensive option for the utility than the status quo. Pipe and pump maintenance will increase the workload on the utility operator. Currently, Diomede only has one operator for the O&M of water and will likely need to hire another. A second operator may not need to be trained as a WTP operator. Compared to other alternatives considered, a fully piped system will be more automated and require less operator labor overall, particularly to fill and empty tanks. The gravity sewer collection system reduces the need for pump maintenance.

In the summer, during peak subsistence season, the operator(s) will need to maintain the intake and distribution and run the treatment plant. In addition, the summer will be the only opportunity to pump septage to the septage dewatering container, the effort however can be performed after surface water is captured and intake O&M is finished or minimal.

A piped system will not require a higher operator certification level. Diomede will need a Level 2 operator to run the proposed rehabilitated WTP.

4.3.5.4 Climate Change Resiliency

Climate change has already affected Diomede and will continue to change life on the island. Inconsistent sea ice and changes in sea mammal migration have been the first signs that the effects of climate change are taking hold. Still on the horizon are sea level rise and increasing storm surge intensity, both of which will need to be accounted for while designing any system on Little Diomede. Most of the existing community buildings, including the WTP are located below the estimated flood elevation and maximum elevation at which infrastructure is exposed to breaking waves (50-year storm) or 17.4 feet MLLW (Diomede Erosion and Flooding, DOWL). Bringing as much infrastructure as possible above 17.4 feet MLLW will help ensure that it will survive the next 20 years. Less than 100 feet of water and sewer main and 150 feet of septage force main will be at or below the estimated flood elevation and will therefore be protected with a rip rap revetment. The WTP, well house, MWTU, and associated pipe will be constructed so floor elevations are above 17.4 MLLW. Foundations will be armored with riprap two to five feet in diameter.

Currently, Diomede relies on a seasonal run-off water source that is in danger of extreme variability due to climate change. Transitioning to a seawater source will aid in resilience during changing conditions. Having access to a year-round source while retaining the ability to treat surface water provides contingency in case of system failure. Improved surface water collection and snow fencing are included to mitigate the possibility of a thinner snowpack and shortened runoff season. Additional water source investigations and quantification will be required as part of design.

Permafrost degradation may increase maintenance on the gravity sewer system. Gravity sewer depends on adequate slopes to function. Ground movement under house service connections could break or lose the slope needed for gravity collection. Ground movement will be mitigated with flexible house connections and adjustable pile foundations.

4.3.5.5 Green Infrastructure

N/A

4.3.6 Costs

4.3.6.1 Capital

Table 12: Alternative 2 Capital Costs

Expense Category	Amount
Design (10%)	$3,835,500
Construction Administration (5%)	$1,875,000
Construction	$16,060,000
Insurance	$1,120,000
Overhead & Profit (12%)	$4,500,000
Estimating Contingency (10%)	$2,740,000
Inflation	$8,540,000
Project Contingency (15%)	$4,520,000
Total	**$43,185,000**

Note: A detailed capital cost estimate by Estimations Inc. is provided in Appendix 11

4.3.6.2 Annual O&M Costs

Table 13 shows a summary of the annual O&M costs for the fully piped alternative and are also provided in Appendix 12.

Table 13: Alternative 2 O&M Costs

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$142,854	$11,905
Fuel and Heating	$17,537	$1,461
Power Consumption	$81,721	$6,810
Other Costs	$13,263	$1,105
Short Lived Assets*	$6,431	$536
Total Operating Costs	$261,808	$21,817
Total Utility Cost	$261,808	$21,817
Total Utility Cost (Per Service)	$8,182	$682
Piped User Cost		
Power Consumption	$256	$21
Maintenance and Replacement (10% of power consumption)	$26	$2
Total Piped User Cost	$281	$23
Total System Cost (Per Piped User)	$8,463	$705

*Short lived assets are adjusted to include RO components not included in Appendix 12. A more detailed description is provided in Section 6.6.3

4.3.6.3 User Costs

If a total amount annual amount of $69,500 is assumed to come from the school ($25,000), the clinic ($8,500), and five small commercial entities ($36,000), the monthly fee per customer will be reduced to $520 for the fully piped alternative. According to ADEC's calculation of Affordability of Water and Sewer Rates in Rural Alaska, a rate above $30 per month will be highly burdensome to most rate payers. During the February 2023 field visit, a question posed to the community during home surveys was if $250 per month was price that household could pay. Of the 19 homes surveyed, only six heads of households believed that they could afford an additional $250 a month in bills. Many heads of households expressed concern that even if they could make it work, their neighbors will not be able to pay.

Considering the established maximum burden rate and the community comments, additional funding sources will be required for financial sustainability. Table 14 shows the annual subsidy required for various fixed monthly rates assuming no fees are collected from other entities and if $69,500 is collected in fees from other entities in the community. This assumes the collection of 32 users, which is based on the projected population growth and current housing density. These numbers are dependent on the estimated contributions of the school (BSSD) and clinic (NSHC). Additional funding sources are unknown at this time.

Table 14: Alternative 2 Subsidy Required

Monthly Cost to User	Annual Subsidy (assumes fees from others)	Annual Subsidy (assumes no fees from others)
$400	$46,080	$115,580
$300	$84,480	$153,980
$200	$122,880	$192,380
$100	$161,280	$230,780
$30	$188,160	$257,660

4.4 Alternative 3: Satellite Water Delivery and Wastewater Collection Stations

4.4.1 Description

Alternative 3 will provide water and wastewater service to each home and end self-haul. A satellite system is proposed that consists of three small, heated buildings housing retractable hoses for water delivery and sewage collection. Vacuum pumps and water pressure pumps will be located in the satellite station to remove sewage and deliver water. An additional sewage holding tank will be located in the satellite station connected to a gravity sewer main that is connected to a central collection point. Wastewater will be treated with a MWTU as described in Section 4.1.5.5. Circulating water mains originating at the WTP will distribute water treated by RO (Section 4.1.5.1) to the satellite stations. A design water demand of 30 gpcd is assumed based on information provided in Section 4.1.2.1. Each home will have a small WST and a wastewater holding tank.

A satellite system is a version of utility haul system that is unable to use four-wheelers or trucks. The system will require about half as much main line pipe as a fully piped system and will not require permanent services to the homes, keeping the space between homes open, requiring less maintenance, an promoting less water use. A satellite system will however require significant labor for operation and has an increased possibility of spilled human waste. Operator(s) will be required to manually carry a 100-foot hose, hook up to each house, and maintain the stations in addition to their other responsibilities. Homes will need to be serviced more than once per week based on the design demand of 30 gpcd.

This alternative includes the following new infrastructure:

- Water Source
  - Construct a seawater well and wellhouse near the beach with a raw water transmission main leading to the WTP.
  - Improve the exiting surface water intake by constructing snow fencing and improving the basin.

- Water Treatment
  - Construct a new WTP.
  - Install a 15 gpm RO skid.
  - Add additional circulation pumps and distribution system hardware.

- o Backwash will continue to be disposed of in an ocean outfall, per ANTHC WTP plans.
- o Backup power source to sustain the distribution system (i.e. dedicated generator for the water circulation loops, and glycol add-heat systems).

- Water Storage
  - o Additional water storage will not be constructed as part of this project. The design assumes the 424,000-gallon tank will be replaced as a separate project.

- Water distribution and wastewater collection
  - o Water and wastewater will follow the same alignment. The proposed water main will be insulated arctic pipe. The core pipes will be dual four-inch HDPE (supply and return). The outside diameter will be 16 inches. The proposed wastewater main will be 6"X16" arctic pipe. The wastewater collection main and circulating water main will include circulating glycol. The shared alignment will be 750 feet.
  - o Three satellite station buildings, including heating and electrical. Each station will be equipped with a portable retractable hose for filling residential WSTs, a vacuum sewer pump, and a retractable sewer hose.
  - o The shared pipe network will be aboveground and supported by micropiles or hung from the boardwalk where possible.
  - o Assuming 100 feet of rip rap protection from storm surges.

- Service Connections
  - o There will be 32 served residences.
  - o For planning and estimating purposes, a 100-gallon WST inside the home and 500-gallon sewer holding tank outside or underneath the home is assumed. Each home will be equipped with an arctic service connection box and evacuation valves and appurtenances that will be connected to the vacuum sewer station to evacuate the holding tank. A larger sewer holding tank will reduce the labor required to service the homes but will require additional space.

- Wastewater Treatment
  - o MWTU capable of 5,000 gpd.
  - o The MWTU will need to be emptied of solids every one to two years. The resulting solids will be pumped to a septage dewatering container on the south end of the community.
  - o A proposed septage dewatering container with approximately 600-SF footprint will be placed on relatively flat ground or, if on a slope, on a platform with downslope posts to create a flat location.
  - o A lift station and six-inch diameter HDPE force main on piles will pump septage from the MWTU to the dewatering container. Decanted liquid will return from the dewatering container to the MWTU in the same line by gravity. Treating the effluent from the dewatering container will eliminate the need for an outfall. The septage force main will only operate in the summer and will not need insulation or heat trace. The line will be flushed after use to avoid freezing. The existing gabion wall will be extended by a total of 150 feet.

See Figure 21 for a concept layout of the satellite delivery water and wastewater system.

4.4.1 Environmental Impacts

A satellite system will not uniquely impact floodplains, wetlands, or historical properties. The goal of ending honey buckets will stop the practice of leaving bags of sanitary waste on the sea ice.

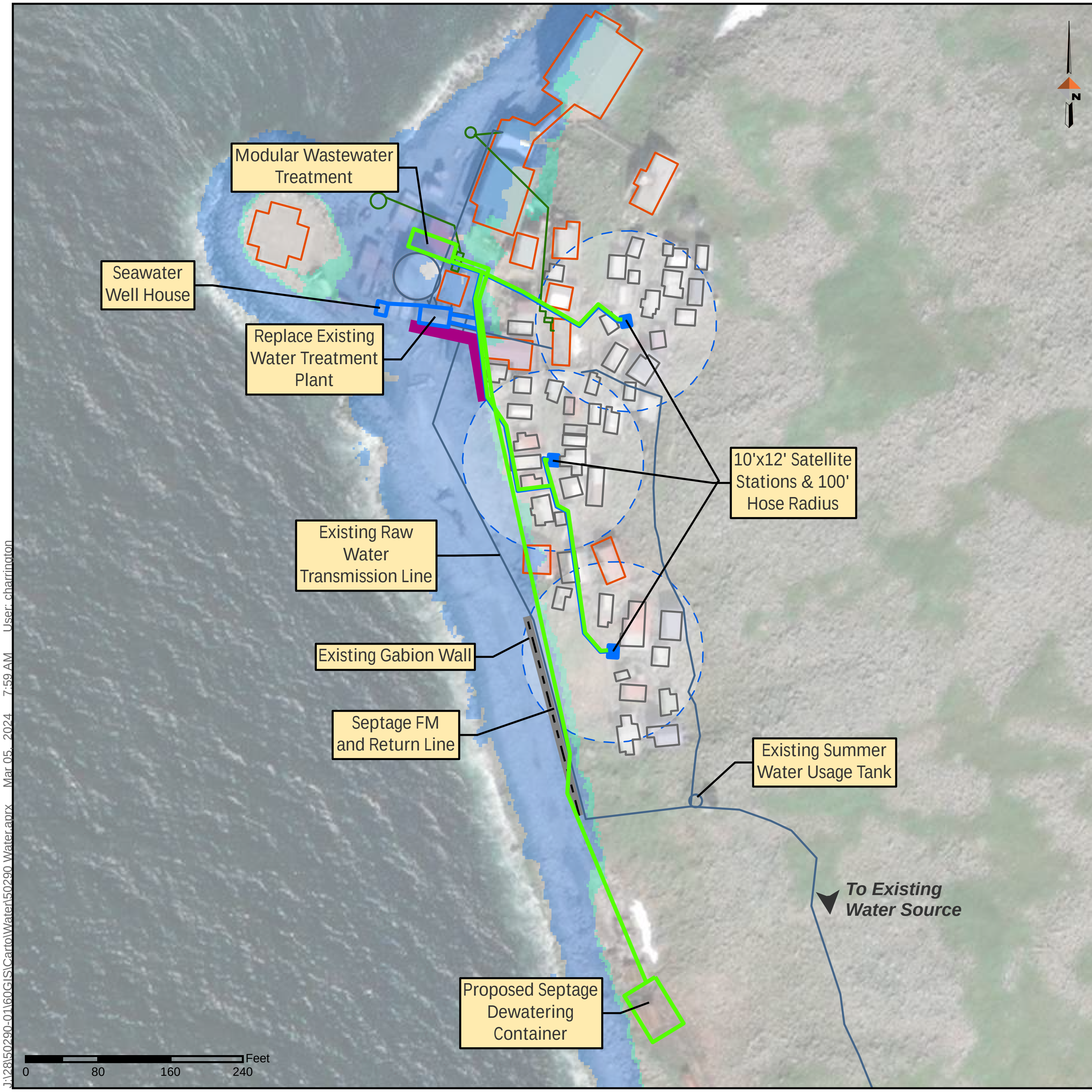
The septage dewatering container will need to undergo ADEC Engineering Support and Plan Review before construction. The dewatering container will be above the design wave run-up height as to not impact Waters of the United States. The return line for decanted water coming from the dewatering container will be treated in the MWTU. Treating the effluent from the dewatering container will allow the dewatering container to not include an outfall.

4.4.2 Land Requirements

The proposed layout of water and sewer mains follows the existing boardwalk ROW as closely as possible. Construction of 750 feet of above-ground mains may require additional land use agreements for section that deviate from the boardwalk alignment. Record of residential property parcels were not found, therefore, the three satellite stations will need an agreement with the Inalik Native Corporation, instead of a utility easement with a property owner.

Other Components:

- Seawater well house near the beach will be located on City property.
- Each satellite station will be approximately 10 feet by 12 feet and be supported on post and pad foundation. The areas surrounding the buildings will need to be cleared to allow operators to move the hoses throughout the 100-foot radius. Each satellite station will need a land use agreement with Inalik Native corporation.
- Additional land for wastewater storage tanks at homes. Tanks will need a land use agreement with Inalik Native corporation.
- MWTU – The current washeteria operates an aboveground septic system in a connex that is deteriorating and will be removed completely and replaced with a community-wide MWTU located on city property.
- Septage Dewatering container –The preferred location for the 600 SF dewatering container is on the south end of the community, close to the existing burn area. An access path from the beach will be required during construction and maintenance. The septage force main will be supported on piles. It is assumed that the dewatering container and septage force main will lie on Inalik Corporation land. In the past, letters of non-objection have been given from the corporation for situations like this.



Alternative 3

Satellite Discovery Stations

Little Diomede 95% ePER

Proposed Sewer Utility Infrastructure
Proposed Water Utility Infrastructure
Proposed Riprap
Gabion Wall
Existing Sewer Utility Infrastructure
Existing Water Utility Infrastructure
Building Outline
House Outline

Possible Water Reach

50 Year Storm
50 Year Storm with 50 Year Sea Level Rise

DOWL

Date: March 2024

Figure 21

4.4.3 Potential Construction Problems

Potential construction challenges include the site's topography and ground surface. A survey will need to be performed to get accurate elevation of the distribution facilities, boardwalks, and ground surface.

Barge access to the island is limited and often requires a barge that is capable of dredging its own mooring points. All construction waste must be shipped off the island at the completion of the project. The nearest solid waste facility will be Nome or Anchorage.

Moving heavy machinery through the community will be difficult. Most previous construction is accomplished by hand and requires a prolonged schedule.

Home condition and proximity of houses from each other could create difficulty when installing the service connection boxes. The homes will need to be assessed for structural stability to accommodate new plumbing. This alternative adds a 100-gallon water tank to the home. If the home is unable to support a storage tank, the water will need to be stored externally and heated.

A satellite system will require three different sets of supporting infrastructure such as controls, and pumps.

4.4.4 Sustainability Considerations

4.4.4.1 Energy Efficiency

A satellite system will require less power to heat and operate the distribution system compared to a fully piped system because the stations will require less piping and no permanent service connections. Satellite stations will need to be heated and electricity will be consumed when operating pumps for extraction and distribution.

Design should evaluate using the following:

- High-efficiency pumps.
- Increased insulation thickness.
- The arctic pipe R-value.
- Repair the waste heat recovery from the power plant to the WTP. There is little documentation about the system, but it was not observed as functional during the February 2023 visit.
- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation during the summer months. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.

- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it will require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all the systems properly. Installing wind power for the sole purpose of making heat has not been shown to be cost effective in Alaska. It will also increase the complexity of the utility's heat add system as there will need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

4.4.4.2 Affordability

The greatest challenge to the alternative is the financial burden. The O&M required of all systems considered is costly, and commitment to paying user fees is vital. If a failure to collect fees becomes standard, the system may become unaffordable and fall into disrepair.

A satellite system is less expensive than the fully piped alternative.

4.4.4.3 Operations

A satellite system is operationally complex and will likely require more direct personnel time. Homes will need to be serviced by an operator on a routine basis, in all weather conditions, to fill the 100-gallon water tanks. Operators will carry hoses twice to each home to fill the tank with water and to empty the sewage holding tank.

In addition, the satellite system requires three vacuum stations for the collection of wastewater. Unlike other vacuum systems, this satellite system will not require vacuum valves and appurtenances at each service, which is often a point of failure in vacuum systems. Since the wastewater holding tanks are larger than the water tanks (500 gallons vs 100 gallons for water), the wastewater will be emptied less frequently.

One operator will not be enough to maintain the system. Water will need to be produced year-round, while also delivering water to homes. In addition, the summer will be the only opportunity to pump septage to the septage dewatering container and will add to the operator's workload for a week of the year. Hauling the 100-foot hoses over talus and snowbanks may prove very difficult and interrupt service. A manual service system has room for human and equipment error that can result in spilled waste in the public spaces. A satellite system has a higher likelihood of community members, especially operators, coming into contact with wastewater.

An operational advantage of the satellite system is maintaining less pipe. Shorter runs of the main will decrease the routine labor required for pipe networks. Also, a satellite system won't require service connections. This is an advantage because of service line freeze-ups and broken service connections due to ground movement will be avoided.

A satellite system will not require a higher operator certification level. Diomede will need a Level 2 operator to run the proposed rehabilitated WTP. The filling and emptying of tanks could be done by a member of the community not certified as an operator.

4.4.4.4 Climate Change Resiliency

Climate change has already affected Diomede and will continue to change life on the island. Inconsistent sea ice and changes in sea mammal migration have been the first signs that the effects of climate change are taking hold. Still on the horizon are sea level rise and increasing storm surge intensity, both of which will need to be accounted for while designing any system on Little Diomede. Most of the existing community buildings, including the WTP, are located below the estimated 50-year storm flood elevation and maximum elevation at which infrastructure is exposed to breaking waves or 17.4 feet MLLW (Diomede Erosion and Flooding, DOWL). Bringing as much infrastructure as possible above 17.4 feet MLLW will help ensure that it will survive the next 20 years. Less than 100 feet of main and 150 feet of septage force main will be at or below the estimated flood elevation and will be protected with rip rap revetment. The WTP, well house, wastewater treatment, and associated pipe will be constructed so floor elevations are above 17.4 MLLW. Foundations will be armored with riprap two to five feet in diameter.

Currently, Diomede relies on a seasonal run-off water source that is in danger of extreme variability due to climate change. Transitioning to a seawater source will aid in resilience during changing conditions. Having access to a year-round source while retaining the ability to treat surface water provides contingency in case of system failure. An improved surface water collection system and snow fencing are included to mitigate the possibility of a thinner snowpack and shortened runoff season. Additional water source investigations and quantification will be required as part of design.

A satellite system has the advantage of being resilient to ground movement. The lack of service connections allow buildings to move with the ground and not disturb service. Less length of mains will also be resilient to ground movement. Being able to hang the mains from the boardwalk will allow for adjustments as the boardwalk profile changes. Permafrost degradation may increase maintenance on the gravity sewer system. Gravity sewer from the station to the collection point depends on slopes to function.

4.4.4.5 Green Infrastructure

Not applicable.

4.4.5 Costs

4.4.5.1 Capital

Table 15: Alternative 3 Capital Costs

Expense Category	Amount
Design (10%)	$3,850,000
Construction Administration (5%)	$1,890,000
Construction	$16,200,000
Insurance	$1,030,000
Overhead and Profit (12%)	$4,540,000
Estimating Contingency (10%)	$2,760,000
Inflation	$8,610,000
Project Contingency (15%)	$4,560,000
Total	$43,540,000

Note: Detailed capital cost estimate by Estimations Inc. is provided in Appendix 11

4.4.5.2 Annual O&M Cost

Table 16 provides a summary of the annual O&M costs for the satellite water delivery and wastewater collection alternative and O&M costs are also provided in Appendix 12. Table 16 estimates does not take into account the contributions from the NSHC clinic, school, or other small commercial users. The monthly cost to the user assumes all O&M is paid for by residents. Incorporating the rates from the clinic, school, and commercial users the residential rates could decrease an estimated $100 per month.

Table 16: Alternative 3 O&M Costs

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$185,286	$15,441
Fuel and Heating	$15,727	$1,311
Power Consumption	$63,246	$5,271
Other Costs	$27,141	$2,262
Short Lived Assets*	$6,431	$536
Total Operating Costs	$297,831	$24,283
Total Utility Cost	**$297,831**	**$24,283**
Total Utility Cost (Per Service)	**$9,307**	**$759**
Piped User Cost		
Power Consumption	$129	$11
Maintenance and Replacement	$13	$1
Piped User Additional Cost	**$142**	$12
Total System Cost (Per Piped User)	**$9,449**	**$787**

*Short Lived Asset estimate was added to the table and does not appear in Appendix 12. The explanation for the estimate appears in Section 6.6.3

4.4.5.3 User Costs

If a total amount annual amount of $69,500 is assumed to come from the school ($25,000), the clinic ($8,500), and five small commercial entities ($36,000), the monthly fee per customer will be reduced to $606 for the satellite alternative. According to ADEC's calculation of Affordability of Water and Sewer Rates in Rural Alaska, a rate above $30 per month will be highly burdensome to most rate payers. During the February field visit a question posed to the community during home surveys was if $250 per month was price that household could pay. Of the 19 homes surveyed, only six heads of households believed that they could afford an additional $250 a month in bills. Many heads of households expressed concern that even if they could make it work, their neighbors will not be able to pay.

Considering the established maximum burden rate and the community comments, additional funding sources will be required for financial sustainability. Table 17 shows the annual subsidy required for various fixed monthly rates assuming no fees are collected from other entities and if $69,500 is collected in fees from other entities in the community. This assumes the collection of 32 users, which is based on the projected population growth and current housing density. These numbers are dependent on the estimated contributions of the school and clinic from NSHC.

Table 17: Alternative 3 Subsidy Required

Monthly Cost to User	Annual Subsidy (assumes fees from others)	Annual Subsidy (assumes no fees from others)
$400	$79,275	$148,775
$300	$117,675	$187,175
$200	$156,075	$225,575
$100	$194,475	$263,975
$30	$221,355	$290,855

4.5 Alternative 4: Satellite Water Delivery/Piped Wastewater

4.5.1 Description

Alternative 4 will provide satellite water delivery and piped wastewater to each home. The advantages of a hybrid piped wastewater and satellite water delivery system are a high level of wastewater service and a moderate level of water service engineered to conserve water. A satellite system will consist of three small, heated buildings housing retractable hoses for water delivery. Sewage will be collected by gravity sewer service to each home and mains connected to a MWTU (Section 4.1.5.5). Circulating water mains will run between the small buildings and the WTP. Water will be sourced from sea water and treated using a RO unit (Section 4.1.5.1). Each home will have a 100-gallon WST. A satellite system will require about half as much water main line pipe as a fully piped system. Unlike the full satellite option, piped wastewater will reduce the risk of operators and community members coming into contact with wastewater. Piped wastewater will also save space in and around the home by not requiring a wastewater holding tank.

A satellite system will need an operator to manually carry the 100-foot hose, hook up the hose to each house, and maintain the stations. Based on the assumed demand of 30 gpcd (Section 4.1.2.1), homes may need to be serviced more than once every week and this will require a full-time operator.

This alternative includes the following new infrastructure:

- Water Source
    - Construct seawater well and wellhouse near the beach with a raw water transmission main leading to the water treatment plant.
    - Improve the existing surface water intake by constructing snow fencing and improving the basin.

- Water Treatment
    - Construct a new WTP.
    - Install a 15 gpm RO skid.
    - Add additional circulation pumps and distribution system hardware.
    - Backwash will continue to be disposed of in an ocean outfall, per ANTHC WTP plans.

- Install backup power source to sustain the distribution system (i.e. dedicated generator for the water circulation loop, glycol circulating loop and glycol heating equipment).

- Water Storage
  - Additional water storage will not be constructed as part of this project. The design assumes the 424,000-gallon tank will be replaced as a separate project.

- Water Distribution
  - The water main will be dual four-inch HDPE core pipes (return and supply) in 16” outside diameter arctic pipe with circulating glycol. The alignment will be 750 feet.
  - Three satellite station buildings, 10 feet by 12 feet, including heating and electrical. Each station will be equipped with a potable water hose for filling residential WSTs. Residences will be serviced with 100-foot, one-inch retractable hoses from each station.
  - The pipe network will be aboveground and supported by micropiles or hung from the boardwalk where possible.
  - Assuming 100 feet of rip rap protection from storm surges.

- Wastewater Collection
  - The wastewater main will be 6”X16” arctic pipe and have a circulating glycol loop.
  - Share alignment with water, where possible.
  - 1,300 feet of wastewater main.

- Service Connections
  - There will be 32 served residences each with a 100-gallon WST.
  - Wastewater services are assumed to be 4”X12” arctic pipe. and include electric heat trace.
  - Each home will be equipped with an arctic service connection box.
  - Install three residential lift stations for homes that are unable to be serviced by gravity sewer.
  - 1000 feet of service lines.

- Wastewater Treatment
  - MWTU capable of 5,000 gpd.
  - The MWTU will need to be emptied of solids every one to three years. The resulting solids will be pumped to a septage dewatering container on the south end of the community.
  - A proposed septage dewatering container with approximately 600-SF footprint will be placed on relatively flat ground or, if on a slope, on a platform with downslope posts to create a flat location.
  - A lift station and six-inch diameter HDPE force main supported on piles will transport septage from the MWTU to the dewatering container. The septage force main will only operate in the summer and will not need insulation or heat trace. Decanted liquid will run from the dewatering container to the MWTU in the same pipe by gravity. The line will be flushed after use to avoid freezing. Treating the effluent from the dewatering container will eliminate the need for an outfall. The existing gabion wall will be extended by a total of 150 feet.

See Figure 22 for a concept layout of the satellite water and piped wastewater system.

4.5.2 Environmental Impacts

A satellite water delivery/piped wastewater alternative will not uniquely impact floodplains, wetlands, or historical properties. Eliminating honey buckets will stop the practice of leaving bags of human waste on the sea ice.

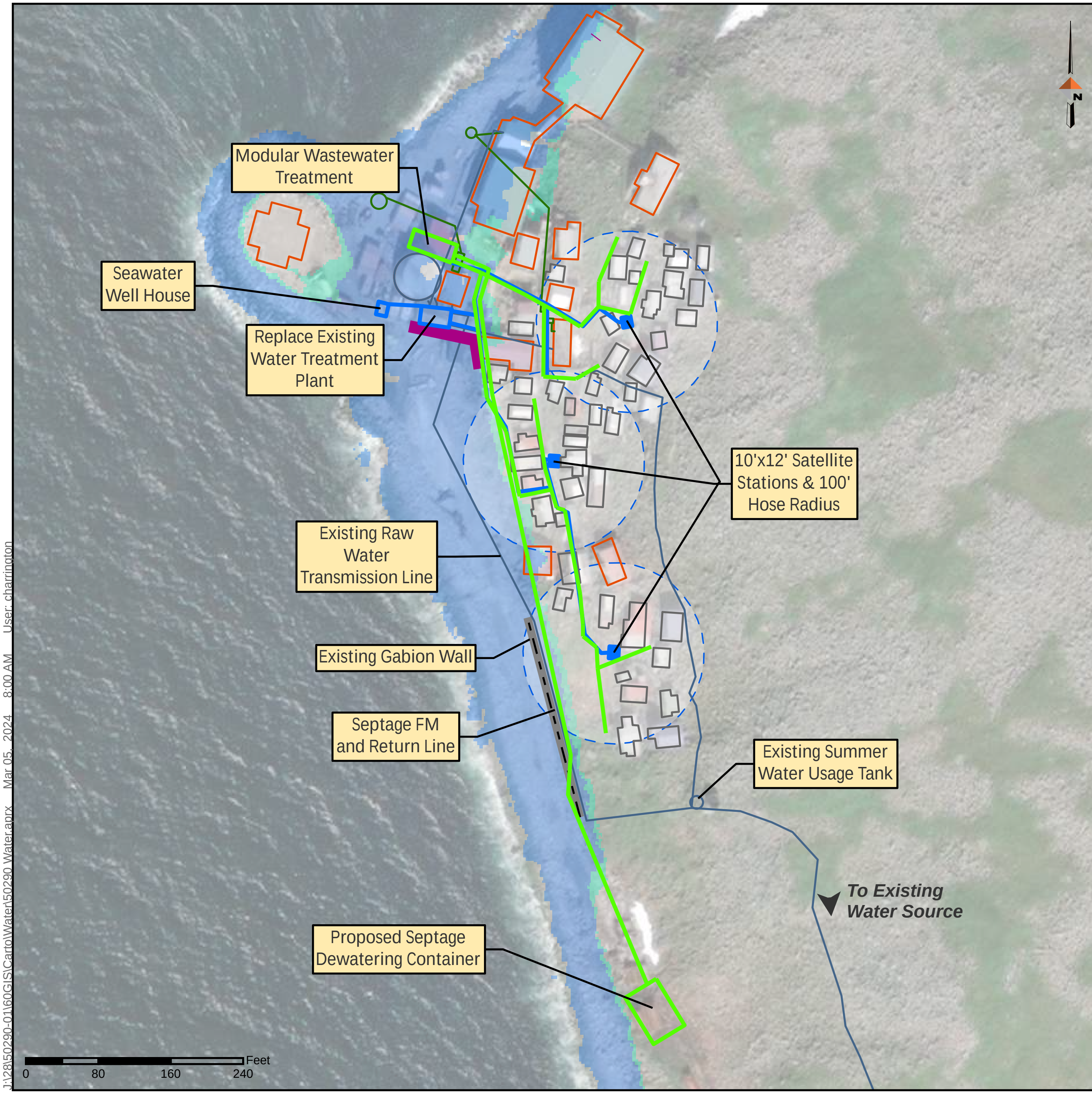
The septage dewatering container will need to undergo ADEC Engineering Support and Plan Review before construction. The dewatering container will be above the design wave run-up height as to not impact Waters of the United States. The return line for decanted water coming from the dewatering container will be treated in the MWTU. Treating the effluent from the dewatering container will allow the dewatering container to not include an outfall.

4.5.3 Land Requirements

The proposed water and sewer main alignments follow the existing boardwalk ROW as closely as possible. Construction of 1,500 feet of above-ground sewer mains may require additional land use agreements for section that deviate from the boardwalk alignment. Record of residential property parcels were not found; therefore, the three satellite stations and 1,500 feet of service lines will need an agreement with the Inalik Native Corporation, instead of a utility easement with a property owner.

Other Components:

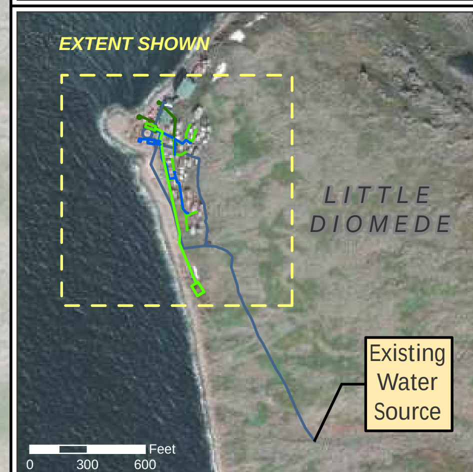
- Seawater well house near the beach will be located on city property.
- Each satellite station will be approximately 10 feet by 12 feet and be supported on post and pad foundation. The areas surrounding the buildings will need to be cleared to allow operators to move the hoses throughout the 100-foot radius. Each satellite station will need a land use agreement with Inalik Native corporation.
- MWTU – The current washeteria operates an aboveground septic system in a connex that is deteriorating. It will be removed and replaced with a community wide MWTU located on city property.
- Septage Dewatering Container –The preferred location for the dewatering container is on the south end of the community, close to the existing burn area. An access path from the beach will be required during construction and maintenance. The septage force main will be supported on piles. The proposed dewatering container and septage force main are located on Inalik Corporation land. In the past, letters of non-objection have been given from the corporation for situations like this.



Alternative 4
Piped Wastewater and Satellite Water Delivery

Little Diomede 95% ePER

Proposed Sewer Utility Infrastructure
Proposed Water Utility Infrastructure
Proposed Riprap
Gabion Wall
Existing Sewer Utility Infrastructure
Existing Water Utility Infrastructure
Building Outline
House Outline
Possible Water Reach
50 Year Storm
50 Year Storm with 50 Year Sea Level Rise



DOWL

Date: March 2024

Figure 22

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4.5.4 Potential Construction Problems

Potential construction challenges include the site's topography and ground surface. A survey will need to be performed to get accurate elevation of the distribution facilities, boardwalks, and ground surface.

Barge access to the island is limited and often requires a barge that is capable of dredging its own harbor. All construction waste must be shipped off the island at the completion of the project. The nearest solid waste facility will be Nome or Anchorage.

Moving heavy machinery through the community will be difficult. Most previous construction is accomplished by hand and requires a prolonged schedule.

Home condition and proximity of houses from each other could create difficulty when installing the service connection boxes. The homes will need to be assessed for structural stability to accommodate new plumbing. This alternative adds a 100-gallon water tank to the home. If the home is unable to support a storage tank, the water will need to be stored externally and heated.

A satellite system will require three different sets of supporting infrastructure such as controls, pumps, and boilers.

4.5.5 Sustainability Considerations

4.5.5.1 Energy Efficiency and Alternative Energy

The satellite water delivery/piped wastewater system will be the second most energy intensive alternative. Design should evaluate using the following:

- High-efficiency pumps.
- Increased insulation thickness.
- The arctic pipe R-value.
- Repair the waste heat recovery from the power plant to the WTP. There is little documentation about the system, but it was not observed as functional during the February 2023 visit.
- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation during the summer months. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.
- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it will require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all the systems properly. Installing wind power for the sole purpose of making heat has not been shown to be cost effective in Alaska. It will also increase the complexity of the

utility's heat add system as there will need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

4.5.5.2 Affordability

The greatest challenge of a partially piped water and sewer system is the financial burden. The operations and maintenance required of a piped system is costly, and commitment to paying user fees is vital. If a failure to collect fees becomes standard, the system will become unaffordable and fall into disrepair.

This alternative will be the most expensive, but it will provide improved levels of water and wastewater service reducing the labor required of residents, improving access to clean water, and limiting the chance that people will come into contact with human waste.

4.5.5.3 Operations

The operations of the satellite water delivery/piped wastewater system will be more labor intensive for the utility than the status quo. Pipe and pump maintenance will increase the workload on the utility operator. Currently, only one operator is employed to operate and maintain the water system and will likely need to hire another to meet the satellite station demand. A second operator may not necessarily need to be trained as a WTP operator.

The gravity collection system reduces the need for a pump maintenance. Service connections for sewer also means that there will be less operator labor required to empty tanks. Gravity sewer will decrease the likelihood of people coming into contact with human waste.

In the summer, during peak subsistence season, the operators need to maintain the intake and distribution, run the treatment plant while also delivering water to homes. In addition, the summer will be the only opportunity to pump septage to the septage dewatering container and will add to the operator's workload for a week of the year.

4.5.5.4 Climate Change Resiliency

Climate change has already affected Diomede and will continue to change life on the island. Inconsistent sea ice and changes in sea mammal migration have been the first signs that the effects of climate change are taking hold. Still on the horizon are sea level rise and increasing storm surge intensity, both of which will need to be accounted for while designing any system on Little Diomede.

Most of the existing community buildings, including the WTP are located below the estimated 50-year storm flood elevation and maximum elevation at which infrastructure is exposed to breaking waves or 17.4 feet MLLW (Diomede Erosion and Flooding, DOWL). Bringing as much infrastructure as possible above 17.4 fee MLLW will help ensure that it will survive the next 20 years. Less than 100 feet of main and 150 feet of septage force main will be at or below the estimated flood elevation and will be protected with a rip-rap revetment. The WTP, well house, wastewater treatment, and associated pipe will be constructed so floor elevations are above 17.4 MLLW. Foundations will be armored with rip rap two to five feet in diameter.

Currently, Diomede relies on a seasonal run-off water source that is in danger of extreme variability due to climate change. Transitioning to a seawater source will aid in resilience during changing conditions. Having access to a year-round source while retaining the ability to treat surface water provides contingency plans in case of system failure. An improved surface water collection system and snow fencing are included to mitigate the possibility of a thinner snowpack and shortened runoff season. Additional water source investigations and quantification will be required as part of design.

Permafrost degradation may increase maintenance on the gravity sewer system. Gravity sewer depends on slopes to function. As ground shifts under house services connections could break or lose the slope needed for gravity collection. Design will mitigate the ground movement with flexible house connections and adjustable pile foundations.

4.5.5.5 Green Infrastructure

Not applicable.

4.5.6 Costs

4.5.6.1 Capital

Table 18: Alternative 4 Capital Costs

Expense Category	Amount
Design (10%)	$4,030,000
Construction Administration (5%)	$2,020,000
Construction	$17,300,000
Insurance	$1,210,000
Overhead and Profit (12%)	$4,840,000
Estimating Contingency (10%)	$2,940,000
Inflation	$9,170,000
Project Contingency (15%)	$4,850,000
Total	**$46,355,000**

Note: Detailed capital cost estimate by Estimations Inc. is provided in Appendix 11

4.5.6.2 Annual O&M Cost

Table 19 provides a summary of the annual O&M costs for the satellite water delivery and piped wastewater alternative. A detailed estimate of O&M costs are provided in Appendix 12. Table 19 estimates does not take into account the contributions from the NSHC clinic, school, or other small commercial users. The monthly cost to the user assumes all O&M is paid for by residents. Incorporating the rates from the clinic, school, and commercial users the residential rates could decrease an estimated $100 per month.

Table 19: Alternative 4 O&M Costs

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$171,142	$14,262
Fuel and Heating	$16,582	$1,382
Power Consumption	$63,246	$5,271
Other Costs	$26,078	$2,173
Short Term Assets*	$6,431	$536
Total Operating Costs	$283,479	$23,623
Total Utility Cost	**$283,479**	**$23,623**
Total Utility Cost (Per Service)	**$8,859**	**$738**
Piped User Cost		
Power Consumption	$129	$11
Maintenance and Replacement	$13	$1
Piped User Additional Cost	**$142**	$12
Total System Cost (Per Piped User)	**$9,001**	**$750**

*Short Lived Asset estimate was added to the table and does not appear in Appendix 12. The explanation for the estimate appears in Section 6.6.3

4.5.6.3 User Costs

If a total amount annual amount of $69,500 is assumed to come from the school ($25,000), the clinic ($8,500), and five small commercial users ($36,000), the monthly fee per customer will be reduced to $570 for the satellite delivered water and piped wastewater alternative. According to ADEC's calculation of Affordability of Water and Sewer Rates in Rural Alaska, a rate above $30 per month will be highly burdensome to most rate payers. During the February 2023 field visit a question posed to the community during home surveys was if $250 per month was price that household could pay. Of the 19 homes surveyed, only six heads of households believed that they could afford an additional $250 a month in bills. Many heads of households expressed concern that even if they could make it work, their neighbors will not be able to pay. The new WTP process is expected to cost the community $180 a month per service but there is funding from Norton Sound Economic Development Corporation to subsidize the user cost for the next two years. A concern for this project could be that the new treated water cost will fall on the homeowners close to the added cost of the piped system.

Considering the established maximum burden rate and the community comments, additional funding sources will be required for financial sustainability. Table 20 shows the annual subsidy required for various fixed monthly rates assuming no fees are collected from other entities and if $69,500 is collected in fees from other entities in the community. This assumes the collection of 32 users, which is based on the projected population growth and current housing density. These numbers are dependent on the estimated contributions of the school and clinic from NSHC.

Table 20: Alternative 4 Subsidy Required

Monthly Cost to User	Annual Subsidy (assumes fees from others)	Annual Subsidy (assumes no fees from others)
$400	$57,600	$127,100
$300	$96,000	$165,500
$200	$134,400	$203,900
$100	$172,800	$242,300
$30	$199,680	$269,180

5.0 SELECTION OF AN ALTERNATIVE

5.1 Life Cycle Cost Analysis

A life cycle cost analysis was performed to compare the net present value (NPV) of each alternative. The NPV identifies the cost of owning and operating an asset for the entirety of its lifespan. The equation used to derive NPV has several variables and uses the following equation:

$$NPV = C + USPW(O\&M) - SPPW(S)$$

The variables in the equation are as follows:

- C = Estimated capital cost of the alternative
- USPW = Uniform Series Present Worth Factor, which is applied to O&M
- O&M = Estimated annual O&M cost of each alternative, including both utility and customer expenses
- SPPW = The Single Payment Present Worth factor, which is applied to S
- S = Estimated Salvage value of each alternative, which is assumed to be zero

The USPW is a function of the Office of Management and Budget (OMB) “real” discount rate (i) and the lifespan of the asset (n). For a 20-year life (n=20), the February 2023 discount rate is 2.0%.

The estimated life cycle cost for each alternative can be seen in Table 21. Capital cost estimates can be found in Appendix 8 and O&M cost estimates in Appendix 9.

Table 21: Life-Cycle Cost Analysis Calculations

******Capital costs have not been updated to reflect new WTP**********

	Monthly User Cost	Annual O&M (Utility + Customer)	Capital Costs	Net Present Value
Alternative 1: Do Nothing	$90	$103,275	$0	$2,018,000
Alternative 2: Piped Water and Sewer	$520	$270,800	$43,186,870	$48,473,870
Alternative 3: Satellite Water and Sewer	$610	$302,375	$43,539,598	$49,442,598
Alternative 4: Satellite Delivery/Piped Wastewater	$570	$288,023	$46,358,553	$51,981,553

5.2 Non-Monetary and Community Factors

In addition to the life-cycle cost analysis, non-monetary factors were considered to evaluate the alternatives for water and sewer. To help determine these non-monetary factors from the perspective of community members, a brainstorming session was conducted after the alternatives presentation at the August 29th community meeting. The following list was created in the order of priority to help select an alternative. Monetary and non-monetary factors are however mixed in the list per the direction of the community (non-monetary highlighted).

- End user cost
- **Ease of maintenance** – cost of shipping materials
- **Longevity**
- **Corrosion resistance**
- Replacement cost
- **Ground instability (resistance to)**
- **Water conservation**
- Energy savings
- **Small footprint or vertical construction given limited space**
- **Homeowner maintenance/burden**

The next morning, the project team met with the available members of the Diomede Tri-Org Council to discuss the non-monetary factors further. The leadership were able to condense the list and place importance on four factors, three of which are non-monetary (highlighted below):

- End user cost - Specifically the cost to homeowners to operate and maintain the system, this includes replacement costs.
- **Ease of maintenance** - Request to be self-reliant and not depend on Remote Maintenance Workers (RMWs) or outside technicians.
- **Environmental concerns** - Environmental concerns combine the resiliency of the system to ground instability, permafrost, climate change, storm surges, and salt exposure.
- **Homeowner responsibility** - Lighten the burden on the homeowner to maintain the system as much as possible.

After reviewing meeting notes from both the February 2023 and August 2023 community meetings, the project team added “increase in public health” to the list of non-monetary factors as highest priority. An increase to public health may have been seen as too obvious to be included in the discussion, but the majority of comments from the community involve improvements to public health. An improvement to public health is also considered the need for the project; therefore, any alternative selected must meet the purpose and need of the project first.

DOWL created a weighted decision matrix (Table 22) assigned a weight to each non-monetary consideration and assigned a score between zero and five to each alternative based on how well it addressed the non-monetary factor. An alternative has a total possible score of 500 points. The reasoning behind the scoring is presented in Table 23.

Table 22: Non-Monetary Decision Matrix

Calculation Cell
Criteria Weights:
Criterion Rating:

Decision Criteria -->	Improve Sanitation		Environmental Resiliency		Ease of Maintenance		Homeowner Responsibility		Total Score
Criteria Weights -->	40		20		30		10		
	Rating	Score	Rating	Score	Rating	Score	Rating	Score	
Alternative 1: Do Nothing	0	0	1	100	4	120	1	10	**150.0**
Alternative 2: Piped Water and Sewer (RO)	5	200	3	60	2.5	75	4	40	**375.0**
Alternative 3: Satellite Water and Sewer	4	160	3	60	1	30	3	30	**280.0**
Alternative 4: Satellite Delivery/Piped Wastewater	4.5	180	3	60	2	60	3.5	35	**335.0**

Table 23: Reasoning for Non-Monetary Decision Matrix

	Sanitation Improvement	Environmental Resiliency	Level of O&M Effort	Homeowner Responsibility
Alt 1: Do Nothing	No improvement to sanitation.	Relies on surface water source only, low resiliency.	Very low	High homeowner responsibility
Alt 2: Piped Water/Sewer	Highest level of sanitation improvement.	Seawater source, infrastructure in the wave runup zone protected. Vulnerable to ground movement.	Moderate A longer length of main will require maintenance. Daily operations will be low	Low homeowner responsibility due to service and circulation pump
Alt 3: Satellite Water and Sewer	Moderate sanitation improvement.	Seawater source, infrastructure in the wave runup zone protected. Vulnerable to ground movement.	Very high A smaller length of main line will require maintenance. Daily operations required to fill and evacuate tanks is very high	High homeowner responsibility due two holding tanks
Alt 4: Satellite Water/Piped Sewer	High level of service lower water consumption.	Seawater source, infrastructure in the wave runup zone protected. Vulnerable to ground movement.	High A moderate length of main line will require maintenance. Daily operations required to fill tanks is high	Moderate homeowner responsibility due to one holding tank and wastewater service

From the non-monetary weighted decision matrix, Alternative 2, fully piped system, is the preferred alternative. Not only does a fully piped system address the purpose and need of the project but the different components of the system will have the least homeowner responsibility, the easiest to maintain, and the most environmentally resilient.

A Diomede Tri-Org Council meeting was held October 19, 2023, to discuss the preferred alternative. Materials were provided for review and DOWL was present to answer questions and discuss. The Diomede Tri-Org Council supported Alternative 2, a fully piped system, contingent on further information regarding the availability of O&M subsidies. A signed resolution is provided in Appendix 13.

6.0 PREFERED ALTERNATIVE

6.1 Preliminary Project Design

A conceptual 15% design layout is provided in Appendix 14.

6.1.1 Drinking Water

6.1.1.1 Water Supply/Treatment

For the preferred alternative, Diomede will rely primarily on seawater as the main water source. A new seawater well(s) will need to be constructed on the beach. Subsurface geology will act as a natural primary filter as well as protect the intake from wave and ice action throughout the year. The well(s) will require a wellhouse or an insulated vault and transmission line. The ground surface elevation at the proposed site is below the storm wave run up height and will therefore need to be elevated and fortified with revetments. The transmission main to the WTP will likely be less than 50 feet in length to minimize heating costs in the winter.

The preferred alternative also includes upgrading the seasonal raw water intake. While surface water will not be the primary water source, maintaining and improving access to surface water will improve resiliency. By switching the membranes in the RO system, the community can treat fresh water in the summer months and save on electricity costs. This option has not been included in the alternative's O&M calculation to assume worst case scenario, but costs saving are possible if the raw water source is maintained.

The existing intake upgrades will be constructed by hand because moving equipment up the hill is not possible without helicopter and possible platform construction. To retain more water, a shallow engineered basin will be constructed downslope of the existing intake. See intake concept for details (Figure 19 and Appendix 14, Sheet 502). Included in the intake upgrade is the construction of snow fencing to capture and retain as much precipitation as possible within the drainage. Further study will be necessary.

A seawater source will be treated using a modular RO unit. At a demand of 50 gpcd the community will need a unit that can treat seawater at 15 gpm. The RO unit can run for six hours a day and satisfy the community demand. A brine outfall will be required as a direct ocean outfall and require ADEC discharge approval.

The RO skid will be customized for the community and preferably not include a clean-in-place (CIP) unit. O&M budget will include money to replace the membranes annually. Replacement of the membranes is economically similar to CIP for the following reasons: the CIP will be harder to maintain in a remote community; they often are a point of failure; they require chemicals, a separate backwash outfall, and a higher level of operator training. To avoid the risk of system failure and costs of shipping chemicals to the island, it is recommended that extra membranes be stored on site and replace the membranes periodically. The cost of membrane replacement is included in the O&M cost analysis as "short lived assets". Switching membranes will be the bulk of the maintenance required. If the community can switch to the surface water source in the summer, the membranes will need to be switched and this seasonal transition will be built in maintenance.

A RO unit has a much smaller footprint than the current treatment system. The same sized WTP building will be able to house the skid, all extra materials, a testing bench, and all the equipment needed for the distribution system. A SCADA system will be installed to monitor the RO unit remotely by NSHC or operators outside Diomede, including the RO manufacturer.

A new WTP building will be constructed as part of the project. The footprint will be 815 SF or similar to the newly rehabilitated WTP. The proposed rehabilitation of the WTP in Summer of 2024 is a short-term solution because the finished floor elevation will not be above the 50 -year flood. The new WTP will be located at least four feet higher in elevation in the same location as the proposed rehabilitated structure.

Refer to Appendix 14, Sheet 503 for the conceptual layout of the WTP.

6.1.1.2 Storage

This alternative will not add or replace water storage. The existing wood stave tank is owned and operated by the City, primarily as a pressure break, and will remain in use. The existing 424,000-gallon tank is at the end of its useful life and is planned for replacement under a separate project. The new tank will have the same dimensions of 47.5 feet in diameter and height of 32 feet and have similar bolted steel construction.

The 424,000-gallon tank will provide the community with over 60 days of stored treated water and emergency water for fighting fires (60,000 gallons). Fire protection is an important consideration due to the density of houses and remoteness of the island. When fires have started in winter or spring months, it can quickly deplete the stored water available to the community. By using seawater as the treated source and keeping the 424,000-gallon tank, the community will have options when the unexpected happens.

6.1.1.3 Distribution System

Water distribution will be an above-ground pipe network with two circulating loops: east and south. The east loop will serve approximately 15 homes. The south loop will serve the remaining 17 homes. The main will be dual 4-inch diameter HDPE core pipe (return and supply) insulated in 16-inch arctic pipe with a CMP jacket. Heat will be added to the water at the WTP, and additional freeze protection provided by circulating glycol. The majority of the water alignment will follow the existing boardwalks (Appendix 8). Small sections that stray from the boardwalk will need additional land use agreements. In coordination with Kawerak, new boardwalks will be constructed with the intent of hanging pipes underneath where possible. Where not hung beneath the boardwalk, the mains and services will be founded on three to six-inch diameter micropiles drilled and grouted 5 to 10 feet into the talus; however, bedrock anchoring is preferred. The drill will be mobilized by hand. Refer to Appendix 14, Sheets C-101 through C-104 for the alignment and profiles. Refer to Appendix 14, Sheet C-501 for further detail of main suspension under the boardwalks and micro piles.

Other components for water distribution design:

- 100 LF of rip rap has been included in the cost estimate to protect small sections of main and WTP that lie below the 50-year flood level. These sections are unavoidable due to the fact that the WTP is located below wave runup height.

- Installation of heat exchangers, circulation pumps, and pressure pumps for the water distribution in the new WTP building. The water main loops will have heat exchangers, circulation pumps, and a control panel.

- Electrical for the monitoring of circulating temperatures and associated controls.

- All associated piping valves, power, and controls.

6.1.1.4 Residential Plumbing

This alternative plans for 32 residential service connections. This project may need to include housing renovation funds to ensure there is adequate space and insulation for the installation of pipes and fixtures. The typical home upgrade will include building an arctic box for flexible service connections, interior walls for a bathroom area (approximately five feet by seven feet), flushable toilet, bathroom sink, bathtub shower, as well as a kitchen sink.

It should be noted that the eligibility surveys conducted in both February 2023 and August 2023 initiated concerns about the viability of services being placed within homes. At least five homes reported freezing floors and walls in the winter. Most foundations appear to be unsupported, and many homes are visibly slanting. Anecdotally, the community will refer to the buildings as "sliding down the hill". Additionally, almost 30% of homeowners interviewed indicated that their home will need an extension to fit a five-foot by seven-foot bathroom. The condition of the homes will pose significant obstacles in the completion of this project.

Water service will share 15" diameter arctic pipe with the gravity sewer service. Water service will be circulating dual one-inch diameter HDPE pipes with heat trace for freeze protection. Flexible service connections will connect the buildings to the service, and a shutoff valve will be installed to allow for service to be terminated in cases of non-payment or excessive water use. Refer to Appendix 14, Sheet C-501 for further detail of services and flexible connections.

6.1.2 Wastewater

6.1.2.1 Collection System

Gravity sewer has been selected as the preferred method of sewage collection. Diomede is built on a steep hillside and has a significant potential for gravity wastewater collection. The proposed pipe layout ensures that the collection pipe slopes stay above 2% which maintain sewage velocity above two fps, based on the existing ground surface (Alaska DCCED, 2004). Some of the greatest benefits of gravity sewer system are no additional pump installations or energy cost to the community and simple construction and maintenance.

In some areas of the community, slopes exceed 15% and have the potential for liquid and solid separation due to high velocities. The need for energy dissipation in the sewer mains and services will be assessed during design. Gravity sewer may not work at select households and a small residential grinder pump assembly will be used instead to pump to the gravity system. Prior to design work, detailed topographic survey information will be required to confirm all slopes from houses to the gravity sewer.

The gravity wastewater mains will be 6”X16” arctic pipe. The wastewater main will include a circulating glycol loop for freeze protection. Gravity sewer service lines will share a 15” diameter arctic pipe with water service and have heat trace for freeze protection. A flexible service connection will connect the service lines to each building. Refer to Appendix 14, Sheets C-101 through C-104 for the alignment and profiles.

Other components of the gravity sewage collection include:

- Electrical monitoring of sewage collection main temperatures and associated controls.
- Residential lift stations contingent on final site survey. It is anticipated that up to three homes may require lift stations due to topography not suitable for gravity sewer.

6.1.2.2 Washeteria Updates

The current washeteria remains unchanged since the initial construction. Even with the planned introduction of piped water and wastewater, the washeteria will remain a crucial sanitation facility, particularly since space constraints in most households will limit the possibility of in-home laundry. Maintaining a functional washeteria is pivotal, providing the community continued access to bathrooms in case of system complications.

As part of this project, the existing above-ground septic tank will be removed and the wastewater from the washeteria will be directed to the MWTU described in the next section.

6.1.2.3 Wastewater Treatment

Wastewater will be treated using a centralized MWTU. There is more than one option of MWTU but for the purposes of this ePER, a design by Lifewater capable of serving a community that produces 5,000 gpd is assumed. This treatment unit uses fixed activated sludge and UV lighting for treatment disinfection. It is composed of double-walled, insulated tanks on a steel skid, approximately 30 feet in length. The unit will not require space inside a building but will require being connected to the WTP power grid.

The proposed location of the MWTU is northwest of the WST near the existing washeteria septic tanks. The location will require an elevated foundation protected by riprap 2 to 5 feet in diameter. Effluent will be discharged to the existing seepage pit. The seepage pit may be enlarged to accommodate the discharge. The community has yet to experience a backup. Design records for the seepage pit either do not exist or were not made available for our review.

Septage will be removed from the MWTU every one to two years and pumped using a lift station and pile supported force main to an above ground septage dewatering container located 950 feet south of the community. Prior to pumping, a polymer flocking agent may be added to the primary storage tank in the MWTU. The septage dewatering container will be designed to retain the solids on a filter material such as sand or a membrane and the decanted liquid will be captured on the bottom of the container and returned by gravity to the MWTU. Valves will be installed so that the decanted liquid can return in the force main by gravity. The footprint of the unit is expected to be similar to a connex or 600 SF. Approximately 450 feet of the force main will be located below the 50-year flood elevation. Approximately 250 feet will be protected by the existing gabion wall that protects the water transmission main. The gabion wall will have to be extend on both ends for a total of 150 feet. The additional 50 feet of protection will come from the rip rap revetment proposed to protect the mains near the water treatment plant.

It is assumed that the dewatering container will be accessible to utility staff so that the dewatered sludge can be removed once dried and the filter material can be replaced. The container will have two compartments to allow for two years of septage dewatering. The top will be protected from the elements but designed to promote air movement over the material and also allow for solids to freeze and dry over a winter. The container will be elevated on a platform supported on the downslope side by pile supports to create a level location. The elevated platform will also allow for easier removal of the dried solids as it creates a space below the unit where barrels or watertight containers sized for movement by hand could be placed to capture the dried solids when removed. It is assumed the dried solids can then be stored on site until a landfill is identified for disposal. Later design may consider a larger solids storage container that can be moved out from below the dewatering container and a side dump or bottom dump option on the dewatering container for easier transfer. A simpler drying method created using a filter sock enclosed by fencing with a underdrain capture will also be considered. At this time, a facility willing to accept dried septage from Diomede has not been identified and shipping companies operating in the area have indicated they will not accept septage.

A relatively flat area 950 feet south of the community was chosen as a possible location for the dewatering container because it is separated from the community, in the same area as the current solid waste disposal and is 30 feet above the beach. There is a slightly smaller shelf in the same area that is 50 feet above the beach that is an alternative location. If the area is not sufficiently flat, the dewatering container will be founded on a platform supported by vertical members that are drilled and bonded into the talus or anchored directly into rock. See Appendix 14, Sheet 504 for further detail.

6.2 Project Schedule

Following approval of this ePER, it is likely design and pre-construction activities will take one to two years. There will be significant field activities as described in section 7.0. Land agreements for placement of water and sewer mains, where they deviate from existing ROW will take negotiations with the Village Corporation, which will take time.

Construction will be limited by the short summer season and need to be coordinated closely with Kawerak and boardwalk construction. Access to homes will need to be maintained through construction, so temporary boardwalks and access will need to be constructed as the water and sewer mains are installed. It is likely the water and sewer mains will be constructed over two summer seasons.

Construction of the water treatment components could happen independently of the water and sewer main construction and could occur in the fall/winter months after the new WST has been filled. Temporary water treatment will be considered as a modular unit so that construction of the WTP can be completed in the same location.

Some components such as temporary water treatment and the septage dewatering container could be constructed as modular and off-site.

A preliminary design and construction schedule is shown below for planning purposes:

- Year One Activities:
    - Topographic survey
    - Geotechnical investigations
    - Power grid assessment
    - Housing studies and outreach
    - Easement and ROW processes
    - Environmental permitting
    - Preliminary design
- Year Two Activities:
    - Easement and ROW processes
    - Final Design
    - ADEC Approval to Construct applications
    - Invitation to bid
    - Construction contract awards
    - Modular WTP construction (off-site)
- Year Three Activities:
    - Material procurement and shipping
    - Existing WTP demolition after tank filling
    - Placement of proposed Modular WTP
    - Drilling seawater wells and well house construction
    - Wastewater treatment and septage dewatering container construction
- Year Four and Five Activities:
    - Water and sewer main construction
    - Residential plumbing and services

Throughout design and construction, the project will require substantial community involvement to improve the design and actively promote the project and build project momentum.

6.3 Permit Requirements

This project will require a NEPA assessment. The following federal and state permits will also be required:

- ADEC – Approval to Construct the proposed water and sewer improvements.
- ADEC – Approval to Operate the water and sewer improvements.
- ADNR – Modification of the City's Water Rights Permit
- ADNR –SHPO Section 106 concurrence with project area
    - Consultation with SHPO and with the National Park Service (NPS) will be required throughout the process of detailed design and for construction approval. Memorandum of Agreements will most likely be required.
- USACE – Section 404 Permit for construction activities in wetlands and other waters of the U.S.
- Regulatory Commission of Alaska (RCA) – Application for Provisional Certificate of Public Convenience and Necessity for the water and sewer utility

6.4 Sustainability Considerations

6.4.1 Water and Energy Efficiency

The fully piped system will be the most energy intensive alternative. Design should evaluate using the following:

- High-efficiency pumps.
- Increased insulation thickness.
- The arctic pipe R-value.
- Repair the waste heat recovery from the power plant to the WTP. There is little documentation about the system, but it was not observed as functional during the February 2023 visit.
- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation during the summer months. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.
- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it will require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all the systems properly. Installing wind power for the sole purpose of making heat has not been shown to be cost effective in Alaska. It will also increase the complexity of the utility's heat add system as there will need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

6.4.2 Green Infrastructure

N/A

6.4.3 Other

The preferred alternative will be designed to ensure maximum resilience. The decision to utilize seawater in the water treatment process was driven by the community's strong commitment to establishing a resilient water supply and the economic benefits with reducing required tankage. The concern arose from the potential risks posed by changing environmental conditions and fluctuations in snowpack levels, which could leave the community vulnerable. By designating seawater as the primary water source while also maintaining access to fresh water, the community has safeguards in place for the changing climate.

The implementation of a fully piped network is preferred for its operational simplicity compared to a satellite system. This choice minimizes the need for extensive labor hours to operate and maintain the system. Challenging conditions—strong winds, deep cold, and drifted snow—could make access to households difficult or impossible during the winter. While every system demands periodic maintenance, the piped systems reliance on gravity and simplified alignment considerably streamlines operations.

In addition, the installation of a MWTU and septage dewatering container is a significant step forward for the community. This allows the community to cease the practice of discharging human waste into the ocean, resulting in substantial benefits for both human health and the local environment that sustains them.

6.5 Total Project Cost Estimate

The estimated total cost for the proposed project $43,186,870. This cost assumes the project will be constructed by a general contractor(s) and represents the total project cost, including 10% for design and permitting, 5% construction management, and 15% contingency. A breakdown of this cost is in Appendix 8.

6.6 Annual Operating Budget

6.6.1 Income

The revenue to operate a piped water and sewer utility in Diomede will be generated through residential user fees, commercial and institutional user fees, and subsidies. The different sources for subsidies are still being evaluated and negotiated, and its amount is yet to be determined. The estimated revenue collection outlined in Table 24 assumes 32 residential customers, the NSHC clinic, Diomede School, five small commercial customers, and no subsidy. Possible small commercial customers include the post office, the City offices, Tribal office, Corporation office, and Native store.

Table 24: Proposed Annual Projected Revenue

Revenue Source	Monthly Utility Rate	Rate of Collection	# of Customers	Yearly Projected Revenue
Residential Users	$520	85%	32	$169,728
Clinic (estimated)	$800	100%	1	$9,600
School (estimated)	$2,000	100%	1	$24,000
Small Commercial Customers (estimated)	$600	100%	5	$36,000
			Total	**$261,350**

A monthly bill of $520 will be a substantial burden for the residents in the community. Raising the rate for the clinic and school will reduce the month rate per service.

6.6.2 Annual O&M Costs

The total O&M cost for the proposed alternative is $270,800 (Table 25 and Appendix 12). This includes the total utility cost of $261,808 as well as an additional $281 annual per customer cost incurred due to increased electricity bills and required savings for part repair and replacement. Residents are expected to replace the equipment inside of their homes when needed. For a further breakdown of costs see Appendix 12.

Table 25: Annual O&M Costs

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$142,854	$11,905
Fuel and Heating	$17,537	$1,461
Power Consumption	$81,721	$6,810
Other Costs	$13,263	$1,105
Short Lived Assets*	$6,431	$536
Total Operating Costs	$261,808	$21,817
Total Utility Cost	$261,808	$21,817
Total Utility Cost (Per Service)	$8,182	$682
Piped User Cost		
Power Consumption	$256	$21
Maintenance and Replacement	$26	$2
Piped User Additional Cost	$281	$23
Total System Cost (Per Piped User)	$8,463	$705

* Short lived assets are adjusted to include RO components not included in Appendix 12

6.6.3 Debt Repayments

N/A

6.6.4 Reserves

Replacement costs for short-lived assets are included in the annual O&M cost estimates. The annual costs assume an inflation rate of 2%. The compiled annual reserves for these replacement costs are shown in Table 26.

Table 26: Estimated Short Lived Asset Reserves

	Unit Cost	Expected Equipment Life (years)	Quantity of Asset	Annual Cost
Water Supply				
Well head	$4,000	10	1	$488
WST Source Circulation Pumps	$1,000	10	1	$122
Heat Exchangers	$4,000	15	1	$359
Water Treatment and Washeteria				
RO Feed Pump	$1,000	10	1	$122
RO Membranes	$6,000	5	1	$1,325
CIP Pump	$1,000	10	1	$122
Chemical Injection Pumps (LMI or eq)	$500	15	2	$90
Water Distribution				
Pressure Pump	$2,500	10	2	$609
Pressure Tank Bladder	$500	5	1	
Water Main Circulation Pumps	$1,500	10	2	$366
Heat Exchangers	$4,000	15	2	$718
Gravity Sewer and MWTU				
East Branch Glycol Circ Pump	$1,000	10	2	$244
South Branch Glycol Circ Pump	$1,000	10	2	$244
Heat Exchanger	$3,000	15	2	$538
Septage Pump	$2,000	10	1	$244
Lifewater - UV Bulbs and Sleeves	$100	10	4	$49
Lifewater - Air Blower	$3,000	10	1	$366
Lifewater - Diffusers	$1,000	10	1	$122
Lifewater - Effluent Pumps	$1,000	10	2	$244
Lifewater - Floats	$100	10	5	$61
			Total	**$ 6,431**

7.0 CONCLUSIONS AND RECOMMENDATIONS

The lack of water and sewer infrastructure in Diomede poses risk to public and environmental health. Self-haul typically lowers the water usage, which results in compromised hygiene. The honey bucket system used for sewage handling has a high risk of human contact with waste, both in the home and throughout the community, and exposure to sewage poses especially high risks for children and the elderly.

The evaluation of the four water and sewer alternatives considered in this ePER indicates that Diomede will be best served by a RO water treatment system; an above-ground, fully piped water and sewer system; and a MWTU. A record of review by ANTHC and others as the ePER progressed is available in Appendix 15.

The following steps of action will help with timely detailed design and construction of this project.

Studies

a. Topographic Survey – A topographic survey is required to establish existing ground elevations throughout Diomede and to develop a base map for the project. This is necessary to finalize the alignment of water and sewer mains, amongst other aspects of design. The survey should be completed throughout the project area with sufficient detail to develop one-foot contour intervals and tie in property boundaries. It should include finished floor elevations for commercial facilities and sufficient information required to secure easements or rights-of-way for proposed improvements.

b. Power Grid Assessment – This project requires a consistent and reliable power generation for it to succeed. A detailed assessment of the electrical grid and power generation system will be required to determine what improvements are needed for the safe operation of the RO unit, circulation pumps, and wastewater treatment.

c. Geotechnical Investigations –Additional investigations should be performed at the new WTP location, along proposed pipeline routes and septage dewatering container locations to supplement existing information and confirm permafrost and groundwater conditions. Another key investigation to maximize the usable life for all existing and proposed infrastructure is to perform a slope stability assessment.

d. Housing Structural Assessments – Detailed housing assessments will be required to determine home improvements required for installation of piped water and sewer. The earlier this is completed throughout the course of the project, the more prepared the community will be to receive piped water and sewer.

e. Heat Recovery Assessment – Little is known about the waste heat recovery that is currently in place. An investigation will be needed to assess the option of using heat recovery technology in this project. If the heat recovery is fixed as part of this project it could reduce WTP fuel consumption substantially.

Necessary Coordination

f. Coordinating with ANTHC on the progress of the proposed WTP is important for the continuation of this project. Any updates or alterations made during this project will need to be communicated.

g. ANTHC's plan to construct a new WST to the North of the community is not recommended by this preferred project. Coordination with ANTHC will be needed to best assess next steps.

h. Coordination with Kawerak is necessary to ensure that the new boardwalks are able to support the proposed water and sewer mains. If the alignment of the boardwalk changes during the course of that project, the plans for ROW may need to be updated as well.

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APPENDIX 1:

GEOTECHNICAL DESKTOP

TECHNICAL MEMORANDUM

TO:	Will Moran, Project Manager
FROM:	Jeremiah Holland, PE and Chase Nelson, PE
DATE:	June 5, 2023
PROJECT:	Geotechnical Desktop Study – Little Diomede First Service Water and Sewer ePER

In accordance with Delivery Order 23-D-200815, this memorandum presents the results of our desktop geotechnical study for the First Service Water and Sewer Project in Diomede, Alaska. The scope of services for this memorandum included a summary of our background review, description of the physical setting, geotechnical considerations, and recommendations for additional geotechnical investigation. This work was done in support of the alternatives developed to increase the level of sanitary service.

PROJECT UNDERSTANDING

Currently, the community collects water from a surface water drainage source located south of the community and transports it through a pipe system to the water treatment plant (WTP). The WTP will be upgraded on its existing footprint in the Summer of 2023 as a separate project. Treated water is stored in a 424,000-gallon water storage tank (WST). An additional 380,000-gallon WST located just north of the school has been designed and funded but is delayed in anticipation that the capacity may be adjusted as part of this ePER.

Wastewater is treated by above ground septic or secondary mechanized modular systems that are capable of secondary treatment. Wastewater is discharged to a seepage pit located on the beach or direct to the beach.

At this stage of the ePER (prior to 65%), proposed infrastructure developed as part of the alternatives include an additional WST (350,000 to 400,000 gallons), expansion (height and/or diameter) of either the existing or proposed WST's, above ground service and main lines for water and wastewater, expansion of the new WTP, a septage collection lagoon with ocean outfall, and upgrades to the surface water intake.

This geotechnical desktop study was prepared to summarize anticipated subsurface conditions in the area and help guide the development of alternatives for improved water and wastewater service. After the final ePER is developed, additional geotechnical investigations including test borings and test pits are likely necessary to reach final design for the features identified in the ePER. A geotechnical investigation plan will be developed at a later date when the preferred alternative is identified.

BACKGROUND REVIEW

DOWL reviewed the following reports containing geotechnical or construction data in and near Diomede, Alaska. The list of reports reviewed for this memorandum are as follows:

- R&M Consultants, Inc. 1979. *Proposed High School Foundation Site Selection and Inspection, Little Diomede Island, Alaska.* No. 951267.

- Alaska International Construction. 1984. *Little Diomede High School: Nomination as Alaska's Top Construction Project of 1983, Most Noteworthy Buildings.*

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- R&M Consultants, Inc. 2010. *Geotechnical Report Elementary School Renovation, Little Diomede, Alaska.* No. 1630.01.

Due to the remote nature of the community, very little geotechnical data has been gathered on the island. The 2002 PND investigation of the seawater intake was the only project reviewed that completed geotechnical borings. The geotechnical borings and associated data are located offshore in front of the school.

PHYSICAL SETTING

Diomede, AK, is situated on the west coast of Little Diomede Island located in the Bering Strait. It is approximately 135 miles northwest of Nome and 185 miles southwest of Kotzebue. The village is around 800 feet long and 550 feet wide and starts at sea level and rapidly ascends in elevation to approximately 200 feet. The community has a small school, post office, and health clinic. Little Diomede Island is about 2.5 square miles.

Area Geology and Topography

Little Diomede is an island located within the northern section of the Bering Platform physiographic division just west of the Seward Peninsula. Topographically, the island steeply rises to elevations of 1,000 to 1,500 feet above sea level with rolling highlands at the top. Geologically, the island consists of steep talus slopes and bedrock of Cretaceous-age, porphyritic granites and biotite-hornblende quartz monzonites. Most of the island is composed of talus slopes covered with boulders and is mostly barren of vegetation. Vegetation that does exist is considered alpine tundra.

The near shore area where the community is located is not as steep as the rest of the island. Slopes are roughly 25 to 40 degrees above the beach, covered with boulders and talus. Active landslides have not been observed above the village (R&M 1979). Given the steep slopes and talus, rockfall may be present at some locations.

Subsurface Conditions

Little is known about the subsurface conditions under the community and upslope from the beach such as depth to bedrock. Boulders in a matrix of sand and fines were observed just offshore of the school to 40 feet deep (PND 2002). Community members who have worked on constructing buildings such as the Diomede Health Clinic and the High School encountered boulders and sand while excavating for the foundations. Other than the high school, which is founded on 29 steel caissons ranging from 4 to 20 feet deep, foundations have typically been hand excavated and are composed of post and pad or resting on boulders.

Stated in the R&M 2010 report, the proposed project area is mapped as generally underlain by continuous permafrost. Permafrost is assumed to be present nearly everywhere except in areas close to the coastline where there is potential permafrost thaw due to wave run-up, in drainages or below seeps, and in areas disturbed by human development. The near surface soils are part of the active layer that freezes and thaws each year. The active layer thickness is unknown and will be highly variable depending on the surface cover (boulders vs vegetation) but is suggested to be about four to six feet (R&M 1979). It may be deeper given the recent climatic warming trends.

Permafrost was observed in the shallow subsurface excavation of slopes during high school construction. Permafrost was possibly present or is still present under the footprint of the elementary school due to documented settlement after construction on the order of 18 to 24 inches. The settlement however may also be a result of the erosion of sediments from storms washing against the talus formation causing boulders to settle (R&M 2010).

Liquefaction and Seismicity

Liquefaction is the partial or total loss of strength of soils that can occur during strong earthquake shaking of significant duration. Earthquake-induced liquefaction generally only occurs under particular conditions, including high groundwater table, strong earthquake ground shaking of long duration, and loose, uniform sands. Typically, liquefaction occurs where the groundwater table is shallow (5 to 10 feet below ground surface) and usually at depths less than about 50 feet. Liquefaction is assumed to have a low risk in frozen grounds and bonded permafrost; however, areas with deep thaw or no permafrost may be susceptible such as areas by the beach that are regularly exposed to seawater. It is unclear how shallow groundwater table is underneath the community as it is assumed that any groundwater flow would follow the top of less permeable layers like permafrost and bedrock.

Diomede is in an area of low to moderate seismicity. Assuming a seismic site class C (very dense soil and soft rock), the ASCE 7 online hazard calculator provides a PGA_M of 0.18g. The USGS Unified Hazard Tool evaluating the 2,500-year return period provides a mean magnitude of M6.11 at 10.6 miles due to shallow crust seismicity. The nearest mapped seismic sources are the Kigluaik and Bendeleben normal fault systems approximately 120 and 150 miles away, respectively.

Climate

Diomede is located in a transitional climate zone with weather patterns characterized as continental climate when the sea is frozen, and maritime climate when the sea is thawed. Nome, Kotzebue, and Wales, Alaska, are the closest communities with available historical climate data, which was used to analyze climate projections and assumed permafrost conditions. We’d expect Wales to be most similar to Diomede given their proximity. The climatological data presented below for Wales and vicinity was taken from the Western Regional Climate Center and the National Oceanic and Atmospheric Administration (NOAA).

Mean Annual Precipitation	11.9 in
Mean Annual Snowfall	38.1 in
Mean Maximum Temperature July	51.5 °F
Mean Maximum Temperature January	5.3 °F
Mean Minimum Temperature July	42.7 °F
Mean Minimum Temperature January	-8.0 °F
Average Annual Temperature	21.7 °F

Mean monthly temperatures and precipitation for Wales and vicinity, for the period between 1981 and 2010 from the Western Regional Climate Center are shown in Table 1.

Table 1: Average Monthly Temperatures and Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature (°F)	-1.4	-0.2	-1.5	10.9	28.1	38.2	47.1	46.9	41.0	29.4	16.0	4.4
Precipitation (in)	0.56	0.61	0.69	0.35	0.49	0.72	1.36	2.45	1.83	1.32	0.69	0.89

NOAA climate data for Nome during the period of 1987 to 2022 was analyzed to calculate the average and design air thawing and freezing indices for the minimum and maximum using a 100-year return period over a Weibull probability distribution. Wales temperature data was available from 1987 to 1994. Wales compared to Nome and Kotzebue data during the same period had air thawing indices 700-800 F°-Degree*Days colder. Wales freezing indices were 1,200 F°-Degree*Days colder than Nome and 350 F°-Degree*Days warmer than Kotzebue. If similar contrasts hold 30 years later, then Wales has colder summers than Kotzebue or Nome and experiences typical winters more similar to Kotzebue than Nome. Diomede likely experiences summer and winter temperatures similar to Wales. The estimated design indices are given in Table 2.

Table 2: Design Air-Thawing and Design Air-Freezing Indices

Location: Method	Air-Thawing Indices (F°-Degree*Days)			Air-Freezing Indices (F°-Degree*Days)		
	Avg.	Min.	Design or Max	Avg.	Min.	Design or Max
Nome: 100-year Return Period[1], 1987-2022 range	2238	1498	2862	3618	1876	5275
Kotzebue: 100-year Return Period[1], 1991-2020 range	2317	1386	2976	5234	2724	7082
Wales and Diomede: Estimated Values	1600	-	2500	4900	-	6700

[1]The Weibull probability distribution is a recommended method used to calculate the 100-year return period (Steurer 1996) for design warmest and coolest thawing and freezing indices.

The average annual temperature for the last 30 years for Nome is 28.0 °F with years 2014, 2016, and 2019 average exceeding 32 °F. Overall, the average annual temperatures have risen 2.6 °F over the last 35 years in Nome with similar increases in the region Diomede may have experienced a similar average annual temperature increase. Due to lack of available subsurface and site-specific climate data, indicators of permafrost conditions based on climate trends were not feasible.

GEOTECHNICAL CONSIDERATIONS AND EXPLORATION

A geotechnical exploration should be completed at the locations planned for new infrastructure or expansions. Significant structures placed upslope from the beach will need to assess the permafrost conditions to determine foundation feasibility. Thaw-unstable soils or ice-rich permafrost will have significant settlement if not kept in a frozen state. Due to the steep slopes within the community and limited to no road access, standard methods for geotechnical exploration may not be applicable and alternative methods for subsurface data collection should be explored. Viable exploration methods are likely going to be hand-carried or helicopter drill rigs using air rotary and/or rock core drilling methods.

Based on available data, slope stability investigations are not anticipated. However, slope monitoring may be recommended based on site-specific observations.

Piped Water Utilities

Historically, piped water utilities have been located above ground and anchored to large boulders at the surface. This may be a reasonable solution for future piping. However, if the proposed piped water system has a low tolerance for movement due to seasonal frost or if the piped water system needs to be elevated above ground by more than a few feet, we recommend completing an investigation at those specific locations to provide engineered foundation recommendations. Because boulders may be on permafrost with potential ice-growth or thawing in large, dilated fractures, to stay within design tolerances a deep foundation such as a micropile would be a preferred choice to extend to stable depths. Micropiles are essentially bored in soil or rock with a single, grade 75 thread bar for reinforcement. They are like rock anchors that provide excellent load resistance in compression and tension. Steel casing can be installed in the upper portion to extend above ground for aerial supports or increased compressive or lateral load capacities. Depending on the borehole size, typically 4 to 12 inches in diameter, they can be installed with small, drilling rigs.

Buried piped water utilities may be feasible along the beach area provided they are protected from ocean storms and erosion. Conventional trenching upslope of the beach is likely not feasible without resorting to drilling and blasting to break up boulders and excavate bedrock. Drilling and blasting in close proximity to existing structures will be difficult due to vibration and exposure to fly rock.

Water Treatment Plant

We recommend test borings at the location of proposed expansion to the existing water treatment plant. Evaluating the potential for differential displacement cannot be adequately evaluated without test boring data. The number of borings will be commensurate with the structures' size and the depth will be determined by the estimated maximum embedment depth of the foundations. We anticipate two to three tests borings into competent bedrock.

Foundation feasibility depends largely on the permafrost condition, thermal state, or if intact, competent bedrock is present near the surface. If continuous, bonded permafrost is near the surface and extends to the depths explored, a passively chilled, at-grade foundation is feasible in an insulated gravel pad kept cold using passive, flat-loop thermosyphons. If seasonal thaw extends to 10 feet or so, it may be feasible to refreeze the ground over a winter season. Beyond these depths, deep foundations may be the only viable option unless the ground is fully thawed. Additionally, the topography may limit the ability to install a flat gravel pad.

If competent bedrock is near the surface or even at some depth, foundations such as micropiles are an economical choice to support heavy loads, buildings, or install casing for raised structures. Micropiles are comprised of a 4 to 12-inch diameter drilled shaft, typically 10 feet or more into bedrock with a single thread bar grouted in place. Casing is often used to extend through soft or compressible soil and for raised supports above the ground to provide additional lateral support.

If competent bedrock is exposed at the surface, it may be possible to support structures on shallow footings placed on the bedrock. Feasibility may be questionable if discontinuities or fractures in the rock are filled with ice or frost susceptible fines within the active layer. Freezing action can cause boulders or portions of the bedrock to shift or heave beyond design tolerances.

Water Storage Tank

If a new water storage tank is needed, test borings within the footprint of the tank are recommended. Test borings will evaluate subsurface soil and thermal conditions to provide foundation recommendations. The number, extent, and location of the test borings will be determined by the selected location and size of the proposed water storage tank.

APPENDIX 2:
EROSION, FLOODING, AND PERMAFROST DESKTOP

TECHNICAL MEMORANDUM

TO:	Will Moran, Project Manager
FROM:	Dana Brunswick, EIT, Jeremiah Holland, PE, and Chase Nelson, PE
DATE:	June 16, 2023
PROJECT:	Flooding, Erosion, and Permafrost Desktop Study – Little Diomede First Service Water and Sewer ePER

In accordance with Delivery Order 23-D-200815 this memorandum presents the results of our flooding, erosion, and permafrost desktop study for the First Service Water and Sewer Project in Diomede, Alaska. A summary of the background review is provided in addition to a discussion of considerations for the location and preliminary design elements of the proposed infrastructure that will be developed as part of the alternatives for increasing the level of sanitary service.

PROJECT UNDERSTANDING

Currently, the Inalik or Diomede community collects water from a drainage source south of the community and pipes it through a 2,000 linear foot above ground pipeline to the water treatment plant (WTP) and stores treated water in a water storage tank (WST). Wastewater is treated by above-ground septic or mechanized modular systems capable of secondary treatment. Wastewater is discharged to a seepage pit located on the beach or directly to the beach. The project area is shown in Figure 1.

At this stage of the ePER (prior to 65%), proposed infrastructure includes an additional WST (350,000 to 400,000 gallons), expansion (height and/or diameter) of either the existing or proposed WSTs, above-ground service and main lines for water and wastewater, expansion of the new WTP, a septage collection lagoon with ocean outfall, and upgrades to the surface water intake.

This desktop study was prepared to provide an initial flooding and erosion susceptibility assessment of the coastal area near the community where new infrastructure may be built as a result of the project or already exists. A discussion of considerations for the location of the proposed infrastructure and preliminary design elements is included in this memorandum; however, the infrastructure proposed for construction near the shoreline will require further engineering assessment during design to ensure longevity.

PHYSICAL SETTING

Area Topography and Near Shore Environment

Diomede is located in the Bering Straits 135 miles northwest of Nome, 185 miles from Kotzebue, and 2.5 east of Big Diomede Island, Russia. A shallow reef exists between the two islands. The island is thought to have been formed when lava erupted through a thick ice sheet, resulting in a steep-sided volcano creating near vertical slopes along the coastline except where the community is situated. Slopes are roughly 25 to 40 degrees to an elevation of 1,300 feet above sea level near the community.

Offshore slopes are also steep. Slopes between the shoreline to approximately 280 feet offshore are approximately 2 to 20 degrees (Figure 2). As waves travel towards the coast, friction on the ocean bottom slows them down. The steep slopes in front of Diomede mean that the ocean floor doesn't dampen wave energy until the waves are near the shoreline. Waves along steep shorelines, like Diomede's, are also frequently plunging breakers. The force exerted by plunging breakers is greater than that exerted by spilling breakers which occur more frequently on beaches with gentle slopes.

Another indication of the energy climate along the shoreline is the size and shape of the beach and ocean floor substrate. Energy, such as the energy from wave action or currents, transports and weathers beach material. Most of the time, beaches with high-energy wave action have larger rounder substrates than beaches exposed to low-energy waves. The beach material at Diomede consists of 2 to 4-foot diameter sub-angular boulders, which indicates the shore is exposed to high wave energy. These shoreline boulders and cobbles are subjected to ice-picking (PND 2002b).

Underwater video recorded in 2002 along a temporary intake line installed on the seafloor offshore of the school for the Arctic Environmental Observatory showed rounded cobbles covered in seaweed out to 150 feet offshore, boulders and sand 150 to 300 feet offshore, sand 300 to 500 feet offshore, and bedrock 500 to 600 feet offshore (PND 2002a). These substrate observations provide indications of the wave and ice forces that a permanent outfall needs to withstand along its length. The finer substrate observed 300 feet offshore indicates the limits of the surf zone and flatter slopes. The seaweed-covered boulders observed 150 feet offshore (water depth approximately 26-30 feet) indicate that ice occasionally moves material to that extent, but ice keels do not frequently scour to that depth which allows seaweed to grow.

Climate

There is no climate station in Diomede. Wales, Alaska is the closest community with historical climate data. Mean monthly temperatures and precipitation for Wales and its vicinity between 1949 and 1995 from the Western Regional Climate Center and the National Oceanic and Atmospheric Administration (NOAA) are shown in Table 1. Summer temperatures average 40 °F to 50 °F and winter temperatures average between -10 °F to 6 °F. Annual precipitation is 11.5 inches, and annual snowfall is 38 inches.

Table 1: Average Monthly Temperatures, Precipitation, and Snowfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	8.4	2.8	5.8	16.4	32.1	43.3	51.0	50.7	43.8	32.7	22.3	10.1	26.6
Average Min. Temperature (F)	-5.9	-10.6	-8.3	3.5	22.9	33.3	41.7	42.4	36.4	24.7	11	-2.7	15.7
Average Total Precipitation (in.)	0.43	0.37	0.44	0.31	0.51	0.68	1.42	2.65	2.15	1.41	0.71	0.40	11.48
Average Total Snowfall (in.)	4.1	3.8	4.5	3.3	2.2	0.2	0.2	0	1.4	6.2	7.7	4.6	38.1

(Western Regional Climate Center 2020)

Winds at Diomede blow consistently from the north and south, averaging 15 knots and gusts of 60 to 80 mph. Currents vary between 1 and 3 knots, dominantly to the north (USACE 2014).

Design Air Thawing and Freezing Indices

NOAA climate data for Nome during the period of 1987 to 2022 was analyzed to calculate the average and design air thawing and freezing indices for the minimum and maximum using a 100-year return period over a Weibull probability distribution. Wales temperature data was available from 1987 to 1994. Wales, compared to Nome and Kotzebue data during the same period, had air thawing indices 700-800 F°-Degree*Days colder. Wales freezing indices were 1,200 F°-Degree*Days colder than Nome and 350 F°-Degree*Days warmer than Kotzebue. If similar contrasts hold 30 years later, then Wales has colder summers than Kotzebue or Nome and experiences typical winters more similar to Kotzebue than Nome. Diomede likely experiences winter temperatures similar to Wales. The estimated design indices are given in Table 2.

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Location: Method	Air-Thawing Indices (F°-Degree*Days)			Air-Freezing Indices (F°-Degree*Days)		
	Avg.	**Min.**	**Design or Max**	**Avg.**	**Min.**	**Design or Max**
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[1]The Weibull probability distribution is a recommended method used to calculate the 100-year return period (Steurer 1996) for design warmest and coolest thawing and freezing indices.

The average annual temperature for the last 30 years for Nome is 28.0 °F with years 2014, 2016, and 2019 average exceeding 32 °F. Overall, the average annual temperatures have risen 2.6 °F over the last 35 years in Nome with similar increases in the region. Diomede may have experienced a similar average annual temperature increase. Due to lack of available subsurface and site-specific climate data, indicators of permafrost conditions based on climate trends were not feasible.

Sea Ice

The Bering Strait between Big and Little Diomede freezes in mid-December and thaws by mid-June (Alaska Department of Commerce Community and Economic Development 2008). The monthly and average annual sea ice concentration is shown in Table 3.

Table 3: Sea ice concentration at Diomede, AK*

	Ice Concentration 1850-1974	Ice Concentration 1975-2021	Percent change in sea ice concentration pre-1975 and post-1975
Jan	97	94	-3%
Feb	96	96	0%
Mar	95	96	1%
Apr	96	92	-5%
May	78	54	-45%
Jun	49	8	-497%
Jul	18	1	-1797%
Aug	2	0	N/A
Sept	6	0	-1951%
Oct	8	1	-758%
Nov	25	15	-67%
Dec	88	77	-14%
Annual	55	44	-23%

(University of Alaska Fairbanks 2023)
*Sea ice concentration is the fractional portion of the sea surface covered by ice. An ice concentration of 0 reflects open water conditions, and an ice concentration of 100 reflects complete ice coverage.

Statistical estimates of ice thickness at Kotzebue station, 180 miles away, were made by PND (2002). The 2-, 10-, and 100-year design ice thicknesses are 49, 56, and 63 inches, respectively. Alaska Department of Transportation and Public Facilities (DOT&PF) found that the ice sheets near Diomede can grow over 72 inches thick, suggesting that the estimates at Kotzebue are less than observations at Diomede (Smith and Carter 2011). A safety factor of 1.5 was applied to the statistical estimation from Kotzebue and results in a 2-, 10-, and 100-year design ice thicknesses of 73.5, 84, and 94.5 inches.

EXISTING AND PROPOSED INFRASTRUCTURE IMPROVEMENTS

Coastal armoring and shoreline protection measures include:

- 1985 Breakwater: Two jetties using boulders form a protected area serving as a small boat harbor while also causing leeward sediment deposition. (The Diomede Hazard Mitigation Planning Team 2019)
- 1988 Helipad: Beach armoring to create a helipad constructed seaward of the WST.
- 2001-2003: Beach restoration and gabion wall constructed. The project was funded by Denali Commission (USACE 2014). The gabion rock wall was installed to armor the shoreline; however, portions of the wall fell 2 years later during a 2005 storm (USACE 2007).

- Proposed: Potential breakwater and staging area either to the north or south of the island are being considered by the community and United States Army Corps of Engineers (USACE). USACE response to the DOT&PF dated 23 June 2015 indicates that the elevation of the northern breakwater attached to the helipad would match its top elevation of 20 feet mean lower low water (MLLW), while the southern breakwater would have a crest elevation of 25 feet MLLW. The armor stone sized to dissipate wave energy is 16 tons. (USACE 2014)
- Proposed: Repair of the helipad, including additional armor stone at the crest and toe. The proposed crest is at an elevation of 23.5 ft (MLLW). (Alaska Department of Transportation and Public Facilities 2023)

FLOODING CONSIDERATIONS

An increase in seawater levels during storms is generally caused by storm surge, wave setup, and tides. Due to the steep nearshore environment near Diomede, storm surge is not significant, but wind waves, swell, and tide can accumulate, causing water levels to rise and cause coastal flooding.

Diomede has been part of disaster declarations due to severe weather in 1990, 2004, and 2013 (Alaska Department of Commerce Community and Economic Development 2022). The documented declarations and additional documentation of flooding by community members are as follows:

- 1977: Flood of record (December 1977) caused by waves reaching 15-20 feet (vertical elevation reference unknown) (USACE 2000).
- 1990: November 21st storm destroyed fuel storage facilities. The damage was caused by waves up to 25 feet (The Diomede Hazard Mitigation Planning Team 2019).
- 1996: The largest storm of record from the south, as reported by the USACE Navigational Improvements feasibility study, October 1996 (USACE 2014).
- 2003: November storm with high wind and coastal flooding caused damage (The Diomede Hazard Mitigation Planning Team 2019).
- 2013: November storm with high winds and ice.
- 2018: February storm damaged insulation on the WST and the water transmission line (Alaska Native Tribal Health Consortium 2021).
- 2022: November 21st storm damaged a boat docking on the south side of the helipad area, damaged 5 feet of gabion wall that protects the tank farm and high school and moved rocks on top of the transmission line (Diomede 2022).

The water level during storms can reach 14-20 feet MLLW based on data collated from the existing reports. This elevation range represents both the flooding elevation and the estimated maximum elevation in which infrastructure is exposed to the force of breaking waves. This extent is shown in Figure 1 and assumes a water surface elevation of 17.4 feet MLLW and is supported by the following information.

Wave Setup

Wave setup is the water level rise from breaking waves. Diomede is affected by waves from the north, south, and west during open-water periods. The USACE modeled deep-water waves using hindcasted wind data and data from 1985-2009 storms and historical extreme storm events to determine a 50-year deepwater wave height as a part of a Navigational Improvements project. Waves were modeled from the north and south to represent the predominant wave climates. The deepwater waves were then propagated nearshore using a model to provide a design wave height of 16.4 feet MLLW (USACE 2014). It should be noted that the model was not validated because measured data was unavailable and should be used with caution. The model output was justified by comparison of output to back-calculated wave heights and the success of rock sized for existing structures. It should also be noted that this design wave height applies to a specific storm (intensity, duration, and orientation) and site. The design wave height for shoreline structures should be modeled independently as the design progresses.

Tides

Little Diomede experiences semi-diurnal tides (two high-water tides daily). Tides are estimated to be 1.02 feet MLLW based on data recorded at Tin City, Alaska, the nearest tidal gage station (National Oceanic and Atmospheric Administration 2023). If MLLW is the reference datum (0 feet), mean sea level is 0.47 feet, and mean higher high water is 1.02 feet. A tidal elevation of 1.02 feet was incorporated in the design wave heights calculated by the USACE.

Recorded Water Levels During Storms

Community members report that fall storm waves reach approximately 14 feet elevation (vertical elevation reference unknown) (CRW 2011). USACE records indicate the flood of record occurred in 1977 and flood elevation reached 15 to 20 feet (vertical elevation reference unknown) (USACE 2000). At some time prior to 2019, ADOT&PF established a temporary benchmark that also serves as a reference point to gage future floodwater elevation. The benchmark is located at the top of the northwest anchor border of the anchor plate on the southwest corner of the high school, situated at 25.72 feet MLLW (The Diomede Hazard Mitigation Planning Team 2019).

Climate Change Impacts

Flooding risk may increase over the design life of the project. Climate change impacts over the next 50 years include temperature increase and sea ice decline. The average annual temperatures have risen 2.6 °F over the last 35 years in Nome, and Diomede likely experienced a similar increase. Warmer air and sea temperatures have reduced the sea ice extent and duration such that both have both declined over the last few decades. (University of Alaska Fairbanks 2023) A reduction in sea ice has made the village increasingly vulnerable to extreme weather events.

Sea ice decline, both in extent and duration, increases the distance of open water in which waves are generated. Average annual ice cover in the Bering Strait declined 23 percent during the period 1975-2021, shown in Table 2 (University of Alaska Fairbanks 2023). Coastal areas once sheltered by shorefast sea ice during fall storms are now experiencing large storms without the ice to dampen wave energy and armor the shore. An example is a storm during a historically low sea ice concentration in February 2018 that damaged the sea WTP. Infrastructure should be designed to account for projected increases in flooding and wave energy during storms under the assumption that sea ice concentrations will continue to decline.

Sea level rise is another consideration when assuming a flood water level elevation. The USACE evaluated three climate change scenarios and the resulting impact on sea level rise rates: low (baseline), intermediate, and high. The baseline, intermediate, and high sea level rise values at the end of the 50-year period of analysis were projected to be 0.54 ft, 1.2 ft, and 2.5 ft, respectively. Figure 1 shows the contribution of sea level rise on water levels based on the “high” climate change scenario.

EROSION

High tides, wind and waves, permafrost degradation, fall storm surge, and late-forming offshore ice contribute to erosion. There have been no known formal assessments of coastal erosion or data to quantify the magnitude of erosion; however, residents have reported erosion as a concern along most of the coastline fronting Diomede (DCRA 2004)(Figure 1). Large storms have been reported to cause erosion on the southwest portion of the island on the beach below homes and the south side beach in front of the old tank farm near the village corporation office. The fuel header and fuel lines along the beach have required repairs after being unburied during storms and required repairs in 2004. (USACE 2007)

Significant erosional events were noted during storms that caused flooding in 1990 and 2003, but the extent of erosion is unknown. Erosion during a 2005 storm was reported to be 3 feet. (USACE 2007)

Long-term erosion was not evident in aerial imagery (1958,1974, 2004, 2017, 2020); however, the imagery was not clear enough to make a confident shoreline delineation and erosion assessment. It may be that longshore currents converge in front of Diomede and temporarily replace some material scoured during storm events. The USACE evaluated the beach north and south of the helipad and found no sediment deposition (USACE 2014).

Climate Change Impacts

Additional climate change impacts may include increased erosion from storms. Temperature increases may thaw coastal permafrost and make the shore more susceptible to erosion. Sea ice decline, both in extent and duration, would further subject the island to wave action during storms and exacerbate shoreline erosion.

PERMAFROST

The proposed project area is mapped as generally underlain by continuous permafrost (R&M Consultants 2010). Permafrost is assumed to be present nearly everywhere except in areas close to the coastline where there is potential permafrost thaw due to wave run-up, in drainages or below seeps, and in areas disturbed by human development. The near surface soils are part of the active layer that freezes and thaws each year. The active layer thickness is unknown and will be highly variable depending on the surface cover (boulders vs vegetation) but is suggested to be about four to six feet (R&M Consultants 1979). It may be deeper given the recent climatic warming trends.

Permafrost was observed in the shallow subsurface excavation of slopes during high school construction. Permafrost was possibly present or is still present under the footprint of the elementary school due to documented settlement after construction on the order of 18 to 24 inches. The settlement however may also be a result of the erosion of sediments from storms washing against the talus formation causing boulders to settle (R&M Consultants 2010).

DISCUSSION

Diomede is subject to flooding and erosion during extreme storm events. A 2020 risk assessment lists all of Diomede’s utilities, except telecom and satellite, as at risk due to flooding or erosion (The Diomede Hazard Mitigation Planning Team 2019). Utilities should be located outside of flood hazard areas (Figure 1) or protected using measures such as coastal armor and riprap, sheet pilings, gabion baskets, articulated matting, concrete, asphalt, or other armoring or protective materials. Structures along the shoreline should be designed to withstand forces from wave energy, ice pileup, and ice plucking.

As the level ice sheet forms during winter, it freezes around anything located along the shoreline, such as armor stone or exposed structures. When the ice sheet moves due to a storm, anything encapsulated within it can be plucked from its original location and moved with the ice. Additionally, ice pile-up can occur as single-year ice sheets and multi-year rubble ice or rafted ice that occurs when moving ice floes collide, ride up, and freeze together creating a much thicker ice mass. Design sea ice strength values of 50 psi for bending strength and 280 psi for compressive strength (crushing) should be considered. (PND 2002b). USACE calculates that an 8-ton armor stone can withstand forces from ice shove (USACE 2014).

Significant structures placed upslope from the beach will need to assess the permafrost conditions through additional geotechnical investigation to determine foundation feasibility.

Water Treatment Plant and Water Storage Tank

The WST and WTP are located on a bench constructed 15 to 20 feet above and 35 feet back from the shore (PND 2002a) and are within the area at risk of flooding from the 50-year storm. Due to the lack of appropriate locations for large infrastructure, we assume these structures will stay in their original locations. Continued use of the existing WST and WTP should consider replacement or design modification of the existing 9-feet high, 12-foot-wide gabion walls located in front of the tank and the south side of the WTP. The gabion wall appears to have deteriorated per photo documentation included in the ANTHC Technical Memorandum for the 424,000-gallon water storage tank (2021). As evidenced in the photos, damage to the tank seems to have occurred above the 9-foot height of the gabion wall. Fronting the existing gabion wall with armor rock is preferable as protection against wave and ice damage during storms. Currents and swash during storms have caused minor erosion at the tank foundation and may have scoured the material supporting the baskets. The forces from large rocks and ice striking the wire baskets compromise the basket integrity. Rock armor protects the gabion wall from scour and provides additional wave dissipation.

The small section of 3-feet high gabion wall south of the WTP also appears to be deteriorating; however, it is planned for replacement along with the addition of 2.7-foot-high concrete barriers as part of the WTP upgrades planned for construction summer of 2023. The WTP upgrade will also raise the elevation of the WTP building 4 feet to reduce exposure to breaking waves.

A 350,000-gallon WST on a slightly elevated gravel pad is proposed on the north side of the school as part of a separate project. At this stage in the ePER it is assumed that the tank will be constructed and will be part of the water distribution system for each alternative developed. It is our understanding that an existing gabion wall approximately 9 feet high in some locations will be reinforced on the seaward side with armor stone 2 to 5 feet in diameter (stone weight is 2 tons and mean diameter approximately 2.5 feet) (CRW 2011).

Localized wave modeling should be considered to optimize rock armor size and slope of the structure. Generally, the stone diameter should be approximately one-half of the design wave height for a breaking wave at a 1.5H:1V slope. The armor stone designed for placement in front of the gabion per the construction plans for the tank developed by CRW (2011) is generally appropriate at sites with wave heights of 10 feet or less. The armor stone as designed may be undersized if the design wave heights are 15 feet, as mentioned in the plans, however. For context, the armor rock at the Diomede helipad is 3-4 times heavier.

The toe of the armor stone slope should be keyed in to prevent scouring of the native soil, which could undermine the structure and cause failure. Consider excavating and placing material at the toe at least two rock diameters below the native soil elevation and three rock diameters in length. Slopes of the armor stone should be as shallow as feasible and no less than 1.5H:1V, which is the minimum stable angle of repose of large angular armor stone. Shallow slopes (3H:1V or flatter) have the potential to refract wave energy and reduce ice plucking but also increase the project footprint and cost of the material. A 1H:1V slope shown in the CRW Water Storage Tank Construction Plans (2011) (C-304, sheet 17) requires good rock interlocking and may be prone to ice plucking.

If a new WST is proposed as part of a selected alternative, coordination with the USACE should be established as the proposed small boat harbor and ramp concept is moved to the design phase. The boat ramp will increase wave runup locally during storms with direct approach orientation.

Water Transmission Line

Approximately 200 feet of the existing 4-inch diameter HDPE water transmission line is strapped to the top of a gabion wall that varies in height from approximately 5 to 10 feet. It is our understanding that in recent storm events, large rocks were moved by waves to the top of the wall damaging the transmission line, and sections of the wall were damaged or destroyed (Diomede 2022). The existing gabion wall should be repaired, if possible, or replaced. The gabion wall should be raised at least 5 feet, as evidenced from the overtopping during the 2018 and 2022 storms. Construction of a seaward revetment, similar to the proposed revetment fronting the 38-foot diameter water storage tank (CRW 2011) would provide additional protection to the water transmission line and landward buildings. The armor rock should be sized to properly dissipate wave energy, and slopes should be shallow to reduce ice plucking. If a coastal revetment is proposed as part of a selected alternative, coordination with the USACE should be established to explore options to optimize the benefits to both projects. For example, constructing a staging area for the boat harbor seaward of the gabion wall, as is one option of the USACE alternatives (2014 proposed breakwater depicted in Figure 1), would also reduce the wave and ice forces along the gabion wall supporting the water transmission line. The USACE project could potentially be extended on shore to armor the gabion wall as well.

Steep shore slopes mean that shore revetments would require significant material to achieve a stable slope. Construction may be difficult since accurate key-in of a revetment toe would be challenging due to its location in deep water. The benefits of large armor rock and shallow slopes that increase project footprint should be weighed carefully against the cost of obtaining and shipping the material to the community. The island’s steep slopes may preclude mining armor rock from a local quarry. It is our understanding that a quarry may be developed on the east side of the island as part of the USACE harbor project; however, it is still being determined how quickly that project will be constructed.

Attachments:

Figure 1 Flooding and erosion overview

Figure 2 Cross section beginning at gabion baskets and extending offshore

REFERENCES

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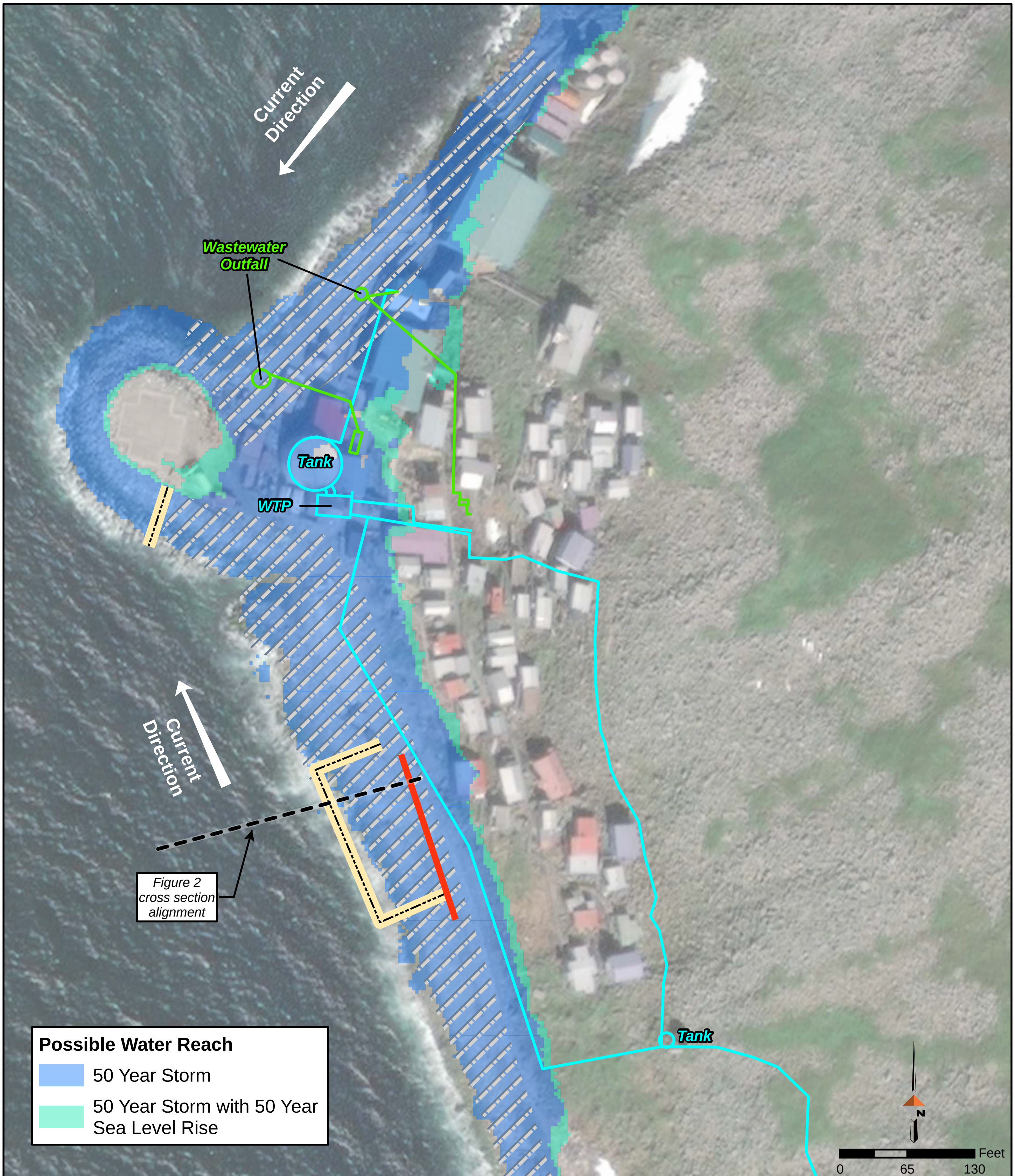

Existing Water Utility Infrastructure

Existing Wastewater Utility Infrastructure

USACE Proposed Breakwater (2014)[1]

USACE Erosion Assessment (2007)[2]

DRCA Erosion (2004)[3]

[1]*USACE. (2014). Navigation Improvements Diomede, Alaska; Final Interim Feasibility Report Environmental Assessment and Finding of No Significant Impact*

[2]*USACE. (2007). Alaska Baseline Erosion Assessment Erosion Information Paper - Diomede, Alaska*

[3]*DCRA. (2004). Diomede Community Map prepared by Kawerak Inc.*

Flooding and Erosion Overview

Little Diomede PER

DOWL

Date: June 2023

Figure 1

\\dowl.com\j\Projects\28\50290-01\60GIS\Carto\Water\50290 Water.aprx Jun 14, 2023 3:48 PM User: ssterling

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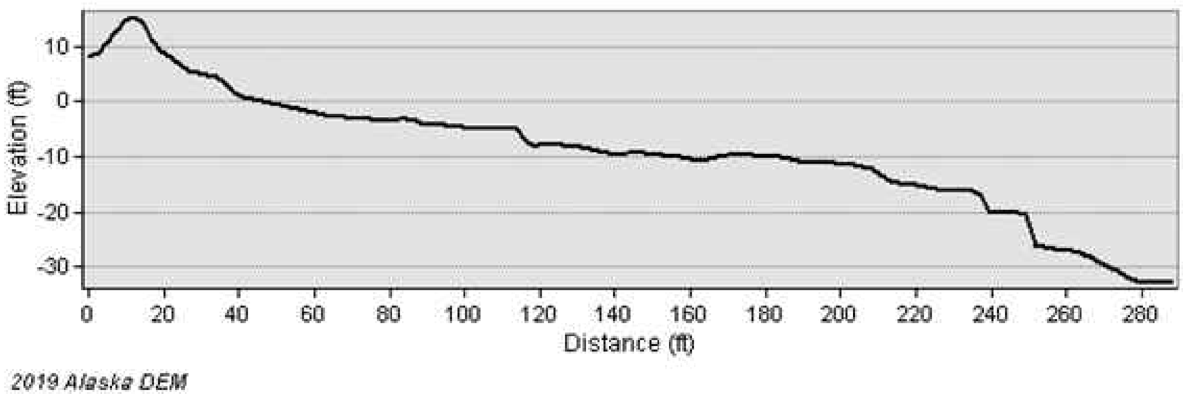


Figure 2: Cross section beginning at gabion baskets and extending offshore

APPENDIX 3:
HOME SURVEY RESULTS

RCS Survey Results: Diomede, Alaska (March and August 2023)

Assigned House Number	Owner/Occupant	# of Occupants	Home Built (Year)	Moved In (Year)	Indoor Plumbing	Type of Heating System	Thermostatically Controlled	Foundation Stability	Home Stays Above Freezing	Space in the Home for Bathroom/Plumbing
3	Cassandra Ahkvaluk	6	-	-	None	Toyo	yes	no	No	No room for 5x7 bathroom
7	Vern Ozenna	1	1986	1986	None		unkonwn	unknown		Seemed to have room in the home but said he wasn't interested in plumbing.
8	Carla/Stevie	4	-	2017	None	Toyo (but observed frost on the floors)	yes	unknown	-	House is supposed to be remodeled and new bathroom will be built in. Remodel was supposed to happen last year. Exsisting bath area is 3.5x8ft- Too narrow for more than a toilet and sink unless the wall adjacent to the stairs is removed. Easy access on underside of home for arctic pipeno sheathing on roof so will be replaced in addition to interior remodel
9	Justin Akinga	1	-	-	-	Toyo	yes	yes	yes	yes
10	Reuben Ozenna	1	-	2013	None	Laser w/ thermostat	yes	unknown	-	Space on back side of the wall behind the kitchen (extend the house)
13	Marty Ozenna	5	-	-	-	Toyo	yes	no	no	yes
16	Leticia	4	1970s	2022	None.	Toyo	yes	unknown	-	Currently 3x6 space for honey bucket but room for expansion
18	Gerald Ozenna (Spike)	4	2004	2014	Plumbing for bathroom, maybe missing toilet, pump for water filter	Toyo	yes	no	no	Spike requested we do not take photos of the inside of the home. Full bathroom is on second level, kitchen on main level. Unsure of condition of existing plumbing- Spike mentioned drains leak if used. Underside of building has easy access for arctic pipe
21	Ernest Iyapana	6	2000s	2022	None	toya tomi	yes	unknown	-	House will be torn down and will have plumbing once it's rebuilt
22	John Ahkvaluk	1				toyo	yes	no	yes	
23	Edwin	1	1970	1970 maybe	None	Toyo, Laser 56	yes	unknown	-	Space for either alt 2 or 3 in the entry.Ample space for bathroom No existing plumbing Access under house for arctic pipe and on south side of home
24	Justin Akinga/Harry Goldsberry	1	-	-	-	toyo	yes	yes	yes	
25	Ann Soolook, Robert Larsen	4	1930s or 40s	2014	Sink that drains (?)	toyo stove	yes	unknown	-	Home is 10x20, would be extremely tight to fit in bathroom. No access on underside of home for artic pipe but can be accessed on north side of home near the kitchen Very little insulation under floors and prone to freezing
27	Robert Soolook	1	-	-	-	toyo	yes	no	no	yes
28	Charles Manatlook/Peter Ohenee	6	1971	-	None.	Toyo	yes	no	yes	Sink and toilet only off of kitchen but would be tight. Peter's new home will have room for bathroom but he won't be adding fixtures in.
30	Edward Soolook	1	1973	2008	None	Toyo monitor	yes	unknown	-	Space where existing bathroom is and a back room that could be expanded into
32	Samantha Ozenna	-	Being remodeled currently	2010	will have plumbing once remodel is finsihed	Toyo	yes	unknown	-	Will have plumbing but not a lot of extra room.
33	Henry Soolook	2	1972	-	None.	Toyo	yes	no	yes	A storage room would be able to fit bathroom
35	Anne Marie Ozenna, Kevin Ozenna	3	1995	22-Dec	none	toya tomi	yes	no	yes	4x6 space where HB is. Would be space to expand.
36	Jerry Iyapana	6	1973	-	None	Laser 56 and electric	yes	yes	yes	5x8 bathroom would fit
37	John Iyapana Jr.	2	1971	-	none	Toyo monitor	yes	yes	yes	Space for bathroom but wall outside of entryway could be an issue.
39	Kevin Ozenna	3	1970s	-	None.	Toyo	yes	no	no	Space where existing bathroom is
40	Rodger Kyaunka	1	1920	1999	None	Toyo	yes	no	yes	Has space for 3x5 but not 5x8 without expandingthe home
42	Jared Menadelook	1	-	-	none	-	unkonwn	no	yes	yes
47	Andrew Milligrock	1	-	-	None.	Toyo	yes	no	yes	Home is on list to be replaced, leaking very badly (folgers Home)
48	Marlene (Opik) Akinga	1	-	-	Bathroom sink, kitchen sink, tub and plumbing for flush toilet (?)	-	yes	no	yes	yes
49	Frances Ozenna	5	2007	2007	Bathroom sink, kitchen sink, tub and plumbing for flush toilet	Boiler and water maker	yes	unknown	-	already has bathroom

Assigned House Number	Reaction to $250 a Month for Sanitary Service	Notes on Reactions to Alternatives	Water Source	Water Use General
3	-	-	-	-
7	-	Not interested in running water but doesn't want that to effect others. Thinks the project will be hard because they run out of water and there're no "straight lines" for pipes.	Does not use the WTP	
8	The cost is "just something they'd have to adjust to"	-	-	Use a Berkley water filter
9	$350/month	-	-	-
10	Unanswered	Doesn't want to be forced to drink treated water. Says city water is poison.	snow and hauls from spring in the summer	10 gallons at a time, 5 gallons a day
13	450/month	-	-	-
16	Unanswered	-	-	-
18	Is "ok" with cost of piped water, says cost is "worth it"	Thinks above ground pipes could be an issue for freezing.	-	-
21	-	Didn't come to meeting and not much to say about piped water.	-	5-10 gallons a day
22	50/month	-	-	-
23	The cost is "fine" but the community is hurting w/o heating assitance and food stamps.	-	-	-
24	300/month	-	-	-
25	The cost seems reasonable but already paying ~$200 for utilities. They use about 15-20 gal every other day.	-	WTP	15-20 gallons every other day and dump gray water outside
27	-	-	-	-
28	50/month	Prefers piped water and sewer and willing to pay for it. Peter is currently building a new home. Not a lot of space, hopefully funding for extending the home	WTP	-
30	Thinks most people won't be able to afford $250 a month	Wants flexible pipes beacue the houses are moving and knows it will be a lot of maintenance.	WTP	5 gallons every 2 days
32	-	-	-	-
33	50/month	-	Snow/ rainwater	Grew up on natural water and will not drink treated water even with piped water available.
35	350/month	Doesn't think community should modernize and should retain culture.. Keeps her strong and doesn't think they need it. Pipes would shift with the island and it would be expensive to be repairing broken pipes.	WTP but not to drink	Works at clinic and says the clinic uses bottled water
36	250/month	Would be good to get piped.	WTP	Thinks his family huals >50 gallons a week
37	Would continue to use HB and melt snow rather than pay bill. Would pay 250/month	Is disabled and would be good but cannot afford to pay another bill.	WTP	Fills ups 5 gallons twice a week
39	Willing and able to pay for piped water. 350/month	-	WTP, but drinking melted snow	-
40	50/month	Rodger is disabled and not having to haul water would be really great for him.	WTP only for dishes (alergic to chlorine)	-
42	600/month	-	-	-
47	Willing and able to pay for piped water. 150/month	-	WTP	-
48	150/month	-	-	-
49	Unanswered	Favors options that include running water and flush toilets. Wants to be able to shower in own home.	WTP	Hauls 25 gallons of water twice a week, 20 gallons of waste a week. (2min trip for hauling waste ?)

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 7

Occupant

Owner: Vern Ozenna

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? Does not use the WTP

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes: Not interested in running water but doesn't want that to effect others. Thinks the project will be hard because they run out of water and there're no "straight lines" for pipes.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type:

Visual Inspection

Heating Type:

Diomede Home Survey Details

Completed by: SW, CK **Date:** 2/15/2023

House Number: 8

Occupant

Owner: Carla/Stevie

Average Number of Occupants: 4

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access: Use a Berkley water filter

Are they satisfied with water access? Use a Berkley water filter

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

The cost is "just something they'd have to adjust to"

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo (but observed frost on the floors)

Visual Inspection

Heating Type: Toyo (but observed frost on the floors)

HOME VISIT PHOTOS

Home #8 – Carla and Stevie

FIGURE: Exixting Honey Bucket Space

FIGURE: Adjacent to Honey Bucket

FIGURE: Current Water Storage

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 10

Occupant

Owner: Reuben Ozenna

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? snow and hauls from spring in the summer

Other Water Access: 10 gallons at a time, 5 gallons a day

Are they satisfied with water access? 10 gallons at a time, 5 gallons a day

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Unanswered

Resident Notes: Doesn't want to be forced to drink treated water. Says city water is poison.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Laser w/ thermostat

Visual Inspection

Heating Type: Laser w/ thermostat

Home #10 - Reuben

	
FIGURE: Exterior Wall of Entryway	FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: SW, CK **Date:** 2/15/2023

House Number: 16

Occupant

Owner: Leticia

Average Number of Occupants: 4

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Unanswered

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Diomede Home Survey Details

Completed by: SW, CK **Date:** 2/15/2023

House Number: 18

Occupant

Owner: Gerald Ozenna (Spike)

Average Number of Occupants: 4

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Is "ok" with cost of piped water, says cost is "worth it"

Resident Notes: Thinks above ground pipes could be an issue for freezing.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components: Plumbing for bathroom, maybe missing toilet, pump for water filter

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #18 – Spike

FIGURE: Exterior	FIGURE: No Photos Taken Inside Home

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 21

Occupant

Owner: Ernest Iyapana

Average Number of Occupants: 6

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access: 5-10 gallons a day

Are they satisfied with water access? 5-10 gallons a day

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes: Didn't come to meeting and not much to say about piped water.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: toya tomi

Visual Inspection

Heating Type: toya tomi

Diomede Home Survey Details

Completed by: SW, CK **Date:** 2/15/2023

House Number: 23

Occupant

Owner: Edwin

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

The cost is "fine" but the community is hurting w/o heating assitance and food stamps.

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo, Laser 56

Visual Inspection

Heating Type: Toyo, Laser 56

Home #23 – Edwin

FIGURE: Space for Bathroom in Entry

FIGURE: Interior Room

FIGURE: Exterior Wall of Entry

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: SW, CK **Date:** 2/15/2023

House Number: 25

Occupant

Owner: Robert Larsen

Average Number of Occupants: 4

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access: 15-20 gallons every other day and dump gray water outside

Are they satisfied with water access? 15-20 gallons every other day and dump gray water outside

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

The cost seems reasonable but already paying ~$200 for utilities. They use about 15-20 gal every other day.

Resident Notes:

Existing House Components

Existing Bathroom Components: Sink

Other Bathroom Components: Sink that drains (?)

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: toyo stove

Visual Inspection

Heating Type: toyo stove

Home #25 – Larsen family

	
FIGURE: Exixting Honey Bucket Space	FIGURE: Interior Room 1
	
FIGURE: Interior Room 2	FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: CS, DH **Date:** 2/15/2023

House Number: 28

Occupant

Owner: Charles Manatlook/Peter Ohenee

Average Number of Occupants: 7

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Willing to pay.

Resident Notes: Prefers piped water and sewer and willing to pay for it. Peter is currently building a new home. Not a lot of space, hopefully funding for extending the home

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #28 – Charles and Peter

FIGURE: Exisiting Kitchen

FIGURE: Water Storage and Heater

FIGURE: Exterior Wall of Entry

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 30

Occupant

Owner: Edward Soolook

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access: 5 gallons every 2 days

Are they satisfied with water access? 5 gallons every 2 days

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Thinks most people won't be able to afford $250 a month

Resident Notes: Wants flexible pipes beacue the houses are moving and knows it will be a lot of maintenance.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo monitor

Visual Inspection

Heating Type: Toyo monitor

Home #30 – Edward

FIGURE: Space for Bathroom

FIGURE: Existing Honey Bucket Space

FIGURE: Exterior of House

FIGURE:

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 32

Occupant

Owner: Samantha Ozenna

Average Number of Occupants:

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now?

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components: will have plumbing once remodel is finsihed

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #32 - Samantha

	
FIGURE: Space for Bathroom	FIGURE: Interior Room
	
FIGURE: Exterior Wall of Entry	FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: CS, DH **Date:** 2/15/2023

House Number: 33

Occupant

Owner: Henry Soolook

Average Number of Occupants: 2

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? Snow/ rainwater

Other Water Access: Grew up on natural water and will not drink treated water even with piped water available.

Are they satisfied with water access? Grew up on natural water and will not drink treated water even with piped water available.

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Unanswered

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #33 - Henry

FIGURE: Existing Honey Bucket Space

FIGURE: Space for Bathroom

FIGURE: Exterior Wall of Possible Bathroom

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 35

Occupant

Owner: Anne Marie Ozenna

Average Number of Occupants: 4

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP but not to drink

Other Water Access: Works at clinic and says the clinic uses bottled water

Are they satisfied with water access? Works at clinic and says the clinic uses bottled water

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes: Doesn't think community should modernize and should retain culture.. Keeps her strong and doesn't think they need it. Pipes would shift with the island and it would be expensive to be repairing broken pipes.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: toya tomi

Visual Inspection

Heating Type: toya tomi

Home #35 – Anne Marie

FIGURE: Existing Honey Bucket Space

FIGURE: Possible Bathroom Area

FIGURE: Space for Arctic Pipe

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 36

Occupant

Owner: Jerry Iyapana

Average Number of Occupants: 6

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access: Thinks his family huals >50 gallons a week

Are they satisfied with water access? Thinks his family huals >50 gallons a week

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes: Would be good to get piped.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Laser 56 and electric

Visual Inspection

Heating Type: Laser 56 and electric

Home #36 - Jerry

FIGURE: Existing Honey Bucket Space

FIGURE:

FIGURE: Exterior Wall of Possible Bathroom

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 37

Occupant

Owner: John Iyapana Jr.

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access: Fills ups 5 gallons twice a week

Are they satisfied with water access? Fills ups 5 gallons twice a week

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Would continue to use HB and melt snow rather than pay bill.

Resident Notes: Is disabled and would be good but cannot afford to pay another bill.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo monitor

Visual Inspection

Heating Type: Toyo monitor

Home #37 – John

FIGURE: Existing Honey Bucket Space

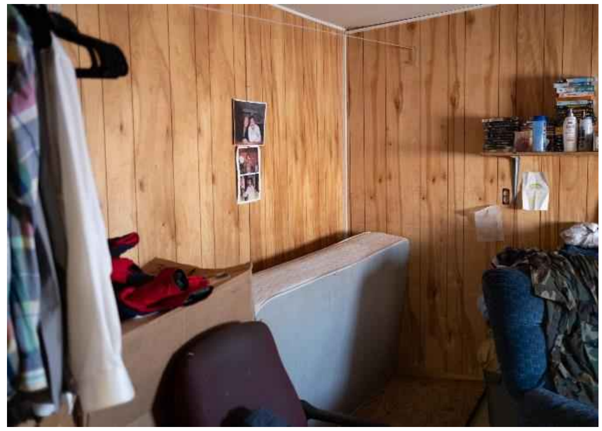


FIGURE: Possible Bathroom Area

FIGURE: Exterior Wall of Possible Bathroom

FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: CS, DH **Date:** 2/15/2023

House Number: 39

Occupant

Owner: Kevin Ozenna

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP, but drinking melted snow

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Willing and able to pay for piped water.

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #39 - Kevin

	
FIGURE: Existing Honey Bucket Space	FIGURE: Possible Bathroom Area
	
FIGURE: Exterior Wall of Possible Bathroom	FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: MW, CF **Date:** 2/15/2023

House Number: 40

Occupant

Owner: Rodger Kyaunka

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP only for dishes (alergic to chlorine)

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Resident Notes: Rodger is disabled and not having to haul water would be really great for him.

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #39 - Kevin

	
FIGURE: Existing Honey Bucket Space	FIGURE: Possible Bathroom Area
	
FIGURE: Exterior Wall of Possible Bathroom	FIGURE: Space for Arctic Pipe

Diomede Home Survey Details

Completed by: CS, DH **Date:** 2/15/2023

House Number: 47

Occupant

Owner: Andrew Milligrock

Average Number of Occupants: 1

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access:

Are they satisfied with water access?

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Willing and able to pay for piped water.

Resident Notes:

Existing House Components

Existing Bathroom Components:

Other Bathroom Components:

Kitchen Components:

House Heat

Thermostatically controlled heater? Yes

Heating Type: Toyo

Visual Inspection

Heating Type: Toyo

Home #40 - Roger

FIGURE: Existing Honey Bucket Space

FIGURE: Possible Bathroom Area

FIGURE: Exterior Wall of Possible Bathroom

FIGURE: Exterior of Entrance

Diomede Home Survey Details

Completed by: Self **Date:** 2/15/2023

House Number: 49

Occupant

Owner: Frances Ozenna

Average Number of Occupants: 5

Current Water

Existing Level of Service: Haul Water & Sewer

How is water accessed now? WTP

Other Water Access: Hauls 25 gallons of water twice a week, 20 gallons of waste a week. (2min trip for hauling

Are they satisfied with water access? Hauls 25 gallons of water twice a week, 20 gallons of waste a week. (2min trip for hauling waste ?)

Are they satisfied with water quality? No

Future Service

How much are you willing to spend for the water & sewer every month?

Unanswered

Resident Notes: Favors options that include running water and flush toilets. Wants to be able to shower in own home.

Existing House Components

Existing Bathroom Components: Sink_shower

Other Bathroom Components: Bathroom sink, kitchen sink, tub and plumbing for flush toilet

Kitchen Components: Sink

House Heat

Thermostatically controlled heater? Yes

Heating Type: Boiler and water maker

Visual Inspection

Heating Type: Boiler and water maker

POTENTIAL SATELLITE STATION LOCATIONS

North Station

	
FIGURE: North Facing	FIGURE: East Facing
	
FIGURE: Facing North	FIGURE: West Facing

Middle Station

FIGURE: North Facing

FIGURE: East Facing

FIGURE: South Facing

FIGURE: West Facing

South Station

FIGURE: North Facing

FIGURE: East Facing

FIGURE: South Facing

FIGURE: West Facing

Diomede Home Survey

Completed By
Cf

Date Time
August 29, 2023 2:46 PM

Survey Location


House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
3

House Status
Occupied

Name of person interviewed?
Cassandra ahkvaluk

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Cass a

Homeowner Name
Cass a

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
6

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
No

What is the condition of the fuel tank?
Okay

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 2:18 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number

9

House Status

Name of person interviewed?

Frances

Phone number of person interviewed?

7826762

Is house rented?

No

If house is rented – 5 year lease?

Occupant

Occupant Name
Justin akinga

Homeowner Name
Justin a

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $350/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
Yes

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
New

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By

Date Time

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
11

House Status
Occupied

Name of person interviewed?
Anne Soolook

Phone number of person interviewed?
6868179

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Anne

Homeowner Name
Sue Steinnecker

Is Homeowner Alaska Native or American Indian?
No

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
4

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $250/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

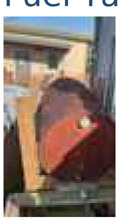
Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?

Is there room for 5x7 bathroom?
No

What is the condition of the fuel tank?
Fair

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

No insulation in the floor. The floor will frost. Missing beams and house is resting on rock.

Other photos

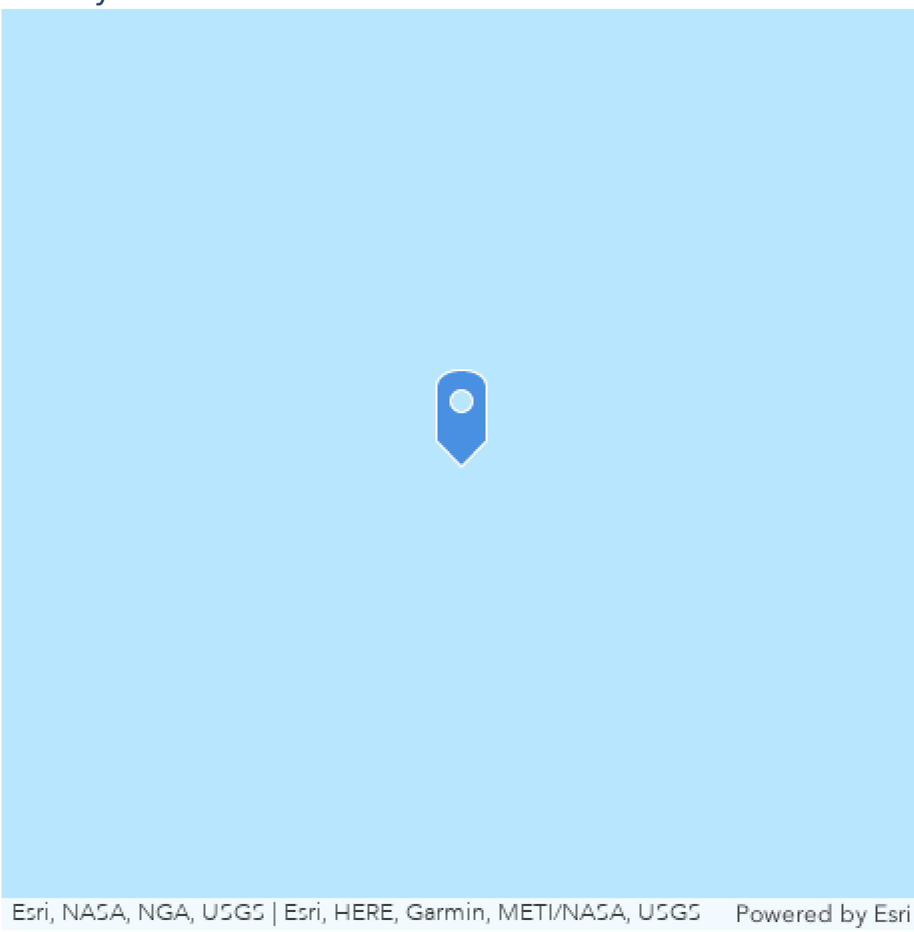
Sketch

Diomede Home Survey

Completed By

Date Time

Survey Location



House

Photo of Front of House

Photo of Left Side of House

Photo of Right Side of House

Photo of Back of House

House Number
13

House Status

Name of person interviewed?
Marty Ozenna Ieticha

Phone number of person interviewed?
9074346151

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name

Marty

Is Homeowner Alaska Native or American Indian?

Yes

Is this Homeowner’s Primary Residence?

Yes

Is home occupied year round?

Yes

How many people in the house?

5

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
Other

Other amount willing to spend?
450

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good for another 2 or three years.

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Ice on the floor. Recently leveled but needs to go every year. Existing bathroom is 4 x 8. Thinks sink and toilet are most important.

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 11:39 AM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Left Side of House

Photo of Back of House

House Number
14

House Status
Occupied

Name of person interviewed?
Cynthia snowball

Phone number of person interviewed?
2184434

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Cyn s

Homeowner Name
Cyn s

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
No

How many people in the house?
3

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $250/month

Other amount willing to spend?

How is home heated?
Other

Other home heated?
Hot plate

Is interior heat thermostatically controlled?
No

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
No

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Ok not connected

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
Mgw

Date Time
August 28, 2023 2:29 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
18

House Status
Occupied

Name of person interviewed?
Brendan ozenna

Phone number of person interviewed?

Is house rented?
Yes

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name

Bering strait housing

Is Homeowner Alaska Native or American Indian?

Is this Homeowner’s Primary Residence?

Is home occupied year round?

Yes

How many people in the house?

4

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

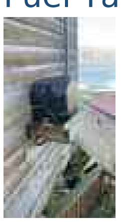
Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
Yes

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Works

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Upstairs bed room gets ic buildup in corner

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 11:07 AM

Survey Location


House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
22

House Status
Occupied

Name of person interviewed?
John ahkvaluk

Phone number of person interviewed?
4346406

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
John ahkaluk

Homeowner Name
Isabel ahkvaluk

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $50/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Fair

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

House to be willed to son

Other photos

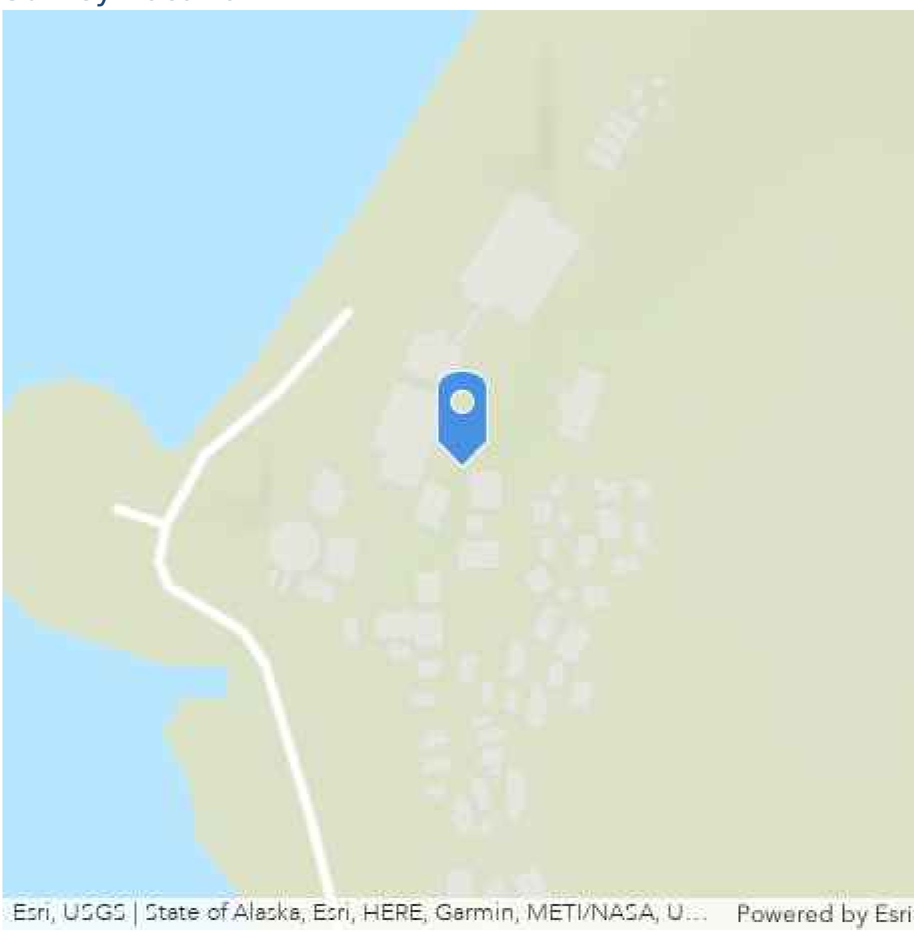
Sketch

Diomede Home Survey

Completed By

Date Time

Survey Location



House

Photo of Front of House

Photo of Right Side of House

Photo of Left Side of House

Photo of Back of House

House Number
24

House Status
Occupied

Name of person interviewed?
Frances

Phone number of person interviewed?

Is house rented?
Yes

If house is rented – 5 year lease?
No

Occupant

Occupant Name
Harry goldsberry

Homeowner Name
Justin akinga

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $300/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
New

Fuel Tank Photo

Has the house flooded before?
Yes

Year Flooded:
2018

How deep?
6

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 3:00 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
27

House Status
Occupied

Name of person interviewed?
Robert soolook

Phone number of person interviewed?
9076866273

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Robert s

Homeowner Name
Robert s

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 11:34 AM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
28

House Status
Occupied

Name of person interviewed?
Sam m

Phone number of person interviewed?
No

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Samantha menadelook

Homeowner Name
Charles m

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
6

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $50/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
No

What is the condition of the fuel tank?

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 11:23 AM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
33

House Status
Occupied

Name of person interviewed?
Henry soolook

Phone number of person interviewed?
6841027

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Henry s

Homeowner Name
Same

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
2

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $50/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

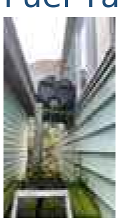
Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good

Fuel Tank Photo



Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By

Date Time

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
35

House Status
Vacant

Name of person interviewed?
Kevin ozenna

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Kevin ozenna

Homeowner Name
Louis ozenna

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
No

How many people in the house?
3

Utilities

Existing Level of Water Service

Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service

Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?

up to $350/month

Other amount willing to spend?

How is home heated?

Toyo

Other home heated?

Is interior heat thermostatically controlled?

Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?

Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
Mow

Date Time
August 28, 2023 1:19 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
36

House Status
Occupied

Name of person interviewed?
Jerry iyapena

Phone number of person interviewed?
4342965

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Jerry

Homeowner Name
Patrick omiak

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
6

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $250/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
Yes

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Bad, drums coming soon

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

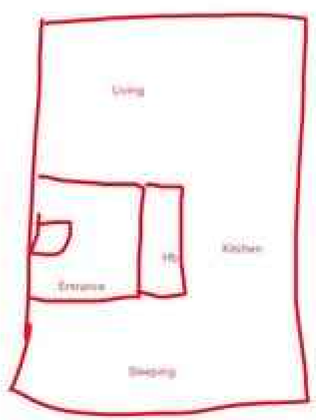
What is the final floor elevation?

Other

General notes

Other photos

Sketch



Diomede Home Survey

Completed By
MGW

Date Time
August 28, 2023 1:36 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Left Side of House

Photo of Back of House

House Number
37

House Status
Occupied

Name of person interviewed?
Eric Iyapena

Phone number of person interviewed?
72723475

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name
Eric owns half John junior own half

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
2

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $250/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
Yes

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Fair

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Flood from spring runoff snow built up behind house

Other photos

Sketch

Diomede Home Survey

Completed By

Date Time

Survey Location

<u>House</u>

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number
39

House Status
Occupied

Name of person interviewed?
Kevin ozenna

Phone number of person interviewed?
4346403

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Kevin o

Homeowner Name
Kevin o

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
3

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $350/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 11:57 AM

Survey Location

House

Photo of Front of House

Photo of Left Side of House

Photo of Right Side of House

Photo of Back of House

House Number
40

House Status
Occupied

Name of person interviewed?
Roger kunayac

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Roger k

Homeowner Name
Edwin kiminock

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $50/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Fair

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
Mgw

Date Time
August 28, 2023 6:23 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Left Side of House

Photo of Back of House

House Number
42

House Status
Occupied

Name of person interviewed?
Jared Menadelook

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name

Mary Menadelook, maybe passed

Is Homeowner Alaska Native or American Indian?

Yes

Is this Homeowner's Primary Residence?

Is home occupied year round?

No

How many people in the house?

1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
Other

Other amount willing to spend?
600

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Fair

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Probably moving and needs to be leveled. Cracks in ceiling and walls. The house used to be plugged into the transmission pipe until broke and house flooded. 5 or 6 dollars per gallon. Worth more than electricity

Other photos

Sketch

Diomede Home Survey

Completed By
CI

Date Time
August 29, 2023 2:06 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Left Side of House

Photo of Back of House

House Number
44

House Status

Name of person interviewed?
Andrew milligook

Phone number of person interviewed?
9076868426

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Andrew m

Homeowner Name

Carla m

Is Homeowner Alaska Native or American Indian?

Yes

Is this Homeowner’s Primary Residence?

Yes

Is home occupied year round?

Yes

How many people in the house?

1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $150/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Good but tilted

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

Diomede Home Survey

Completed By
Mgw

Date Time
August 28, 2023 3:16 PM

Survey Location

House

Photo of Front of House

Photo of Left Side of House

Photo of Right Side of House

Photo of Back of House

House Number
48

House Status
Occupied

Name of person interviewed?

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name
Marlene Akinga

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
up to $200/month

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
No

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
No

Distance from the ground to the bottom of the house?

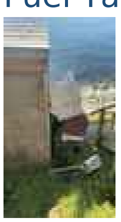
Is the house connected to community power?
Yes

Is there an existing bathroom?
Yes

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Needs to be replaced

Fuel Tank Photo



Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

House is shifting forward possibly sinking. Old construction bathroom with flushable toilet and water tank.

Other photos

Sketch

Diomede Home Survey

Completed By
Mgw

Date Time
August 28, 2023 2:24 PM

Survey Location

House

Photo of Front of House

Photo of Right Side of House

Photo of Back of House

Photo of Left Side of House

House Number

House Status
Occupied

Name of person interviewed?
Rob umiak

Phone number of person interviewed?

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name
Rob

Homeowner Name
Karen kazingnuk

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
No

Is home occupied year round?
Yes

How many people in the house?
1

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?

Other amount willing to spend?

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
Yes

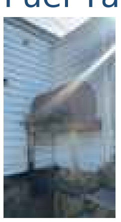
Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
No

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Old

Fuel Tank Photo


Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Price should be based off usage

Other photos

Sketch

Diomede Home Survey

Completed By

Date Time
August 28, 2023 2:56 PM

Survey Location

House

Photo of Front of House

Photo of Left Side of House

Photo of Right Side of House

Photo of Back of House

House Number

House Status
Occupied

Name of person interviewed?
Frances Ozenna

Phone number of person interviewed?
9076862232

Is house rented?
No

If house is rented – 5 year lease?

Occupant

Occupant Name

Homeowner Name
Frances

Is Homeowner Alaska Native or American Indian?
Yes

Is this Homeowner’s Primary Residence?
Yes

Is home occupied year round?
Yes

How many people in the house?
4

Utilities

Existing Level of Water Service
Self Haul from Watering Point

Other Water Service

Existing Level of Sewer Service
Honey Bucket & Wash Basin

Other Sewer Service

How much are you willing to spend for water & sewer every month?
Other

Other amount willing to spend?
425

How is home heated?
Toyo

Other home heated?

Is interior heat thermostatically controlled?
Yes

Can home maintain a temperature inside the home that will protect pipes or other infrastructure from freezing?
Yes

What type of foundation does the home have?
Post Pad

Foundation Type (other)

Is the foundation stable so that house will not move and damage piping either inside or outside?
Yes

Distance from the ground to the bottom of the house?

Is the house connected to community power?
Yes

Is there an existing bathroom?
Yes

Is there room for 5x7 bathroom?
Yes

What is the condition of the fuel tank?
Poor weathered

Fuel Tank Photo

Has the house flooded before?
No

Year Flooded:

How deep?

What is the final floor elevation?

Other

General notes

Other photos

Sketch

APPENDIX 4:
FEBRUARY 2023 COMMUNITY ENGAGEMENT REPORT

ANTHC Diomede Water and Sewer ePER Trip Report

February 14-16, 2023

Agnew::Beck Consulting | Role: Community Engagement Lead

Visiting Project Team

The visiting Project Team included:

- Agnew::Beck staff: Shelly Wade, Curtis Fincher
- DOWL staff: Cara Shonsey, Maya Wharton
- ANTHC staff: Chris Cronick, Derek Hancey
- NSH Corporation staff: Shyler Johnson

The Project Team arrives in Diomede. Photo: Agnew::Beck Consulting.

Tuesday: February 14, 2023

The project team landed in Diomede about 2:30 pm and were greeted at the helipad by the Mayor and a few other residents. We were shown to our lodging in the school gym and an adjacent woodshop. It took several trips to carry the group's luggage and boxed water into the school.

Shelly and Cara left to purchase door prizes within the community (tokens to the washeteria and coupons for fuel oil), while Maya and Curtis began to set up for that night's community meeting. The team had brought approximately 70 sandwiches from the Subway in Nome, fresh vegetables and fruit, and door prizes, such as wool socks and hats.

Shelly and Cara returned and helped finish setting up for the meeting and tailoring the layout to their presentation needs shortly before the first attendees began to arrive at 6:00 pm. Upon entering the gym, attendees came to a table with an attendance sheet, a sign-up for the raffle to be held later that night, a stapled packet with an overview of the project (that included a brief description of each alternative), and agendas for the evening.

Two other nearby tables had signup sheets for home visits and a 24" x 36" satellite image of Diomede with every house numbered. These tables were manned by Curtis and Maya. Approximately 15 individuals signed up for scheduled home visits by pointing to their homes on the map. Others helped identify which houses in the community were abandoned (12 in total).

Beyond these two tables, an 8'x5' square was taped out on the floor next to a sign that read "Approximate Bathroom Size (Alternative 2): would this fit inside your home?". Visitors were encouraged to step inside the taped rectangle and visualize whether this rectangle would fit inside their homes. A few individuals noted wryly that it would take up half of their house.

Shelly invited the mayor to bless the food, which he did. Shelly suggested the meal begin with elders in the community, who the mayor invited up to get food. Once the elders had their food, remaining attendees visited the food tables and then sat with their food in a large horseshoe shape facing Shelly and Cara and three posters. These posters were 24” x 36”, but some older attendees had trouble seeing them. It was also difficult for some older visitors to hear Shelly and Cara without amplification. (In a team debrief, it was agreed that for future community meetings, posters should be at least 36” x 48”, larger sizes of the stapled packets of information should be available for elders (11X17), and the project team should bring a small portable PA system.) The three posters showed:

Map of numbered Diomede homes. Photo: Agnew::Beck Consulting.

1. a diagram of where water/sewer utility lines would potentially run through Diomede for Alternative 2,
2. a diagram of where water/sewer utility lines would potentially run through Diomede and the satellite stations for Alternative 3, and
3. an inverted pyramid schematic demonstrating level of wastewater service from honey buckets (level 1) to fully piped sewer (level 5). (The team plans to simplify this graphic for future use.)

Shelly kicked off the presentation by thanking the community for hosting the visiting project team and describing in plain and easily understood language that the project team was there to listen to the hopes and concerns Diomede residents have about the water and wastewater alternatives, as well as ask whether the community has any initial preferences among the four alternatives to be included in the Preliminary Engineering Report (PER). She then listed each of these alternatives and described them in lay terms.

The community was so engaged in the topic and there were so many questions, that it proved difficult to get through the presentation in the manner/order of topics that Shelly and Cara had discussed beforehand. Shelly and Cara responded flexibly and allowed the community to determine the flow of the meeting in an organic way. Meeting attendees preferred to dialogue about the options rather than be presented to. As the questions grew more technical, Shelly handed off the meeting to Cara.

Answering these questions in a large-group format constituted the majority of the 1.5-hour information session. The community was thorough and incisive in the questions they asked; there were little to no off-topic or irrelevant questions. While it was difficult to extract a single message or theme from the many questions asked, a few topics were recurring. These were:

- Obvious hopefulness about the project, particularly Alternative 2 (the fully piped option).
- Skepticism about the project to the effect of, “We’ve been promised/heard this before,” and “I’ll believe it when I see it”.
- Questions about whether expanding homes to accommodate the bathroom would be a legal/permissible use of funds.
- Questions about the prerequisites of homes (built to code, etc.) to qualify for funding.
- Questions about operations and maintenance (O&M) costs of approximately $240 per month for Alternative 2. It was clarified that this was the total projected cost, not in addition to the anticipated $125 per month cost for water once the water treatment plant upgrades have been completed.
- Significant concerns and skepticism about the source of water for a fully piped system. The widespread belief in the room appeared to be that there was not enough water on the island to support unregulated access to running water in the home.
    - Residents asked about reverse osmosis of seawater as a potential solution. Cara explained that this was not a feasible solution. (Upon further discussion with ANTHC after the community meeting, reverse osmosis was later described as a feasible solution in the tri-organization meeting held the next day).
- Questions about where the pipes would go and how to prevent them from obstructing walkways around the village.

Diomede Community Meeting. Photo: Agnew::Beck Consulting.

Cara fielded these questions clearly and directly; she also reinforced the estimated monthly cost to the resident associated with each alternative. Shelly occasionally chimed in to clarify a specific engineering point or term that was not obvious to the audience or to keep the flow of the meeting progressing. Derek Hancey of ANTHC fielded a few specific questions about what constituted permissible uses of ANTHC funds for a First-Service project. Overall, there did not appear to be a firm grasp of Alternative 3 (satellite systems) by the residents. Cara referenced the example of a community that used a fourwheeler as a vacuum truck, then qualified that by saying “I know that wouldn’t work here.” More specifics from DOWL and/or ANTHC about how Alternative 3 would work in Diomede are important for any subsequent community outreach. After the visit, Cara suggested bringing a detachable hose and box to concretely demonstrate how the system would function; Agnew::Beck staff agrees that this would be a highly effective way to communicate the design of this alternative.

Eventually the question-and-answer portion of the meeting was terminated in favor of answering questions one-on-one after the meeting. The questions did not appear to be slowing down (particularly from a few individuals) while many others in the crowd (including children) were growing somewhat restless, and it was beginning to difficult to hear as people milled about.

Shelly segued to raffling off door-prizes, which included warm socks, hats, balaclavas, gloves, fuel coupons, and washeteria tokens. Shelly and Cara encouraged visitors to sign up for home visits before leaving and said the visiting team members would be available to answer any outstanding questions. The meeting was concluded, and Shelly, Cara and Derek continued to answer questions for the next 15-20 minutes. Maya and Curtis signed up a few more residents for home visits. Residents exited from the gym at approximately 9:30 pm.

The meeting was attended by 22 adults or approximately one-third of Diomede’s total population of about 80 people. Community leaders and school staff that observed the meeting commented that the meeting was well attended.

The project team gathered to eat dinner, line out the plan for the following day and consolidate notes from the evening. It was mentioned that one resident told a project team member that 70 percent of the community was on welfare and would not be able to pay $240 per month in utility bills. Several residents had spoken to individual project team members stating that the proposed new water tank location pictured in that evening’s diagrams were not optimal. Several residents had also expressed concern about the ability of any hard-piped sewer infrastructure to withstand the movement of the hillside on which Diomede sits.

Diomede. Photo: Agnew::Beck Consulting.

It became clear during this debrief that several additional projects are coming to Diomede in the next 3-5 years in addition to the water and sewer service project: upgrading and renovating the water treatment plant, increasing the elevation the helipad by four feet, creating a sea wall to establish/improve a harbor, upgrade/replacement of the bulk fuel tanks, repairing the glycol line along the below ground portion of the water transmission line and repairing the pipe and gabion wall along the above ground portion of the transmission line, upgrading the washeteria, improving the boardwalks to allow for water and sewer pipes beneath them, the installation of separating toilets in community member's homes, and 12-15 new/remodeled houses. Continued agency and contractor coordination among these different projects will be critical to avoid problems, such as:

- Plumbing fixtures installed in the remodeled/newly built homes could lead to disappointment if the ePER process does not land on Alternative 2 or Alternative 3.
- The water treatment plant's new tank is sized for current consumption, not for providing piped water to houses, which would increase water consumption.

When asked, Frances Ozenna (Tribal Administrator) said that she and Ahna Ozenna (City Administrator) are coordinating among these projects.

This meeting was concluded at 10:00 pm.

Wednesday: February 15, 2023

Curtis left the gym at 8:30 am to post signs around town advertising project information and home visits. The full team met with Frances Ozenna (Tribal Administrator) from 9:00 am – 12 noon in the school gym to discuss the project and the City's revenue streams, expenses, various operations, upcoming projects, and ability to pay for the O&M costs and necessary staff positions associated with the project. The number of unfilled job postings (12) seen around town was noted as disconcerting during this meeting. The mayor stopped in for part of this meeting and (although he described Diomede as hard-working at the community engagement meeting the night before) commented that Covid relief funding has damaged everyone's work ethic in Diomede. He also explained that the Tribe currently assists families with paying for utilities as needed. It was unclear what process was used to determine eligibility for this subsidy.

Frances reported that Kawerak and/or NSEDC would pay for two years of utility bills for the proposed upgrades to the water treatment plant to allow the community a buffer while adjusting to the new system. It was unclear to Agnew::Beck if Frances sharing of this information influenced residents' willingness to provisionally agree to ~$240/month for piped water/sewer, in that they might not have actually believed they would actually have to pay for it themselves. Relatedly, Frances had cautioned the project team to be "careful" during the community meeting to not talk about costs too much. <u>There are unresolved questions here regarding the community's ability to pay this amount vs. their attested willingness to pay which Agnew::Beck recommends be explored during a future site visit.</u> A survey question such as "would you be willing to pay $240/mo for piped water/sewer *if you received no subsidies/economic assistance"* might have resulted in different answers than "would you be willing to pay $240/mo for piped/sewer" (which is what the project team actually asked, and received mostly "yes" responses to).

Other important details mentioned or discussed during this meeting included:

- NSHC does not pay the City for the clinic's water use. There is a water line that runs up to the clinic from the Water Treatment plant.

- The school is currently the only paying utility recipient for water at $2,400 per month.
- The City has a haul system in place for honey bucket waste. NSEDC pays $60,000 per year to fund a staff position to carry the waste onto the ice and dump it. Frances said it would be a mess if everybody was dumping their own waste.

As the meeting with Frances was ending, Cara received word via satellite nReach that 60 knot winds were anticipated for Friday, and the team would have to be pulled from Diomede on Thursday (the following day). The team divided into three teams of two to conduct home visits more quickly given the new timeline. The project team discussed an example of a questionnaire that Chris Cronick had brought and agreed to modify them to include only the eight highest-priority questions for time and relevance.


Visiting Diomede homes. Photo: Agnew::Beck Consulting.

The various teams left the school and began their home visits. Those homes that had previously agreed to and scheduled home visits were visited first. This group was quickly exhausted. At 2:00 pm, all two-person teams but Maya and Curtis left to attend the leadership meeting at the IRA building. Maya and Curtis continued to survey homes, knocking on doors and cold-querying individuals in the general store and around town. A handful of individuals declined the visits, but for the most part, people were willing to allow the project team to conduct the home visits. As the leadership meeting ended at 5:00 pm, the full team rejoined the home visits. By 7:00pm that night, every house in Diomede had been either visited or queried.

The team knocked on the doors of all occupied homes. The team visited a total of 19 houses (estimated to house approximately 55 people) in which a resident allowed the team into the home and discussed water and sewer service. All individuals who agreed to home visits also consented to having pictures of the inside and outside of their homes taken. Twenty residents declined a home interview or were not home. Prior to the survey, 12 houses were identified as having no occupants. The project team estimated there to be a total of approximately 50 structures designated as residences (occupied or unoccupied). While the surveys and associated notes capture a more detailed picture of these interactions, a few recurring themes stand out:

- Almost everyone agreed that piped water/sewer would make their life easier.
- A handful of individuals are content with how they currently handle water/wastewater and are not interested in any improvements. They suggested that they would opt out of any

improvements if such improvements do occur but are unopposed to those improvements happening because other people would like them.

- Almost everyone thinks the existing city water is of very poor quality. Several referred to it as "poison." Many who are able carry and melt snow rather than hauling water from the washeteria due to this belief.
- Concern about the plastic in the ocean affecting sea life from the current honey bucket waste dumping.
- There was a wide range of hauled water usage per home, from 5 gallons to 50 gallons per week.
- Most people suggested they would find space for a 5'x8' bathroom if they were provided piped water and sewer; this size bathroom appeared as though it would fit in the same space where honey buckets were already located in most homes (entryway/mudroom of the house).
- Many mentioned that their homes are tilting downhill, that the hillside is eroding, and questioned how this would affect the longevity of sewer pipes.
- Many were skeptical about their neighbors' ability to afford $240 per month in utility fees but said they themselves could afford it. A few individuals said they could not afford it and would therefore not opt in.
- Many brought up the scarcity of water on the island.
- Most were skeptical yet hopeful about the project coming to fruition.

From 2:00 – 5:00 pm, the project team (except for Maya and Curtis) attended the leadership meeting held at the IRA building. Residents present at this meeting were: Ann Soolook, JoAnn Kaningok, Edwin Kiminock, Ernest Iyapana, Frances Ozenna, Robert Larsen, Edward Soolook, Robert F. Soolook Jr., Steven Ahkinga, Samantha Ozenna, Carla Ahkinga, and Ahna Ozenna. Representation from the Tribe, City and Village council were present at the meeting. Ahna Ozenna recorded the official meeting minutes[1].

After some discussion, the leaders asked the project team to leave the room so they could discuss the options among themselves. When the project team returned, the leadership announced that they had voted to proceed with further investigation of Alternative 2 (piped water and sewer), as this alternative best aligns with the community's needs and values. It was communicated by Cara at this point that all options are still on the table and will be investigated through the ePER process. That said, leadership made it clear that their preference was for Alternative 2 and that the preliminary estimate cost of $240 per month per residence was not a hurdle that the community could not overcome.

The council was not in favor of Alternative 3 (satellite system) due to concerns of too much O&M and the potential for sewer spills/contamination. This reluctance could be due in part to unclear communication about what exactly this alternative would look like. Agnew::Beck strongly recommends clarifications and improvements to the illustrative images and schematics explaining this alternative.

[1] A copy of the leadership meeting minutes was not available at the time of this report because Diomede phone and internet service were not working and the information could not be sent. A copy of the minutes will be requested and can be provided at a later date if deemed necessary.

The council was not in favor of Alternative 4 (PASS) because this is believed to be a marginal improvement from the existing system, and the biggest complaint from residents is hauling water and waste up and down the hill, which PASS would not solve.

Samantha Ozenna, the Tribal Chief, was concerned about when the project team would be coming back. She communicated that other teams have come to Diomede in the past, completed planning exercises, and did not follow up with the community, nor adequately inform the community about what the next steps were or the reason for those plans never being implemented. Sam made it clear that she hopes this project goes through to construction and that the project team would return to Diomede to communicate progress and plans summer 2023.[2] Cara and Shelly confirmed to Sam that they would be returning at some point when the project had progressed further. Agnew::Beck recommends that the next opportunity to return to Diomede include sharing the results of home visit surveys with community leadership. This is important information that, given the compressed schedule the team was operating on, the project team did not have time to compile and share with leadership while there.

Diomede Water Treatment Plant. Photo: Agnew::Beck Consulting.

Much of the conversation at the leadership meeting focused on the current water treatment plant. Reverse osmosis to supplement the island's limited water sources was discussed in depth; Edward Soolook (the power plant operator) offered many of his thoughts on the subject, including the location of an additional water tank located south of the community.

When the leadership meeting was finished, the project team reconvened with Maya and Curtis and helped finish all outstanding home visits and surveys. At 7:30 pm, after finishing the home visits and eating a quick dinner, the project team held another meeting to discuss the plan for tomorrow and what they had learned during the day. By this point, a full picture of the project seemed to have coalesced and significant new pieces of information (other planned related projects, lack of maintenance on related assets, community finances, etc.) were no longer emerging.

Thursday: February 16, 2023

Frances came by the school at 9:00 am with cookies, ready for another meeting. During this meeting, she spoke of Diomede, its history and future more broadly, with less focus on this specific project. She noted that the Tribe is moving forward with washeteria improvements; neither ANTHC funding nor

[2] Robert Larsen, Water Plant Operator, communicated a similar sentiment to the project team the following day, asking the team if they would be coming back and when that might be.

assistance are requested for the project. Frances expressed a desire for self-sufficiency and that the community should be doing what is within its abilities, which includes the washeteria project. She said that only two-thirds of the community uses the washeteria. She also noted that treated water cannot be used for fermenting walrus intestine, referencing a continued need for snow and water hauling.

At a resident's request, a last-minute home visit was conducted by Shelly and Curtis for a house that was uninhabited and had therefore been skipped the previous day. A polar bear was spotted on the ice in front of town, and two men from town went out to hunt it (it got away), which provided some brief excitement for both the project team and the villagers. The project team's extra food was given away to a resident who, during home visits, had appeared to be in need. The team was picked up at the helipad a little after 12:00 pm and safely delivered to Nome by 2:00 pm.

Polar bear. Photo: Agnew::Beck Consulting.

APPENDIX 5:
AUGUST 2023 COMMUNITY ENGAGEMENT REPORT

TRIP REPORT

PROJECT:	Little Diomede Water and Sewer ePER	DATE:	8/31/2023
DOWL PROJECT NUMBER:	1528.50290.01	ANTHC PROJECT NUMBER:	23-D-200815
CLIENT:	ANTHC	CLIENT CONTACT:	Will Moran
PREPARED BY:	M. Wharton	ATTACHMENTS:	

Dear Will,

DOWL is pleased to present the following summary of the field trip to Diomede, Alaska, completed August 28th through 30th, 2023, as part of the Little Diomede Water and Sewer ePER for the Alaska Native Tribal Health Consortium (ANTHC). The work was performed as under the term contract No. 22-TC-16335. The purpose of the trip was to update the community on the more developed alternatives, conduct home eligibility surveys, and discuss non-monetary factors. This was accomplished by organizing and facilitating a community meeting, facilitating a meeting with the Joint Council (City and Tribe), and conducting home visits with willing community members. During home visits, observations were made of the location and condition of the properties as well as the preferred location of a proposed bathroom inside the home. The site visit was performed by a group of five from DOWL, Agnew:Beck and NSHC. The participants in the site visit were Chase Nelson, PE of DOWL; Maya Wharton, EIT of DOWL; Brita Mjos, EIT of DOWL; Curtis Fincher of Agnew::Beck; and Richard Kuzuguk, Remote Maintenance Worker (RMW) of Norton Sound Health Corporation (NSHC).

August 28, 2023

Maya Wharton and Curtis Fincher traveled to Diomede by a helicopter operated by Pathfinder Aviation. The helicopter arrived at 1:00 pm and was met by community members who helped move luggage and equipment into the school gym.

With the help of Robert Larsen, Diomede water treatment plant operator, Wharton and Fincher began conducting home visits. Robert Larsen directed the team to homes that would have residents available for the survey. The home visits consisted of a short survey on the condition of the homes and a 360 video of the interior. Surveys were performed on a voluntary basis and photographs and videos were consented to prior to taking. At approximately 5:00 pm, the team stopped home visits in order to give the community members time to be with family after the workday.

A local resident offered to take Wharton and Fincher on a hike to the top of the island. This was a great opportunity to see the storage area to the South, the wood stave tank, and the existing water source. The potential location of the septage lagoon is at the existing storage area. This is a relatively flat area and could be a good location for either the septage lagoon or a water storage tank. The wood stave tank has newly been installed with no visible leaks. The existing water source was running but the transmission line was closed because the community was not treating water. The source intake did not have a screen, confirming reports from the operator, but appeared to be positioned properly to collect water.

Figure 1 Photo of Raw Water Intake

After Wharton and Fincher returned to the school, they used the reminder of the evening to plan for the coming days and debrief the overall impressions of Day 1.

August 29, 2023

While Wharton and Fincher waited for an appropriate time to start home visits, which was recommended as 11:00 am, they spent time talking to community members. Wharton recorded a 360 video of the boardwalks alignment so that others could see the general layout of the community and the condition of the homes exterior. The company Passive Homes is working with the community of Diomede to construct the new store and renovate existing housing. Wharton and Fincher were able to discuss with the foreman some of the challenges of construction on the island. Passive Homes claims to be employing 17 community members at a generous wage of $50/hr.

At approximately 11:00 am, Wharton and Fincher began visiting homes. With the direction of Robert Larsen, Wharton and Fincher also conducted some surveys at residents' workplaces, such as the post office, city office, school etc. In the case of conducting a survey outside of the home, a 360 video of the inside was not taken but photos of the outside were captured.

The picture below is an example of potential problematic foundations found throughout the community. Many homes were observed to have a "post and pad" foundations, but the "pads" were often large boulder, stacks of rocks, or unlevel blocks of wood. It was found that 75% (16 homes) were said to move frequently and homeowners stated the home was not structurally stable. In addition, 40% (8 homes) of residents stated that their home could not maintain temperatures above freezing throughout the winter, resulting in frosting floors and walls.

Figure 2 Example of Foundations Observed

Out of 21 surveys conducted, 17 residents were willing to talk about how much money they would be willing to spend each month on a water and sewer system. Approximately 60% (10 responses) of residents would not be willing to pay over $250/month. Only one resident stated that they would be willing to pay up to $600/month.

At approximately 1:00 pm, Chase Nelson, Brita Mjos, and Richard Kuzuguk arrived via Pathfinder helicopter. Fincher and Larsen continued collecting surveys while Wharton met the group at the Helipad to help them get situated in the school. Frances Ozenna, Tribal Administrator, also came to meet with the group at the school and shared her frustration about the state of the WTP project. She was very concerned with the timeline of the project and insisted that the community has been in need of a new WTP since 2005. DOWL explained that the ePER is a separate project from the WTP, and a water and sewer system would not be delivering water that is unsafe to drink.

After talking with Frances Ozenna and the principal, Nelson, Mjos, Kuzuguk, and Larsen began a DEC Sanitary Survey. Wharton and Fincher continued to collect surveys until approximately 4:30 pm when they went back to the school to start setting up for the community meeting at 6:00 pm.

At the meeting, residents were asked to sign in and take the printed materials provided by DOWL. Subway sandwiches and fruit were brought from Nome to be enjoyed by all attendees. Once everyone had served themselves food and taken a seat, Chase Nelson led the presentation to the community where they introduced the purpose of the ePER and discussed the proposed alternatives for water and sewer service. The presentation was given verbally with the assistance of visual aids such as posters and booklets. Community members asked questions throughout the presentation. Near the end of the presentation, the community was asked to brainstorm factors excluding the cost of the project that would be important to consider while selecting an alternative. The brainstormed list included:

- End user cost
- Ease of maintenance – cost of shipping materials
- Longevity
- Corrosion resistance
- Replacement cost
- Ground instability

- Water conservation
- Energy savings
- Small footprint or vertical construction given limited space
- Homeowner maintenance/burden

See notes attached for community meeting details. After the presentation, group members spread out and spoke with people one-on-one to answer questions and hear concerns. Despite understanding that the ePER was a separate project than the WTP, the community expressed frustration at the quality of their water and the lack of progress on the WTP project. Agnew::Beck encourages ANTHC to communicate more proactively with community leaders about the state of the WTP project and the reason for any delays to ensure that trust and goodwill are maintained with the community.

Approximately a quarter of the community (18 of approximately 80 people) was in attendance and engaging with the project. Many community members were out of town on medical appointments because there had been flight delays in the previous weeks. Community leaders and school staff that observed the meeting told the group the meeting was well attended. The meeting lasted approximately 3 hours and maintained attendance and engagement throughout.

August 30, 2023

The group reconvened at 8:30 am and discussed a plan for the day. The group debriefed to consolidate notes from the community meeting and prepared for leadership meeting scheduled for 10:00 am. A Pathfinder helicopter was scheduled for pickup for after 12:00 pm to bring the group back to Nome.

At 10:00 am, the group gathered in the Tribal Office to discuss the community meeting and solidify a list of non-monetary priorities from the community. The community had brainstormed 11 factors that the tri-org council was able to simply into four main points:

- End user cost
    - Specifically the cost to homeowners to operate and maintain the system, this includes replacement costs.
- Environmental concerns
    - Environmental concerns combine the resiliency of the system to ground instability, permafrost, climate change, storm surges, and salt exposure.
- Ease of maintenance, and
    - Diomede leadership want to be self-reliant and not depend on RMW’s or outside technicians.
- Homeowner responsibility.
    - Lighten the burden on the homeowner to maintain the system as much as possible.

See notes attached for discussion details.

After the meeting, the group packed and brought everything to the Helipad in preparation for the incoming helicopter. The helicopter agent was then able to give the update that the helicopter would not arrive until 2:00 pm. This gave the group some extra time to walk around the community and assess potential areas for construction. Pictures were taken to the north of school where the potential water storage tank is planned for construction. Past the potential tank was explored for the possibility of a septage lagoon. Construction to the North of the community was observed to be very difficult. The average slopes are greater than 30 degrees. There are slightly flatter (15–25-degree slopes) directly above the potential WST site but many grave sites could be seen from below.

Figure 3 Possible Septage Lagoon Location, Facing South

The helicopter arrived at approximately 2:00 pm and transported Chase Nelson, Brita Mjos, Richard Kuzuguk, Curtis Fincher, and Maya Wharton to Nome. The group arrived in Nome at approximately 3:30 pm. Once back in Nome, the group went to lunch and then waited for the evening flight back to Anchorage at 6:00 pm.

Attachments

- Attachment 1: Community Meeting Notes
- Attachment 2: Community Sign-in
- Attachment 3: Tri-org Meeting Notes
- Attachment 4: Tri-Org Sign-in

Attachment 1: Community Meeting Notes

Diomede Community Meeting Notes (8/29/2023)

Comments from the community below.

- You'll do all this work, then the fee will be like $100.
- A 12x12 house doesn't have room for a bathroom, will the project include bathrooms?
  - *Home additions have not been included in other similarly funded projects that we are aware of.*
- Have you gotten outside engineers input like Canada, because they do a lot of arctic pipe? Would consulting with outside engineers add to the cost of W&S to the users?
  - *We have not consulted with outside engineers at this point in the project. If we were to consult it would not affect the cost to operate the system.*
- Do other communities in Alaska, like Barrow, have systems like what Dio would get? They have the money to fix them when they need maintenance.
  - *Many communities in Alaska are operating versions of the systems we are presenting. A utility haul system, like the satellite station alternative is a common system in YK Delta region, the difference being those communities use 4-wheelers or trucks instead of the hoses. PASS has been used by other communities and was developed by ANTHC for rural Alaska.*
- Would there be financial subsidies to put W&S to the homes?
  - *Adding plumbing the inside of homes would be included in this project and therefore would be subsidized by the money available for project construction. The cost of operating will be high, and we will consider sources for subsidies.*
- What would our share of the cost be?
  - *This is dependent on the subsidies available for operating the system. We are optimistic that subsidies are available but unfortunately do not know the specifics of that.*
- I don't think NSEDC will contribute to W&S.
- I don't think we would use 50 gpd, maybe 15 to 30 gpd.
  - *ANTHC design standards are 75 gpcd which we have reduced to 50 gpcd based on other communities use. Installing piped water will change the amount of water consumed by the community for many reasons. Demand may increase with time as young people grow up with piped water. We want to design a system that allows for connivences like in-home laundry and showers. If the community does use less water than planned, that may decrease the operating cost slightly.*
- If the solid waste gets used for energy, would we factor that into the cost?
  - *Yes, waste to energy could offset some of the operating cost associated with fuel to run the system. Other renewable power sources, like wind or solar, will also offset the cost of running the system.*
- Diomede best practice score needs to go up, has to be NSHC's priority getting the score up. Have to hold monthly meeting including utility reports to raise scores.
- I raised the score when I had time at the city, now I'm pulled over to infrastructure projects. The best practice score matrix doesn't work for dio.
- Because of Starlink we can push our work, it has really improved things for dio, compared to DSL.
- Have any communities done this satellite system?

  - *While the satellite system is similar to how other communities use utility delivery and collection, it is specific to Diomede to have the dispersed satellite stations instead of using trucks or 4-wheelers.*
- So these hoses from Arctic box A, B, and C could reach all the way to the houses near that box?
  - *Yes, that is the plan.*
- How much fuel would the WTP use w/ satellite alternative? We need fuel estimates to know how much to order. Do we have enough fuel storage?
  - *The exact fuel needed will be thoroughly examined during design but at this stage we believe there is enough storage for the additional fuel needed for the treatment and circulation systems.*
- We've heard of PASS, it was supposed to happen, Fatima at VSW. Some PASS units sitting in Nome, so will likely be installed for a few years before water and sewer system.
  - *The units waiting in Nome are only separating toilets but could be a great interim solution while this project is developed.*
- The no action estimated monthly cost is over $100k more than current operating cost, currently 74,000.
  - *The no action alternative includes the operating cost for the WTP that has not been constructed yet. We included this cost because it will be the future operating cost for treated water.*
- The raw water has 3x more bacteria than the treated water.
- Have you seen the sediment that settles out of the water?
  - *We have not but the new WTP will address many of the water quality concerns.*
- We can use solid waste for energy savings.
- People might rather haul water than shovel out the satellite stations.
- Several people agreed with Richard's ideas to improve water intake with a conical debris diverter.
- You have taken time to study Dio and prepare, you are building a partnership with city and community.
- Not enough is said about the hardships of mothers to keep children and families safe in the home. Can't keep water at room temp too long before sediment and bacteria are a problem.
- The community expressed support for Alternative 2 (fully piped) and Alternative 4 (Satellite delivery and gravity sewer).

<u>Brainstormed list</u>

- End user cost
- Ease of maintenance – cost of shipping materials
- Longevity
- Corrosion resistance
- Replacement cost
- Ground instability
- Water conservation
- Energy savings
- Small footprint or vertical construction given limited space

- Homeowner maintenance/burden

Attachment 2: Community Sign-in

Sign-in Sheet

Community Meeting: Diomede Sanitation Improvements

August 17, 2023 | 6:00 – 8:00 pm | Diomede School

Name (Please write neatly)	Phone	Email
Robert Larsen	686-4179	larsenrob24@gmail.com
Robert F. Soolook Jr.	907 686-6273	robertsoolook312@gmail.com
Jared Menadelook		jaredmenadelook667@gmail.com
Ann Soolook	686 8179	
Samantha Menadelook		
Harry Goldsberry		
John Ahkvaluk		
Frances Ozenna	686-2232	Sistugofdiomede@gmail.com
Roger A. Kunayak Sr		
Robert Corbett		
Anna Ozenna	686 2232	cityofdiomede1@gmail.com
Eric Iyapana	727-3475	
John Iyapana		
Cynthia Snowball	2184	
[illegible] Ahkinga	684-1013	dio.env103@yahoo.com
Kylie Ahkvaluk		
Aurora Ahkinga		
Nova Akvaluk		

Attachment 3: Tri-Org Meeting Notes

Tri-Org Meeting Notes 8/30/2023

Attendees: Opik Marlene Akinga, Robert Soolook (Mayor), Robert Larsen(Operator), JoAnn Kaningok, Ann Soolook, Ahna Ozenna

Chase Nelson, Brita Mjos, Maya Wharton, Richard Kuzuguk, Curtis Fincher

Figure 1 Photo of Tri-Org Meeting

The available Tri-Org Council members met at approximately 10:00 am on Wednesday, August 30, 2023, to discuss the priority considerations to decide on the preferred water and sewer system for the community of Diomede. Below is the full list of priority factors discussed at the community meeting the night before. The top four non-monetary factors are highlighted in yellow below and are as follows:

- End user cost,
- Ease of maintenance,
- Environmental concerns, and
- Homeowner responsibility.

Factors that have been struck out were combined with more general priorities. The comments in relation to each factor by community members are below.

1. End user cost
    a. End user cost and replacement cost can also group together.
    b. Diomede is signed up with CUAP recently (a format of subsidy) EMI's Helmsley funds going to CUAP and must be spent.
    c. Sharon McConnell helping with Kawerak's support of taxes and workman's comp – Richard Kuzuguk
    d. Everyone agrees end user cost is a top factor.
2. Ease of maintenance
    a. Need to have the best of the best here to not require constant maintenance.
    b. Build system with parts that won't freeze up or require RMW's or technicians.

    c. City's sewage system overflows every winter, smells in the washeteria. New pump was left sitting outside last winter.
    d. If the city is responsible for the system, which they will be, there needs to be training for the residents.

3. ~~Longevity~~ Environmental Concerns
    a. We're moving westward, daily, annually, we don't feel it but we are moving.
    b. Agreement to lump ground stability, permafrost, climate change, storm surges, and salt exposure into "Environmental Concerns."
    c. Sewage lagoon location should be moved to other end of town to avoid impacting seaweed and crab harvesting areas.
    d. Environmental factors (ground movement, storm surge, corrosion) can be grouped into Longevity and is considered a top factor.
4. ~~Corrosion resistance~~
5. ~~Replacement cost~~
6. ~~Ground instability~~
7. Water conservation
    a. School is metered, clinic was supposed to have meter.
    b. Some confusion about how much water is being used.
8. Energy savings
9. Small footprint or vertical construction given limited space.
    a. Pipes will be aboveground under boardwalks as much as possible but will be exposed for service connections. The arctic pipe is large and will be between 12"-22".
    b. Pipes to houses won't be a problem as far as obstacles, we're an island of rocks and anywhere can be a trail.
    c. Proposed locations for new WST are not concrete since sites were identified in winter.
10. Operator demands.
11. Homeowner maintenance/burden
    a. Create a list of homeowner/building responsibilities for each alternative.
    b. Homeowner responsibility should be clearly communicated for community to understand before planning.
    c. Richard Kuzuguk – Request flexible service connections to homes to reduce maintenance.
    d. Homeowner maintenance requirements should be minimized and made a priority.
12. Water source improvement
    a. Not included in discussion because each alternative will address this equally.
13. Collaboration with other funding agencies
    a. Grants and funding are always available so collaborating with other funders is not a top priority.

Attachment 4: Tri-Org Sign-in

Tri-Org Meeting: Diomede Sanitation Improvements
Sign-in Sheet

Friday, August 18, 2023 | 10:00 am – 12:00 pm | Tribal Council Office

Please write neatly – thank you 😊!

Name	Phone	Email
JoAnn C. Kaningok	907-684-1025	jKaningok@dio.bssd.org
Robert F. Soolook Jr.	(907) 684-6273	robertsoolookjr312@gmail.com
Ann Soolook	907 686-8179	None
Anna Ozenna	907 686 3071	cityofdiomede1@gmail.com

APPENDIX 6:

WATER SOURCE DESKTOP

TECHNICAL MEMORANDUM

TO:	Will Moran, Project Manager
FROM:	Cara Shonsey, PE, Stephan Bradley, PE and Chase Nelson, PE
DATE:	July 17, 2023
PROJECT:	Water Source Quality and Quantity Desktop Study – Little Diomede First Service Water and Sewer ePER

In accordance with Delivery Order 23-D-200815, this memorandum presents the results of our existing water source quality and quantity desktop study for the Alaska Native Tribal Health Consortium (ANTHC) First Service Water and Sewer Project in Diomede, Alaska. The review and discussion are intended to support a decision to either continue using the existing surface water source or to develop an additional source or sources as part of the alternatives that will be developed to improve sanitation services for the community. Also included is a summary of a review of the water treatment methods and design that are proposed for construction during the summer of 2023.

The community is currently on a fill and draw system that is highly dependent on "high" flows (30 gpm or higher) from the surface water source that occur for about a month and half as a result of snow accumulation. "Low" flows (average of 5 gpm) are captured for an additional month and a half to two months to top off tanks before the surface water source stops flowing. The community then relies on stored treated water for 7 to 8 months of the year while the source is not active. The surface water source has not been well studied; however, it is our understanding that the water has been consistently available and used by the community for many years now. During the time when the surface water source is running, a significant amount of effort is required by the operators to capture the water and maintain flow due to plugging from mobilized sediment.

The raw surface water contains high levels of naturally occurring arsenic and nitrates that are a result of the large bird population that resides on the island in the summer. The water is not currently treated to EPA drinking water standards; however, proposed upgrades to the water treatment plant planned for construction the summer of 2023 are designed to treat the current surface water source to meet EPA drinking water standards.

CURRENT SURFACE WATER SUPPLY - WATER QUANTITY

Background

Water supply for the community is provided by a seasonal surface water source located in a shallow channel approximately 40 feet wide that has formed in the bottom of a talus filled ravine approximately 1500 feet south of the community (Photo Log, Figure 1 and 2). The flow as it moves down the channel appears and disappears within the talus. It is our understanding that the flow has consistently appeared on the surface at the current intake location which is at approximate elevation of 314 feet; however, it disappears down slope. Community members have documented the appearance of other surface water above the community at what seem to be similar elevations which may indicate a geologic "control" or consistent occurrence of subsurface geologic conditions at that elevation that moves water to the surface after it drains from the upper slopes (Photo Log, Figure 3). A geophysics study was performed just above the intake by Golder (1998) estimating that the top of bedrock is located approximately 60 feet below the surface of the talus. The study however does not state if the geophysical results indicate that there is water running in the talus below the surface or the geometry of the channel (ie a thaw bulb surrounded by permafrost at depth).

The water in the channel reportedly runs from June to October. Flows in the transmission line have been estimated mostly by visual observation. Flows in the channel are partially obscured by the large diameter surface material and therefore even visual observations have not been documented. It is our understanding that the tank levels are periodically measured by hand by the operators; however, the information has not been provided for this study. "High" flow through the transmission line is estimated at 30 gpm (ANTHC 2018) and above from June to July while snow is melting. ANTHC estimated "high" flows of over 100 gpm in the transmission line July 6, 2021 by timing how long it took to fill a bucket of known volume (ANTHC 2021b). From August to September, after snow melt, flow can be intermittent in the channel occurring after rain events and "low" flow in the transmission line averages 5 gpm from August through September. The flow stops around the end of September or October (ANTHC 2018, Golder 1998) once temperatures are consistently below freezing.

Water is captured by multiple open-ended HDPE pipes set into the shallow channel that feed into an intake manifold (Photo Log, Figure 4). The intake was updated in 2005 by ANTHC (ANTHC 2018). Capturing runoff requires constant adjustment by the operator to maintain a pool of water as sediment and organics mobilize and constantly change the flow path of water through the talus. The constant movement of sediment also quickly clogs intake screens. During the site visit in February 2023, the City Administrator commented that the operator removed the screens toward the end of Summer of 2022 to reduce his maintenance load. Similar reports of screen removal are documented in the Water Source and Storage Investigation by Golder (1998). The current tank is filled during "high" flows and is then topped off later in the year before "low" flow stops in the channel.

The watershed or contributing basin above the intake is the largest on the west side of Little Diomede Island estimated to be 40 acres based on a cursory review that could be enhanced by improved topographic data. The watershed fills with multiple feet of snow (Golder 1998). During the geophysics site visit an observation was made by Golder (1998) that the watershed had 6 to 10 feet of snow in some places near the intake. Site specific data related to precipitation and snow accumulation is not being collected.

Various reports have commented that the community routinely runs low on water and is forced to ration staring in March, April (CRW 2012, Golder 1998). The most recent occurrence reviewed indicated that the community had to ration water in late May of 2021 due to a late thaw (ANTHC 2021a).

Water Use and Storage

If the community were to receive piped water and wastewater direct to their homes, it is estimated that water use could increase to a maximum rate of approximately 75 gpcd (ANTHC 2022). A review of water use by surrounding communities that receive piped water to their home however indicate that this use rate may be closer to 50 gpcd. A more detailed discussion of design use rates will be included in the ePER. For this memorandum water use rates of 20 to 75 gpcd (ANTHC 2018) will be discussed.

If water use increases above 20 gpcd, additional storage will be required above the total current (424,000-gallon tank) and planned (340,000-gallon tank) amount of 764,000 gallons. Estimated storage amounts are provided below in Table 1 and the attached Table A and range from 550,000 gallons to 2 M gallons, based on an assumption that 300 days of storage will be required. Estimates were checked with a more detailed analysis of when the surface water source is available and when it produces at higher rates in June and July (Attached Tables B and C). Also, in Table 1 is the estimated hours of operation that the proposed Water Treatment Plant (WTP) would need to operate during the high flow season if storage tanks only held treated water. The hours of operation could decrease if raw water was also stored and treated at other times of the year.

The estimated hours of operation each day when the WTP will need to treat water range from 6 to 30. There are only 24 hours in a day therefore the 30 hours estimated for a water use rate of 75 gpcd is not achievable. To supply water at a rate of 75 gpcd, raw water storage would need to be created or the treatment rate of the water treatment plant would need to be increased to approximately 40 gpm. Raw water storage and the rate of treatment may not be needed if the intake or basin were improved to lengthen the high flow duration to 55 or 60 days or roughly the end of July instead of the middle of July as is currently assumed.

Storage estimates are based on the following assumptions:

- 300 days of storage
- The maximum design treatment rate of the proposed water treatment plant is 30 gpm
- The surface water source is active for 106 days out of the year
- The surface water source can provide 30 gpm or more for 44 days
- The surface water source can provide an average of 5 gpm for an addition 62 days.
- The population is expected to grow to approximately 93 people over the next 25 years based on an estimated population growth of 0.5%. The growth rate is based on the estimated average growth rate for the Nome Census District for the next 25 years according to the Alaska Department of Labor and Workforce Development (ADLWD, 2020).
- Fire suppression storage should be a minimum of 2,000 gpm for 15 minutes, or 30,000 gallons. This design basis volume should be reviewed later based on the firefighting equipment available and should comply with NFPA 22.
- Current water storage available is the existing 424,000-gallon tank and the 340,000-gallon tank proposed north of the school.

Table 1 : Water Storage Required Based on 300 days of Storage

Population	Water use (assume school, washeteria, backwash, and water loss included) (gpcd)	Total Water Use Per Day (gallons)	Storage (days)	Estimated Storage Required (Gallons)	Additional Storage Required Above Planned Amount (gallons)	Required WTP Hours of Operation per Day During “high flow”
93	75	6,975	300	2,092,500	1,328,500	30
93	50	4,650	300	1,395,000	631,000	19
93	35	3,255	300	976,500	212,500	13
93	30	2,790	300	837,000	73,000	11

93	20	1,860	300	558,000	0	6

Snowpack Vulnerability

Water storage is highly dependent on the “high” flows associated with melting snowpack therefore a brief review of the forecasted snowpack has been performed. The future snowpack projections on Little Diomede were studied with the Scenarios Network for Alaska and Arctic Planning model (SNAP, 2022). This model was created by the International Arctic Research Center at the University of Alaska Fairbanks (UAF) and uses representative concentration pathways (RCPs) to review possible future climate scenarios based on greenhouse gas concentrations. The RCP 4.5 and 8.5 were reviewed for the 20-year outlook at Little Diomede. The RCP 4.5 assumes reduced emissions and RCP 8.5 assumes emissions increase throughout the period. The months with average temperatures below freezing are included in Table 2

Table 2 SNAP Climate Projections

Date Range	Scenario	Unit	January	February	March	April	May	October	November	December	Annual predicted snowpack (in)	Percent Change in Snowpack
Historical	PRISM	°F	2.12	-5.44	-1.12	8.96	27.5	27.32	15.08	2.84		
	PRISM	in	0.63	0.51	0.39	0.43	0.4	1.34	0.94	0.63	5.28	-
2030-39	RCP 4.5	°F	10.76	3.02	6.8	13.64	30.7	**32.18**	24.26	14		
		in	0.71	0.59	0.47	0.47	0.43	**1.5***	1.14	0.83	4.65	-12%
	RCP 8.5	°F	13.82	5	6.44	14.72	30.9	**32.54**	24.98	16.88		
		in	0.79	0.63	0.47	0.43	0.43	**1.54***	1.06	0.91	4.72	-10%
2060-69	RCP 4.5	°F	16.52	7.34	8.06	18.14	**33.3**	**34.16**	26.6	19.76		
		in	0.83	0.63	0.51	0.51	**0.47***	**1.69***	1.18	0.79	4.65	-12%
	RCP 8.5	°F	24.08	13.28	13.64	21.02	**34.7**	**36.14**	30.38	25.52		
		in	1.02	0.75	0.59	0.55	**0.55***	**1.69***	1.26	1.06	5.24	-1%

*Not included in annual predicted snowpack

Based on the SNAP model the snowpack totals are predicted to decrease by 10% to 12% by 2039 and 1% to 12% by 2069 due to an increase in temperatures. Precipitation and temperature are both projected to increase. The increase in temperature has conservatively been interpreted as precipitation falling as snow to falling as rain for the month of October for all scenarios and October and May for the 2060-2069 projected scenarios. The precipitation that will fall as rain is expected to increase from 11% to 12% by 2039 and 21% to 25% for 2060 to 2069. Mean temperatures, not shown from June through September, are predicted to increase by an average of 8% to 10% from 2030 to 2039 and 13% to 18% from 2060 to 2069. The increase in summer temps will melt the snowpack more rapidly.

In 2022, a study was also conducted on the climate and hydrology projections for Alaska and Hawaii using ten global climate models using RCP 4.5 and 8.5. This research was conducted by the National Center for Atmospheric Research, United States Geological Survey and others. The models predict large reductions in seasonal snowpack (50–100 %) along the Gulf of Alaska and Bering Sea from 2040 to 2099 (Mizukami et. All, 2022). The projection however is for a very large area and therefore the downscaled estimates reported above have been used in further discussion.

Drainage Basin and Channel

Early season flow in the channel is controlled by ambient temperature fluctuations; however, specific historical site information related to ambient temperature fluctuations and flows in the surface water channel are not available. For preliminary discussion, an estimate of rate of flow equally distributed over the “high” flow time period has been calculated below in Table 3 based on the assumed parameters that the watershed is approximately 40 acres, high flows in the channel are observed for approximately 44 days (June 1 to July 15), and average snowpack can vary between 1 to 5 feet deep (no snow water equivalent applied).

Table 3: Estimated volume of water available from watershed assuming varying snow pack

Average depth of snow across watershed (feet)	Size of Watershed (acres)	Estimated volume of water available (gallons)	GPM available if released equally for 44 days	
1	40	13,034,109	206	
2	40	26,068,219	411	
3	40	39,102,328	617	
4	40	52,136,437	823	
5	40	65,170,546	1029	

The potential amount of water that could be released in the snowpack over the watershed is relatively small. The historically observed flows of 50 to 100 gallons plus in the transmission line indicate the majority of the water released by snowpack is actually running close to the surface based on preliminary estimates of channel geometry provided in Table 4 assuming velocities from 1.4 to 0.5 feet per second based on published information for open channel flow through mountain streams with high occurrence of woody debris and large material by Yochum et al. (2011) and also a reduced rate of 0.5 ft/s.

Table 4: Flow estimates for current surface water channel based on different channel geometry and velocity

Velocity (ft/s)	Width of Channel (ft)	Depth of Channel (feet)	Flow (cubic feet/second)	Flow (GPM)

1.4	40	1	56	25,133
0.5	40	1	20	8,976
1.4	10	1	14	6,283
0.5	10	1	5	2,244
1.4	2	2	6	2,513
0.5	2	2	2	898

CURRENT SURFACE WATER SOURCE – RAW WATER QUALITY

ANTHC has been collecting and testing raw water samples of the current surface water source since 2003. A summary of the results provided by ANTHC is included in Table C with a comparison to Environmental Protection Agency (EPA) primary and secondary drinking water standards maximum contaminant limits (MCLs). In addition to the MCLs identified in the table the raw water is subject to the EPA surface water treatment rules. Both the standards and the rules that apply to the system are a part of the EPA Safe Drinking Water Act.

Results show significant variance in the individual parameter values. Arsenic and nitrate levels in the raw water increased significantly after a raw water pipeline project was completed in 2005 (ANTHC 2018). No additional information on the cause of this change was identified in the study and none could be found during this review. It is likely that these parameters are changing due to natural processes and should not be expected to improve by changing the location or type of intake structure.

Primary drinking water MCLs exceeded include arsenic, nitrate, lead, selenium, and pH levels. Recent testing results for selenium and lead were not provided in the 2020 and 2021 testing. The abnormally high results from 2019 suggest a possible error and the water source should be retested for those parameters.

- Arsenic levels have varied from 7 to 37 µg/l from 2020 to 2021 far exceeding the MCL limit of 10 µg/l.
- Nitrate levels have varied from 11 to 14 µg/l, exceeding the MCL of 10 µg/l.
- pH was measured at 5 and below; however recent testing was again not provided for our review.

Secondary standards exceeded are aluminum, manganese, and silver. Treatment of the secondary contaminants that exceed standards are not mandated but are recommended.

Review of Proposed Water Treatment Design, Methods, and Operation and Maintenance

Upgrades to the WTP building and treatment are planned for construction summer of 2023. The current surface water source method of treatment is greensand filtration, granular activated carbon, and ion exchange (ANTHC project AN-19-N7P) of the existing surface water source. A review of the construction plan set (ANTHC 2023b) and the final pilot study report (ANTHC 2023a) was performed.

Overall, the proposed system provides an effective means of treating the existing raw surface water to meet EPA drinking water standards. A pilot study was completed by ANTHC (2022) and confirmed the above treatment methods would be successful. This pilot study did not include estimates of required backwash water, filter to waste water, or regen water, therefore, no estimate of overall system recovery rates were provided. The 2018 PER gave a value of 95% recovery for the ion exchange process. A typical multimedia filtration system would have an overall efficiency between 95% and 98%. The GAC filters would have an overall efficiency of 98% or greater. Taking these together, the overall efficiency of the proposed system should fall in the 90% to 92% range.

The following is a summary of the design and methods for treatment and the design of the building. Suggestions for improvements and operation and maintenance considerations are provided throughout the summary and should be considered for adjustment during construction in 2023 or as future effort that would result as part of the ePER.

The existing surface water is collected at the current intake and then flows toward the wood stave tank with the option for bypass.

- *The wood stave tank could be lined with a NSF61 approved plastic liner and continue to provide water to a non-potable system as well as function as a raw water collection tank to provide surge volume to feed the proposed filtration system. This lining is not part of the current design, which assumes bypassing this tank.*
- *Additional insulation and heat tracing should be considered on some of the raw water lines.*

The proposed filtration system consists of multiple processes each designed to remove specific contaminants in the raw water stream. Raw water would be screened to remove larger particulates. Potassium permanganate is injected into the screened raw water to oxidize iron, manganese, and some organic compounds. The oxidized water is routed through a contact tank to provide reaction time followed by the addition of a polymer to assist in coagulation of oxidized solids. The polymer dosing rate is controlled by a streaming current detector.

- *These devices are notoriously difficult to maintain and operate. While they do provide an excellent method of dosing control, they require tuning, cleaning, and operator attention to establish a baseline for calibration of the polymer dosing rate. Operators should expect to spend the first year optimizing this device before it can be relied upon.*

After oxidation and polymer addition, water is sent through a multimedia pressure filter that contains anthracite, greensand, and support media. The greensand is a natural ion exchange resin capable of providing softening and removing iron, manganese, and hydrogen sulfide from water. The anthracite will provide physical filtration of solids and the support media provides a layer to keep the outlet collection header free of smaller filter media to improve flow. Excess permanganate is typically fed to the greensand filter to continuously regenerate the media. This equipment requires periodic backwash cycles to purge filtered solids and oxidized material. The backwash cycles may also include air purging to agitate the filter media for more effective solids removal. Once backwashing is complete, a short filter to waste cycle reestablishes the flow patterns prior to bringing the filters back online.

- *Backwash cycles should be triggered by monitoring the filter outlet turbidity using a Hach 5300U turbidimeter. This unit is very reliable and easy to maintain. High turbidity triggers a backwash cycle. Once the backwash is complete, a filter to waste cycle begins and the* *filtered water turbidity is monitored until it falls below a predetermined level (normally less than 0.2 NTU) when the unit can be returned to service.*

After multimedia filtration, the filtered water is sent through another filter vessel filled with granular activated carbon (GAC) media. GAC is used to remove any remaining organics (reducing TOC levels) to prevent formation of disinfection byproducts when chlorine is added to the treated water.

- *This system is monitored using ultraviolet (UV) light at a wavelength of 254 nm, commonly called UV_{254}. UV_{254} meters are typically very easy to use and are reliable; however, they do not typically correlate well with TOC removal and instead are often better calibrated to the actual DBP levels anticipated in the treated water.*
- *The operators should expect to collect data over the first two years to develop a correlation between the UV_{254} value and expected DBP values. Once this has been completed, the operators will be able to predict when the GAC media requires replacement.*

The proposed system includes an ion exchange process after GAC filtration to assist with polishing the treated water. This polishing step will remove arsenic, aluminum, nitrate, and other metals present in the raw water depending on the selected ion exchange resin. The resin requires regeneration with a brine solution followed by rinsing with potable quality water. This process is mostly automated and is a reliable method of removing difficult to filter contaminants.

After the treatment steps have been completed, the resulting water will be free of most ions, including calcium carbonate, and will have a very low pH. This water would be considered corrosive and/or aggressive in nature.

- *To address this issue, a calcite contactor has been provided to dissolve calcium carbonate into the water. No calcium hydroxide for pH adjustment has been provided; however, it is strongly suggested that this option be added to the system to ensure maximum flexibility in controlling the aggressiveness of the treated water.*

Treated water will be stored in the existing 424,000 gallon tank or the proposed 340,000 gallon tank.

- *Given the low turnover in a tank of this size, water circulation and chlorine residual monitoring would also be recommended. The selected treatment method must consider the impact of residual organics (total organic carbon, or TOC) on the formation potential of disinfection byproducts (DBPs). Since the stored volume will remain in the tank for several months, DBPs could be a concern if the selected treatment system does not remove TOC adequately.*

The proposed treatment system is designed to fit into the existing treatment building after some upgrades are completed. The 95% design package prepared by ANTHC (2023) outlines the demolition and additions required to upgrade this building for future filtration equipment.

- *It is recommended that fuel storage be separated from the filtration equipment regardless of the technology selected. The fuel system and boilers should be isolated in a separate room with an automatic fire suppression system. EPA guidelines for chemical* *storage recommends the storage of paint, antifreeze, detergent, oil, grease, fuel, solvent, and beverages be separate from water treatment chemical storage. In addition, polymer and strong bases should be stored separately.*

ALTERNATIVE WATER SOURCES

Further discussion is provided below regarding the reliability of the current surface water source to produce the required water should water use increase. Alternative water sources are available; however, developing the alternative sources have the potential to introduce additional operation and maintenance responsibilities or there are significant unknowns related to the ability of an alternative source to produce. Alternative sources discussed below include additional surface water sources, groundwater, and seawater.

Surface Water

Surface water on the island is limited to steep drainage courses located on the perimeter of the island. Golder (1998) performed a review of additional surface water drainages on the island and found that additional sources pose similar challenges for capture as the current source and provide flow at similar or shorter times of the year therefore there is no advantage to switching to another surface water source.

The springs located just above the community may however be used to supplement the current supply (Golder 1998). The community is already actively doing this using HDPE lines that connect to the main transmission line that can be moved easily (ANTHC 2021a). The quality produced by these sources are unknown.

Groundwater

A review of the hydrogeologic conceptual model by Golder (1998) concludes that establishing a sufficient year-round freshwater groundwater source in the fractured bedrock below the unconsolidated talus is unlikely. Based on a geophysical survey and review of existing geologic information, the bedrock is estimated to contain few fractures. The majority of the recharge to the few fractures that exist occurs when the active layer is still present in the summer likely creating a barrier to flow entering the fractures.

Golder (1998) suggests that a shallow groundwater well that produces water from the shallow fractured bedrock and unconsolidated material above the bedrock in the same drainage basin as the surface water source may extend the length of time the community can access water, albeit with anticipated similar quality. However, the cursory analysis of the channel and available production provided above indicates water is not flowing very far underneath the surface. Due to the low flows also observed in the summer months it is likely that fine sediments packed between the large diameter material is allowing the water to remain shallow in the channel near the intake. Frozen ground created by the active layer in the spring near the surface may also be assisting but does not seem to be the only less permeable layer within the talus slope

Shallow groundwater wells advanced near the beach downslope of the current surface water source may be an option to extend the amount of time when water can be produced. Test wells could be advanced if a geotechnical investigation was performed to further the design of other proposed infrastructure and not require the need to sling equipment to higher elevations.

Seawater

The known disadvantages of processing seawater into drinking water are a high power cost and high level of operator training / qualifications. Therefore, the selection of a seawater source is likely to hinge on surface water reliability and other non-financial factors. Modern reverse osmosis (RO) systems are reliable, automated, and produce very high-quality water after minor post-treatment pH adjustment. Seawater as a source is limited only by the intake structure and redundant structures provide a method to ensure the system can produce drinking water reliably throughout the year.

Using seawater as a raw water source and desalination with RO as a treatment method provides several benefits to any proposed upgraded potable water system. An unlimited raw water supply is available year-round which could potentially lower treated water storage volume requirements. RO treated seawater will have nearly zero TOC levels which results in a lower risk of DBPs.

Seawater and RO treatment also presents several challenges to the community. A well-trained system operator will be required to monitor and maintain the RO system. High power costs have been mentioned previously, but it should also be noted that the treatment process could not be online if power is lost for any reason without the use of a backup generator. Product water from an RO system will typically require post-treatment to balance the water and prevent corrosion in piping systems. Based on our institutional knowledge of similar systems membranes and RO provide high quality treatment, but the consequences of failure are expensive and these systems often require very dedicated and consistent operators who are well trained.

Blended Raw Water

Blending seawater and the existing raw water sources prior to treatment is another method of improving the performance of a membrane-based treatment system. A blend of water from the raw water storage tank and the beach well intake could be sent to a RO skid during certain times of the year. This technique would reduce the osmotic pressure of the blended water stream, resulting in a lower inlet pressure at the membranes and a higher recovery rate. To evaluate the performance difference between blended and seawater as a source, further raw water testing of the seawater source would be required. Using additional test data, a model could be developed to predict the reduced operating costs associated with blending.

Blended raw water does introduce additional complications, mostly related to a potential for organic membrane fouling that would need to be cleaned with caustic cleaning processes. Any membrane skid should be specified to include clean-in-place (CIP) equipment on the skid so the operators have all options available to them for maintaining the system regardless of the feed water quality change over time.

DISCUSSION

Based on the information reviewed, the current surface water source can meet the increased demand associated with piped services if the decrease in snowpack does not exceed the projected amount stated. The surface water source however creates a substantial amount of risk to continue to support the community because it does not provide a year-round source in the case the something should go wrong with the system in the winter. The cursory evaluation of the snowpack also does not include conditions where snowpack falls below the average. If surface water will be the source for the community, additional upgrades should be included in projects going forward such as increasing the treatment rate of the above 30 gpm and improving the intake to capture more water. Snow fences should also be constructed in the watershed. O&M costs should assume that at least two operators will be employed by the community to allow for longer treatment periods when the surface water source is running at a high rate due to snow melt. It is our understanding that ANTHC is already suggesting to the community that a second operator may be necessary to operate the new WTP.

The attached Table D provides a brief estimate of hours of operation for the WTP to meet storage requirements if the snowpack decreases by 12%, temperatures increased by 10%, “high” flows occur for only 40 days (90% of the 44 days assumed currently), and water treatment remained at 30 gpm. If water use increased to 75 gpcd the WTP could not operate long enough every day at its current treatment rate unless one of the tanks is switched to raw water storage.

If the flows captured during the “low” flow time period do not increase to offset the amount of water use during that period, the storage capacity available to the community would also need to increase. Water use of 50 to 75 gpcd requires treatment rates of 8 to 11 gpm during the low flow period to prevent reduction of storage tank levels. Adding 12% to the already low average flow (5 gpm) during the “low” flow periods only increases flow to a little less than 1 gpm, therefore improved capture would be needed.

A preliminary concept for intake upgrades has been provided in Figure 1. The design is based on the assumption that the majority of the flow is maintained at the surface of the channel as stated earlier. The upgraded intake would extend no deeper than 6 feet in the channel and be located just below where the flow is currently at the surface and has historically been maintained. The intake concept can be constructed easily by hand as site access for equipment and materials is limited. Based on our institutional knowledge the talus can be removed by hand using pry bars and manually driven hydraulic shoring and larger material can be broken into more manageable pieces using chemical additives or very small amounts of dynamite. The upgrades to the intake would also have the added benefit of reducing current operator maintenance efforts by creating more reliable capture and reducing sediment loading through the application of filter material that could be dropped by super sack from a helicopter sling or brought up by hand.

Additional reasons for continuing to use the surface water source are associated with operation and maintenance. A more detailed discussion will be provided in the 65% ePER; however, the cost of operating an RO unit, will be higher than surface water filtration. Based on our institutional knowledge of the operation of membrane systems, the RO unit will be a similar (possibly less) amount of effort to maintain for the operators when compared to the four operations (Potassium permanganate and contact chamber, green sand filters, GAC filters, and ion exchange vessels) that are currently planned at part of the WTP upgrades for 2023.

Lower storage volumes could be used if a more reliable source water were selected (RO); however, consideration should be given to providing more storage and maintaining access to the surface water source as part of the project in the case that additional water treatment is too difficult to maintain or there are significant time periods where treatment is offline. Additional storage means the community would have increased options to maintain access to an increased amount of water and therefore increase the level of sanitation.

Further consideration should be given to improving the information reviewed for this memorandum. Additional study includes recording the flows in the transmission line by installing a logging flow meter near the WTP, installing a pressure transducer in the existing water storage tank, and periodically measuring the snowpack in the watershed before thaw.

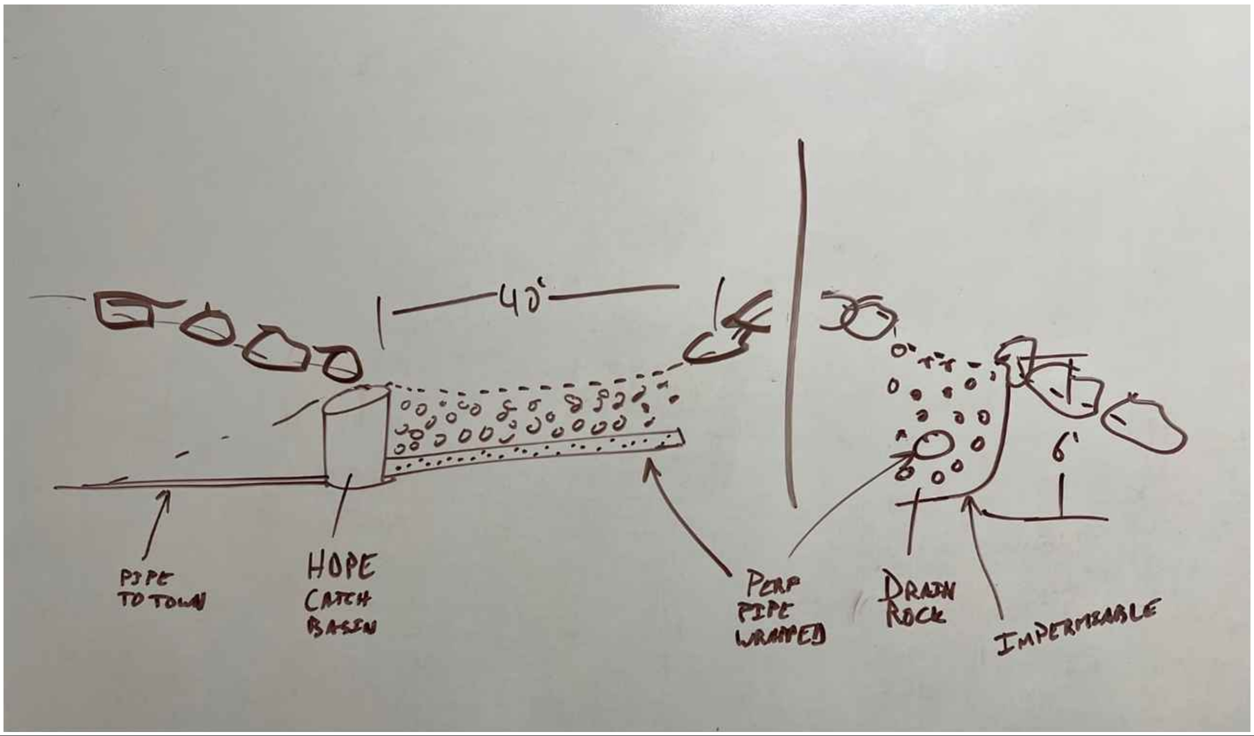


Figure 1: Preliminary Intake Concept

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APPENDIX 7:
DIOMEDE FINANCIAL REPORTS
FY21-22

Budget Appropriations Ordinance

Ordinance No. 2021-06
AN ORDINANCE FOR THE CITY OF PROVIDING FOR THE ESTABLISHMENT AND ADOPTION OF THE BUDGET FOR FISCAL YEAR 2022

BE IT ENACTED BY THE COUNCIL OF THE CITY OF Diomede

Section 1. Classification.

This is a **Non-Code Ordinance.**

Section 2. General Provisions.

The attached document is the authorized budget of revenues and expenditures for the period July 1 through June 30 and is made a matter of public record.

Section 3. Effective Date.

This ordinance becomes effective upon its adoption by the city council.

First Reading September 21, 2021
Public Hearing September 28, 2021

ADOPTED by a duly constituted quorum of the City Council of Diomede, Alaska, this 28th day of September, 2021.

[signature]
Mayor

ATTEST: Heather Ivanoff
City Clerk

Attachment: Authorized FY 21 Revenues and Expenditures.

*or the Manager, if the Manager plan has been adopted.

Original *- To be kept by city.*
Copy *- To be returned to the Department of Commerce, Community, and Economic Development*

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
Prior Year Cash Balance	$198,133.50	$54,527.98
Heating Fuel Asset (in cash)	$0.00	
Heating Fuel Asset (in gallons)	$0.00	
Repair and replacement fund W&S	$0.00	
Capital improvement fund	$0.00	
ADMINISTRATION & FINANCE INCOME		
Sales Tax (%)	$21,727.55	$25,000.00
Building rentals	$13,950.00	$14,000.00
Equipment Rentals/Leases		$5,000.00
Community Revenue Sharing	$75,032.63	$75,361.34
Payment in Lieu of Taxes	$13,376.92	$13,380.00
Fines and penalties		
Bank Interest deposits		$25.00
NSEDC COVID-19 CBS	100,000.00 ~~$1,000,000.00~~	
NSEDC CBS YR 19	$4,313.32	
NSEDC CBS YR 20	$39,415.08	
NSEDC CBS YR 21		
NSEDC Employment Training	$12,928.57	
IRS Back Tax Refund	$12,391.91	
Miscellaneous	$700.01	$1,000.00
Other		
Other		
TOTAL ADMINISTRATION & FINANCE INCOME	$1,193,835.99	$133,766.34

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
ADMINISTRATION & FINANCE EXPENSES		
Salaries	$28,055.33	$41,580.00
Payroll Taxes	$8,053.16	$8,500.00
Workers Comp		$1,000.00
Airfare	$700.00	
Per Diem		
Telephone/Internet	$2,714.14	$4,560.00
Electricity	$2,143.68	$2,160.00
Heating Oil		$10,000.00
Office Supplies	$1,684.88	$5,600.00
Postage supplies		$150.00
Computer and Accessories		$1,500.00
Insurance		$1,000.00
Membership dues & fees		$500.00
Bank Service Charge	$169.27	$192.00
Miscellaneous	$7,869.93	$1,000.00
IRS Back Taxes	$14,370.73	$4,000.00
Purchased Equipment	$1,371.00	$2,000.00
Local Match Funds Plan & Design	$26,295.00	
Public Donations		$1,000.00
Other		
Other		
Subsidy to Water/Sewer		
Subsidy to Washeteria		
Other NSEDC CBS YR xx		
Other NSEDC CBS YR XX		
Other NSEDC CBS YR xx		
Other NSEDC CBS YR XX		
Other NSEDC CBS YR XX		
TOTAL ADMIN. & FINANCE EXPENSES	$93,427.12	$84,742.00
ADMINISTRATION & FINANCE NET	$1,100,408.87	$49,024.34

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
CITY COUNCIL EXPENSES		
Salaries: Election Judges	$470.27	$475.00
Stipends	$11,354.94	$12,600.00
Payroll taxes	$1,807.84	$1,900.00
Mayor's Compensation	$1,100.00	$1,200.00
Joint Meeting	$0.00	$2,100.00
Election Refreshments	$13.77	$100.00
Membership dues	$0.00	$150.00
Other		
TOTAL COUNCIL EXPENSES	$14,746.82	$18,525.00
PUBLIC SAFETY EXPENSES		
Salaries	$4,957.33	$5,376.00
Payroll Taxes	$1,018.63	$1,350.00
Workers Comp		
Other duty guard	$367.40	$400.00
Other bear watch		$1,200.00
Other		
other		
other		
TOTAL PUBLIC SAFETY EXPENSES	$6,343.36	$8,326.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
FIRE EXPENSES		
Salaries		
Payroll taxes		
Workers Compensation		
Stipends		$4,000.00
Repairs/Maintenance		
Other: freight		
TOTAL FIRE EXPENSES	$0.00	$4,000.00
STREETS and ROADS EXPENSES		
Salaries		$3,000.00
Payroll Taxes		$1,000.00
Workers Comp		
Other dog disposal fee		
Postage supplies	$0.00	
Other shovels	$284.95	$500.00
Shipping for Shovels	$30.00	$35.00
Fuel oil	$0.00	
Building materials	$0.00	
Other	$0.00	
Other	$0.00	
TOTAL STREETS and ROADS EXPENSES	$314.95	$4,535.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
HEAVY EQUIPMENT EXPENSES		
Salaries	$850.87	$2,000.00
Payroll Taxes	$242.06	$600.00
Workers Comp		
Vehicle/equipment maintenance		$800.00
Other: Freight		$500.00
Parts and Lube Oil	$1,015.00	$3,500.00
Other	$0.00	
other	$0.00	
TOTAL STREETS and ROADS EXPENSES	$2,107.93	$7,400.00
ELECTRIC UTILITY		
Electrical Income for Inaliq, DBA	$33,812.56	
Wells Fargo Refund	$460.00	
Wells Fargo Deposit Error	$0.60	
TOTAL ELECTRIC UTILITY INCOME	$34,273.16	

Etta/adge

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
ELECTRIC UTILITY EXPENSES		
Salaries	$1,948.81	$4,000.00
Payroll Taxes	$3,216.50	$3,400.00
Telephone	$2,056.00	$2,160.00
Stipends	$5,974.54	$12,600.00
Electricity		$960.00
Office Supplies	$845.64	$1,200.00
Postage suppiles	$0.00	$50.00
Bank Service Charge	$5.00	$10.00
Freight for Glycol & Antifreeze	$480.00	$1,000.00
Power Plant Generator	$1,811.75	
Equipment Upgràde - Inaliq, DBA	$6,541.81	
PCE 2020 - Inaliq, DBA	$21,719.02	
IRS Back Taxes	$1,148.98	
Other:		
Other:		
Other:		
TOTAL ELECTRIC UTILITY EXPENSES	$45,748.05	$25,380.00
EIECTRIC UTILITY NET	-$11,474.89	-$25,380.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
GARBARGE & LANDFILL INCOME		
Garbage fee	$0.00	
SUBSIDY from		
TOTAL GARBARGE & LANDFILL INCOME	$0.00	$0.00
GARBARGE & LANDFILL EXPENSES		
Salaries		
Payroll Taxes		
Workers Comp		
Equipment		
Membership dues		
other	$0.00	
other	$0.00	
Equipment maintenance		
Vehicle/equipment repair		
Equipment rental		
Equipment fuel		
Water sample freight		
Membership dues		
TOTAL GARBARGE & LANDFILL EXPENSES	$0.00	$0.00
GARBAGE & LANDFILL NET	$0.00	$0.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
WATER/SEWER DEPARTMENT		
Water Commercial Sales - Revenues	$25,362.00	$28,000.00
Bank Interest Deposit	$5.70	$10.00
IRS Refund	$386.68	
Other: Subsdidy from NSEDC CBS FY xx w/s pay		
Other: Subsidy from NSEDC CBS FY xx w/s pay		
Other: Subsdidy from Admin/finance		$9,600.00
TOTAL WATER/SEWER INCOME	$25,754.38	$37,610.00
WATER/SEWER EXPENSES		
Salaries	$11,881.12	$23,388.00
Payroll Taxes	$2,911.96	$3,100.00
Workers' comp		$800.00
Building Material Equipment	$1,266.32	$1,600.00
Water Sample Fees	$512.94	$875.00
Office Supplies	$606.24	$1,400.00
Postage supplies	$23.00	$25.00
Copier Supplies	$61.54	
Micron Filters	$796.46	$3,000.00
Chlorine Purchase		$1,500.00
Equipment /Tools		$300.00
Membership dues and fees		$100.00
Sales Tax		$1,000.00
Electric Bill	$647.29	$0.00
Other:		
Repair & Replacment Fund Contribution		
Other		
other		
TOTAL WATER/SEWER EXPENSES	$18,706.87	$37,088.00
WATER/SEWER NET	$7,047.51	$522.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
WASHTERIA INCOME		
Washers/dryers	$0.00	
Showers		
Other: Subsidy from admin/finance		$31,810.00
TOTAL WASHETERIA INCOME	$0.00	$31,810.00
WASHETERIA EXPENSES		
Salaries		$20,160.00
Payroll Taxes		$8,100.00
Workers Comp		
Other building maintenance wages		$1,150.00
Telephone		
Office Supplies	$0.00	$2,400.00
Bank charges	$0.00	
Sales Tax	$0.00	
other		
other		
other		
TOTAL WASHETERIA EXPENSES	$0.00	$31,810.00
WASHETERIA NET	$0.00	$0.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
BULK FUEL INCOME		
fuel sale		
NSEDC fuel purchase transfer - journal entry		$53,030.48
Other: Subsidy		
TOTAL BULK FUEL INCOME	$0.00	$53,030.48
BULK FUEL EXPENSES		
Salaries		
Payroll Taxes		
Workers Comp		
Gas and oil		
Other to admin/finance fuel transfer		
Other to water/sewer fuel transfer	$0.00	
Other to public safety fuel transfer	$0.00	
other	$0.00	
Other		
TOTAL BULK FUEL EXPENSES	$0.00	$0.00
BULK FUEL NET	$0.00	$53,030.48

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
INCOME		
Bingo		
Pull tabs		
other		
TOTAL INCOME	$0.00	$0.00
EXPENSES		
Salaries		
Payroll Taxes		
Workers Comp		
Gas and oil		
Electric		
Copier supplies	$0.00	
other	$0.00	
TOTAL EXPENSES	$0.00	$0.00
NET	$0.00	$0.00
SUMMARY		
TOTAL OPERATING REVENUES	$1,451,997.03	$310,744.80
TOTAL OPERATING EXPENDITURES	$181,395.10	$221,806.00
BALANCE	$1,270,601.93	$88,938.80

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
GRANTS		
CARES Funding	$0.00	$145,725.68
CARES Funding Expenses		
Salaries		$0.00
Payroll Taxes/Inuit Fees		$0.00
Inuit fees		$0.00
Electricity		$0.00
Water/sewer		$0.00
Other: community service		$0.00
ARPA Funds		$28,725.68
Coronavirus Relief Funds		$117,000.00
Contingency		$0.00
Other W&S subsidy		
TOTAL CARES FUNDING EXPENSES	$0.00	$145,725.68
CARES Funding Balance	$0.00	$0.00
AEA Power Plant Project	$0.00	$166,241.00
Power Plant Project EXPENSES		
Switchgear Upgrades		$82,800.00
DERA Upgrades		$74,241.00
Final Reports		$9,200.00
Other:		
Other		$0.00
Other		
TOTAL Power Plant Project	$0.00	$166,241.00
POWER PLANT PROJECT Balance	$0.00	$0.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
WATER FUND REPAIR PROJECT	$0.00	$5,000.00
WATER FUND REPAIR EXPENSES		
Salaries		$5,000.00
Payroll Taxes/Inuit Fees		
Workers' comp		
Water Catchment Material		
Other		$0.00
Other		
TOTAL WATER FUND REPAIR EXPENSES	$0.00	$5,000.00
WATER FUND Balance	$0.00	$0.00
NSEDC 2019 CBS	$0.00	$0.00
NSEDC 2019 CBS EXPENSES		
Salaries		
Payroll Taxes Portable & solid waste		
Payroll Taxes electrical/generator repair		
Other: portale burn unit technician		
Other Metal debris backhaul		
Other: Freight		
TOTAL NSEDC 2019 CBS EXPENSES	$0.00	$0.00
NSEDC 2019 CBS Balance	$0.00	$0.00

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
NSEDC 2020 CBS	$200,000.00	$200,000.00
NSEDC 2020 CBS EXPENSES		
Salaries portable burn unit	$19,629.53	$23,040.00
Payroll Taxes	$4,569.66	11%
Workers' Compensation	$0.00	
Garbage/Honeybucket Labor		
Tank Farm Operator		
Airfare for fire, 1st aid & CPR		
Perdiem		
Training/Workshop		
2019 CBS Funds	$25,589.60	
Fuel Oil	$18,200.00	$18,200.00
Office and Clerical Supplies		
Postage Supplies		
Cleaning for all Community Facilities		
Equipment Office		
purchase portable burn unit		
Barge Freight		
Other: Eagle Eye Electric, LLC		$48,129.52
Contractual: Beach Debris		
Back Haul Fee		
Dumpsite Laborers	$52,122.50	$57,600.00
Dumpsite Payroll Taxes	$15,682.87	11%
Dumpsite Prg. Workers Compensation		
TOTAL NSEDC 2020 CBS EXPENSES	$135,794.16	$146,969.52
NSEDC 2020 Balance	$64,205.84	$53,030.48

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
NSEDC CEP Revenues	$12,788.00	$12,788.00
Grant Expenses		
Salaries	$2,202.49	~~$12,788.00~~
Payroll Taxes/Inuit Fees	fringe	11%
Other		
Other		
TOTAL Grant EXPENSES	$2,202.49	$12,788.00
NSEDC CEP Grant Balance	$10,585.51	$0.00
NSEDC CBS COVID-19 Revenue	$100,000.00	$0.00
NSEDC CBS COVID-19 Expenses		
Salaries Washeteria Monitor	$22,941.50	
Salaries Garbage/Honeybucket Labor		
Payroll Taxes	$7,104.70	
Patrollers		
Facility Sanitation Cleaners	$826.69	
COVID Prize Drawing	$500.00	
Cleaning Supplies for City Building		
Community PPE		
Washeteria Tokens	$16,208.00	
NSEDC Holiday Donation	$2,860.20	
TOTAL NSEDC EXPENSES	$50,441.09	$0.00
NSEDC CBS COVID-19 Balance	$49,558.91	$0.00
TOTAL GRANTS		
TOTAL GRANT REVENUES	$156,656.97	$529,754.68
TOTAL GRANT EXPENDITURES	$188,437.74	$310,483.20
BALANCE	-$31,780.77	$219,271.48

CITY OF DIOMEDE OPERATING BUDGET FY22	FY2021 Actuals	FY2022 BUDGET
TOTAL ALL SUMMARY		
SUMMARY OPERATING REVENUES		
Prior year cash balance	$198,133.50	$54,527.98
Locally generated revenues	$108,797.01	$114,445.00
Outside revenue sources, including grants	$405,651.44	$618,496.02
TOTAL OPERATING REVENUES	$712,581.95	$787,469.00
SUMMARY EXPENDITURES		
Admin/finance	$93,427.12	$84,742.00
Council	$14,746.82	$18,525.00
Public safety	$6,343.36	$8,326.00
Fire	$0.00	$4,000.00
Streets and roads	$314.95	$4,535.00
Airport		
Electric	$45,748.05	$25,380.00
Garbarge		
Water/sewer	$18,706.87	$37,088.00
Heavy equipment	$2,107.93	$7,400.00
Washeteria		$31,810.00
Bulk Fuel		
Grant: NSEDC CEP Grant	$2,202.49	$12,788.00
Grant: NSEDC CBS 2020	$135,794.16	
Grant: NSEDC COVID-19 CBS	$50,441.09	
Grant: Conornavirus Relief Funding		$117,000.00
Grant:FY22 ARPA Funding		$28,725.68
Grant: AEA Diomede Power Plant Project		$166,241.00
Grant: NSEDC CBS 2021	$18,200.00	$200,000.00
Grant:		
TOTAL OPERATING EXPENSES	$388,032.84	$746,560.68
BALANCE	$324,549.11	$40,908.32

Diomede Joint Utilit.
Monthly Financial Status Report

Electricity and Water Fund
June 2022

Beginning Balance		**($22.35)**
Deposits/Credits	$	9,340.01
New Balance		**$9,317.66**
Expense		
Electricity Utility	$	3,124.43
Water Fund	$	2,147.36
Water Repair Project	$	-
Total Expenditures:	**$**	**5,271.79**
Ending Bank Balance		**$4,045.87**
Revenues:		
Water Sales - BSSD	$	9,314.50
Bank Interest Deposit	$	0.01
Refund - Bering Air, Inc.	$	25.50
Total Revenues:	**$**	**9,340.01**

Monthly Financial Status Report

Instructions:

Prepare before the monthly City Council Meetings

1. City (Name and complete address): City of Diomede P.O. Box 7039 Diomede, Alaska 99762	2. Employer Identification No. 92-0124685	3. Project Fiscal Period: From (month, day, year): To (month, day, year): July 01, 2021 to June 30, 2022
DJU: Electric Utility PLEASE CHOOSE FUND	5. Final Report ☑ Yes ☐ No	6. Period Covered by This Report: June 1- June 30

7. a) Is the City current and not delinquent on its obligations to the Internal Revenue Service? ☑ Yes ☐ No
b) Is the City current and not delinquent on its obligations to the Department of Labor? ☑ Yes ☐ No

~ STATUS OF FUNDS ~

ACCOUNT DESCRIPTION/BUDGET ITEM	APPROVED BUDGET	EXPENDITURES THIS MONTH	YEAR TO DATE EXPENDITURES	BALANCE
Utility Clerk	$ 4,000.00	$ 335.01	$ 1,065.51	$ 2,934.49
Meeting Stipends	$ 12,600.00	$ 848.50	$ 10,054.98	$ 2,545.02
Payroll Taxes	$ 3,400.00	$ 817.37	$ 3,105.02	$ 294.98
Telephone	$ 2,160.00	$ 98.91	$ 822.65	$ 1,337.35
Office Supplies	$ 1,200.00	$ -	$ -	$ 1,200.00
Postage	$ 50.00	$ -	$ -	$ 50.00
Freight for Glycol & Anti Freeze	$ 1,000.00	$ -	$ 720.00	$ 280.00
Bank Service Charge	$ 10.00	$ -	$ -	$ 10.00
Electricity	$ 960.00	$ 989.64	$ 1,771.10	$ (811.10)
Insurance	$ 4,617.00	$ -	$ 4,617.00	$ -
IRS Back Taxes	$ 1,000.00	$ -	$ 234.47	$ 765.53
Fuel Transferred	$ 136.30	$ -	$ 136.30	$ -
Power Plant Supplies	$ 3,500.00	$ -	$ 1,223.26	$ 2,276.74
Wells Fargo - Overdraft Fee	$ -	$ 35.00	$ 35.00	$ (35.00)
0	$ -	$ -	$ -	$ -
TOTALS	$ 34,633.30	$ 3,124.43	$ 23,785.29	$ 10,848.01

Monthly Financial Status Report

Instructions:

Prepare before the monthly City Council Meetings

1. City (Name and complete address): Diomede Joint Utilities P.O. Box 7039 Diomede, Alaska 99762	2. Employer Identification No. 92-0062020	3. Project Fiscal Period: From (month, day, year): To (month, day, year): July 1, 2021 to June 30, 2022
DJU Water & Sewer PLEASE CHOOSE FUND	5. Final Report ☑ Yes ☐ No	6. Period Covered by This Report: June 1 - June30

7. a) Is the City current and not delinquent on its obligations to the Internal Revenue Service? ☑ Yes ☐ No
b) Is the City current and not delinquent on its obligations to the Department of Labor? ☑ Yes ☐ No

~ STATUS OF FUNDS ~

ACCOUNT DESCRIPTION/BUDGET ITEM	APPROVED BUDGET	EXPENDITURES THIS MONTH	YEAR TO DATE EXPENDITURES	BALANCE
Water Plant Operator	$ 23,388.00	$ 1,370.93	$ 24,318.19	$ (930.19)
Payroll Taxes	$ 5,847.00	$ 751.43	$ 7,404.02	$ (1,557.02)
Workers' Compensation	$ 800.00		$ -	$ 800.00
Building Material/Equipment	$ 1,600.00	$ -	$ 334.00	$ 1,266.00
Water Sample Fees	$ 975.00	$ 25.00	$ 829.00	$ 146.00
Office Supplies	$ 1,400.00	$ -	$ 195.00	$ 1,205.00
Postage	$ 25.00	$ -	$ -	$ 25.00
Micron Filters	$ 3,000.00	$ -	$ 61.54	$ 2,938.46
Chlorine Purchase	$ 1,500.00	$ -	$ 301.08	$ 1,198.92
Equipment/Tools	$ 300.00	$ -	$ -	$ 300.00
Membership Dues and Fees	$ 100.00	$ -	$ -	$ 100.00
Sales Tax	$ 1,000.00	$ -	$ -	$ 1,000.00
Freight Charges	$ 1,000.00	$ -	$ 50.00	$ 950.00
Building Maintenance Repair	$ -	$ -	$ 1,691.96	$ 1,691.96
0	$ -	$ -	$ -	$ -
TOTALS	$ 40,935.00	$ 2,147.36	$ 35,184.79	$ 9,134.13

Monthly Financial Status Report

Instructions:

Prepare before the monthly City Council Meetings

1. (Name and complete address):	2. Employer Identification No.	3. Project Fiscal Period: From (month, day, year): To (month, day, year):
Diomede Joint Utilties P.O. Box 7020 Diomede, Alaska 99762	92-0124685	July 01, 2021 to June 30, 2022
4. **Diomede Joint Utilites Revenues** PLEASE CHOOSE FUND	5. Final Report ☐ Yes ☑ No	6. Period Covered by This Report: June 1-June 30

7. a) Is the City current and not delinquent on its obligations to the Internal Revenue Service? ☑ Yes ☐ No
b) Is the City current and not delinquent on its obligations to the Department of Labor? ☐ Yes ☐ No

~ STATUS OF FUNDS ~

ACCOUNT DESCRIPTION/BUDGET ITEM	APPROVED BUDGET	REVENUES THIS MONTH	YEAR TO DATE REVENUES	BALANCE
Water Sales	$ 28,000.00	$ 9,314.50	$ 24,897.00	$ 3,103.00
Bank Interest Deposit	$ 10.00	$ 0.01	$ 1.26	$ 8.74
Refund	$ -	$ 25.50	$ 1,150.68	$ (1,150.68)
Subsidy from Admin/Finance	$ 9,600.00		$ -	$ 9,600.00
AEA Power Plant Project	$ 166,241.00		$ -	$ 166,241.00
ANTHC Water Fund Repair Project	$ -		$ 5,000.00	$ (5,000.00)
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
0	$ -		$ -	$ -
TOTALS	$ 203,851.00	$ 9,340.01	$ 31,048.94	$ 172,802.06

B: -22.35
E: 4,095.87

4:00 PM
07/12/22
Accrual Basis

Diomede Joint
Profit & Loss Detail
June 2022

	Type	Date	Num	Name	Memo	Class	Clr	Split	Amount	Balance
Income										
Deposits										
Bank Interest Deposits										
	Deposit	06/30/2022		Bank Card Deposit	Interest Paym...	Electricity...		Diomede Joint ...	0.01	0.01
Total Bank Interest Deposits									0.01	0.01
Water Sales										
	Deposit	06/23/2022		Bank By Mail Deposit	BSSD Water ...	Water Fund		Diomede Joint ...	9,314.50	9,314.50
Total Water Sales									9,314.50	9,314.50
Total Deposits									9,314.51	9,314.51
Refund										
	Deposit	06/23/2022		Bank By Mail Deposit	Bering Air, Inc...	Electricity...		Diomede Joint ...	25.50	25.50
Total Refund									25.50	25.50
Total Income									9,340.01	9,340.01
Expense										
Council Member Meeting Stipend										
	Check	06/24/2022	12853	Walter Ozenna	Monthly Meeti...	Electricity...		Diomede Joint ...	109.70	109.70
	Check	06/24/2022	12854	JoAnn Kaningok	Monthly Meeti...	Electricity...		Diomede Joint ...	184.70	294.40
	Check	06/24/2022	12855	Marlene Ahkinga	Monthly Meeti...	Electricity...		Diomede Joint ...	184.70	479.10
	Check	06/24/2022	12856	Rebecca Ozenna	Monthly Meeti...	Electricity...		Diomede Joint ...	184.70	663.80
	Check	06/24/2022	12857	Robert F Soolook Jr.	Monthly Meeti...	Electricity...		Diomede Joint ...	184.70	848.50
Total Council Member Meeting Stipend									848.50	848.50
Payroll Expenses										
State/Federal Payroll Taxes										
941 Taxes										
	Check	06/03/2022	EFTPS	Internal Revenue Se...	Water Fund 9...	Water Fund	X	Diomede Joint ...	0.00	0.00
	Check	06/03/2022	EFTPS	Internal Revenue Se...	Council Budg...	Electricity...	X	Diomede Joint ...	0.00	0.00
	Check	06/28/2022	EFTPS	Internal Revenue Se...	Water Fund 9...	Water Fund		Diomede Joint ...	314.63	314.63
	Check	06/28/2022	EFTPS	Internal Revenue Se...	Council Budg...	Electricity...		Diomede Joint ...	456.00	770.63
	Check	06/28/2022	EFTPS	Internal Revenue Se...	5% Penalty Fee	Electricity...		Diomede Joint ...	38.54	809.17
	Check	06/28/2022	EFTPS	Internal Revenue Se...	Water Fund 9...	Water Fund		Diomede Joint ...	341.52	1,150.69
	Check	06/28/2022	EFTPS	Internal Revenue Se...	Council Budg...	Electricity...		Diomede Joint ...	228.00	1,378.69
	Check	06/28/2022	EFTPS	Internal Revenue Se...	Electricity Fun...	Electricity...		Diomede Joint ...	59.31	1,438.00
Total 941 Taxes									1,438.00	1,438.00

Diomede Joint
Profit & Loss Detail
June 2022

Type	Date	Num	Name	Memo	Class	Clr	Split	Amount	Balance
State/Federal Payroll Taxes - Other									
Check	06/29/2022	12860	Alaska Depart. of La...	Water Fund E...	Water Fund		Diomede Joint ...	95.28	95.28
Check	06/29/2022	12860	Alaska Depart. of La...	Electricity Fun...	Electricity...		Diomede Joint ...	35.52	130.80
Total State/Federal Payroll Taxes - Other								130.80	130.80
Total State/Federal Payroll Taxes								1,568.80	1,568.80
Total Payroll Expenses								1,568.80	1,568.80
Reimbursement									Utility Clerk
Check	06/27/2022	12859	Diomede City Counc...	Check #1833...	Electricity...		Diomede Joint ...	335.01	335.01
Check	06/27/2022	12859	Diomede City Counc...	Check #1833...	Water Fund		Diomede Joint ...	733.67	1,068.68
Check	06/27/2022	12859	Diomede City Counc...	Check #1832...	Water Fund		Diomede Joint ...	637.26	1,705.94
Total Reimbursement								1,705.94	WTPO 1,705.94
Utilities									
Telephone, Internet & Fax									
Check	06/02/2022	12850	TelAlaska	Account #012...	Electricity...		Diomede Joint ...	98.91	98.91
Total Telephone, Internet & Fax								98.91	98.91
Utilities - Other									
Check	06/02/2022	12849	Inaliq, DBA	May 2022 Ele...	Electricity...		Diomede Joint ...	150.07	150.07
Check	06/24/2022	12858	Inaliq, DBA	May 2022 Ele...	Electricity...		Diomede Joint ...	839.57	989.64
Total Utilities - Other								989.64	989.64
Total Utilities								1,088.55	1,088.55
Water Plant Operator									
Check	06/10/2022	12852	Robert Larsen	Water Plant O...	Water Fund	X	Diomede Joint ...	0.00	0.00
Total Water Plant Operator								0.00	0.00
Water Sample Expense									
Check	06/03/2022	12851	Norton Sound Healt...	Lab Sample I...	Water Fund		Diomede Joint ...	25.00	25.00
Total Water Sample Expense								25.00	25.00
Wells Fargo Bank									
Nonsuffient Funds (NSF)									
Check	06/22/2022	EFTPS	Wells Fargo Bank	Overdraft Fee...	Electricity...		Diomede Joint ...	35.00	35.00
Total Nonsuffient Funds (NSF)								35.00	35.00
Total Wells Fargo Bank								35.00	35.00
Total Expense								5,271.79	5,271.79

Diomede Joint
Profit & Loss Detail
June 2022

	Type	Date	Num	Name	Memo	Class	Clr	Split	Amount	Balance
Net Income									4,068.22	4,068.22

APPENDIX 8:

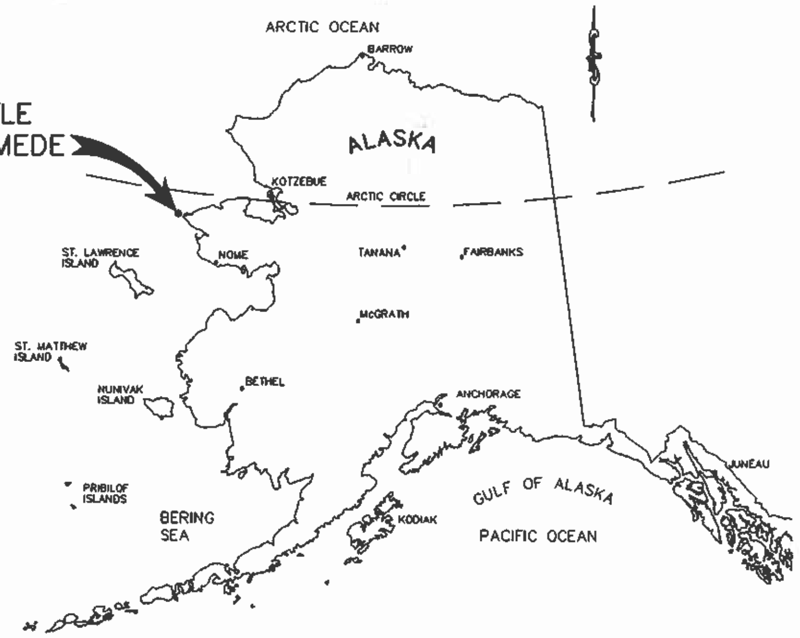
BOARDWALK AS-BUILTS

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	-	7	T 4 N	R 49 W	KATEEL RIVER	2008

INALIK WALKWAY PROJECT

A KAWERAK TRANSPORTATION PROJECT

LITTLE DIOMEDE, ALASKA

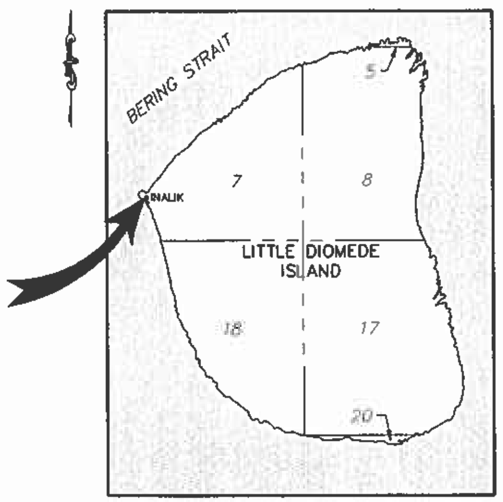


PROJECT LOCATION MAP

INDIAN RESERVATION ROUTES

1000	2002	2010
1100	2003	2011
1200	2006	2029

THIS PROJECT



VICINITY MAP

APPROXIMATE SCALE: 1" = 1/2 MILE
SOURCE MAP: USGS QUADRANGLE TELLER (D-5) ALASKA, 1950

GRAPHIC SCALE

(APPROXIMATE)
1 inch = 1/2 mile

INDEX OF SHEETS

ABBREVIATIONS

ADOT&PF	ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES	NE	NORTHEAST
		NW	NORTHWEST
ACQ	ALKALINE COPPER QUATERNARY	N/A	NOT APPLICABLE
ADT	AVERAGE DAILY TRAFFIC	NTS	NOT TO SCALE
APPROX.	APPROXIMATE	PI	POINT OF INTERSECTION
CL	CENTERLINE	PVI	POINT OF VERTICAL INTERSECTION
CP	CONTROL POINT	R	RADIUS, RANGE
E	EAST, EASTING	S	SOUTH
EL.	ELEVATION	SS	STAINLESS STEEL
H/HORZ.	HORIZONTAL	SE	SOUTHEAST
IRR	INDIAN RESERVATION ROAD	SW	SOUTHWEST
MAX.	MAXIMUM	SEC.	SECTION
MIN.	MINIMUM	STA.	STATION
MLLW	MEAN LOWER LOW WATER	V/VERT.	VERTICAL
N	NORTH, NORTHING	W	WEST

PLAN LEGEND

EXISTING	NEW	
		BOARDWALK
—100—		CONTOUR (10' INCREMENTS)
---102---		CONTOUR (2' INCREMENTS)
		EDGE OF GRAVEL ROAD
—F—		FUEL LINE
—OHL—		OVERHEAD LINE
		PROPERTY LINE
—T—		TELEPHONE LINE
		TRAIL
		DESIGN WALKWAY
		AS-BUILT WALKWAY
		BUILDING
		POWER POLE
		WINDSOCK

DESIGN DATA

CURRENT ADT	N/A*
DESIGN ADT, 20-YEAR PROJECTION	N/A*
MAXIMUM GRADIENT	N/A*
DESIGN SPEED	N/A*
MINIMUM RADIUS CURVE	N/A*
STOPPING SIGHT DISTANCE	N/A*
MAXIMUM SUPERELEVATION RATE	N/A*
DESIGN STRUCTURAL LOADING	350 POUND CONCENTRATED LOAD

*MOST OF THE TYPICAL ROADWAY DESIGN DATA ARE NOT APPLICABLE TO THIS WALKWAY PROJECT.

OFFICIAL AS-BUILTS

STATE OF ALASKA
49TH
AS-BUILTS
Brian L. Pederson
CE9834
Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA
Rodney P. Kinney Associates, Inc.
CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

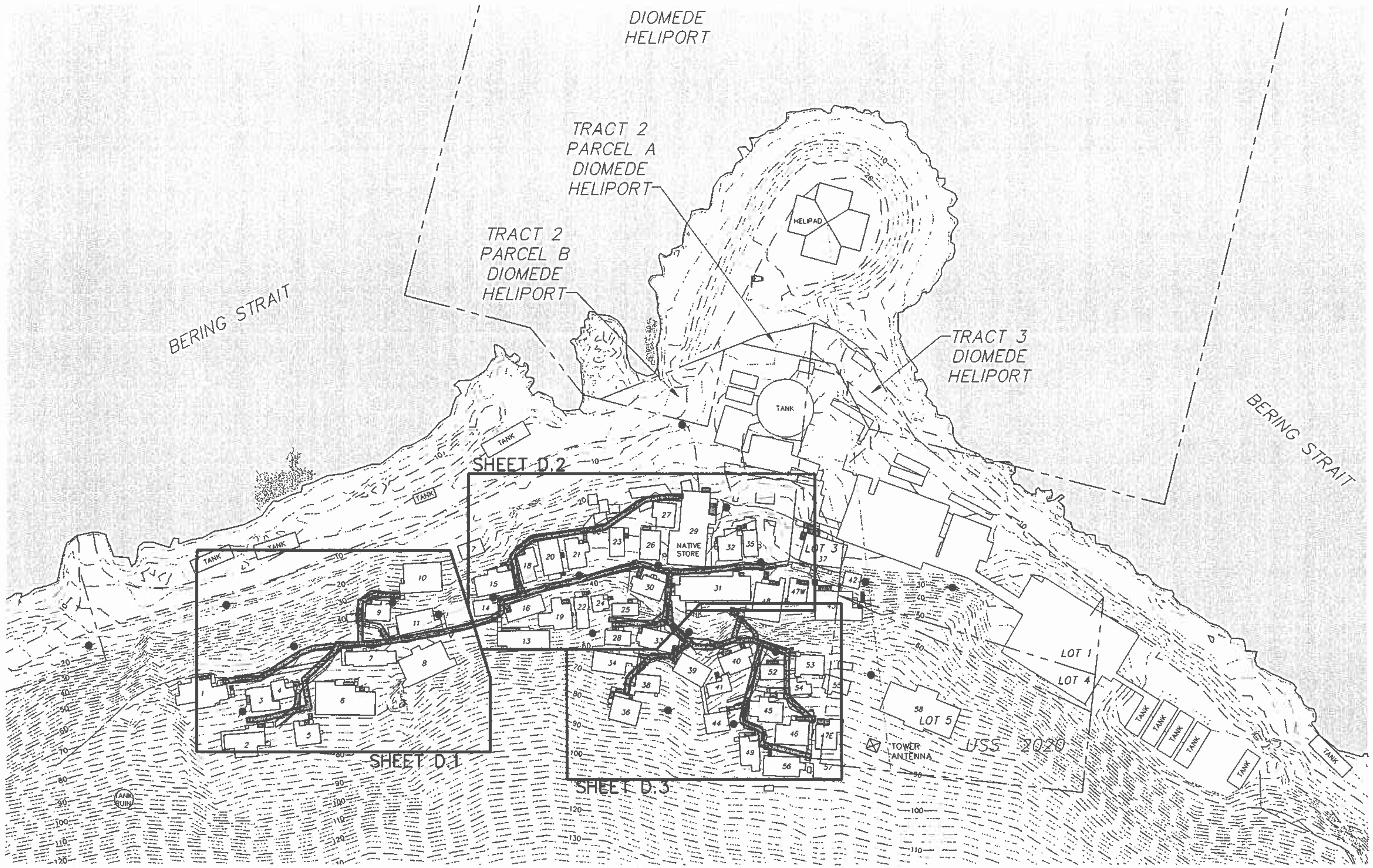
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

TITLE SHEET

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	AS SHOWN

SHEET NO.
A.1

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008



GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE 2004 ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES, STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 2004 EDITION; AND THE SPECIAL CONTRACT REQUIREMENTS. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN.

2. GROUND DISTURBING ACTIVITIES FOR THIS PROJECT ARE EXPECTED TO BE SIGNIFICANTLY LESS THAN ONE ACRE. IF CHANGES OCCUR SUCH THAT ONE ACRE OR MORE OF GROUND IS DISTURBED, ALL REQUIREMENTS OF THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) SHALL BE MET AND PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A COPY OF THE NOTICE OF INTENT (NOI) AND A NOTICE OF TERMINATION (NOT) TO KAWERAK TRANSPORTATION.

3. THE LIMIT OF WORK FOR THE NEW CONSTRUCTION SHALL BE THE OUTER EDGE OF WALKWAY AND FOUNDATION. THE CONTRACTOR SHALL NOT WORK OUTSIDE THE LIMITS OF WORK WITHOUT PRIOR APPROVAL BY KAWERAK TRANSPORTATION. THE CONTRACTOR IS SOLELY LIABLE FOR ALL DAMAGES AND RESTITUTION FOR ANY DISTURBANCE OUTSIDE THE WORK LIMITS. THIS INCLUDES INDEMNIFICATION OF RODNEY P. KINNEY ASSOCIATES, INC., KAWERAK INC, THE NATIVE VILLAGE OF INALIK, AND THE CITY OF DIOMEDE FROM LITIGATION ARISING FROM THE CONTRACTOR'S ACTIONS.

4. UTILITY LOCATIONS SHOWN, BOTH HORIZONTAL AND VERTICAL, ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES BY OBTAINING UTILITY LOCATES PRIOR TO CONSTRUCTION IN ACCORDANCE WITH SUBSECTION 105-1.06. PROTECT ALL EXISTING FACILITIES FROM DAMAGE DURING WALKWAY CONSTRUCTION.

5. THE CONTRACTOR SHALL SUBMIT A QUALITY CONTROL PLAN IN ACCORDANCE WITH SUBSECTION 106-1.03.

6. THE CONTRACTOR SHALL PROVIDE ACCESS TO ALL BUILDINGS FROM THE NEW PATHWAY BY PROVIDING RAMPS OR STAIRS CONNECTING TO EXISTING TRAILS LEADING TO BUILDINGS, OR CONNECTING DIRECTLY TO THE EXISTING STAIRS OR LANDING OF A BUILDING.

7. TOPOGRAPHY SHOWN IN THIS PLAN SET IS BASED ON MAPPING PREPARED BY KAWERAK INC. IN COOPERATION WITH THE ALASKA DEPARTMENT OF COMMERCE, COMMUNITY, AND ECONOMIC DEVELOPMENT (COMMERCE) USING FUNDING FROM THE BUREAU OF INDIAN AFFAIRS TRANSPORTATION PLANNING, ALASKA NATIVE TRIBAL HEALTH CONSORTIUM, ALASKA VILLAGE ELECTRIC COOPERATIVE, AND FUNDING FROM THE INITIATIVE FOR ACCELERATED INFRASTRUCTURE DEVELOPMENT (IAID). THE IAID IS SUPPORTED BY GRANTS FROM THE DENALI COMMISSION, USDA RURAL DEVELOPMENT, ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES AND COMMERCE. KAWERAK, INC. CONTRACTED WITH GLOBAL POSITIONING SERVICES INC. IN MAY OF 2004 TO PREPARE THE MAPPING. TRAIL LOCATIONS ARE BASED ON SURVEY DATA PROVIDED BY KAWERAK, INC, AND BUILDING LOCATIONS ARE BASED ON A SURVEY COMPLETED BY RODNEY P. KINNEY ASSOCIATES, INC.

8. SPECIES AND GRADE OF ALL LUMBER USED IN THIS PROJECT SHALL BE NO. 2 DOUGLAS FIR, KILN DRIED TO A MAXIMUM MOISTURE CONTENT OF 23%. ALL LUMBER SHALL BE PRESSURE TREATED WITH ACQ, AND SHALL BE INCISED PRIOR TO TREATMENT. CUTTING AND BORING OF LUMBER SHALL BE KEPT TO A PRACTICAL MINIMUM. ALL CUT OR BORED SURFACES SHALL BE COATED WITH AT LEAST TWO BRUSH COATS OF THE SPECIFIED TREATMENT.

9. ALL STEEL SHALL BE ASTM A36 AND COMPLY WITH ASTM A123 FOR HOT DIP GALVANIZING, OR SHALL BE GRADE 304 STAINLESS STEEL, AS SHOWN IN PLANS. STAINLESS STEEL SHALL BE USED WHERE POSSIBLE TO ACHIEVE HIGHER CORROSION RESISTANCE.

10. SIMPSON HANGERS, OR APPROVED EQUIVALENT, ARE SPECIFIED THROUGHOUT THESE PLANS. STAINLESS STEEL HANGERS HAVE BEEN SPECIFIED WHERE AVAILABLE. THE INTENT IS TO PROVIDE THE HIGHEST CORROSION RESISTANT MATERIAL OR COATING THAT IS PRACTICABLY AVAILABLE. THE CONTRACTOR SHALL CHECK AT TIME OF MATERIAL ORDERING TO SEE IF STAINLESS STEEL HANGER MODELS HAVE BEEN ADDED THAT COULD REPLACE SPECIFIED NON-STAINLESS HARDWARE, AND SUBSTITUTE STAINLESS MODELS IF AVAILABLE, IF APPROVED BY KAWERAK TRANSPORTATION. USE FASTENERS COMPATIBLE WITH THE HARDWARE BEING INSTALLED.

11. A QUALIFIED ARCHAEOLOGICAL MONITOR MUST BE ON SITE DURING ANY GROUND DISTURBING ACTIVITIES. THE INTENT OF THESE PLANS IS TO MINIMIZE GROUND DISTURBING ACTIVITY.

12. IF PREVIOUSLY UNKNOWN ARCHAEOLOGICAL MATERIALS OR HUMAN REMAINS ARE DISCOVERED DURING THE COURSE OF CONSTRUCTION, NOTIFY KAWERAK TRANSPORTATION IMMEDIATELY, AND CEASE ALL ACTIVITIES IN THE IMMEDIATE AREA OF THE FINDS UNTIL KAWERAK TRANSPORTATION GIVES FURTHER DIRECTION.

13. THE INTENT OF THIS PLAN SET IS TO PROVIDE GENERAL DIRECTION, TYPICAL CONSTRUCTION PROCEDURES, AND OTHER PARAMETERS TO GUIDE CONSTRUCTION. PRECISE LAYOUT INFORMATION (SUCH AS STAIR LOCATIONS AND DETAILED CONNECTION TO EACH HOUSE OR TRAIL) IS NOT INCLUDED, AND MUST BE FIELD FIT DURING CONSTRUCTION TO MEET THE INTENT OF THE PLANS.

14. AS-BUILT DRAWINGS SHALL BE SUBMITTED TO KAWERAK TRANSPORTATION AFTER CONSTRUCTION IS COMPLETED. THESE DRAWINGS MUST UTILIZE THE COORDINATE SYSTEM SHOWN ON THE SURVEY CONTROL SHEET OF THIS PLAN SET AND SHALL DEPICT HORIZONTAL AND VERTICAL LOCATIONS OF ALL IMPROVEMENTS.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

OFFICIAL AS-BUILTS

STATE OF ALASKA
49TH
AS-BUILTS
Brian L. Pederson
CE9834
Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA
Rodney P. Kinney Associates, Inc.
CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

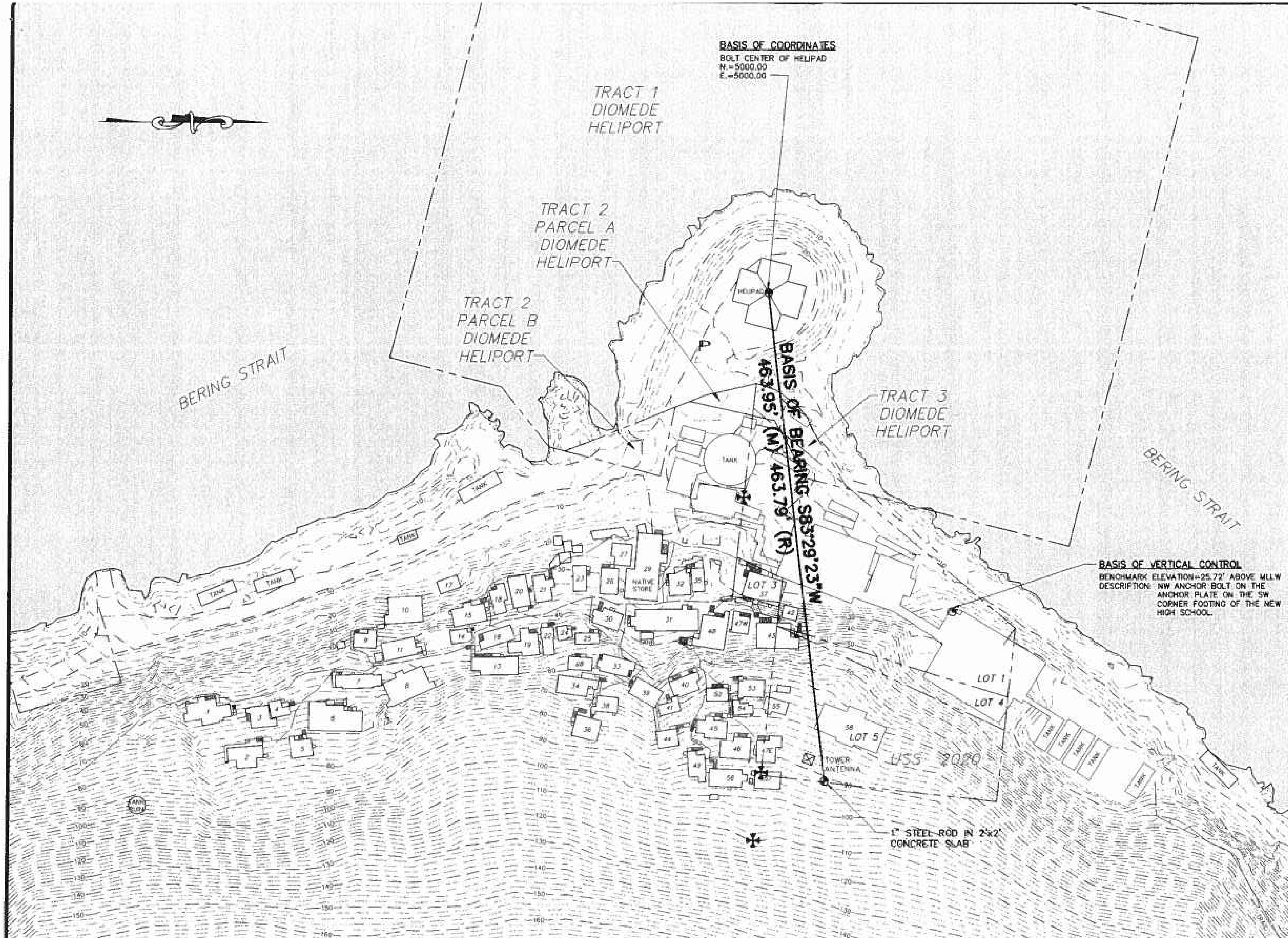
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

GENERAL NOTES, KEY MAP

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	1" = 50'

SHEET NO.
A.2

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008



GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

HOUSE NUMBER	FINISH FLOOR ELEVATION
1	59.08'
2	76.86'
3	65.21'
4	60.99'
5	75.45'
6	66.88'
7	56.55'
8	63.26'
9	40.66'
10	32.59'
11	48.00'
12	NOT USED
13	59.45'
14	42.52'
15	35.38'
16	46.37'
17	19.00'
18	33.42'
19	49.32'
20	33.08'
21	33.32'
22	48.63'
23	30.76'
24	48.82'
25	48.94'
26	31.75'
27	24.18'
28	58.95'
29	27.68'

HOUSE NUMBER	FINISH FLOOR ELEVATION
30	39.20'
31	35.95'
32	31.31'
33	59.18'
34	66.07'
35	31.95'
36	83.48'
37	36.16'
38	74.03'
39	63.57'
40	64.80'
41	70.14'
42	32.31'
43	48.60'
44	82.84'
45	82.23'
46	87.43'
47E	88.44'
47W	43.19'
48	NOT USED
49	90.93'
50	NOT USED
51	NOT USED
52	74.26'
53	72.78'
54	76.31'
55	75.54'
56	95.89'
57	95.86'
58	77.88'

LEGEND
(THIS SHEET ONLY)

- BRASS CAP MONUMENT
- 1" STEEL ROD PAINTED YELLOW
- BOLT CENTER OF HELIPAD
- BENCH MARK
- PROPERTY LINE

OFFICIAL AS-BUILTS

STATE OF ALASKA 49th AS-BUILTS Brian L. Pederson CE8834 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA
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P.O. BOX 948
NOME, ALASKA 99762

INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

SURVEY CONTROL DIAGRAM

DESIGNED BY: MAA
DRAWN BY: JCS
APPROVED BY: BLP
DATE: Jan 14, 2009
SCALE: N/A

SHEET NO.
B.1

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008

ESTIMATE OF QUANTITIES SUMMARY			
PAY ITEM NUMBER	DESCRIPTION	PAY UNIT	ESTIMATED QUANTITY
107(1)	ARCHAEOLOGICAL MONITORING	LUMP SUM	ALL REQUIRED
202(1)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LUMP SUM	ALL REQUIRED
203(1)	COMMON EXCAVATION	CUBIC YARD	10
504(2)	STRUCTURAL STEEL	POUND	400
506(3)	TREATED TIMBER	MBM	7.8
506(5)	BOULDER FOUNDATION	EACH	615
506(6)	SPREAD FOOTING FOUNDATION	EACH	50
507(2)	PEDESTRIAN RAILING	LINEAR FOOT	950
507(6)	PEDESTRIAN RAILING MOUNTING BRACKET	EACH	190
640(1)	MOBILIZATION AND DEMOBILIZATION	LUMP SUM	ALL REQUIRED
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	LUMP SUM	ALL REQUIRED
641(3)	TEMPORARY EROSION AND POLLUTION CONTROL	LUMP SUM	ALL REQUIRED
642(1)	CONSTRUCTION SURVEYING	LUMP SUM	ALL REQUIRED
673(1)	FRP COMPOSITE DECK PANEL	SQUARE FOOT	5470
673(2)	FRP COMPOSITE STAIR TREAD	EACH	210

OFFICIAL AS–BUILTS

STATE OF ALASKA 49TH AS–BUILTS Brian L. Pederson CE8634 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

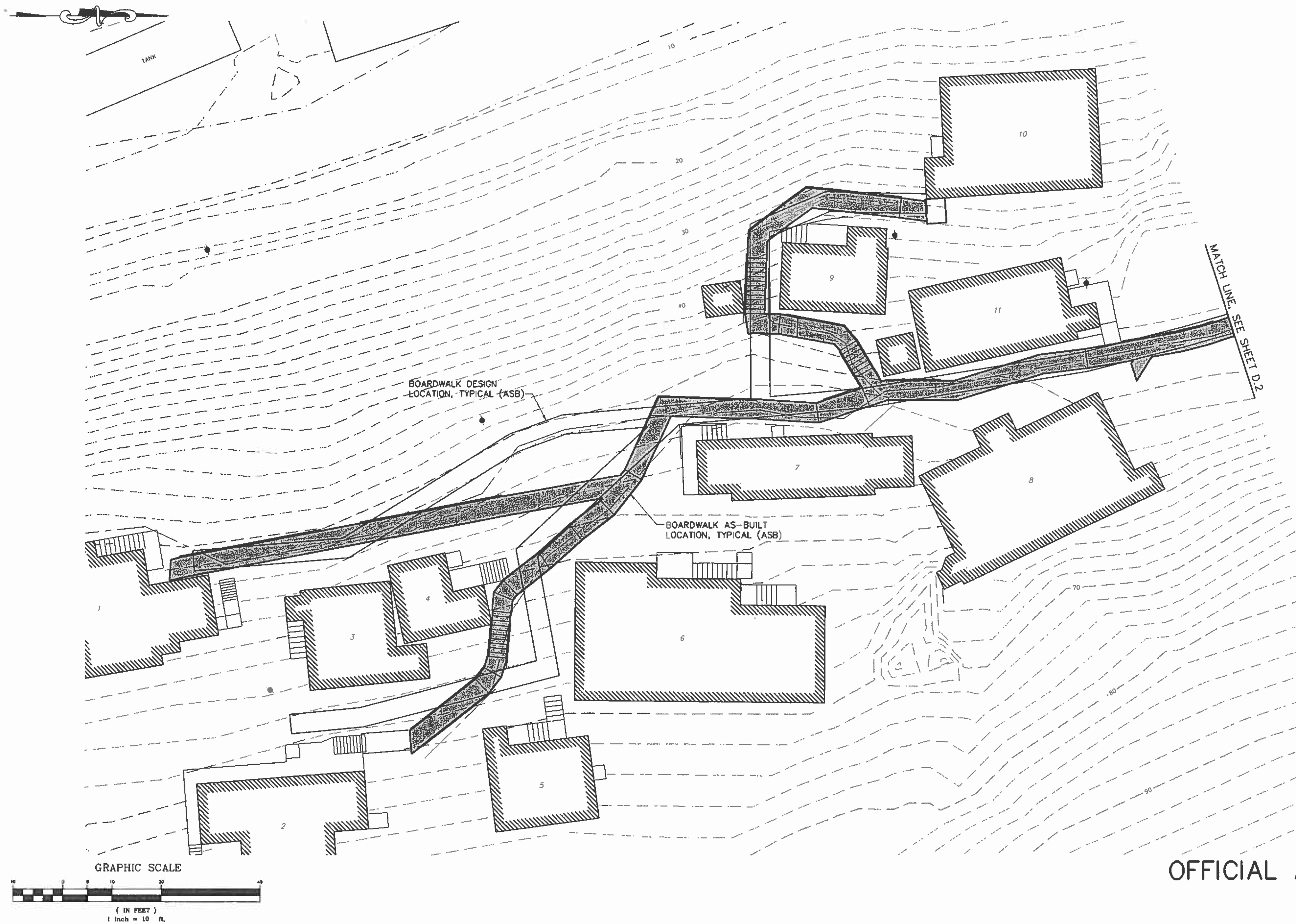
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

SUMMARY OF QUANTITIES

DESIGNED BY: MAA
DRAWN BY: SPK/JCS
APPROVED BY: BLP
DATE: Jan 14, 2009
SCALE: NTS

SHEET NO. C.1

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	-	7	T 4 N	R 49 W	KATEEL RIVER	2008



OFFICIAL AS-BUILTS

STATE OF ALASKA
49TH
AS-BUILTS
Brian L. Pederson
CE9834
Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA
Rodney P. Kinney Associates, Inc.
CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

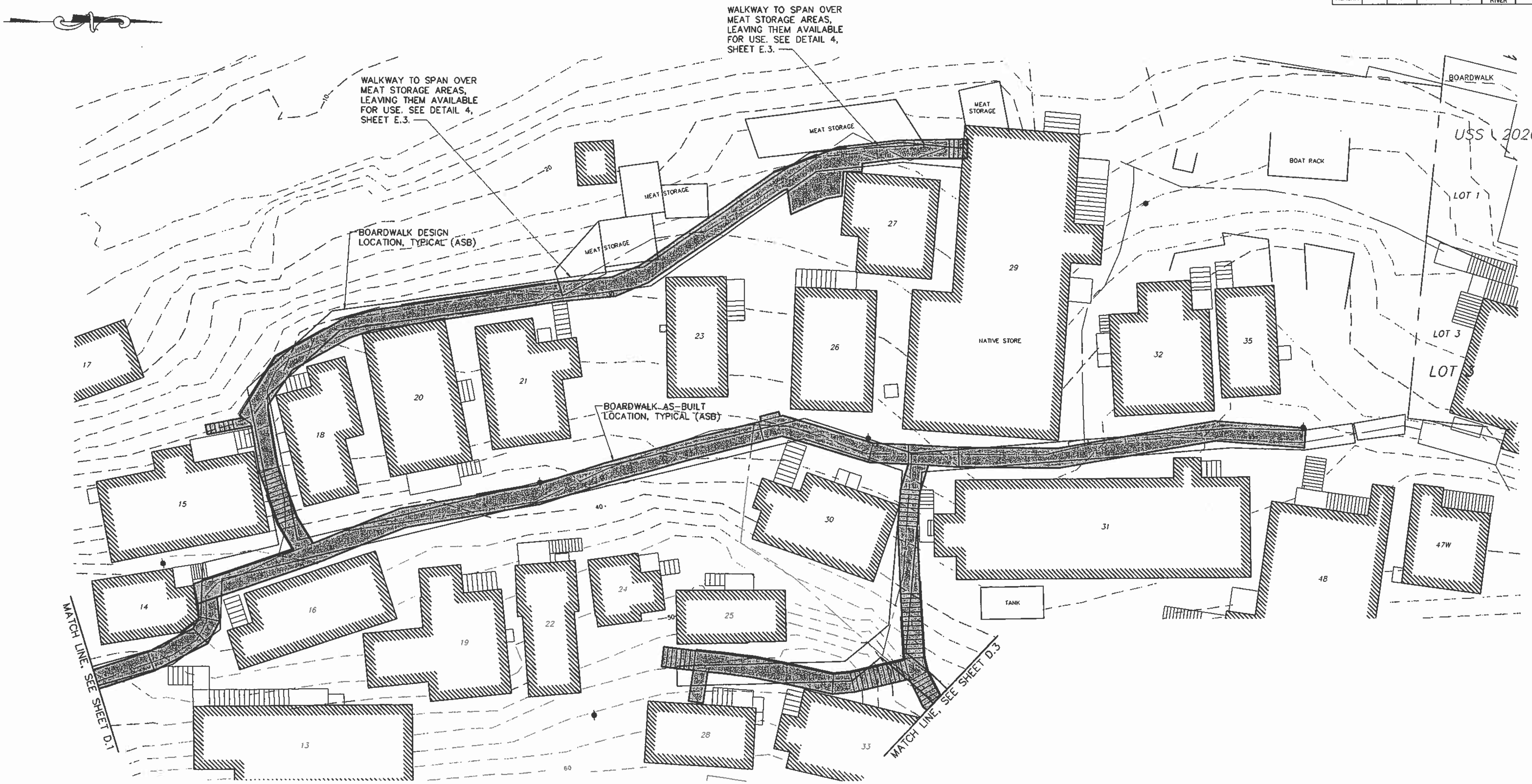
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

PLAN VIEW

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	HORZ: 1"=10' VERT: 1"=1'

SHEET NO.
D.1

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008



GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

OFFICIAL AS-BUILTS

STATE OF ALASKA 49TH AS-BUILTS Brian L. Pederson CE8834 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

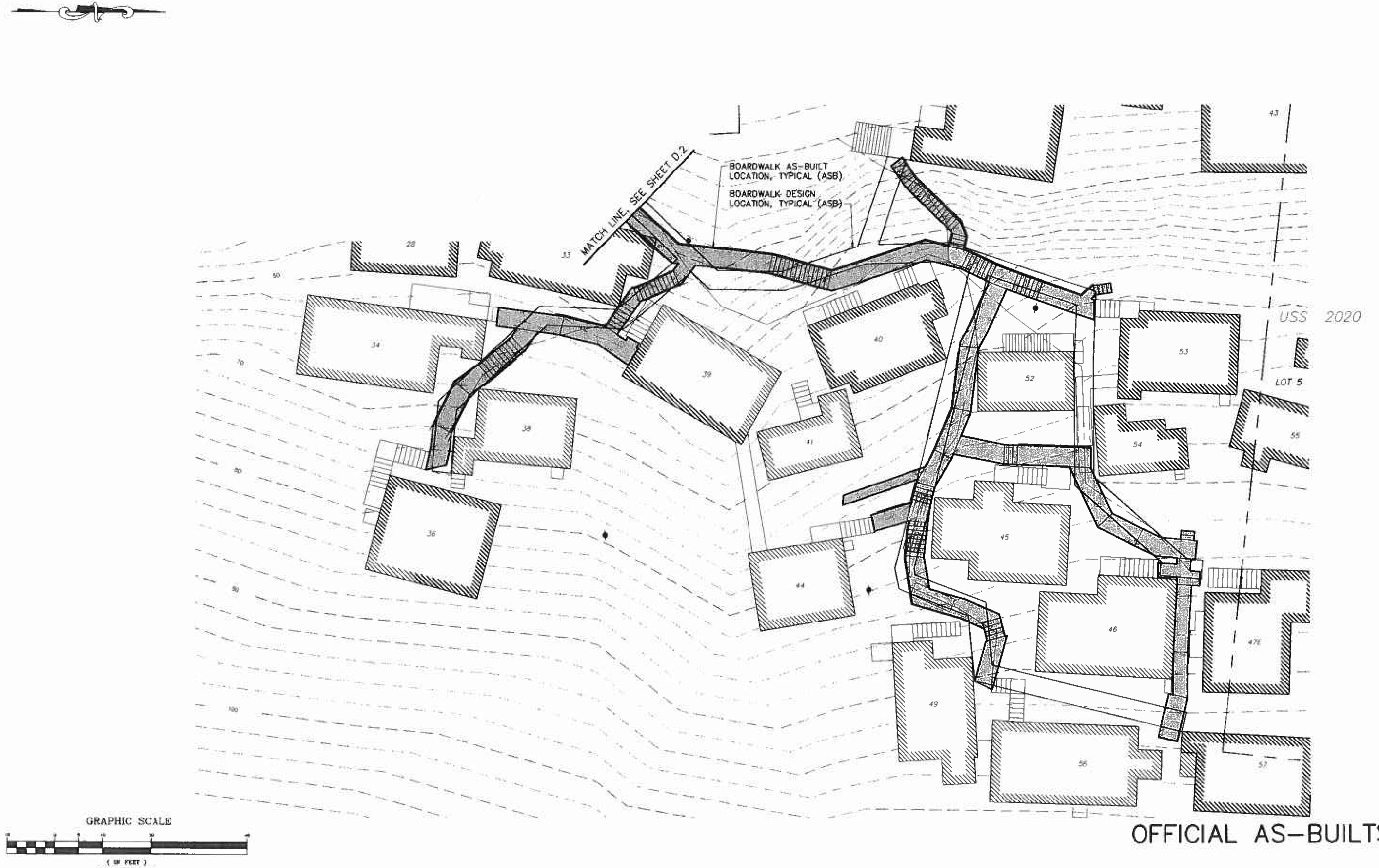
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

PLAN VIEW

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	HORZ: 1"=10' VERT: 1"=1'

SHEET NO.
D.2

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	-	7	T 4 N	R 49 W	KATEEL RIVER	2008



OFFICIAL AS-BUILTS

STATE OF ALASKA 49TH ★ AS-BUILTS Brian L. Pederson CE9834 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

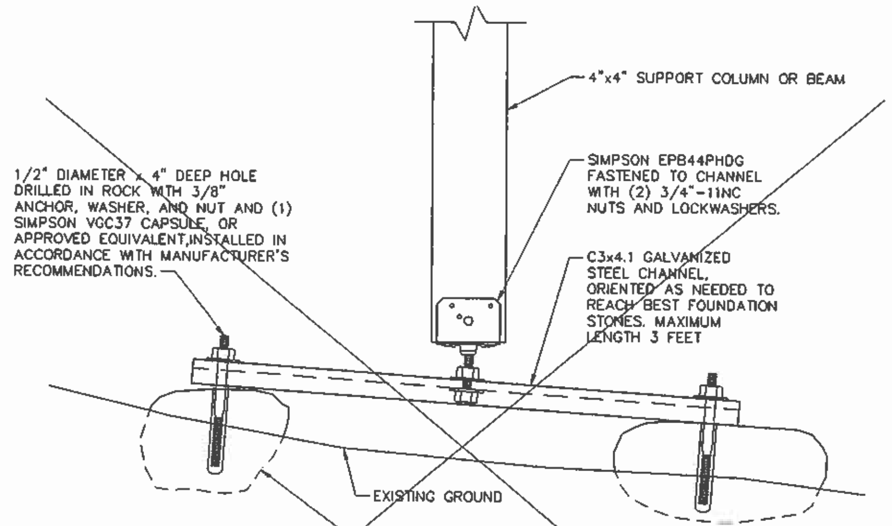
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

PLAN VIEW

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	HORZ: 1"=10' VERT: 1"=1'

SHEET NO.
D.3

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	~	7	T 4 N	R 49 W	KATEEL RIVER	2008

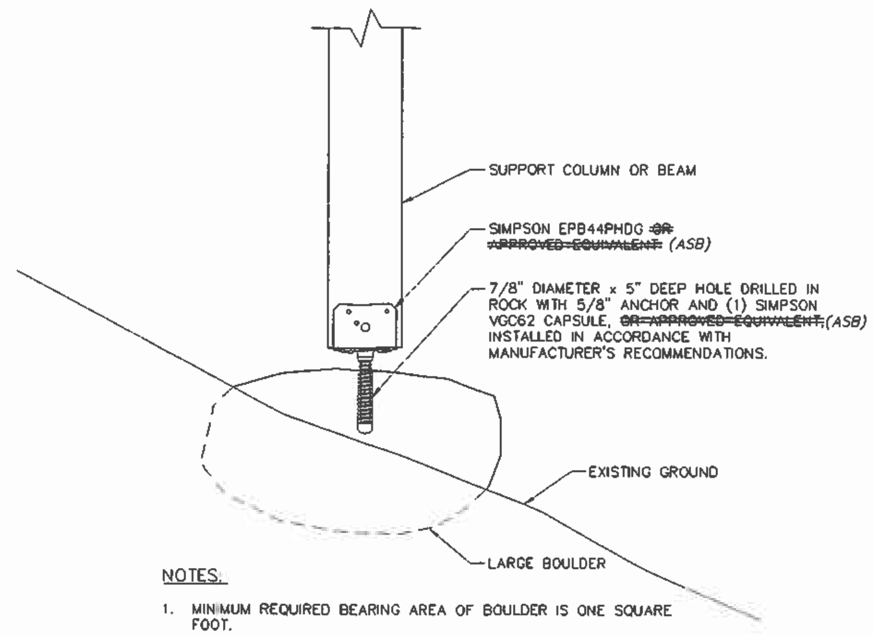


NOTES:

1. MINIMUM REQUIRED BEARING AREA OF BOULDER IS ONE SQUARE FOOT.
2. FOUNDATION BOULDERS SHALL HAVE SUFFICIENT EMBEDMENT TO PROVIDE STABILITY FROM ROLLING OR SLIDING, AND MAY BE REJECTED BY KAWERAK TRANSPORTATION DUE TO STABILITY CONCERNS.

1 / E.1 MULTIPLE STONE FOUNDATION -NTS-

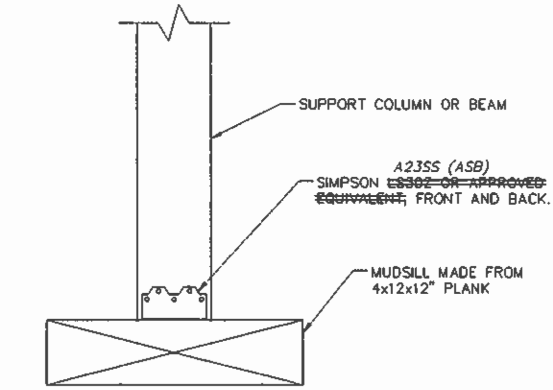
NOT USED (ASB)



NOTES:

1. MINIMUM REQUIRED BEARING AREA OF BOULDER IS ONE SQUARE FOOT.
2. FOUNDATION BOULDERS SHALL HAVE SUFFICIENT EMBEDMENT TO PROVIDE STABILITY FROM ROLLING OR SLIDING, AND MAY BE REJECTED BY KAWERAK TRANSPORTATION DUE TO STABILITY CONCERNS.

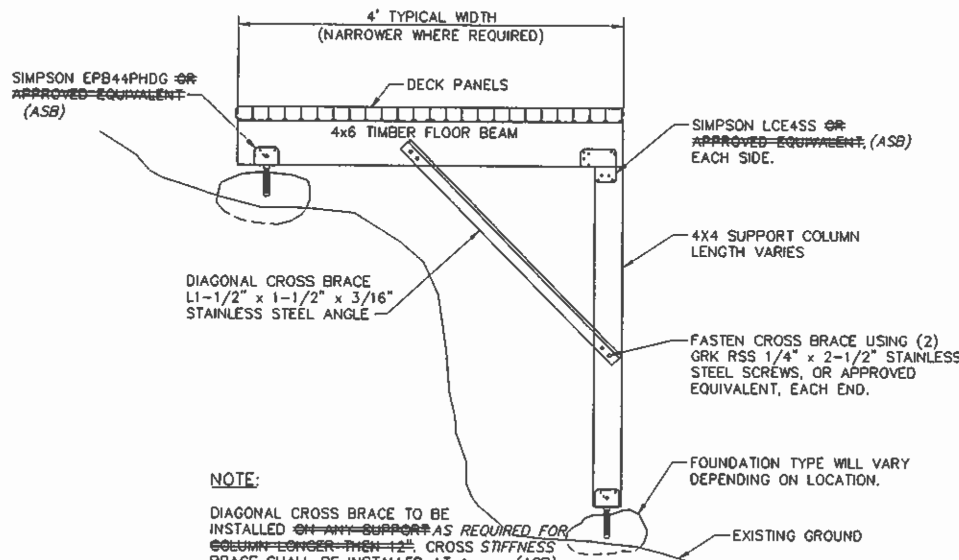
2 / E.1 INDIVIDUAL BOULDER FOUNDATION -NTS-



NOTES:

1. SPREAD FOOTING FOUNDATION TO BE USED ONLY WHEN BOULDER OR ROCK FOUNDATION IS NOT FEASIBLE.
2. SPREAD FOOTINGS ARE CENTERED ON THE INTERSECTION BETWEEN SUPPORT COLUMNS AND FLOOR BEAMS.
3. SUBGRADE PREPARATION FOR SPREAD FOOTINGS WILL CONSIST OF HAND LEVELING EXISTING GROUND AS REQUIRED TO PROVIDE LEVEL FOUNDATION.

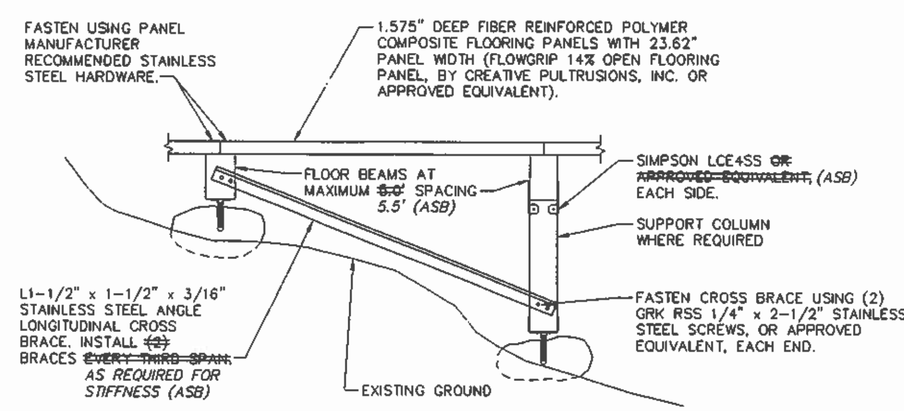
3 / E.1 WALKWAY ON SPREAD FOOTING FOUNDATION
SECTION VIEW -NTS-



NOTE:

DIAGONAL CROSS BRACE TO BE INSTALLED ~~ON ANY SUPPORT~~ AS REQUIRED FOR ~~COLUMN LONGER THEN 12"~~. CROSS STIFFNESS (ASB) BRACE SHALL BE INSTALLED AT ~~A~~ NO MORE THAN A 45° ANGLE (ASB) AND MOUNTED WITHIN THE BOTTOM THIRD OF THE SUPPORT COLUMN.

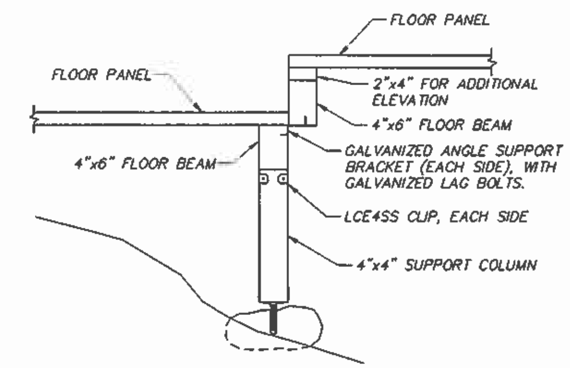
4 / E.1 WALKWAY SECTION VIEW -NTS-



NOTES:

1. INSTALL HANDRAIL AT ALL LOCATIONS WHERE THE WALKWAY IS MORE THAN 30" ABOVE THE GROUND SURFACE.
2. FOUNDATION TYPE WILL VARY DEPENDING ON LOCATION.

5 / E.1 WALKWAY DECK
SIDE VIEW -NTS-



6 / E.1 *SINGLE STEP DETAIL (AS-BUILT)*
SIDE VIEW *-NTS-*
(ASB)

OFFICIAL AS-BUILTS

STATE OF ALASKA 49TH AS-BUILTS Brian L. Pederson CE9034 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

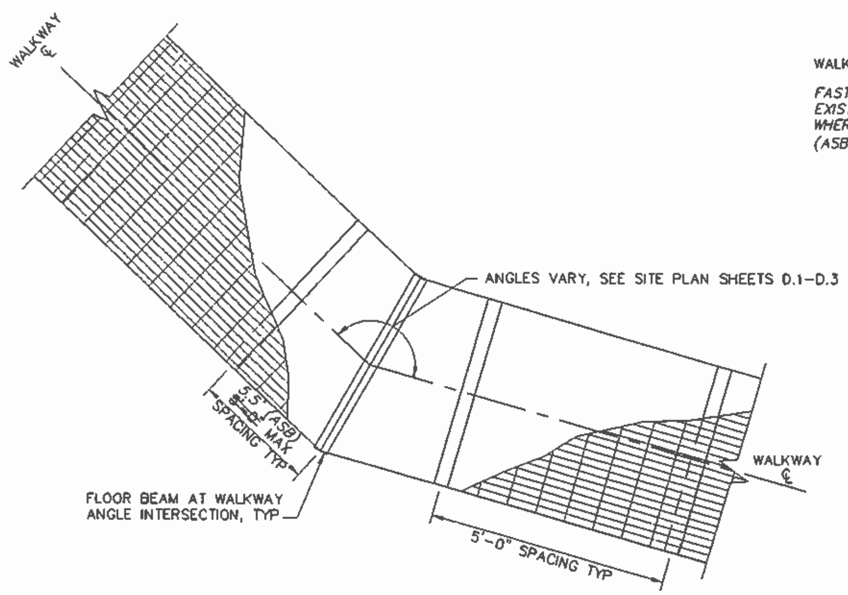
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

WALKWAY DETAILS

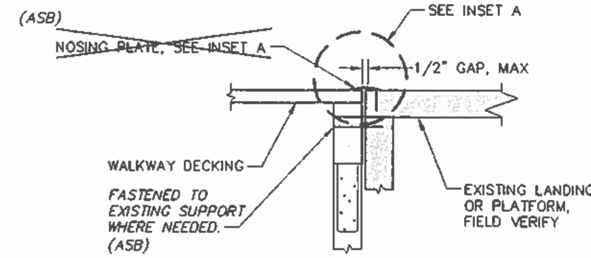
DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	NTS

SHEET NO. E.1

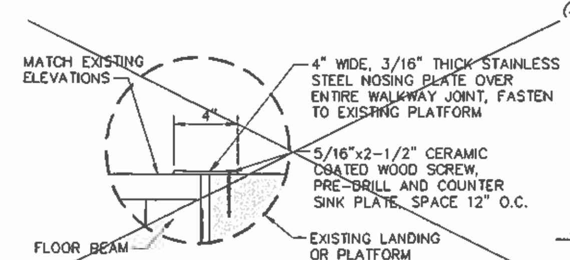
STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	~	7	T 4 N	R 49 W	KATEEL RIVER	2008



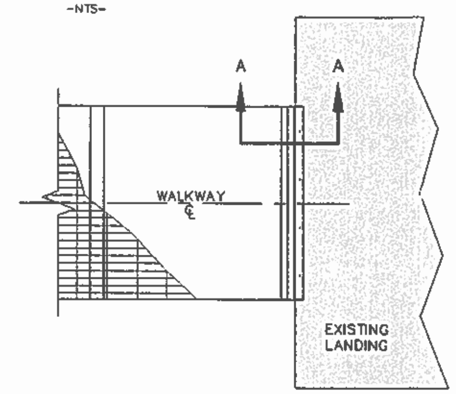
1 E.2 TYPICAL WALKWAY ANGLE
PLAN VIEW -NTS-



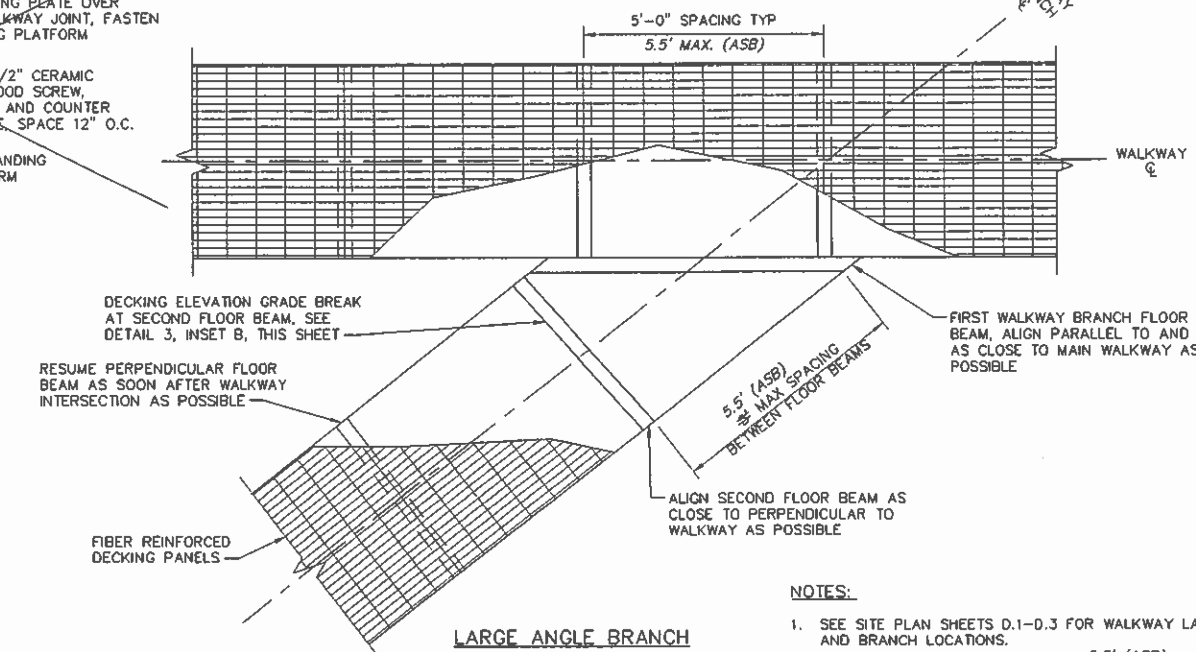
SECTION A–A
-NTS-



INSET A



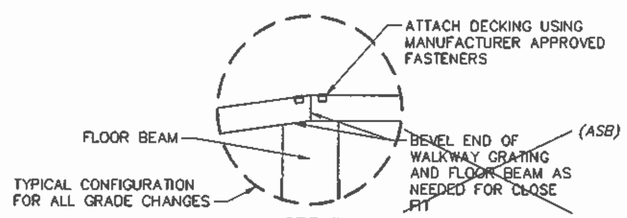
2 E.2 WALKWAY/EXISTING LANDING TRANSITION
PLAN VIEW -NTS-



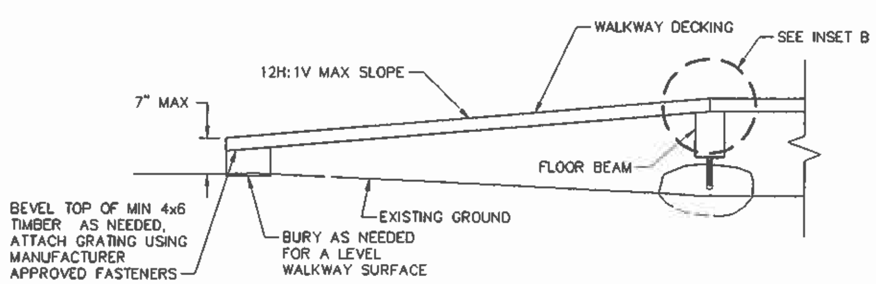
LARGE ANGLE BRANCH

NOTES:

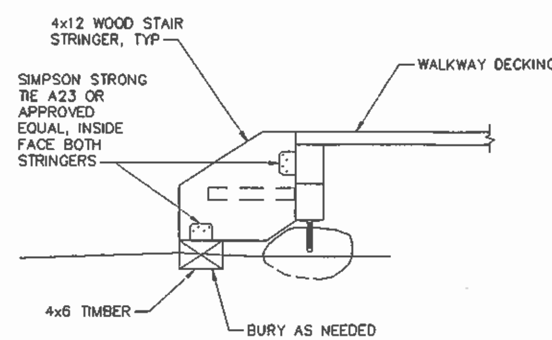
1. SEE SITE PLAN SHEETS D.1–D.3 FOR WALKWAY LAYOUT AND BRANCH LOCATIONS.
2. MAXIMUM FLOOR BEAM SPACING IS ~~5'-0"~~ 5.5' (ASB).
3. ATTACH FIBER REINFORCED POLYMER COMPOSITE FLOORING PANELS TO FLOOR BEAMS AS DIRECTED BY THE MANUFACTURER USING APPROVED STAINLESS STEEL HARDWARE.



INSET B

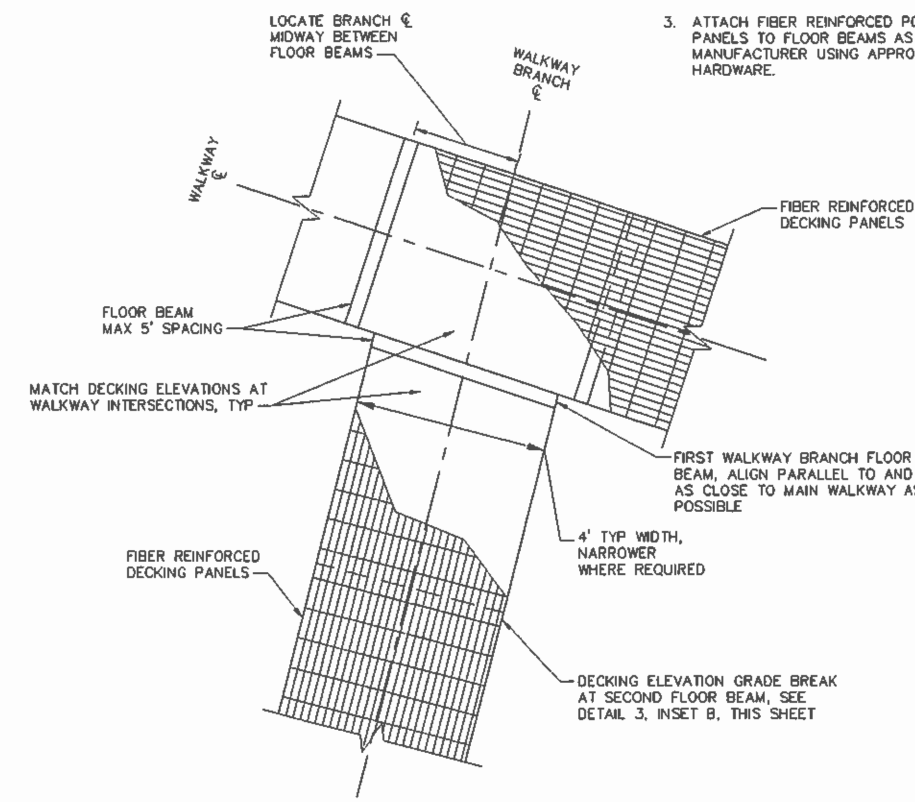


RAMP ENDING/BEGINNING



STEP ENDING/BEGINNING

3 E.2 TYPICAL WALKWAY ENDING/BEGINNING
SIDE VIEW -NTS-



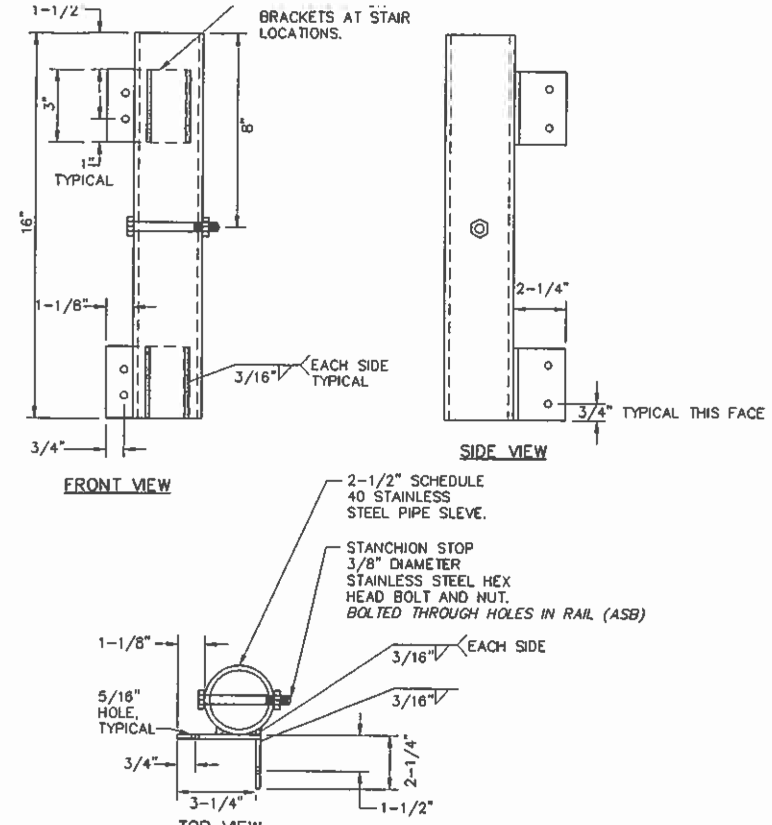
4 E.2 TYPICAL WALKWAY BRANCH
PLAN VIEW -NTS-

OFFICIAL AS–BUILTS

STATE OF ALASKA 49TH AS–BUILTS Brian L. Pederson CE8834 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY						
				RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS	KAWERAK, INC. KAWERAK TRANSPORTATION P.O. BOX 948 NOME, ALASKA 99762	INALIK WALKWAY PROJECT LITTLE DIOMEDE, ALASKA	WALKWAY DETAILS	DESIGNED BY: MAA DRAWN BY: SPK/JCS APPROVED BY: BLP DATE: Jan 14, 2009 SCALE: NTS	SHEET NO. E.2

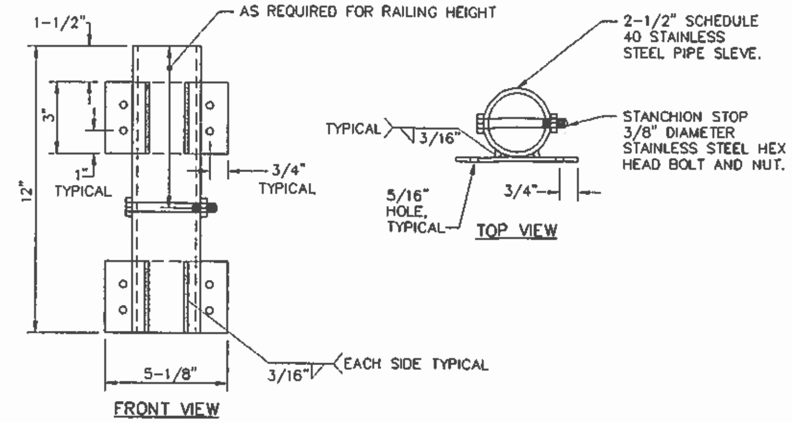
STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008



NOTES:

1. FABRICATE MOUNTING BRACKETS FROM 2-1/2" SCHEDULE 40 STAINLESS STEEL PIPE AND 3/16" THICK 304 STAINLESS STEEL PLATE.
2. FASTEN BRACKET TO TIMBER WITH GRK RSS 5/16"x3-1/8" STAINLESS STEEL SCREW OR APPROVED EQUIVALENT. PREDRILLING OF WOOD NOT REQUIRED.
3. AT TOP AND BOTTOM OF STAIRS, FABRICATE MOUNTING BRACKET AS SHOWN IN THIS DETAIL, EXCEPT REPLACE TOP ANGLE ATTACHMENT PLATE WITH FLAT PLATE FROM DETAIL 2, THIS SHEET, TO AVOID CONFLICT WITH STAIR STRINGER AND HANGER.

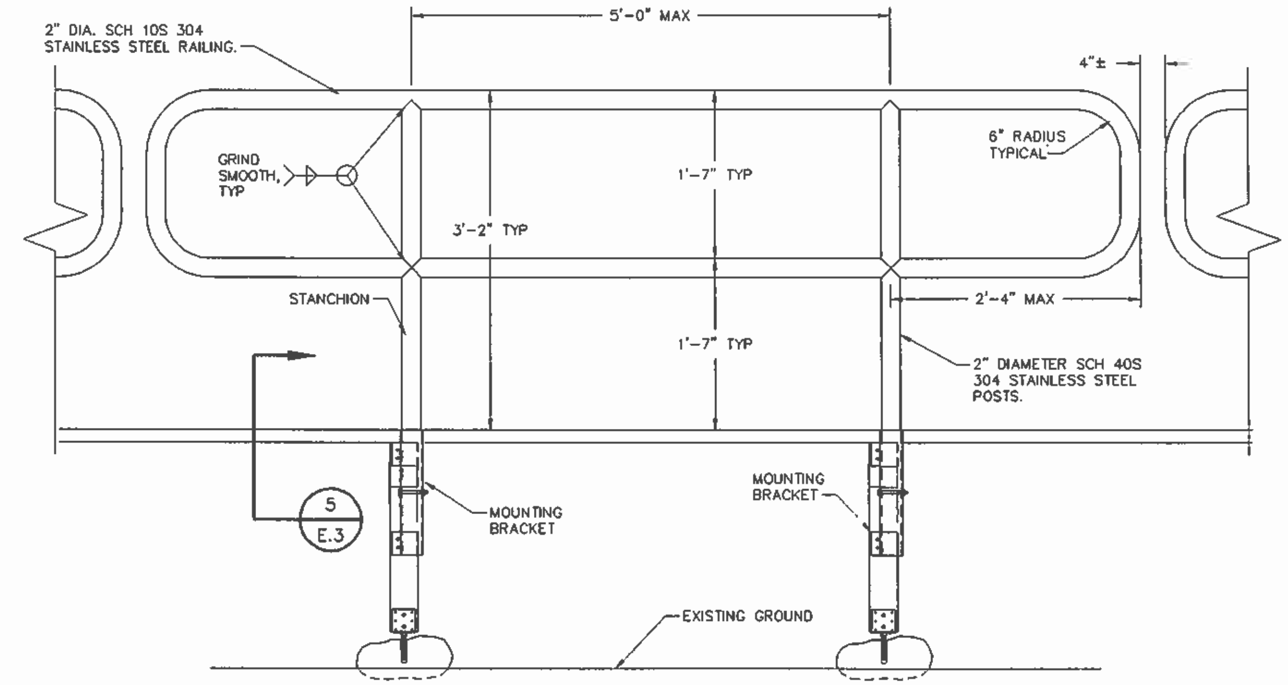
1 / E.3 RAILING MOUNTING BRACKET
FOR MOUNTING TO FLOOR BEAM AND POST -NTS-



NOTES:

1. FABRICATE MOUNTING BRACKETS FROM 2-1/2" SCHEDULE 40 STAINLESS STEEL PIPE AND 3/16" THICK 304 STAINLESS STEEL PLATE.
2. FASTEN BRACKET TO TIMBER WITH GRK RSS 5/16"x3-1/8" STAINLESS STEEL SCREW OR APPROVED EQUIVALENT. PREDRILLING OF WOOD NOT REQUIRED.

2 / E.3 RAILING MOUNTING BRACKET
FOR MOUNTING TO SIDE OF 4x12 STRINGER -NTS-

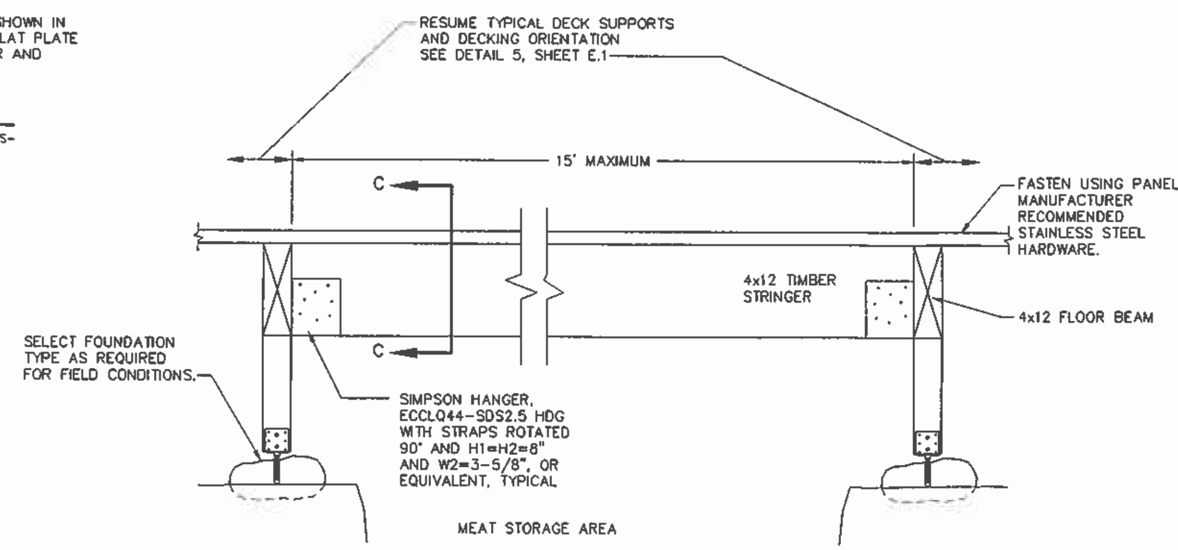


ASB NOTE
SOME RAILING FIELD CUT AND WELDED TO FIT SPECIFIC LOCATIONS

NOTES:

1. INSTALL RAILING ON ALL PORTIONS OF WALKWAY ELEVATED MORE THAN 30 INCHES ABOVE GROUND LEVEL.
2. WELDING SHALL BE IN ACCORDANCE WITH AMERICAN WELDING SOCIETY GUIDELINES.
3. BRACKET HOLES SHALL BE DRILLED TO SPECIFIED DIAMETERS, AND NOT TORCH CUT.
4. RAIL POSTS SHALL BE INSTALLED PLUMB, IN THE LATERAL DIRECTION, AND PERPENDICULAR TO WALKWAY SURFACE IN THE LONGITUDINAL DIRECTION, EXCEPT THAT STAIR RAILING POSTS SHALL BE INSTALLED PLUMB IN BOTH DIRECTIONS.

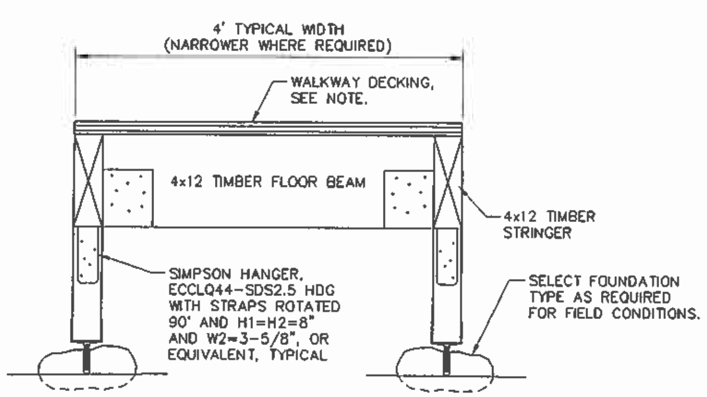
3 / E.3 REMOVABLE WALKWAY RAILING
SIDE VIEW -NTS-



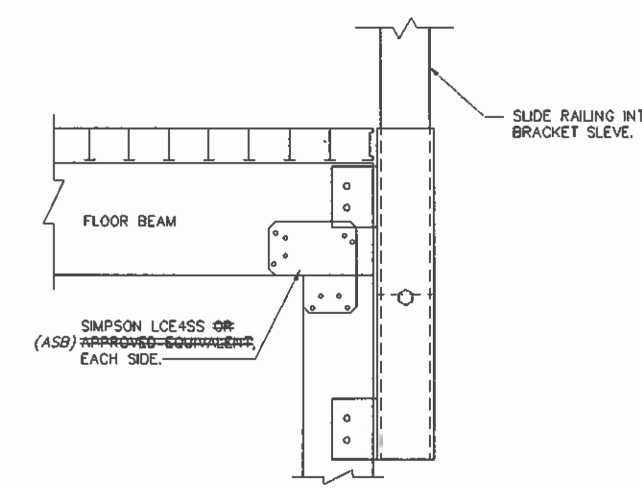
NOTES:

1. WHERE STRINGERS ARE USED TO INCREASE SPAN LENGTH, DECKING MUST BE INSTALLED PERPENDICULAR TO LENGTH OF WALKWAY, TO CARRY LOAD ACROSS STRINGERS INSTEAD OF BETWEEN FLOOR BEAMS.
2. 3-1/8"x12" GLULAM IS ACCEPTABLE SUBSTITUTION FOR STRINGERS AND FLOOR BEAMS, WITH COMPATIBLE HANGERS, PROVIDED GLULAM IS PRESSURE TREATED TO SIMILAR LEVELS.

4 / E.3 WALKWAY DECK AT MEAT STORAGE AREAS
SIDE VIEW -NTS-



SECTION C-C
-NTS-



5 / E.3 REMOVABLE WALKWAY RAILING
SECTION VIEW -NTS-

OFFICIAL AS-BUILTS

STATE OF ALASKA 49TH AS-BUILTS Brian L. Pederson CE9634 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.
KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

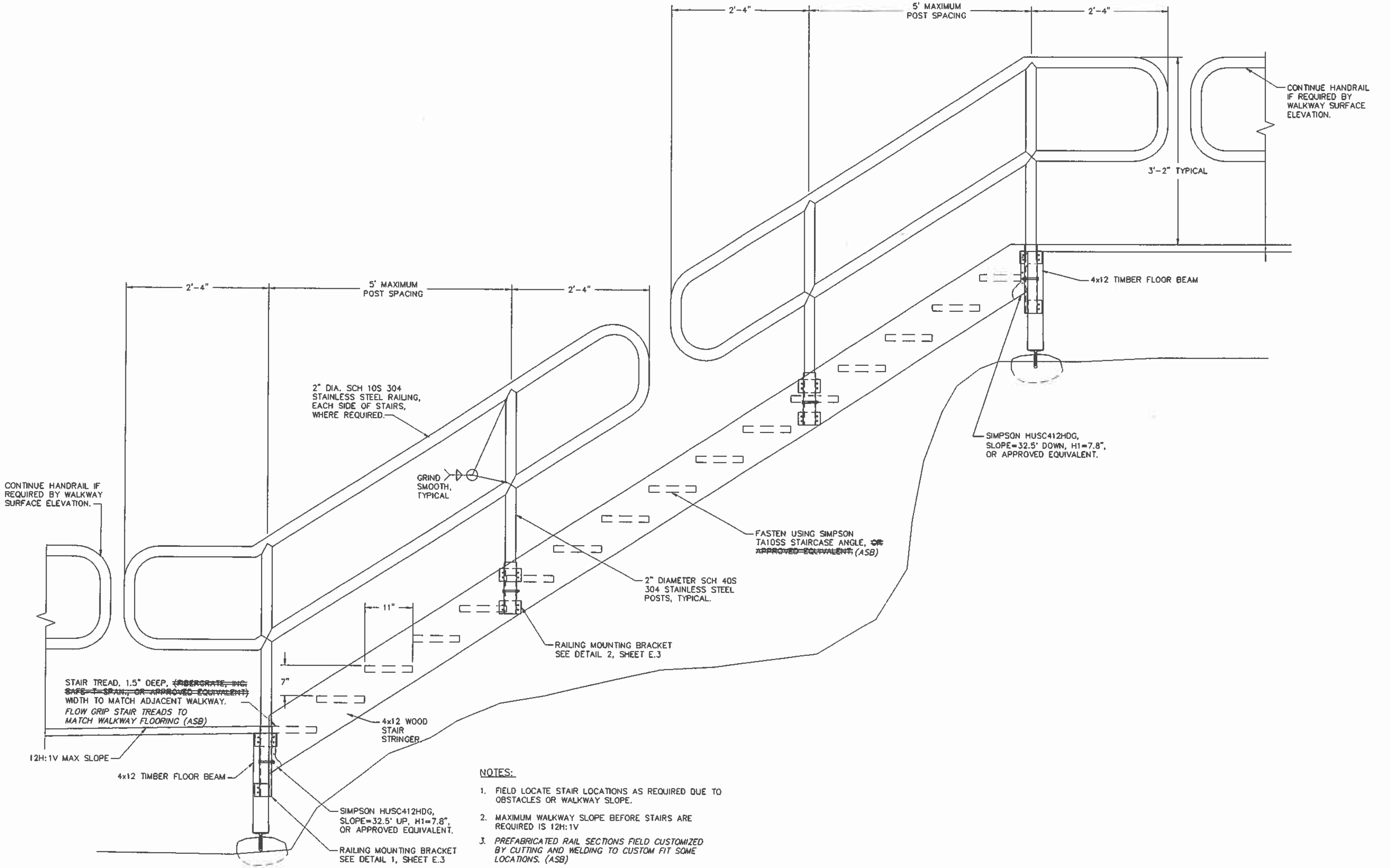
INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

WALKWAY DETAILS

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	NTS

SHEET NO.
E.3

STATE	ROUTE	SECTION	TOWNSHIP	RANGE	MERIDIAN	YEAR
ALASKA	–	7	T 4 N	R 49 W	KATEEL RIVER	2008



NOTES:

1. FIELD LOCATE STAIR LOCATIONS AS REQUIRED DUE TO OBSTACLES OR WALKWAY SLOPE.
2. MAXIMUM WALKWAY SLOPE BEFORE STAIRS ARE REQUIRED IS 12H:1V
3. *PREFABRICATED RAIL SECTIONS FIELD CUSTOMIZED BY CUTTING AND WELDING TO CUSTOM FIT SOME LOCATIONS. (ASB)*

1 / E.4 WALKWAY STAIRS AND RAILING SIDE VIEW -NTS-

OFFICIAL AS-BUILTS

STATE OF ALASKA 49TH AS-BUILTS Brian L. Pederson CE9834 Registered Professional Engineer

REV.	DATE	DESCRIPTION	BY

RPKA Rodney P. Kinney Associates, Inc. CONSULTING ENGINEERS & SURVEYORS

KAWERAK, INC.

KAWERAK TRANSPORTATION
P.O. BOX 948
NOME, ALASKA 99762

INALIK WALKWAY PROJECT
LITTLE DIOMEDE, ALASKA

WALKWAY DETAILS

DESIGNED BY:	MAA
DRAWN BY:	SPK/JCS
APPROVED BY:	BLP
DATE:	Jan 14, 2009
SCALE:	NTS

SHEET NO. E.4

APPENDIX 9:

ADEC CORRESPONDENCE

From:	Mendez, Johnny (DEC) <johnny.mendez@alaska.gov>
Sent:	Wednesday, April 5, 2023 11:04 AM
To:	Maya Wharton
Cc:	Ballou, Nellie B (DEC)
Subject:	[EXT] RE: Little Diomede Raw Water
Attachments:	Electronic FOIA Fillable.pdf

Hi Maya,
We don't have any engineering drawings that I know of that show the connections between the Wood Stave tank and the raw water that is distributed to the community in summer from it. We do have a sanitary survey report from 2017 that has good pictures showing the details of the wood-stave tank inlet and outlet piping and talks about the raw water being distributed to the community by the boardwalk in summer. There are also some trip reports from ANTHC and the remote maintenance workers that have photos of the wood stave tank and raw water piping.
We would need you to fill out a records request form first before we can send this info your way (see attached).

The Wood Stave tank and raw water line with taps has been a sanitary issue that DEC has brought up before with multiple entities involved in DW projects in the community to see if they can be addressed. However there has not been any promising lead on that yet. I know that Diomede had purchased a replacement for the wood stave tank and we requested engineered plans for it before it was installed. But DEC has not received a submittal requesting construction approval for that replacement tank yet.

I hope that helps,

Johnny

Johnny Mendez, P.E.
Engineer 2

Drinking Water Program
Alaska Department of Environmental Conservation
610 University Ave.
Fairbanks, AK 99709
Ph: (907) 451-5193
Fax: (907) 451-2188
http://dec.alaska.gov/eh/dw/index.htm

From: Maya Wharton <mwharton@dowl.com>
Sent: Wednesday, April 5, 2023 10:04 AM
To: Mendez, Johnny (DEC) <johnny.mendez@alaska.gov>
Subject: Little Diomede Raw Water

CAUTION: This email originated from outside the State of Alaska mail system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Johnny,

Thanks for returning my call. We are writing a first service PER for the community of Diomede and are missing some information on the raw water distribution. I'm not sure which program this would fall under, but I was hoping you might be able to direct my question.

There is currently a water stave tank to the south of the community. It is in bad shape and there are plans to replace it. We don't have information or plans on the raw water lines coming from the tank. Do both lines empty into the tank before running to the WTP? If there are drawings or records of what is happening at that intersection, we would love to see that.

Also, community members and past reports mention that there are spigots around the community. I think that this is a summer fire protection system, but they are definitely used for drinking water. Are there plans to turn these off to prevent residents drinking raw water? Again, any records or drawings of these spigots would be helpful.

Thank you,

Maya Wharton, EIT (CA)
Water Resources Designer

DOWL

(907) 562-2000 | office
(907) 865-1253 | direct

dowl.com

From: Maya Wharton
Sent: Wednesday, April 26, 2023 9:35 AM
To: Cara Shonsey
Subject: FW: [EXT] RE: Desalination Requirements

This is an email I got back from the operator cert program. ADEC doesn't have a specific training required for Desal but it would probably bump Diomede from a small treated system to a class 2 or 3 system. The new WTP is a class 2 system, I believe, so desal may not require more training but if they needed to hire another operator it would be $750 for the class, and $250 for the license.

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL
(907) 562-2000 | office
(907) 865-1253 | direct
dowl.com

From: DEC-Water-FCO-OPCert (DEC sponsored) <DEC.Water.FCO.OPCert@alaska.gov>
Sent: Wednesday, April 26, 2023 9:24 AM
To: Maya Wharton <mwharton@dowl.com>
Subject: RE: [EXT] RE: Desalination Requirements

Hi Maya,

It appears that in 2020 and 2022 we had some conversations with ANTHC concerning the upgrades to the Diomede water system. They submitted three proposals for classification, i.e., reverse osmosis, ion exchange, and GAC. Below are the classifications for each.

Total Score	System Classification
1-30	Class 1
31-55	Class 2
56-75	Class 3
>75	Class 4

RO (WT 2):

Score Category	Score
Size (Peak day design capacity, gallons per day) - 50,001 - 100,000	4
Water Supply Source - Surface water	6
Pretreatment - Roughing filter: Cartridge filter	2
Pretreatment - Roughing filter: Backwashable granular media filter	8
Adjustment and Corrosion Control - Limestone or calcite contactor	2
Activated Carbon - Cartridge or bag filter	2
Filtration - Membrane filtration	8
Disinfection - Liquid and powdered hypochlorites	3
Sludge Treatment - Discharge to sewer or other off-site treatment	0
Storage - Water storage tank, for achieving CT	3
Storage - Pressure tanks	0
Total	***38***

IX (WT 2):

Score Category	Score
Size (Peak day design capacity, gallons per day) - 50,001 - 100,000	4
Water Supply Source - Surface water	6
Pretreatment - Roughing filter: Cartridge filter	2
Pretreatment - Roughing filter: Backwashable granular media filter	8
Adjustment and Corrosion Control - pH adjustment	3
Adjustment and Corrosion Control - Limestone or calcite contactor	2
Aeration / Ion Exchange - Ion exchange	4
Disinfection - Liquid and powdered hypochlorites	3
Sludge Treatment - Discharge to sewer or other off-site treatment	0
Storage - Water storage tank, for achieving CT	3
Total	***35***

GAC (WT 2):

Score Category	Score
Size (Peak day design capacity, gallons per day) - 10,000 - 50,000	2
Water Supply Source - Surface water	6
Pretreatment - Roughing filter: Non-backwashable strainer or filter	2
Adjustment and Corrosion Control - Corrosion inhibitor	3
Adjustment and Corrosion Control - Limestone or calcite contactor	2
Aeration / Ion Exchange - Ion exchange	4
Activated Carbon - Granular activated carbon contactors	4
Coagulation - Primary coagulant	5
Coagulation - Coagulant aid, flocculent, or filter aid (3 each up to 12)	3
Mixing - In-line static mixers	0
Filtration - Granular media	8
Disinfection - Liquid and powdered hypochlorites	3
Sludge Treatment - Discharge to sewer or other off-site treatment	0
Storage - Water storage tank, for achieving CT	3
Storage - Pressure tanks	0
Total	***45***

For water treatment training, there are several options.

- Classroom training, typically posted on our training calendar at https://dec.alaska.gov/water/operator-certification/training-calendar/
    - NTL Water Treatment Level 1, typically held in Anchorage or Fairbanks, https://www.ntlalaskainc.com/copy-of-class-registration
        - Course Fee: $750
        - Exam Fee: $150
        - The next course is scheduled for the week of October 30th in Fairbanks
    - ARWA Water Treatment Level 1, varying locations, contact Kelly Comerford, 907-841-2800 or kelly@arwa.org, for more information about ARWA's trainings
        - Course Fee: None
        - Exam Fee: $150
- Online/Virtual, also posted on our training calendar
    - Virtual ANTHC Water Treatment Level 1, varying locations, contact Brian Berube, 907-729-3673 or bjberube@anthc.org, for more information about ANTHC's virtual trainings
        - Course Fee: None
        - Exam Fee: $150
    - American Water Works Association (AWWA) Water Treatment Operator Level 1, July 17 – August 18, https://engage.awwa.org/personifyebusiness/Events/AWWA-Events-Calendar/Meeting-Details?productId=161871384&productId=161871384
        - Course Fee: $525
        - Operator must register with DEC to take the exam which can be administered in Diomede
- Correspondence Course

    - California State University, Sacramento (CSUS), Office of Water Programs
        - Water Treatment Plant Operation, Volume 1, https://www.owp.csus.edu/courses/drinking-water/water-treatment-plant-operation-vol-1.php
            - Cost: $175 plus shipping

The exam/certification process, https://dec.alaska.gov/water/operator-certification/get-certified/:

1. Take WT P/1 exam (exam fee $150)
2. After passing WT P/1 exam, apply for certification (Application fee $100)

Let me know if you have any additional questions.

Have a great day!

Thanks,
Martin

Martin Suzuki
Environmental Program Manager 1
Alaska Department of Environmental Conservation
Operator Certification Program
P.O. Box 111800
Juneau, AK 99811-1800
Phone: (907) 465-5140
Centralized Phone: (907) 465-1139
Fax: (907) 465-5177

From: Maya Wharton <mwharton@dowl.com>
Sent: Wednesday, April 26, 2023 8:26 AM
To: DEC-Water-FCO-OPCert (DEC sponsored) <DEC.Water.FCO.OPCert@alaska.gov>
Subject: RE: [EXT] RE: Desalination Requirements

Thanks for getting back to me Martin,

We're working with Little Diomede to explore piped water and sewer. We'd like to present desalination in our report as a possible water source, but we won't be able to develop a full treatment plan. Would you be able to give a rough estimate on what it costs the community to train and maintain a Class 1 operator for 1 year? We can factor in travel costs. Or if you could point me in the direction of where I could find pricing information, that would be great as well.

Best,

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL
(907) 562-2000 | office
(907) 865-1253 | direct
dowl.com

From: DEC-Water-FCO-OPCert (DEC sponsored) <DEC.Water.FCO.OPCert@alaska.gov>
Sent: Wednesday, April 26, 2023 7:56 AM
To: Maya Wharton <mwharton@dowl.com>
Subject: [EXT] RE: Desalination Requirements

Hi Maya,

Would it be possible to let me know the name of the community you are working with?

Due to the complexity of a desalination water treatment plant, the system will at a minimum be a Water Treatment Class 1 system. What type of treatment are you proposing? Distillation, membrane filtration, or something else?

Unfortunately, I don't know of any training specific to desalination water treatment plants.

Thanks,
Martin

Martin Suzuki
Environmental Program Manager 1
Alaska Department of Environmental Conservation
Operator Certification Program
P.O. Box 111800
Juneau, AK 99811-1800
Phone: (907) 465-5140
Centralized Phone: (907) 465-1139
Fax: (907) 465-5177

From: Maya Wharton <mwharton@dowl.com>
Sent: Tuesday, April 25, 2023 5:38 PM
To: DEC-Water-FCO-OPCert (DEC sponsored) <DEC.Water.FCO.OPCert@alaska.gov>
Subject: Desalination Requirements

Hello,

I'm writing a water and sewer PER and would like some information on training operators for desalination water treatment plants. The community we are working with is currently a small treated community with one operator. If a desalination plant were to be pursued, what class of treatment system could be assumed?
The current operator has 1.40 CEUs, is there a ballpark cost for training and maintaining him as a desal operator.

Any information you have on this topic would be appreciated. Feel free to give me a call at 907-865-1253.

Thank you,

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL
(907) 562-2000 | office
(907) 865-1253 | direct
dowl.com

From: Coss, Pablo M (DEC) <moses.coss@alaska.gov>
Sent: Monday, May 1, 2023 5:31 PM
To: Maya Wharton
Cc: Bower, Trisha M (DEC)
Subject: RE: [EXT] RE: Little Diomede Follow-Up

You don't often get email from moses.coss@alaska.gov. Learn why this is important

Hi Maya,

Please feel free to call me to see if I can answer your questions to your satisfaction. If I don't answer, please leave a message and I'll call you back.

My best,

Moses Coss
ADEC – AQ
907-451-2163

From: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Sent: Monday, May 1, 2023 4:52 PM
To: Maya Wharton <mwharton@dowl.com>
Cc: Coss, Pablo M (DEC) <moses.coss@alaska.gov>
Subject: RE: [EXT] RE: Little Diomede Follow-Up

Good Afternoon Maya,

There has never been a legal landfill in Diomede. There isn't space for a landfill, and there isn't any area that would meet the regulatory requirements for a landfill. That is why Diomede is classified as a transfer site.

You would have to check with our Air Quality Program regarding whether or not Diomede has an air quality permit. Diomede is also an extreme situation, so it is possible that they have a waiver or an exemption. It is a very small burn unit, and I know that the other incinerators that do have a permit are in much larger hub communities. I am cc'ing Moses Coss with our Air Quality Program, and while he may not be the right person for you to ask, he can point you in the right direction.

The community of Skagway, Barrow, and Dillingham all have incinerators for waste management. They are much larger communities with tourism and other factors that made incineration economically viable for them. The cost of fuel and the availability of fuel are limiting factors for small scale incineration of waste using a fuel fed and electricity driven incinerator. It has not proven to be a viable option for small communities like Diomede to my knowledge. This may be something that Moses or his staff has more information on as they manage air permits for the large incinerators in Alaska.

Sincerely,
Trisha Bower

Trisha Bower
Northern and Southeast Regional Program Manager
Dept. of Environmental Health | Solid Waste Program
610 University, Fairbanks, AK 99709 ☎ 907.451-2174 | 🖷 907.451-2188 | https://dec.alaska.gov/eh/solid-waste.aspx

Think of the Environment - Do you need to print this e-mail?

From: Maya Wharton <mwharton@dowl.com>
Sent: Monday, May 1, 2023 4:40 PM
To: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Subject: RE: [EXT] RE: Little Diomede Follow-Up

Thanks Trisha,

Just to clarify, there has never been an accepting landfill because only recyclables get backhauled?

On a slightly different topic, we've been looking into incineration for Diomede. I have a few questions below that would be great to get your input on.
Do you know of small-scale incinerators used by other communities?
Does Diomede currently have an air quality permit to operate their burn barrel?

Thank you,

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL
(907) 562-2000 | office
(907) 865-1253 | direct
dowl.com

From: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Sent: Monday, May 1, 2023 4:04 PM
To: Maya Wharton <mwharton@dowl.com>
Subject: [EXT] RE: Little Diomede Follow-Up

Maya,

I am not certain where all of Diomede's materials go. I do know that some does go to Nome, but I believe that is a special case. Nome does not accept waste from outside communities, without Assembly approval, but it does seem that Diomede often is granted approval. They are a special situation in the region. I am not involved with the minutiae of where Diomede sends different materials, but I do know that most of their recyclables either go to Kawerak in Nome or to Total Reclaim in Anchorage.
I believe that this may also change from year to year, based on who is visiting Diomede. The Coast Guard often also assists Diomede with backhauling materials off of Diomede. ANTHC has also provided assistance when they have projects in Diomede- they often schedule an extra barge just for the purpose of backhauling materials off of Diomede.

Your best option to find out what all of the options are would be to contact the Native Village of Diomede and inquire about their process for arranging backhaul. My understanding is that they take advantage of every option that becomes available to them in any given year.

Sincerely,
Trisha Bower

From: Maya Wharton <mwharton@dowl.com>
Sent: Wednesday, April 19, 2023 4:18 PM
To: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Subject: Little Diomede Follow-Up

Trisha,

Thank you for answering my questions about Diomede's solid wase situation last week. I was hoping you could answer one more question; **if Nome doesn't accept waste from outside communities, where is the nearest facility that would accept waste from Diomede?** You mentioned that the UAF research vessel currently backhauls from Diomede, where is that waste brought?

Best,

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL

(907) 562-2000 | office
(907) 865-1253 | direct

dowl.com

From: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Sent: Thursday, June 8, 2023 5:07 PM
To: Maya Wharton
Cc: Bear, Tonya (DEC)
Subject: RE: [EXT] RE: Little Diomede Neighboring Communities

Maya,

The helicopter service has been hesitant to accept and transport any material that could foul their helicopters in the past. It is probably unlikely that they would agree to transport human waste, but you can ask them. They have not been willing to transport recyclables either which is why the local environmental program has gotten so creative with figuring out ways to backhaul their materials out of Diomede.

You will have to coordinate with Tonya on Brevig Mission. My understanding is that the Brevig System is contained and does not require pumping, but it was a one of a kind design that has had some challenges and partial failures. My knowledge is only based on what the local EPA GAP staff have mentioned to me during my landfill inspections.

Sincerely,
Trish Bower

From: Maya Wharton <mwharton@dowl.com>
Sent: Thursday, June 8, 2023 3:31 PM
To: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Cc: Bear, Tonya (DEC) <tonya.bear@alaska.gov>
Subject: RE: [EXT] RE: Little Diomede Neighboring Communities

Thank you, Trisha.

We were hoping for a helicopter backhaul, since that is the most consistent means of transportation, but either way it does seem cost prohibitive. Out of curiosity, what does Brevig do with the solids resulting from their specialized septic?

Thanks!

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL
(907) 562-2000 | office
(907) 865-1253 | direct
dowl.com

From: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Sent: Wednesday, June 7, 2023 4:46 PM
To: Maya Wharton <mwharton@dowl.com>
Cc: Bear, Tonya (DEC) <tonya.bear@alaska.gov>
Subject: [EXT] RE: Little Diomede Neighboring Communities

Good Afternoon Maya,

The landfill in Wales is on the beach and is threatened on two sides by storm surges. It is not permitted to manage human waste now, and wouldn't be permitted to expand in order to take that new waste stream.
I am cc'ing Tonya Bear to see if they have a permitted sewage lagoon or other waste water facility in Wales. However, I don't think that you can actually get from Diomede to Wales. The coast is too shallow for boats, which is why all backhaul and other goods have to come in via the military Long Range Radar Station called Tin City. So Wales may not be a logistically viable option, even if they have a legal waste water facility. Neither Teller nor Brevig Mission have a human waste disposal area either, as Teller does not have water and sewer service and Brevig has a specialized waste water system that ends in a septic type leach field system. The closest disposal options, that would still have to grant approval, may be either Nome or Kotzebue, based on the map that I have in my office.

Sincerely,
Trish Bower

Trisha Bower
Northern and Southeast Regional Program Manager
Dept. of Environmental Health | Solid Waste Program
610 University, Fairbanks, AK 99709 ☎ 907.451-2174 | 🖷 907.451-2188 | https://dec.alaska.gov/eh/solid-waste.aspx

From: Maya Wharton <mwharton@dowl.com>
Sent: Wednesday, June 7, 2023 3:37 PM
To: Bower, Trisha M (DEC) <trisha.bower@alaska.gov>
Subject: Little Diomede Neighboring Communities

Hi Trisha,

I just left you a voicemail but realize email may be more appropriate for this question. We spoke in April about Diomede's current waste practices for the first service water and wastewater PER we're putting together. Per our previous conversation, it's hard to find facilities accepting waste from other communities. Unfortunately, we still need to explore this thoroughly because landfilling on Diomede is not an option.

Wales would be the closest community with a landfill, do you know if they would need to upgrade their landfill status to monofil septage waste? Are there any communities in the area with a septage monofil already operating?

Would love to connect sometime this week if possible, feel free to reach out my number is 907-865-1253. Thanks!

Maya Wharton, EIT (CA) *(she/her)*
Water Resources Designer

DOWL

(907) 562-2000 | office
(907) 865-1253 | direct

dowl.com

MEETING SUMMARY

PROJECT:	Little Diomede ePER	DATE:	9/26/2023
PROJECT NUMBER:	1528.50290	TIME:	9:00 AM
ORGANIZER:	DOWL	SUBJECT:	Wastewater and Septage

ATTENDEES:	ORGANIZATION:
Tonya Bear	ADEC
Derek Hancey	ANTHC
Will Moran	ANTHC
Chase Nelson	DOWL
Maya Wharton	DOWL

- **Current Situation and Issue:**
  - Lifewater units not maintained, community dumps sludge by hand in ocean.
  - Existing seepage pit not regulated; needs better management. Very little understanding of it's design and what level of treatment is being achieved.
- **Septage Management Options:**
  - Proposal suggests a lined septage lagoon or back hauling.
  - Back hauling faces challenges with facility acceptance.
- **Septage Lagoon Details:**
  - Lined septage pit/lagoon proposed for Diomede due to limited options.
  - Proposed material: bentonite instead of membrane plastic.
  - Need a discharge permit for the septage lagoon unless the overflow is back to the proposed mechanized (Lifewater) treatment plant.
- **Regulatory and Compliance Insights:**
  - Diomede is one of the 76 Alaska Native Villages exempt from applying for a secondary treatment waiver, exemptions discussed.
  - EPA's preference leans towards secondary treatment.
  - Direct discharge to deep ocean outfall/diffuser not allowed even with a large mixing zone
    - 18 AAC 72.050 Minimum treatment section
  - Compliance concerns: community's ability to maintain units.
- **Discharge and Treatment Preferences:**
  - Effluent line back to treatment plant is suggested.
  - Preference for secondary treatment (Lifewater) due to rural challenges.
  - Concerns about violating Clean Water Act standards.
- **Regulatory Considerations and Options:**
  - Exploring options for subsurface leach field.
  - Consideration of discharge to surface waters.
  - Preference for a lined septage pit/lagoon with effluent return.
- **ADEC's Approach:**
  - ADEC's preference is for secondary treatment.
  - Solids management and feasibility of lined septage pit is preliminarily supported.
- **Planning and Design Stages:**

    - Considering secondary treatment (Lifewater) or leach field on the beach.
        - Feasibility of leach field is questionable with what is known about on-site material.
    - Derek prefers a conservative approach (Lifewater) in the planning/PER stage.
- **Key Agreements and Directions:**
    - Direct discharge of untreated wastewater ruled out.
    - DEC prefers secondary treatment.
    - ANTHC recommends higher treatment levels at the Planning stage.
    - Septage pit acceptable with a return to the wastewater treatment plant.

APPENDIX 10:
DISMISSED ALTERNATIVES

1.1 Alternative 5: PASS

1.1.1 Description

The PASS alternative includes a 100-gallon water storage tank, a water treatment system, a sink, a solid separating toilet, and urinal for human waste disposal. The PASS water treatment system includes a point-of-use cartridge filter and manual chlorination. The advantages of using PASS are a low monthly cost to the homeowner, water savings, and no impact to space congestion. PASS is considered an interim solution for many communities until piped water is an option. PASS is not preferred by the community and the maintenance responsibility will fall on the homeowner.

Alternative 5 will provide the following new infrastructure.

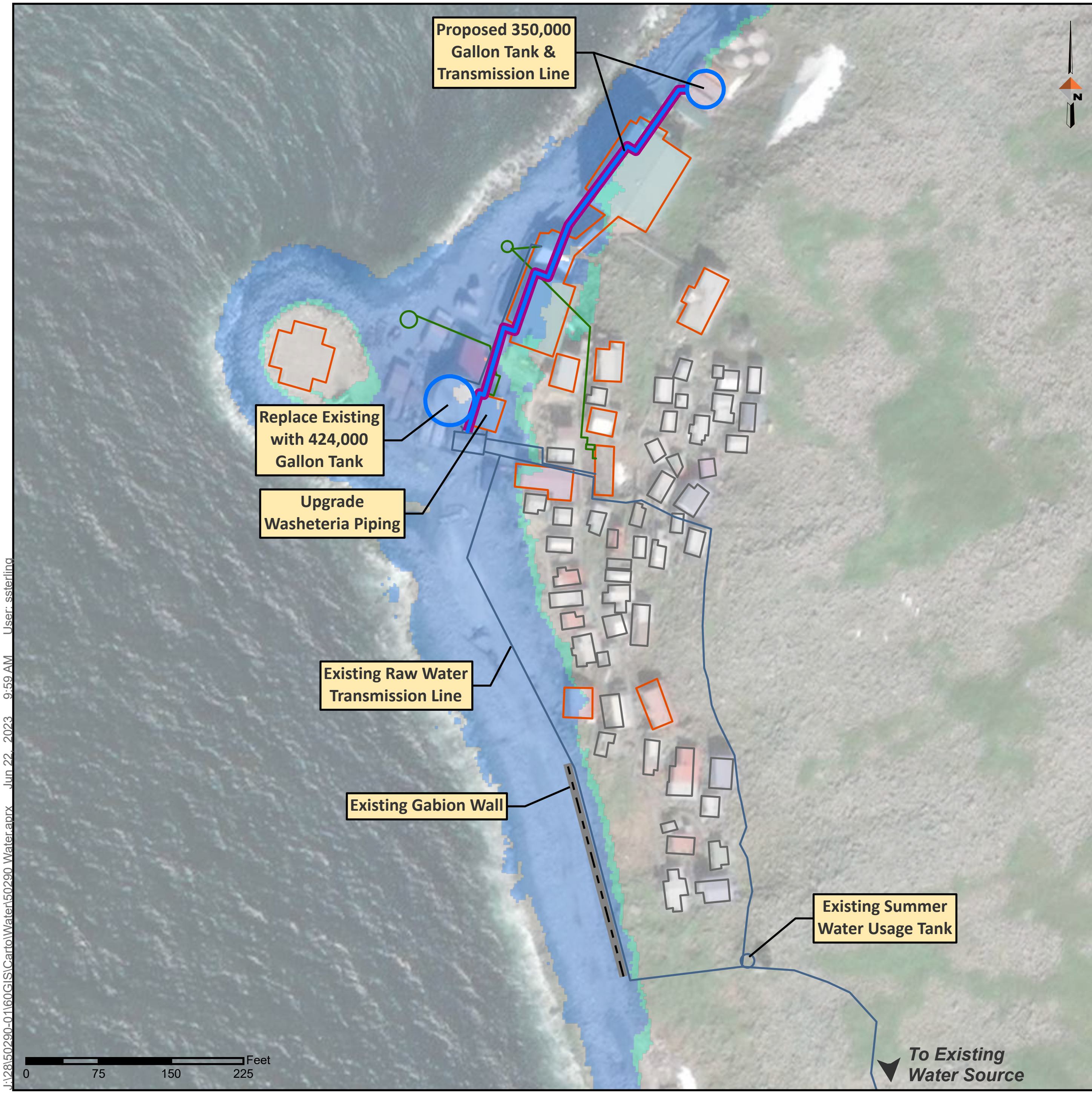
- Water Source
  - Improve the exiting surface water intake by constructing snow fencing and improving the basin.

- Water Treatment
  - Remove all existing treatment equipment and install a RO skid capable of 15 gpm.
  - Backwash will continue to be disposed of in an ocean outfall, per ANTHC WTP plans.
  - Backup power source may need to be replaced to sustain the distribution system

- Water Storage
  - Replace the existing 424,000 WST.
- PASS
  - For each residence install 100-gallon WST tank, rain catchment system, sink, ventilated separating toilet.

- Wastewater Treatment
  - Upgrade washeteria septic piping to dispose of urine receptacles.
  - Purchase of advanced burn barrels for solid incineration or plan to barge solids to accepting facility.

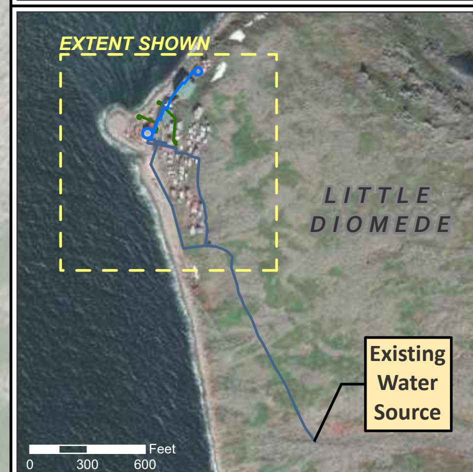
See Figure 20 for concept layouts for the PASS alternative.



Alternative 5
PASS

Little Diomede 65% ePER

Proposed Water Utility Infrastructure
Proposed Riprap
Gabion Wall
Existing Sewer Utility Infrastructure
Existing Water Utility Infrastructure
Building Outline
House Outline
Possible Water Reach
50 Year Storm
50 Year Storm with 50 Year Sea Level Rise



DOWL

Date: June 2023

Figure 20

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1.1.2 Environmental Impacts

The PASS alternative would not require a septage lagoon so Waters of the United States would not be impacted. Greywater would need to be discharged onsite which could be a potential hazard to human health.

The resulting dried solids would be incinerated in an advanced burn barrel per ADEC approval. The current burn plan (only when winds blow from the north) would need to remain in effect. Incineration would help alleviate some the material waste burden and prevent trash from being disposed in the ocean.

1.1.3 Land Requirements

- This alternative does not require any needed space and pedestrian activities would remain constant.

- Upgrade of Existing Septic Tank – The current washeteria operates an aboveground septic system that is deteriorating. The washeteria piping will need to be updated to allow for convenient urine receptacles disposal and a new septic system should replace the old one.

1.1.4 Potential Construction Problems

This alternative proposes limited new construction. Condition of homes may present problems while installing PASS.

The high winds common in Diomede will make the construction of the tanks more challenging.

1.1.5 Sustainability Considerations

1.1.5.1 Energy Efficiency & Alternative Energy

The PASS alternative will be the least energy intensive alternative because there will be a reduced water consumption and no additional piped infrastructure.

- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation for the water treatment process as the high solar gain period would coincide with the time water treatment. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.

- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it would require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid such as Diomede's increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all of the systems properly. Installing wind power for the sole purpose of making has heat has not been shown to be cost effective in Alaska. It would also increase the complexity of the utility's heat add system as there would need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

1.1.5.2 Affordability

PASS is the most affordable option. Self-haul would still be required for PASS but with the ventilated toilet and sink there will be an improvement in sanitation without much cost to the residents. These internal systems would not require more operator maintenance.

1.1.5.3 Operations

PASS may require more maintenance by residents because all the elements are inside of the home.

In the summer, during peak subsistence season, the operators need to maintain the intake and distribution, and run the treatment plant. A PASS system will not require a lower operator training level. Diomede will need Level 2 operator to run the treatment plant.

Because PASS dries the solids they can be incinerated, and a lagoon would not be needed in this design. A lagoon will be a high capital cost project, require O&M, and may be unfavorable to the community.

1.1.5.4 Climate Change Resiliency

Climate change has already affected Diomede and will continue to change life on the island. Inconsistent sea ice and changes in sea mammal migration have been the first signs that the effects of climate change are taking hold. Still on the horizon are sea level rise and increasing storm surge intensity, both of which will need to be accounted for while designing any system on Little Diomede. Most of the existing community buildings, including the WTP and origin of the distribution system, are located below the USACE design wave height of 16.4 feet above sea level (Diomede Erosion and Flooding, DOWL). Bringing as much infrastructure as possible above the expected wave run up height will help ensure that it will survive the next 25 years. As the WTP and wastewater collection will likely remain in the flood zone due to space constraints, design will focus on protecting the infrastructure from the flooding and ice damage.

Diomede relies on a seasonal run-off water source that is in danger of extreme variability due to climate change. A redesigned water collection system, snow fencing, and increased water storage are included to mitigate the possibility of a thinner snowpack and shortened runoff season. The PASS alternative will require the least amount of water and likely be the most resilient option.

1.1.5.5 Green Infrastructure

Not applicable

1.1.6 Costs

1.1.6.1 Capital Cost

Table 1: Alternative 5 Capital Costs

Expense Category	Amount
Permit	$0
Geotech	$0
Design (10%)	$3,620,000
CA (5%)	$1,810,000
Procurement	$60,000
Construction	$14,340,000
Insurance	$1,090,000
Overhead & Profit (12%)	$4,350,000
Estimating Contingency (10%)	$2,850,000
Inflation	$8,890,000
Project Contingency (15%)	$4,700,000
Total	**$41,700,000**

1.1.6.2 Annual O&M Cost

Table 21 shows a summary of the annual O&M costs for the PASS alternative.

Table 2: Alternative 5 O&M Costs

Description	Annual Utility Expense	Annual Customer Expense	Total Cost
Personnel	$58,200		$58,200
Insurance	$3,510		$3,510
Energy Cost (Fuel)	$42,300		$42,300
Energy Cost (Electrical)	$6,620		$6,620
Process Chemical	$6,060		$6,060
Monitoring & Testing	$1,880		$1,880
Short Lived Asset Maintenance/Replacement*	$4,390	$11,500	$15,890
Materials and Routine Maintenance	$4,650		$4,650
Miscellaneous	$625		$625
Total	**$128,235**	**$11,500**	**$139,735**

1.1.6.3 User Costs

If user fees alone will be used to generate revenue to cover O&M costs, then residential users would be expected to pay $230 per month for PASS. According to ADEC's calculation of "Affordability of Water and Sewer Rates in Rural Alaska", the maximum burden rate possible would be $30 per month. During the February field visit a question posed to the community during home surveys was if $250 per month was price that household could pay. Of the 19 homes surveyed, only 6 heads of households believed that they could afford an additional $250 a month in bills. Many heads of households expressed concern that even if they could make it work, their neighbors would not be able to pay. The new WTP is expected to cost the community $180 a month per service but there is funding from Norton Sound Economic Development Corporation to subsidize the user cost for the next two years. A concern for this project could be that the new WTP cost will fall on the homeowners close to the added cost of the piped system.

Considering the established maximum burden rate and the community comments, additional funding sources will be required for financial sustainability. Table 22 shows the annual subsidy required for various fixed monthly rates. This assumes the collection of 33 users, which is based on the projected population growth and current housing density. These numbers are dependent on the estimated contributions of the school and clinic from NSHC.

Table 3: Alternative 5 Subsidy Required

Monthly Cost to User	Annual Subsidy
$250	$0
$200	$19,800
$150	$39,600
$100	$59,400
$30	$87,120

1.2 Alternative 6: PASS and Satellite Water Delivery/Piped Wastewater

1.2.1 Description

Alternative 6 combines PASS with a satellite station concept. In this alternative, homes would have PASS installed and have water delivery from the satellite delivery station. Greywater would be collected via vacuum pumps at the satellite station and collected to a central septic system with a seepage pit. Dried solids from the ventilated separating toilet would need to be hauled to a central location to be incinerated.

The main advantage of the satellite collection of greywater and PASS is the benefits of PASS while not having to haul all water and wastewater. A septage vault would not be needed for this alternative, but the seepage pit would need to be upgraded. The community hasn't had issues with their seepage pit and expanding it would be less intensive than building a vault, road, and septage FM system. The satellite stations could also have a watering point and residential water storage tanks can be filled directly instead of community members hauling water.

The disadvantages of this alternative are a low level of service and solids will still need to be hauled by the residents. Solids will need to be hauled to a central location to be incinerated but the ventilated toilet will dry solids making transport much easier than honey buckets.

This alternative has been dismissed due to the inability to secure funding for a project that delivers water but does not provide comprehensive wastewater collection.

Alternative 6 includes the following new infrastructure:

- Water Source

    - Improve the exiting surface water intake by constructing snow fencing and improving the basin.

- Water Treatment
    - Add 200 SF to the existing WTP building for additional circulation pumps and distribution system hardware.
    - Backwash will continue to be disposed of in an ocean outfall, per ANTHC WTP plans
    - Backup power source may need to be replaced to sustain the distribution system

- Water Storage
    - Demolish and replace existing 424,000-gallon tank with 484,000-gallon tank.
    - Construct new 350,000-gallon water storage tank.
    - A satellite system assumes lower water usage and would not require an additional 464,000-gallon storage tank.
- Water distribution and wastewater collection
    - Water and wastewater will follow the same alignment. The water line would likely be 4-inch HDPE. The wastewater line would likely be 6-inch HDPE and have a circulating glycol loop. The shared alignment would be 750 feet and be housed in separate arctic carrier pipes.
    - 3 Satellite station buildings, including heating and electrical. Each station will be equipped with a potable water hose for filling residential water storage tanks and a vacuum sewer pump.
    - Residences will be serviced with 100-foot retractable water and sewer hoses from each station.
    - The shared pipe network will be aboveground and supported by micropiles or hung from the boardwalk where possible.
    - Assuming 100 feet of rip rap protection from storm surges.

- Service Connections
    - There will be 33 served residences. For planning and estimating purposes, a 100-gallon water storage tank inside the home and 500-gallon sewer holding tank outside or underneath the home is assumed. Each home will be equipped with an arctic service connection box and evacuation valves and appurtenances.

- PASS
    - For each residence install 100-gallon WST tank, rain catchment system, sink, ventilated separating toilet.

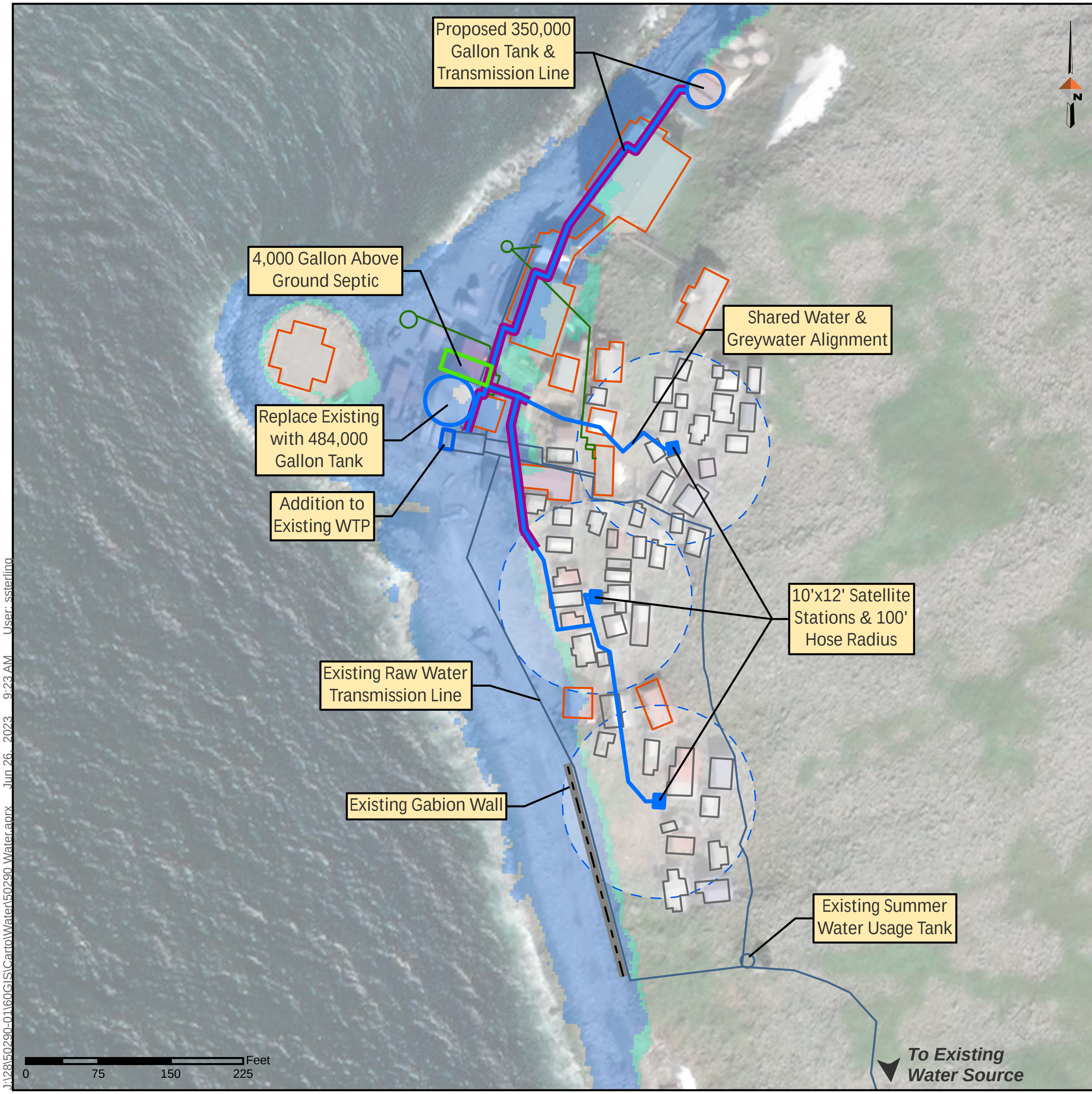
- Wastewater Treatment
    - Seepage pit upgrade to 5 feet deep.
    - 4,000-gallon above ground septic
    - Advanced burn barrels for solid incineration per ADEC approval.

See Figure 21 for concept layouts for the hybrid PASS and satellite system.

1.2.2 Environmental Impacts

A satellite water delivery and greywater collection system will not uniquely impact floodplains, wetlands, or historical properties. The goal of ending honey buckets will stop the practice of leaving bags of sanitary waste on the sea ice and will be a positive impact on endangered polar bears and all wildlife in the area.

The PASS alternative would not require a septage lagoon so Waters of the United States would not be impacted. The resulting dried solids would be incinerated in an advanced burn barrel per ADEC approval. The current burn plan (only when winds blow from the north) would need to remain in effect. Incineration would help alleviate some the material waste burden and prevent trash from being disposed in the ocean.



Alternative 6

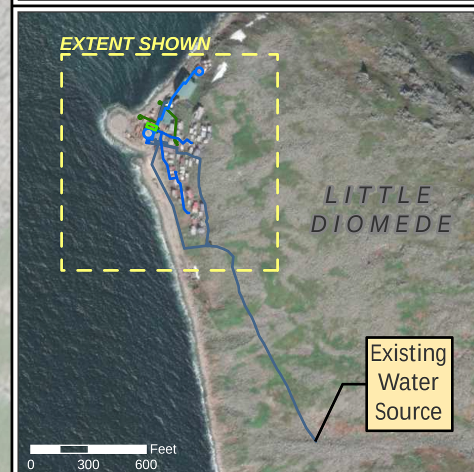
PASS and Satellite Water and Greywater

Little Diomede 65% ePER

- Proposed Sewer Utility Infrastructure
- Proposed Water Utility Infrastructure
- Proposed Riprap
- Gabion Wall
- Existing Sewer Utility Infrastructure
- Existing Water Utility Infrastructure
- Building Outline
- House Outline

Possible Water Reach

- 50 Year Storm
- 50 Year Storm with 50 Year Sea Level Rise



DOWL

Date: June 2023

Figure 21

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1.2.3 Land Requirements

- The proposed layout lies primarily outside of existing residential property boundaries. Construction of above-ground distribution mains will be within the boardwalk easement when possible though additional easements will be required where the pipes run along residential property lines.

- Each satellite station will be approximately 10 foot by 12 foot and be supported on foundation. The areas surrounding the buildings will need to be cleared to allow operators to move the hoses throughout the 100-foot radius.

- WTP Addition – Approximately 200 SF will need to be added to the existing WTP to house the water distribution pumps. CRW explored the option to add a second story to the WTP which could be a solution to the space constraints in the community center where the WTP is located. The structural integrity of the existing building will need to be assessed during design.

- Water Storage Tanks – To add 410,000 gallons of water storage, the existing tank will need to be expanded and a new tank will be built. The existing tank can be rebuilt in its footprint and expanded vertically. There is an ANTHC project to construct a new WST to the north of the school in conjunction with the upgrades to the WTP, where the old school water tanks are currently.

- Septic tank and seepage pit – The current washeteria operates an above ground septic system that is deteriorating and could be removed completely and replaced with a community wide above ground septic system for the treatment of greywater. The existing seepage pit would need to be expanded.

1.2.4 Potential Construction Problems

Potential construction challenges include the site's topography and ground surface. A survey will need to be performed to get accurate elevation of the distribution facilities, boardwalks, and ground surface.

Barge access to the island is limited and often requires a barge that is capable of dredging its own harbor. All construction waste must be shipped off the island at the completion of the project. The nearest solid waste facility would be Nome or Anchorage.

Moving heavy machinery through the community will be difficult. Most previous construction is accomplished by hand and requires a prolonged schedule.

Home condition and proximity of houses from each other could create difficulty when installing water storage and wastewater holding tanks.

1.2.5 Sustainability Considerations

The operations would be similar to Alternative 3, a satellite system. Unlike Alternative 3, a septage lagoon would not add maintenance work to the subsistence season.

1.2.5.1 Energy Efficiency & Alternative Energy

The satellite system has the advantage of using less water and requiring less power to operate the distribution system. The satellite stations will require additional heating costs and the use of three vacuum systems.

- Some of the greatest benefits of gravity sewer system from the satellite station to the collection point are no additional pump installations or energy cost to the community, and simple construction and maintenance.
- High-efficiency pumps
- Investigate insulating the WTP & WSTs
- The arctic pipe should be designed with a minimum R-value of R-26 to minimize heat loss.
- Incorporating solar PV could potentially reduce the need for diesel-fired electrical generation for the water treatment process as the high solar gain period would coincide with the time water treatment. Unfortunately, the majority of the energy consumed in the system is associated with water heating and circulation during the winter.
- Diomede has a Class 7 wind regime (the highest). Although it has a strong resource, it would require close coordination with the electric generation and distribution system. Adding wind power to a small electrical grid such as Diomede's increases the complexity of the system and frequently reduces reliability if there are not sufficient resources available to maintain all of the systems properly. Installing wind power for the sole purpose of making has heat has not been shown to be cost effective in Alaska. It would also increase the complexity of the utility's heat add system as there would need to be parallel heating fuel and electric boilers to provide the required redundancy for when the wind is not blowing.

1.2.5.2 Affordability

The greatest challenge to sustainability of a satellite system in Diomede is the financial burden. The operations and maintenance required of a piped system is costly, and commitment to paying user fees is vital. If a failure to collect fees becomes standard, the system may become unaffordable and fall into disrepair.

A PASS/satellite system is less expensive than the fully piped alternative but it will not provide the greatest level of service and has a risk of people coming into contact with human waste. Self-haul of solids would still be required for PASS but with the ventilated toilet and sink there will be an improvement in sanitation without much cost to the residents. These internal systems would not require more operator maintenance.

1.2.5.3 Operations

A satellite system is operationally complex and will likely require more direct personnel time. Homes will need to be serviced by an operator on a routine basis, in all weather conditions, to fill the 100-gallon water tanks. Operators will carry hoses twice to each home to fill the tank with water and to empty the holding tank. PASS may require more maintenance by residents because all the elements are inside of the home.

One operator will not be enough to keep the system going. In the summer, they will need to maintain the intake and distribution, run the treatment plant while also delivering water to homes. Given the topography of Diomede hauling two 100-foot hoses over talus and snowbanks may prove very difficult and interrupt service. A manual service system has room for human and equipment error that can result in spilled waste in the public spaces. A satellite system has a higher likelihood of community members, especially operators, coming into contact with greywater.

In addition, the satellite system requires three vacuum pumps for the collection of wastewaters. Unlike other systems though, this satellite wouldn't require vacuum valves and appurtenances at each service which is often the issue in small communities.

An operational advantage of the satellite system is maintaining less length of pipe. Shorter runs of the main will decrease the routine labor required for pipe networks. Also, a satellite system won't require service connections. This is an advantage because of service line freeze-ups and broken service connections due to ground movement will be avoided.

A satellite system will not require a higher operator training level. Diomede will need a Level 2 operator to run the treatment plant. A second operator may not necessarily need to be trained as a WTP operator.

Residents will self-haul solids to a central location. Because PASS dries the solids they can be incinerated, and a lagoon would not be needed in this design. A lagoon will be a high capital cost project, require O&M, and may be unfavorable to the community.

1.2.5.4 Climate Change Resiliency

Climate change has already affected Diomede and will continue to change life on the island. Inconsistent sea ice and changes in sea mammal migration have been the first signs that the effects of climate change are taking hold. Still on the horizon are sea level rise and increasing storm surge intensity, both of which will need to be accounted for while designing any system on Little Diomede. Most of the existing community buildings, including the WTP and origin of the distribution system, are located below the USACE design wave height of 16.4 feet above sea level (Diomede Erosion and Flooding, DOWL). Bringing as much infrastructure as possible above the expected wave run up height will help ensure that it will survive the next 25 years. As the WTP and wastewater collection and treatment will likely remain in the flood zone due to space constraints, design will focus on protecting the infrastructure from the flooding and ice damage.

Diomede relies on a seasonal run-off water source that is in danger of extreme variability due to climate change. A redesigned water collection system, snow fencing, and increased water storage are included to mitigate the possibility of a thinner snowpack and shortened runoff season. The PASS alternative will require the least amount of water and likely be the most resilient option.

Permafrost degradation may increase maintenance on the gravity sewer system. A satellite system utilizing gravity sewer depends on slopes to function. As ground shift under house service connections could break or lose the slope needed for collection. Design will mitigate the differential movement with flexible house connections and adjustable pipe foundations.

1.2.5.5 Green Infrastructure

Not applicable.

1.2.6 Costs

1.2.6.1 Capital Cost

Table 4: Alternative 6 Capital Costs

Expense Category	Amount
Permit	$25,000
Geotech	$200,000
Design (10%)	$4,020,000
CA (5%)	$2,010,000
Procurement	$60,000
Construction	$17,250,000
Insurance	$1,210,000
Overhead & Profit (12%)	$4,830,000
Estimating Contingency (10%)	$2,940,000
Inflation	$9,160,000
Project Contingency (15%)	$4,850,000
Total	**$46,555,000**

1.2.6.2 Annual O&M Cost

Table 24 shows a summary of the annual O&M costs for the PASS and satellite water delivery and greywater collection alternative.

Table 5: Alternative 6 O&M Costs

Description	Annual Utility Expense	Annual Customer Expense	Total Cost
Personnel	$101,000		$101,000
Insurance	$3,510		$3,510
Energy Cost (Fuel)	$46,100	$10,300	$56,400
Energy Cost (Electrical)	$36,200		$36,200
Process Chemical	$6,060		$6,060
Monitoring & Testing	$1,880		$1,880
Short Lived Asset Maintenance/Replacement*	$17,800	$11,500	$29,300
Materials and Routine Maintenance	$12,400		$12,400
Miscellaneous	$625		$625
Total	$225,575	$21,800	$247,375

1.2.6.3 User Costs

If user fees alone will be used to generate revenue to cover O&M costs, then residential users would be expected to pay $510 per month for PASS and the satellite system. According to ADEC's calculation of "Affordability of Water and Sewer Rates in Rural Alaska", a rate above $30 per month would be highly burdensome to most rate payers. During the February field visit a question posed to the community during home surveys was if $250 per month was price that household could pay. Of the 19 homes surveyed, only 6 heads of households believed that they could afford an additional $250 a month in bills. Many heads of households expressed concern that even if they could make it work, their neighbors would not be able to pay. The new WTP is expected to cost the community $180 a month per service but there is funding from Norton Sound Economic Development Corporation to subsidize the user cost for the next two years. A concern for this project could be that the new WTP cost will fall on the homeowners close to the added cost of the piped system.

Considering the established maximum burden rate and the community comments, additional funding sources will be required for financial sustainability. Table 25 shows the annual subsidy required for various fixed monthly rates. This assumes the collection of 33 users, which is based on the projected population growth and current housing density. These numbers are dependent on the estimated contributions of the school and clinic from NSHC.

Table 6: Alternative 6 Subsidy Required

Monthly Cost to User	Annual Subsidy
$500	$3,960
$400	$43,560
$300	$83,160
$200	$122,760
$100	$162,360
$30	$190,080

Little Diomede Ph II 1st Water & Sewer Services

Alternate 6 - PASS and Satellite Collection Greywater

Little Diomede, Alaska

Construction Cost Estimate

65% ePER Submittal

July 26, 2023

ESTIMATIONS

1225 E. International Airport Road, Suite 235
Anchorage, Alaska 99518
907.561.0790

Prepared for:
DOWL
5015 Business Park Boulevard, #4000
Anchorage, Alaska 99503
907.562.2000

Little Diomede Ph II 1st Water & Sewer Services

Alternate 6 - PASS and Satellite Collection Greywater
Prepared for DOWL by Estimations

Construction Cost Estimate
65% ePER Submittal
July 26, 2023

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 6 - PASS and Satellite Collection Greywater
Estimate Date:	July 26, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

SCOPE OF WORK

a. Existing Water Source – See Alt 2
b. Water Storage – See Alt 3
c. Water distribution and wastewater collection – See Alt 3
d. Service Connections – See Alt 3
e. PASS – See Alt 5
f. Wastewater Treatment
i. Seepage pit upgrade to 5' deep.
ii. 4000-gallon above ground septic
iii. Advanced burn barrels for solid incineration.

Notes on the Estimate

DOCUMENTS

65% ePER Submittal

SOURCE OF COST DATA:

Estimations Internal cost database

Vendor Quote

Labor based on State of Alaska Title 36 Wages 04/2023.

Assumes Must Meet American Iron and Steel (AIS) or BABA

ESTIMATE ASSUMPTIONS:

Summer 2025 Construction

Design Bid Build

Time on Site 16 MTHS

Little Diomede Ph II 1st Water & Sewer Services — **Construction Cost Estimate**

Alternate 6 - PASS and Satellite Collection Greywater — **65% ePER Submittal**

Prepared for DOWL by Estimations — **July 26, 2023**

Description	Material	Labor	Hours	Equipment	Estimated Cost
0 OWNER COSTS	**$4,023,515**	**$2,068,428**	**21,099.70**	**$0**	**$6,091,943**
20 OWNER DEVELOPMENT	$4,023,515	$0	-	$0	$4,023,515
30 PROCUREMENT REQUIREMENTS	$0	$2,068,428	21,099.70	$0	$2,068,428
A SUBSTRUCTURE	**$544,119**	**$255,361**	**2,529.40**	**$54,263**	**$853,743**
A10 FOUNDATIONS	$544,119	$255,361	2,529.40	$54,263	$853,743
B SHELL	**$344,225**	**$291,351**	**$2,831**	**$1,047**	**$636,623**
B10 SUPERSTRUCTURE	$77,354	$126,584	1,298.50	$1,047	$204,985
B20 EXTERIOR VERTICAL ENCLOSURES	$253,359	$153,713	1,419.10	$0	$407,072
B30 EXTERIOR HORIZONTAL ENCLOSURES	$13,512	$11,054	113.40	$0	$24,566
C INTERIORS	**$143,956**	**$334,438**	**3,379.50**	**$0**	**$478,394**
C10 INTERIOR CONSTRUCTION	$100,534	$233,979	2,384.80	$0	$334,513
C20 INTERIOR FINISHES	$43,422	$100,459	994.70	$0	$143,881
D SERVICES	**$3,541,442**	**$1,245,563**	**10,510.40**	**$0**	**$4,787,005**
D20 PLUMBING	$3,246,373	$730,556	6,226.00	$0	$3,976,929
D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	$36,104	$56,457	509.10	$0	$92,561
D50 ELECTRICAL	$258,965	$458,550	3,775.30	$0	$717,515

Description	Material	Labor	Hours	Equipment	Estimated Cost
E EQUIPMENT AND FURNISHINGS	**$196,000**	**$23,884**	**245.00**	**$0**	**$219,884**
E10 EQUIPMENT	$0	$0	-	$0	$0
E20 FURNISHINGS	$196,000	$23,884	245.00	$0	$219,884
F SPECIAL CONSTRUCTION AND DEMOLITION	**$219,138**	**$159,081**	**1,854.70**	**$22,323**	**$400,542**
F30 DEMOLITION	$219,138	$159,081	1,854.70	$22,323	$400,542
G SITEWORK	**$3,196,990**	**$772,298**	**8,188.90**	**$406,517**	**$4,375,805**
G10 SITE PREPARATION	$111,837	$57,560	560.90	$66,951	$236,348
G20 SITE IMPROVEMENTS	$154,308	$156,442	1,586.00	$187,623	$498,373
G30 LIQUID AND GAS SITE UTILITIES	$2,930,845	$558,296	6,042.00	$151,943	$3,641,084
Z GENERAL	**$3,506,468**	**$1,861,374**	**18,475.20**	**$130,858**	**$28,483,157**
Z10 GENERAL REQUIREMENTS	$3,506,468	$1,861,374	18,475.20	$130,858	$5,498,700
Z70 TAXES, PERMITS, INSURANCE AND BONDS	$0	$0	-	$0	$1,207,055
Z90 FEES	$0	$0	-	$0	$4,828,218
Z90 CONTINGENCIES	$0	$0	-	$0	$16,949,184
TOTAL ESTIMATED COST	**$15,715,853**	**$7,011,778**	**$69,114**	**$615,008**	**$46,327,096**

Little Diomede Ph II 1st Water & Sewer Services
Alternate 6 - PASS and Satellite Collection Greywater
Prepared for DOWL by Estimations

Construction Cost Estimate
65% ePER Submittal
July 26, 2023

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
1	**20 OWNER DEVELOPMENT**											
2												
3	**2010 Site Acquisition**											
4	Not Included											
5												
6	**2020 Permits**		NONE									
7												
8	**2030 Professional Services**											
9	Design Fees 10% Of Construction	1	LS	$4,023,515.30	$4,023,515						$4,023,515	$4,023,515
10												
11												
12												
13												
14												
15												
16												
17	**Subtotal: 20 OWNER DEVELOPMENT**				$4,023,515							**$4,023,515**
18												
19												
20	**30 PROCUREMENT REQUIREMENTS**											
21												
22	**3010 Project Delivery**											
23	Construction Admin 5% Of Construction	1	LS			20,636.833	20,636.8	$2,011,754			$2,011,754	$2,011,754
24	Survey ANTHC - Early	1	LS			142.857	142.9	$18,388			$18,388	$18,388
25	Estimator	40	HRS			1.000	40.0	$4,743			$119	$4,743
26	ANTHC Scheduling	40	HRS			1.000	40.0	$3,726			$93	$3,726
27	Purchasing	60	HRS			1.000	60.0	$7,855			$131	$7,855
28	Project Closeout	1	LS			180.000	180.0	$21,962			$21,962	$21,962
29												
30												
31												
32												
33												
34												
35												
36												
37												
38	**Subtotal: 30 PROCUREMENT REQUIREMENTS**						21,099.7	$2,068,428				**$2,068,428**
39												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
40												
41	**A10 FOUNDATIONS**											
42												
43	**A1020 Special Foundations**											
44												
45	**WTP - Addition Foundation**	**6**	**EA**									
46	Concrete Piers	6	EA	$2,880.00	$17,280	26.667	160.0	$18,769	$1,111.11	$6,667	$7,119	$42,716
47	Steel Framing	3,300	LBS	$4.50	$14,850	0.006	19.8	$1,930	$0.15	$495	$5	$17,275
48												
49	**Subtotal**	**6**	**EA**		$32,130		179.8	$20,699		$7,162		$59,991
50												
51	**Satellite Station Building Foundation**	**3**	**EA**									
52	Post and Pad	27	EA	$172.00	$4,644	6.000	162.0	$19,004			$876	$23,648
53												
54	**Subtotal**	**3**	**EA**		$4,644		162.0	$19,004				$23,648
55												
56	**WW Collection Point Bldg**	**2**	**EA**									
57	Post and Pad	18	EA	$172.00	$3,096	6.000	108.0	$12,669			$876	$15,765
58												
59	**Subtotal**	**2**	**EA**		$3,096		108.0	$12,669				$15,765
60												
61	**WST Foundations**	**2**	**EA**									
62	Insulated Concrete Precast	1,600	SF	$40.00	$64,000	0.032	51.2	$5,254	$9.08	$14,525	$52	$83,779
63	AWW Mud Sills 4x12 @ 2'oc	1,644	LF	$8.00	$13,152	0.114	187.4	$18,268	$1.00	$1,644	$20	$33,064
64	AWW 8x12	1,488	LF	$40.00	$59,520	0.343	510.4	$49,756	$4.00	$5,952	$77	$115,228
65	AWW Plywood 5/8	2,880	SF	$1.25	$3,600	0.019	54.7	$5,332			$3	$8,932
66	Hardware	2	SETS	$2,000.00	$4,000						$2,000	$4,000
67	Insulation XPS, High Compression 2"	235,008	BF	$0.90	$211,507	0.003	705.0	$68,726			$1	$280,233
68	Concrete	36	CY	$1,800.00	$64,800	8.000	288.0	$28,075	$350.00	$12,600	$2,930	$105,475
69	Grade Ring	239	LF	$266.67	$63,670	1.185	282.9	$27,578	$51.85	$12,380	$434	$103,628
70	Misc	2	EA	$10,000.00	$20,000						$10,000	$20,000
71												
72	**WST Foundations**	**2**	**EA**		$504,249		2,079.6	$202,989		$47,101		$754,339
73												
74												
75												
76												
77												
78	**Subtotal: A10 FOUNDATIONS**				$544,119		2,529.4	$255,361		$54,263		**$853,743**
79												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
80												
81	**B10 SUPERSTRUCTURE**											
82												
83	**B1010 Floor Construction**											
84												
85	**WTP - Addition**	**200**	**SF**									
86	Glulam Beams	928	BF	$6.00	$5,569	0.021	19.5	$1,901	$0.15	$139	$8	$7,609
87	1.5" Metal Decking	200	SF	$6.00	$1,200	0.021	4.2	$409			$8	$1,609
88	Pea Gravel Fill at Flutes	1	CY	$100.00	$52	0.100	0.1	$10	$3.00	$2	$123	$64
89	4" Rigid High Density Insulation Board	800	BF	$0.90	$720	0.004	3.2	$312			$1	$1,032
90	6" Dura-Base Composite Mat	200	SF	$5.00	$1,000	0.021	4.2	$409			$7	$1,409
91	Concrete Slab 6"	200	SF	$3.89	$778	0.037	7.4	$721	$0.65	$130	$8	$1,629
92												
93	**Subtotal**	**200**	**SF**		$9,319		38.6	$3,762		$271		$13,352
94												
95	**Satellite Station Building Foundation**	**3**	**EA**									
96	**AREA**	**120**	**SF/EA**									
97	Glulam Beams	928	BF	$6.00	$5,569	0.021	19.5	$1,901	$0.15	$139	$8	$7,609
98	Joist	360	LF	$12.00	$4,320	0.050	18.0	$1,755			$17	$6,075
99	1.5" Metal Decking	360	SF	$6.00	$2,160	0.021	7.6	$741			$8	$2,901
100	Pea Gravel Fill at Flutes	1	CY	$100.00	$93	0.100	0.1	$10	$3.00	$3	$114	$106
101	4" Rigid High Density Insulation Board	1,440	BF	$0.90	$1,296	0.004	5.8	$565			$1	$1,861
102	6" Dura-Base Composite Mat	360	SF	$5.00	$1,800	0.021	7.6	$741			$7	$2,541
103	Concrete Slab 6"	360	SF	$3.89	$1,400	0.037	13.3	$1,297	$0.65	$233	$8	$2,930
104												
105	**Subtotal**	**3**	**EA**		$16,638		71.9	$7,010		$375		$24,023
106												
107	**WW Collection Building Foundation**	**2**	**EA**									
108	**AREA**	**200**	**SF/EA**									
109	Glulam Beams	928	BF	$6.00	$5,569	0.021	19.5	$1,901	$0.15	$139	$8	$7,609
110	Joist	400	LF	$12.00	$4,800	0.050	20.0	$1,950			$17	$6,750
111	1.5" Metal Decking	400	SF	$6.00	$2,400	0.021	8.4	$819			$8	$3,219
112	Pea Gravel Fill at Flutes	1	CY	$100.00	$104	0.100	0.1	$10	$3.00	$3	$113	$117
113	4" Rigid High Density Insulation Board	1,600	BF	$0.90	$1,440	0.004	6.4	$624			$1	$2,064
114	6" Dura-Base Composite Mat	400	SF	$5.00	$2,000	0.021	8.4	$819			$7	$2,819
115	Concrete Slab 6"	400	SF	$3.89	$1,556	0.037	14.8	$1,443	$0.65	$259	$8	$3,258
116												
117	**Subtotal**	**2**	**EA**		$17,869		77.6	$7,566		$401		$25,836
118												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
119												
120	**B1020 Roof Construction**											
121												
122	**WTP - Addition**	**200**	**SF**									
123	GLB 6x36	10	LF	$117.00	$1,170	9.000	90.0	$8,774			$994	$9,944
124	Column	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
125	SIPs Panels	200	SF	$14.00	$2,800	0.071	14.2	$1,384			$21	$4,184
126												
127	**Subtotal**	**200**	**SF**		$6,220		109.6	$10,684				$16,904
128												
129	**Satellite Station Building 3 Ea**	**360**	**SF**									
130	GLB 6x36	44	LF	$117.00	$5,148	9.000	396.0	$38,604			$994	$43,752
131	Column	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
132	SIPs Panels	360	SF	$14.00	$5,040	0.071	25.6	$2,496			$21	$7,536
133												
134	**Subtotal**	**360**	**SF**		$12,438		427.0	$41,626				$54,064
135												
136	**WW Collection Building 2 Ea**	**400**	**SF**									
137	GLB 6x36	60	LF	$117.00	$7,020	9.000	540.0	$52,641			$994	$59,661
138	Column	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
139	SIPs Panels	400	SF	$14.00	$5,600	0.071	28.4	$2,769			$21	$8,369
140												
141	**Subtotal**	**400**	**SF**		$14,870		573.8	$55,936				$70,806
142												
143												
144												
145												
146												
147												
148												
149												
150												
151												
152												
153												
154												
155												
156												
157	**Subtotal: B10 SUPERSTRUCTURE**				$77,354		1,298.5	$126,584		$1,047		**$204,985**
158												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
159												
160	**B20 EXTERIOR VERTICAL ENCLOSURES**											
161												
162	**B2010 Exterior Walls**											
163												
164	**WTP - Addition**	**768**	**SF**									
165	SIPs Panels	768	SF	$14.00	$10,752	0.071	54.5	$5,313			$21	$16,065
166	Weather Barrier	768	SF	$1.80	$1,382	0.009	6.9	$673			$3	$2,055
167	Siding	768	SF	$18.00	$13,824	0.086	66.0	$8,397			$29	$22,221
168	Furring	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
169	Vapor Retarder	768	SF	$0.50	$384	0.006	4.6	$448			$1	$832
170	GWB	768	SF	$0.78	$599	0.034	26.1	$3,040			$5	$3,639
171	FRP Panels	768	SF	$5.00	$3,840	0.057	43.8	$4,270			$11	$8,110
172	Exterior Door, Single	1	EA	$2,850.00	$2,850	7.000	7.0	$682			$3,532	$3,532
173	Windows	77	SF	$75.00	$5,775	0.200	15.4	$1,501			$94	$7,276
174												
175	**Subtotal**	**768**	**SF**		$41,656		229.7	$24,850				$66,506
176												
177	**Satellite Station Building 3 Ea**	**2,112**	**SF**									
178	SIPs Panels	2,112	SF	$14.00	$29,568	0.071	150.0	$14,623			$21	$44,191
179	Weather Barrier	2,112	SF	$1.80	$3,802	0.009	19.0	$1,852			$3	$5,654
180	Siding	2,112	SF	$18.00	$38,016	0.086	181.6	$23,105			$29	$61,121
181	Furring	3	EA	$1,125.00	$3,375	2.679	8.0	$780			$1,385	$4,155
182	Vapor Retarder	2,112	SF	$0.50	$1,056	0.006	12.7	$1,238			$1	$2,294
183	GWB	2,112	SF	$0.78	$1,647	0.034	71.8	$8,363			$5	$10,010
184	FRP Panels	2,112	SF	$5.00	$10,560	0.057	120.4	$11,737			$11	$22,297
185	Exterior Door, Single	3	EA	$2,850.00	$8,550	7.000	21.0	$2,047			$3,532	$10,597
186	Windows	211	SF	$75.00	$15,825	0.200	42.2	$4,114			$94	$19,939
187												
188	**Subtotal**	**2,112**	**SF**		$112,399		626.7	$67,859				$180,258
189												
190												
191												
192												
193												
194												
195												
196												
197												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
198												
199	**WW Collection Building 2 Ea**	**1,920**	**SF**									
200	SIPs Panels	1,920	SF	$14.00	$26,880	0.071	136.3	$13,287			$21	$40,167
201	Weather Barrier	1,920	SF	$1.80	$3,456	0.009	17.3	$1,686			$3	$5,142
202	Siding	1,920	SF	$18.00	$34,560	0.086	165.1	$21,005			$29	$55,565
203	Furring	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
204	Vapor Retarder	1,920	SF	$0.50	$960	0.006	11.5	$1,121			$1	$2,081
205	GWB	1,920	SF	$0.78	$1,498	0.034	65.3	$7,606			$5	$9,104
206	FRP Panels	1,920	SF	$5.00	$9,600	0.057	109.4	$10,665			$11	$20,265
207	Exterior Door, Single	2	EA	$2,850.00	$5,700	7.000	14.0	$1,365			$3,533	$7,065
208	Windows	192	SF	$75.00	$14,400	0.200	38.4	$3,743			$94	$18,143
209												
210	**Subtotal**	**1,920**	**SF**		$99,304		562.7	$61,004				$160,308
211												
212												
213												
214												
215												
216												
217												
218												
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225												
226												
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230												
231												
232												
233												
234												
235												
236	**Subtotal: B20 EXTERIOR VERTICAL ENCLOSURES**				$253,359		1,419.1	$153,713				**$407,072**
237												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
239	**B30 EXTERIOR HORIZONTAL ENCLOSURES**											
241	**B3010 Roofing**											
243	**WTP - Addition**	**200**	**SF**									
244	SAM Vapor Barrier	200	SF	$1.15	$230	0.009	1.8	$175			$2	$405
245	Metal Roofing	200	SF	$10.00	$2,000	0.086	17.2	$1,677			$18	$3,677
246	Flashing	60	LF	$9.00	$540	0.071	4.3	$419			$16	$959
248	**Subtotal**	**200**	**SF**		$2,770		23.3	$2,271				$5,041
250	**Satellite Station Building 3 Ea**	**360**	**SF**									
251	SAM Vapor Barrier	360	SF	$1.15	$414	0.009	3.2	$312			$2	$726
252	Metal Roofing	360	SF	$10.00	$3,600	0.086	31.0	$3,022			$18	$6,622
253	Flashing	132	LF	$9.00	$1,188	0.071	9.4	$916			$16	$2,104
255	**Subtotal**	**360**	**SF**		$5,202		43.6	$4,250				$9,452
257	**WW Collection Building 2 Ea**	**400**	**SF**									
258	SAM Vapor Barrier	400	SF	$1.15	$460	0.009	3.6	$351			$2	$811
259	Metal Roofing	400	SF	$10.00	$4,000	0.086	34.4	$3,353			$18	$7,353
260	Flashing	120	LF	$9.00	$1,080	0.071	8.5	$829			$16	$1,909
262	**Subtotal**	**400**	**SF**		$5,540		46.5	$4,533				$10,073
276	**Subtotal: B30 EXTERIOR HORIZONTAL ENCLOSURES**				$13,512		113.4	$11,054				**$24,566**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
278												
279	**C10 INTERIOR CONSTRUCTION**											
280												
281	**C1010 Interior Partitions**											
282												
283	**Residential Improvement**	**49**	**HOMES**									
284	2x Wood Framing & Hardware Allowance For Repairs	1,593	BF	$2.00	$3,185	0.057	90.8	$8,852			$8	$12,037
285	5/8" GWB Allowance For Repairs	1,838	SF	$0.72	$1,323	0.043	79.0	$9,202			$6	$10,525
286												
287	**Subtotal**	**49**	**HOMES**		$4,508		169.8	$18,054				$22,562
288												
289	**C1030 Interior Doors**											
290												
291	**Residential Improvement**	**49**	**HOMES**									
292	Wall Framing Modifications	49	EA	$50.00	$2,450	4.000	196.0	$19,107			$440	$21,557
293	Prehung Wood Flush Door & Frame 3x7	49	EA	$500.00	$24,500	4.000	196.0	$19,107			$890	$43,607
294	Privacy Lockset	49	EA	$150.00	$7,350	2.000	98.0	$9,553			$345	$16,903
295	Door Casing Trim	1,666	LF	$5.00	$8,330	0.071	118.3	$11,532			$12	$19,862
296												
297	**Subtotal**	**49**	**HOMES**		$42,630		608.3	$59,299				$101,929
298												
299	**WTP - Addition**	**1**	**EA**									
300	Doors	1	EA	$1,750.00	$1,750	8.000	8.0	$780			$2,530	$2,530
301												
302	**Subtotal**	**1**	**EA**		$1,750		8.0	$780				$2,530
303												
304	**C1060 Raised Floor Construction**											
305												
306	**Residential Improvement**	**49**	**HOMES**									
307	**Bathtub Platform Construction**											
308	Framed Curb @ 16" O.C.	1,470	BF	$3.00	$4,410	0.071	104.4	$10,177			$10	$14,587
309	3/4" Plywood Subfloor	1,568	SF	$2.00	$3,136	0.043	67.4	$6,570			$6	$9,706
310												
311	**Subtotal**	**49**	**HOMES**		$7,546		171.8	$16,747				$24,293
312												
313												
314												
315												
316												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
317												
318	**C1070 Suspended Ceiling Construction**											
319												
320	**Residential Improvement**	**49**	**HOMES**									
321	**Bathroom Exhaust Fan Soffit**											
322	Framing	5,880	BF	$3.00	$17,640	0.114	670.3	$65,343			$14	$82,983
323	Soffit Paneling	3,920	SF	$3.00	$11,760	0.143	560.6	$54,649			$17	$66,409
324												
325	**Subtotal**	**49**	**HOMES**		$29,400		1,230.9	$119,992				$149,392
326												
327	**C1090 Interior Specialties**											
328												
329	**Residential Improvement**	**49**	**HOMES**									
330	Bathroom Accessories	49	SET	$300.00	$14,700	4.000	196.0	$19,107			$690	$33,807
331												
332	**Subtotal**	**49**	**SET**		$14,700		196.0	$19,107				$33,807
333												
334												
335												
336												
337	**Subtotal: C10 INTERIOR CONSTRUCTION**				$100,534		2,384.8	$233,979				$334,513
338												
339												
340	**C20 INTERIOR FINISHES**											
341												
342	**C2010 Wall Finishes**											
343												
344	**Residential Improvement**	**49**	**HOMES**									
345	Patching & Painting	4,900	SF	$1.20	$5,880	0.043	210.7	$22,286			$6	$28,166
346												
347	**Subtotal**	**4,900**	**SF**		$5,880		210.7	$22,286				$28,166
348												
349	**C2030 Flooring**											
350												
351	**Residential Improvement**	**49**	**HOMES**									
352	3/8" Underlayment	3,920	SF	$1.25	$4,900	0.043	168.6	$16,436			$5	$21,336
353	Sheet Vinyl Flooring	3,920	SF	$7.00	$27,440	0.071	278.3	$27,130			$14	$54,570
354	Rubber Base	1,764	LF	$1.50	$2,646	0.057	100.5	$9,797			$7	$12,443
355												
356	**Subtotal**	**49**	**HOMES**		$34,986		547.4	$53,363				$88,349

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
357												
358	**WTP - Addition**	**200**	**SF**									
359	Sealed Concrete	200	SF	$0.35	$70	0.017	3.4	$331			$2	$401
360												
361	**Subtotal**	**200**	**SF**		$70		3.4	$331				$401
362												
363	**Satellite Station Building 3 Ea**	**360**	**SF**									
364	Sealed Concrete	360	SF	$0.35	$126	0.017	6.1	$595			$2	$721
365												
366	**Subtotal**	**360**	**SF**		$126		6.1	$595				$721
367												
368	**WW Collection Building 2 Ea**	**720**	**SF**									
369	Sealed Concrete	720	SF	$0.35	$252	0.017	12.2	$1,189			$2	$1,441
370												
371	**Subtotal**	**720**	**SF**		$252		12.2	$1,189				$1,441
372												
373	**C2050 Ceiling Finishes**											
374												
375	**Residential Improvement**	**49**	**HOMES**									
376	Ceiling Paint Allowance @ Fan Soffit	4,900	SF	$0.42	$2,058	0.043	210.7	$22,286			$5	$24,344
377												
378	**Subtotal**	**49**	**HOMES**		$2,058		210.7	$22,286				$24,344
379												
380	**WTP - Addition**	**200**	**SF**									
381	Paint Ceilings	200	SF	$0.25	$50	0.021	4.2	$409			$2	$459
382												
383	**Subtotal**	**200**	**SF**		$50		4.2	$409				$459
384												
385												
386												
387												
388												
389												
390												
391												
392												
393												
394												
395	**Subtotal: C20 INTERIOR FINISHES**				$43,422		994.7	$100,459				$143,881
396												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
397												
398	**D20 PLUMBING**											
399												
400	**D2010 Domestic Water Distribution**											
401												
402	**Residential Improvement**	**49**	**HOMES**									
403	PASS Separate Toilet	600	EA	$4,750.00	$2,850,000	6.000	3,600.0	$428,241			$5,464	$3,278,241
404	PASS Bathroom Sink	150	EA	$625.00	$93,750	4.000	600.0	$71,373			$1,101	$165,123
405	PASS Urinal	150	EA	$250.00	$37,500	4.000	600.0	$71,373			$726	$108,873
406	Plumbing	1	LS	$2,000.00	$2,000	16.000	16.0	$1,560			$3,560	$3,560
407												
408	PASS Campwater HPF2 Treatment System, Storage Tank & Frame	10	EA	$16,250.00	$162,500	16.000	160.0	$19,033			$18,153	$181,533
409												
410	**Subtotal**	**49**	**EA**		$3,145,750		4,976.0	$591,580				$3,737,330
411												
412	**Satellite Buildings**	**3**	**EA**									
413	**Water Service Equipment**											
414	100' Hose	3	EA	$62.50	$188	6.943	20.8	$2,474			$887	$2,662
415	Valving	3	EA	$31.25	$94	0.500	1.5	$178			$91	$272
416	Water Meter	3	EA	$312.50	$938	2.000	6.0	$714			$551	$1,652
417												
418	**Facility Water Distribution Piping**											
419	Domestic HW/CW Supply, Type L Copper											
420	3/4" Pipe	30	LF	$4.65	$140	0.100	3.0	$357			$17	$497
421	Hangers	6	EA	$8.75	$53	0.143	0.9	$107			$27	$160
422	Fittings	1	LS	$131.25	$131	4.500	4.5	$535			$666	$666
423	Sterilization & Pressure Test	3	EA	$62.50	$188	4.000	12.0	$1,427			$538	$1,615
424	Water Connection Boxes	3	EA	$350.00	$1,050	12.000	36.0	$3,509			$1,520	$4,559
425	**Subtotal**	**3**	**EA**		$2,782		84.7	$9,301				$12,083
426												
427												
428												
429												
430												
431												
432												
433												
434												
435												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
436												
437	**D2020 Sanitary Drainage**											
438												
439	**Residential Improvement**	**49**	**HOMES**									
440	**Facility Sanitary Sewage Piping**											
441	Above Grade ABS											
442	1-1/2" Pipe	490	LF	$2.14	$1,049	0.089	43.6	$5,186			$13	$6,235
443	2" Pipe	735	LF	$2.97	$2,183	0.060	44.1	$5,246			$10	$7,429
444	3" Pipe	490	LF	$5.63	$2,759	0.070	34.3	$4,080			$14	$6,839
445	Hangers	286	EA	$8.75	$2,503	0.250	71.5	$8,505			$38	$11,008
446	Fittings	1	LS	$8,986.50	$8,987	163.265	163.3	$19,425			$28,412	$28,412
447	Valve Allowance	49	EA	$15.00	$735	0.500	24.5	$2,388			$64	$3,123
448	Vent Thru Roof, 3"	49	EA	$125.00	$6,125	8.000	392.0	$46,631			$1,077	$52,756
449	Sewer Storage Tank 500 Gal	49	EA	$1,500.00	$73,500	8.000	392.0	$38,214			$2,280	$111,714
450												
451	**Subtotal**	**49**	**HOMES**		$97,841		1,165.3	$129,675				$227,516
452												
453												
454												
455												
456												
457												
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466												
467												
468												
469												
470												
471												
472												
473												
474	**Subtotal: D20 PLUMBING**				$3,246,373		6,226.0	$730,556				$3,976,929
475												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
476												
477	**D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**											
478												
479	**D3010 Facility Fuel Systems**											
480												
481	**Residential Improvement**	**49**	**EA**									
482	Fuel Filter Kit	49	EA	$112.50	$5,513	2.000	98.0	$11,658			$350	$17,171
483	Fuel Line & Fittings	49	EA	$187.50	$9,188	4.000	196.0	$23,315			$663	$32,503
484												
485	**Subtotal**	**49**	**EA**		$14,701		294.0	$34,973				$49,674
486												
487	**Satellite Bldg**	**3**	**EA**									
488	Electric Heat	3	EA	$1,875.00	$5,625	8.000	24.0	$2,855			$2,827	$8,480
489												
490	**Subtotal**	**3**	**EA**		$5,625		24.0	$2,855				$8,480
491												
492	**D3060 Ventilation**											
493												
494	**Residential Improvement**	**49**	**EA**									
495	PASS Exhaust Fan/Ducting	49	EA	$250.00	$12,250	2.000	98.0	$9,553			$445	$21,803
496	4" Oval To Round Adapter	49	EA	$25.00	$1,225	0.500	24.5	$2,388			$74	$3,613
497	4" Duct	196	LF	$3.00	$588	0.100	19.6	$1,911			$13	$2,499
498	Ext. Wall Hood W/ Damper & Screen	49	EA	$35.00	$1,715	1.000	49.0	$4,777			$132	$6,492
499												
500	**Subtotal**	**49**	**EA**		$15,778		191.1	$18,629				$34,407
501												
502												
503												
504												
505												
506												
507												
508												
509												
510												
511												
512												
513												
514	**Subtotal: D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**				$36,104		509.1	$56,457				$92,561
515												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
516												
517	**D50 ELECTRICAL**											
518	**D5020 Electrical Service and Distribution**											
519												
520	**Residential Improvement**	**49**	**EA**									
521	**Services**	**49**	**EA**									
522	Service Upgrade Allowances - Panels, Ground & Feeds	49	EA	$3,125.00	$153,125	24.000	1,176.0	$142,837			$6,040	$295,962
523												
524	**Subtotal**	**49**	**EA**		$153,125		1,176.0	$142,837				$295,962
525												
526	**Satellite Bldg**	**3**	**EA**									
527	**Services**	**3**	**EA**									
528	Service To Satellite Bldgs	3	EA	$3,750.00	$11,250	24.000	72.0	$8,745			$6,665	$19,995
529												
530	**Subtotal**	**3**	**EA**		$11,250		72.0	$8,745				$19,995
531												
532	**D5030 General Purpose Electrical Power**											
533												
534	**Residential Improvement**	**49**	**EA**									
535	**Power Circuits**	**392**	**EA**									
536	Bathroom Exhaust Fan, Light, Recept	49	EA									
537	Circulation Pump	49	EA									
538	Heat Trace Well Line x2	49	EA									
539	Lift Station x2	49	EA									
540	Well Pump	49	EA									
541	Heat Trace Emergency Well Line	49	EA									
542	Heat Trace Well x2	49	EA									
543	Water Treatment	49	EA									
544	J-Boxes	392	EA	$12.50	$4,900	0.314	123.1	$14,952			$51	$19,852
545	Wiring: 1/2"C, (2)#12, (1)#12	7,840	LF	$3.13	$24,539	0.114	893.8	$108,561			$17	$133,100
546	Wiring: 1/2"C, (3)#12, (1)#12	5,880	LF	$3.44	$20,227	0.114	670.3	$81,414			$17	$101,641
547	Wiring: 1/2"C, (3)#10, (1)#10	2,450	LF	$4.06	$9,947	0.114	279.3	$33,924			$18	$43,871
548	Pilot Switches	245	EA	$43.75	$10,719	0.500	122.5	$14,879			$104	$25,598
549	Switches	98	EA	$43.75	$4,288	0.500	49.0	$5,952			$104	$10,240
550	Outlets, GFCI	49	EA	$25.00	$1,225	0.500	24.5	$2,976			$86	$4,201
551	Outlet, Duplex	196	EA	$6.25	$1,225	0.500	98.0	$11,903			$67	$13,128
552												
553	**Subtotal**	**392**	**EA**		$88,320		2,332.5	$283,306				$371,626

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
554												
555	**WTP Addition**	**1**	**EA**									
556	**Power Circuits**	**5**	**EA**									
557	Receptacles 20A	4	EA	$6.25	$25	0.500	2.0	$243			$67	$268
558	Receptacles GFCI WP	1	EA	$57.50	$58	0.500	0.5	$61			$119	$119
559	J-Boxes	5	EA	$12.50	$63	0.314	1.6	$194			$51	$257
560	Wiring: 1/2"C, (2)#12, (1)#12	150	LF	$3.13	$470	0.114	17.1	$2,077			$17	$2,547
561												
562	**Subtotal**	**1**	**EA**		$616		21.2	$2,575				$3,191
563												
564	**Satellite Bldg**	**3**	**EA**									
565	**Power Circuits**	**15**	**EA**									
566	Receptacles 20A	12	EA	$6.25	$75	0.500	6.0	$729			$67	$804
567	Receptacles GFCI WP	3	EA	$57.50	$173	0.500	1.5	$182			$118	$355
568	J-Boxes	15	EA	$12.50	$188	0.314	4.7	$571			$51	$759
569	Wiring: 1/2"C, (2)#12, (1)#12	450	LF	$3.13	$1,409	0.114	51.3	$6,231			$17	$7,640
570												
571	**Subtotal**	**3**	**EA**		$1,845		63.5	$7,713				$9,558
572												
573	**D5040 Lighting**											
574												
575	**Residential Improvement**	**49**	**HOMES**									
576	**Interior Lighting**	**49**	**EA**									
577	Vanity Light	10	EA	$112.50	$1,125	1.000	10.0	$1,215			$234	$2,340
578	J-Boxes	10	EA	$8.75	$88	0.314	3.1	$377			$47	$465
579	Switch	10	EA	$17.50	$175	0.500	5.0	$607			$78	$782
580	Wiring: 1/2"C, (2)#12, (1)#12	350	LF	$3.13	$1,096	0.114	39.9	$4,846			$17	$5,942
581												
582	**Subtotal**	**49**	**EA**		$2,484		58.0	$7,045				$9,529
583												
584	**WTP Addition**	**1**	**EA**									
585	LED Lights Interior	4	EA	$500.00	$2,000	2.000	8.0	$972			$743	$2,972
586	LED Lights Exterior	1	EA	$562.50	$563	2.000	2.0	$243			$806	$806
587	Switch	1	EA	$17.50	$18	0.500	0.5	$61			$79	$79
588	Wiring: 1/2"C, (2)#12, (1)#12	180	LF	$3.13	$563	0.114	20.5	$2,490			$17	$3,053
589												
590	**Subtotal**	**1**	**EA**		$3,144		31.0	$3,766				$6,910
591												
592												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
593												
594	**Satellite Bldg**	**3**	**EA**									
595	LED Lights Interior	12	EA	$500.00	$6,000	2.000	24.0	$2,915			$743	$8,915
596	LED Lights Exterior	3	EA	$562.50	$1,688	2.000	6.0	$729			$806	$2,417
597	Switch	3	EA	$17.50	$53	0.500	1.5	$182			$78	$235
598	Wiring: 1/2"C, (2)#12, (1)#12	540	LF	$3.13	$1,690	0.114	61.6	$7,482			$17	$9,172
599												
600	**Subtotal**	**3**	**EA**		$9,431		93.1	$11,308				$20,739
601												
602												
603												
604												
605												
606												
607	**Subtotal: D50 ELECTRICAL**				$258,965		3,775.3	$458,550				$717,515
608												
609												
610	**E10 EQUIPMENT**		**NONE**									
611												
612												
613												
614	**Subtotal: E10 EQUIPMENT**											
615												
616												
617	**E20 FURNISHINGS**											
618												
619	**E2010 Fixed Furnishings**	**49**	**EA**									
620												
621	**Residential Improvement**	**49**	**HOMES**									
622	Base Cabinet, Countertop & Backsplash	490	LF	$400.00	$196,000	0.500	245.0	$23,884			$449	$219,884
623												
624	**Subtotal**	**49**	**HOMES**		$196,000		245.0	$23,884				$219,884
625												
626												
627												
628												
629												
630	**Subtotal: E20 FURNISHINGS**				$196,000		245.0	$23,884				$219,884
631												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
633	**F30 DEMOLITION**											
635	**F3010 Structure Demolition**	**1**	**EA**									
637	**Demo 432 K GAL Storage Tank**	**1**	**EA**									
638	Demo Tank Insulation	5,909	SF			0.100	590.9	$50,486			$9	$50,486
639	Demo Top and Framing	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
640	Demo Walls	4,775	SF			0.100	477.5	$40,798	$2.00	$9,550	$11	$50,348
641	Demo Base Plate	1,134	SF			0.100	113.4	$9,689	$2.00	$2,268	$11	$11,957
642	Demo Fdn System Wood And Steel Deck	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
643	Demo Concrete	716	SF			0.050	35.8	$3,674	$2.00	$1,433	$7	$5,107
644	Ship Out Waste - Insulation	35,456	SF	$2.59	$91,831	0.001	35.5	$3,033			$3	$94,864
645	Ship Out Waste - Foundation	54,438	LBS	$0.86	$46,816	0.001	54.4	$4,648			$1	$51,464
646	Ship Out Waste - Steel	93,594	LBS	$0.86	$80,491	0.001	93.6	$7,997			$1	$88,488
647	Concrete Dispose On Site											
649	**Subtotal**	**1**	**EA**		$219,138		1,854.7	$159,081		$22,323		$400,542
669	**Subtotal: F30 DEMOLITION**				$219,138		1,854.7	$159,081		$22,323		$400,542

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
672	**G10 SITE PREPARATION**											
674	**G1010 Site Clearing**	**5,000**	**SF**	$0.46	$2,300						$0	$2,300
676	**G1070 Site Earthwork**											
678	**Runoff Basin**	**50**	**LF**									
679	Excavation 4'	89	CY			0.200	17.8	$1,827	$10.50	$933	$31	$2,760
680	Fill - Subbase B	171	CY	$116.00	$19,797	0.200	34.1	$3,499	$10.50	$1,792	$147	$25,088
681	Concrete Apron	1,000	SF	$8.68	$8,680	0.127	127.0	$13,033	$1.30	$1,296	$23	$23,009
682	Grout Boulders	1	LS	$10,000.00	$10,000						$10,000	$10,000
684	**Runoff Basin**	**50**	**LF**		$38,477		178.9	$18,359		$4,021		$60,857
686	**WST Foundation Earthwork**	**2**	**EA**									
687	Fill - Subbase B	160	CY	$116.00	$18,560	0.200	32.0	$3,284	$10.50	$1,680	$147	$23,524
688	Rip Rap	350	CY	$150.00	$52,500	1.000	350.0	$35,917	$175.00	$61,250	$428	$149,667
690	**WST Foundation Earthwork**	**2**	**EA**		$71,060		382.0	$39,201		$62,930		$173,191
709	**Subtotal: G10 SITE PREPARATION**				$111,837		560.9	$57,560		$66,951		$236,348

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
711												
712	**G20 SITE IMPROVEMENTS**											
713												
714	**G2060 Site Development**	**1**	**LS**									
715												
716	**Heavy Duty Snow Fence**	**200**	**LF**									
717	Helical Foundations at 10	21	EA	$300.00	$6,300	6.000	126.0	$10,765	$250.00	$5,250	$1,063	$22,315
718	Steel Post	21	EA	$75.00	$1,575	1.000	21.0	$1,794			$160	$3,369
719	Runners, 2x6 Treated Double Top/Bot	800	BF	$1.75	$1,400	0.019	15.2	$1,299			$3	$2,699
720	2x6 Pickets 6'H	2,400	BF	$1.75	$4,200	0.019	45.6	$3,896			$3	$8,096
721												
722	**Heavy Duty Snow Fence**	**200**	**LF**		$13,475		207.8	$17,754		$5,250		$36,479
723												
724	**Rip Rap Protection**	**100**	**LF**									
725	Imported Rock From Nome	400	CY	$150.00	$60,000						$150	$60,000
726	Filter Stone Import From Nome	533	CY	$100.00	$53,333						$100	$53,333
727	Haul Rock From Beach	933	CY			0.100	93.3	$9,574	$6.00	$5,600	$16	$15,174
728	Place Filter Rock	533	CY			1.000	533.3	$54,727	$175.00	$93,333	$278	$148,060
729	Place Rip Rap	400	CY			1.000	400.0	$41,048	$175.00	$70,000	$278	$111,048
730	Geofabric	1,200	BF	$1.75	$2,100	0.019	22.8	$1,948			$3	$4,048
731												
732	**Rip Rap Protection**	**100**	**LF**		$115,433		1,049.4	$107,297		$168,933		$391,663
733												
734	**Road To Beach**	**200**	**LF**									
735	Borrow	640	CY	$20.00	$12,800						$20	$12,800
736	Haul	640	CY			0.100	64.0	$6,568	$6.00	$3,840	$16	$10,408
737	Place Borrow	640	CY			0.200	128.0	$13,135	$15.00	$9,600	$36	$22,735
738	Geofabric	7,200	SF	$1.75	$12,600	0.019	136.8	$11,688			$3	$24,288
739												
740	**Road To Beach**	**200**	**LF**		$25,400		328.8	$31,391		$13,440		$70,231
741												
742												
743												
744												
745												
746												
747												
748	**Subtotal: G20 SITE IMPROVEMENTS**				$154,308		1,586.0	$156,442		$187,623		$498,373
749												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
750												
751	**G30 LIQUID AND GAS SITE UTILITIES**											
752												
753	**G3010 Water Utilities**											
754												
755	**Water Main 2"**	**750**	**LF**									
756	Arctic Pipe 2x12 (5% Extra)	788	LF	$75.00	$59,100						$75	$59,100
757	AP Fitting Allowance	8	EA	$1,500.00	$12,000						$1,500	$12,000
758	Bedding Material	250	CY	$30.00	$7,500						$30	$7,500
759	1" PEX Glycol Loop	1,576	LF	$2.00	$3,152						$2	$3,152
760	**Production Rate**	**300**	**LF/DAY**									
761	Time	30	HRS									
762	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
763	Laborers	30	HRS			1.000	30.0	$2,563			$85	$2,563
764	Local Labor	30	HRS			1.000	30.0	$1,223			$41	$1,223
765	Skid Steer	30	HRS			1.000	30.0	$3,079	$28.00	$840	$131	$3,919
766	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Sewer 50%**	**8**	**EA**									
767	Micro Pilings	16	EA	$400.00	$6,400						$400	$6,400
768	Cross Beam	560	LBS	$3.00	$1,680						$3	$1,680
769	Pipe Supports (2 Per Pier)	16	EA	$35.00	$560						$35	$560
770	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**8**	**EA/DAY**									
771	Time	10	HRS									
772	Foreman	10	HRS			1.000	10.0	$1,248	$12.00	$100	$135	$1,348
773	Laborers	10	HRS			1.000	10.0	$854			$85	$854
774	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
775	Track Or Manual Drilling	10	HRS			2.000	20.0	$2,052	$175.00	$1,750	$380	$3,802
776	Skid Steer	10	HRS			1.000	10.0	$1,026	$28.00	$280	$131	$1,306
777	ATV With Trailer	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
778												
779	**Water Main 2"**	**750**	**LF**		$90,392		200.0	$17,631		$3,620		$111,643
780												
781												
782												
783												
784												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
785												
786	**Water Storage Tank**	**484**	**K GAL**									
787	Tanks, Subcontract, 484K Gallon	1	EA	$685,000.00	$685,000						$685,000	$685,000
788	Tank Insulation Package	8,746	SF	$30.00	$262,386						$30	$262,386
789	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
790												
791	**Water Storage Tank**	**484**	**K GAL**		$953,011		$30	$3,569				$956,580
792												
793	**Water Storage Tank**	**350**	**K GAL**									
794	Tanks, Subcontract, 460K Gallon	1	EA	$560,000.00	$560,000						$560,000	$560,000
795	Tank Insulation Package	5,909	SF	$30.00	$177,280						$30	$177,280
796	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
797												
798	**Water Storage Tank**	**350**	**K GAL**		$742,905		$30	$3,569				$746,474
799												
800	**Water Intake**	**1**	**EA**									
801	Perf Pipe	40	LF	$65.00	$2,600						$65	$2,600
802	HDPE Catch Basin	1	EA	$3,000.00	$3,000						$3,000	$3,000
803	Filter Material	20	CY	$60.00	$1,200						$60	$1,200
804	Helicopter Time (Includes Mob/Demob From Nome)	40	HRS	$2,500.00	$100,000						$2,500	$100,000
805	Time	180	HRS									
806	Foreman	180	HRS			1.000	180.0	$22,470	$12.00	$1,800	$135	$24,270
807	Laborers	1,440	HRS			1.000	1,440.0	$123,034			$85	$123,034
808	Skid Steer	180	HRS			1.000	180.0	$18,472	$28.00	$5,040	$131	$23,512
809	ATV With Trailer	180	HRS			1.000	180.0	$18,472	$35.00	$6,300	$138	$24,772
810												
811	**Water Intake**	**1**	**EA**		$106,800		1,980.0	$182,448		$13,140		$302,388
812												
813	**G3010 Water Utilities**	**1**	**LS**		$1,893,108		2,240.0	$207,217		$16,760		$2,117,085
814												
815												
816												
817												
818												
819												
820												
821												
822												
823												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
824												
825	**G3020 Sanitary Sewerage Utilities**											
826												
827	**6" Arctic Pipe Gravity Sewer**	**750**	**LF**									
828	Arctic Pipe 6x15	788	LF	$109.00	$85,838						$109	$85,838
829	AP Fitting Allowance	23	EA	$2,000.00	$46,000						$2,000	$46,000
830	1" PEX Glycol Loop	1,575	LF	$2.00	$3,150						$2	$3,150
831	Energy Dissipation Structures	4	EA	$5,000.00	$20,000	16.000	64.0	$6,239	$1,000.00	$4,000	$7,560	$30,239
832	Cleanouts	5	EA	$1,500.00	$7,500	6.000	30.0	$2,925	$200.00	$1,000	$2,285	$11,425
833	**Production Rate**	**300**	**LF/DAY**									
834	Time	30	HRS									
835	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
836	Laborers	30	HRS			1.000	30.0	$2,563			$85	$2,563
837	Local Labor	30	HRS			1.000	30.0	$1,223			$41	$1,223
838	Skid Steer	30	HRS			1.000	30.0	$3,079	$28.00	$840	$131	$3,919
839	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Water 50%**	**7**	**EA**									
840	Micro Pilings	14	EA	$400.00	$5,600						$400	$5,600
841	Cross Beam	490	LBS	$3.00	$1,470						$3	$1,470
842	Pipe Supports (2 Per Pier)	14	EA	$35.00	$490						$35	$490
843	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**7**	**EA/DAY**									
844	Time	10	HRS									
845	Foreman	10	HRS			1.000	10.0	$1,248	$12.00	$100	$135	$1,348
846	Laborers	10	HRS			1.000	10.0	$854			$85	$854
847	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
848	Track or Manual Drilling	10	HRS			2.000	20.0	$2,052	$175.00	$1,750	$380	$3,802
849	Skid Steer	10	HRS			1.000	10.0	$1,026	$28.00	$280	$131	$1,306
850	ATV With Trailer	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
851												
852	**6" Arctic Pipe Gravity Sewer**	**750**	**LF**		$170,048		294.0	$26,795		$8,620		$205,463
853												
854												
855												
856												
857												
858												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
859												
860	**Residential Seepage Pit**	**49**	**EA**									
861	36" Dia ADS Culvert Seepage Tank W/ Lid	49	EA	$2,000.00	$98,000						$2,000	$98,000
862	Gravel Leach Material	328	CY	$50.00	$16,395						$50	$16,395
863	Monitor Pipe	49	EA	$35.00	$1,715						$35	$1,715
864	Filter Fabric	1,960	SY	$1.50	$2,940						$2	$2,940
865	Seeding	2,352	SY	$1.00	$2,352						$1	$2,352
866	**Production 2 Services/Day**	**25**	**EA**									
867	Time	250	HRS									
868	Foreman	250	HRS			1.000	250.0	$31,209	$12.00	$2,500	$135	$33,709
869	Laborers	250	HRS			1.000	250.0	$21,360			$85	$21,360
870	Plumber 1/2 Time	125	HRS			1.000	125.0	$14,869	$12.50	$1,250	$129	$16,119
871	Local Labor	250	HRS			1.000	250.0	$10,188			$41	$10,188
872	Operators	250	HRS			1.000	250.0	$25,655			$103	$25,655
873	Truck Drivers	250	HRS			1.000	250.0	$25,420			$102	$25,420
874	Skid Steer	250	HRS						$35.00	$8,750	$35	$8,750
875	Excavator 320	250	HRS						$108.50	$27,125	$109	$27,125
876	End Dump	250	HRS						$65.00	$16,250	$65	$16,250
877												
878	**Residential Seepage Pit**	**49**	**EA**		$121,402		1,375.0	$128,701		$55,875		$305,978
879												
880												
881												
882												
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Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
897												
898	**Residential STEP Septic System**	**49**	**EA**									
899	1250 Gal Poly Septic Tank W/ Risers, Foam Insulation, Lids, Inlets/Outlets	49	EA	$4,500.00	$220,500						$4,500	$220,500
900	Lift Station Unit W/ Insulation	49	EA	$7,500.00	$367,500						$7,500	$367,500
901	Anchoring Straps	49	SETS	$1,500.00	$73,500						$1,500	$73,500
902	Rigid Insulation	43,512	BF	$0.80	$34,810						$1	$34,810
903	Field Foam Insulation	98	LOC	$20.00	$1,960						$20	$1,960
904	Bedding Material	454	CY	$45.00	$20,417						$45	$20,417
905	Seeding	19,600	SY	$1.00	$19,600						$1	$19,600
906	**Production 2 Services/Day**	**25**	**EA**									
907	Time_B1	250	HRS									
908	Foreman	250	HRS			1.000	250.0	$31,209	$12.00	$2,500	$135	$33,709
909	Laborers	375	HRS			1.000	375.0	$32,040			$85	$32,040
910	Electrician	250	HRS			1.000	250.0	$30,365			$121	$30,365
911	Plumber	250	HRS			1.000	250.0	$29,739	$12.50	$2,500	$129	$32,239
912	Local Labor	500	HRS			1.000	500.0	$20,375			$41	$20,375
913	Operators	250	HRS			1.000	250.0	$25,655			$103	$25,655
914	Truck Drivers	250	HRS			1.000	250.0	$25,420			$102	$25,420
915	Skid Steer	250	HRS						$35.00	$8,750	$35	$8,750
916	Excavator 320	375	HRS						$108.50	$40,688	$109	$40,688
917	End Dump	250	HRS						$65.00	$16,250	$65	$16,250
918												
919	**Residential STEP Septic System**	**49**	**EA**		$738,287		2,125.0	$194,803		$70,688		$1,003,778
920												
921	**Advanced Burn Barrel, Smartash Burn Barrel**	2	EA	$4,000.00	$8,000	4.000	8.0	$780			$4,390	$8,780
922												
923												
924	**G3020 Sanitary Sewerage Utilities**	-	-		$1,037,737		3,802.0	$351,079		$135,183		$1,523,999
925												
926												
927												
928												
929												
930												
931												
932	**Subtotal: G30 LIQUID AND GAS SITE UTILITIES**				$2,930,845		6,042.0	$558,296		$151,943		**$3,641,084**
933												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
934												
935	**Z10 GENERAL REQUIREMENTS**											
936												
937	**Z1020 Administrative Requirements**											
938	Supervisor, 60 Hour/Week	69	WEEKS			60.000	4,140.0	$763,871			$11,071	$763,871
939	Project Expeditor, 20 Hour/Week	69	WEEKS			20.000	1,380.0	$117,907			$1,709	$117,907
940	Time Keeper/Cost Control, 40 Hour/Week	69	WEEKS			40.000	2,760.0	$139,517			$2,022	$139,517
941												
942	**Z1040 Quality Requirements**											
943	Quality Control	16	MTHS	$1,000.00	$16,000	40.000	640.0	$35,946			$3,247	$51,946
944	Test Lab Services	20	EA	$250.00	$5,000						$250	$5,000
945	Survey	1	EA	$40,000.00	$40,000						$40,000	$40,000
946												
947	**Z1050 Temporary Facilities and Controls**											
948	**Subsistence**											
949	Rental House	16	MTHS						$3,000.00	$48,000	$3,000	$48,000
950	Room & Board - Incidental	8,063	MDAY	$20.00	$161,266						$20	$161,266
951												
952	**Travel**											
953	Air Fare - Anchorage - Site	287	EA	$500.00	$143,500						$500	$143,500
954	Early Construction	4	EA									
955	Survey	6	EA									
956	Crew/Super (Trip/30 Mdays)	269	EA									
957	Inspections	8	EA									
958												
959	**Small Tools & Consumables**											
960	Consumables	1	LS	$3,500.00	$3,500						$3,500	$3,500
961	Small Tools	1	LS	$92,650.00	$92,650						$92,650	$92,650
962												
963												
964												
965												
966												
967												
968												
969												
970												
971												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
972												
973	**Mobilization**											
974	Mobilization - Equipment	122	TONS	$2,300.00	$280,600						$2,300	$280,600
975	Side By Sides	3,500	LBS									
976	ATV & Trailer	1,000	LBS									
977	FE Loader	42,800	LBS									
978	Excavator	47,400	LBS									
979	End Dumps (3)	78,000	LBS									
980	Skid Steer	5,000	LBS									
981	Sm Dozer	35,000	LBS									
982	Compactor	20,000	LBS									
983	Conc Mixer	1,000	LBS									
984	Misc	10,000	LBS									
985	Demobilization - Equipment	122	TONS	$1,725.00	$210,450						$1,725	$210,450
986	Surface Freight Seattle - Job Site	938	TONS	$2,300.00	$2,157,400						$2,300	$2,157,400
987	Handling Labor	122	HRS			1.000	122.4	$10,458			$85	$10,458
988												
989	Air Freight Anchorage - Job Site - Incidental	16	MTHS	$2,000.00	$32,000						$2,000	$32,000
990												
991	**Equipment**											
992	Equipment Standby and Travel Time	2	MTHS						$27,828.80	$55,658	$27,829	$55,658
993	Side By Sides	2	EA									
994	ATV & Trailer	1	EA									
995	FE Loader With Forks	1	EA									
996	Excavator	1	EA									
997	Skid Steer	1	EA									
998	Mini Excavator	1	EA									
999	Dozer D4	1	EA									
1,000	Compactor	1	EA									
1,001	End Dumps	4	EA									
1,002	Fuel (3/Hr Covered In Equip Rates)	47,151	GAL	$4.00	$188,602						$4	$188,602
1,003	Maintenance Labor 1 FTE	16	MTHS			259.800	4,156.8	$339,569			$21,223	$339,569
1,004												
1,005												
1,006												
1,007												
1,008												
1,009												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1,010												
1,011	**Temporary Facilities**	**16**	**MTHS**									
1,012	Project Office Trailer	16	MTHS						$1,500.00	$24,000	$1,500	$24,000
1,013	Office Equipment/Supplies	16	MTHS	$500.00	$8,000						$500	$8,000
1,014	Project Tool Sheds	16	MTHS						$200.00	$3,200	$200	$3,200
1,015	Project Safety Equipment	1	LS	$1,500.00	$1,500						$1,500	$1,500
1,016	Communications/Internet	16	MTHS	$1,000.00	$16,000						$1,000	$16,000
1,017												
1,018	**SWPPP Maintenance**											
1,019	Erosion Control Inspections (4H/Wk)	69	WKS			4.000	276.0	$26,906			$390	$26,906
1,020	Silt Fences, BMPs	20,000	LF	$5.00	$100,000	0.250	5,000.0	$427,200			$26	$527,200
1,021												
1,022	**G5010 Site Communications Systems**											
1,023	Record Documents	100	SHTS	$100.00	$10,000						$100	$10,000
1,024	Operations and Maintenance Manuals	1	LS	$25,000.00	$25,000						$25,000	$25,000
1,025	Contract Closeout and Training	1	LS	$15,000.00	$15,000						$15,000	$15,000
1,026												
1,027												
1,028												
1,029												
1,030												
1,031												
1,032												
1,033												
1,034												
1,035												
1,036												
1,037												
1,038												
1,039												
1,040												
1,041												
1,042												
1,043												
1,044												
1,045												
1,046												
1,047												
1,048	**Subtotal: Z10 GENERAL REQUIREMENTS**				$3,506,468		18,475.2	$1,861,374		$130,858		**$5,498,700**
1,049												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
1,050												
1,051	**Z70 TAXES, PERMITS, INSURANCE AND BONDS**											
1,052												
1,053	Insurance and Bond 3.0%	1	LS									$1,207,055
1,054												
1,055												
1,056												
1,057												
1,058												
1,059	**Subtotal: Z70 TAXES, PERMITS, INSURANCE AND BONDS**											**$1,207,055**
1,060												
1,061												
1,062	**Z90 FEES**											
1,063												
1,064	Overhead and Profit 12%	1	LS									$4,828,218
1,065												
1,066												
1,067												
1,068												
1,069												
1,070												
1,071	**Subtotal: Z90 FEES**											**$4,828,218**
1,072												
1,073												
1,074	**Z90 CONTINGENCIES**											
1,075												
1,076	**Z9050 Construction Contingencies**											
1,077	Estimating Contingency 10%	1	LS									$2,937,791
1,078	Project Contingency 15%	1	LS									$4,847,355
1,079	Inflation 6.5% Per Year For 3.5% Yr = 24.66%	1	LS									$9,164,037
1,080												
1,081												
1,082												
1,083												
1,084												
1,085												
1,086												
1,087												
1,088	**Subtotal: Z90 CONTINGENCIES**											**$16,949,184**
1,089												

Little Diomede Ph II 1st Water & Sewer Services
Alternate 5 - PASS
Little Diomede, Alaska

Construction Cost Estimate
65% ePER Submittal
July 28, 2023

ESTIMATIONS
1225 E. International Airport Road, Suite 235
Anchorage, Alaska 99518
907.561.0790

Prepared for:
DOWL
5015 Business Park Boulevard, #4000
Anchorage, Alaska 99503
907.562.2000

Little Diomede Ph II 1st Water & Sewer Services | **Construction Cost Estimate**
Alternate 5 - PASS | **65% ePER Submittal**
Prepared for DOWL by Estimations | **July 28, 2023**

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 5 - PASS
Estimate Date:	July 28, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

SCOPE OF WORK

a. Existing Water Source – See Alt 2
b. Water Storage
i. Replace the existing 424,000 WST. (See Existing_Tank.pdf)
ii. Construct new 350,000-gallon water storage tank. (See Proposed Tank Design.pdf).
c. PASS
i. For each residence,100-gallon WST tank, rain catchment system, sink, ventilated separating toilet. See ANTHC component list.
d. Wastewater Treatment
i. Upgrade washeteria septic piping to dispose of pee jugs.
ii. Advanced burn barrel for solid incineration.

Notes on the Estimate

DOCUMENTS
65% ePER Submittal

SOURCE OF COST DATA:
Estimations Internal cost database
Vendor Quote
Labor based on State of Alaska Title 36 Wages 04/2023.
BABA Compliance not Required.

ESTIMATE ASSUMPTIONS:
Summer 2025 Construction
Design Bid Build
Time on Site 18 MTHS

Little Diomede Ph II 1st Water & Sewer Services

Alternate 5 - PASS

Prepared for DOWL by Estimations

Construction Cost Estimate

65% ePER Submittal

July 28, 2023

Description	Material	Labor	Hours	Equipment	Estimated Cost
0 OWNER COSTS	**$3,308,174**	**$1,710,760**	**17,430.70**	**$0**	**$5,018,934**
20 OWNER DEVELOPMENT	$3,308,174	$0	-	$0	$3,308,174
30 PROCUREMENT REQUIREMENTS	$0	$1,710,760	17,430.70	$0	$1,710,760
A SUBSTRUCTURE	**$504,249**	**$202,989**	**2,079.60**	**$47,101**	**$754,339**
A10 FOUNDATIONS	$504,249	$202,989	2,079.60	$47,101	$754,339
C INTERIORS	**$141,708**	**$331,134**	**3,345.60**	**$0**	**$472,842**
C10 INTERIOR CONSTRUCTION	$98,784	$233,199	2,376.80	$0	$331,983
C20 INTERIOR FINISHES	$42,924	$97,935	968.80	$0	$140,859
D SERVICES	**$3,408,908**	**$1,069,625**	**8,955.60**	**$0**	**$4,478,533**
D20 PLUMBING	$3,145,750	$591,580	4,976.00	$0	$3,737,330
D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	$30,479	$53,602	485.10	$0	$84,081
D50 ELECTRICAL	$232,679	$424,443	3,494.50	$0	$657,122
E EQUIPMENT AND FURNISHINGS	**$196,000**	**$23,884**	**245.00**	**$0**	**$219,884**
E10 EQUIPMENT	$0	$0	-	$0	$0
E20 FURNISHINGS	$196,000	$23,884	245.00	$0	$219,884

Little Diomede Ph II 1st Water & Sewer Services — **Construction Cost Estimate**

Alternate 5 - PASS — **65% ePER Submittal**

Prepared for DOWL by Estimations — **July 28, 2023**

Description	Material	Labor	Hours	Equipment	Estimated Cost
F SPECIAL CONSTRUCTION AND DEMOLITION	**$219,138**	**$159,081**	**1,854.70**	**$22,323**	**$400,542**
F30 DEMOLITION	$219,138	$159,081	1,854.70	$22,323	$400,542
G SITEWORK	**$2,182,114**	**$414,863**	**4,304.90**	**$269,364**	**$2,866,341**
G10 SITE PREPARATION	$111,837	$57,560	560.90	$66,951	$236,348
G20 SITE IMPROVEMENTS	$154,308	$156,442	1,586.00	$187,623	$498,373
G30 LIQUID AND GAS SITE UTILITIES	$1,915,969	$200,861	2,158.00	$14,790	$2,131,620
Z GENERAL	**$2,802,240**	**$2,045,027**	**20,190.70**	**$140,258**	**$23,889,260**
Z10 GENERAL REQUIREMENTS	$2,802,240	$2,045,027	20,190.70	$140,258	$4,987,525
Z70 TAXES, PERMITS, INSURANCE AND BONDS	$0	$0	-	$0	$992,452
Z90 FEES	$0	$0	-	$0	$3,969,809
Z90 CONTINGENCIES	$0	$0	-	$0	$13,939,474
TOTAL ESTIMATED COST	**$12,762,531**	**$5,957,363**	**$58,407**	**$479,046**	**$38,100,675**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1	**20 OWNER DEVELOPMENT**											
2												
3	**2010 Site Acquisition**											
4	Not Included											
5												
6	**2020 Permits**		NONE									
7												
8	**2030 Professional Services**											
9	Design Fees 10% Of Construction	1	LS	$3,308,174.15	$3,308,174						$3,308,174	$3,308,174
10												
11												
12												
13												
14												
15												
16												
17	**Subtotal: 20 OWNER DEVELOPMENT**				$3,308,174							**$3,308,174**
18												
19												
20	**30 PROCUREMENT REQUIREMENTS**											
21												
22	**3010 Project Delivery**											
23	Construction Admin 5% Of Construction	1	LS			16,967.809	16,967.8	$1,654,086			$1,654,086	$1,654,086
24	Survey ANTHC - Early	1	LS			142.857	142.9	$18,388			$18,388	$18,388
25	Estimator	40	HRS			1.000	40.0	$4,743			$119	$4,743
26	ANTHC Scheduling	40	HRS			1.000	40.0	$3,726			$93	$3,726
27	Purchasing	60	HRS			1.000	60.0	$7,855			$131	$7,855
28	Project Closeout	1	LS			180.000	180.0	$21,962			$21,962	$21,962
29												
30												
31												
32												
33												
34												
35												
36	**Subtotal: 30 PROCUREMENT REQUIREMENTS**						17,430.7	$1,710,760				**$1,710,760**
37												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
38												
39	**A10 FOUNDATIONS**											
40												
41	**A1020 Special Foundations**											
42												
43	**WST Foundations**	**2**	**EA**									
44	Insulated Concrete Precast	1,600	SF	$40.00	$64,000	0.032	51.2	$5,254	$9.08	$14,525	$52	$83,779
45	AWW Mud Sills 4x12 @ 2'oc	1,644	LF	$8.00	$13,152	0.114	187.4	$18,268	$1.00	$1,644	$20	$33,064
46	AWW 8x12	1,488	LF	$40.00	$59,520	0.343	510.4	$49,756	$4.00	$5,952	$77	$115,228
47	AWW Plywood 5/8	2,880	SF	$1.25	$3,600	0.019	54.7	$5,332			$3	$8,932
48	Hardware	2	SETS	$2,000.00	$4,000						$2,000	$4,000
49	Insulation XPS, High Compression 2"	235,008	BF	$0.90	$211,507	0.003	705.0	$68,726			$1	$280,233
50	Concrete	36	CY	$1,800.00	$64,800	8.000	288.0	$28,075	$350.00	$12,600	$2,930	$105,475
51	Grade Ring	239	LF	$266.67	$63,670	1.185	282.9	$27,578	$51.85	$12,380	$434	$103,628
52	Misc	2	EA	$10,000.00	$20,000						$10,000	$20,000
53												
54	**WST Foundations**	**2**	**EA**		$504,249		2,079.6	$202,989		$47,101		$754,339
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73	**Subtotal: A10 FOUNDATIONS**				$504,249		2,079.6	$202,989		$47,101		**$754,339**
74												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
75												
76	**C10 INTERIOR CONSTRUCTION**											
77												
78	**C1010 Interior Partitions**											
79												
80	**Residential Improvement**	**49**	**HOMES**									
81	2x Wood Framing & Hardware Allowance For Repairs	1,593	BF	$2.00	$3,185	0.057	90.8	$8,852			$8	$12,037
82	5/8" GWB Allowance For Repairs	1,838	SF	$0.72	$1,323	0.043	79.0	$9,202			$6	$10,525
83												
84	**Subtotal**	**49**	**HOMES**		$4,508		169.8	$18,054				$22,562
85												
86	**C1030 Interior Doors**											
87												
88	**Residential Improvement**	**49**	**HOMES**									
89	Wall Framing Modifications	49	EA	$50.00	$2,450	4.000	196.0	$19,107			$440	$21,557
90	Prehung Wood Flush Door & Frame 3x7	49	EA	$500.00	$24,500	4.000	196.0	$19,107			$890	$43,607
91	Privacy Lockset	49	EA	$150.00	$7,350	2.000	98.0	$9,553			$345	$16,903
92	Door Casing Trim	1,666	LF	$5.00	$8,330	0.071	118.3	$11,532			$12	$19,862
93												
94	**Subtotal**	**49**	**HOMES**		$42,630		608.3	$59,299				$101,929
95												
96	**C1060 Raised Floor Construction**											
97												
98	**Residential Improvement**	**49**	**HOMES**									
99	**Bathtub Platform Construction**											
100	Framed Curb @ 16" O.C.	1,470	BF	$3.00	$4,410	0.071	104.4	$10,177			$10	$14,587
101	3/4" Plywood Subfloor	1,568	SF	$2.00	$3,136	0.043	67.4	$6,570			$6	$9,706
102												
103	**Subtotal**	**49**	**HOMES**		$7,546		171.8	$16,747				$24,293
104												
105												
106												
107												
108												
109												
110												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
112	**C1070 Suspended Ceiling Construction**											
114	**Residential Improvement**	**49**	**HOMES**									
115	**Bathroom Exhaust Fan Soffit**											
116	Framing	5,880	BF	$3.00	$17,640	0.114	670.3	$65,343			$14	$82,983
117	Soffit Paneling	3,920	SF	$3.00	$11,760	0.143	560.6	$54,649			$17	$66,409
119	**Subtotal**	**49**	**HOMES**		$29,400		1,230.9	$119,992				$149,392
121	**C1090 Interior Specialties**											
123	**Residential Improvement**	**49**	**HOMES**									
124	Bathroom Accessories	49	SET	$300.00	$14,700	4.000	196.0	$19,107			$690	$33,807
126	**Subtotal**	**49**	**SET**		$14,700		196.0	$19,107				$33,807
147	**Subtotal: C10 INTERIOR CONSTRUCTION**				$98,784		2,376.8	$233,199				$331,983

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
149												
150	**C20 INTERIOR FINISHES**											
151												
152	**C2010 Wall Finishes**											
153												
154	**Residential Improvement**	**49**	**HOMES**									
155	Patching & Painting	4,900	SF	$1.20	$5,880	0.043	210.7	$22,286			$6	$28,166
156												
157	**Subtotal**	**4,900**	**SF**		$5,880		210.7	$22,286				$28,166
158												
159	**C2030 Flooring**											
160												
161	**Residential Improvement**	**49**	**HOMES**									
162	3/8" Underlayment	3,920	SF	$1.25	$4,900	0.043	168.6	$16,436			$5	$21,336
163	Sheet Vinyl Flooring	3,920	SF	$7.00	$27,440	0.071	278.3	$27,130			$14	$54,570
164	Rubber Base	1,764	LF	$1.50	$2,646	0.057	100.5	$9,797			$7	$12,443
165												
166	**Subtotal**	**49**	**HOMES**		$34,986		547.4	$53,363				$88,349
167												
168	**C2050 Ceiling Finishes**											
169												
170	**Residential Improvement**	**49**	**HOMES**									
171	Ceiling Paint Allowance @ Fan Soffit	4,900	SF	$0.42	$2,058	0.043	210.7	$22,286			$5	$24,344
172												
173	**Subtotal**	**49**	**HOMES**		$2,058		210.7	$22,286				$24,344
174												
175												
176												
177												
178												
179												
180												
181												
182												
183												
184	**Subtotal: C20 INTERIOR FINISHES**				$42,924		968.8	$97,935				$140,859
185												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
186												
187	**D20 PLUMBING**											
188												
189	**D2010 Domestic Water Distribution**											
190												
191	**Residential Improvement**	**49**	**HOMES**									
192	PASS Separate Toilet	600	EA	$4,750.00	$2,850,000	6.000	3,600.0	$428,241			$5,464	$3,278,241
193	PASS Bathroom Sink	150	EA	$625.00	$93,750	4.000	600.0	$71,373			$1,101	$165,123
194	PASS Urinal	150	EA	$250.00	$37,500	4.000	600.0	$71,373			$726	$108,873
195	Plumbing	1	LS	$2,000.00	$2,000	16.000	16.0	$1,560			$3,560	$3,560
196												
197	PASS Campwater HPF2 Treatment System, Storage Tank & Frame	10	EA	$16,250.00	$162,500	16.000	160.0	$19,033			$18,153	$181,533
198												
199	**Subtotal**	**49**	**EA**		$3,145,750		4,976.0	$591,580				$3,737,330
200												
201												
202												
203												
204												
205												
206												
207												
208												
209												
210												
211												
212												
213												
214												
215												
216												
217												
218												
219												
220												
221	**Subtotal: D20 PLUMBING**				$3,145,750		4,976.0	$591,580				$3,737,330
222												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
223												
224	**D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**											
225												
226	**D3010 Facility Fuel Systems**											
227												
228	**Residential Improvement**	**49**	**EA**									
229	Fuel Filter Kit	49	EA	$112.50	$5,513	2.000	98.0	$11,658			$350	$17,171
230	Fuel Line & Fittings	49	EA	$187.50	$9,188	4.000	196.0	$23,315			$663	$32,503
231												
232	**Subtotal**	**49**	**EA**		$14,701		294.0	$34,973				$49,674
233												
234	**D3060 Ventilation**											
235												
236	**Residential Improvement**	**49**	**EA**									
237	PASS Exhaust Fan/Ducting	49	EA	$250.00	$12,250	2.000	98.0	$9,553			$445	$21,803
238	4" Oval To Round Adapter	49	EA	$25.00	$1,225	0.500	24.5	$2,388			$74	$3,613
239	4" Duct	196	LF	$3.00	$588	0.100	19.6	$1,911			$13	$2,499
240	Ext. Wall Hood W/ Damper & Screen	49	EA	$35.00	$1,715	1.000	49.0	$4,777			$132	$6,492
241												
242	**Subtotal**	**49**	**EA**		$15,778		191.1	$18,629				$34,407
243												
244												
245												
246												
247												
248												
249												
250												
251												
252												
253												
254												
255												
256												
257												
258	**Subtotal: D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**				$30,479		485.1	$53,602				$84,081
259												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
260												
261	**D50 ELECTRICAL**											
262												
263	**D5020 Electrical Service and Distribution**											
264												
265	**Residential Improvement**	**49**	**EA**									
266	**Services**	**49**	**EA**									
267	Service Upgrade Allowances - Panels, Ground & Feeds	49	EA	$3,125.00	$153,125	24.000	1,176.0	$142,837			$6,040	$295,962
268												
269	**Subtotal**	**49**	**EA**		$153,125		1,176.0	$142,837				$295,962
270												
271	**D5030 General Purpose Electrical Power**											
272												
273	**Residential Improvement**	**49**	**EA**									
274	**Power Circuits**	**392**	**EA**									
275	Bathroom Exhaust Fan, Light, Recept	49	EA									
276	Circulation Pump	49	EA									
277	Heat Trace Well Line x2	49	EA									
278	Lift Station x2	49	EA									
279	Well Pump	49	EA									
280	Heat Trace Emergency Well Line	49	EA									
281	Heat Trace Well x2	49	EA									
282	Water Treatment	49	EA									
283	J-Boxes	392	EA	$12.50	$4,900	0.314	123.1	$14,952			$51	$19,852
284	Wiring: 1/2"C, (2)#12, (1)#12	7,840	LF	$3.13	$24,539	0.114	893.8	$108,561			$17	$133,100
285	Wiring: 1/2"C, (3)#12, (1)#12	5,880	LF	$3.44	$20,227	0.114	670.3	$81,414			$17	$101,641
286	Wiring: 1/2"C, (3)#10, (1)#10	2,450	LF	$4.06	$9,947	0.114	279.3	$33,924			$18	$43,871
287												
288	Pilot Switches	245	EA	$43.75	$10,719	0.500	122.5	$14,879			$104	$25,598
289	Switches	98	EA	$43.75	$4,288	0.500	49.0	$5,952			$104	$10,240
290	Outlets, GFCI	49	EA	$25.00	$1,225	0.500	24.5	$2,976			$86	$4,201
291	Outlet, Duplex	196	EA	$6.25	$1,225	0.500	98.0	$11,903			$67	$13,128
292												
293	**Subtotal**	**392**	**EA**		$77,070		2,260.5	$274,561				$351,631
294												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
295												
296	**D5040 Lighting**											
297												
298	**Residential Improvement**	**49**	**HOMES**									
299	**Interior Lighting**	**49**	**EA**									
300	Vanity Light	10	EA	$112.50	$1,125	1.000	10.0	$1,215			$234	$2,340
301	J-Boxes	10	EA	$8.75	$88	0.314	3.1	$377			$47	$465
302	Switch	10	EA	$17.50	$175	0.500	5.0	$607			$78	$782
303	Wiring: 1/2"C, (2)#12, (1)#12	350	LF	$3.13	$1,096	0.114	39.9	$4,846			$17	$5,942
304												
305	**Subtotal**	**49**	**EA**		$2,484		58.0	$7,045				$9,529
306												
307												
308												
309	**Subtotal: D50 ELECTRICAL**				$232,679		3,494.5	$424,443				$657,122
310												
311												
312	**E10 EQUIPMENT**		**NONE**									
313												
314												
315												
316	**Subtotal: E10 EQUIPMENT**											
317												
318												
319	**E20 FURNISHINGS**											
320												
321	**E2010 Fixed Furnishings**	**49**	**EA**									
322												
323	**Residential Improvement**	**49**	**HOMES**									
324	Base Cabinet, Countertop & Backsplash	490	LF	$400.00	$196,000	0.500	245.0	$23,884			$449	$219,884
325												
326	**Subtotal**	**49**	**HOMES**		$196,000		245.0	$23,884				$219,884
327												
328												
329	**Subtotal: E20 FURNISHINGS**				$196,000		245.0	$23,884				$219,884
330												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
331												
332	**F30 DEMOLITION**											
333												
334	**F3010 Structure Demolition**	**1**	**EA**									
335												
336	**Demo 432 KGAL Storage Tank**	**1**	**EA**									
337	Demo Tank Insulation	5,909	SF			0.100	590.9	$50,486			$9	$50,486
338	Demo Top and Framing	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
339	Demo Walls	4,775	SF			0.100	477.5	$40,798	$2.00	$9,550	$11	$50,348
340	Demo Base Plate	1,134	SF			0.100	113.4	$9,689	$2.00	$2,268	$11	$11,957
341	Demo Fdn System Wood And Steel Deck	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
342	Demo Concrete	716	SF			0.050	35.8	$3,674	$2.00	$1,433	$7	$5,107
343	Ship Out Waste - Insulation	35,456	SF	$2.59	$91,831	0.001	35.5	$3,033			$3	$94,864
344	Ship Out Waste - Foundation	54,438	LBS	$0.86	$46,816	0.001	54.4	$4,648			$1	$51,464
345	Ship Out Waste - Steel	93,594	LBS	$0.86	$80,491	0.001	93.6	$7,997			$1	$88,488
346	Concrete Dispose On Site											
347												
348	**Subtotal**	**1**	**EA**		$219,138		1,854.7	$159,081		$22,323		$400,542
349												
350												
351												
352												
353												
354												
355												
356												
357												
358												
359												
360												
361												
362												
363												
364												
365	**Subtotal: F30 DEMOLITION**				$219,138		1,854.7	$159,081		$22,323		$400,542
366												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
367												
368	**G10 SITE PREPARATION**											
369												
370	**G1010 Site Clearing**	**5,000**	**SF**	$0.46	$2,300						$0	$2,300
371												
372	**G1070 Site Earthwork**											
373												
374	**Runoff Basin**	**50**	**LF**									
375	Excavation 4'	89	CY			0.200	17.8	$1,827	$10.50	$933	$31	$2,760
376	Fill - Subbase B	171	CY	$116.00	$19,797	0.200	34.1	$3,499	$10.50	$1,792	$147	$25,088
377	Concrete Apron	1,000	SF	$8.68	$8,680	0.127	127.0	$13,033	$1.30	$1,296	$23	$23,009
378	Grout Boulders	1	LS	$10,000.00	$10,000						$10,000	$10,000
379												
380	**Runoff Basin**	**50**	**LF**		$38,477		178.9	$18,359		$4,021		$60,857
381												
382	**WST Foundation Earthwork**	**2**	**EA**									
383	Fill - Subbase B	160	CY	$116.00	$18,560	0.200	32.0	$3,284	$10.50	$1,680	$147	$23,524
384	Rip Rap	350	CY	$150.00	$52,500	1.000	350.0	$35,917	$175.00	$61,250	$428	$149,667
385												
386	**WST Foundation Earthwork**	**2**	**EA**		$71,060		382.0	$39,201		$62,930		$173,191
387												
388												
389												
390	**Subtotal: G10 SITE PREPARATION**				$111,837		560.9	$57,560		$66,951		$236,348
391												
392												
393	**G20 SITE IMPROVEMENTS**											
394												
395	**G2060 Site Development**	**1**	**LS**									
396												
397	**Heavy Duty Snow Fence**	**200**	**LF**									
398	Helical Foundations at 10	21	EA	$300.00	$6,300	6.000	126.0	$10,765	$250.00	$5,250	$1,063	$22,315
399	Steel Post	21	EA	$75.00	$1,575	1.000	21.0	$1,794			$160	$3,369
400	Runners, 2x6 Treated Double Top/Bot	800	BF	$1.75	$1,400	0.019	15.2	$1,299			$3	$2,699
401	2x6 Pickets 6'H	2,400	BF	$1.75	$4,200	0.019	45.6	$3,896			$3	$8,096
402												
403	**Heavy Duty Snow Fence**	**200**	**LF**		$13,475		207.8	$17,754		$5,250		$36,479

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
404												
405	**Rip Rap Protection**	**100**	**LF**									
406	Imported Rock From Nome	400	CY	$150.00	$60,000						$150	$60,000
407	Filter Stone Import From Nome	533	CY	$100.00	$53,333						$100	$53,333
408	Haul Rock From Beach	933	CY			0.100	93.3	$9,574	$6.00	$5,600	$16	$15,174
409	Place Filter Rock	533	CY			1.000	533.3	$54,727	$175.00	$93,333	$278	$148,060
410	Place Rip Rap	400	CY			1.000	400.0	$41,048	$175.00	$70,000	$278	$111,048
411	Geofabric	1,200	BF	$1.75	$2,100	0.019	22.8	$1,948			$3	$4,048
412												
413	**Rip Rap Protection**	**100**	**LF**		$115,433		1,049.4	$107,297		$168,933		$391,663
414												
415	**Road To Beach**	**200**	**LF**									
416	Borrow	640	CY	$20.00	$12,800						$20	$12,800
417	Haul	640	CY			0.100	64.0	$6,568	$6.00	$3,840	$16	$10,408
418	Place Borrow	640	CY			0.200	128.0	$13,135	$15.00	$9,600	$36	$22,735
419	Geofabric	7,200	SF	$1.75	$12,600	0.019	136.8	$11,688			$3	$24,288
420												
421	**Road To Beach**	**200**	**LF**		$25,400		328.8	$31,391		$13,440		$70,231
422												
423												
424												
425												
426												
427												
428												
429												
430												
431												
432												
433												
434												
435												
436												
437												
438												
439	**Subtotal: G20 SITE IMPROVEMENTS**				$154,308		1,586.0	$156,442		$187,623		$498,373
440												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
441												
442	**G30 LIQUID AND GAS SITE UTILITIES**											
443												
444	**G3010 Water Utilities**											
445												
446	**Water Storage Tank**	**484**	**K GAL**									
447	Tanks, Subcontract, 484K Gallon	1	EA	$685,000.00	$685,000						$685,000	$685,000
448	Tank Insulation Package	8,746	SF	$30.00	$262,386						$30	$262,386
449	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
450												
451	**Water Storage Tank**	**484**	**K GAL**		$953,011		$30	$3,569				$956,580
452												
453	**Water Storage Tank**	**350**	**K GAL**									
454	Tanks, Subcontract, 460K Gallon	1	EA	$560,000.00	$560,000						$560,000	$560,000
455	Tank Insulation Package	5,909	SF	$30.00	$177,280						$30	$177,280
456	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
457												
458	**Water Storage Tank**	**350**	**K GAL**		$742,905		$30	$3,569				$746,474
459												
460	**Water Intake**	**1**	**EA**									
461	Perf Pipe	40	LF	$65.00	$2,600						$65	$2,600
462	HDPE Catch Basin	1	EA	$3,000.00	$3,000						$3,000	$3,000
463	Filter Material	20	CY	$60.00	$1,200						$60	$1,200
464	Helicopter Time (Includes Mob/Demob From Nome)	40	HRS	$2,500.00	$100,000						$2,500	$100,000
465	Time	180	HRS									
466	Foreman	180	HRS			1.000	180.0	$22,470	$12.00	$1,800	$135	$24,270
467	Laborers	1,440	HRS			1.000	1,440.0	$123,034			$85	$123,034
468	Skid Steer	180	HRS			1.000	180.0	$18,472	$28.00	$5,040	$131	$23,512
469	ATV With Trailer	180	HRS			1.000	180.0	$18,472	$35.00	$6,300	$138	$24,772
470												
471	**Water Intake**	**1**	**EA**		$106,800		1,980.0	$182,448		$13,140		$302,388
472												
473												
474	**G3010 Water Utilities**	**1**	**LS**		$1,802,716		2,040.0	$189,586		$13,140		$2,005,442
475												
476												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
477												
478	**G3020 Sanitary Sewerage Utilities**											
479												
480	**Sewage Plants**	**1**	**EA**									
481	Lifewater System 5000 GPD	1	EA	$100,000.00	$100,000						$100,000	$100,000
482	Permit Cost	1	EA	$2,000.00	$2,000						$2,000	$2,000
483	Treated Timber Base	250	BF	$3.00	$750						$3	$750
484	Hardware	1	LS	$250.00	$250						$250	$250
485	4" Rigid Insulation	200	BF	$0.80	$160						$1	$160
486	Helical Anchor	4	EA	$300.00	$1,200						$300	$1,200
487	Bedding Material	17	CY	$50.00	$833						$50	$833
488	Power 3/4"C, (3)#12	30	LF	$2.00	$60						$2	$60
489	**Production 0.5 EA/DAY**	**2**	**DAYS**									
490	Time	20	HRS									
491	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
492	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
493	Electrician	10	HRS			1.000	10.0	$1,215			$122	$1,215
494	Plumber	10	HRS			1.000	10.0	$1,190	$12.50	$100	$129	$1,290
495	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
496	Operators	20	HRS			1.000	20.0	$2,052			$103	$2,052
497	Truck Drivers	10	HRS			1.000	10.0	$1,017			$102	$1,017
498	Skid Steer	20	HRS						$35.00	$700	$35	$700
499	End Dump	10	HRS						$65.00	$650	$65	$650
500												
501	**Sewage Plants**	**1**	**EA**		$105,253		110.0	$10,495		$1,650		$117,398
502												
503	**Advanced Burn Barrel, Smartash Burn Barrel**	2	EA	$4,000.00	$8,000	4.000	8.0	$780			$4,390	$8,780
504												
505	**G3020 Sanitary Sewerage Utilities**	-	-		$113,253		118.0	$11,275		$1,650		$126,178
506												
507												
508												
509												
510	**Subtotal: G30 LIQUID AND GAS SITE UTILITIES**				$1,915,969		2,158.0	$200,861		$14,790		**$2,131,620**
511												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
512												
513	**Z10 GENERAL REQUIREMENTS**											
514												
515	**Z1020 Administrative Requirements**											
516	Supervisor, 60 Hour/Week	78	WEEKS			60.000	4,680.0	$863,507			$11,071	$863,507
517	Project Expeditor, 20 Hour/Week	78	WEEKS			20.000	1,560.0	$133,286			$1,709	$133,286
518	Time Keeper/Cost Control, 40 Hour/Week	78	WEEKS			40.000	3,120.0	$157,715			$2,022	$157,715
519												
520	**Z1040 Quality Requirements**											
521	Quality Control	18	MTHS	$1,000.00	$18,000	40.000	720.0	$40,440			$3,247	$58,440
522	Test Lab Services	20	EA	$250.00	$5,000						$250	$5,000
523	Survey	1	EA	$40,000.00	$40,000						$40,000	$40,000
524												
525	**Z1050 Temporary Facilities and Controls**											
526	**Subsistence**											
527	Rental House	18	MTHS						$3,000.00	$54,000	$3,000	$54,000
528	Room & Board - Incidental	6,814	MDAY	$20.00	$136,283						$20	$136,283
529												
530	**Travel**											
531	Air Fare - Anchorage - Site	245	EA	$500.00	$122,500						$500	$122,500
532	Early Construction	4	EA									
533	Survey	6	EA									
534	Crew/Super (Trip/30 Mdays)	227	EA									
535	Inspections	8	EA									
536												
537	**Small Tools & Consumables**											
538	Consumables	1	LS	$3,900.00	$3,900						$3,900	$3,900
539	Small Tools	1	LS	$76,200.00	$76,200						$76,200	$76,200
540												
541												
542												
543												
544												
545												
546												
547												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
548												
549	**Mobilization**											
550	Mobilization - Equipment	122	TONS	$2,300.00	$280,600						$2,300	$280,600
551	Side By Sides	3,500	LBS									
552	ATV & Trailer	1,000	LBS									
553	FE Loader	42,800	LBS									
554	Excavator	47,400	LBS									
555	End Dumps (3)	78,000	LBS									
556	Skid Steer	5,000	LBS									
557	Sm Dozer	35,000	LBS									
558	Compactor	20,000	LBS									
559	Conc Mixer	1,000	LBS									
560	Misc	10,000	LBS									
561	Demobilization - Equipment	122	TONS	$1,725.00	$210,450						$1,725	$210,450
562	Surface Freight Seattle - Job Site	673	TONS	$2,300.00	$1,547,900						$2,300	$1,547,900
563	Handling Labor	122	HRS			1.000	122.3	$10,449			$85	$10,449
564												
565	Air Freight Anchorage - Job Site - Incidental	18	MTHS	$2,000.00	$36,000						$2,000	$36,000
566												
567	**Equipment**											
568	Equipment Standby and Travel Time	2	MTHS						$27,828.80	$55,658	$27,829	$55,658
569	Side By Sides	2	EA									
570	ATV & Trailer	1	EA									
571	FE Loader With Forks	1	EA									
572	Excavator	1	EA									
573	Skid Steer	1	EA									
574	Mini Excavator	1	EA									
575	Dozer D4	1	EA									
576	Compactor	1	EA									
577	End Dumps	4	EA									
578	Fuel (3/Hr Covered In Equip Rates)	36,727	GAL	$4.00	$146,907						$4	$146,907
579	Maintenance Labor 1 FTE	18	MTHS			259.800	4,676.4	$382,015			$21,223	$382,015
580												
581												
582												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
583												
584	**Temporary Facilities**	**18**	**MTHS**									
585	Project Office Trailer	18	MTHS						$1,500.00	$27,000	$1,500	$27,000
586	Office Equipment/Supplies	18	MTHS	$500.00	$9,000						$500	$9,000
587	Project Tool Sheds	18	MTHS						$200.00	$3,600	$200	$3,600
588	Project Safety Equipment	1	LS	$1,500.00	$1,500						$1,500	$1,500
589	Communications/Internet	18	MTHS	$1,000.00	$18,000						$1,000	$18,000
590												
591	**SWPPP Maintenance**											
592	Erosion Control Inspections (4H/Wk)	78	WKS			4.000	312.0	$30,415			$390	$30,415
593	Silt Fences, BMPs	20,000	LF	$5.00	$100,000	0.250	5,000.0	$427,200			$26	$527,200
594												
595	**G5010 Site Communications Systems**											
596	Record Documents	100	SHTS	$100.00	$10,000						$100	$10,000
597	Operations and Maintenance Manuals	1	LS	$25,000.00	$25,000						$25,000	$25,000
598	Contract Closeout and Training	1	LS	$15,000.00	$15,000						$15,000	$15,000
599												
600												
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615												
616												
617												
618	**Subtotal: Z10 GENERAL REQUIREMENTS**				$2,802,240		20,190.7	$2,045,027		$140,258		**$4,987,525**
619												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
620												
621	**Z70 TAXES, PERMITS, INSURANCE AND BONDS**											
622												
623	Insurance and Bond 3.0%	1	LS									$992,452
624												
625												
626												
627												
628												
629	**Subtotal: Z70 TAXES, PERMITS, INSURANCE AND BONDS**											**$992,452**
630												
631												
632	**Z90 FEES**											
633												
634	Overhead and Profit 12%	1	LS									$3,969,809
635												
636												
637												
638												
639												
640												
641	**Subtotal: Z90 FEES**											**$3,969,809**
642												
643												
644	**Z90 CONTINGENCIES**											
645												
646	**Z9050 Construction Contingencies**											
647	Estimating Contingency 10%	1	LS									$2,416,120
648	Project Contingency 15%	1	LS									$3,986,598
649	Inflation 6.5% Per Year For 3.5% Yr = 24.66%	1	LS									$7,536,756
650												
651												
652												
653												
654												
655	**Subtotal: Z90 CONTINGENCIES**											**$13,939,474**
656												

APPENDIX 11:
CAPITAL COSTS

Little Diomede Ph II 1st Water & Sewer Services

Alternate 4 - Piped Wastewater and Satellite Delivery Stations

Little Diomede, Alaska

Construction Cost Estimate

95% ePER Submittal

October 16, 2023

ESTIMATIONS
1225 E. International Airport Road, Suite 235
Anchorage, Alaska 99518
907.561.0790

Prepared for:

DOWL
5015 Business Park Boulevard, #4000
Anchorage, Alaska 99503
907.562.2000

Little Diomede Ph II 1st Water & Sewer Services | **Construction Cost Estimate**

Alternate 4 - Piped Wastewater and Satellite Delivery Stations | **95% ePER Submittal**

Prepared for DOWL by Estimations | **October 16, 2023**

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 4 - Piped Wastewater and Satellite Delivery Stations
Estimate Date:	October 16, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

SCOPE OF WORK

Alternate 4 - Satellite System Delivery And Gravity Sewer Collection

Water Treatment Paln Equipment Renovation with Seawater Source	EA	1
Surface Water Source Intake Improvement	EA	1
Wave runup Fortification (Riprap)	LF	100
Replace Existing WST 424, 000 Gallons	EA	1.00
Satellite Station Buildings with retractable hose	EA	3
Water Mains	LF	750
Residential Storage Tank	EA	33
WW Service Lines	EA	33
In-Home Plumbing	EA	33
Residential Lift Stations	EA	3
Washeteria Updates	EA	1
Gravity Sewer Main	LF	1,500
Lifewater Wastewater Treatment Plant	EA	1
Lift Station and Utilidor to Vault	LF	960
Septage Vault	EA	1
Archaeological Monitor	day	

Notes on the Estimate

Little Diomede Ph II 1st Water & Sewer Services | **Construction Cost Estimate**

Alternate 4 - Piped Wastewater and Satellite Delivery Stations | **95% ePER Submittal**

Prepared for DOWL by Estimations | **October 16, 2023**

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 4 - Piped Wastewater and Satellite Delivery Stations
Estimate Date:	October 16, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

DOCUMENTS

95% ePER Submittal

SOURCE OF COST DATA:

Estimations Internal cost database

Vendor Quote

Labor based on State of Alaska Title 36 Wages 04/2023.

BABA Compliance not Required.

ESTIMATE ASSUMPTIONS:

Summer 2025 Construction

Design Bid Build

Time on Site 20 MTHS of Construction over 4 Years

Notes on the Estimate

Little Diomede Ph II 1st Water & Sewer Services

Alternate 4 - Piped Wastewater and Satellite Delivery Stations
Prepared for DOWL by Estimations

Construction Cost Estimate

95% ePER Submittal
October 16, 2023

Description	Material	Labor	Hours	Equipment	Estimated Cost
0 OWNER COSTS	**$3,834,800**	**$1,917,400**	**19,668.90**	**$0**	**$5,752,200**
20 OWNER DEVELOPMENT	$3,834,800	$0	-	$0	$3,834,800
30 PROCUREMENT REQUIREMENTS	$0	$1,917,400	19,668.90	$0	$1,917,400
A SUBSTRUCTURE	**$508,893**	**$221,993**	**2,241.60**	**$47,101**	**$777,987**
A10 FOUNDATIONS	$508,893	$221,993	2,241.60	$47,101	$777,987
B SHELL	**$146,677**	**$120,745**	**$1,169**	**$375**	**$267,797**
B10 SUPERSTRUCTURE	$29,076	$48,636	498.90	$375	$78,087
B20 EXTERIOR VERTICAL ENCLOSURES	$112,399	$67,859	626.70	$0	$180,258
B30 EXTERIOR HORIZONTAL ENCLOSURES	$5,202	$4,250	43.60	$0	$9,452
C INTERIORS	**$95,562**	**$223,588**	**2,259.10**	**$0**	**$319,150**
C10 INTERIOR CONSTRUCTION	$66,528	$157,043	1,600.60	$0	$223,571
C20 INTERIOR FINISHES	$29,034	$66,545	658.50	$0	$95,579
D SERVICES	**$738,408**	**$926,429**	**7,939.50**	**$0**	**$1,664,837**
D20 PLUMBING	$539,873	$580,801	5,082.60	$0	$1,120,674
D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	$18,496	$29,723	256.00	$0	$48,219
D50 ELECTRICAL	$180,039	$315,905	2,600.90	$0	$495,944

Little Diomede Ph II 1st Water & Sewer Services

Construction Cost Estimate

Alternate 4 - Piped Wastewater and Satellite Delivery Stations

95% ePER Submittal

Prepared for DOWL by Estimations

October 16, 2023

Description	Material	Labor	Hours	Equipment	Estimated Cost
E EQUIPMENT AND FURNISHINGS	**$181,500**	**$16,085**	**165.00**	**$0**	**$197,585**
E10 EQUIPMENT	$0	$0	-	$0	$0
E20 FURNISHINGS	$181,500	$16,085	165.00	$0	$197,585
F SPECIAL CONSTRUCTION AND DEMOLITION	**$1,066,338**	**$943,580**	**9,838.30**	**$30,323**	**$2,040,241**
F10 SPECIAL CONSTRUCTION	$750,000	$750,002	7,693.60	$0	$1,500,002
F30 DEMOLITION	$316,338	$193,578	2,144.70	$30,323	$540,239
G SITEWORK	**$3,372,471**	**$1,345,308**	**14,687.80**	**$477,740**	**$5,195,519**
G10 SITE PREPARATION	$83,666	$41,161	401.10	$40,188	$165,015
G20 SITE IMPROVEMENTS	$154,308	$156,442	1,586.00	$187,623	$498,373
G30 LIQUID AND GAS SITE UTILITIES	$3,134,497	$1,147,705	12,700.70	$249,929	$4,532,131
Z GENERAL	**$3,619,887**	**$2,228,696**	**21,906.40**	**$149,658**	**$27,884,907**
Z10 GENERAL REQUIREMENTS	$3,619,887	$2,228,696	21,906.40	$149,658	$5,998,241
Z70 TAXES, PERMITS, INSURANCE AND BONDS	$0	$0	-	$0	$1,150,441
Z90 FEES	$0	$0	-	$0	$4,601,763
Z90 CONTINGENCIES	$0	$0	-	$0	$16,134,463
TOTAL ESTIMATED COST	**$13,564,536**	**$7,943,824**	**$79,876**	**$705,197**	**$44,100,223**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1	**20 OWNER DEVELOPMENT**											
2												
3	**2010 Site Acquisition**											
4	Not Included											
5												
6	**2020 Permits**		**NONE**									
7												
8	**2030 Professional Services**											
9	Design Fees 10% Of Construction	1	LS	$3,834,800.00	$3,834,800						$3,834,800	$3,834,800
10												
11												
12												
13												
14												
15												
16												
17	**Subtotal: 20 OWNER DEVELOPMENT**				$3,834,800							**$3,834,800**
18												
19												
20	**30 PROCUREMENT REQUIREMENTS**											
21												
22	**3010 Project Delivery**											
23	Construction Management 5% Of Construction	1	LS			19,668.914	19,668.9	$1,917,400			$1,917,400	$1,917,400
24												
25												
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36	**Subtotal: 30 PROCUREMENT REQUIREMENTS**						19,668.9	$1,917,400				**$1,917,400**
37												

Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
A10 FOUNDATIONS											
A1020 Special Foundations											
Satellite Station Building Foundation	**3**	**EA**									
Post and Pad	27	EA	$172.00	$4,644	6.000	162.0	$19,004			$876	$23,648
Subtotal	**3**	**EA**		$4,644		162.0	$19,004				$23,648
WST Foundations	**2**	**EA**									
Insulated Concrete Precast	1,600	SF	$40.00	$64,000	0.032	51.2	$5,254	$9.08	$14,525	$52	$83,779
AWW Mud Sills 4x12 @ 2'oc	1,644	LF	$8.00	$13,152	0.114	187.4	$18,268	$1.00	$1,644	$20	$33,064
AWW 8x12	1,488	LF	$40.00	$59,520	0.343	510.4	$49,756	$4.00	$5,952	$77	$115,228
AWW Plywood 5/8	2,880	SF	$1.25	$3,600	0.019	54.7	$5,332			$3	$8,932
Hardware	2	SETS	$2,000.00	$4,000						$2,000	$4,000
Insulation XPS, High Compression 2"	235,008	BF	$0.90	$211,507	0.003	705.0	$68,726			$1	$280,233
Concrete	36	CY	$1,800.00	$64,800	8.000	288.0	$28,075	$350.00	$12,600	$2,930	$105,475
Grade Ring	239	LF	$266.67	$63,670	1.185	282.9	$27,578	$51.85	$12,380	$434	$103,628
Misc	2	EA	$10,000.00	$20,000						$10,000	$20,000
WST Foundations	**2**	**EA**		$504,249		2,079.6	$202,989		$47,101		$754,339
Subtotal: A10 FOUNDATIONS				$508,893		2,241.6	$221,993		$47,101		**$777,987**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
75												
76	**B10 SUPERSTRUCTURE**											
77												
78	**B1010 Floor Construction**											
79												
80	**Satellite Station Building Foundation**	**3**	**EA**									
81	**AREA**	**120**	**SF/EA**									
82	Glulam Beams	928	BF	$6.00	$5,569	0.021	19.5	$1,901	$0.15	$139	$8	$7,609
83	Joist	360	LF	$12.00	$4,320	0.050	18.0	$1,755			$17	$6,075
84	1.5" Metal Decking	360	SF	$6.00	$2,160	0.021	7.6	$741			$8	$2,901
85	Pea Gravel Fill at Flutes	1	CY	$100.00	$93	0.100	0.1	$10	$3.00	$3	$114	$106
86	4" Rigid High Density Insulation Board	1,440	BF	$0.90	$1,296	0.004	5.8	$565			$1	$1,861
87	6" Dura-Base Composite Mat	360	SF	$5.00	$1,800	0.021	7.6	$741			$7	$2,541
88	Concrete Slab 6"	360	SF	$3.89	$1,400	0.037	13.3	$1,297	$0.65	$233	$8	$2,930
89												
90	**Subtotal**	**3**	**EA**		$16,638		71.9	$7,010		$375		$24,023
91												
92	**B1020 Roof Construction**											
93												
94	**Satellite Station Building 3 Ea**	**360**	**SF**									
95	GLB 6x36	44	LF	$117.00	$5,148	9.000	396.0	$38,604			$994	$43,752
96	Column	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
97	SIPs Panels	360	SF	$14.00	$5,040	0.071	25.6	$2,496			$21	$7,536
98												
99	**Subtotal**	**360**	**SF**		$12,438		427.0	$41,626				$54,064
100												
101												
102												
103												
104												
105												
106												
107												
108												
109												
110	**Subtotal: B10 SUPERSTRUCTURE**				$29,076		498.9	$48,636		$375		**$78,087**
111												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
112												
113	**B20 EXTERIOR VERTICAL ENCLOSURES**											
114												
115	**B2010 Exterior Walls**											
116												
117	**Satellite Station Building 3 Ea**	**2,112**	**SF**									
118	SIPs Panels	2,112	SF	$14.00	$29,568	0.071	150.0	$14,623			$21	$44,191
119	Weather Barrier	2,112	SF	$1.80	$3,802	0.009	19.0	$1,852			$3	$5,654
120	Siding	2,112	SF	$18.00	$38,016	0.086	181.6	$23,105			$29	$61,121
121	Furring	3	EA	$1,125.00	$3,375	2.679	8.0	$780			$1,385	$4,155
122	Vapor Retarder	2,112	SF	$0.50	$1,056	0.006	12.7	$1,238			$1	$2,294
123	GWB	2,112	SF	$0.78	$1,647	0.034	71.8	$8,363			$5	$10,010
124	FRP Panels	2,112	SF	$5.00	$10,560	0.057	120.4	$11,737			$11	$22,297
125	Exterior Door, Single	3	EA	$2,850.00	$8,550	7.000	21.0	$2,047			$3,532	$10,597
126	Windows	211	SF	$75.00	$15,825	0.200	42.2	$4,114			$94	$19,939
127												
128	**Subtotal**	**2,112**	**SF**		$112,399		626.7	$67,859				$180,258
129												
130												
131	**Subtotal: B20 EXTERIOR VERTICAL ENCLOSURES**				$112,399		626.7	$67,859				**$180,258**
132												
133												
134	**B30 EXTERIOR HORIZONTAL ENCLOSURES**											
135												
136	**B3010 Roofing**											
137												
138	**Satellite Station Building 3 Ea**	**360**	**SF**									
139	SAM Vapor Barrier	360	SF	$1.15	$414	0.009	3.2	$312			$2	$726
140	Metal Roofing	360	SF	$10.00	$3,600	0.086	31.0	$3,022			$18	$6,622
141	Flashing	132	LF	$9.00	$1,188	0.071	9.4	$916			$16	$2,104
142												
143	**Subtotal**	**360**	**SF**		$5,202		43.6	$4,250				$9,452
144												
145												
146												
147	**Subtotal: B30 EXTERIOR HORIZONTAL ENCLOSURES**				$5,202		43.6	$4,250				**$9,452**
148												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
149												
150	**C10 INTERIOR CONSTRUCTION**											
151												
152	**C1010 Interior Partitions**											
153												
154	**Residential Improvement**	**33**	**HOMES**									
155	2x Wood Framing & Hardware Allowance For Repairs	1,073	BF	$2.00	$2,145	0.057	61.1	$5,956			$8	$8,101
156	5/8" GWB Allowance For Repairs	1,238	SF	$0.72	$891	0.043	53.2	$6,197			$6	$7,088
157												
158	**Subtotal**	**33**	**HOMES**		$3,036		114.3	$12,153				$15,189
159												
160	**C1030 Interior Doors**											
161												
162	**Residential Improvement**	**33**	**HOMES**									
163	Wall Framing Modifications	33	EA	$50.00	$1,650	4.000	132.0	$12,868			$440	$14,518
164	Prehung Wood Flush Door & Frame 3x7	33	EA	$500.00	$16,500	4.000	132.0	$12,868			$890	$29,368
165	Privacy Lockset	33	EA	$150.00	$4,950	2.000	66.0	$6,434			$345	$11,384
166	Door Casing Trim	1,122	LF	$5.00	$5,610	0.071	79.7	$7,769			$12	$13,379
167												
168	**Subtotal**	**33**	**HOMES**		$28,710		409.7	$39,939				$68,649
169												
170	**C1060 Raised Floor Construction**											
171												
172	**Residential Improvement**	**33**	**HOMES**									
173	**Bathtub Platform Construction**											
174	Framed Curb @ 16" O.C.	990	BF	$3.00	$2,970	0.071	70.3	$6,853			$10	$9,823
175	3/4" Plywood Subfloor	1,056	SF	$2.00	$2,112	0.043	45.4	$4,426			$6	$6,538
176												
177	**Subtotal**	**33**	**HOMES**		$5,082		115.7	$11,279				$16,361
178												
179												
180												
181												
182												
183												

			Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
C1070 Suspended Ceiling Construction											
Residential Improvement	**33**	**HOMES**									
Bathroom Exhaust Fan Soffit											
Framing	3,960	BF	$3.00	$11,880	0.114	451.4	$44,004			$14	$55,884
Soffit Paneling	2,640	SF	$3.00	$7,920	0.143	377.5	$36,800			$17	$44,720
Subtotal	**33**	**HOMES**		$19,800		828.9	$80,804				$100,604
C1090 Interior Specialties											
Residential Improvement	**33**	**HOMES**									
Bathroom Accessories	33	SET	$300.00	$9,900	4.000	132.0	$12,868			$690	$22,768
Subtotal	**33**	**SET**		$9,900		132.0	$12,868				$22,768
Subtotal: C10 INTERIOR CONSTRUCTION				$66,528		1,600.6	$157,043				$223,571

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
220												
221	**C20 INTERIOR FINISHES**											
222												
223	**C2010 Wall Finishes**											
224												
225	**Residential Improvement**	**33**	**HOMES**									
226	Patching & Painting	3,300	SF	$1.20	$3,960	0.043	141.9	$15,009			$6	$18,969
227												
228	**Subtotal**	**3,300**	**SF**		$3,960		141.9	$15,009				$18,969
229												
230	**C2030 Flooring**											
231												
232	**Residential Improvement**	**33**	**HOMES**									
233	3/8" Underlayment	2,640	SF	$1.25	$3,300	0.043	113.5	$11,064			$5	$14,364
234	Sheet Vinyl Flooring	2,640	SF	$7.00	$18,480	0.071	187.4	$18,268			$14	$36,748
235	Rubber Base	1,188	LF	$1.50	$1,782	0.057	67.7	$6,600			$7	$8,382
236												
237	**Subtotal**	**33**	**HOMES**		$23,562		368.6	$35,932				$59,494
238												
239	**Satellite Station Building 3 Ea**	**360**	**SF**									
240	Sealed Concrete	360	SF	$0.35	$126	0.017	6.1	$595			$2	$721
241												
242	**Subtotal**	**360**	**SF**		$126		6.1	$595				$721
243												
244	**C2050 Ceiling Finishes**											
245												
246	**Residential Improvement**	**33**	**HOMES**									
247	Ceiling Paint Allowance @ Fan Soffit	3,300	SF	$0.42	$1,386	0.043	141.9	$15,009			$5	$16,395
248												
249	**Subtotal**	**33**	**HOMES**		$1,386		141.9	$15,009				$16,395
250												
251												
252												
253												
254												
255	**Subtotal: C20 INTERIOR FINISHES**				$29,034		658.5	$66,545				$95,579
256												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
257												
258	**D20 PLUMBING**											
259												
260	**D2010 Domestic Water Distribution**											
261												
262	**Residential Improvement**	**33**	**HOMES**									
263	**Plumbing Fixtures**											
264	Water Closet	33	EA	$625.00	$20,625	2.000	66.0	$7,851			$863	$28,476
265	Lavatory, Counter Mounted	33	EA	$375.00	$12,375	2.000	66.0	$7,851			$613	$20,226
266	Kitchen Sink	33	EA	$812.50	$26,813	5.000	165.0	$19,628			$1,407	$46,441
267	Bath/Shower Combo	33	EA	$1,875.00	$61,875	12.000	396.0	$47,106			$3,302	$108,981
268												
269	**Specialties**											
270	Oil Fired Hot Water Heater	33	EA	$3,125.00	$103,125	16.000	528.0	$62,809			$5,028	$165,934
271	Vent Kit	33	EA	$593.75	$19,594	8.000	264.0	$31,404			$1,545	$50,998
272	Drip Pan	33	EA	$187.50	$6,188	0.250	8.3	$987			$217	$7,175
273												
274	**Water Service Equipment**											
275	Well Circ Pump	33	EA	$500.00	$16,500	6.000	198.0	$23,553			$1,214	$40,053
276	Drain Valve	99	EA	$18.75	$1,856	0.500	49.5	$5,888			$78	$7,744
277	Isolation Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
278	Expansion Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
279	P-Gauge	33	EA	$18.75	$619	0.500	16.5	$1,963			$78	$2,582
280	Water Storage Tank 100 Gal With Appurtences	33	EA	$750.00	$24,750	8.000	264.0	$31,404			$1,702	$56,154
281	Pressure Tank	33	EA	$1,000.00	$33,000	4.000	132.0	$15,702			$1,476	$48,702
282	Fitting & Accessories	33	EA	$625.00	$20,625	12.000	396.0	$47,106			$2,052	$67,731
283	Water Treatment Equipment Unit Allowance	33	EA	$2,500.00	$82,500	12.000	396.0	$47,106			$3,927	$129,606
284												
285												
286												
287												
288												
289												
290												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
291												
292	**Facility Water Distribution Piping**											
293	Domestic HW/CW Supply, Type L Copper											
294	3/4" Pipe	330	LF	$4.65	$1,535	0.100	33.0	$3,926			$17	$5,461
295	Hangers	66	EA	$8.75	$578	0.143	9.4	$1,118			$26	$1,696
296	Fittings	1	LS	$1,439.06	$1,439	49.500	49.5	$5,888			$7,327	$7,327
297	Domestic HW/CW Supply, PEX											
298	1/2" Pipe	660	LF	$1.56	$1,030	0.050	33.0	$3,926			$8	$4,956
299	3/4" Pipe	495	LF	$1.88	$931	0.050	24.8	$2,950			$8	$3,881
300	1" Pipe	330	LF	$2.19	$723	0.050	16.5	$1,963			$8	$2,686
301	Hangers	371	EA	$6.25	$2,319	0.150	55.7	$6,626			$24	$8,945
302	Fittings	1	LS	$1,258.13	$1,258	55.725	55.7	$6,626			$7,884	$7,884
303	Sterilization & Pressure Test	33	EA	$62.50	$2,063	4.000	132.0	$15,702			$538	$17,765
304	Water Connection Boxes	33	EA	$350.00	$11,550	12.000	396.0	$38,604			$1,520	$50,154
305												
306	**Subtotal**	**33**	**EA**		$459,647		3,816.9	$445,539				$905,186
307												
308	**Satellite Buildings**	**3**	**EA**									
309	**Water Service Equipment**											
310	100' Hose	3	EA	$62.50	$188	6.943	20.8	$2,474			$887	$2,662
311	Valving	3	EA	$31.25	$94	0.500	1.5	$178			$91	$272
312	Water Meter	3	EA	$312.50	$938	2.000	6.0	$714			$551	$1,652
313												
314	**Facility Water Distribution Piping**											
315	Domestic HW/CW Supply, Type L Copper											
316	3/4" Pipe	30	LF	$4.65	$140	0.100	3.0	$357			$17	$497
317	Hangers	6	EA	$8.75	$53	0.143	0.9	$107			$27	$160
318	Fittings	1	LS	$131.25	$131	4.500	4.5	$535			$666	$666
319	Sterilization & Pressure Test	3	EA	$62.50	$188	4.000	12.0	$1,427			$538	$1,615
320	Water Connection Boxes	3	EA	$350.00	$1,050	12.000	36.0	$3,509			$1,520	$4,559
321												
322	**Subtotal**	**3**	**EA**		$2,782		84.7	$9,301				$12,083
323												
324												
325												
326												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
327												
328	**D2020 Sanitary Drainage**											
329												
330	**Residential Improvement**	**33**	**HOMES**									
331	**Facility Sanitary Sewage Piping**											
332	Above Grade ABS											
333	1-1/2" Pipe	330	LF	$2.14	$706	0.089	29.4	$3,497			$13	$4,203
334	2" Pipe	495	LF	$2.97	$1,470	0.060	29.7	$3,533			$10	$5,003
335	3" Pipe	330	LF	$5.63	$1,858	0.070	23.1	$2,748			$14	$4,606
336	Hangers	193	EA	$8.75	$1,689	0.250	48.3	$5,746			$39	$7,435
337	Fittings	1	LS	$6,051.00	$6,051	110.003	110.0	$13,085			$19,136	$19,136
338	Valve Allowance	33	EA	$15.00	$495	0.500	16.5	$1,608			$64	$2,103
339	Vent Thru Roof, 3"	33	EA	$125.00	$4,125	8.000	264.0	$31,404			$1,077	$35,529
340	Water Connection Boxes	33	EA	$350.00	$11,550	12.000	396.0	$38,604			$1,520	$50,154
341	Sewer Storage Tank 500 Gal	33	EA	$1,500.00	$49,500	8.000	264.0	$25,736			$2,280	$75,236
342												
343	**Subtotal**	**33**	**HOMES**		$77,444		1,181.0	$125,961				$203,405
344												
345												
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360												
361												
362	**Subtotal: D20 PLUMBING**				$539,873		5,082.6	$580,801				$1,120,674
363												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
365	**D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC**											
367	**D3010 Facility Fuel Systems**											
369	**Residential Improvement**	**33**	**EA**									
370	Fuel Filter Kit	33	EA	$112.50	$3,713	2.000	66.0	$7,851			$350	$11,564
371	Fuel Line & Fittings	33	EA	$187.50	$6,188	4.000	132.0	$15,702			$663	$21,890
373	**Subtotal**	**33**	**EA**		$9,901		198.0	$23,553				$33,454
375	**Satellite Bldg**	**3**	**EA**									
376	Electric Heat	3	EA	$1,875.00	$5,625	8.000	24.0	$2,855			$2,827	$8,480
378	**Subtotal**	**3**	**EA**		$5,625		24.0	$2,855				$8,480
380	**D3060 Ventilation**											
382	**Residential Improvement**	**33**	**EA**									
383	Exhaust Fan	10	EA	$250.00	$2,500	2.000	20.0	$1,950			$445	$4,450
384	4" Duct	40	LF	$3.00	$120	0.100	4.0	$390			$13	$510
385	Ext. Wall Hood W/ Damper & Screen	10	EA	$35.00	$350	1.000	10.0	$975			$133	$1,325
387	**Subtotal**	**33**	**EA**		$2,970		34.0	$3,315				$6,285
399	**Subtotal: D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**				$18,496		256.0	$29,723				$48,219

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
401												
402	**D50 ELECTRICAL**											
403												
404	**D5020 Electrical Service and Distribution**											
405												
406	**Residential Improvement**	**33**	**EA**									
407	**Services**	**33**	**EA**									
408	Service Upgrade Allowances - Panels, Ground & Feeds	33	EA	$3,125.00	$103,125	24.000	792.0	$96,196			$6,040	$199,321
409												
410	**Subtotal**	**33**	**EA**		$103,125		792.0	$96,196				$199,321
411												
412	**Satellite Bldg**	**3**	**EA**									
413	**Services**	**3**	**EA**									
414	Service To Satellite Bldgs	3	EA	$3,750.00	$11,250	24.000	72.0	$8,745			$6,665	$19,995
415												
416	**Subtotal**	**3**	**EA**		$11,250		72.0	$8,745				$19,995
417												
418	**D5030 General Purpose Electrical Power**											
419												
420	**Residential Improvement**	**33**	**EA**									
421	**Power Circuits**	**264**	**EA**									
422	Bathroom Exhaust Fan, Light, Recept	33	EA									
423	Circulation Pump	33	EA									
424	Heat Trace Well Line x2	33	EA									
425	Lift Station x2	33	EA									
426	Well Pump	33	EA									
427	Heat Trace Emergency Well Line	33	EA									
428	Heat Trace Well x2	33	EA									
429	Water Treatment	33	EA									
430	J-Boxes	264	EA	$12.50	$3,300	0.314	82.9	$10,069			$51	$13,369
431	Wiring: 1/2"C, (2)#12, (1)#12	5,280	LF	$3.13	$16,526	0.114	601.9	$73,107			$17	$89,633
432	Wiring: 1/2"C, (3)#12, (1)#12	3,960	LF	$3.44	$13,622	0.114	451.4	$54,827			$17	$68,449
433	Wiring: 1/2"C, (3)#10, (1)#10	1,650	LF	$4.06	$6,699	0.114	188.1	$22,847			$18	$29,546
434												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
435												
436	Pilot Switches	165	EA	$43.75	$7,219	0.500	82.5	$10,020			$104	$17,239
437	Switches	66	EA	$43.75	$2,888	0.500	33.0	$4,008			$104	$6,896
438	Outlets, GFCI	33	EA	$25.00	$825	0.500	16.5	$2,004			$86	$2,829
439	Outlet, Duplex	132	EA	$6.25	$825	0.500	66.0	$8,016			$67	$8,841
440												
441	**Subtotal**	**264**	**EA**		$51,904		1,522.3	$184,898				$236,802
442												
443	**Satellite Bldg**	**3**	**EA**									
444	**Power Circuits**	**15**	**EA**									
445	Receptacles 20A	12	EA	$6.25	$75	0.500	6.0	$729			$67	$804
446	Receptacles GFCI WP	3	EA	$57.50	$173	0.500	1.5	$182			$118	$355
447	J-Boxes	15	EA	$12.50	$188	0.314	4.7	$571			$51	$759
448	Wiring: 1/2"C, (2)#12, (1)#12	450	LF	$3.13	$1,409	0.114	51.3	$6,231			$17	$7,640
449												
450	**Subtotal**	**3**	**EA**		$1,845		63.5	$7,713				$9,558
451												
452	**D5040 Lighting**											
453												
454	**Residential Improvement**	**33**	**HOMES**									
455	**Interior Lighting**	**33**	**EA**									
456	Vanity Light	10	EA	$112.50	$1,125	1.000	10.0	$1,215			$234	$2,340
457	J-Boxes	10	EA	$8.75	$88	0.314	3.1	$377			$47	$465
458	Switch	10	EA	$17.50	$175	0.500	5.0	$607			$78	$782
459	Wiring: 1/2"C, (2)#12, (1)#12	350	LF	$3.13	$1,096	0.114	39.9	$4,846			$17	$5,942
460												
461	**Subtotal**	**33**	**EA**		$2,484		58.0	$7,045				$9,529
462												
463												
464												
465												
466												
467												
468												
469												
470												
471												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
472												
473	**Satellite Bldg**	**3**	**EA**									
474	LED Lights Interior	12	EA	$500.00	$6,000	2.000	24.0	$2,915			$743	$8,915
475	LED Lights Exterior	3	EA	$562.50	$1,688	2.000	6.0	$729			$806	$2,417
476	Switch	3	EA	$17.50	$53	0.500	1.5	$182			$78	$235
477	Wiring: 1/2"C, (2)#12, (1)#12	540	LF	$3.13	$1,690	0.114	61.6	$7,482			$17	$9,172
478												
479	**Subtotal**	**3**	**EA**		$9,431		93.1	$11,308				$20,739
480												
481												
482												
483												
484	**Subtotal: D50 ELECTRICAL**				$180,039		2,600.9	$315,905				$495,944
485												
486												
487	**E10 EQUIPMENT**		**NONE**									
488												
489												
490												
491	**Subtotal: E10 EQUIPMENT**											
492												
493												
494	**E20 FURNISHINGS**											
495												
496	**E2010 Fixed Furnishings**	**33**	**EA**									
497												
498	**Residential Improvement**	**33**	**HOMES**									
499	Base Cabinet, Countertop & Backsplash	330	LF	$550.00	$181,500	0.500	165.0	$16,085			$599	$197,585
500												
501	**Subtotal**	**33**	**HOMES**		$181,500		165.0	$16,085				$197,585
502												
503												
504												
505												
506	**Subtotal: E20 FURNISHINGS**				$181,500		165.0	$16,085				$197,585
507												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
508												
509	**F10 SPECIAL CONSTRUCTION**	**1**	**EA**									
510												
511	**Washeteria Upgrades**	**1**	**EA**									
512	Budget	1	LS	$750,000.00	$750,000	7,693.583	7,693.6	$750,002			$1,500,002	$1,500,002
513												
514	**Subtotal**	**1**	**EA**		$750,000		7,693.6	$750,002				$1,500,002
515												
516												
517												
518												
519												
520	**Subtotal: F10 SPECIAL CONSTRUCTION**				$750,000		7,693.6	$750,002				$1,500,002
521												
522												
523	**F30 DEMOLITION**											
524												
525	**F3010 Structure Demolition**	**1**	**EA**									
526												
527	**Demo 424 K GAL Storage Tank**	**1**	**EA**									
528	Demo Tank Insulation	5,909	SF			0.100	590.9	$50,486			$9	$50,486
529	Demo Top and Framing	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
530	Demo Walls	4,775	SF			0.100	477.5	$40,798	$2.00	$9,550	$11	$50,348
531	Demo Base Plate	1,134	SF			0.100	113.4	$9,689	$2.00	$2,268	$11	$11,957
532	Demo Fdn System Wood and Steel Deck	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
533	Demo Concrete	716	SF			0.050	35.8	$3,674	$2.00	$1,433	$7	$5,107
534	Ship Out Waste - Insulation	35,456	SF	$2.59	$91,831	0.001	35.5	$3,033			$3	$94,864
535	Ship Out Waste - Foundation	54,438	LBS	$0.86	$46,816	0.001	54.4	$4,648			$1	$51,464
536	Ship Out Waste - Steel	93,594	LBS	$0.86	$80,491	0.001	93.6	$7,997			$1	$88,488
537	Concrete Dispose On Site											
538												
539	**Subtotal**	**1**	**EA**		$219,138		1,854.7	$159,081		$22,323		$400,542
540												
541												
542												
543												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
544												
545	**F3030 Selective Demolition**	**1**	**EA**									
546												
547	**Remove Existing Treatment Equipment**	**1**	**EA**									
548	Demo WTP	2,000	SF			0.100	200.0	$23,791	$5.00	$8,000	$16	$31,791
549	Ship Out Waste	90,000	LBS	$1.08	$97,200	0.001	90.0	$10,706			$1	$107,906
550												
551	**Subtotal**	**1**	**EA**		$97,200		290.0	$34,497		$8,000		$139,697
552												
553												
554	**Subtotal: F30 DEMOLITION**				$316,338		2,144.7	$193,578		$30,323		$540,239
555												
556												
557	**G10 SITE PREPARATION**											
558												
559	**G1010 Site Clearing**	**5,000**	**SF**	$0.46	$2,300						$0	$2,300
560												
561	**G1070 Site Earthwork**											
562	**Runoff Basin**	**50**	**LF**									
563	Excavation 4'	89	CY			0.200	17.8	$1,827	$10.50	$933	$31	$2,760
564	Fill - Subbase B	171	CY	$116.00	$19,797	0.200	34.1	$3,499	$10.50	$1,792	$147	$25,088
565	Concrete Apron	1,000	SF	$8.68	$8,680	0.127	127.0	$13,033	$1.30	$1,296	$23	$23,009
566	Grout Boulders	1	LS	$10,000.00	$10,000						$10,000	$10,000
567												
568	**Runoff Basin**	**50**	**LF**		$40,777		178.9	$18,359		$4,021		$63,157
569												
570	**Raise Beach WST Foundation**	**1**	**EA**									
571	Fill - Subbase B	111	CY	$116.00	$12,889	0.200	22.2	$2,278	$10.50	$1,167	$147	$16,334
572	Rip Rap 50' Of Armoring	200	CY	$150.00	$30,000	1.000	200.0	$20,524	$175.00	$35,000	$428	$85,524
573												
574	**Raise Beach WST Foundation**	**1**	**EA**		$42,889		222.2	$22,802		$36,167		$101,858
575												
576												
577												
578	**Subtotal: G10 SITE PREPARATION**				$83,666		401.1	$41,161		$40,188		$165,015
579												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
580												
581	**G20 SITE IMPROVEMENTS**											
582												
583	**G2060 Site Development**	**1**	**LS**									
584												
585	**Heavy Duty Snow Fence**	**200**	**LF**									
586	Helical Foundations at 10	21	EA	$300.00	$6,300	6.000	126.0	$10,765	$250.00	$5,250	$1,063	$22,315
587	Steel Post	21	EA	$75.00	$1,575	1.000	21.0	$1,794			$160	$3,369
588		800	BF	$1.75	$1,400	0.019	15.2	$1,299			$3	$2,699
	Runners, 2x6 Treated Double Top/Bot											
589	2x6 Pickets 6'H	2,400	BF	$1.75	$4,200	0.019	45.6	$3,896			$3	$8,096
590												
591	**Heavy Duty Snow Fence**	**200**	**LF**		$13,475		207.8	$17,754		$5,250		$36,479
592												
593	**Rip Rap Protection**	**100**	**LF**									
594	Imported Rock From Nome	400	CY	$150.00	$60,000						$150	$60,000
595	Filter Stone Import From Nome	533	CY	$100.00	$53,333						$100	$53,333
596	Haul Rock From Beach	933	CY			0.100	93.3	$9,574	$6.00	$5,600	$16	$15,174
597	Place Filter Rock	533	CY			1.000	533.3	$54,727	$175.00	$93,333	$278	$148,060
598	Place Rip Rap	400	CY			1.000	400.0	$41,048	$175.00	$70,000	$278	$111,048
599	Geofabric	1,200	BF	$1.75	$2,100	0.019	22.8	$1,948			$3	$4,048
600												
601	**Rip Rap Protection**	**100**	**LF**		$115,433		1,049.4	$107,297		$168,933		$391,663
602												
603	**Road To Beach**	**200**	**LF**									
604	Borrow	640	CY	$20.00	$12,800						$20	$12,800
605	Haul	640	CY			0.100	64.0	$6,568	$6.00	$3,840	$16	$10,408
606	Place Borrow	640	CY			0.200	128.0	$13,135	$15.00	$9,600	$36	$22,735
607	Geofabric	7,200	SF	$1.75	$12,600	0.019	136.8	$11,688			$3	$24,288
608												
609	**Road To Beach**	**200**	**LF**		$25,400		328.8	$31,391		$13,440		$70,231
610												
611												
612												
613	**Subtotal: G20 SITE IMPROVEMENTS**				$154,308		1,586.0	$156,442		$187,623		$498,373
614												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
615												
616	**G30 LIQUID AND GAS SITE UTILITIES**											
617												
618	**G3010 Water Utilities**											
619												
620	**Water Main 4"**	**750**	**LF**									
621	Arctic Pipe 4x12 (5% Extra)	788	LF	$80.00	$63,040						$80	$63,040
622	AP Fitting Allowance	8	EA	$1,500.00	$12,000						$1,500	$12,000
623	Bedding Material	250	CY	$30.00	$7,500						$30	$7,500
624	**Production Rate**	**100**	**LF/DAY**									
625	Time	80	HRS									
626	Foreman	80	HRS			1.000	80.0	$9,987	$12.00	$800	$135	$10,787
627	Laborers	80	HRS			1.000	80.0	$6,835			$85	$6,835
628	Local Labor	80	HRS			1.000	80.0	$3,260			$41	$3,260
629	Skid Steer	80	HRS			1.000	80.0	$8,210	$28.00	$2,240	$131	$10,450
630	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Sewer 50%**	**8**	**EA**									
631	Micro Pilings	16	EA	$400.00	$6,400						$400	$6,400
632	Cross Beam	560	LBS	$3.00	$1,680						$3	$1,680
633	Pipe Supports (2 Per Pier)	16	EA	$35.00	$560						$35	$560
634												
635	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**5**	**EA/DAY**									
636	Time	20	HRS									
637	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
638	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
639	Local Labor	40	HRS			1.000	40.0	$1,630			$41	$1,630
640	Track Or Manual Drilling	20	HRS			2.000	40.0	$4,105	$175.00	$3,500	$380	$7,605
641	Skid Steer	20	HRS			1.000	20.0	$2,052	$28.00	$560	$131	$2,612
642												
643	**Water Main 4"**	**750**	**LF**		$91,180		460.0	$40,285		$7,300		$138,765
644												
645												
646												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
647												
648	**Water Storage Tank**	**424**	**K GAL**									
649	Tanks, Subcontract, 424K Gallon	1	EA	$625,000.00	$625,000						$625,000	$625,000
650	Add For Difficult Environment, High Winds	1	EA	$200,000.00	$200,000						$200,000	$200,000
651	Tank Insulation Package	6,773	SF	$30.00	$203,198						$30	$203,198
652	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
653												
654	**Water Storage Tank**	**424**	**K GAL**		$1,033,823		$30	$3,569				$1,037,392
655												
656	**RO Unit**	**1**	**LS**									
657	RO Unit, Price Supplied By DOWL Based On Discussion With Known Supplier	1	EA	$350,000.00	$350,000						$350,000	$350,000
658												
659	**RO Unit**	**1**	**LS**		$350,000							$350,000
660												
661	**Water Intake**	**1**	**EA**									
662	Perf Pipe	40	LF	$65.00	$2,600						$65	$2,600
663	HDPE Catch Basin	1	EA	$3,000.00	$3,000						$3,000	$3,000
664	Filter Material	20	CY	$60.00	$1,200						$60	$1,200
665	Helicopter Time (Includes Mob/Demob From Nome)	40	HRS	$2,500.00	$100,000						$2,500	$100,000
666	Time	180	HRS									
667	Foreman	180	HRS			1.000	180.0	$22,470	$12.00	$1,800	$135	$24,270
668	Laborers	1,440	HRS			1.000	1,440.0	$123,034			$85	$123,034
669	Skid Steer	180	HRS			1.000	180.0	$18,472	$28.00	$5,040	$131	$23,512
670												
671	**Water Intake**	**1**	**EA**		$106,800		1,800.0	$163,976		$6,840		$277,616
672												
673												
674	**G3010 Water Utilities**	**1**	**LS**		$1,581,803		2,290.0	$207,830		$14,140		$1,803,773
675												
676												
677												
678												
679												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
680												
681	**G3020 Sanitary Sewerage Utilities**											
682												
683	**6" Arctic Pipe Gravity Sewer**	**1,500**	**LF**									
684	Arctic Pipe 6x15	1,575	LF	$109.00	$171,675						$109	$171,675
685	AP Fitting Allowance	23	EA	$2,000.00	$46,000						$2,000	$46,000
686	1" PEX Glycol Loop	3,150	LF	$2.00	$6,300						$2	$6,300
687	Energy Dissipation Structures	4	EA	$5,000.00	$20,000	16.000	64.0	$6,239	$1,000.00	$4,000	$7,560	$30,239
688	Cleanouts	5	EA	$1,500.00	$7,500	6.000	30.0	$2,925	$200.00	$1,000	$2,285	$11,425
689	**Production Rate**	**100**	**LF/DAY**									
690	Time	150	HRS									
691	Foreman	150	HRS			1.000	150.0	$18,725	$12.00	$1,500	$135	$20,225
692	Laborers	150	HRS			1.000	150.0	$12,816			$85	$12,816
693	Local Labor	150	HRS			1.000	150.0	$6,113			$41	$6,113
694	Skid Steer	150	HRS			1.000	150.0	$15,393	$28.00	$4,200	$131	$19,593
695												
696	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c.. - Split With Water 50%**	**22**	**EA**									
697	Micro Pilings	44	EA	$400.00	$17,600						$400	$17,600
698	Cross Beam	1,540	LBS	$3.00	$4,620						$3	$4,620
699	Pipe Supports (2 Per Pier)	44	EA	$35.00	$1,540						$35	$1,540
700	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**5**	**EA/DAY**									
701	Time	50	HRS									
702	Foreman	50	HRS			1.000	50.0	$6,242	$12.00	$500	$135	$6,742
703	Laborers	50	HRS			1.000	50.0	$4,272			$85	$4,272
704	Local Labor	100	HRS			1.000	100.0	$4,075			$41	$4,075
705	Track Or Manual Drilling	50	HRS			2.000	100.0	$10,262	$175.00	$8,750	$380	$19,012
706	Skid Steer	50	HRS			1.000	50.0	$5,131	$28.00	$1,400	$131	$6,531
707												
708	**6" Arctic Pipe Gravity Sewer**	**1,500**	**LF**		$275,235		1,044.0	$92,193		$21,350		$388,778
709												
710												
711												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
712												
713	**Sewer Service Line**	**33**	**EA**									
714	Pipe - AP 6x16 - Allow 10% Extra For Damppage, Cuts, Misc. - Split With Water 50% Of Pipe	1,888	LF	$120.00	$226,512						$120	$226,512
715	Long Sweep 90 AP 6x16	17	EA	$2,200.00	$36,300						$2,200	$36,300
716	Long Sweep 45 AP 6x16	33	EA	$1,980.00	$65,340						$1,980	$65,340
717	Service 90	17	EA	$2,090.00	$34,485						$2,090	$34,485
718	AP 6x16 36" Pipe Joint Kit	160	EA	$300.00	$48,114						$300	$48,114
719	Arctic Box & Boot	17	EA	$8,000.00	$132,000						$8,000	$132,000
720	HDPE 3" Or 4"	1,908	LF	$5.00	$9,538						$5	$9,538
721	Minor Housing Repairs	33	EA	$25.00	$825						$25	$825
722	**Production 2 Services/Day Split With Water**	**17**	**DAYS**									
723	Time_B1	170	HRS									
724	Foreman	170	HRS			1.000	170.0	$21,222	$12.00	$1,700	$135	$22,922
725	Laborers	170	HRS			1.000	170.0	$14,525			$85	$14,525
726	Electrician 1/2 Time_B1	85	HRS			1.000	85.0	$10,324			$121	$10,324
727	Local Labor	510	HRS			1.000	510.0	$20,783			$41	$20,783
728	Operators	340	HRS			1.000	340.0	$34,891			$103	$34,891
729	Truck Drivers	340	HRS			1.000	340.0	$34,571			$102	$34,571
730	Skid Steer	170	HRS						$35.00	$5,950	$35	$5,950
731	Mini Excavator	170	HRS						$77.00	$13,090	$77	$13,090
732	End Dump	170	HRS						$65.00	$11,050	$65	$11,050
733												
734	**Sewer Service Line**	**33**	**EA**		$553,114		$1,615	$136,316		$31,790		$721,220
735												
736												
737												
738												
739												
740												
741												
742												
743												
744												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
745												
746	**Residential Lift Station**	**3**	**EA**									
747	Lift Station Unit W/ Insulation	3	EA	$7,500.00	$22,500						$7,500	$22,500
748	Anchoring Straps	3	SETS	$1,500.00	$4,500						$1,500	$4,500
749	Rigid Insulation	2,664	BF	$0.80	$2,131						$1	$2,131
750	Field Foam Insulation	6	LOC	$20.00	$120						$20	$120
751	Bedding Material (Import)	28	CY	$100.00	$2,778						$100	$2,778
752	Seeding	1,200	SY	$1.00	$1,200						$1	$1,200
753	**Production 1 Services/Day**	**3**	**EA**									
754	Time	30	HRS									
755	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
756	Laborers	45	HRS			1.000	45.0	$3,845			$85	$3,845
757	Electrician	30	HRS			1.000	30.0	$3,644			$121	$3,644
758	Plumber	30	HRS			1.000	30.0	$3,569	$12.50	$300	$129	$3,869
759	Local Labor	60	HRS			1.000	60.0	$2,445			$41	$2,445
760	Operators	30	HRS			1.000	30.0	$3,079			$103	$3,079
761	Skid Steer With Trailer	30	HRS						$45.00	$1,350	$45	$1,350
762	Excavator 320	45	HRS						$108.50	$4,883	$109	$4,883
763												
764	**Residential Lift Station**	**3**	**EA**		$33,229		225.0	$20,327		$6,833		$60,389
765												
766												
767												
768												
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Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
782												
783	**Sewage Plants**	**1**	**EA**									
784	Lifewater System 5000 GPD	1	EA	$100,000.00	$100,000						$100,000	$100,000
785	Permit Cost	1	EA	$2,000.00	$2,000						$2,000	$2,000
786	Treated Timber Base	250	BF	$3.00	$750						$3	$750
787	Hardware	1	LS	$250.00	$250						$250	$250
788	4" Rigid Insulation	200	BF	$0.80	$160						$1	$160
789	Helical Anchor	4	EA	$300.00	$1,200						$300	$1,200
790	Bedding Material	17	CY	$50.00	$833						$50	$833
791	Power 3/4"C, (3)#12	30	LF	$2.00	$60						$2	$60
792	**Production 0.5 EA/DAY**	**2**	**DAYS**									
793	Time	20	HRS									
794	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
795	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
796	Electrician	10	HRS			1.000	10.0	$1,215			$122	$1,215
797	Plumber	10	HRS			1.000	10.0	$1,190	$12.50	$100	$129	$1,290
798	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
799	Operators	20	HRS			1.000	20.0	$2,052			$103	$2,052
800	Truck Drivers	10	HRS			1.000	10.0	$1,017			$102	$1,017
801	Skid Steer	20	HRS						$35.00	$700	$35	$700
802	End Dump	10	HRS						$65.00	$650	$65	$650
803												
804	**Sewage Plants**	**1**	**EA**		$105,253		110.0	$10,495		$1,650		$117,398
805												
806												
807												
808												
809												
810												
811												
812												
813												
814												
815												
816												
817												
818												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
819												
820	**Septage Transmission Line 6"**	**960**	**LF**									
821	HDPE 6"	960	LF	$11.00	$10,560						$11	$10,560
822	Fitting Allowance	10	EA	$50.00	$500						$50	$500
823	Bedding Material	320	CY	$45.00	$14,400						$45	$14,400
824	**Pipe Trench**	**960**	**LF**									
825	**Production 50 LF/DAY**	**20**	**DAYS**									
826	Time	200	HRS									
827	Foreman	200	HRS			1.000	200.0	$24,967	$12.00	$2,000	$135	$26,967
828	Laborers	200	HRS			1.000	200.0	$17,088			$85	$17,088
829	Local Labor	600	HRS			1.000	600.0	$24,450			$41	$24,450
830	Skid Steer	200	HRS			1.000	200.0	$20,524	$28.00	$5,600	$131	$26,124
831	Small Dozer	200	HRS			1.000	200.0	$20,524	$35.00	$7,000	$138	$27,524
832	Excavator 320	200	HRS			1.000	200.0	$20,524	$80.00	$16,000	$183	$36,524
833	Compactor With Operator	200	HRS			1.000	200.0	$20,524	$35.00	$7,000	$138	$27,524
834	End Dump	400	HRS			1.000	400.0	$19,708	$80.00	$32,000	$129	$51,708
835												
836	**Septage Transmission Line 6"**	**960**	**LF**		$25,460		2,200.0	$168,309		$69,600		$263,369
837												
838												
839												
840												
841												
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Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
856												
857	**Outfall Line**	**50**	**LF**									
858	HDPE 6"	50	LF	$11.00	$550						$11	$550
859	Weights	6	EA	$300.00	$1,800						$300	$1,800
860	Bedding Material	17	CY	$45.00	$750						$45	$750
861	**Pipe Trench**	**50**	**LF**									
862	**Allowance For Blasting Rock**	**50**	**LF**	$100.00	$5,000						$100	$5,000
863	**Production 50 LF/DAY**	**1**	**DAYS**									
864	Time	10	HRS									
865	Foreman	10	HRS			1.000	10.0	$1,248	$12.00	$100	$135	$1,348
866	Laborers	10	HRS			1.000	10.0	$854			$85	$854
867	Local Labor	30	HRS			1.000	30.0	$1,223			$41	$1,223
868	Skid Steer	10	HRS			1.000	10.0	$1,026	$28.00	$280	$131	$1,306
869	Small Dozer	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
870	Excavator 320	10	HRS			1.000	10.0	$1,026	$80.00	$800	$183	$1,826
871	Compactor With Operator	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
872	End Dump	20	HRS			1.000	20.0	$985	$80.00	$1,600	$129	$2,585
873	Skiff - Local Rental	1	LS						$5,000.00	$5,000	$5,000	$5,000
874												
875	**Outfall Line**	**50**	**LF**		$8,100		110.0	$8,414		$8,480		$24,994
876												
877	**ANTHC Standard Lift Station**	**1**	**EA**									
878	Wet Well	1	LF	$20,000.00	$21,000	360.000	378.0	$38,790	$25,000.00	$26,250	$81,943	$86,040
879	Excavation	1,500	CY			0.114	171.0	$17,548	$10.00	$15,000	$22	$32,548
880	Backfill - Screened	1,500	CY	$30.00	$45,000	0.229	343.5	$35,250	$10.00	$15,000	$64	$95,250
881	Pumps and Controls	1	EA	$81,250.00	$81,250	600.000	600.0	$72,876	$18,750.00	$15,000	$169,126	$169,126
882	Pump Building 14x16	1	EA	$40,000.00	$40,000	2,520.000	2,520.0	$245,659			$285,659	$285,659
883	Plumbing - Domestic	1	EA	$3,750.00	$3,750	10.000	10.0	$1,190			$4,940	$4,940
884	HVAC	1	EA	$3,125.00	$3,125	20.000	20.0	$2,438			$5,563	$5,563
885	Electrical	1	EA	$62,500.00	$62,500	100.000	100.0	$12,146			$74,646	$74,646
886												
887	**ANTHC Standard Lift Station**	**1**	**EA**		$256,625		4,142.5	$425,897		$71,250		$753,772
888												
889												
890												
891												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
892												
893	**Septage Vault (40x20' x 10'd)**	**1**	**EA**									
894	**Earthwork For Foundation**											
895	Gravel Fill	135	CY									
896	Benched Into Slope											
897	Borrow (Imported)	135	CY	$100.00	$13,511						$100	$13,511
898	**Production**	**100**	**CY/DAY**									
899	Time	14	HRS									
900	Foreman	14	HRS			1.000	13.5	$1,685	$12.00	$135	$135	$1,820
901	Laborers	14	HRS			1.000	13.5	$1,153			$85	$1,153
902	Compactor With Operator	14	HRS			1.000	13.5	$1,385	$65.00	$878	$167	$2,263
903	Dozer D6 With Operator	14	HRS			1.000	13.5	$1,385	$80.00	$1,081	$183	$2,466
904	Off Road Haul Unit	41	HRS			1.000	40.5	$1,995	$125.00	$5,067	$174	$7,062
905												
906	**Down Slope Foundation and Support**											
907	Concrete Foundations	13	CY	$1,400.00	$18,667	8.000	106.7	$10,402			$2,180	$29,069
908	Columns and Bracing	2,500	LBS	$3.00	$7,500	0.014	35.0	$3,412	$0.15	$375	$5	$11,287
909	Beam Support	2,000	LBS	$3.00	$6,000	0.014	28.0	$2,730	$0.15	$300	$5	$9,030
910												
911	**Vault 20x40x12 (10' Liquid Level, With Baffle**	1	EA	$250,000.00	$250,000						$250,000	$250,000
912	**Installation**	**10**	**DAYS**									
913	Time	100	HRS									
914	Foreman	100	HRS			1.000	100.0	$12,484	$12.00	$1,000	$135	$13,484
915	Laborers	100	HRS			1.000	100.0	$8,544			$85	$8,544
916	Local Labor	300	HRS			1.000	300.0	$12,225			$41	$12,225
917	Skid Steer With Operator	100	HRS			1.000	100.0	$10,262	$35.00	$3,500	$138	$13,762
918	Excavator With Operator	100	HRS			1.000	100.0	$10,262	$125.00	$12,500	$228	$22,762
919												
920	**Septage Vault (40x20' x 10'd)**	**1**	**EA**		$295,678		964.2	$77,924		$24,836		$398,438
921												
922	**G3020 Sanitary Sewerage Utilities**	**-**	**-**		$1,552,694		10,410.7	$939,875		$235,789		$2,728,358
923												
924												
925	**Subtotal: G30 LIQUID AND GAS SITE UTILITIES**				$3,134,497		12,700.7	$1,147,705		$249,929		**$4,532,131**
926												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
927												
928	**Z10 GENERAL REQUIREMENTS**											
929												
930	**Z1020 Administrative Requirements**											
931	Supervisor, 60 Hour/Week	87	WEEKS			60.000	5,220.0	$963,142			$11,071	$963,142
932	Project Expeditor, 20 Hour/Week	87	WEEKS			20.000	1,740.0	$148,666			$1,709	$148,666
933	Time Keeper/Cost Control, 40 Hour/Week	87	WEEKS			40.000	3,480.0	$175,912			$2,022	$175,912
934												
935	**Z1040 Quality Requirements**											
936	Quality Control	20	MTHS	$1,000.00	$20,000	40.000	800.0	$44,933			$3,247	$64,933
937	Test Lab Services	20	EA	$250.00	$5,000						$250	$5,000
938	Survey	1	EA	$40,000.00	$40,000						$40,000	$40,000
939												
940	**Z1050 Temporary Facilities and Controls**											
941	**Subsistence**											
942	Rental House	20	MTHS						$3,000.00	$60,000	$3,000	$60,000
943	Room & Board - Incidental	9,319	MDAY	$20.00	$186,377						$20	$186,377
944												
945	**Travel**											
946	Air Fare - Anchorage - Site	329	EA	$500.00	$164,500						$500	$164,500
947	Early Construction	4	EA									
948	Survey	6	EA									
949	Crew/Super (Trip/30 Mdays)	311	EA									
950	Inspections	8	EA									
951												
952	**Small Tools & Consumables**											
953	Consumables	1	LS	$4,300.00	$4,300						$4,300	$4,300
954	Small Tools	1	LS	$88,200.00	$88,200						$88,200	$88,200
955												
956												
957												
958												
959												
960												
961												
962												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
963												
964	**Mobilization**											
965	Mobilization - Equipment	122	TONS	$2,300.00	$280,600						$2,300	$280,600
966	Side By Sides	3,500	LBS									
967	ATV & Trailer	1,000	LBS									
968	FE Loader	42,800	LBS									
969	Excavator	47,400	LBS									
970	End Dumps (3)	78,000	LBS									
971	Skid Steer	5,000	LBS									
972	Sm Dozer	35,000	LBS									
973	Compactor	20,000	LBS									
974	Conc Mixer	1,000	LBS									
975	Misc	10,000	LBS									
976	Demobilization - Equipment	122	TONS	$1,725.00	$210,450						$1,725	$210,450
977	Surface Freight Seattle - Job Site	949	TONS	$2,300.00	$2,182,700						$2,300	$2,182,700
978	Handling Labor	122	HRS			1.000	122.4	$10,458			$85	$10,458
979												
980	Air Freight Anchorage - Job Site - Incidental	20	MTHS	$2,000.00	$40,000						$2,000	$40,000
981												
982	**Equipment**											
983	Equipment Standby and Travel Time	2	MTHS						$27,828.80	$55,658	$27,829	$55,658
984	Side By Sides	2	EA									
985	ATV & Trailer	1	EA									
986	FE Loader With Forks	1	EA									
987	Excavator	1	EA									
988	Skid Steer	1	EA									
989	Mini Excavator	1	EA									
990	Dozer D4	1	EA									
991	Compactor	1	EA									
992	End Dumps	4	EA									
993	Fuel (3/Hr Covered In Equip Rates)	54,065	GAL	$4.00	$216,260						$4	$216,260
994	Maintenance Labor 1 FTE	20	MTHS			259.800	5,196.0	$424,461			$21,223	$424,461
995												
996												
997												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
998												
999	**Temporary Facilities**	**20**	**MTHS**									
1,000	Project Office Trailer	20	MTHS						$1,500.00	$30,000	$1,500	$30,000
1,001	Office Equipment/Supplies	20	MTHS	$500.00	$10,000						$500	$10,000
1,002	Project Tool Sheds	20	MTHS						$200.00	$4,000	$200	$4,000
1,003	Project Safety Equipment	1	LS	$1,500.00	$1,500						$1,500	$1,500
1,004	Communications/Internet	20	MTHS	$1,000.00	$20,000						$1,000	$20,000
1,005												
1,006	**SWPPP Maintenance**											
1,007	Erosion Control Inspections (4H/Wk)	87	WKS			4.000	348.0	$33,924			$390	$33,924
1,008	Silt Fences, BMPs	20,000	LF	$5.00	$100,000	0.250	5,000.0	$427,200			$26	$527,200
1,009												
1,010	**G5010 Site Communications Systems**											
1,011	Record Documents	100	SHTS	$100.00	$10,000						$100	$10,000
1,012	Operations and Maintenance Manuals	1	LS	$25,000.00	$25,000						$25,000	$25,000
1,013	Contract Closeout and Training	1	LS	$15,000.00	$15,000						$15,000	$15,000
1,014												
1,015												
1,016												
1,017												
1,018												
1,019												
1,020												
1,021												
1,022												
1,023												
1,024												
1,025												
1,026												
1,027												
1,028												
1,029												
1,030												
1,031												
1,032												
1,033	**Subtotal: Z10 GENERAL REQUIREMENTS**				$3,619,887		21,906.4	$2,228,696		$149,658		**$5,998,241**
1,034												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1,035												
1,036	**Z70 TAXES, PERMITS, INSURANCE AND BONDS**											
1,037												
1,038	Insurance and Bond 3.0%	1	LS									$1,150,441
1,039												
1,040												
1,041												
1,042												
1,043	**Subtotal: Z70 TAXES, PERMITS, INSURANCE AND BONDS**											**$1,150,441**
1,044												
1,045												
1,046	**Z90 FEES**											
1,047												
1,048	Overhead and Profit 12%	1	LS									$4,601,763
1,049												
1,050												
1,051												
1,052												
1,053	**Subtotal: Z90 FEES**											**$4,601,763**
1,054												
1,055												
1,056	**Z90 CONTINGENCIES**											
1,057												
1,058	**Z9050 Construction Contingencies**											
1,059	Estimating Contingency 10%	1	LS									$2,796,576
1,060	Project Contingency 15%	1	LS									$4,614,350
1,061	Inflation 6.5% Per Year For 3.5% Yr = 24.66%	1	LS									$8,723,536
1,062												
1,063												
1,064												
1,065												
1,066												
1,067												
1,068												
1,069												
1,070	**Subtotal: Z90 CONTINGENCIES**											**$16,134,463**
1,071												

Little Diomede Ph II 1st Water & Sewer Services
Alternate 2b - Fully Piped Water With Seawater Source
Little Diomede, Alaska

Construction Cost Estimate
95% ePER Submittal
October 5, 2023

ESTIMATIONS
1225 E. International Airport Road, Suite 235
Anchorage, Alaska 99518
907.561.0790

Prepared for:
DOWL
5015 Business Park Boulevard, #4000
Anchorage, Alaska 99503
907.562.2000

Little Diomede Ph II 1st Water & Sewer Services — **Construction Cost Estimate**
Alternate 2b - Fully Piped Water With Seawater Source — **95% ePER Submittal**
Prepared for DOWL by Estimations — **October 5, 2023**

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 2b - Fully Piped Water With Seawater Source
Estimate Date:	October 5, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

SCOPE OF WORK

Alternative 2B – Fully Piped W/ Seawater Source

Water Treatment Plant Equipment Renovation	EA	1.00
Seawater Source	EA	1.00
Surface Water Source Intake Improvement	EA	1.00
Wave runup Fortification (Riprap)	LF	100.00
Replace Existing WST	GAL	424,000.00
Water Main	LF	1,500.00
Combined Service Lines	EA	33.00
In-Home Plumbing	EA	33.00
Residential Lift Stations	EA	3.00
Washeteria Updates	EA	1.00
Gravity Sewer Main	LF	1,500.00
Lifewater Wastewater Treatment Plant	EA	1.00
Lift Station and Utilidor to Vault	LF	960.00
Septage Vault	EA	1.00
Archaeological Monitor	day	

Notes on the Estimate

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 2b - Fully Piped Water With Seawater Source
Estimate Date:	October 5, 2023
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Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

DOCUMENTS
95% ePER Submittal

SOURCE OF COST DATA:
Estimations Internal cost database
Vendor Quote
Labor based on State of Alaska Title 36 Wages 04/2023.
BABA Compliance not Required.

ESTIMATE ASSUMPTIONS:
Summer 2025 Construction
Design Bid Build
Time on Site 28 MTHS of Construction over 6 Years

Description	Material	Labor	Hours	Equipment	Estimated Cost
0 OWNER COSTS	**$3,747,751**	**$1,961,608**	**20,122.40**	**$0**	**$5,709,359**
20 OWNER DEVELOPMENT	$3,747,751	$87,735	900.00	$0	$3,835,486
30 PROCUREMENT REQUIREMENTS	$0	$1,873,873	19,222.40	$0	$1,873,873
A SUBSTRUCTURE	**$253,673**	**$107,840**	**1,093.90**	**$23,551**	**$385,064**
A10 FOUNDATIONS	$253,673	$107,840	1,093.90	$23,551	$385,064
B SHELL	**$43,170**	**$24,162**	**$231**	**$102**	**$67,434**
B10 SUPERSTRUCTURE	$7,483	$4,601	47.20	$102	$12,186
B20 EXTERIOR VERTICAL ENCLOSURES	$34,212	$18,362	171.00	$0	$52,574
B30 EXTERIOR HORIZONTAL ENCLOSURES	$1,475	$1,199	12.30	$0	$2,674
C INTERIORS	**$95,471**	**$223,159**	**2,254.70**	**$0**	**$318,630**
C10 INTERIOR CONSTRUCTION	$66,528	$157,043	1,600.60	$0	$223,571
C20 INTERIOR FINISHES	$28,943	$66,116	654.10	$0	$95,059
D SERVICES	**$621,294**	**$752,151**	**6,282.30**	**$0**	**$1,373,445**
D20 PLUMBING	$439,741	$437,152	3,677.90	$0	$876,893
D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	$14,746	$27,820	240.00	$0	$42,566
D50 ELECTRICAL	$166,807	$287,179	2,364.40	$0	$453,986

Description	Material	Labor	Hours	Equipment	Estimated Cost
E EQUIPMENT AND FURNISHINGS	**$181,500**	**$16,085**	**165.00**	**$0**	**$197,585**
E10 EQUIPMENT	$0	$0	-	$0	$0
E20 FURNISHINGS	$181,500	$16,085	165.00	$0	$197,585
F SPECIAL CONSTRUCTION AND DEMOLITION	**$1,066,338**	**$943,580**	**9,838.30**	**$30,323**	**$2,040,241**
F10 SPECIAL CONSTRUCTION	$750,000	$750,002	7,693.60	$0	$1,500,002
F30 DEMOLITION	$316,338	$193,578	2,144.70	$30,323	$540,239
G SITEWORK	**$3,329,643**	**$1,228,111**	**13,996.40**	**$511,529**	**$5,069,283**
G10 SITE PREPARATION	$45,189	$22,802	222.20	$36,167	$104,158
G20 SITE IMPROVEMENTS	$205,508	$156,442	1,586.00	$187,623	$549,573
G30 LIQUID AND GAS SITE UTILITIES	$3,078,946	$1,048,867	12,188.20	$287,739	$4,415,552
Z GENERAL	**$3,284,612**	**$3,017,338**	**29,423.80**	**$301,948**	**$28,025,829**
Z10 GENERAL REQUIREMENTS	$3,284,612	$3,017,338	29,423.80	$301,948	$6,603,898
Z70 TAXES, PERMITS, INSURANCE AND BONDS	$0	$0	-	$0	$1,124,325
Z90 FEES	$0	$0	-	$0	$4,497,301
Z90 CONTINGENCIES	$0	$0	-	$0	$15,800,304
TOTAL ESTIMATED COST	**$12,623,452**	**$8,274,034**	**$83,407**	**$867,453**	**$43,186,870**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1	**20 OWNER DEVELOPMENT**											
3	**2010 Site Acquisition**											
4	Not Included											
6	**2020 Permits**		**NONE**									
8	**2030 Professional Services**											
9	Design Fees 10% Of Construction	1	LS	$3,747,751.06	$3,747,751						$3,747,751	$3,747,751
10	Archaeological Monitoring	90	DAYS			10.000	900.0	$87,735			$975	$87,735
17	**Subtotal: 20 OWNER DEVELOPMENT**				$3,747,751		900.0	$87,735				**$3,835,486**
20	**30 PROCUREMENT REQUIREMENTS**											
22	**3010 Project Delivery**											
23	Construction Management 5% Of Construction	1	LS			19,222.423	19,222.4	$1,873,873			$1,873,873	$1,873,873
38	**Subtotal: 30 PROCUREMENT REQUIREMENTS**						19,222.4	$1,873,873				**$1,873,873**

			Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
A10 FOUNDATIONS											
A1020 Special Foundations											
Well House Foundation	**1**	**EA**									
Post and Pad	9	EA	$172.00	$1,548	6.000	54.0	$6,335			$876	$7,883
Subtotal	**1**	**EA**		$1,548		54.0	$6,335				$7,883
WST Foundations	**1**	**EA**									
Insulated Concrete Precast	800	SF	$40.00	$32,000	0.032	25.6	$2,627	$9.08	$7,263	$52	$41,890
AWW Mud Sills 4x12 @ 2'oc	822	LF	$8.00	$6,576	0.114	93.7	$9,134	$1.00	$822	$20	$16,532
AWW 8x12	744	LF	$40.00	$29,760	0.343	255.2	$24,878	$4.00	$2,976	$77	$57,614
AWW Plywood 5/8	1,440	SF	$1.25	$1,800	0.019	27.4	$2,671			$3	$4,471
Hardware	1	SETS	$2,000.00	$2,000						$2,000	$2,000
Insulation XPS, High Compression 2"	117,504	BF	$0.90	$105,754	0.003	352.5	$34,363			$1	$140,117
Concrete	18	CY	$1,800.00	$32,400	8.000	144.0	$14,038	$350.00	$6,300	$2,930	$52,738
Grade Ring	119	LF	$266.67	$31,835	1.185	141.5	$13,794	$51.85	$6,190	$434	$51,819
Misc	1	EA	$10,000.00	$10,000						$10,000	$10,000
WST Foundations	**1**	**EA**		$252,125		1,039.9	$101,505		$23,551		$377,181
Subtotal: A10 FOUNDATIONS				$253,673		1,093.9	$107,840		$23,551		**$385,064**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
82	**B10 SUPERSTRUCTURE**											
84	**B1010 Floor Construction**											
85	**Well House Floor**	**1**	**EA**									
86	**AREA**	**100**	**SF/EA**									
87	Glulam Beams	240	BF	$6.00	$1,440	0.021	5.0	$487	$0.15	$36	$8	$1,963
88	Joist	100	LF	$12.00	$1,200	0.050	5.0	$487			$17	$1,687
89	1.5" Metal Decking	100	SF	$6.00	$600	0.021	2.1	$205			$8	$805
90	Pea Gravel Fill at Flutes	0.26	CY	$130.00	$34	0.100			$3.00	$1	$135	$35
91	4" Rigid High Density Insulation Board	400	BF	$0.90	$360	0.004	1.6	$156			$1	$516
92	6" Dura-Base Composite Mat	100	SF	$5.00	$500	0.021	2.1	$205			$7	$705
93	Concrete Slab 6"	100	SF	$3.89	$389	0.037	3.7	$361	$0.65	$65	$8	$815
95	**Subtotal**	**1**	**EA**		$4,523		19.5	$1,901		$102		$6,526
97	**B1020 Roof Construction**											
98	**Well House**	**100**	**SF**									
99	GLB 5.125x12	40	LF	$39.00	$1,560	0.514	20.6	$2,008			$89	$3,568
100	SIPs Panels	100	SF	$14.00	$1,400	0.071	7.1	$692			$21	$2,092
102	**Subtotal**	**100**	**SF**		$2,960		27.7	$2,700				$5,660
120	**Subtotal: B10 SUPERSTRUCTURE**				$7,483		47.2	$4,601		$102		**$12,186**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
123	**B20 EXTERIOR VERTICAL ENCLOSURES**											
125	**B2010 Exterior Walls**											
126	**Pea Gravel Fill at Flutes**	**528**	**SF**									
127	SIPs Panels	528	SF	$14.00	$7,392	0.071	37.5	$3,656			$21	$11,048
128	Weather Barrier	528	SF	$1.80	$950	0.009	4.8	$468			$3	$1,418
129	Siding	528	SF	$18.00	$9,504	0.086	45.4	$5,776			$29	$15,280
130	Furring	3	EA	$1,125.00	$3,375	2.679	8.0	$780			$1,385	$4,155
131	Vapor Retarder	528	SF	$0.50	$264	0.006	3.2	$312			$1	$576
132	GWB	528	SF	$0.78	$412	0.034	18.0	$2,097			$5	$2,509
133	FRP Panels	528	SF	$5.00	$2,640	0.057	30.1	$2,934			$11	$5,574
134	Exterior Door, Single	3	EA	$2,850.00	$8,550	7.000	21.0	$2,047			$3,532	$10,597
135	Windows	15	SF	$75.00	$1,125	0.200	3.0	$292			$94	$1,417
137	**Subtotal**	**528**	**SF**		$34,212		171.0	$18,362				$52,574
141	**Subtotal: B20 EXTERIOR VERTICAL ENCLOSURES**				$34,212		171.0	$18,362				**$52,574**
144	**B30 EXTERIOR HORIZONTAL ENCLOSURES**											
146	**B3010 Roofing**											
147	**Well House**	**100**	**SF**									
148	SAM Vapor Barrier	100	SF	$1.15	$115	0.009	0.9	$88			$2	$203
149	Metal Roofing	100	SF	$10.00	$1,000	0.086	8.6	$838			$18	$1,838
150	Flashing	40	LF	$9.00	$360	0.071	2.8	$273			$16	$633
152	**Subtotal**	**100**	**SF**		$1,475		12.3	$1,199				$2,674
161	**Subtotal: B30 EXTERIOR HORIZONTAL ENCLOSURES**				$1,475		12.3	$1,199				**$2,674**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
164	**C10 INTERIOR CONSTRUCTION**											
165												
166	**C1010 Interior Partitions**											
167												
168	**Residential Improvement**	**33**	**HOMES**									
169	2x Wood Framing & Hardware Allowance For Repairs	1,073	BF	$2.00	$2,145	0.057	61.1	$5,956			$8	$8,101
170	5/8" GWB Allowance For Repairs	1,238	SF	$0.72	$891	0.043	53.2	$6,197			$6	$7,088
171												
172	**Subtotal**	**33**	**HOMES**		$3,036		114.3	$12,153				$15,189
173												
174	**C1030 Interior Doors**											
175												
176	**Residential Improvement**	**33**	**HOMES**									
177	Wall Framing Modifications	33	EA	$50.00	$1,650	4.000	132.0	$12,868			$440	$14,518
178	Prehung Wood Flush Door & Frame 3x7	33	EA	$500.00	$16,500	4.000	132.0	$12,868			$890	$29,368
179	Privacy Lockset	33	EA	$150.00	$4,950	2.000	66.0	$6,434			$345	$11,384
180	Door Casing Trim	1,122	LF	$5.00	$5,610	0.071	79.7	$7,769			$12	$13,379
181												
182	**Subtotal**	**33**	**HOMES**		$28,710		409.7	$39,939				$68,649
183												
184												
185	**C1060 Raised Floor Construction**											
186												
187	**Residential Improvement**	**33**	**HOMES**									
188	**Bathtub Platform Construction**											
189	Framed Curb @ 16" O.C.	990	BF	$3.00	$2,970	0.071	70.3	$6,853			$10	$9,823
190	3/4" Plywood Subfloor	1,056	SF	$2.00	$2,112	0.043	45.4	$4,426			$6	$6,538
191												
192	**Subtotal**	**33**	**HOMES**		$5,082		115.7	$11,279				$16,361
193												
194												
195												
196												
197												
198												
199												
200												
201												
202												
203												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
204	**C1070 Suspended Ceiling Construction**											
205												
206	**Residential Improvement**	**33**	**HOMES**									
207	**Bathroom Exhaust Fan Soffit**											
208	Framing	3,960	BF	$3.00	$11,880	0.114	451.4	$44,004			$14	$55,884
209	Soffit Paneling	2,640	SF	$3.00	$7,920	0.143	377.5	$36,800			$17	$44,720
210												
211	**Subtotal**	**33**	**HOMES**		$19,800		828.9	$80,804				$100,604
212												
213	**C1090 Interior Specialties**											
214												
215	**Residential Improvement**	**33**	**HOMES**									
216	Bathroom Accessories	33	SET	$300.00	$9,900	4.000	132.0	$12,868			$690	$22,768
217												
218	**Subtotal**	**33**	**SET**		$9,900		132.0	$12,868				$22,768
219												
220	**Subtotal: C10 INTERIOR CONSTRUCTION**				$66,528		1,600.6	$157,043				$223,571
221												
222												
223	**C20 INTERIOR FINISHES**											
224												
225	**C2010 Wall Finishes**											
226												
227	**Residential Improvement**	**33**	**HOMES**									
228	Patching & Painting	3,300	SF	$1.20	$3,960	0.043	141.9	$15,009			$6	$18,969
229												
230	**Subtotal**	**3,300**	**SF**		$3,960		141.9	$15,009				$18,969
231												
232	**C2030 Flooring**											
233												
234	**Residential Improvement**	**33**	**HOMES**									
235	3/8" Underlayment	2,640	SF	$1.25	$3,300	0.043	113.5	$11,064			$5	$14,364
236	Sheet Vinyl Flooring	2,640	SF	$7.00	$18,480	0.071	187.4	$18,268			$14	$36,748
237	Rubber Base	1,188	LF	$1.50	$1,782	0.057	67.7	$6,600			$7	$8,382
238												
239	**Subtotal**	**33**	**HOMES**		$23,562		368.6	$35,932				$59,494
240												
241	**Well House**	**100**	**SF**									
242	Sealed Concrete	100	SF	$0.35	$35	0.017	1.7	$166			$2	$201
243												
244	**Subtotal**	**100**	**SF**		$35		1.7	$166				$201

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
245												
246	**C2050 Ceiling Finishes**											
247												
248	**Residential Improvement**	**33**	**HOMES**									
249	Ceiling Paint Allowance @ Fan Soffit	3,300	SF	$0.42	$1,386	0.043	141.9	$15,009			$5	$16,395
250												
251	**Subtotal**	**33**	**HOMES**		$1,386		141.9	$15,009				$16,395
252												
253												
254												
255	**Subtotal: C20 INTERIOR FINISHES**				$28,943		654.1	$66,116				$95,059
256												
257												
258	**D20 PLUMBING**											
259	**D2010 Domestic Water Distribution**											
260												
261	**Residential Improvement**	**33**	**HOMES**									
262	**Plumbing Fixtures**											
263	Water Closet	33	EA	$625.00	$20,625	2.000	66.0	$7,851			$863	$28,476
264	Lavatory, Counter Mounted	33	EA	$375.00	$12,375	2.000	66.0	$7,851			$613	$20,226
265	Kitchen Sink	33	EA	$812.50	$26,813	5.000	165.0	$19,628			$1,407	$46,441
266	Bath/Shower Combo	33	EA	$1,875.00	$61,875	12.000	396.0	$47,106			$3,302	$108,981
267												
268	**Specialties**											
269	Oil Fired Hot Water Heater	33	EA	$3,125.00	$103,125	16.000	528.0	$62,809			$5,028	$165,934
270	Vent Kit	33	EA	$593.75	$19,594	8.000	264.0	$31,404			$1,545	$50,998
271	Drip Pan	33	EA	$187.50	$6,188	0.250	8.3	$987			$217	$7,175
272												
273	**Water Service Equipment**											
274	Well Circ Pump	33	EA	$500.00	$16,500	6.000	198.0	$23,553			$1,214	$40,053
275	Drain Valve	99	EA	$18.75	$1,856	0.500	49.5	$5,888			$78	$7,744
276	Isolation Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
277	Expansion Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
278	P-Gauge	33	EA	$18.75	$619	0.500	16.5	$1,963			$78	$2,582
279	Pressure Tank	33	EA	$1,000.00	$33,000	4.000	132.0	$15,702			$1,476	$48,702
280	Fitting & Accessories	33	EA	$625.00	$20,625	12.000	396.0	$47,106			$2,052	$67,731
281	Water Treatment Equipment Unit Allowance	33	EA	$2,500.00	$82,500	12.000	396.0	$47,106			$3,927	$129,606
282												
283												
284												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
285	**Facility Water Distribution Piping**											
286	Domestic HW/CW Supply, Type L Copper											
287	3/4" Pipe	330	LF	$4.65	$1,535	0.100	33.0	$3,926			$17	$5,461
288	Hangers	66	EA	$8.75	$578	0.143	9.4	$1,118			$26	$1,696
289	Fittings	1	LS	$1,439.06	$1,439	49.500	49.5	$5,888			$7,327	$7,327
290	Domestic HW/CW Supply, PEX											
291	1/2" Pipe	660	LF	$1.56	$1,030	0.050	33.0	$3,926			$8	$4,956
292	3/4" Pipe	495	LF	$1.88	$931	0.050	24.8	$2,950			$8	$3,881
293	1" Pipe	330	LF	$2.19	$723	0.050	16.5	$1,963			$8	$2,686
294	Hangers	371	EA	$6.25	$2,319	0.150	55.7	$6,626			$24	$8,945
295	Fittings	1	LS	$1,258.13	$1,258	55.725	55.7	$6,626			$7,884	$7,884
296	Sterilization & Pressure Test	33	EA	$62.50	$2,063	4.000	132.0	$15,702			$538	$17,765
297												
298	**Subtotal**	**33**	**EA**		$423,347		3,156.9	$375,531				$798,878
299												
300	**D2020 Sanitary Drainage**											
301	**Residential Improvement**	**33**	**HOMES**									
302	**Facility Sanitary Sewage Piping**											
303	Above Grade ABS											
304	1-1/2" Pipe	330	LF	$2.14	$706	0.089	29.4	$3,497			$13	$4,203
305	2" Pipe	495	LF	$2.97	$1,470	0.060	29.7	$3,533			$10	$5,003
306	3" Pipe	330	LF	$5.63	$1,858	0.070	23.1	$2,748			$14	$4,606
307	Hangers	193	EA	$8.75	$1,689	0.250	48.3	$5,746			$39	$7,435
308	Fittings	1	LS	$6,051.00	$6,051	110.003	110.0	$13,085			$19,136	$19,136
309	Valve Allowance	33	EA	$15.00	$495	0.500	16.5	$1,608			$64	$2,103
310	Vent Thru Roof, 3"	33	EA	$125.00	$4,125	8.000	264.0	$31,404			$1,077	$35,529
311												
312	**Subtotal**	**1**	**LS**		$16,394		521.0	$61,621				$78,015
313												
314	**Subtotal: D20 PLUMBING**				$439,741		3,677.9	$437,152				$876,893
315												
316												
317	**D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC**											
318												
319	**D3010 Facility Fuel Systems**											
320												
321	**Residential Improvement**	**33**	**EA**									
322	Fuel Filter Kit	33	EA	$112.50	$3,713	2.000	66.0	$7,851			$350	$11,564
323	Fuel Line & Fittings	33	EA	$187.50	$6,188	4.000	132.0	$15,702			$663	$21,890
324												
325	**Subtotal**	**33**	**EA**		$9,901		198.0	$23,553				$33,454

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
326												
327	**D3020 Heating Systems**											
328	**Well House**	**1**	**EA**									
329	Electric Heat	1	EA	$1,875.00	$1,875	8.000	8.0	$952			$2,827	$2,827
330												
331	**Subtotal**	**1**	**EA**		$1,875		8.0	$952				$2,827
332												
333	**D3060 Ventilation**											
334												
335	**Residential Improvement**	**33**	**EA**									
336	Exhaust Fan	10	EA	$250.00	$2,500	2.000	20.0	$1,950			$445	$4,450
337	4" Duct	40	LF	$3.00	$120	0.100	4.0	$390			$13	$510
338	Ext. Wall Hood W/ Damper & Screen	10	EA	$35.00	$350	1.000	10.0	$975			$133	$1,325
339												
340	**Subtotal**	**33**	**EA**		$2,970		34.0	$3,315				$6,285
341												
342												
343												
344	**Subtotal: D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**				$14,746		240.0	$27,820				$42,566
345												
346												
347	**D50 ELECTRICAL**											
348												
349	**D5020 Electrical Service and Distribution**											
350												
351	**Residential Improvement**	**33**	**EA**									
352	**Services**	**33**	**EA**									
353	Service Upgrade Allowances - Panels, Ground & Feeds	33	EA	$3,125.00	$103,125	24.000	792.0	$96,196			$6,040	$199,321
354												
355	**Subtotal**	**33**	**EA**		$103,125		792.0	$96,196				$199,321
356												
357	**Well House**	**1**	**EA**									
358	**Services**	**1**	**EA**									
359	Service To Satellite Bldgs	1	EA	$3,750.00	$3,750	24.000	24.0	$2,915			$6,665	$6,665
360												
361	**Subtotal**	**1**	**EA**		$3,750		24.0	$2,915				$6,665
362												
363												
364												
365												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
366	**D5030 General Purpose Electrical Power**											
367												
368	**Residential Improvement**	**33**	**EA**									
369	**Power Circuits**	**234**	**EA**									
370	Bathroom Exhaust Fan, Light, Recept	33	EA									
371	Circulation Pump	33	EA									
372	Heat Trace Well Line x2	33	EA									
373	Lift Station x2	3	EA									
374	Well Pump	33	EA									
375	Heat Trace Emergency Well Line	33	EA									
376	Heat Trace Well x2	33	EA									
377	Water Treatment	33	EA									
378	J-Boxes	234	EA	$12.50	$2,925	0.314	73.5	$8,927			$51	$11,852
379	Wiring: 1/2"C, (2)#12, (1)#12	5,280	LF	$3.13	$16,526	0.114	601.9	$73,107			$17	$89,633
380	Wiring: 1/2"C, (3)#12, (1)#12	2,760	LF	$3.44	$9,494	0.114	314.6	$38,211			$17	$47,705
381	Wiring: 1/2"C, (3)#10, (1)#10	1,650	LF	$4.06	$6,699	0.114	188.1	$22,847			$18	$29,546
382												
383												
384	Pilot Switches	165	EA	$43.75	$7,219	0.500	82.5	$10,020			$104	$17,239
385	Switches	66	EA	$43.75	$2,888	0.500	33.0	$4,008			$104	$6,896
386	Outlets, GFCI	33	EA	$25.00	$825	0.500	16.5	$2,004			$86	$2,829
387	Outlet, Duplex	132	EA	$6.25	$825	0.500	66.0	$8,016			$67	$8,841
388												
389	**Subtotal**	**234**	**EA**		$51,151		1,400.1	$170,055				$221,206
390												
391	**Well House**	**1**	**EA**									
392	**Power Circuits**	**5**	**EA**									
393	Receptacles 20A	4	EA	$6.25	$25	0.500	2.0	$243			$67	$268
394	Receptacles GFCI WP	1	EA	$57.50	$58	0.500	0.5	$61			$119	$119
395												
396	J-Boxes	5	EA	$12.50	$63	0.314	1.6	$194			$51	$257
397	Wiring: 1/2"C, (2)#12, (1)#12	150	LF	$3.13	$470	0.114	17.1	$2,077			$17	$2,547
398												
399	**Subtotal**	**1**	**EA**		$616		21.2	$2,575				$3,191
400												
401												
402												
403												
404												
405												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
406												
407	**D5040 Lighting**											
408												
409	**Residential Improvement**	**33**	**HOMES**									
410	**Interior Lighting**	**33**	**EA**									
411	Vanity Light	10	EA	$112.50	$1,125	1.000	10.0	$1,215			$234	$2,340
412	J-Boxes	10	EA	$8.75	$88	0.314	3.1	$377			$47	$465
413	Switch	10	EA	$17.50	$175	0.500	5.0	$607			$78	$782
414	Wiring: 1/2"C, (2)#12, (1)#12	350	LF	$3.13	$1,096	0.114	39.9	$4,846			$17	$5,942
415												
416	**Subtotal**	**33**	**EA**		$2,484		58.0	$7,045				$9,529
417												
418	**Well House**	**1**	**EA**									
419	LED Lights Interior	12	EA	$500.00	$6,000	2.000	24.0	$2,915			$743	$8,915
420	LED Lights Exterior	3	EA	$562.50	$1,688	2.000	6.0	$729			$806	$2,417
421	Switch	3	EA	$17.50	$53	0.500	1.5	$182			$78	$235
422	Wiring: 1/2"C, (2)#12, (1)#12	540	LF	$3.13	$1,690	0.114	61.6	$7,482			$17	$9,172
423												
424	**Subtotal**	**1**	**EA**		$9,431		93.1	$11,308				$20,739
425												
426												
427	**Subtotal: D50 ELECTRICAL**				$166,807		2,364.4	$287,179				$453,986
428												
429												
430	**E10 EQUIPMENT**		**NONE**									
431												
432												
433	**Subtotal: E10 EQUIPMENT**											
434												
435												
436	**E20 FURNISHINGS**											
437	**E2010 Fixed Furnishings**	**33**	**EA**									
438												
439	**Residential Improvement**	**33**	**HOMES**									
440	Base Cabinet, Countertop & Backsplash	330	LF	$550.00	$181,500	0.500	165.0	$16,085			$599	$197,585
441												
442	**Subtotal**	**33**	**HOMES**		$181,500		165.0	$16,085				$197,585
443												
444												
445	**Subtotal: E20 FURNISHINGS**				$181,500		165.0	$16,085				$197,585
446												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
447												
448	**F10 SPECIAL CONSTRUCTION**	**1**	**EA**									
449												
450	**Washeteria Upgrades**	**1**	**EA**									
451	Budget	1	LS	$750,000.00	$750,000	7,693.583	7,693.6	$750,002			$1,500,002	$1,500,002
452												
453	**Subtotal**	**1**	**EA**		$750,000		7,693.6	$750,002				$1,500,002
454												
455												
456												
457												
458	**Subtotal: F10 SPECIAL CONSTRUCTION**				$750,000		7,693.6	$750,002				$1,500,002
459												
460												
461	**F30 DEMOLITION**											
462	**F3010 Structure Demolition**	**1**	**EA**									
463	**Demo 424 KGAL Storage Tank**	**1**	**EA**									
464	Demo Tank Insulation	5,909	SF			0.100	590.9	$50,486			$9	$50,486
465	Demo Top and Framing	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
466	Demo Walls	4,775	SF			0.100	477.5	$40,798	$2.00	$9,550	$11	$50,348
467	Demo Base Plate	1,134	SF			0.100	113.4	$9,689	$2.00	$2,268	$11	$11,957
468	Demo Fdn System Wood and Steel	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
469	Demo Concrete	716	SF			0.050	35.8	$3,674	$2.00	$1,433	$7	$5,107
470	Ship Out Waste - Insulation	35,456	SF	$2.59	$91,831	0.001	35.5	$3,033			$3	$94,864
471	Ship Out Waste - Foundation	54,438	LBS	$0.86	$46,816	0.001	54.4	$4,648			$1	$51,464
472	Ship Out Waste - Steel	93,594	LBS	$0.86	$80,491	0.001	93.6	$7,997			$1	$88,488
473	Concrete Dispose On Site											
474												
475	**Subtotal**	**1**	**EA**		$219,138		1,854.7	$159,081		$22,323		$400,542
476												
477	**F3030 Selective Demolition**	**1**	**EA**									
478	**Remove Existing Treatment Equipment**	**1**	**EA**									
479	Demo WTP	2,000	SF			0.100	200.0	$23,791	$5.00	$8,000	$16	$31,791
480	Ship Out Waste	90,000	LBS	$1.08	$97,200	0.001	90.0	$10,706			$1	$107,906
481												
482	**Subtotal**	**1**	**EA**		$97,200		290.0	$34,497		$8,000		$139,697
483												
484												
485	**Subtotal: F30 DEMOLITION**				$316,338		2,144.7	$193,578		$30,323		$540,239
486												

Description	Qty	UNITS	Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
			Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
G10 SITE PREPARATION											
G1010 Site Clearing	**5,000**	**SF**	$0.46	$2,300						$0	$2,300
G1070 Site Earthwork											
Raise Extg WST Foundation	**1**	**EA**									
Fill - Subbase B	111	CY	$116.00	$12,889	0.200	22.2	$2,278	$10.50	$1,167	$147	$16,334
Rip Rap 50' Of Armoring	200	CY	$150.00	$30,000	1.000	200.0	$20,524	$175.00	$35,000	$428	$85,524
Raise Extg WST Foundation	**1**	**EA**		$42,889		222.2	$22,802		$36,167		$101,858
Subtotal: G10 SITE PREPARATION				$45,189		222.2	$22,802		$36,167		$104,158
G20 SITE IMPROVEMENTS											
G2060 Site Development	**1**	**LS**									
Heavy Duty Snow Fence	**200**	**LF**									
Helical Foundations at 10	21	EA	$300.00	$6,300	6.000	126.0	$10,765	$250.00	$5,250	$1,063	$22,315
Steel Post	21	EA	$75.00	$1,575	1.000	21.0	$1,794			$160	$3,369
Runners, 2x6 Treated Double Top/Bot	800	BF	$1.75	$1,400	0.019	15.2	$1,299			$3	$2,699
2x6 Pickets 6'H	2,400	BF	$1.75	$4,200	0.019	45.6	$3,896			$3	$8,096
Heavy Duty Snow Fence	**200**	**LF**		$13,475		207.8	$17,754		$5,250		$36,479
Rip Rap Protection	**100**	**LF**									
Imported Rock From Nome	400	CY	$150.00	$60,000						$150	$60,000
Filter Stone Import From Nome	533	CY	$100.00	$53,333						$100	$53,333
Haul Rock From Beach	933	CY			0.100	93.3	$9,574	$6.00	$5,600	$16	$15,174
Place Filter Rock	533	CY			1.000	533.3	$54,727	$175.00	$93,333	$278	$148,060
Place Rip Rap	400	CY			1.000	400.0	$41,048	$175.00	$70,000	$278	$111,048
Geofabric	1,200	BF	$1.75	$2,100	0.019	22.8	$1,948			$3	$4,048
Rip Rap Protection	**100**	**LF**		$115,433		1,049.4	$107,297		$168,933		$391,663

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
529	**Road To Beach**	**200**	**LF**									
530	Borrow (Import)	640	CY	$100.00	$64,000						$100	$64,000
531	Haul	640	CY			0.100	64.0	$6,568	$6.00	$3,840	$16	$10,408
532	Place Borrow	640	CY			0.200	128.0	$13,135	$15.00	$9,600	$36	$22,735
533	Geofabric	7,200	SF	$1.75	$12,600	0.019	136.8	$11,688			$3	$24,288
535	**Road To Beach**	**200**	**LF**		$76,600		328.8	$31,391		$13,440		$121,431
540	**Subtotal: G20 SITE IMPROVEMENTS**				$205,508		1,586.0	$156,442		$187,623		$549,573
543	**G30 LIQUID AND GAS SITE UTILITIES**											
545	**G3010 Water Utilities**											
547	**Water Main 4"**	**1,500**	**LF**									
548	Arctic Pipe 4x12 (5% Extra)	1,575	LF	$80.00	$126,000						$80	$126,000
549	AP Fitting Allowance	25	EA	$1,500.00	$37,500						$1,500	$37,500
550	**Production Rate**	**100**	**LF/DAY**									
551	Difficult Conditions With Obstructions											
552	Time	150	HRS									
553	Foreman	150	HRS			1.000	150.0	$18,725	$12.00	$1,500	$135	$20,225
554	Laborers	150	HRS			1.000	150.0	$12,816			$85	$12,816
555	Local Labor	150	HRS			1.000	150.0	$6,113			$41	$6,113
556	Skid Steer	150	HRS			1.000	150.0	$15,393	$28.00	$4,200	$131	$19,593

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
568	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Sewer 50%**	**15**	**EA**									
569	Micro Pilings	30	EA	$400.00	$12,000						$400	$12,000
570	Cross Beam	1,050	LBS	$3.00	$3,150						$3	$3,150
571	Pipe Supports (2 Per Pier)	30	EA	$35.00	$1,050						$35	$1,050
572												
573	**Production Rate**	**5**	**EA/DAY**									
574	Difficult Conditions, Boulder and Debris											
575	Time	30	HRS									
576	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
577	Laborers	30	HRS			1.000	30.0	$2,563			$85	$2,563
578	Local Labor	60	HRS			1.000	60.0	$2,445			$41	$2,445
579	Track Or Manual Drilling	30	HRS			2.000	60.0	$6,157	$175.00	$5,250	$380	$11,407
580	Skid Steer	30	HRS			1.000	30.0	$3,079	$28.00	$840	$131	$3,919
581	ATV With Trailer	30	HRS			1.000	30.0	$3,079	$35.00	$1,050	$138	$4,129
582												
583	**Water Main 4"**	**1,500**	**LF**		$179,700		840.0	$74,115		$13,140		$266,955
584												
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Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
607	**Combined Service Lines Water/Sewer**	**33**	**EA**									
608	Pipe - AP 4" Waste, 1" HDPE Water in 12" CMP Jacket - Allow 10% Extra For Damppage, Cuts, Misc. - Split With Sewer 50% Of Pipe	1,815	LF	$90.00	$163,350						$90	$163,350
609	Long Sweep 90 AP 1&4 x 12	17	EA	$2,200.00	$36,300						$2,200	$36,300
610	Long Sweep 45 AP 1&4 x 12	33	EA	$1,980.00	$65,340						$1,980	$65,340
611	Service 90 AP 1&4 x 12	17	EA	$2,090.00	$34,485						$2,090	$34,485
612	AP 12 x 36" Pipe Joint Kit	157	EA	$275.00	$43,106						$275	$43,106
613	Arctic Box & Boot	33	EA	$2,000.00	$66,000						$2,000	$66,000
614	PEX 1" Heat Trace Conduit	2,145	LF	$1.00	$2,145						$1	$2,145
615	Heat Trace Termination	66	EA	$50.00	$3,300						$50	$3,300
616	Arctic Pipe Heat Trace Cable	2,805	LF	$8.40	$23,562						$8	$23,562
617	Minor Housing Repairs	33	EA	$25.00	$825						$25	$825
618	**Production 2 Services/Day**	**17**	**DAYS**									
619	Time	170	HRS									
620	Foreman	170	HRS			1.000	170.0	$21,222	$12.00	$1,700	$135	$22,922
621	Laborers	170	HRS			1.000	170.0	$14,525			$85	$14,525
622	Electrician 1/2 Time_B1	85	HRS			1.000	85.0	$10,324			$121	$10,324
623	Local Labor	510	HRS			1.000	510.0	$20,783			$41	$20,783
624	Skid Steer With Operator	170	HRS			1.000	170.0	$16,572	$35.00	$5,950	$132	$22,522
625	Mini Excavator With Operator	170	HRS			1.000	170.0	$17,445	$77.00	$13,090	$180	$30,535
626	Dozer and Trailer For Pipe	170	HRS			1.000	170.0	$8,376	$45.00	$7,650	$94	$16,026
627												
628	**Combined Service Lines Water/Sewer**	**33**	**EA**		$438,413		$1,445	$109,247		$28,390		$576,050
629												
630	**Water Storage Tank**	**424**	**K GAL**									
631	Tanks, Subcontract, 424K Gallon	1	EA	$625,000.00	$625,000						$625,000	$625,000
632	Add For Difficult Environment, High Winds	1	EA	$200,000.00	$200,000						$200,000	$200,000
633	Tank Insulation Package	6,773	SF	$30.00	$203,198						$30	$203,198
634	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
635												
636	**Water Storage Tank**	**424**	**K GAL**		$1,033,823		$30	$3,569				$1,037,392
637												
638	**RO Unit**	**1**	**LS**									
639	RO Unit, Price Supplied By DOWL Based On Discussion With Known	1	EA	$350,000.00	$350,000						$350,000	$350,000
640												
641	**RO Unit**	**1**	**LS**		$350,000							$350,000
642												

Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
Shallow Beach Well	**2**	**EA**									
40' Well Assume With Cable Type Drill	2	EA	$50,000.00	$100,000						$50,000	$100,000
Shallow Beach Well	**2**	**EA**		$100,000							$100,000
G3010 Water Utilities	**1**	**LS**		$2,101,936		2,315.0	$186,931		$41,530		$2,330,397
G3020 Sanitary Sewerage Utilities											
6" Arctic Pipe Gravity Sewer	**1,500**	**LF**									
Arctic Pipe 6x15	1,575	LF	$109.00	$171,675						$109	$171,675
AP Fitting Allowance	21	EA	$2,000.00	$42,000						$2,000	$42,000
1" PEX Glycol Loop	3,150	LF	$2.00	$6,300						$2	$6,300
Energy Dissipation Structures	4	EA	$5,000.00	$20,000	16.000	64.0	$6,239	$1,000.00	$4,000	$7,560	$30,239
Cleanouts	5	EA	$1,500.00	$7,500	6.000	30.0	$2,925	$200.00	$1,000	$2,285	$11,425
Production Rate	**100**	**LF/DAY**									
Difficult Conditions With Obstructions											
Time	150	HRS									
Foreman	150	HRS			1.000	150.0	$18,725	$12.00	$1,500	$135	$20,225
Laborers	150	HRS			1.000	150.0	$12,816			$85	$12,816
Local Labor	150	HRS			1.000	150.0	$6,113			$41	$6,113
Skid Steer	150	HRS			1.000	150.0	$15,393	$28.00	$4,200	$131	$19,593

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
684	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Water 50%**	**15**	**EA**									
685	Micro Pilings	30	EA	$400.00	$12,000						$400	$12,000
686	Cross Beam	1,050	LBS	$3.00	$3,150						$3	$3,150
687	Pipe Supports (2 Per Pier)	30	EA	$35.00	$1,050						$35	$1,050
688	**Production Rate**	**5**	**EA/DAY**									
689	Difficult Conditions With Obstructions											
690	Time	30	HRS									
691	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
692	Laborers	30	HRS			1.000	30.0	$2,563			$85	$2,563
693	Local Labor	60	HRS			1.000	60.0	$2,445			$41	$2,445
694	Track Or Manual Drilling	30	HRS			2.000	60.0	$6,157	$175.00	$5,250	$380	$11,407
695	Skid Steer	30	HRS			1.000	30.0	$3,079	$28.00	$840	$131	$3,919
696	ATV With Trailer	30	HRS			1.000	30.0	$3,079	$35.00	$1,050	$138	$4,129
697												
698	**6" Arctic Pipe Gravity Sewer**	**1,500**	**LF**		$263,675		934.0	$83,279		$18,140		$365,094
699												
700												
701	**Sewer Service Line - See Combined Services in Water Section Above**	**33**	**EA**									
702												
703	**Residential Lift Station**	**3**	**EA**									
704	Lift Station Unit W/ Insulation	3	EA	$7,500.00	$22,500						$7,500	$22,500
705	Anchoring Straps	3	SETS	$1,500.00	$4,500						$1,500	$4,500
706	Rigid Insulation	2,664	BF	$0.80	$2,131						$1	$2,131
707	Field Foam Insulation	6	LOC	$20.00	$120						$20	$120
708	Bedding Material (Import)	28	CY	$100.00	$2,778						$100	$2,778
709	Seeding	1,200	SY	$1.00	$1,200						$1	$1,200
710	**Production 1 Services/Day**	**3**	**EA**									
711	Time	30	HRS									
712	Foreman	30	HRS			1.000	30.0	$3,745	$12.00	$300	$135	$4,045
713	Laborers	45	HRS			1.000	45.0	$3,845			$85	$3,845
714	Electrician	30	HRS			1.000	30.0	$3,644			$121	$3,644
715	Plumber	30	HRS			1.000	30.0	$3,569	$12.50	$300	$129	$3,869
716	Local Labor	60	HRS			1.000	60.0	$2,445			$41	$2,445
717	Operators	30	HRS			1.000	30.0	$3,079			$103	$3,079
718	Skid Steer With Trailer	30	HRS						$45.00	$1,350	$45	$1,350
719	Excavator 320	45	HRS						$108.50	$4,883	$109	$4,883
720												
721	**Residential Lift Station**	**3**	**EA**		$33,229		225.0	$20,327		$6,833		$60,389

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
722												
723	**Sewage Plants**	**1**	**EA**									
724	Lifewater System 5000 GPD	1	EA	$100,000.00	$100,000						$100,000	$100,000
725	Permit Cost	1	EA	$2,000.00	$2,000						$2,000	$2,000
726	Treated Timber Base	250	BF	$3.00	$750						$3	$750
727	Hardware	1	LS	$250.00	$250						$250	$250
728	4" Rigid Insulation	200	BF	$0.80	$160						$1	$160
729	Helical Anchor	4	EA	$300.00	$1,200						$300	$1,200
730	Bedding Material (Import)	17	CY	$100.00	$1,667						$100	$1,667
731	Power 3/4"C, (3)#12	30	LF	$2.00	$60						$2	$60
732												
733												
734	**Production 0.5 EA/DAY**	**2**	**DAYS**									
735	Time	20	HRS									
736	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
737	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
738	Electrician	10	HRS			1.000	10.0	$1,215			$122	$1,215
739	Plumber	10	HRS			1.000	10.0	$1,190	$12.50	$100	$129	$1,290
740	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
741	Operators	20	HRS			1.000	20.0	$2,052			$103	$2,052
742	Skid Steer With Trailer	20	HRS						$45.00	$900	$45	$900
743												
744	**Sewage Plants**	**1**	**EA**		$106,087		100.0	$9,478		$1,200		$116,765
745												
746	**Septage FM Decanted Water 2"**	**960**	**LF**									
747	HDPE 4"	960	LF	$7.00	$6,720						$7	$6,720
748	Fitting Allowance	10	EA	$20.00	$200						$20	$200
749	Bedding Material (Import)	320	CY	$100.00	$32,000						$100	$32,000
750	**Pipe Trench**	**960**	**LF**									
751	**Production 50 LF/DAY**	**20**	**DAYS**									
752	Time	200	HRS									
753	Foreman	200	HRS			1.000	200.0	$24,967	$12.00	$2,000	$135	$26,967
754	Laborers	200	HRS			1.000	200.0	$17,088			$85	$17,088
755	Local Labor	600	HRS			1.000	600.0	$24,450			$41	$24,450
756	Skid Steer	200	HRS			1.000	200.0	$20,524	$28.00	$5,600	$131	$26,124
757	Small Dozer	200	HRS			1.000	200.0	$20,524	$35.00	$7,000	$138	$27,524
758	Excavator 320	200	HRS			1.000	200.0	$20,524	$80.00	$16,000	$183	$36,524
759	Compactor With Operator	200	HRS			1.000	200.0	$20,524	$35.00	$7,000	$138	$27,524
760	Off Road Haul Unit	400	HRS			1.000	400.0	$19,708	$125.00	$50,000	$174	$69,708
761												
762	**Septage FM Decanted Water 2"**	**960**	**LF**		$38,920		2,200.0	$168,309		$87,600		$294,829

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
763												
764	**Septage Transmission Line 6"**	**950**	**LF**									
765	HDPE 6"	950	LF	$11.00	$10,450						$11	$10,450
766	Fitting Allowance	10	EA	$50.00	$500						$50	$500
767	Bedding Material (Import)	317	CY	$100.00	$31,667						$100	$31,667
768	**Pipe Trench**	**950**	**LF**									
769	**Production 50 LF/DAY**	**19**	**DAYS**									
770	Time	190	HRS									
771	Foreman	190	HRS			1.000	190.0	$23,719	$12.00	$1,900	$135	$25,619
772	Laborers	190	HRS			1.000	190.0	$16,234			$85	$16,234
773	Local Labor	570	HRS			1.000	570.0	$23,228			$41	$23,228
774	Skid Steer	190	HRS			1.000	190.0	$19,498	$28.00	$5,320	$131	$24,818
775	Small Dozer	190	HRS			1.000	190.0	$19,498	$35.00	$6,650	$138	$26,148
776	Excavator 320	190	HRS			1.000	190.0	$19,498	$80.00	$15,200	$183	$34,698
777	Compactor With Operator	190	HRS			1.000	190.0	$19,498	$35.00	$6,650	$138	$26,148
778	Off Road Haul Unit	380	HRS			1.000	380.0	$18,723	$125.00	$47,500	$174	$66,223
779												
780	**Septage Transmission Line 6"**	**950**	**LF**		$42,617		2,090.0	$159,896		$83,220		$285,733
781												
782	**Outfall Line**	**50**	**LF**									
783	HDPE 6"	50	LF	$11.00	$550						$11	$550
784	Weights	6	EA	$300.00	$1,800						$300	$1,800
785	Bedding Material (Import)	17	CY	$100.00	$1,667						$100	$1,667
786	**Pipe Trench**	**50**	**LF**									
787	**Production 50 LF/DAY**	**1**	**DAYS**									
788	Time	10	HRS									
789	Foreman	10	HRS			1.000	10.0	$1,248	$12.00	$100	$135	$1,348
790	Laborers	10	HRS			1.000	10.0	$854			$85	$854
791	Local Labor	30	HRS			1.000	30.0	$1,223			$41	$1,223
792	Skid Steer	10	HRS			1.000	10.0	$1,026	$28.00	$280	$131	$1,306
793	Small Dozer	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
794	Excavator 320	10	HRS			1.000	10.0	$1,026	$80.00	$800	$183	$1,826
795	Compactor With Operator	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
796	Off Road Haul Unit	20	HRS			1.000	20.0	$985	$125.00	$2,500	$174	$3,485
797	Skiff - Local Rental	1	LS						$5,000.00	$5,000	$5,000	$5,000
798												
799	**Outfall Line**	**50**	**LF**		$4,017		110.0	$8,414		$9,380		$21,811
800												
801												
802												
803												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
804	**Lift Station**	**1**	**EA**									
805	Pumps and Controls	1	EA	$81,250.00	$81,250	600.000	600.0	$72,876	$18,750.00	$15,000	$169,126	$169,126
806	Pump Building 14x16	1	EA	$40,000.00	$40,000	2,520.000	2,520.0	$245,659			$285,659	$285,659
807	Plumbing - Domestic	1	EA	$3,750.00	$3,750	10.000	10.0	$1,190			$4,940	$4,940
808	HVAC	1	EA	$3,125.00	$3,125	20.000	20.0	$2,438			$5,563	$5,563
809	Electrical	1	EA	$62,500.00	$62,500	100.000	100.0	$12,146			$74,646	$74,646
810												
811	**Lift Station**	**1**	**EA**		$190,625		3,250.0	$334,309		$15,000		$539,934
812												
813	**Septage Vault (40x20' x 10'd)**	**1**	**EA**									
814	**Earthwork For Foundation**											
815	Gravel Fill	135	CY									
816	Benched into Slope											
817	Borrow (Imported From Nome)	135	CY	$116.00	$15,673						$116	$15,673
818	**Production**	**100**	**CY/DAY**									
819	Time	14	HRS									
820	Foreman	14	HRS			1.000	13.5	$1,685	$12.00	$135	$135	$1,820
821	Laborers	14	HRS			1.000	13.5	$1,153			$85	$1,153
822	Compactor With Operator	14	HRS			1.000	13.5	$1,385	$65.00	$878	$167	$2,263
823	Dozer D6 With Operator	14	HRS			1.000	13.5	$1,385	$80.00	$1,081	$183	$2,466
824	Off Road Haul Unit	41	HRS			1.000	40.5	$1,995	$125.00	$5,067	$174	$7,062
825												
826	**Down Slope Foundation and Support**											
827	Concrete Foundations	13	CY	$1,400.00	$18,667	8.000	106.7	$10,402			$2,180	$29,069
828	Columns and Bracing	2,500	LBS	$3.00	$7,500	0.014	35.0	$3,412	$0.15	$375	$5	$11,287
829	Beam Support	2,000	LBS	$3.00	$6,000	0.014	28.0	$2,730	$0.15	$300	$5	$9,030
830												
831												
832												
833												
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844												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
845	**Vault 20x40x12 (10' Liquid Level, With Baffle**	1	EA	$250,000.00	$250,000						$250,000	$250,000
846	**Installation**	**10**	**DAYS**									
847	Time	100	HRS									
848	Foreman	100	HRS			1.000	100.0	$12,484	$12.00	$1,000	$135	$13,484
849	Laborers	100	HRS			1.000	100.0	$8,544			$85	$8,544
850	Local Labor	300	HRS			1.000	300.0	$12,225			$41	$12,225
851	Skid Steer With Operator	100	HRS			1.000	100.0	$10,262	$35.00	$3,500	$138	$13,762
852	Excavator With Operator	100	HRS			1.000	100.0	$10,262	$125.00	$12,500	$228	$22,762
853												
854	**Septage Vault (40x20' x 10'd)**	**1**	**EA**		$297,840		964.2	$77,924		$24,836		$400,600
855												
856	**G3020 Sanitary Sewerage Utilities**	-	-		$977,010		9,873.2	$861,936		$246,209		$2,085,155
857												
858												
859												
860												
861												
862												
863												
864	**Subtotal: G30 LIQUID AND GAS SITE UTILITIES**				$3,078,946		12,188.2	$1,048,867		$287,739		**$4,415,552**
865												
866												
867	**Z10 GENERAL REQUIREMENTS**											
868												
869	**Z1020 Administrative Requirements**											
870	Supervisor, 60 Hour/Week	121	WEEKS			60.000	7,260.0	$1,339,543			$11,071	$1,339,543
871	Project Expeditor, 20 Hour/Week	121	WEEKS			20.000	2,420.0	$206,765			$1,709	$206,765
872	Time Keeper/Cost Control, 40 Hour/Week	121	WEEKS			40.000	4,840.0	$244,660			$2,022	$244,660
873												
874	**Z1040 Quality Requirements**											
875	Quality Control	28	MTHS	$1,000.00	$28,000	40.000	1,120.0	$62,906			$3,247	$90,906
876	Test Lab Services	20	EA	$250.00	$5,000						$250	$5,000
877	Survey	1	EA	$40,000.00	$40,000						$40,000	$40,000
878												
879	**Z1050 Temporary Facilities and Controls**											
880	**Subsistence**											
881	Rental House	28	MTHS						$3,000.00	$84,000	$3,000	$84,000
882	Room & Board - Incidental	9,731	MDAY	$20.00	$194,617						$20	$194,617

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
883												
884	**Travel**											
885	Air Fare - Anchorage - Site	342	EA	$1,018.00	$348,156						$1,018	$348,156
886	Early Construction	4	EA									
887	Survey	6	EA									
888	Crew/Super (Trip/30 Mdays)	324	EA									
889	Inspections	8	EA									
890												
891	**Small Tools & Consumables**											
892	Consumables	1	LS	$6,100.00	$6,100						$6,100	$6,100
893	Small Tools	1	LS	$86,370.00	$86,370						$86,370	$86,370
894												
895	**Mobilization**											
896	Mobilization - Equipment	142	TONS	$2,300.00	$326,600						$2,300	$326,600
897	Side By Sides	3,500	LBS									
898	ATV & Trailer	1,000	LBS									
899	FE Loader	42,800	LBS									
900	Excavator	47,400	LBS									
901	Off Road Haul Unit (3)	117,000	LBS									
902	Skid Steer	5,000	LBS									
903	Sm Dozer	35,000	LBS									
904	Compactor	20,000	LBS									
905	Conc Mixer	1,000	LBS									
906	Misc	10,000	LBS									
907	Demobilization - Equipment	142	TONS	$1,725.00	$244,950						$1,725	$244,950
908	Surface Freight Seattle - Job Site	641	TONS	$2,300.00	$1,474,300						$2,300	$1,474,300
909	Handling Labor & Equipment	425	HRS			1.000	425.4	$36,346	$35.00	$14,890	$120	$51,236
910												
911	Air Freight Anchorage - Job Site - Incidental	28	MTHS	$2,000.00	$56,000						$2,000	$56,000
912	Winter Shutdown/Spring Restarts	3	EA	$5,000.00	$15,000	200.000	600.0	$58,490	$5,000.00	$15,000	$29,497	$88,490
913												
914												
915												
916												
917												
918												
919												
920												
921												
922												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
923	**Equipment**											
924	Equipment Standby and Travel Time	2	MTHS						$32,828.80	$65,658	$32,829	$65,658
925	Side By Sides	2	EA									
926	ATV & Trailer	1	EA									
927	FE Loader With Forks	1	EA									
928	Excavator	1	EA									
929	Skid Steer	1	EA									
930	Mini Excavator	1	EA									
931	Dozer D4	1	EA									
932	Compactor	1	EA									
933	Off Road Haul Units	3	EA									
934	Fuel (3/Hr Covered In Equip Rates)	66,505	GAL	$4.00	$266,019						$4	$266,019
935	Maintenance Labor 1 FTE	28	MTHS			259.800	7,274.4	$594,246			$21,223	$594,246
936												
937	**Temporary Facilities (24 Mths Over 6 Yr)**	**72**	**MTHS**									
938	Project Office Trailer	72	MTHS						$1,500.00	$108,000	$1,500	$108,000
939	Office Equipment/Supplies	28	MTHS	$500.00	$14,000						$500	$14,000
940	Project Tool Sheds	72	MTHS						$200.00	$14,400	$200	$14,400
941	Project Safety Equipment	1	LS	$1,500.00	$1,500						$1,500	$1,500
942	Communications/Internet	28	MTHS	$1,000.00	$28,000						$1,000	$28,000
943												
944	**SWPPP Maintenance**											
945	Erosion Control Inspections (4H/Wk)	121	WKS			4.000	484.0	$47,182			$390	$47,182
946	Silt Fences, BMPs	20,000	LF	$5.00	$100,000	0.250	5,000.0	$427,200			$26	$527,200
947												
948	**G5010 Site Communications Systems**											
949	Record Documents	100	SHTS	$100.00	$10,000						$100	$10,000
950	Operations and Maintenance Manuals	1	LS	$25,000.00	$25,000						$25,000	$25,000
951	Contract Closeout and Training	1	LS	$15,000.00	$15,000						$15,000	$15,000
952												
953												
954												
955												
956												
957												
958												
959												
960												
961	**Subtotal: Z10 GENERAL REQUIREMENTS**				$3,284,612		29,423.8	$3,017,338		$301,948		**$6,603,898**
962												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
963												
964	**Z70 TAXES, PERMITS, INSURANCE AND BONDS**											
965												
966	Insurance and Bond 3%	1	LS									$1,124,325
967												
968												
969												
970												
971												
972	**Subtotal: Z70 TAXES, PERMITS, INSURANCE AND BONDS**											**$1,124,325**
973												
974												
975	**Z90 FEES**											
976												
977	Overhead and Profit 12%	1	LS									$4,497,301
978												
979												
980												
981												
982	**Subtotal: Z90 FEES**											**$4,497,301**
983												
984												
985	**Z90 CONTINGENCIES**											
986												
987	**Z9050 Construction Contingencies**											
988	Estimating Contingency 10%	1	LS									$2,738,657
989	Project Contingency 15%	1	LS									$4,518,783
990	Inflation 6.5% For 3.5% Per Year = 24.66%	1	LS									$8,542,864
991												
992												
993												
994												
995												
996	**Subtotal: Z90 CONTINGENCIES**											**$15,800,304**
997												

Little Diomede Ph II 1st Water & Sewer Services

Alternate 3 - Satellite Delivery Stations With Seawater Source

Little Diomede, Alaska

Construction Cost Estimate

95% ePER Submittal

October 16, 2023

ESTIMATIONS

1225 E. International Airport Road, Suite 235

Anchorage, Alaska 99518

907.561.0790

Prepared for:

DOWL

5015 Business Park Blvd #4000

Anchorage, Alaska 99503

907.562.2000

Little Diomede Ph II 1st Water & Sewer Services

Alternate 3 - Satellite Delivery Stations With Seawater Source
Prepared for DOWL by Estimations

Construction Cost Estimate
95% ePER Submittal
October 16, 2023

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 3 - Satellite Delivery Stations With Seawater Source
Estimate Date:	October 16, 2023
Prepared By:	Jay Lavoie
Company:	Estimations, Inc
Address:	1225 E. Int'l Airport Road, Suite 235
City, State, Zip:	Anchorage, Alaska 99518
Phone:	907.561.0755
email:	jay@estimations.com

SCOPE OF WORK

Alternate 3 - Satellite System

Water Treatment Paln Equipment Renovation with Seawater Source	EA	1
Surface Water Source Intake Improvement	EA	1.00
Wave runup Fortification (Riprap)	LF	100.00
Replace Existing WST 424, 000 Gallons	EA	1.00
Satellite Station Buildings with retractable hose	EA	3.00
Water Main	LF	750.00
Residential Storage Tanks	EA	33.00
In-Home Plumbing	EA	33.00
Washeteria Updates	EA	1.00
Gravity Sewer Main	LF	750.00
Lifewater Wastewater Treatment Plant	EA	1.00
Lift Station and Utilidor to Vault	LF	960.00
Septage Vault	EA	1.00
Archaeological Monitor	day	

Notes on the Estimate

Basis of Estimate

Project:	**Little Diomede Ph II 1st Water & Sewer Services**
	Alternate 3 - Satellite Delivery Stations With Seawater Source
Estimate Date:	October 16, 2023
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Address:	1225 E. Int'l Airport Road, Suite 235
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email:	jay@estimations.com

DOCUMENTS

95% ePER Submittal

SOURCE OF COST DATA:

Estimations Internal cost database
Vendor Quote
Labor based on State of Alaska Title 36 Wages 04/2023.
BABA Compliance not Required.

ESTIMATE ASSUMPTIONS:

Summer 2025 Construction
Design Bid Build
Time on Site 22 MTHS of Construction over 4 Years

Little Diomede Ph II 1st Water & Sewer Services — **Construction Cost Estimate**

Alternate 3 - Satellite Delivery Stations With Seawater Source — **95% ePER Submittal**

Prepared for DOWL by Estimations — **October 16, 2023**

Description	Material	Labor	Hours	Equipment	Estimated Cost
0 OWNER COSTS	**$3,583,319**	**$1,864,768**	**19,129.00**	**$0**	**$5,448,087**
20 OWNER DEVELOPMENT	$3,583,319	$73,113	750.00	$0	$3,656,432
30 PROCUREMENT REQUIREMENTS	$0	$1,791,655	18,379.00	$0	$1,791,655
A SUBSTRUCTURE	**$508,893**	**$221,993**	**2,241.60**	**$47,101**	**$777,987**
A10 FOUNDATIONS	$508,893	$221,993	2,241.60	$47,101	$777,987
B SHELL	**$146,705**	**$120,745**	**$1,169**	**$375**	**$267,825**
B10 SUPERSTRUCTURE	$29,104	$48,636	498.90	$375	$78,115
B20 EXTERIOR VERTICAL ENCLOSURES	$112,399	$67,859	626.70	$0	$180,258
B30 EXTERIOR HORIZONTAL ENCLOSURES	$5,202	$4,250	43.60	$0	$9,452
C INTERIORS	**$95,562**	**$223,588**	**2,259.10**	**$0**	**$319,150**
C10 INTERIOR CONSTRUCTION	$66,528	$157,043	1,600.60	$0	$223,571
C20 INTERIOR FINISHES	$29,034	$66,545	658.50	$0	$95,579
D SERVICES	**$716,847**	**$843,714**	**7,258.50**	**$0**	**$1,560,561**
D20 PLUMBING	$539,873	$580,801	5,082.60	$0	$1,120,674
D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)	$18,496	$29,723	256.00	$0	$48,219
D50 ELECTRICAL	$158,478	$233,190	1,919.90	$0	$391,668

Little Diomede Ph II 1st Water & Sewer Services | **Construction Cost Estimate**

Alternate 3 - Satellite Delivery Stations With Seawater Source | **95% ePER Submittal**

Prepared for DOWL by Estimations | **October 16, 2023**

Description	Material	Labor	Hours	Equipment	Estimated Cost
E EQUIPMENT AND FURNISHINGS	**$181,500**	**$16,085**	**165.00**	**$0**	**$197,585**
E10 EQUIPMENT	$0	$0	-	$0	$0
E20 FURNISHINGS	$181,500	$16,085	165.00	$0	$197,585
F SPECIAL CONSTRUCTION AND DEMOLITION	**$1,066,338**	**$943,580**	**9,838.30**	**$30,323**	**$2,040,241**
F10 SPECIAL CONSTRUCTION	$750,000	$750,002	7,693.60	$0	$1,500,002
F30 DEMOLITION	$316,338	$193,578	2,144.70	$30,323	$540,239
G SITEWORK	**$2,758,621**	**$1,086,829**	**11,583.80**	**$404,707**	**$4,250,157**
G10 SITE PREPARATION	$83,666	$41,161	401.10	$40,188	$165,015
G20 SITE IMPROVEMENTS	$154,308	$156,442	1,586.00	$187,623	$498,373
G30 LIQUID AND GAS SITE UTILITIES	$2,520,647	$889,226	9,596.70	$176,896	$3,586,769
Z GENERAL	**$3,385,355**	**$2,397,166**	**23,498.00**	**$159,058**	**$26,419,683**
Z10 GENERAL REQUIREMENTS	$3,385,355	$2,397,166	23,498.00	$159,058	$5,941,579
Z70 TAXES, PERMITS, INSURANCE AND BONDS	$0	$0	-	$0	$1,074,996
Z90 FEES	$0	$0	-	$0	$4,299,983
Z90 CONTINGENCIES	$0	$0	-	$0	$15,103,125
TOTAL ESTIMATED COST	**$12,443,140**	**$7,718,468**	**$77,143**	**$641,564**	**$41,281,276**

Little Diomede Ph II 1st Water & Sewer Services

Alternate 3 - Satellite Delivery Stations With Seawater Source
Prepared for DOWL by Estimations

Construction Cost Estimate

95% ePER Submittal
October 16, 2023

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
1	**20 OWNER DEVELOPMENT**											
3	**2010 Site Acquisition**											
4	Not Included											
6	**2020 Permits**		**NONE**									
8	**2030 Professional Services**											
9	Design Fees 10% Of Construction	1	LS	$3,583,318.87	$3,583,319						$3,583,319	$3,583,319
10	Archaeological Monitoring	75	DAYS			10.000	750.0	$73,113			$975	$73,113
19	**Subtotal: 20 OWNER DEVELOPMENT**				$3,583,319		750.0	$73,113				**$3,656,432**
22	**30 PROCUREMENT REQUIREMENTS**											
24	**3010 Project Delivery**											
25	Construction Management 5% Of Construction	1	LS			18,379.041	18,379.0	$1,791,655			$1,791,655	$1,791,655
36	**Subtotal: 30 PROCUREMENT REQUIREMENTS**						18,379.0	$1,791,655				**$1,791,655**

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
38												
39	**A10 FOUNDATIONS**											
40												
41	**A1020 Special Foundations**											
42												
43	**Satellite Station Building Foundation**	**3**	**EA**									
44	Post and Pad	27	EA	$172.00	$4,644	6.000	162.0	$19,004			$876	$23,648
45												
46	**Subtotal**	**3**	**EA**		$4,644		162.0	$19,004				$23,648
47												
48	**WST Foundations**	**2**	**EA**									
49	Insulated Concrete Precast	1,600	SF	$40.00	$64,000	0.032	51.2	$5,254	$9.08	$14,525	$52	$83,779
50	AWW Mud Sills 4x12 @ 2'oc	1,644	LF	$8.00	$13,152	0.114	187.4	$18,268	$1.00	$1,644	$20	$33,064
51	AWW 8x12	1,488	LF	$40.00	$59,520	0.343	510.4	$49,756	$4.00	$5,952	$77	$115,228
52	AWW Plywood 5/8	2,880	SF	$1.25	$3,600	0.019	54.7	$5,332			$3	$8,932
53	Hardware	2	SETS	$2,000.00	$4,000						$2,000	$4,000
54	Insulation XPS, High Compression 2"	235,008	BF	$0.90	$211,507	0.003	705.0	$68,726			$1	$280,233
55	Concrete	36	CY	$1,800.00	$64,800	8.000	288.0	$28,075	$350.00	$12,600	$2,930	$105,475
56	Grade Ring	239	LF	$266.67	$63,670	1.185	282.9	$27,578	$51.85	$12,380	$434	$103,628
57	Misc	2	EA	$10,000.00	$20,000						$10,000	$20,000
58												
59	**WST Foundations**	**2**	**EA**		$504,249		2,079.6	$202,989		$47,101		$754,339
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73	**Subtotal: A10 FOUNDATIONS**				$508,893		2,241.6	$221,993		$47,101		**$777,987**
74												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
75												
76	**B10 SUPERSTRUCTURE**											
77												
78	**B1010 Floor Construction**											
79												
80	**Satellite Station Building Foundation**	**3**	**EA**									
81	**AREA**	**120**	**SF/EA**									
82	Glulam Beams	928	BF	$6.00	$5,569	0.021	19.5	$1,901	$0.15	$139	$8	$7,609
83	Joist	360	LF	$12.00	$4,320	0.050	18.0	$1,755			$17	$6,075
84	1.5" Metal Decking	360	SF	$6.00	$2,160	0.021	7.6	$741			$8	$2,901
85	Pea Gravel Fill at Flutes	1	CY	$130.00	$121	0.100	0.1	$10	$3.00	$3	$144	$134
86	4" Rigid High Density Insulation Board	1,440	BF	$0.90	$1,296	0.004	5.8	$565			$1	$1,861
87	6" Dura-Base Composite Mat	360	SF	$5.00	$1,800	0.021	7.6	$741			$7	$2,541
88	Concrete Slab 6"	360	SF	$3.89	$1,400	0.037	13.3	$1,297	$0.65	$233	$8	$2,930
89												
90	**Subtotal**	**3**	**EA**		$16,666		71.9	$7,010		$375		$24,051
91												
92	**B1020 Roof Construction**											
93												
94	**Satellite Station Building 3 Ea**	**360**	**SF**									
95	GLB 6x36	44	LF	$117.00	$5,148	9.000	396.0	$38,604			$994	$43,752
96	Column	2	EA	$1,125.00	$2,250	2.679	5.4	$526			$1,388	$2,776
97	SIPs Panels	360	SF	$14.00	$5,040	0.071	25.6	$2,496			$21	$7,536
98												
99	**Subtotal**	**360**	**SF**		$12,438		427.0	$41,626				$54,064
100												
101												
102												
103												
104												
105												
106												
107												
108												
109												
110	**Subtotal: B10 SUPERSTRUCTURE**				$29,104		498.9	$48,636		$375		**$78,115**
111												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
112												
113	**B20 EXTERIOR VERTICAL ENCLOSURES**											
114												
115	**B2010 Exterior Walls**											
116												
117	**Satellite Station Building 3 Ea**	**2,112**	**SF**									
118	SIPs Panels	2,112	SF	$14.00	$29,568	0.071	150.0	$14,623			$21	$44,191
119	Weather Barrier	2,112	SF	$1.80	$3,802	0.009	19.0	$1,852			$3	$5,654
120	Siding	2,112	SF	$18.00	$38,016	0.086	181.6	$23,105			$29	$61,121
121	Furring	3	EA	$1,125.00	$3,375	2.679	8.0	$780			$1,385	$4,155
122	Vapor Retarder	2,112	SF	$0.50	$1,056	0.006	12.7	$1,238			$1	$2,294
123	GWB	2,112	SF	$0.78	$1,647	0.034	71.8	$8,363			$5	$10,010
124	FRP Panels	2,112	SF	$5.00	$10,560	0.057	120.4	$11,737			$11	$22,297
125	Exterior Door, Single	3	EA	$2,850.00	$8,550	7.000	21.0	$2,047			$3,532	$10,597
126	Windows	211	SF	$75.00	$15,825	0.200	42.2	$4,114			$94	$19,939
127												
128	**Subtotal**	**2,112**	**SF**		$112,399		626.7	$67,859				$180,258
129												
130												
131	**Subtotal: B20 EXTERIOR VERTICAL ENCLOSURES**				$112,399		626.7	$67,859				**$180,258**
132												
133												
134	**B30 EXTERIOR HORIZONTAL ENCLOSURES**											
135												
136	**B3010 Roofing**											
137												
138	**Satellite Station Building 3 Ea**	**360**	**SF**									
139	SAM Vapor Barrier	360	SF	$1.15	$414	0.009	3.2	$312			$2	$726
140	Metal Roofing	360	SF	$10.00	$3,600	0.086	31.0	$3,022			$18	$6,622
141	Flashing	132	LF	$9.00	$1,188	0.071	9.4	$916			$16	$2,104
142												
143	**Subtotal**	**360**	**SF**		$5,202		43.6	$4,250				$9,452
144												
145												
146												
147	**Subtotal: B30 EXTERIOR HORIZONTAL ENCLOSURES**				$5,202		43.6	$4,250				**$9,452**
148												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
149												
150	**C10 INTERIOR CONSTRUCTION**											
151												
152	**C1010 Interior Partitions**											
153												
154	**Residential Improvement**	**33**	**HOMES**									
155	2x Wood Framing & Hardware Allowance For Repairs	1,073	BF	$2.00	$2,145	0.057	61.1	$5,956			$8	$8,101
156	5/8" GWB Allowance For Repairs	1,238	SF	$0.72	$891	0.043	53.2	$6,197			$6	$7,088
157												
158	**Subtotal**	**33**	**HOMES**		$3,036		114.3	$12,153				$15,189
159												
160	**C1030 Interior Doors**											
161												
162	**Residential Improvement**	**33**	**HOMES**									
163	Wall Framing Modifications	33	EA	$50.00	$1,650	4.000	132.0	$12,868			$440	$14,518
164	Prehung Wood Flush Door & Frame 3x7	33	EA	$500.00	$16,500	4.000	132.0	$12,868			$890	$29,368
165	Privacy Lockset	33	EA	$150.00	$4,950	2.000	66.0	$6,434			$345	$11,384
166	Door Casing Trim	1,122	LF	$5.00	$5,610	0.071	79.7	$7,769			$12	$13,379
167												
168	**Subtotal**	**33**	**HOMES**		$28,710		409.7	$39,939				$68,649
169												
170	**C1060 Raised Floor Construction**											
171												
172	**Residential Improvement**	**33**	**HOMES**									
173	**Bathtub Platform Construction**											
174	Framed Curb @ 16" O.C.	990	BF	$3.00	$2,970	0.071	70.3	$6,853			$10	$9,823
175	3/4" Plywood Subfloor	1,056	SF	$2.00	$2,112	0.043	45.4	$4,426			$6	$6,538
176												
177	**Subtotal**	**33**	**HOMES**		$5,082		115.7	$11,279				$16,361
178												
179												
180												
181												
182												
183												
184												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
185												
186	**C1070 Suspended Ceiling Construction**											
187												
188	**Residential Improvement**	**33**	**HOMES**									
189	**Bathroom Exhaust Fan Soffit**											
190	Framing	3,960	BF	$3.00	$11,880	0.114	451.4	$44,004			$14	$55,884
191	Soffit Paneling	2,640	SF	$3.00	$7,920	0.143	377.5	$36,800			$17	$44,720
192												
193	**Subtotal**	**33**	**HOMES**		$19,800		828.9	$80,804				$100,604
194												
195	**C1090 Interior Specialties**											
196												
197	**Residential Improvement**	**33**	**HOMES**									
198	Bathroom Accessories	33	SET	$300.00	$9,900	4.000	132.0	$12,868			$690	$22,768
199												
200	**Subtotal**	**33**	**SET**		$9,900		132.0	$12,868				$22,768
201												
202	**Subtotal: C10 INTERIOR CONSTRUCTION**				$66,528		1,600.6	$157,043				$223,571
203												
204												
205	**C20 INTERIOR FINISHES**											
206												
207	**C2010 Wall Finishes**											
208												
209	**Residential Improvement**	**33**	**HOMES**									
210	Patching & Painting	3,300	SF	$1.20	$3,960	0.043	141.9	$15,009			$6	$18,969
211												
212	**Subtotal**	**3,300**	**SF**		$3,960		141.9	$15,009				$18,969
213												
214	**C2030 Flooring**											
215												
216	**Residential Improvement**	**33**	**HOMES**									
217	3/8" Underlayment	2,640	SF	$1.25	$3,300	0.043	113.5	$11,064			$5	$14,364
218	Sheet Vinyl Flooring	2,640	SF	$7.00	$18,480	0.071	187.4	$18,268			$14	$36,748
219	Rubber Base	1,188	LF	$1.50	$1,782	0.057	67.7	$6,600			$7	$8,382
220												
221	**Subtotal**	**33**	**HOMES**		$23,562		368.6	$35,932				$59,494

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
222												
223	**Satellite Station Building 3 Ea**	**360**	**SF**									
224	Sealed Concrete	360	SF	$0.35	$126	0.017	6.1	$595			$2	$721
225												
226	**Subtotal**	**360**	**SF**		$126		6.1	$595				$721
227												
228	**C2050 Ceiling Finishes**											
229												
230	**Residential Improvement**	**33**	**HOMES**									
231	Ceiling Paint Allowance @ Fan Soffit	3,300	SF	$0.42	$1,386	0.043	141.9	$15,009			$5	$16,395
232												
233	**Subtotal**	**33**	**HOMES**		$1,386		141.9	$15,009				$16,395
234												
235												
236												
237												
238												
239												
240												
241	**Subtotal: C20 INTERIOR FINISHES**				$29,034		658.5	$66,545				$95,579
242												
243												
244	**D20 PLUMBING**											
245												
246	**D2010 Domestic Water Distribution**											
247												
248	**Residential Improvement**	**33**	**HOMES**									
249	**Plumbing Fixtures**											
250	Water Closet	33	EA	$625.00	$20,625	2.000	66.0	$7,851			$863	$28,476
251	Lavatory, Counter Mounted	33	EA	$375.00	$12,375	2.000	66.0	$7,851			$613	$20,226
252	Kitchen Sink	33	EA	$812.50	$26,813	5.000	165.0	$19,628			$1,407	$46,441
253	Bath/Shower Combo	33	EA	$1,875.00	$61,875	12.000	396.0	$47,106			$3,302	$108,981
254												
255	**Specialties**											
256	Oil Fired Hot Water Heater	33	EA	$3,125.00	$103,125	16.000	528.0	$62,809			$5,028	$165,934
257	Vent Kit	33	EA	$593.75	$19,594	8.000	264.0	$31,404			$1,545	$50,998
258	Drip Pan	33	EA	$187.50	$6,188	0.250	8.3	$987			$217	$7,175

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
259												
260	**Water Service Equipment**											
261	Well Circ Pump	33	EA	$500.00	$16,500	6.000	198.0	$23,553			$1,214	$40,053
262	Drain Valve	99	EA	$18.75	$1,856	0.500	49.5	$5,888			$78	$7,744
263	Isolation Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
264	Expansion Valve	66	EA	$43.75	$2,888	0.500	33.0	$3,926			$103	$6,814
265	P-Gauge	33	EA	$18.75	$619	0.500	16.5	$1,963			$78	$2,582
266	Water Storage Tank 100 Gal With Appurtences	33	EA	$750.00	$24,750	8.000	264.0	$31,404			$1,702	$56,154
267	Pressure Tank	33	EA	$1,000.00	$33,000	4.000	132.0	$15,702			$1,476	$48,702
268	Fitting & Accessories	33	EA	$625.00	$20,625	12.000	396.0	$47,106			$2,052	$67,731
269	Water Treatment Equipment Unit Allowance	33	EA	$2,500.00	$82,500	12.000	396.0	$47,106			$3,927	$129,606
270												
271	**Facility Water Distribution Piping**											
272	Domestic HW/CW Supply, Type L Copper											
273	3/4" Pipe	330	LF	$4.65	$1,535	0.100	33.0	$3,926			$17	$5,461
274	Hangers	66	EA	$8.75	$578	0.143	9.4	$1,118			$26	$1,696
275	Fittings	1	LS	$1,439.06	$1,439	49.500	49.5	$5,888			$7,327	$7,327
276	Domestic HW/CW Supply, PEX											
277	1/2" Pipe	660	LF	$1.56	$1,030	0.050	33.0	$3,926			$8	$4,956
278	3/4" Pipe	495	LF	$1.88	$931	0.050	24.8	$2,950			$8	$3,881
279	1" Pipe	330	LF	$2.19	$723	0.050	16.5	$1,963			$8	$2,686
280	Hangers	371	EA	$6.25	$2,319	0.150	55.7	$6,626			$24	$8,945
281	Fittings	1	LS	$1,258.13	$1,258	55.725	55.7	$6,626			$7,884	$7,884
282	Sterilization & Pressure Test	33	EA	$62.50	$2,063	4.000	132.0	$15,702			$538	$17,765
283	Water Connection Boxes	33	EA	$350.00	$11,550	12.000	396.0	$38,604			$1,520	$50,154
284												
285	**Subtotal**	**33**	**EA**		$459,647		3,816.9	$445,539				$905,186
286												
287												
288												
289												
290												
291												
292												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
293												
294	**Satellite Buildings**	**3**	**EA**									
295	**Water Service Equipment**											
296	100' Hose	3	EA	$62.50	$188	6.943	20.8	$2,474			$887	$2,662
297	Valving	3	EA	$31.25	$94	0.500	1.5	$178			$91	$272
298	Water Meter	3	EA	$312.50	$938	2.000	6.0	$714			$551	$1,652
299												
300	**Facility Water Distribution Piping**											
301	Domestic HW/CW Supply, Type L Copper											
302	3/4" Pipe	30	LF	$4.65	$140	0.100	3.0	$357			$17	$497
303	Hangers	6	EA	$8.75	$53	0.143	0.9	$107			$27	$160
304	Fittings	1	LS	$131.25	$131	4.500	4.5	$535			$666	$666
305	Sterilization & Pressure Test	3	EA	$62.50	$188	4.000	12.0	$1,427			$538	$1,615
306	Water Connection Boxes	3	EA	$350.00	$1,050	12.000	36.0	$3,509			$1,520	$4,559
307												
308	**Subtotal**	**3**	**EA**		$2,782		84.7	$9,301				$12,083
309												
310	**D2020 Sanitary Drainage**											
311												
312	**Residential Improvement**	**33**	**HOMES**									
313	**Facility Sanitary Sewage Piping**											
314	Above Grade ABS											
315	1-1/2" Pipe	330	LF	$2.14	$706	0.089	29.4	$3,497			$13	$4,203
316	2" Pipe	495	LF	$2.97	$1,470	0.060	29.7	$3,533			$10	$5,003
317	3" Pipe	330	LF	$5.63	$1,858	0.070	23.1	$2,748			$14	$4,606
318	Hangers	193	EA	$8.75	$1,689	0.250	48.3	$5,746			$39	$7,435
319	Fittings	1	LS	$6,051.00	$6,051	110.003	110.0	$13,085			$19,136	$19,136
320	Valve Allowance	33	EA	$15.00	$495	0.500	16.5	$1,608			$64	$2,103
321	Vent Thru Roof, 3"	33	EA	$125.00	$4,125	8.000	264.0	$31,404			$1,077	$35,529
322	Water Connection Boxes	33	EA	$350.00	$11,550	12.000	396.0	$38,604			$1,520	$50,154
323	Sewer Storage Tank 500 Gal	33	EA	$1,500.00	$49,500	8.000	264.0	$25,736			$2,280	$75,236
324												
325	**Subtotal**	**33**	**HOMES**		$77,444		1,181.0	$125,961				$203,405
326												
327	**Subtotal: D20 PLUMBING**				$539,873		5,082.6	$580,801				$1,120,674
328												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
329												
330	**D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**											
331												
332	**D3010 Facility Fuel Systems**											
333												
334	**Residential Improvement**	**33**	**EA**									
335	Fuel Filter Kit	33	EA	$112.50	$3,713	2.000	66.0	$7,851			$350	$11,564
336	Fuel Line & Fittings	33	EA	$187.50	$6,188	4.000	132.0	$15,702			$663	$21,890
337												
338	**Subtotal**	**33**	**EA**		$9,901		198.0	$23,553				$33,454
339												
340	**Satellite Bldg**	**3**	**EA**									
341	Electric Heat	3	EA	$1,875.00	$5,625	8.000	24.0	$2,855			$2,827	$8,480
342												
343	**Subtotal**	**3**	**EA**		$5,625		24.0	$2,855				$8,480
344												
345	**D3060 Ventilation**											
346												
347	**Residential Improvement**	**33**	**EA**									
348	Exhaust Fan	10	EA	$250.00	$2,500	2.000	20.0	$1,950			$445	$4,450
349	4" Duct	40	LF	$3.00	$120	0.100	4.0	$390			$13	$510
350	Ext. Wall Hood W/ Damper & Screen	10	EA	$35.00	$350	1.000	10.0	$975			$133	$1,325
351												
352	**Subtotal**	**33**	**EA**		$2,970		34.0	$3,315				$6,285
353												
354												
355												
356												
357												
358												
359												
360												
361												
362												
363												
364	**Subtotal: D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**				$18,496		256.0	$29,723				$48,219
365												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
366												
367	**D50 ELECTRICAL**											
368												
369	**D5020 Electrical Service and Distribution**											
370												
371	**Residential Improvement**	**33**	**EA**									
372	**Services**	**33**	**EA**									
373	Service Upgrade Allowances - Panels, Ground & Feeds	33	EA	$3,125.00	$103,125	24.000	792.0	$96,196			$6,040	$199,321
374												
375	**Subtotal**	**33**	**EA**		$103,125		792.0	$96,196				$199,321
376												
377	**Satellite Bldg**	**3**	**EA**									
378	**Services**	**3**	**EA**									
379	Service To Satellite Bldgs	3	EA	$3,750.00	$11,250	24.000	72.0	$8,745			$6,665	$19,995
380												
381	**Subtotal**	**3**	**EA**		$11,250		72.0	$8,745				$19,995
382												
383	**D5030 General Purpose Electrical Power**											
384												
385	**Residential Improvement**	**33**	**EA**									
386	**Power Circuits**	**132**	**EA**									
387	Bathroom Exhaust Fan, Light, Recept	33	EA									
388	Heat Trace Emergency Well Line	33	EA									
389	Heat Trace Well x2	33	EA									
390	Water Treatment	33	EA									
391	J-Boxes	132	EA	$12.50	$1,650	0.314	41.4	$5,028			$51	$6,678
392	Wiring: 1/2"C, (2)#12, (1)#12	3,960	LF	$3.13	$12,395	0.114	451.4	$54,827			$17	$67,222
393	Wiring: 1/2"C, (3)#12, (1)#12	1,320	LF	$3.44	$4,541	0.114	150.5	$18,280			$17	$22,821
394												
395	Pilot Switches	165	EA	$43.75	$7,219	0.500	82.5	$10,020			$104	$17,239
396	Switches	66	EA	$43.75	$2,888	0.500	33.0	$4,008			$104	$6,896
397	Outlets, GFCI	33	EA	$25.00	$825	0.500	16.5	$2,004			$86	$2,829
398	Outlet, Duplex	132	EA	$6.25	$825	0.500	66.0	$8,016			$67	$8,841
399												
400	**Subtotal**	**132**	**EA**		$30,343		841.3	$102,183				$132,526

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
401												
402	**Satellite Bldg**	**3**	**EA**									
403	**Power Circuits**	**15**	**EA**									
404	Receptacles 20A	12	EA	$6.25	$75	0.500	6.0	$729			$67	$804
405	Receptacles GFCI WP	3	EA	$57.50	$173	0.500	1.5	$182			$118	$355
406	J-Boxes	15	EA	$12.50	$188	0.314	4.7	$571			$51	$759
407	Wiring: 1/2"C, (2)#12, (1)#12	450	LF	$3.13	$1,409	0.114	51.3	$6,231			$17	$7,640
408												
409	**Subtotal**	**3**	**EA**		$1,845		63.5	$7,713				$9,558
410												
411	**D5040 Lighting**											
412												
413	**Residential Improvement**	**33**	**HOMES**									
414	**Interior Lighting**	**33**	**EA**									
415	Vanity Light	10	EA	$112.50	$1,125	1.000	10.0	$1,215			$234	$2,340
416	J-Boxes	10	EA	$8.75	$88	0.314	3.1	$377			$47	$465
417	Switch	10	EA	$17.50	$175	0.500	5.0	$607			$78	$782
418	Wiring: 1/2"C, (2)#12, (1)#12	350	LF	$3.13	$1,096	0.114	39.9	$4,846			$17	$5,942
419												
420	**Subtotal**	**33**	**EA**		$2,484		58.0	$7,045				$9,529
421												
422	**Satellite Bldg**	**3**	**EA**									
423	LED Lights Interior	12	EA	$500.00	$6,000	2.000	24.0	$2,915			$743	$8,915
424	LED Lights Exterior	3	EA	$562.50	$1,688	2.000	6.0	$729			$806	$2,417
425	Switch	3	EA	$17.50	$53	0.500	1.5	$182			$78	$235
426	Wiring: 1/2"C, (2)#12, (1)#12	540	LF	$3.13	$1,690	0.114	61.6	$7,482			$17	$9,172
427												
428	**Subtotal**	**3**	**EA**		$9,431		93.1	$11,308				$20,739
429												
430												
431												
432												
433												
434												
435	**Subtotal: D50 ELECTRICAL**				$158,478		1,919.9	$233,190				$391,668
436												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
437												
438	**E10 EQUIPMENT**		**NONE**									
439												
440												
441												
442	**Subtotal: E10 EQUIPMENT**											
443												
444												
445	**E20 FURNISHINGS**											
446												
447	**E2010 Fixed Furnishings**	**33**	**EA**									
448												
449	**Residential Improvement**	**33**	**HOMES**									
450	Base Cabinet, Countertop & Backsplash	330	LF	$550.00	$181,500	0.500	165.0	$16,085			$599	$197,585
451												
452	**Subtotal**	**33**	**HOMES**		$181,500		165.0	$16,085				$197,585
453												
454												
455												
456												
457												
458	**Subtotal: E20 FURNISHINGS**				$181,500		165.0	$16,085				$197,585
459												
460												
461	**F10 SPECIAL CONSTRUCTION**	**1**	**EA**									
462												
463	**Washeteria Upgrades**	**1**	**EA**									
464	Budget	1	LS	$750,000.00	$750,000	7,693.583	7,693.6	$750,002			$1,500,002	$1,500,002
465												
466	**Subtotal**	**1**	**EA**		$750,000		7,693.6	$750,002				$1,500,002
467												
468												
469												
470												
471	**Subtotal: F10 SPECIAL CONSTRUCTION**				$750,000		7,693.6	$750,002				$1,500,002
472												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
473												
474	**F30 DEMOLITION**											
475												
476	**F3010 Structure Demolition**	**1**	**EA**									
477												
478	**Demo 424 KGAL Storage Tank**	**1**	**EA**									
479	Demo Tank Insulation	5,909	SF			0.100	590.9	$50,486			$9	$50,486
480	Demo Top and Framing	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
481	Demo Walls	4,775	SF			0.100	477.5	$40,798	$2.00	$9,550	$11	$50,348
482	Demo Base Plate	1,134	SF			0.100	113.4	$9,689	$2.00	$2,268	$11	$11,957
483	Demo Fdn System Wood and Steel Deck	1,134	SF			0.200	226.8	$19,378	$4.00	$4,536	$21	$23,914
484	Demo Concrete	716	SF			0.050	35.8	$3,674	$2.00	$1,433	$7	$5,107
485	Ship Out Waste - Insulation	35,456	SF	$2.59	$91,831	0.001	35.5	$3,033			$3	$94,864
486	Ship Out Waste - Foundation	54,438	LBS	$0.86	$46,816	0.001	54.4	$4,648			$1	$51,464
487	Ship Out Waste - Steel	93,594	LBS	$0.86	$80,491	0.001	93.6	$7,997			$1	$88,488
488	Concrete Dispose On Site											
489												
490	**Subtotal**	**1**	**EA**		$219,138		1,854.7	$159,081		$22,323		$400,542
491												
492	**F3030 Selective Demolition**	**1**	**EA**									
493												
494	**Remove Existing Treatment Equipment**	**1**	**EA**									
495	Demo WTP	2,000	SF			0.100	200.0	$23,791	$5.00	$8,000	$16	$31,791
496	Ship Out Waste	90,000	LBS	$1.08	$97,200	0.001	90.0	$10,706			$1	$107,906
497												
498	**Subtotal**	**1**	**EA**		$97,200		290.0	$34,497		$8,000		$139,697
499												
500												
501												
502												
503												
504												
505												
506	**Subtotal: F30 DEMOLITION**				$316,338		2,144.7	$193,578		$30,323		$540,239
507												

Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
G10 SITE PREPARATION											
G1010 Site Clearing	**5,000**	**SF**	$0.46	$2,300						$0	$2,300
G1070 Site Earthwork											
Runoff Basin	**50**	**LF**									
Excavation 4'	89	CY			0.200	17.8	$1,827	$10.50	$933	$31	$2,760
Fill - Subbase B	171	CY	$116.00	$19,797	0.200	34.1	$3,499	$10.50	$1,792	$147	$25,088
Concrete Apron	1,000	SF	$8.68	$8,680	0.127	127.0	$13,033	$1.30	$1,296	$23	$23,009
Grout Boulders	1	LS	$10,000.00	$10,000						$10,000	$10,000
Runoff Basin	**50**	**LF**		$40,777		178.9	$18,359		$4,021		$63,157
Raise Extg WST Foundation	**1**	**EA**									
Fill - Subbase B	111	CY	$116.00	$12,889	0.200	22.2	$2,278	$10.50	$1,167	$147	$16,334
Rip Rap 50' Of Armoring	200	CY	$150.00	$30,000	1.000	200.0	$20,524	$175.00	$35,000	$428	$85,524
Raise Extg WST Foundation	**1**	**EA**		$42,889		222.2	$22,802		$36,167		$101,858
Subtotal: G10 SITE PREPARATION				$83,666		401.1	$41,161		$40,188		$165,015

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
545												
546	**G20 SITE IMPROVEMENTS**											
547												
548	**G2060 Site Development**	**1**	**LS**									
549												
550	**Heavy Duty Snow Fence**	**200**	**LF**									
551	Helical Foundations at 10	21	EA	$300.00	$6,300	6.000	126.0	$10,765	$250.00	$5,250	$1,063	$22,315
552	Steel Post	21	EA	$75.00	$1,575	1.000	21.0	$1,794			$160	$3,369
553	Runners, 2x6 Treated Double Top/Bot	800	BF	$1.75	$1,400	0.019	15.2	$1,299			$3	$2,699
554	2x6 Pickets 6'H	2,400	BF	$1.75	$4,200	0.019	45.6	$3,896			$3	$8,096
555												
556	**Heavy Duty Snow Fence**	**200**	**LF**		$13,475		207.8	$17,754		$5,250		$36,479
557												
558	**Rip Rap Protection**	**100**	**LF**									
559	Imported Rock From Nome	400	CY	$150.00	$60,000						$150	$60,000
560	Filter Stone Import From Nome	533	CY	$100.00	$53,333						$100	$53,333
561	Haul Rock From Beach	933	CY			0.100	93.3	$9,574	$6.00	$5,600	$16	$15,174
562	Place Filter Rock	533	CY			1.000	533.3	$54,727	$175.00	$93,333	$278	$148,060
563	Place Rip Rap	400	CY			1.000	400.0	$41,048	$175.00	$70,000	$278	$111,048
564	Geofabric	1,200	BF	$1.75	$2,100	0.019	22.8	$1,948			$3	$4,048
565												
566	**Rip Rap Protection**	**100**	**LF**		$115,433		1,049.4	$107,297		$168,933		$391,663
567												
568	**Road To Beach**	**200**	**LF**									
569	Borrow	640	CY	$20.00	$12,800						$20	$12,800
570	Haul	640	CY			0.100	64.0	$6,568	$6.00	$3,840	$16	$10,408
571	Place Borrow	640	CY			0.200	128.0	$13,135	$15.00	$9,600	$36	$22,735
572	Geofabric	7,200	SF	$1.75	$12,600	0.019	136.8	$11,688			$3	$24,288
573												
574	**Road To Beach**	**200**	**LF**		$25,400		328.8	$31,391		$13,440		$70,231
575												
576												
577												
578												
579												
580	**Subtotal: G20 SITE IMPROVEMENTS**				$154,308		1,586.0	$156,442		$187,623		$498,373
581												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
582												
583	**G30 LIQUID AND GAS SITE UTILITIES**											
584												
585	**G3010 Water Utilities**											
586												
587	**Water Main 4"**	**750**	**LF**									
588	Arctic Pipe 4x12 (5% Extra)	788	LF	$80.00	$63,040						$80	$63,040
589	AP Fitting Allowance	8	EA	$1,500.00	$12,000						$1,500	$12,000
590	Bedding Material	250	CY	$30.00	$7,500						$30	$7,500
591	**Production Rate**	**100**	**LF/DAY**									
592	Time	80	HRS									
593	Foreman	80	HRS			1.000	80.0	$9,987	$12.00	$800	$135	$10,787
594	Laborers	80	HRS			1.000	80.0	$6,835			$85	$6,835
595	Local Labor	80	HRS			1.000	80.0	$3,260			$41	$3,260
596	Skid Steer	80	HRS			1.000	80.0	$8,210	$28.00	$2,240	$131	$10,450
597												
598	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Sewer 50%**	**8**	**EA**									
599	Micro Pilings	16	EA	$400.00	$6,400						$400	$6,400
600	Cross Beam	560	LBS	$3.00	$1,680						$3	$1,680
601	Pipe Supports (2 Per Pier)	16	EA	$35.00	$560						$35	$560
602	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**5**	**EA/DAY**									
603	Time	20	HRS									
604	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
605	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
606	Local Labor	40	HRS			1.000	40.0	$1,630			$41	$1,630
607	Track Or Manual Drilling	20	HRS			2.000	40.0	$4,105	$175.00	$3,500	$380	$7,605
608	Skid Steer	20	HRS			1.000	20.0	$2,052	$28.00	$560	$131	$2,612
609	ATV With Trailer	20	HRS			1.000	20.0	$2,052	$35.00	$700	$138	$2,752
610												
611	**Water Main 4"**	**750**	**LF**		$91,180		480.0	$42,337		$8,000		$141,517
612												
613												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
614												
615	**Water Storage Tank**	**424**	**K GAL**									
616	Tanks, Subcontract, 424K Gallon	1	EA	$625,000.00	$625,000						$625,000	$625,000
617	Add For Difficult Environment, High Winds	1	EA	$200,000.00	$200,000						$200,000	$200,000
618	Tank Insulation Package	6,773	SF	$30.00	$203,198						$30	$203,198
619	Misc Valves and Controls	1	LS	$5,625.00	$5,625	30.000	30.0	$3,569			$9,194	$9,194
620												
621	**Water Storage Tank**	**424**	**K GAL**		$1,033,823		$30	$3,569				$1,037,392
622												
623	**RO Unit**	**1**	**LS**									
624	RO Unit, Price Supplied By DOWL Based On Discussion With Known Supplier	1	EA	$350,000.00	$350,000						$350,000	$350,000
625												
626	**RO Unit**	**1**	**LS**		$350,000							$350,000
627												
628	**Water Intake**	**1**	**EA**									
629	Perf Pipe	40	LF	$65.00	$2,600						$65	$2,600
630	HDPE Catch Basin	1	EA	$3,000.00	$3,000						$3,000	$3,000
631	Filter Material	20	CY	$60.00	$1,200						$60	$1,200
632	Helicopter Time (Includes Mob/Demob From Nome)	40	HRS	$2,500.00	$100,000						$2,500	$100,000
633	Time	180	HRS									
634	Foreman	180	HRS			1.000	180.0	$22,470	$12.00	$1,800	$135	$24,270
635	Laborers	1,440	HRS			1.000	1,440.0	$123,034			$85	$123,034
636	Skid Steer	180	HRS			1.000	180.0	$18,472	$28.00	$5,040	$131	$23,512
637												
638	**Water Intake**	**1**	**EA**		$106,800		1,800.0	$163,976		$6,840		$277,616
639												
640												
641	**G3010 Water Utilities**	**1**	**LS**		$1,581,803		2,310.0	$209,882		$14,840		$1,806,525
642												
643												
644												
645												
646												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
647												
648	**G3020 Sanitary Sewerage Utilities**											
649												
650	**6" Arctic Pipe Gravity Sewer**	**750**	**LF**									
651	Arctic Pipe 6x15	788	LF	$109.00	$85,838						$109	$85,838
652	AP Fitting Allowance	8	EA	$2,000.00	$16,000						$2,000	$16,000
653	1" PEX Glycol Loop	1,575	LF	$2.00	$3,150						$2	$3,150
654	Energy Dissipation Structures	2	EA	$5,000.00	$10,000	16.000	32.0	$3,119	$1,000.00	$2,000	$7,560	$15,119
655	Cleanouts	3	EA	$1,500.00	$4,500	6.000	18.0	$1,755	$200.00	$600	$2,285	$6,855
656	**Production Rate**	**100**	**LF/DAY**									
657	Time	80	HRS									
658	Foreman	80	HRS			1.000	80.0	$9,987	$12.00	$800	$135	$10,787
659	Laborers	80	HRS			1.000	80.0	$6,835			$85	$6,835
660	Local Labor	80	HRS			1.000	80.0	$3,260			$41	$3,260
661	Skid Steer	80	HRS			1.000	80.0	$8,210	$28.00	$2,240	$131	$10,450
662	**Micro Pile Pier, 2 Piles, Steel Cross Member, at 50' o.c. - Split With Water 50%**	**7**	**EA**									
663	Micro Pilings	14	EA	$400.00	$5,600						$400	$5,600
664	Cross Beam	490	LBS	$3.00	$1,470						$3	$1,470
665	Pipe Supports (2 Per Pier)	14	EA	$35.00	$490						$35	$490
666	**Production Rate (Shared Trench With Water, Trenching Production Double To Account For This)**	**5**	**EA/DAY**									
667	Time	20	HRS									
668	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
669	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
670	Local Labor	40	HRS			1.000	40.0	$1,630			$41	$1,630
671	Track Or Manual Drilling	20	HRS			2.000	40.0	$4,105	$175.00	$3,500	$380	$7,605
672	Skid Steer	20	HRS			1.000	20.0	$2,052	$28.00	$560	$131	$2,612
673	ATV With Trailer	20	HRS			1.000	20.0	$2,052	$35.00	$700	$138	$2,752
674												
675	**6" Arctic Pipe Gravity Sewer**	**750**	**LF**		$127,048		530.0	$47,211		$10,600		$184,859
676												
677												
678												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	**Description**	**Qty**	**UNITS**	**Unit**	**Total**	**Units**	**Totals**	**Cost**	**Unit**	**Cost**	**Unit**	**Cost**
679												
680	**Sewage Plants**	**1**	**EA**									
681	Lifewater System 5000 GPD	1	EA	$100,000.00	$100,000						$100,000	$100,000
682	Permit Cost	1	EA	$2,000.00	$2,000						$2,000	$2,000
683	Treated Timber Base	250	BF	$3.00	$750						$3	$750
684	Hardware	1	LS	$250.00	$250						$250	$250
685	4" Rigid Insulation	200	BF	$0.80	$160						$1	$160
686	Helical Anchor	4	EA	$300.00	$1,200						$300	$1,200
687	Bedding Material	17	CY	$50.00	$833						$50	$833
688	Power 3/4"C, (3)#12	30	LF	$2.00	$60						$2	$60
689	**Production 0.5 EA/DAY**	**2**	**DAYS**									
690	Time	20	HRS									
691	Foreman	20	HRS			1.000	20.0	$2,497	$12.00	$200	$135	$2,697
692	Laborers	20	HRS			1.000	20.0	$1,709			$85	$1,709
693	Electrician	10	HRS			1.000	10.0	$1,215			$122	$1,215
694	Plumber	10	HRS			1.000	10.0	$1,190	$12.50	$100	$129	$1,290
695	Local Labor	20	HRS			1.000	20.0	$815			$41	$815
696	Operators	20	HRS			1.000	20.0	$2,052			$103	$2,052
697	Truck Drivers	10	HRS			1.000	10.0	$1,017			$102	$1,017
698	Skid Steer	20	HRS						$35.00	$700	$35	$700
699	End Dump	10	HRS						$65.00	$650	$65	$650
700												
701	**Sewage Plants**	**1**	**EA**		$105,253		110.0	$10,495		$1,650		$117,398
702												
703												
704												
705												
706												
707												
708												
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711												
712												
713												
714												
715												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
716												
717	**Septage Transmission Line 6"**	**640**	**LF**									
718	HDPE 6"	640	LF	$11.00	$7,040						$11	$7,040
719	Fitting Allowance	10	EA	$50.00	$500						$50	$500
720	Bedding Material	213	CY	$45.00	$9,600						$45	$9,600
721	**Pipe Trench**	**640**	**LF**									
722	**Production 50 LF/DAY**	**13**	**DAYS**									
723	Time	130	HRS									
724	Foreman	130	HRS			1.000	130.0	$16,229	$12.00	$1,300	$135	$17,529
725	Laborers	130	HRS			1.000	130.0	$11,107			$85	$11,107
726	Local Labor	390	HRS			1.000	390.0	$15,893			$41	$15,893
727	Skid Steer	130	HRS			1.000	130.0	$13,341	$28.00	$3,640	$131	$16,981
728	Small Dozer	130	HRS			1.000	130.0	$13,341	$35.00	$4,550	$138	$17,891
729	Excavator 320	130	HRS			1.000	130.0	$13,341	$80.00	$10,400	$183	$23,741
730	Compactor With Operator	130	HRS			1.000	130.0	$13,341	$35.00	$4,550	$138	$17,891
731	End Dump	260	HRS			1.000	260.0	$12,810	$80.00	$20,800	$129	$33,610
732												
733	**Septage Transmission Line 6"**	**640**	**LF**		$17,140		1,430.0	$109,403		$45,240		$171,783
734												
735												
736												
737												
738												
739												
740												
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746												
747												
748												
749												
750												
751												
752												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
753												
754	**Outfall Line**	**50**	**LF**									
755	HDPE 6"	50	LF	$11.00	$550						$11	$550
756	Weights	6	EA	$300.00	$1,800						$300	$1,800
757	Bedding Material	17	CY	$45.00	$750						$45	$750
758	**Pipe Trench**	**50**	**LF**									
759	**Allowance For Blasting Rock**	**50**	**LF**	$100.00	$5,000						$100	$5,000
760	**Production 50 LF/DAY**	**1**	**DAYS**									
761	Time	10	HRS									
762	Foreman	10	HRS			1.000	10.0	$1,248	$12.00	$100	$135	$1,348
763	Laborers	10	HRS			1.000	10.0	$854			$85	$854
764	Local Labor	30	HRS			1.000	30.0	$1,223			$41	$1,223
765	Skid Steer	10	HRS			1.000	10.0	$1,026	$28.00	$280	$131	$1,306
766	Small Dozer	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
767	Excavator 320	10	HRS			1.000	10.0	$1,026	$80.00	$800	$183	$1,826
768	Compactor With Operator	10	HRS			1.000	10.0	$1,026	$35.00	$350	$138	$1,376
769	End Dump	20	HRS			1.000	20.0	$985	$80.00	$1,600	$129	$2,585
770	Skiff - Local Rental	1	LS						$5,000.00	$5,000	$5,000	$5,000
771												
772	**Outfall Line**	**50**	**LF**		$8,100		110.0	$8,414		$8,480		$24,994
773												
774	**ANTHC Standard Lift Station**	**1**	**EA**									
775	Wet Well	1	LF	$20,000.00	$21,000	360.000	378.0	$38,790	$25,000.00	$26,250	$81,943	$86,040
776	Excavation	1,500	CY			0.114	171.0	$17,548	$10.00	$15,000	$22	$32,548
777	Backfill - Screened	1,500	CY	$116.00	$174,000	0.229	343.5	$35,250	$10.00	$15,000	$150	$224,250
778	Pumps and Controls	1	EA	$81,250.00	$81,250	600.000	600.0	$72,876	$18,750.00	$15,000	$169,126	$169,126
779	Pump Building 14x16	1	EA	$40,000.00	$40,000	2,520.000	2,520.0	$245,659			$285,659	$285,659
780	Plumbing - Domestic	1	EA	$3,750.00	$3,750	10.000	10.0	$1,190			$4,940	$4,940
781	HVAC	1	EA	$3,125.00	$3,125	20.000	20.0	$2,438			$5,563	$5,563
782	Electrical	1	EA	$62,500.00	$62,500	100.000	100.0	$12,146			$74,646	$74,646
783												
784	**ANTHC Standard Lift Station**	**1**	**EA**		$385,625		4,142.5	$425,897		$71,250		$882,772
785												
786												
787												
788												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
789												
790	**Septage Vault (40x20' x 10'd)**	**1**	**EA**									
791	**Earthwork For Foundation**											
792	Gravel Fill	135	CY									
793	Benched into Slope											
794	Borrow (Imported)	135	CY	$100.00	$13,511						$100	$13,511
795	**Production**	**100**	**CY/DAY**									
796	Time	14	HRS									
797	Foreman	14	HRS			1.000	13.5	$1,685	$12.00	$135	$135	$1,820
798	Laborers	14	HRS			1.000	13.5	$1,153			$85	$1,153
799	Compactor With Operator	14	HRS			1.000	13.5	$1,385	$65.00	$878	$167	$2,263
800	Dozer D6 With Operator	14	HRS			1.000	13.5	$1,385	$80.00	$1,081	$183	$2,466
801	Off Road Haul Unit	41	HRS			1.000	40.5	$1,995	$125.00	$5,067	$174	$7,062
802												
803	**Down Slope Foundation and Support**											
804	Concrete Foundations	13	CY	$1,400.00	$18,667	8.000	106.7	$10,402			$2,180	$29,069
805	Columns and Bracing	2,500	LBS	$3.00	$7,500	0.014	35.0	$3,412	$0.15	$375	$5	$11,287
806	Beam Support	2,000	LBS	$3.00	$6,000	0.014	28.0	$2,730	$0.15	$300	$5	$9,030
807												
808	**Vault 20x40x12 (10' Liquid Level, With Baffle)**	**1**	**EA**	$250,000.00	$250,000						$250,000	$250,000
809	**Installation**	**10**	**DAYS**									
810	Time	100	HRS									
811	Foreman	100	HRS			1.000	100.0	$12,484	$12.00	$1,000	$135	$13,484
812	Laborers	100	HRS			1.000	100.0	$8,544			$85	$8,544
813	Local Labor	300	HRS			1.000	300.0	$12,225			$41	$12,225
814	Skid Steer With Operator	100	HRS			1.000	100.0	$10,262	$35.00	$3,500	$138	$13,762
815	Excavator With Operator	100	HRS			1.000	100.0	$10,262	$125.00	$12,500	$228	$22,762
816												
817	**Septage Vault (40x20' x 10'd)**	**1**	**EA**		$295,678		964.2	$77,924		$24,836		$398,438
818												
819	**G3020 Sanitary Sewerage Utilities**	-	-		$938,844		7,286.7	$679,344		$162,056		$1,780,244
820												
821												
822	**Subtotal: G30 LIQUID AND GAS SITE UTILITIES**				$2,520,647		9,596.7	$889,226		$176,896		**$3,586,769**
823												

Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
824												
825	**Z10 GENERAL REQUIREMENTS**											
826												
827	**Z1020 Administrative Requirements**											
828	Supervisor, 60 Hour/Week	95	WEEKS			60.000	5,700.0	$1,051,707			$11,071	$1,051,707
829	Project Expeditor, 20 Hour/Week	95	WEEKS			20.000	1,900.0	$162,336			$1,709	$162,336
830	Time Keeper/Cost Control, 40 Hour/Week	95	WEEKS			40.000	3,800.0	$192,088			$2,022	$192,088
831												
832	**Z1040 Quality Requirements**											
833	Quality Control	22	MTHS	$1,000.00	$22,000	40.000	880.0	$49,426			$3,247	$71,426
834	Test Lab Services	20	EA	$250.00	$5,000						$250	$5,000
835	Survey	1	EA	$40,000.00	$40,000						$40,000	$40,000
836												
837	**Z1050 Temporary Facilities and Controls**											
838	**Subsistence**											
839	Rental House	22	MTHS						$3,000.00	$66,000	$3,000	$66,000
840	Room & Board - Incidental	9,000	MDAY	$20.00	$179,999						$20	$179,999
841												
842	**Travel**											
843	Air Fare - Anchorage - Site	318	EA	$500.00	$159,000						$500	$159,000
844	Early Construction	4	EA									
845	Survey	6	EA									
846	Crew/Super (Trip/30 Mdays)	300	EA									
847	Inspections	8	EA									
848												
849	**Small Tools & Consumables**											
850	Consumables	1	LS	$4,800.00	$4,800						$4,800	$4,800
851	Small Tools	1	LS	$82,560.00	$82,560						$82,560	$82,560
852												
853												
854												
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Line No.	Description	Qty	UNITS	Material Costs Unit	Material Costs Total	Labor Hours Units	Labor Hours Totals	Labor Cost	Equipment Costs Unit	Equipment Costs Cost	Total Cost Unit	Total Cost Cost
860												
861	**Mobilization**											
862	Mobilization - Equipment	122	TONS	$2,300.00	$280,600						$2,300	$280,600
863	Side By Sides	3,500	LBS									
864	ATV & Trailer	1,000	LBS									
865	FE Loader	42,800	LBS									
866	Excavator	47,400	LBS									
867	End Dumps (3)	78,000	LBS									
868	Skid Steer	5,000	LBS									
869	Sm Dozer	35,000	LBS									
870	Compactor	20,000	LBS									
871	Conc Mixer	1,000	LBS									
872	Misc	10,000	LBS									
873	Demobilization - Equipment	122	TONS	$1,725.00	$210,450						$1,725	$210,450
874	Surface Freight Seattle - Job Site	859	TONS	$2,300.00	$1,975,700						$2,300	$1,975,700
875	Handling Labor	122	HRS			1.000	122.4	$10,458			$85	$10,458
876												
877	Air Freight Anchorage - Job Site - Incidental	22	MTHS	$2,000.00	$44,000						$2,000	$44,000
878												
879	**Equipment**											
880	Equipment Standby and Travel Time	2	MTHS						$27,828.80	$55,658	$27,829	$55,658
881	Side By Sides	2	EA									
882	ATV & Trailer	1	EA									
883	FE Loader With Forks	1	EA									
884	Excavator	1	EA									
885	Skid Steer	1	EA									
886	Mini Excavator	1	EA									
887	Dozer D4	1	EA									
888	Compactor	1	EA									
889	End Dumps	4	EA									
890	Fuel (3/Hr Covered In Equip Rates)	49,187	GAL	$4.00	$196,746						$4	$196,746
891	Maintenance Labor 1 FTE	22	MTHS			259.800	5,715.6	$466,907			$21,223	$466,907
892												
893												
894												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
895												
896	**Temporary Facilities**	**22**	**MTHS**									
897	Project Office Trailer	22	MTHS						$1,500.00	$33,000	$1,500	$33,000
898	Office Equipment/Supplies	22	MTHS	$500.00	$11,000						$500	$11,000
899	Project Tool Sheds	22	MTHS						$200.00	$4,400	$200	$4,400
900	Project Safety Equipment	1	LS	$1,500.00	$1,500						$1,500	$1,500
901	Communications/Internet	22	MTHS	$1,000.00	$22,000						$1,000	$22,000
902												
903	**SWPPP Maintenance**											
904	Erosion Control Inspections (4H/Wk)	95	WKS			4.000	380.0	$37,044			$390	$37,044
905	Silt Fences, BMPs	20,000	LF	$5.00	$100,000	0.250	5,000.0	$427,200			$26	$527,200
906												
907	**G5010 Site Communications Systems**											
908	Record Documents	100	SHTS	$100.00	$10,000						$100	$10,000
909	Operations and Maintenance Manuals	1	LS	$25,000.00	$25,000						$25,000	$25,000
910	Contract Closeout and Training	1	LS	$15,000.00	$15,000						$15,000	$15,000
911												
912												
913												
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928												
929												
930	**Subtotal: Z10 GENERAL REQUIREMENTS**				$3,385,355		23,498.0	$2,397,166		$159,058		**$5,941,579**
931												

Line				Material Costs		Labor Hours		Labor	Equipment Costs		Total Cost	
No.	Description	Qty	UNITS	Unit	Total	Units	Totals	Cost	Unit	Cost	Unit	Cost
932												
933	**Z70 TAXES, PERMITS, INSURANCE AND BONDS**											
934												
935	Insurance and Bond 3.0%	1	LS									$1,074,996
936												
937												
938												
939												
940	**Subtotal: Z70 TAXES, PERMITS, INSURANCE AND BONDS**											**$1,074,996**
941												
942												
943	**Z90 FEES**											
944												
945	Overhead and Profit 12%	1	LS									$4,299,983
946												
947												
948												
949												
950												
951	**Subtotal: Z90 FEES**											**$4,299,983**
952												
953												
954	**Z90 CONTINGENCIES**											
955												
956	**Z9050 Construction Contingencies**											
957	Estimating Contingency 10%	1	LS									$2,617,815
958	Project Contingency 15%	1	LS									$4,319,395
959	Inflation 6.5% Per Year For 3.5% Yr = 24.66%	1	LS									$8,165,916
960												
961												
962												
963												
964												
965												
966												
967	**Subtotal: Z90 CONTINGENCIES**											**$15,103,125**
968												

APPENDIX 12:

O&M COSTS

Diomede Alternative 2: - Piped Water and Gravity Sewer System

Cost of Electricity	**With PCE**	**Without PCE**				
Diomede	$0.37	$0.77	$/kWh			
Fuel and Heating						
Cost per Galllon for Heating Oil	$9.00	gal				
Total Energy / Gallon of Heating Oil	138000	BTU/gal				
Combustion Efficiency	0.8	eff				
Available Energy/ Gallon of Heating Oil	110400	BTU/gal				
Heating Season (Above Ground)	8	months	240	days	5760	hours
Heating Season (Buried Mains)	8	months	240	days	5760	hours
Buildings	7	BTU/hr*sf				
Water Storage Tank Heat Loss	0.4	BTU/gal-day				
Above Ground Mains Pipe Loss	4.75	BTU/hr/ft				
Above Grade Mains Heat Loss Envelope	0.079166667	BTU/hr/ft/°F				
Heating Degree Days (40°F, Nome)	5522	Day*°F				
Power Consumption						
Lights and Controls	4	watt/sf				
HVAC/Hydronic System	0.4	watt/sf				
Pressure Pump	45	GPM				
Pump HP Conversion	1.522	kW/HP				
Electric Heat Trace Average Power Consumption	8	watt*hr/ft				
Sewer System Pumps						
Force Main	0.6	watts/gal				
Community Lift Station	0.6	watts/gal				
Residential Lift Station Cycle Volume	50	gal				
Residential Pump	30	gpm				
Other						
GPCD	50	g/day	4900	gpd		
Population	98	people	3.402777778	gpm		
Number of Services	35	Services				
Max PCE credit (month)	6,860	kWh/month				
Max PCE credit (annual)	82,320	kWh/year				
Water Quality Testing	$2,000.00	per year				
Operator Training	$2,500.00	per year				
Insurance	$1,500.00	per year				
Wage and Salary						
Benefits (70%)	0.7	of base pay				

Diomede Alternative 2: - Piped Water and Gravity Sewer System

Utility Cost										
Wage and Salary	Number of Staff	Hours per work day	Work Days per week	Base Pay $/hr	Number of Hours per year	BasPay $/yr		Benefits Package (70 % of Base)	Average Annual Labor Cost (Base Plus Benefits)	Average Monthly Cost
Operator	1	8	5	$30.00	2080	$62,400.00		$43,680.00	$106,080.00	$8,840.00
Backup Operator	1	4	4	$20.00	832	$16,640.00		$11,648.00	$28,288.00	$2,357.33
Administration Personnel	1	4	2	$12.00	416	$4,992.00		$3,494.40	$8,486.40	$707.20
								Total Wage and Salary Cost	**$142,854.40**	**$11,904.53**
Fuel and Heating	Size (sf)	Heating Season (hours)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)	Quantity				Average Annual Cost	Average Monthly Cost
Water Treatment Plant	600	5760	24192000	219.13	1				$1,972.17	$164.35
Lift Station	300	5760	12096000	109.57	0				$0.00	$0.00
Well House	100	5760	4032000	36.52	1				$328.70	$27.39
	Size (gal)	Duration (days)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Water Storage Tank	424,000	240	40704000	368.70	3				$9,954.78	$829.57
	Length (ft)	Heating Degree Days (40°F)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Raw Water Line	50	5760	524590	4.75					$42.75	$3.56
Water Mains	3,500	5760	36721300	415.775					$3,741.98	$311.83
Sewer Force Main	1,750	5760	18360650	166.31					$1,496.79	$124.73
								Total Fuel and Heating Cost	**$17,537.17**	**$1,461.43**
Waste Heat Fuel Savings	Max Capacity (BTUh)	Usage Factor	Daily Usage (BTU)	Duration (Months)	Annual Usage	Annual Fuel Savings (Gal)			Annual Cost Offset	Average Monthly
Water Treatment Plant Heat Add	200000	0	0	8	0	***0.00***			**$0.00**	**$0.00**
Power Consumption	Size (sf)	Hours per day	Annual Usage (kWh)	Number of Buildings					Average Annual Cost	Average Monthly Cost
Water Treatment Plant (Lights & Controls)	600	8	7008	1					$2,592.96	$216.08
Waste Water Treatment Unit	1600	24	56064	1					$20,743.68	$1,728.64
Water Treatment Plant (HVAC/Hydronic System)	3000	12	5256	1					$1,944.72	$162.06
	300	12	525.6	0					$0.00	$0.00
	Daily Usage (gal)	Annual Usage (gal)	Hours pumped per year	Pump (HP)	Annual Usage (kWh)					
Pressure Pumps	4900	1788500	662.41	2	2016.368148				$746.06	$62.17
	Pump Size (HP)	Number of Pumps	Hours per Day	Duration (Months)	Annual Usage (kWh)					
Water Circulating Pump	5.0	1	24	12	66,663.60				$24,665.53	$2,055.46
Water Circulation Head Add Pump	0.25	1	24	8	2,222.12				$822.18	$68.52
Water Storage Tank Circ/Heat Add Pump	0.25	3	24	7	5,833.07				$2,158.23	$179.85
Lift Station Sewage Pump	2	1	2	12	2,222.12				$822.18	$68.52
Sewer Low Pressure Main Glycol Circ	1.00	3	24	8	26,665.44				$9,866.21	$822.18
Well/Source Pump	2.00	1	12	4	4,444.24				$1,644.37	$137.03
Reverse Osmosis Pump	25.00	1	3	12	41,664.75				$15,415.96	$1,284.66
Dosing Pumps	0.03	3	12	12	599.97				$221.99	$18.50
Feed Pump	0.5	1	0.15	12	41.66				$15.42	$1.28
Air scour blower	2	1	0.15	12	166.66				$61.66	$5.14
	Pump Size (HP)	Number of Pumps	Hours per day	Annual Usage (kWh)						
Waste Heat Pump	0.5	0	24	0.00					$0.00	$0.00
	2" Pipe Length	Hours per Year	3" Pipe Length	Hours per Year	6" Pipe Length	Hours per Year	Annual Usage (kWh)			
Raw Water Electric Heat trace (8W/ft)	1,550	0					0		$0.00	$0.00
Sewer Electric Heat trace	5,000	0	5,000	0	5,000	0	0		$0.00	$0.00
								Total Power Consumption Cost	**$81,721.16**	**$6,810.09**
Other									Average Annual Cost	Average Monthly Cost

Diomede Alternative 2: - Piped Water and Gravity Sewer System

Equipment R&R						$5,973.46	$497.79
Miscellaneous Materials and Supplies						$7,263.38	$605.28
Water Quality Testing						$2,000.00	$166.67
Operator Training						$2,500.00	$208.33
Insurance						$1,500.00	$125.00
					Total Other Cost	**$13,263.38**	**$1,603.07**

Homeowner Electrical Costs	Length (f)	Quantity	Daily Energy Usage (kWh)	Annual Energy Usage		Average Annual Cost	Average Monthly Cost
Heat Trace (5 W/ FT)	75.00	1	1.80	438.00		$162.06	$13.51
Circulation Pump (1/4 HP)		1	0.3805	138.88		$51.39	$4.28
Low Pressure Sewage Pump (1/2 HP)		1	0.761	114.15		$42.24	$3.52
					Total Electrical Costs	$255.68	$21.31

Diomede Alternative 2: - Piped Water and Gravity Sewer System

Homeowner Maintence Costs		
Annual Cost (10% of annual electrical cost)	**$25.57**	**$2.13**

	Annual Cost	**Monthly Cost**
Total Utility Cost	**$255,376.11**	**$21,776.98**
Utility Cost Per Homeowner	**$7,296.46**	**$622.20**

	Unit Cost	Expected Equipment Life (years)	Quantity of Asset	Annual Cost
Water Supply				
Well head	$ 1,000	10	1	$ 122
WST Circulation Pumps	$ 1,500	10	2	$ 366
Heat Exchangers	$ 4,000	15	2	$ 718
Water Treatment & Washeteria				
Pressure Pump	$ 3,000	10	1	$ 366
Building				
Washeteria and Laundry				
Water Distribution				
Pressure Pump (x2)	$ 2,500	10	2	$ 609
Water Main Circulation Pumps (x4)	$ 1,500	10	4	$ 731
Heat Exchangers (x2)	$ 4,000	15	2	$ 718
Gravity Sewer & Mechanized Treatment				
Upper Branch Glycol Circ Pump	$ 1,000	10	2	$ 244
South Branch GlycolCirc Pump	$ 1,000	10	2	$ 244
Heat Exchanger	$ 3,000	15	2	$ 538
Septage Pump	$ 2,000	10	2	$ 488
Lifewater - UV Bulbs	$ 60	10	4	$ 29
Lifewater - UV Quartz Tube	$ 70	10	1	$ 9
Lifewater - Air Blower	$ 3,000	10	1	$ 366
Lifewater - Diffusers	$ 1,000	10	1	$ 122
Lifewater - Effluent Pumps	$ 1,000	10	2	$ 244
Lifewater - Floats	$ 100	10	5	$ 61
			Total	$ 5,973

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$142,854	$11,905
Fuel and Heating	$17,537	$1,461
Power Consumption	$81,721	$6,810
Other Costs	$13,263	$1,105
Short Lived Assets	$5,973	$498
Total Operating Costs	$261,350	$21,779
Total Utility Cost	***$261,350***	***$21,779***
Total Utility Cost (Per Service)	***$7,467***	***$622***
Piped User Cost		
Power Consumption	$256	$21
Maintenance and Replacement	$26	$2
Piped User Additional Cost	***$281***	$23
Total System Cost (Per Piped User)	***$7,748***	***$646***

Diomede Alternative 3 - Satellite Water and Sewer System

Cost of Electricity	**With PCE**	**Without PCE**				
Diomede	$0.37	$0.77	$/kWh			
Fuel and Heating						
Cost per Galllon for Heating Oil	$9.00	gal				
Total Energy / Gallon of Heating Oil	138000	BTU/gal				
Combustion Efficiency	0.8	eff				
Available Energy/ Gallon of Heating Oil	110400	BTU/gal				
Heating Season (Above Ground)	8	months	240	days	5760	hours
Heating Season (Buried Mains)	8	months	240	days	5760	hours
Buildings	7	BTU/hr*sf				
Water Storage Tank Heat Loss	0.4	BTU/gal-day				
Above Ground Mains Pipe Loss	4.75	BTU/hr/ft				
Above Grade Mains Heat Loss Envelope	0.079166667	BTU/hr/ft/°F				
Heating Degree Days (40°F, Nome)	5522	Day*°F				
Power Consumption						
Lights and Controls	4	watt/sf				
HVAC/Hydronic System	0.4	watt/sf				
Pressure Pump	45	GPM				
Pump HP Conversion	1.522	kW/HP				
Electric Heat Trace Average Power Consumption	8	watt*hr/ft				
Sewer System Pumps						
Force Main	0.6	watts/gal				
Community Lift Station	0.6	watts/gal				
Residential Lift Station Cycle Volume	50	gal				
Residential Pump	30	gpm				
Other						
GPCD	30	g/day				
Population	98	people				
Number of Services	35	Services				
Max PCE credit (month)	6,860	kWh/month				
Max PCE credit (annual)	82,320	kWh/year				
Water Quality Testing	$2,000.00	per year				
Operator Training	$2,500.00	per year				
Insurance	$1,500.00	per year				
Wage and Salary						
Benefits (70%)	0.7	of base pay				

Diomede Alternative 3 - Satellite Water and Sewer System

					Utility Cost					
Wage and Salary	Number of Staff	Hours per work day	Work Days per week	Base Pay $/hr	Number of Hours per year	BasPay $/yr		Benefits Package (70 % of Base)	Average Annual Labor Cost (Base Plus Benefits)	Average Monthly Cost
Operator	1	8	5	$30.00	2080	$62,400.00		$43,680.00	$106,080.00	$8,840.00
Backup Operator	1	8	5	$20.00	2080	$41,600.00		$29,120.00	$70,720.00	$5,893.33
Administration Personnel	1	4	2	$12.00	416	$4,992.00		$3,494.40	$8,486.40	$707.20
								Total Wage and Salary Cost	**$185,286.40**	**$15,440.53**
Fuel and Heating	Size (sf)	Heating Season (hours)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)	Quantity				Average Annual Cost	Average Monthly Cost
Water Treatment Plant	600	5760	24192000	219.13	1				$1,972.17	$164.35
Lift Station	300	5760	12096000	109.57	0				$0.00	$0.00
Water Satellite Station	120	5760	4838400	43.83	3				$1,183.30	$98.61
Well House	100	5760	4032000	36.52	1				$328.70	$27.39
	Size (gal)	Duration (days)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Water Storage Tank	424,000	240	40704000	368.70	3				$9,954.78	$829.57
	Length (ft)	Heating Degree Days (40°F)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Raw Water Line	50	5522	524590	4.75					$42.75	$3.56
Water Mains	1,500	5522	15737700	178.1875					$1,603.69	$133.64
Sewer Force Main	750	5522	7868850	71.28					$641.52	$53.46
								Total Fuel and Heating Cost	**$15,726.92**	**$1,310.58**
Waste Heat Fuel Savings	Max Capacity (BTUh)	Usage Factor	Daily Usage (BTU)	Duration (Months)	Annual Usage	Annual Fuel Savings (Gal)			Annual Cost Offset	Average Monthly
Water Treatment Plant Heat Add	200000	0	0	8	0	***0.00***			**$0.00**	**$0.00**
Power Consumption	Size (sf)	Hours per day	Annual Usage (kWh)	Number of Buildings					Average Annual Cost	Average Monthly Cost
Water Treatment Plant (Lights & Controls)	600	8	7008	1					$2,592.96	$216.08
Waste Water Treatment Unit	1600	24	56064	1					$20,743.68	$1,728.64
Water Treatment Plant (HVAC/Hydronic System)	3000	12	5256	1					$1,944.72	$162.06
Water Satellite Station	120	8	1401.6	3					$1,555.77	$129.65
	Daily Usage (gal)	Annual Usage (gal)	Hours pumped per year	Pump (HP)	Annual Usage (kWh)					
Pressure Pumps	2940	1073100	397.44	2	1209.820889				$447.63	$37.30
	Pump Size (HP)	Number of Pumps	Hours per Day	Duration (Months)	Annual Usage (kWh)					
Water Circulating Pump	1.0	1	24	12	13332.72				$4,933.11	$411.09
Water Circulation Head Add Pump	0.25	1	24	8	2222.12				$822.18	$68.52
Water Storage Tank Circ/Heat Add Pump	0.25	3	24	7	5833.065				$2,158.23	$179.85
Lift Station Sewage Pump	2	1	2	12	2222.12				$822.18	$68.52
Sewer Low Pressure Main Glycol Circ	1.00	3	24	8	26665.44				$9,866.21	$822.18
Well/Source Pump	2.00	1	12	4	4444.24				$1,644.37	$137.03
Reverse Osmosis Pump	25.00	1	3	12	41664.75				$15,415.96	$1,284.66
Dosing Pumps	0.03	3	12	12	599.9724				$221.99	$18.50
Feed Pump	0.5	1	0.15	12	41.66475				$15.42	$1.28
Air scour blower	2	1	0.15	12	166.659				$61.66	$5.14
	Pump Size (HP)	Number of Pumps	Hours per day	Annual Usage (kWh)						
Waste Heat Pump	0.5	0	24	0.00					$0.00	$0.00
	2" Pipe Length	Hours per Year	3" Pipe Length	Hours per Year	6" Pipe Length	Hours per Year	Annual Usage (kWh)			
Raw Water Electric Heat trace (8W/ft)	1,550	0					0		$0.00	$0.00
Sewer Electric Heat trace	5,000	0	5,000	0	5,000	0	0		$0.00	$0.00
								Total Power Consumption Cost	**$63,246.08**	**$5,270.50**

Diomede Alternative 3 - Satellite Water and Sewer System

Other	Average Annual Cost	Average Monthly Cost
Equipment R&R	$13,212.97	$1,101.08
Miscellaneous Materials and Supplies	$7,927.78	$660.65
Water Quality Testing	$2,000.00	$166.67
Operator Training	$2,500.00	$208.33
Insurance	$1,500.00	$125.00
Total Other Cost	**$27,140.75**	**$2,261.73**

Homeowner Electrical Costs	Length (f)	Quantity	Daily Energy Usage (kWh)	Annual Energy Usage		Average Annual Cost	Average Monthly Cost
Heat Trace (5 W/ FT)	40.00	1	0.96	233.60		$86.43	$7.20
Circulation Pump (1/4 HP)		0	0	0.00		$0.00	$0.00
Low Pressure Sewage Pump (1/2 HP)		1	0.761	114.15		$42.24	$3.52
					Total Electrical Costs	$128.67	$10.72

Diomede Alternative 3 - Satellite Water and Sewer System

Homeowner Maintence Costs		
Annual Cost (10% of annual electrical cost)	**$12.87**	**$1.07**

	Annual Cost	Monthly Cost
Total Utility Cost	**$291,387.28**	**$24,282.26**
Utility Cost Per Homeowner	**$8,325.35**	**$693.78**

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$185,286	$15,441
Fuel and Heating	$15,727	$1,311
Power Consumption	$63,246	$5,271
Other Costs	$27,141	$2,262
Total Operating Costs	$291,400	$24,283
Waste Heat Savings	$0	$0
Total Utility Cost	***$291,400***	***$24,283***
Total Utility Cost (Per Service)	***$8,326***	***$694***
Piped User Cost		
Power Consumption	$129	$11
Maintenance and Replacement	$13	$1
Piped User Additional Cost	***$142***	$12
Total System Cost (Per Piped User)	***$8,467***	***$706***

Diomede Alternative 4 - Satellite Water and Piped Gravity Sewer System

Cost of Electricity	**With PCE**	**Without PCE**				
Diomede	$0.37	$0.77	$/kWh			
Fuel and Heating						
Cost per Galllon for Heating Oil	$9.00	gal				
Total Energy / Gallon of Heating Oil	138000	BTU/gal				
Combustion Efficiency	0.8	eff				
Available Energy/ Gallon of Heating Oil	110400	BTU/gal				
Heating Season (Above Ground)	8	months	240	days	5760	hours
Heating Season (Buried Mains)	8	months	240	days	5760	hours
Buildings	7	BTU/hr*sf				
Water Storage Tank Heat Loss	0.4	BTU/gal-day				
Above Ground Mains Pipe Loss	4.75	BTU/hr/ft				
Above Grade Mains Heat Loss Envelope	0.079166667	BTU/hr/ft/°F				
Heating Degree Days (40°F, Nome)	5522	Day*°F				
Power Consumption						
Lights and Controls	4	watt/sf				
HVAC/Hydronic System	0.4	watt/sf				
Pressure Pump	45	GPM				
Pump HP Conversion	1.522	kW/HP				
Electric Heat Trace Average Power Consumption	8	watt*hr/ft				
Sewer System Pumps						
Force Main	0.6	watts/gal				
Community Lift Station	0.6	watts/gal				
Residential Lift Station Cycle Volume	50	gal				
Residential Pump	30	gpm				
Other						
GPCD	30	g/day				
Population	98	people				
Number of Services	35	Services				
Max PCE credit (month)	6,860	kWh/month				
Max PCE credit (annual)	82,320	kWh/year				
Water Quality Testing	$2,000.00	per year				
Operator Training	$2,500.00	per year				
Insurance	$1,500.00	per year				
Wage and Salary						
Benefits (70%)	0.7	of base pay				

Diomede Alternative 4 - Satellite Water and Piped Gravity Sewer System

Utility Cost										
Wage and Salary	Number of Staff	Hours per work day	Work Days per week	Base Pay $/hr	Number of Hours per year	BasPay $/yr		Benefits Package (70 % of Base)	Average Annual Labor Cost (Base Plus Benefits)	Average Monthly Cost
Operator	1	8	5	$30.00	2080	$62,400.00		$43,680.00	$106,080.00	$8,840.00
Backup Operator	1	8	4	$20.00	1664	$33,280.00		$23,296.00	$56,576.00	$4,714.67
Administration Personnel	1	4	2	$12.00	416	$4,992.00		$3,494.40	$8,486.40	$707.20
								Total Wage and Salary Cost	**$171,142.40**	**$14,261.87**
Fuel and Heating	Size (sf)	Heating Season (hours)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)	Quantity				Average Annual Cost	Average Monthly Cost
Water Treatment Plant	600	5760	24192000	219.13	1				$1,972.17	$164.35
Lift Station	300	5760	12096000	109.57	0				$0.00	$0.00
Water Satellite Station	120	5760	4838400	43.83	3				$1,183.30	$98.61
Well House	100	5760	4032000	36.52	1				$328.70	$27.39
	Size (gal)	Duration (days)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Water Storage Tank	424,000	240	40704000	368.70	3				$9,954.78	$829.57
	Length (ft)	Heating Degree Days (40°F)	Annual Usage (BTU)	Annual Heating Oil Usage (gal)						
Raw Water Line	50	5522	524590	4.75					$42.75	$3.56
Water Mains	1,500	5522	15737700	178.1875					$1,603.69	$133.64
Sewer Force Main	1,750	5522	18360650	166.31					$1,496.79	$124.73
								Total Fuel and Heating Cost	**$16,582.19**	**$1,381.85**
Waste Heat Fuel Savings	Max Capacity (BTUh)	Usage Factor	Daily Usage (BTU)	Duration (Months)	Annual Usage	Annual Fuel Savings (Gal)			Annual Cost Offset	Average Monthly
Water Treatment Plant Heat Add	200000	0	0	8	0	***0.00***			$0.00	$0.00
Power Consumption	Size (sf)	Hours per day	Annual Usage (kWh)	Number of Buildings					Average Annual Cost	Average Monthly Cost
Water Treatment Plant (Lights & Controls)	600	8	7008	1					$2,592.96	$216.08
Waste Water Treatment Unit	1600	24	56064	1					$20,743.68	$1,728.64
Water Treatment Plant (HVAC/Hydronic System)	3000	12	5256	1					$1,944.72	$162.06
Water Satellite Station	120	8	1401.6	3					$1,555.77	$129.65
	Daily Usage (gal)	Annual Usage (gal)	Hours pumped per year	Pump (HP)	Annual Usage (kWh)					
Pressure Pumps	2940	1073100	397.44	2	1209.820889				$447.63	$37.30
	Pump Size (HP)	Number of Pumps	Hours per Day	Duration (Months)	Annual Usage (kWh)					
Water Circulating Pump	1.0	1	24	12	13332.72				$4,933.11	$411.09
Water Circulation Head Add Pump	0.25	1	24	8	2222.12				$822.18	$68.52
Water Storage Tank Circ/Heat Add Pump	0.25	3	24	7	5833.065				$2,158.23	$179.85
Lift Station Sewage Pump	2	1	2	12	2222.12				$822.18	$68.52
Sewer Low Pressure Main Glycol Circ	1.00	3	24	8	26665.44				$9,866.21	$822.18
Well/Source Pump	2.00	1	12	4	4444.24				$1,644.37	$137.03
Reverse Osmosis Pump	25.00	1	3	12	41664.75				$15,415.96	$1,284.66
Dosing Pumps	0.03	3	12	12	599.9724				$221.99	$18.50
Feed Pump	0.5	1	0.15	12	41.66475				$15.42	$1.28
Air scour blower	2	1	0.15	12	166.659				$61.66	$5.14
	Pump Size (HP)	Number of Pumps	Hours per day	Annual Usage (kWh)						
Waste Heat Pump	0.5	0	24	0.00					$0.00	$0.00
	2" Pipe Length	Hours per Year	3" Pipe Length	Hours per Year	6" Pipe Length	Hours per Year	Annual Usage (kWh)			
Raw Water Electric Heat trace (8W/ft)	1,550	0					0		$0.00	$0.00
Sewer Electric Heat trace	5,000	0	5,000	0	5,000	0	0		$0.00	$0.00
								Total Power Consumption Cost	**$63,246.08**	**$5,270.50**

Diomede Alternative 4 - Satellite Water and Piped Gravity Sewer System

Other	Average Annual Cost	Average Monthly Cost
Equipment R&R	$12,548.53	$1,045.71
Miscellaneous Materials and Supplies	$7,529.12	$627.43
Water Quality Testing	$2,000.00	$166.67
Operator Training	$2,500.00	$208.33
Insurance	$1,500.00	$125.00
Total Other Cost	**$26,077.65**	**$2,173.14**

Homeowner Electrical Costs	Length (f)	Quantity	Daily Energy Usage (kWh)	Annual Energy Usage		Average Annual Cost	Average Monthly Cost
Heat Trace (5 W/ FT)	40.00	1	0.96	233.60		$86.43	$7.20
Circulation Pump (1/4 HP)		0	0	0.00		$0.00	$0.00
Low Pressure Sewage Pump (1/2 HP)		1	0.761	114.15		$42.24	$3.52
					Total Electrical Costs	$128.67	$10.72

Diomede Alternative 4 - Satellite Water and Piped Gravity Sewer System

Homeowner Maintence Costs		
Annual Cost (10% of annual electrical cost)	**$12.87**	**$1.07**

	Annual Cost	Monthly Cost
Total Utility Cost	**$277,035.45**	**$23,086.28**
Utility Cost Per Homeowner	**$7,915.30**	**$659.61**

Description	Annual Cost	Monthly Cost
Utility Cost		
Wages and Salary	$171,142	$14,262
Fuel and Heating	$16,582	$1,382
Power Consumption	$63,246	$5,271
Other Costs	$26,078	$2,173
Total Operating Costs	$277,048	$23,087
Waste Heat Savings	$0	$0
Total Utility Cost	***$277,048***	***$23,087***
Total Utility Cost (Per Service)	***$7,916***	***$660***
Piped User Cost		
Power Consumption	$129	$11
Maintenance and Replacement	$13	$1
Piped User Additional Cost	***$142***	$12
Total System Cost (Per Piped User)	***$8,057***	***$671***

APPENDIX 13:

SIGNED RESOLUTION FROM DIOMEDE TRI-ORG COUNCIL

Native Village of Diomede
P.O. Box 7079 Diomede, AK 99762

City of Diomede
P.O. Box 7039 Diomede, AK 99762

Inalik Native Corporation
P.O. Box 7040 Diomede, AK 99762

JOINT RESOLUTION #2023-07

A Resolution of support for fully piped water and sewer preferred alternative to address Diomede's water and sewer need

WHEREAS, The Native Village of Diomede, the City of Diomede and Inalik Native Corporation are empowered to make decisions in the best interest of the people they serve; and

WHEREAS, The priority of the Tribal and City governments is the health and welfare of the people and environment of Diomede; and

WHEREAS, The Native Village of Diomede and the City of Diomede are resolved to provide piped water and sewer to all residents in the community; and

WHEREAS, The community has met with representatives of ANTHC and their engineering firm, DOWL, two times in Diomede to discuss alternatives for addressing the need and developing non-monetary considerations to select the preferred alternative; and

WHEREAS, The community fully supports the fully piped water and sewer alternative, contingent on additional information and financial support being provided to the community to make the project affordable to the community.

NOW, THEREFORE, BE IT RESOLVED, that the Native Village of Diomede, the City of Diomede and Inalik Native Corporation support the fully piped water and sewer alternative, identified in the Preliminary Engineering Report as Alternative #2. The community will work with ANTHC and their representatives to develop this project.

CERTIFICATION

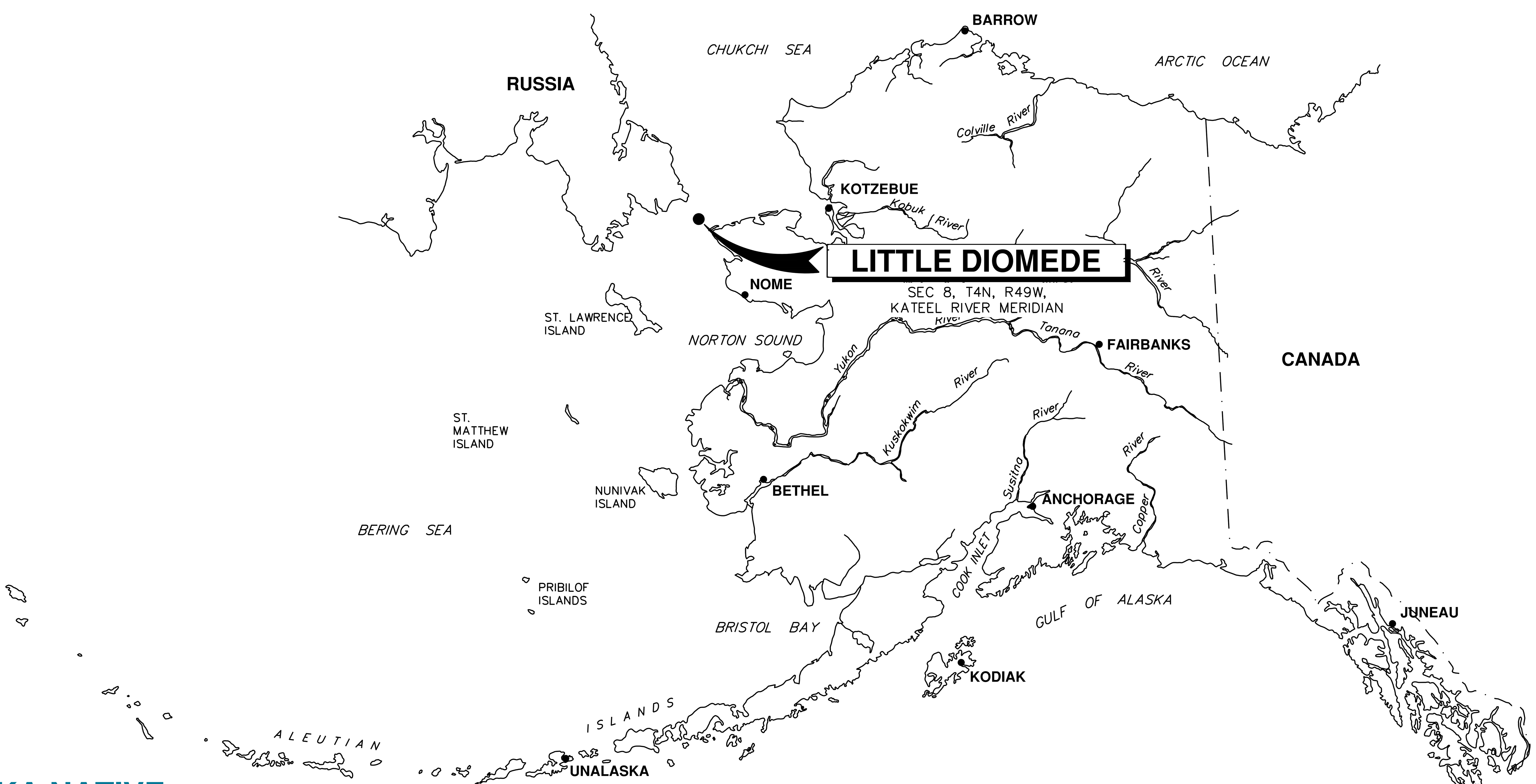
Passed and approved on October 19, 2023.

President, Native Village of Diomede	10/19/2023 Date
Mayor, City of Diomede	10-19-2023 Date
Chairman Steven Ahkinga	10-19-2023 Date

APPENDIX 14:
15% DESIGN CONCEPT

LITTLE DIOMEDE, ALASKA
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

PLAN SET NUMBER: DIO-##-###
ANTHC PROJECT NUMBER: DIOS59-1705MDS



SHEET INDEX

SHEET NUMBER	SHEET TITLE
G-001	COVER
G-002	LEGEND, ABBREVIATIONS, & VICINITY KEY MAP
C-101	MAJOR INFRASTRUCTURE PLAN
C-102	SHARED ALIGNMENT 1&2 PLAN & PROFILE
C-103	SHARED ALIGNMENT 3&4 PLAN & PROFILE
C-104	SHARED ALIGNMENT 5 PLAN & PROFILE
C-105	SEPTAGE PLAN & PROFILE
C-501	UTILITY DETAILS
C-502	WATER INTAKE DETAILS
C-503	WATER TREATMENT PLANT SCHEMATIC
C-504	SEPTAGE DEWATERING CONTAINER SCHEMATIC

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM
DIVISION OF ENVIRONMENTAL HEALTH AND ENGINEERING
4500 DIPLOMACY DRIVE
ANCHORAGE, ALASKA, 99508-3440
PHONE: (907) 729-3600
FAX: (907) 729-4090
http://www.dehe.org

DOWL
AECL848
5015 Business Park Blvd, Suite 4000
Anchorage, Alaska 99503
907-562-2000

1 | 2 | 3 | 4

D | C | B | A

GENERAL SYMBOLS

(X) **VIEW TITLE** XX"-XX' — VIEW NUMBER	DRAWING TITLE OR SECTION TITLE
(X) **VIEW TITLE** HORZ. SCALE XX"-XX' VERT. SCALE XX"-XX' — VIEW NUMBER	DRAWING TITLE OR SECTION TITLE WITH VERTICAL AND HORIZONTAL SCALE
VIEW NUMBER, X / X-XXX, SHEET NUMBER	SECTION INDICATOR
VIEW NUMBER, X / X-XXX, SHEET NUMBER	DRAWING OR PHOTO/IMAGE ELEVATION INDICATOR
VIEW NUMBER, X / X-XXX, SHEET NUMBER	CALL OUT BUBBLE
0 1" 2"	ARCHITECTURAL GRAPHIC SCALE
0 10000' 20000'	ENGINEERING GRAPHIC SCALE
	BREAK LINE
#	KEY NOTE INDICATOR (REFERS TO NOTE ON SAME SHEET)
MATCH LINE, SEE X-XXX	MATCH LINE
x	REVISION INDICATOR

LEGEND

—W—W—	PROPOSED ABOVE GROUND WATER MAIN
—S—S—	PROPOSED ABOVE GROUND SEWER MAIN
—FM—FM—	PROPOSED ABOVE GROUND SEWER FORCE MAIN
— — —	MAJOR CONTOUR
- - - -	MINOR CONTOUR
	EXISTING BOARDWALK
— RW — RW — RW —	RAW WATER
—WS—WS—WS—	WATER SERVICE

ABBREVIATIONS

CMP	CORRUGATED METAL PIPE
E	EASTING
(E)	EXISTING
EG	EXISTING GROUND/GRADE
ELEV	ELEVATION
FM	FORCE MAIN
GAL	GALLON
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
HDPE	HIGH DENSITY POLYETHYLENE
HOH	HEAD OF HOUSEHOLD
LS	LIFT STATION
MAX	MAXIMUM
MIL	MILLIMETER
MIN	MINIMUM
NTS	NOT TO SCALE
RO	REVERSE OSMOSIS
SDR	STANDARD DIMENSIONING RATIO
STA	STATION
TYP	TYPICAL
WST	WATER STORAGE TANK
WTP	WATER TREATMENT PLANT

GENERAL NOTES:

THESE DRAWINGS HAVE BEEN FOR CONCEPTUAL PURPOSES ONLY WITH PUBLICLY AVAILABLE SURVEY INFORMATION.

SECTION 8, T4NN, R49W, KATEEL RIVER MERIDIAN, ALASKA

VICINITY & KEY MAP

SCALE: 1" = 200'

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Anchorage, Alaska 99508
(907) 729-3600

15% CONCEPT NOT FOR CONSTRUCTION

0 1"
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LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

SHEET TITLE

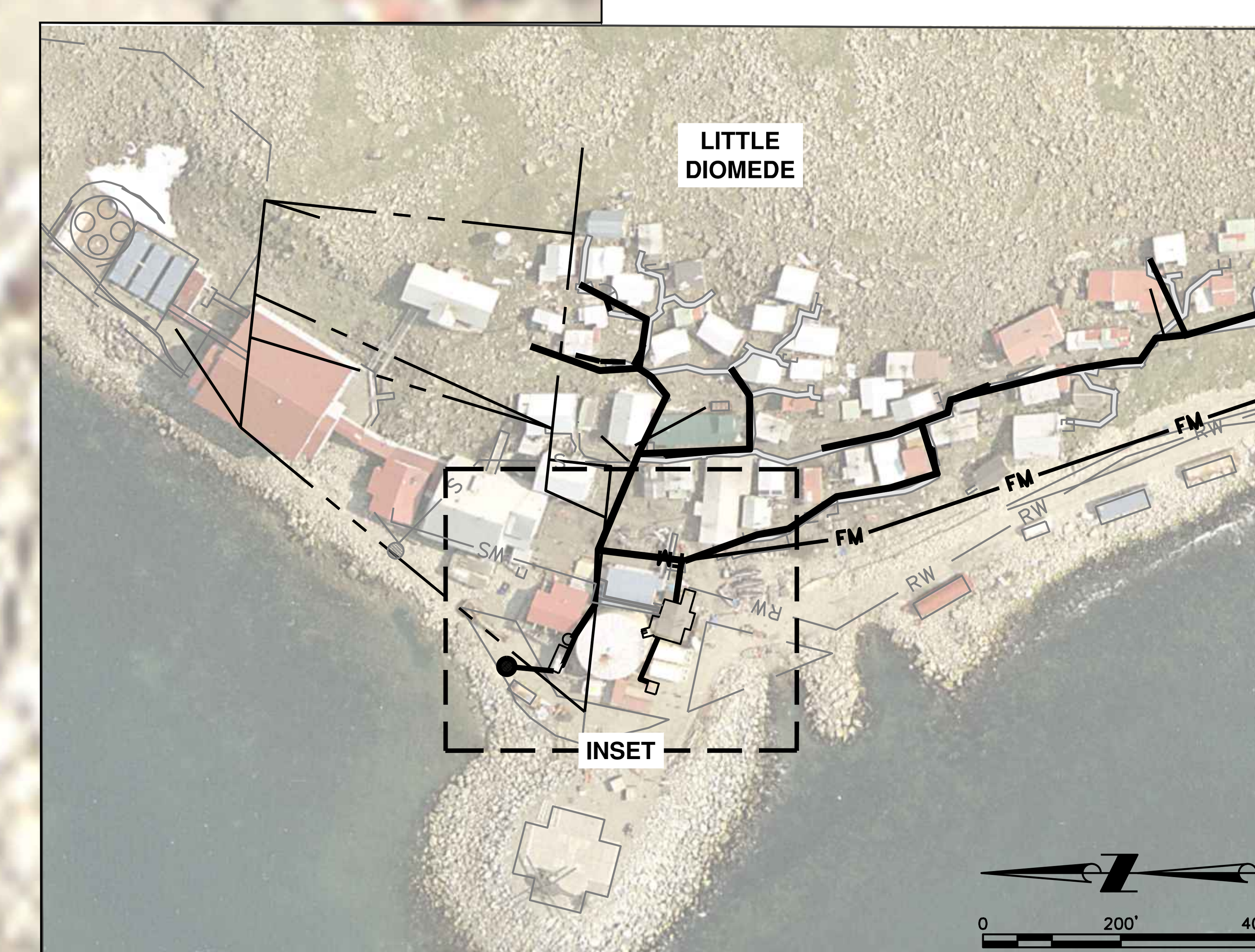
LEGEND, ABBREVIATIONS, & VICINITY KEY MAP

G-002

SHEET **2** OF **2**

QUANTITIES

DESCRIPTION	QTY	UNIT
WELL HOUSE	1	EA
4" HDPE X 10" ARCTIC SEAWATER MAIN	50	LF
REVERSE OSMOSIS SKID (15 GPM)	1	EA
WATER TREATMENT PLANT	800	SF
4" DUAL HDPE X 16" ARCTIC WATER MAIN	3000	LF
6"X16" ARCTIC WASTEWATER MAIN	1500	LF
COMBINED SERVICE CONNECTIONS	1500	LF
MECHANIZED WASTEWATER UNIT	1	EA
SEPTAGE FM 6" HDPE	900	LF
SEPTAGE DEWATERING CONTAINER	1	EA



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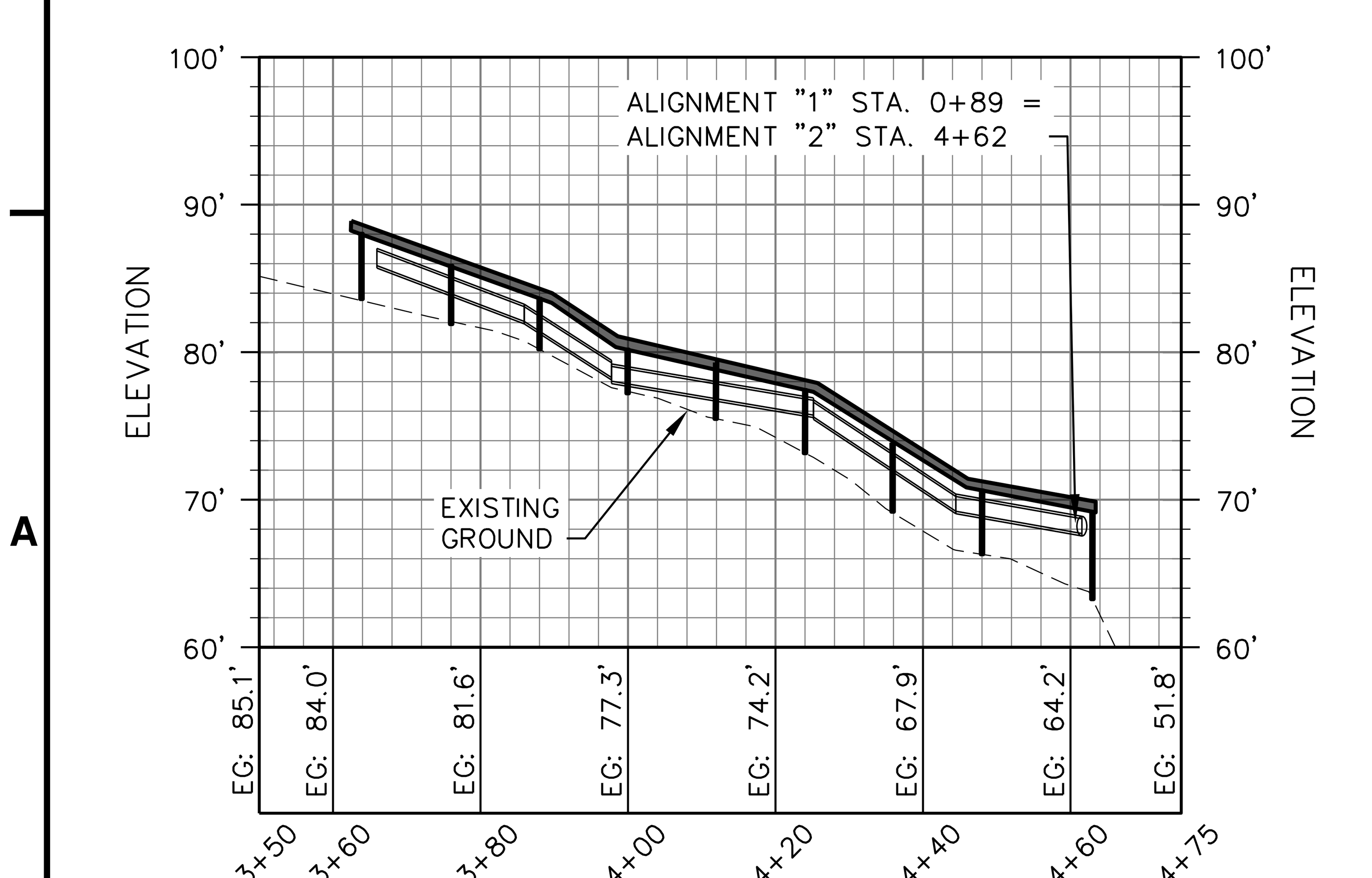
MRK	DATE	DESCRIPTION	INIT

PLAN SET: DIO-##-###
PROJ MGR: CNELSON
PROJ ENG: CNELSON
DRUMS ENG: ----
DRAWN BY: MWHARTON
SHEET TITLE

MAJOR INFRASTRUCTURE PLAN

C-101
SHEET 1 OF 9

HOME ID #	HOH
1	UNKNOWN
2	UNKNOWN
4	RONALD OZENNA
5	UNKNOWN
7	VERNON OZENNA
8	CARLA AHKVALUK
9	JUSTIN AKINGA
11	ROBERT UMIAK
12	UNKNOWN
13	MARTY OZENNA
14	CYNTHIA SNOWBALL
16	UNKNOWN



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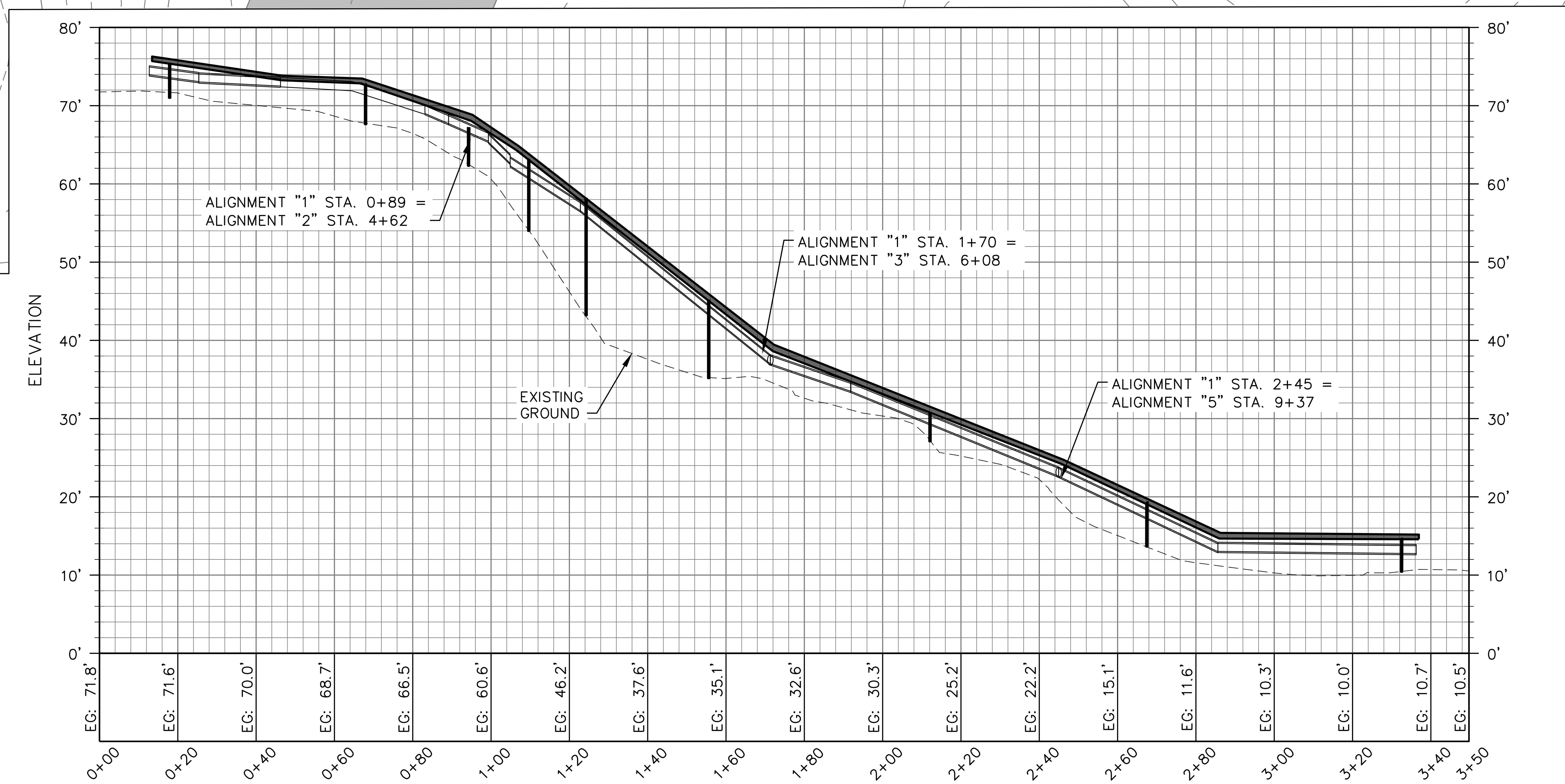

ALIGNMENT "1"

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LITTLE DIOMEDE WATER & SEWER EPER
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MRK	DATE	DESCRIPTION	INIT

PLAN SET: DIO-##-###
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PROJ ENG: CNELSON
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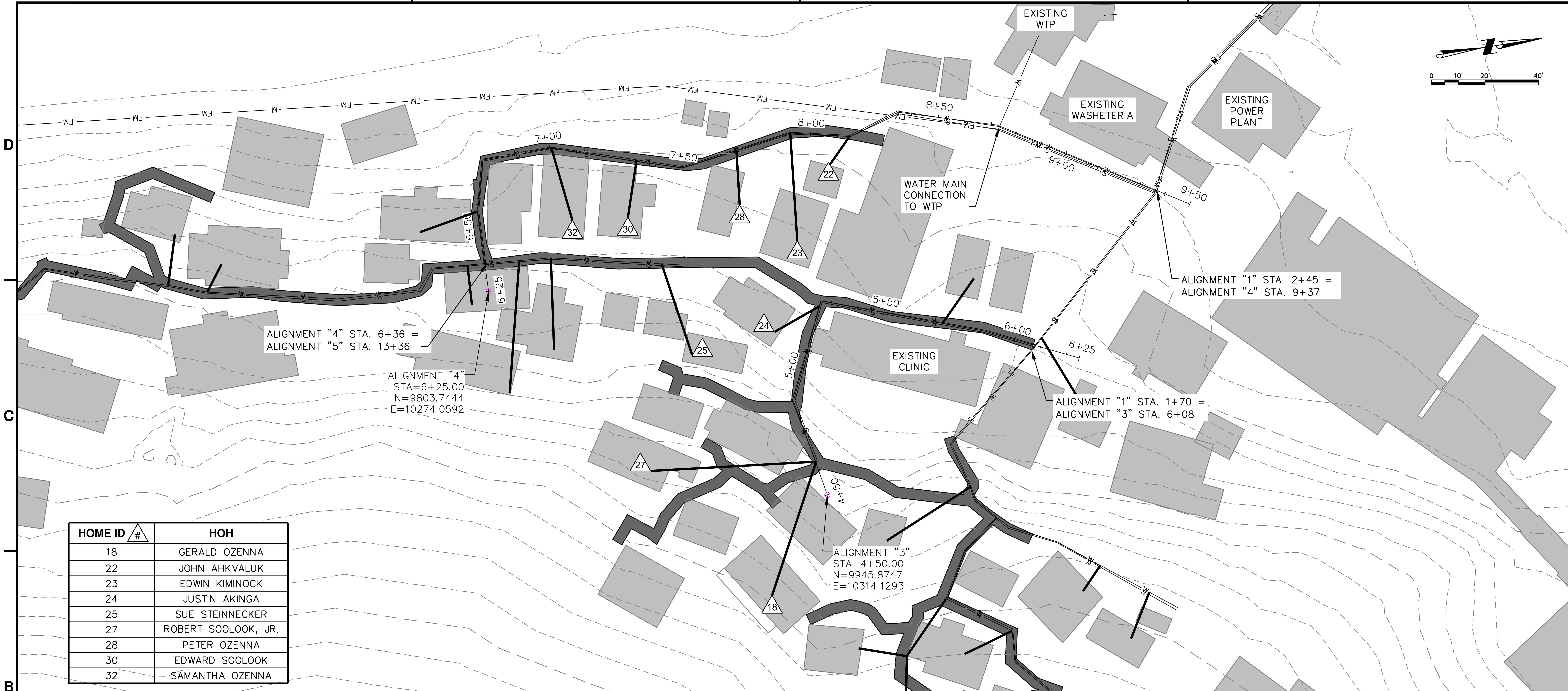
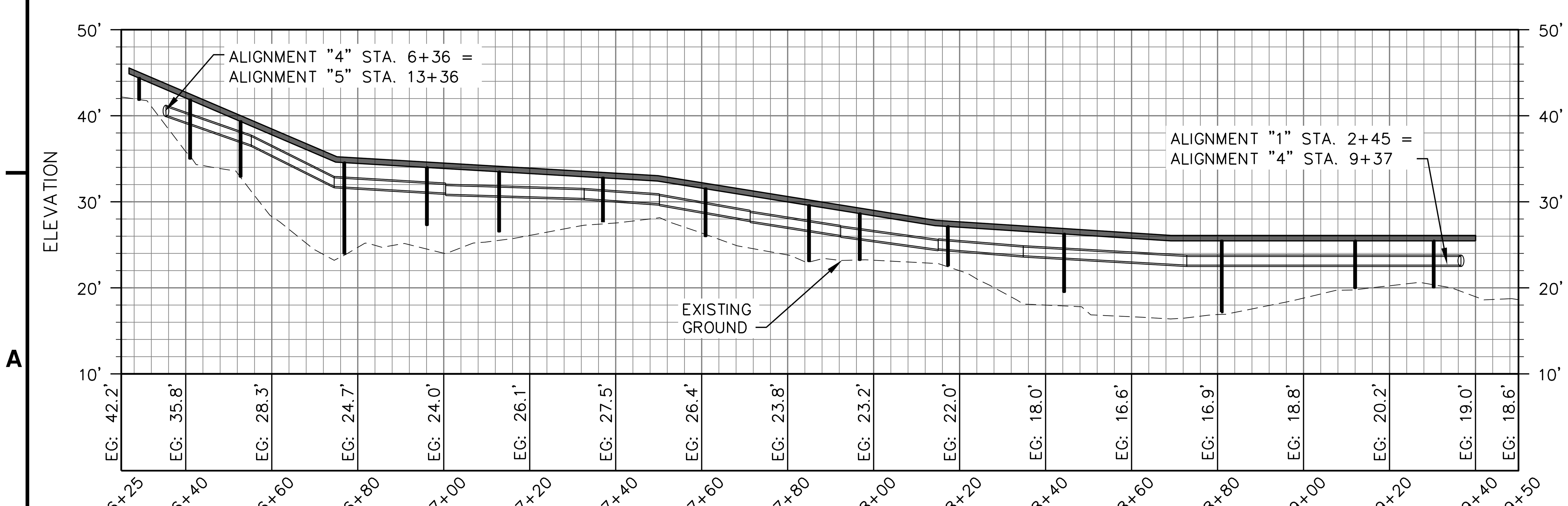
SHEET TITLE
SHARED ALIGNMENT 1&2 PLAN & PROFILE

C-102
SHEET 2 OF 9



HOME ID #	HOH
18	GERALD OZENNA
22	JOHN AHKVALUK
23	EDWIN KIMINOCK
24	JUSTIN AKINGA
25	SUE STEINNECKER
27	ROBERT SOOLOOK, JR.
28	PETER OZENNA
30	EDWARD SOOLOOK
32	SAMANTHA OZENNA



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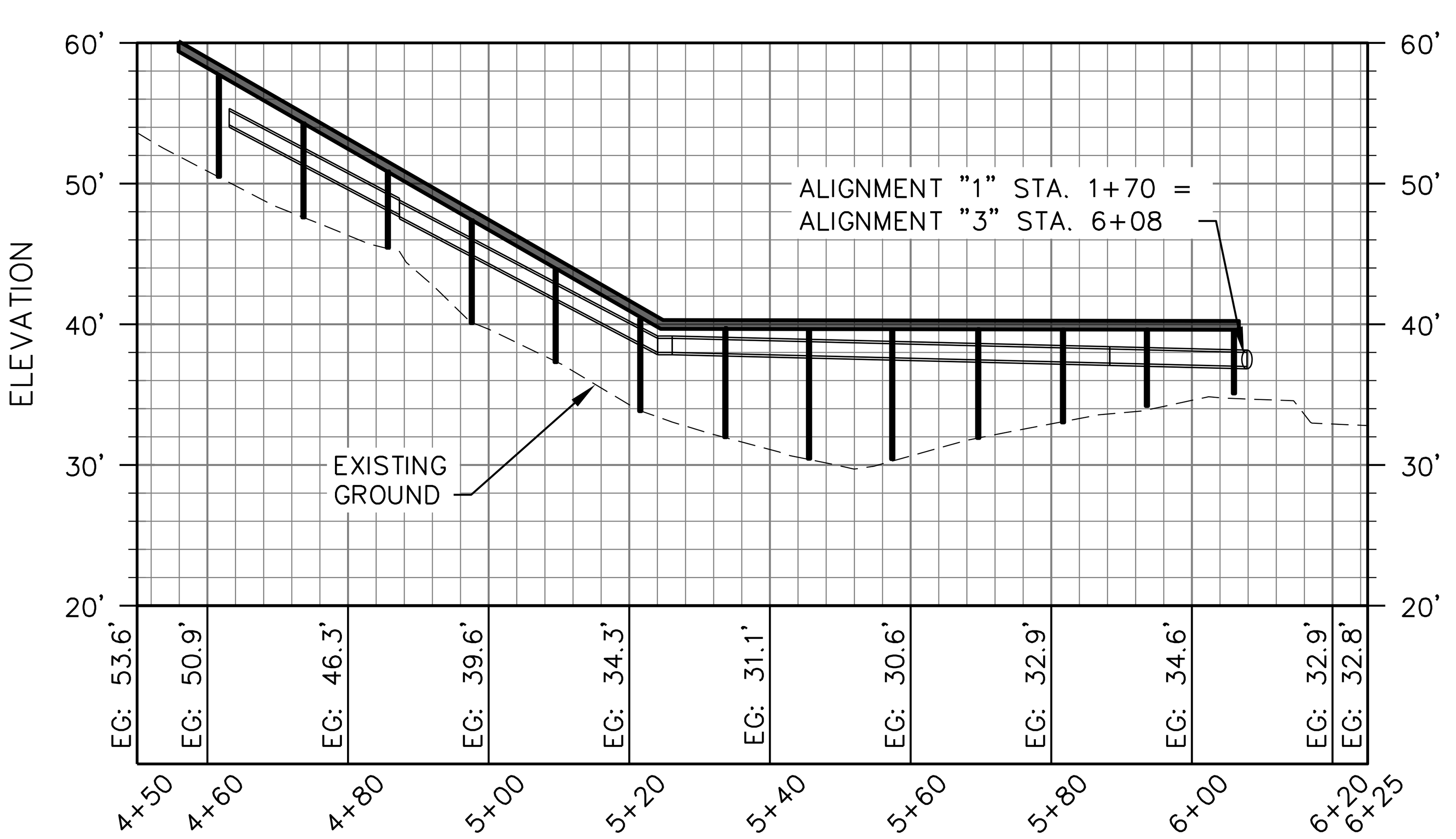

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LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

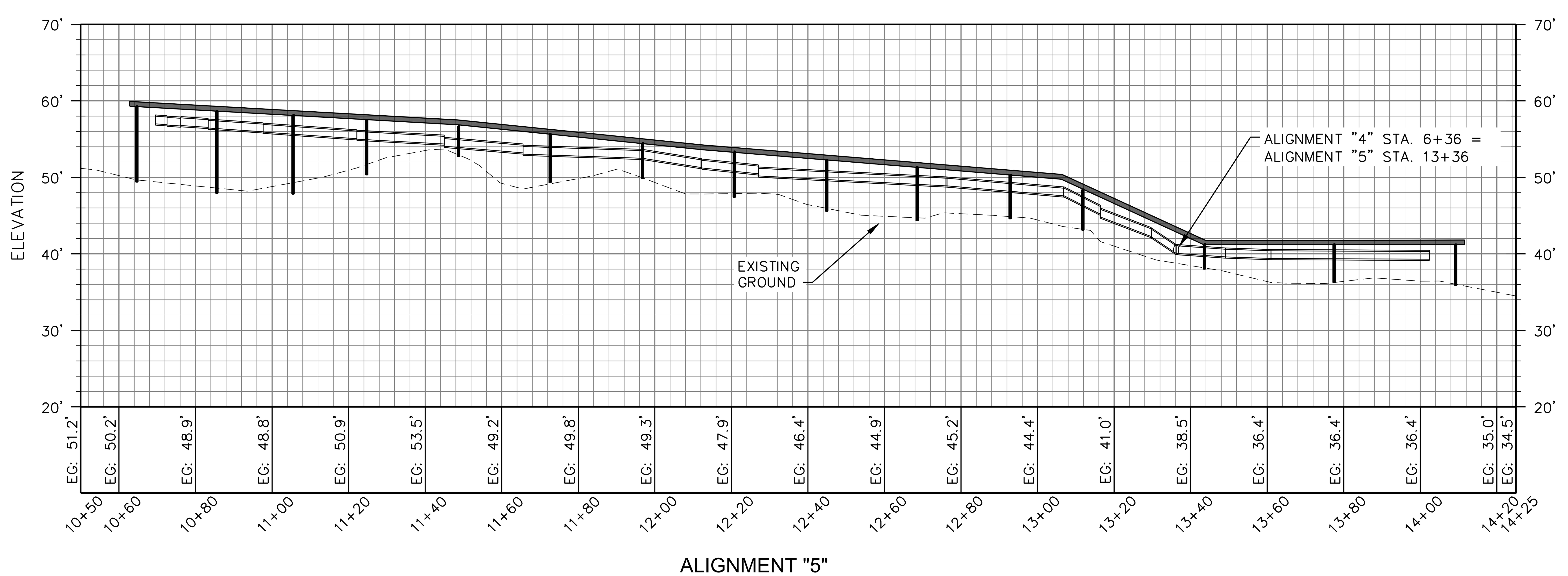
SHEET TITLE

SHARED ALIGNMENT 3&4 PLAN & PROFILE

C-103

SHEET 3 OF 9

HOME ID #	HOH
33	HENRY SOOLOOK
35	LOUIS OZENNA
36	PATRICK UMIAK
37	JOHN IYAPANA JR.
39	KEVIN OZENNA
40	EDWIN KIMINOCK
42	MARY MENADELOOK
46	JOESEPH OZENNA
47	CARLA MILLIGROCK
48	MARLENE AKINGA
49	FRANCES OZENNA



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LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

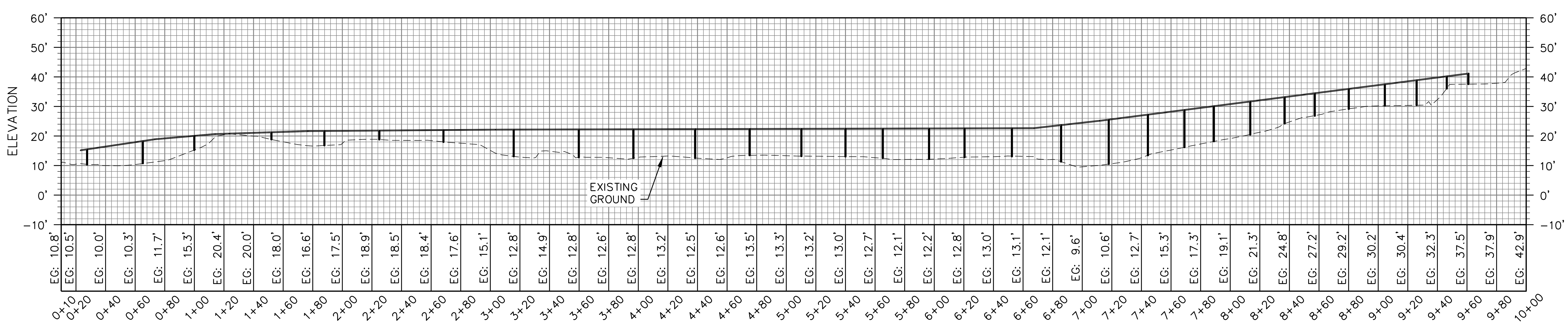
PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

SHEET TITLE

SHARED ALIGNMENT 5 PLAN & PROFILE

C-104

SHEET 4 OF 9



ALIGNMENT "SEPTAGE"

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LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

SHEET TITLE

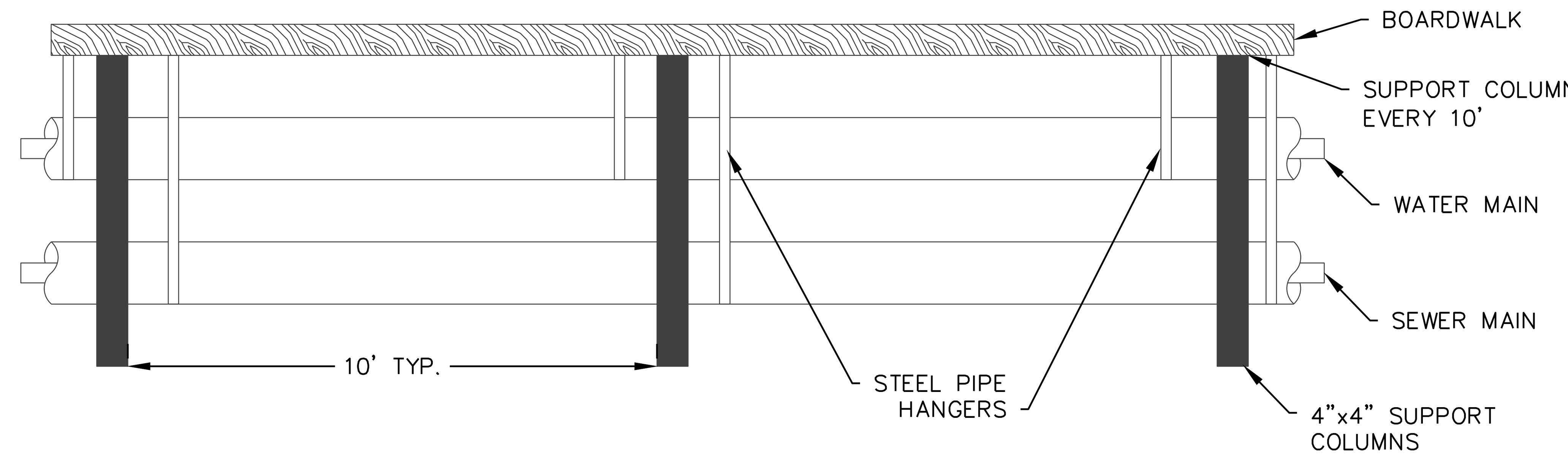
SEPTAGE PLAN & PROFILE

C-105

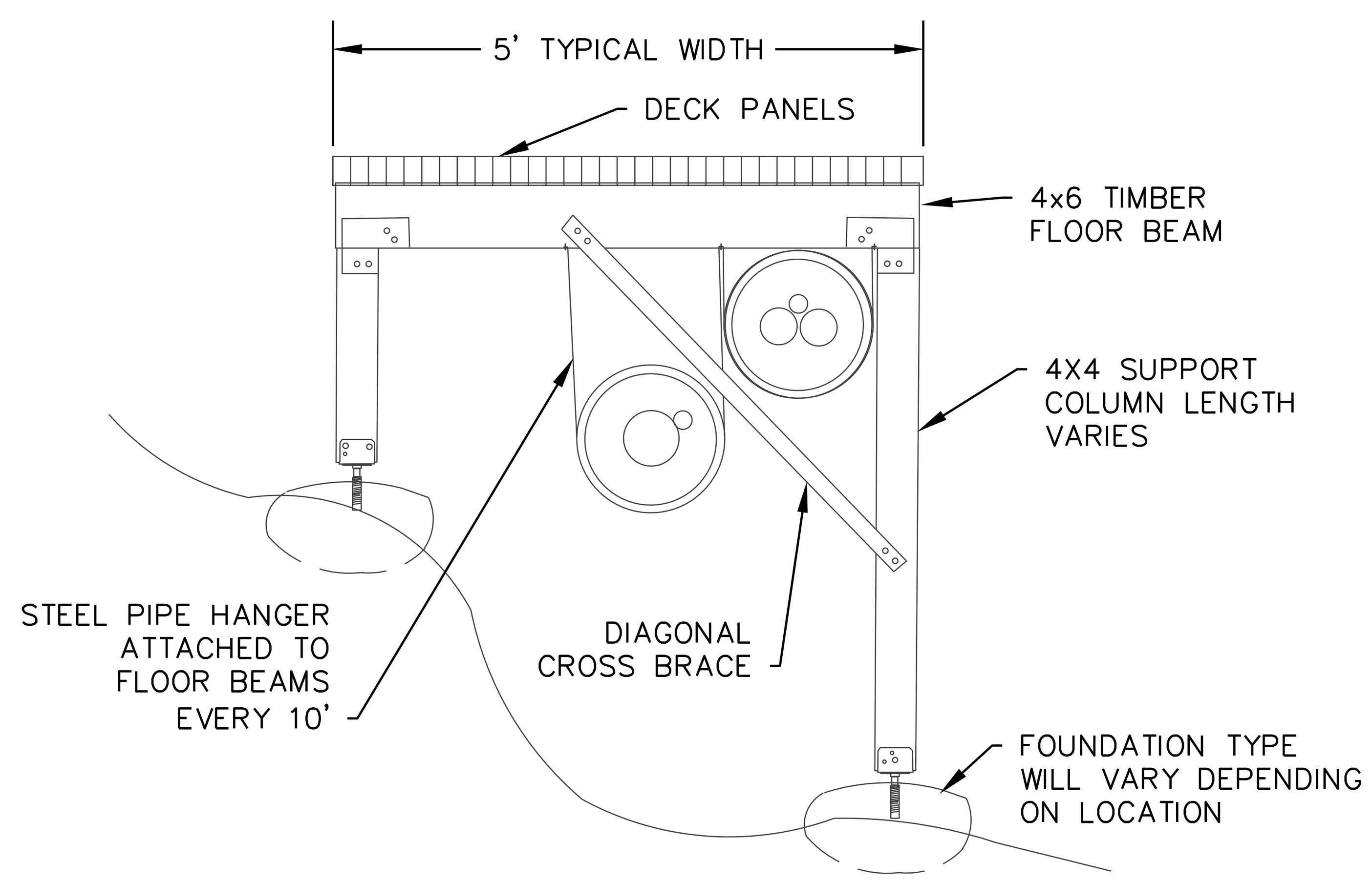
SHEET **5** OF **9**

1 2 3 4

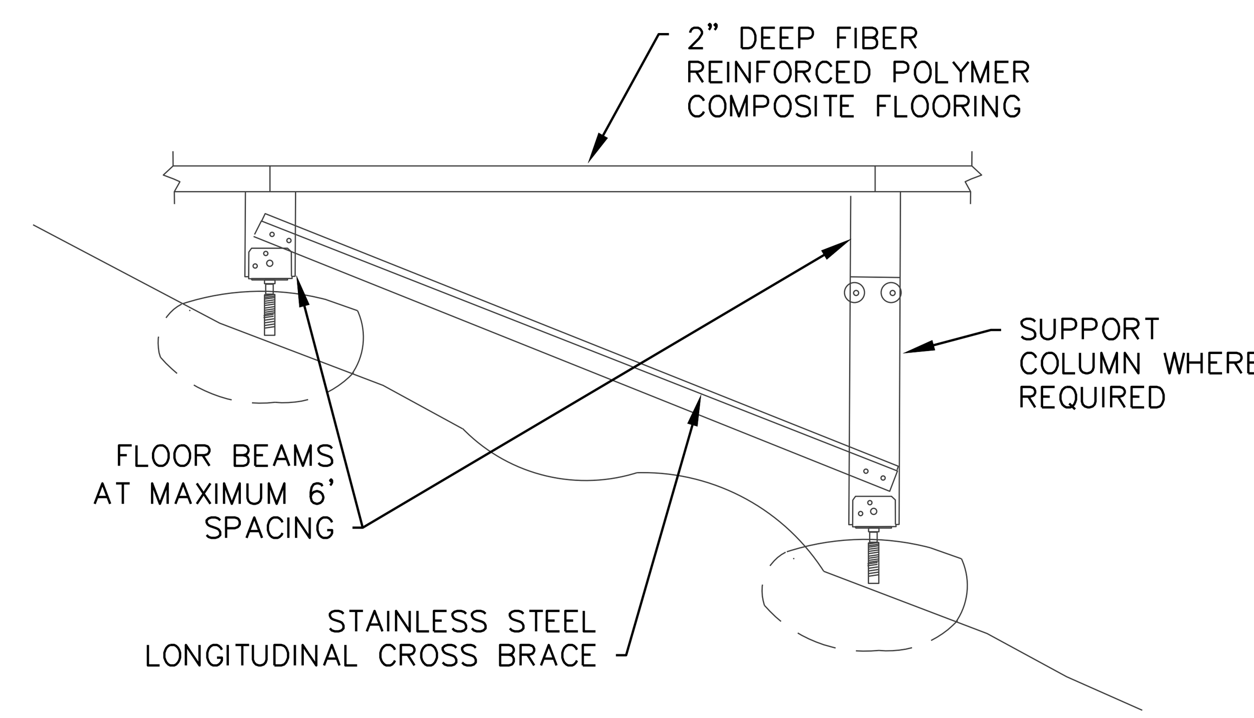
D C B A



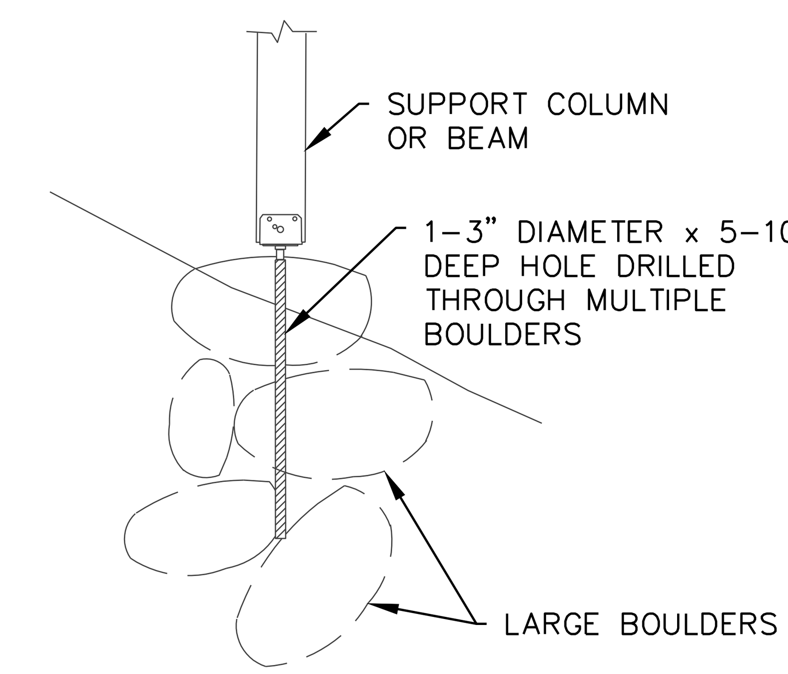
D2 / C-501 **BOARDWALK PROFILE VIEW WITH ARCTIC PIPES**
NTS



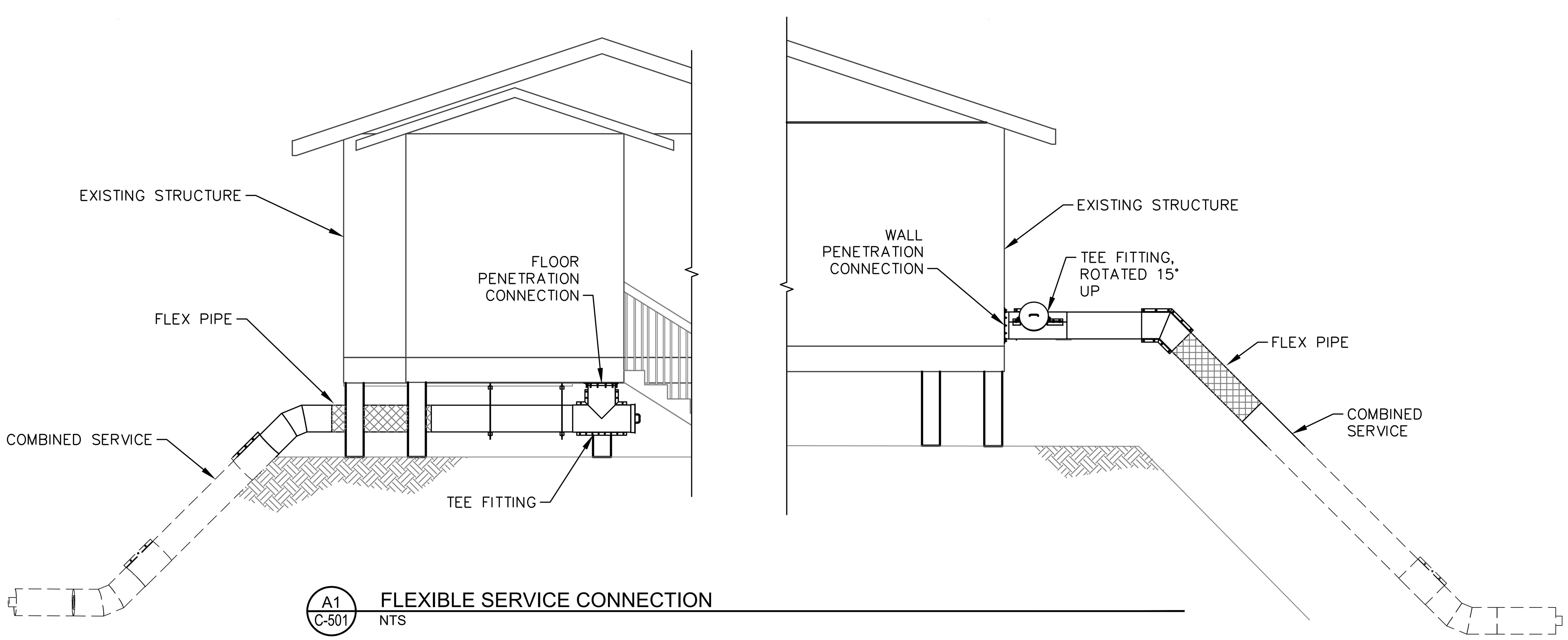
B1 / C-501 **BOARDWALK TYPICAL SECTION WITH ARCTIC PIPES**
NTS



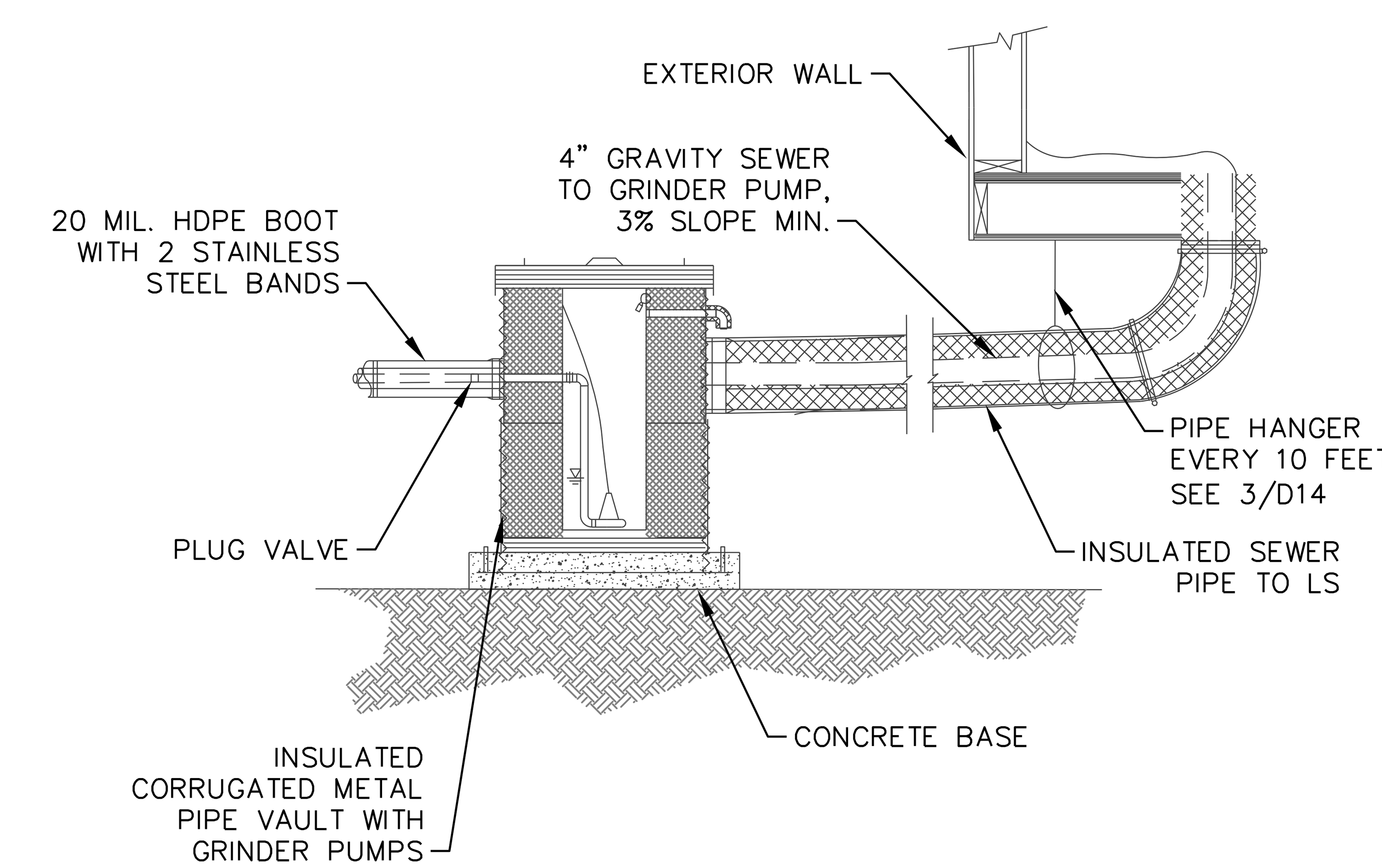
B2 / C-501 **BOARDWALK TYPICAL SECTION WITH NO PIPES**
NTS



B4 / C-501 **MICROPILE SUPPORT MEMBER**
NTS



A1 / C-501 **FLEXIBLE SERVICE CONNECTION**
NTS



A3 / C-501 **RESIDENTIAL LIFT STATION**
NTS

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4500 Diplomacy Drive
Anchorage, Alaska 99508
(907) 729-3600

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NOT FOR
CONSTRUCTION

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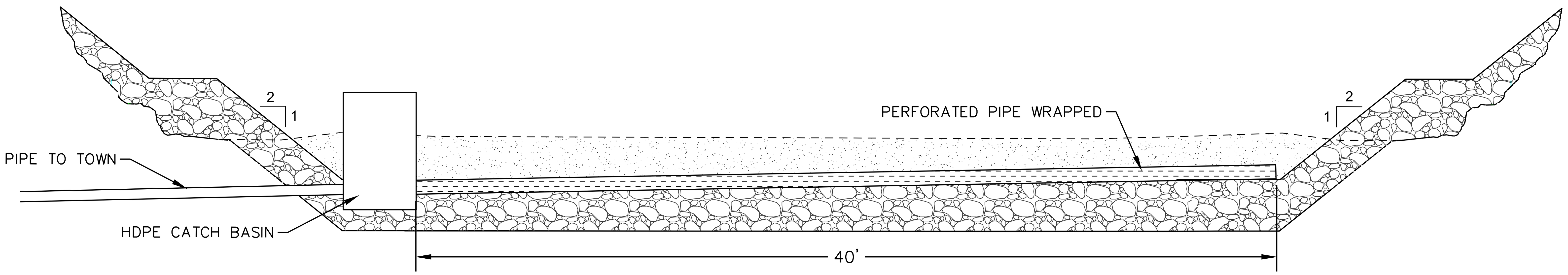
LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

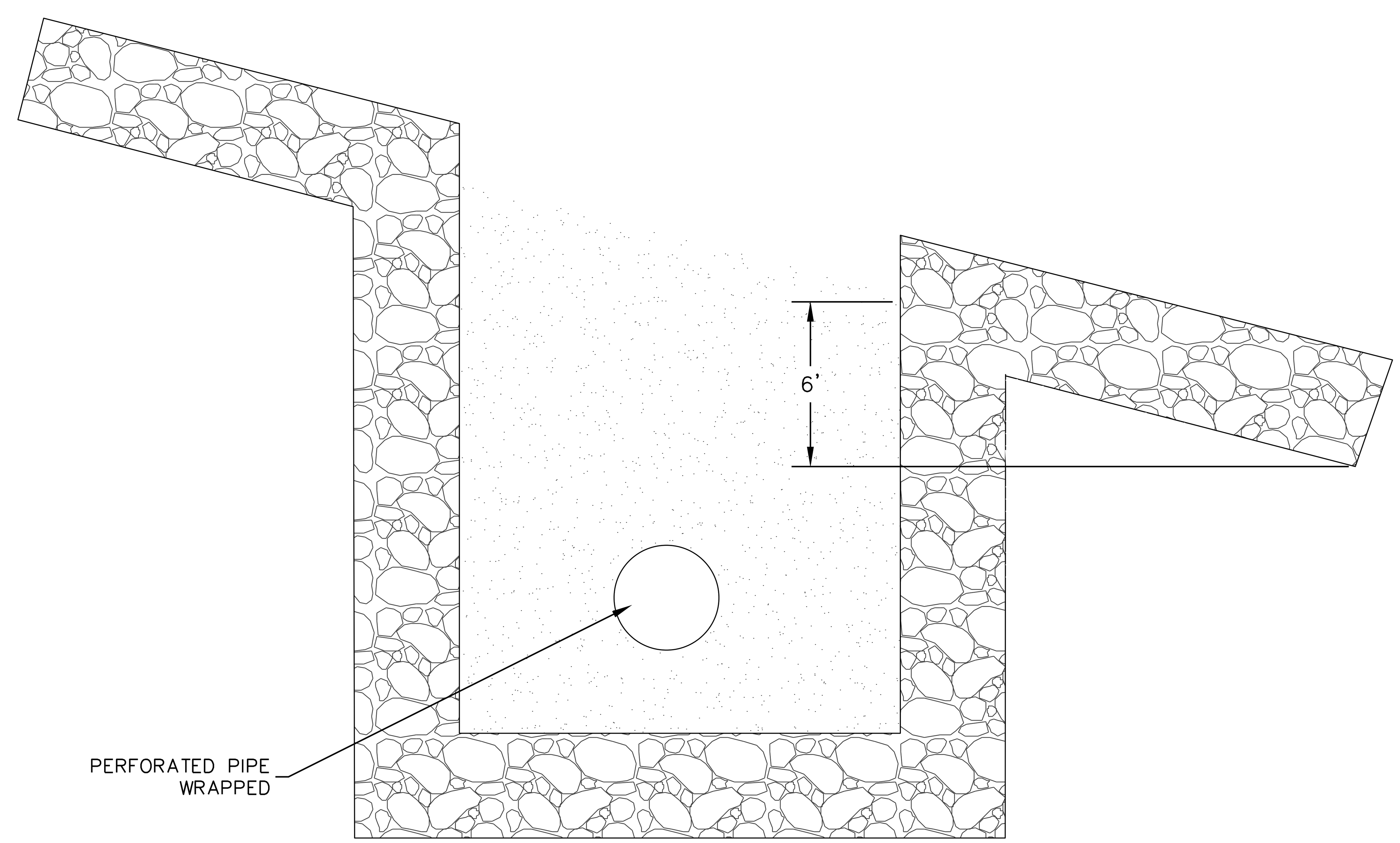
PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

SHEET TITLE
UTILITY DETAILS

C-501
SHEET 6 OF 9



C1 / C-503 INTAKE CROSS SECTION
NTS



A2 / C-503 INTAKE PROFILE
NTS

Division of Environmental Health and Engineering
4500 Diplomacy Drive
Anchorage, Alaska 99508
(907) 729-3600

15% CONCEPT NOT FOR CONSTRUCTION

0 1"
BAR IS ONE INCH ON ORIGINAL DRAWING, IF NOT ADJUST SCALES ACCORDINGLY

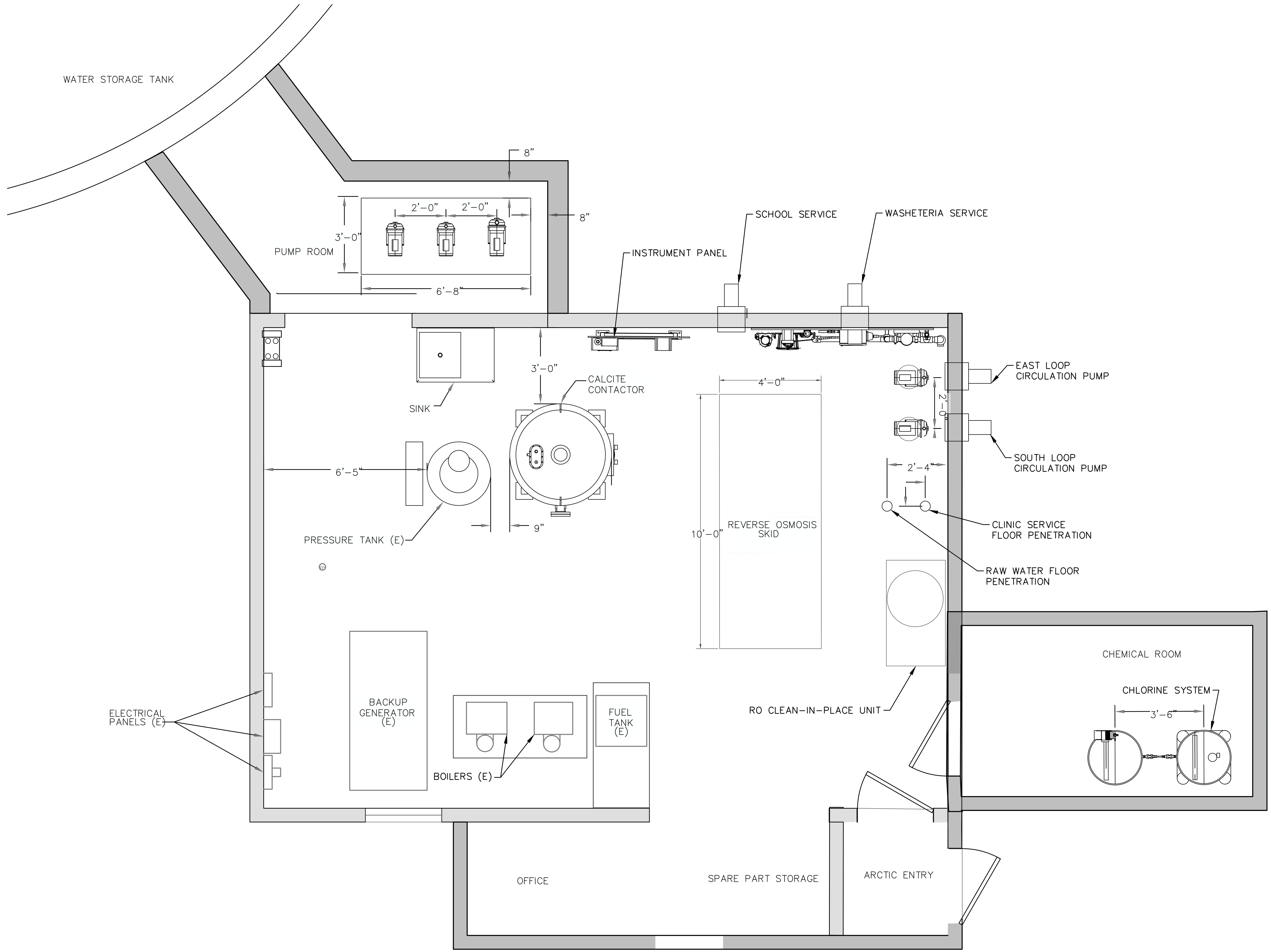
LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

PLAN SET: DIO-##-###
PROJ MGR: CNELSON
PROJ ENG: CNELSON
DRUMS ENG: ----
DRAWN BY: MWHARTON

SHEET TITLE
WATER INTAKE DETAILS

C-502
SHEET 7 OF 9



WATER TREATMENT PLANT SCHEMATIC

Division of Environmental Health and Engineering
4500 Diplomacy Drive
Anchorage, Alaska 99508
(907) 729-3600

15% CONCEPT NOT FOR CONSTRUCTION

0 1"
BAR IS ONE INCH ON ORIGINAL DRAWING, IF NOT ADJUST SCALES ACCORDINGLY

LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

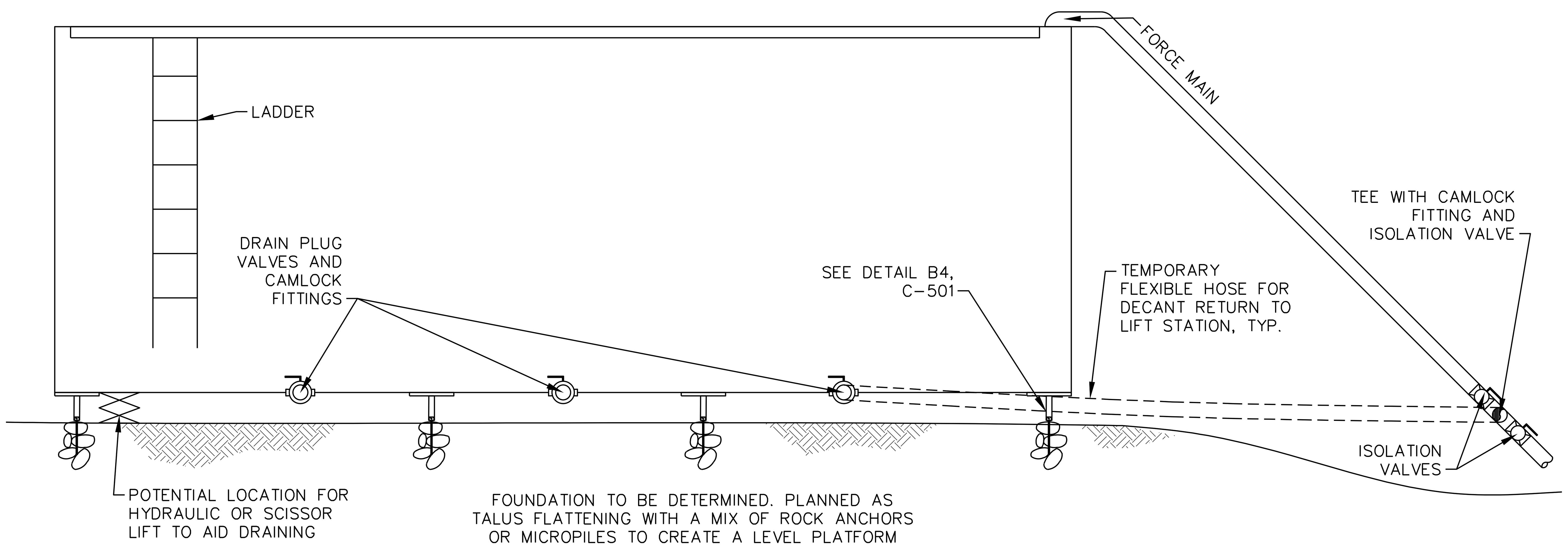
PLAN SET:	DIO-##-###
PROJ MGR:	CNELSON
PROJ ENG:	CNELSON
DRUMS ENG:	----
DRAWN BY:	MWHARTON

SHEET TITLE

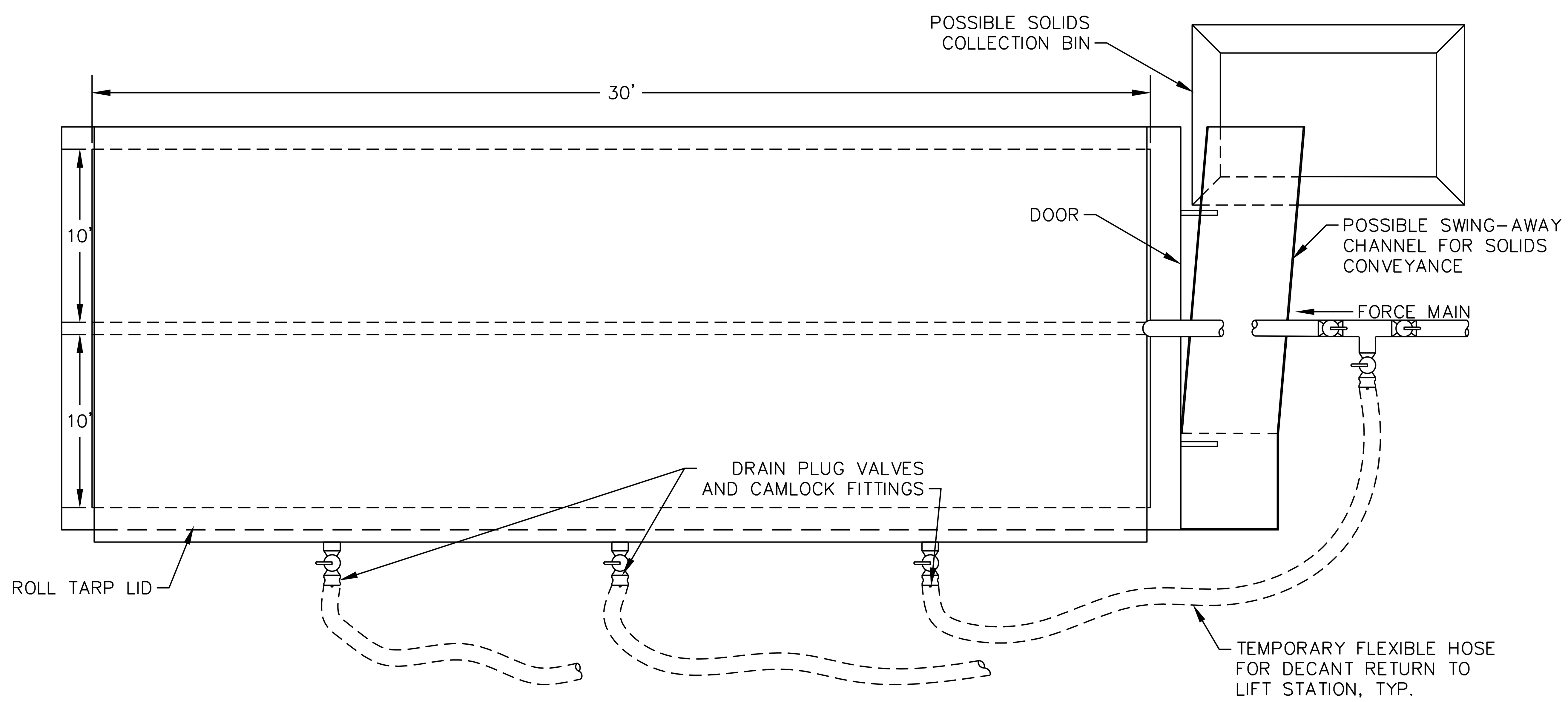
WATER TREATMENT PLANT SCHEMATIC

C-503

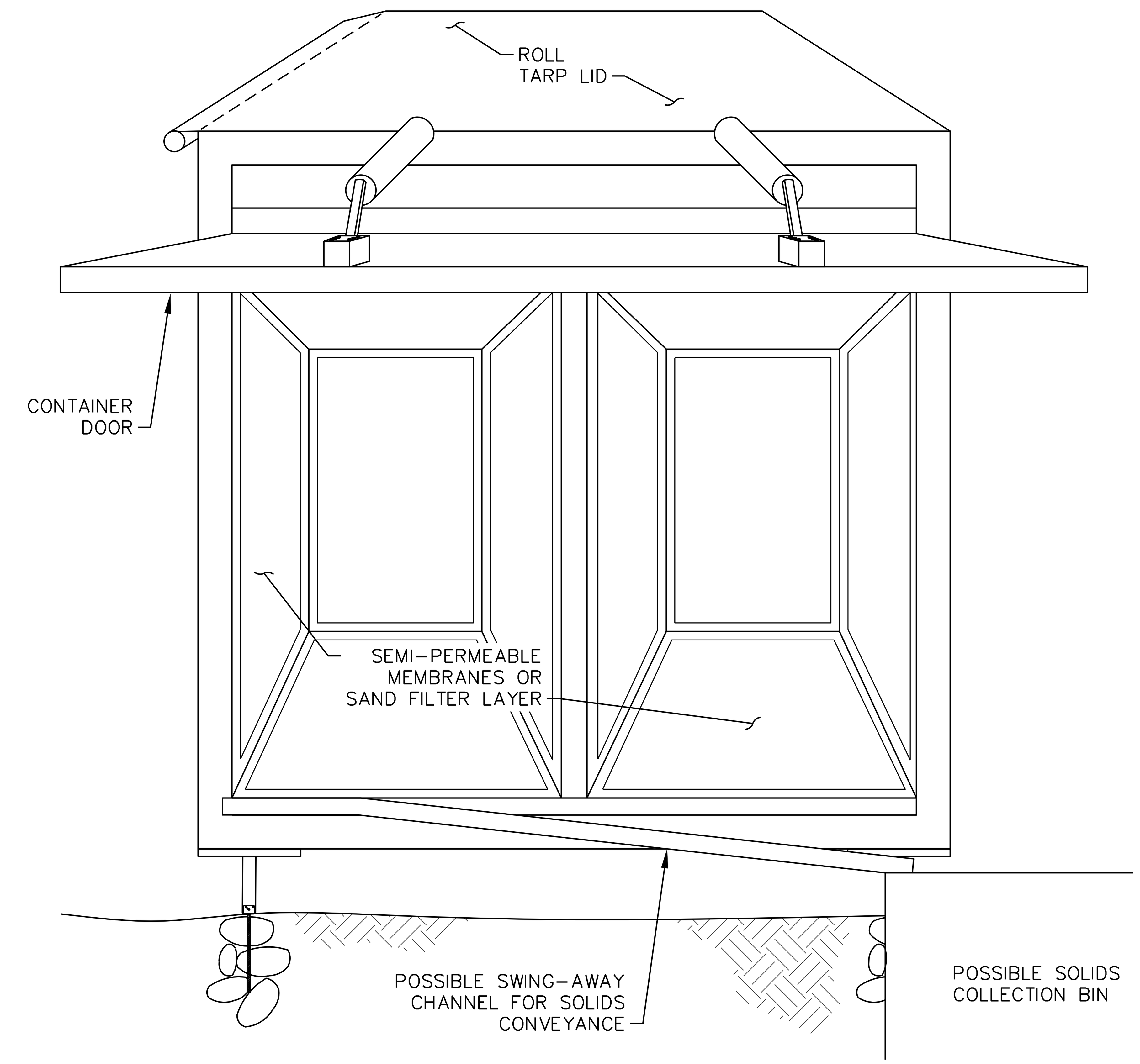
SHEET 8 OF 9



PROFILE VIEW



PLAN VIEW



FRONT VIEW

Division of Environmental Health and Engineering
4500 Diplomacy Drive
Anchorage, Alaska 99508
(907) 729-3600

15% CONCEPT NOT FOR CONSTRUCTION

0 1"
BAR IS ONE INCH ON ORIGINAL DRAWING, IF NOT ADJUST SCALES ACCORDINGLY

LITTLE DIOMEDE, AK
LITTLE DIOMEDE WATER & SEWER EPER
15% CONCEPT DESIGN

MRK	DATE	DESCRIPTION	INIT

PLAN SET: DIO-##-###
PROJ MGR: CNELSON
PROJ ENG: CNELSON
DRUMS ENG: ----
DRAWN BY: MWHARTON

SHEET TITLE
SEPTAGE DEWATERING CONTAINER SCHEMATIC

C-504
SHEET 9 OF 9

APPENDIX 15:
RESPONSE TO COMMENTS

DEHE Review Comment Log

Community:	**Diomede Alt Memo**
Reviews Due Date:	**6/26/2023**
Project Name:	**Alternatives Memo ePER Review**
Project Number:	
Plan Set:	
Reviewer Name(s):	
Respondent Name(s):	

							Question, Comment, Requested Modification, Suggestion	*Question Answered, Comment, Modification, or Suggestion Accepted or Not Accepted and Why*
Comment No.	**Reviewer**	**Respondent**	**Response Verified by Reviewer (dated)**	**Document Page**	**Specification Number**	**Sheet Number**	**Review Comment**	**Response**
1							The ePER should discuss the energy requirements needed for each alternative.	Noted.
2							Emergency power, e.g., back-up battery or generator, for centralized sanitation facilities must be incorporated to address the community-wide power interruptions that frequently occur. The ePER should include a discussion on this topic for each alternative.	Noted and added.
3							For comparison purposes, it would be useful to calculate the energy costs associated with pumping and providing piped water to the whole community over the 25-year design life and compare against the cost of building the water treatment plant (WTP) and storage tank uphill near the raw water intake/summer water use tank.	If the WTP were to be built at a higher elevation, pumping would still be required to circulate the water. The only location that is possible to place the WTP is lower in elevation than half of the homes and due to topography would potentially require pumping raw water uphill.
4							If it can be shown that the pumping costs exceed the construction costs of the new WTP uphill,or even come close (i.e., a benefit cost ratio of 0.9 or similar), the new WTP and core of the piped water system should be located uphill.	See above
5							The ePER should evaluate if the gravity system could be considered a low-pressure system with the use of grinder pumps.	Noted.
6							Another point to consider would be that a gravity-powered water distribution system would allow continuous operation during power outages, thus leading to increased resilience.	A gravity powered water delivery system would not allow for circulation for freeze protection and therefore is not a suitable option for Diomede.

7							Alternatives 5 and 6 reference the potential use of an existing “beach seepage pit” for disposal of urine from ANTHC’s Portable Alternative Sanitation Systems (PASS). The Department of Environmental Conservation has no information on this “beach seepage pit” system. The ePER will need to evaluate the system for potential increased use and whether it meets regulatory requirements. Considering the presumed location of the seepage pit, it is not likely to be approved.	Noted. Further discussion with ADEC has clarified this issue. The final PER does not include Alterntaives 5 and 6.
8							Neither Alternative 5 or 6 state where graywater will be disposed or if it will also be collected in the wastewater holding tank with the urine. If the intent is to also dispose of graywater into the existing washeteria system, it is not likely to be approved.	Noted. Further discussion with ADEC has clarified this issue. The final PER does not include Alterntaives 5 and 6.
9							It is possible, maybe even likely, that any “beach seepage pit” will be considered a functional equivalent to a surface water discharge and will require a discharge permit from the Alaska Pollutant Discharge Elimination System.	Noted.
10							Regarding the use of low-pressure sewer as sub-alternative, if the individual lift stations arepressurizing the sewer main and are needed for the collection system to work, the responsibilityfor maintenance and pump replacement should be with the utility/community, not the individual homeowner.	Noted. Gravity sewer is the preferred collection method.
11							There are thirty (30) BIOLAN separating toilets with ventilation that are on route to Little Diomede per the City’s October 2021 request, when the City chose to request BIOLAN separating toilets instead of PASS infrastructure. The City placed their request after being provided information on both options via teleconference with the city council present. There was extensive coordination carried out between Diomede’s City and various agencies (NSHC, ANTHC, and Village Safe Water) to barge a 20-feet container with materials, currently awaiting in Nome after its itinerary was cut short due to Typhoon Merbok in September 2022. The Review Committee is aware that ANTHC and the newly elected City government staff have been informed that the installation of the City’s requested BIOLAN toilets does not represent an impediment or diversion to the ongoing effort to bring running water into Diomede homes. The ePER should document the current plans for BIOLAN separating toilets with ventilation as an interim upgrade, which would later be backhauled and replaced with permanent infrastructure.	Noted. Information regrading BIOLAN toilets has been added. It is understood that the community has accepted the toilets as an interim solution and are working with NSHC and VSW to coordinate receiving toiets.
12							The ePER will need to address drinking water treatment waste discharge and include permitrequirements. The document sent for review appears to propose discharge to the ocean.	Noted. The proposed WTP has an planned ocean outfall.

13							Alternatives 5 and 6 state that dried solids will be disposed in an incinerator or monofill trench. Diomede does not have a landfill due to being located on bedrock, which is not conducive to landfill construction. The community does not have an incinerator. Currently, the community operates an enclosed burn unit that is not intended to burn sewage solids. Ash is supersacked and periodically backhauled off the island. Trenching will likely be infeasible due to bedrock as well. The document must propose additional options for disposal of sewage solids.	Understood. Barging dried solids would be the prefered method of disposal if it was affordable.
14							If any funding is sought from the Indian Health Service (IHS) to service homes owned byAmerican Indian/Alaska Native (AI/AN) individuals, these homes would need to be clearlyidentified and verified with support documentation. Rental properties are eligible for IHS funding only in certain situations. The following applies: o Must be owned by an AI/AN person or Federally Recognized Tribe. o Primary purpose of rental is not to produce a profit but to providing housing to AI/AN occupants. o Must be leased to an AI/AN person or family. o Documentation must be provided of a long-term lease of 5 years or longer. o Guarantee that the lease price will not be increased after transfer of newly installed facilities. o There must not be additional appropriation restrictions on serving rental homes.	Noted. An eligibility survey was conducted in August 2023 and included in the ePER.
15							The ePER must include a home survey to determine which homes are eligible per IHS eligibility as well as key house characteristics, e.g., properly insulated envelope, thermostatically controlled heat, structurally sound foundation, indoor space availability for a bathroom.	See above.
16							In the particular case of ePERs, the early stage of report development should include consultation with homeowners to query/assess the approximate dollar amount they are willing to pay for monthly water and sewer service fees.	Noted. Included in future report.
17							The e PER should include a table with information that describes the level of impact a subsidy would have on monthly user fees.	Noted and added.
18							Given the limitations for storing construction material in Little Diomede, the ePER should consider phased-construction and accordingly reflect the longer timeframes required for project completion.	Noted.

19							As of May 14, 2022, the Buy America, Build America (BABA) Act imposed new purchasing requirements for federally funded construction projects, such as those funded through the Capital Improvement Projects (CIP) Construction Grant, which receives funding through the USDA Rural Development Rural Alaska Villages Grant (RAVG) and US EPA Alaska Native Villages (ANV) Program. Please ensure that cost estimates account for the requirements of American Iron and Steel (AIS) or BABA.	Noted. DOWL was instructed by ANTHC to not include BABA in the cost estimate.
20							The ePER should include a topography map of the area and additional details on the current water source.	Noted and added.
21							The ePER should provide additional details related to sustainability considerations.	Noted.
22							The ePER should discuss the potential for wind or solar energy to power the system.	Noted.

DESIGN PROCESS
COMMENT REVIEW LOG

DEHE Review Comment Log

Community:	**Diomede 65%**
Reviews Due Date:	**8/18/2023**
Project Name:	**65% ePER Review**
Project Number:	
Plan Set:	
Reviewer Name(s):	
Respondent Name(s):	

							Question, Comment, Requested Modification, Suggestion	*Question Answered, Comment, Modification, or Suggestion Accepted or Not Accepted and Why*
Comment No.	**Reviewer**	**Respondent**	**Response Verified by Reviewer (dated)**	**Document Page**	**Specification Number**	**Sheet Number**	**Review Comment**	**Response**
							Alternatives 5 and 6: Sections 4.6.1 (pdf page 72) and 4.7.1 (pdf page 79) propose dried sewage solids from the PASS system be incinerated in “advanced burn barrel”. The cost estimates for these alternatives (pdf pages 284 and 317) list this as a SmartAsh burner. Per the Solid Waste Program’s knowledge, these units are not designed for this waste stream. Please provide evidence that these units are an approved incineration method for sewage solids or include details about other acceptable disposal methods.	Understood the ADEC may not approve of this disposal method. SmartAsh the company beilved that the units would be able to handle dried human solids. The option to barge dried solids will be added as a disposal method.
							Satellite delivery stations without wastewater collections are not eligible for funding without a wastewater collection alternative.	Noted. This alterntaive will be removed.
							Alternatives 3, 4 and 6 with the satellite approach – The PER should discuss if all homes are structurally able to support the water storage tanks and how the satellite structures (housing the hoses) will be heated.	Noted, structiral stability will need ot be assesed as part of home installation.
							Diomede has frequent power outages. The PER must elaborate on how each of the satellite alternatives (Alternatives 3, 4 and 6) will withstand power outages for a prolonged period of time.	Backup generators at each station?
							Alternatives 3, 4 and 6 with the satellite approach – After filling a house tank with water, there will be the water remaining in the hose. How will this water be cleared from the line to prevent freezing either in the line or on the ground, which could create hazardous conditions in the form of glaciers at each home? The PER should take into consideration how this will impact the movement of residents throughout the community.	Community saftey is a very important aspect of this project. The hoses will be reeled back into the satellite station after use and should not be freezing.

							The PER must clearly identify the dollar amount for monthly user fees that will be applicable to all homes in order to support the selected alternative. A community resolution supporting the monthly cost of user fees associated with the selected alternative is required as part of the 95% PER submittal. If this requirement is not met, the review of the final PER will be delayed until the resolution has been received.	A resolution will be signed at the 95% submittal.
							The PER is missing a summary table for capital costs, operational costs, and user fees for all alternatives.	Monthly user costs has been added to Table 26.
							To estimate user fees, assume all homes will require a small residential grinder pump because grades of 15% or greater are common. Do not assume this would reflect a lower user cost than what will be experienced.	Residnetial grinder pumps are not included in the design of the alterntiaves.
							The cost estimates must incorporate the suggested reinforcements noted in the technical memorandum about environmental threats (Appendix 2).	The cost estimates includes 100LF of riprap reinforcement for the pipe network and raising the water storage tank 4ft.
							Section 4.3.6.3 (pdf page 55) The second sentence of the first paragraph incorrectly portrays the information provided by the Alaska Village Rate Affordability Index. The Affordability Index does not establish a maximum affordable fee for community utilities; rather, it identifies a maximum rate that can be considered either a low or medium burden to the rate payers in the lowest two income quintiles. It would be more accurate to state that the Index suggests a rate above $30/month would be highly burdensome to most rate payers.	Updated in the report.
							Section 4.3.6.3 (pdf page 55) The sixth sentence of the first paragraph states, "The new WTP is expected to cost the community $180 a month but there is funding from Norton Sound Economic Development Corporation to subsidize the user cost for the next two years." It is unclear if the monthly cost noted is per service or for the entire utility. Please clarify.	Updated in the report.
							Section 4.4.6.3 (pdf page 63) The above statements related to 4.3.6.3 pertain to this section as well.	Updated in the report.
							Section 4.4.6.3 (pdf page 63) The first sentence does not appear to be accurate for this alternative.	Updated in the report.
							Section 4.5.6.3 (pdf page 71) The above statements related to 4.3.6.3 pertain to this section as well.	Updated in the report.
							Section 4.5.6.3 (pdf page 71) The first sentence does not appear to be accurate for this alternative.	Updated in the report.
							Section 4.6.6.3 (pdf page 77) The above statements related to 4.3.6.3 pertain to this section as well.	Updated in the report.
							Section 4.6.6.3 (pdf page 77) The first sentence does not appear to be accurate for this alternative.	Updated in the report.

							Section 4.7.6.3 (pdf page 85) The above statements related to 4.3.6.3 pertain to this section as well.	Updated in the report.
							Section 4.7.6.3 (pdf page 85) The first sentence does not appear to be accurate for this alternative.	Updated in the report.
							Pdf pages 31, 56, 64, 78: A statement reads “Backwash will continue to be disposed of in a seepage pit near the beach”. However, the design documents in Appendix 8 appear to show that the discharge is effectively a direct discharge to surface waters, which is subject to an Alaska Pollutant Discharge Elimination System (APDES) permit. The PER should be amended to clarify.	Updated in the report.
							Lined septage pit for pumped waste from proposed wastewater: Discharge to surface waters from this is not likely permittable. The information provided is insufficient to determine level of treatment or whether it would be able to receive plan approval.	The design has been changed to a above ground septage vault with the outfall leading back to the WWTP to be treated.
							Pdf page 72: There is no information provided on graywater disposal from PASS systems. The PER should clarify if urine would be hauled to the washeteria and describe where solids would be disposed of.	PASS has been removed from the considered alternatives.
							Pdf page 74: An area approved for septage disposal would still be required in order for the proposed new washeteria wastewater system to be properly maintained (septic tanks require pumping too).	PASS has been removed from the considered alternatives.
							Pdf pages 78 and 79: There would still be a need for a place to properly dispose of septage from the septic tank for the washeteria. A beach seepage pit will likely be considered a functional equivalent discharge and a higher level of treatment may be needed in order to meet the APDES permit requirements. Otherwise, the system will need to be placed further from the beach and be able to meet requirements for a conventional system.	PASS has been removed from the considered alternatives.
							The PER should describe the structure or space designated for staging all materials for the construction project.	
							Please consider adding bookmarks linked to subheadings.	Noted.
							Font for the figure on pdf page 151 is corrupted.	Noted.
							Pdf pages 142 and 144 appear to be the same. Page 15 of 18 of Appendix 3 appears to be	Noted.
							missing.	
							Page 80 of the Trip Report appears to have the All Markup view still activated.	Noted.

2	NSHC					General	What is the rationale for 2" water mains with circulating glycol freeze protection? This size pipe will not allow for fire protection. The standard for rural water distribution mains is minimum 4".	Pipes have been upsized to 4" and the glycol loop removed from design.
3	NSHC						A circulating water main with circulating services propose a lower cost to the homeowner (instead of the glycol trace with electric heat trace)	Yes, design has been updated.
4	NSHC						Is there a possibility for DEC to continue to honor the existing wastewater treatment system that consists of primary treatment and an ocean outfall? This would be a substantial savings on operations and costs to the community.	Informal communication with DEC indicated that secondary treatment is required for the community,
5	NSHC						Is there space for a facultative lagoon to be constructed in lieu of "septage" lagoon? This would eliminate the need for a wastewater treatment plant.	See section 4.1.5.4 for alterntaive dismissed. There is not room on the island for a faculative lagoon. Also, the talus ground surface would not retain wastewater.
6	NSHC						Micro piles may prove very difficult to install in Diomede. A different structural support design for the water distribution and sewer collection systems may be needed	Geotech field investigation will be required at the design stage and will address foundation recommendations.
7	NSHC						Page 1, 2nd paragraph, 3rd sentence – need to verify that the Old Clinic is still hooked up to the system.	This paragraph is refering to the clinic in use currently.
8	NSHC						Page 6, 1.2.5, 3rd sentence – "The community historically experienced damage due to SEISMIC hazards. Verify this is correct most erosion and floods are due to low pressure events.	Removed "historically" and replaced with "has also"
9	NSHC						Figure 6: Hash lines in the box "DRCA" and then cite "DCRA". Typo?	Noted
10	NSHC						Page 20 2.1, 2nd bullet "TEE's" is it to be tee's?	Yes, fixed.
11	NSHC						Page 22 2.2 History ANTHC did a pilot project for Ion/RO.	Noted.
12	NSHC						Page 30, 2.5.2 Utility Revenue Sources, in 2023 NSHC and City of Diomede executed a Water Agreement for 1/23 to 6/30 $4266.50 and 7/1 to 12/31 for $4266.50.	Thank you for the information. It has been added to the report.
END OF COMMENTS								

DEHE Review Comment Log

Community: Diomende ePER 95%
Reviews Due Date:
Project Name: Diomede 95% ePER Compiled Comments
Project Number:
Plan Set:
Reviewer Name(s): Will Moran, CDT PM
Respondent Name(s): Chase Nelson (CN), Cara Shonsey (CS), Maya Wharton (MW)

Comment No.	Reviewer	Respondent	Response Verified by Reviewer (dated)	Document Page	Specification Number	Sheet Number	Review Comment	Response	Design Milestone
							Question, Comment, Requested Modification, Suggestion	*Question Answered, Comment, Modification, or Suggestion Accepted or Not Accepted and Why*	
1	MM	CN		General			This milestone submittal does not seem to satisfy the minimum contractual requirement for graphics to support a 15% design stage. (CDT please confirm or refute this thought as you are more intimate with the contractual requirements.) A single overview sheet for utility layout from a low resolution perspective with no construction explanation or specific graphics for the septage vault/lagoon (it is described as either, sometime in the same paragraph).	Before finalizing this PER, we will provide additional conceptual design drawings that will include basic site plans for major infrastructure, planning level water and sewer main alignments, planning level details for tanks and process treatment equipment. It was only in January 2024 that guidance was given on other PERs for what is expected for "15% design". Our current scope does not include the recently communicated level of effort for a 15% design which we understand to include professional design sheets that show basic site plans for major infrastructure, planning level water and sewer main alignments, planning level details for tanks and process treatment equipment. Additional discussion regarding scope and budget between DOWL and ANTHC is anticipated.	
2	MM	CN		General			Many of the general (and specific) comments listed here were identified in the 65% submittal comments submitted by Costello. Several options discussed in that submittal have disappeared entirely in this version. General readability seems to have improved very little. I recommend rejecting this effort in its entirety and requesting a re-submittal after someone from DOWL with an engineering stamp reads and updates the report.	We addressed all relevant 65% review comments. Based on ANTHC, Contractor feedback, ADEC Plan Review Feedback, Constructability Reviews, Community Feedback, PER Review Committee Feedback, and CDT PM Feedback this document is a different document than at 65%, and some review comments are no longer applicable.	
3	MM	MW		3			Figure 3: I assume there is supposed to be a label in the tan box near the bottom of the sheet. I also assume some other labels might be missing. For instance, what is the building shape south of the main community that does not really look like a structure?	Fixed.	
4	MM	MW		4			Figure 4: Some buildings are listed as "Unoccupied Buildings" in the legend. Are we to assume these are homes, storage, commercial or some sort of outbuilding?	Unoccupied Building refers to empty homes. These are residential homes that are unoccupied. Some may be currently used as storage, but they were intended to be housing.	
5	MM	MW		4			Figure 4: There are 49 numbered buildings. If we assume these are all residences, and remove the unoccupied residences (about 1/3), then 49 - 17 = 32 potential residences we might be able to provide with water and sewer services. It is confusing that the system proposed is said to serve 33 homes. Where does the extra home come from?	33 services includes an additional home to account for population growth. The expected services will be changed to 32 homes, as that is the number of homes currently occupied. User costs have been calculated assuming 32 residential services.	
6	MM	MW		4 and 21			Figure 4 versus Figure 13: When the figures are compared we see that <u>of the 32 homes that are identified as occupied</u>, 12 are not "Structurally stable". This adds further confusion to why we are proposing to serve 33 homes since 32 - 12 = 20. These two graphics and the data contained within them should be summarized in a single graphic or table to inform the reader how many homes can be connected to the proposed system. This is of critical importance in this, or any, PER.	The expectation is that the 12 homes, which are suspected to have structural instability, will undergo further assessment and could need rehabilitation before the construction begins. These homes are anticipated to become rate-paying customers. Please refer to the response provided in comment 9 for more details.	
7	MM	MW		9			Figure 7: There is a dashed line in this graphic referring the reader to a "Figure 2 cross section alignment". I do not see any cross section in Figure 2. Does this cross section still exist elsewhere or is this a remnant?	This is a remnant and has been removed.	
8	MM	CS		17			Bullet 2: The fact that roughly half of the homes surveyed would be unable to house a normal-sized bathroom is significant. We say these homes "may" be eligible for a version of indoor plumbing that requires less space. We don't say what that might be. Would there be a standard smaller package or would each house have a distinctly different design? How was this worked into the estimate?	Our estimations are based off a 5'x8' bathroom with a kitchen sink area. The bathroom includes a toilet, sink, bath/shower. Our team recognizes that many homes in DIO have very limited space, making this bathroom footprint difficult to accommodate. We understand that ANTHC has multiple versions of bathrooms that will fit smaller spaces; however, detailed information was not provided. We discussed what to use for standard bathroom sizes and variations with ANTHC on January 19, 2023.	
9	MM	CN		21			Figure 13: Who determined the structural stability of these homes and is there any information on the basis for the determination (foundation or build quality/style)?	The structural stability of these homes was not determined through a comprehensive analysis by a qualified structural engineer as it was not included in the scope of the PER. Instead, the assessment relied on homeowners' anecdotal knowledge and high-level visual observations. Homes were considered "unstable" if they exhibited visible cracks and freezing issues or the residents response to the survey indicated instability. If ANTHC would like, DOWL can modify our Scope of Work to include structural assessments by a SE PE.	
10	MM	MW		23			Figure 14: Is the "Old Summer Raw Water Pipe" the same as the what is described on page 22 under the second bullet?	Yes.	
11	MM	CS		28			Figure 16: Wouldn't it be easier to just show the P&ID for the referenced project? Also, if we are going to refer to an ANTHC project, we should reference the ANTHC project number.	The ANTHC project number will be added. The simplified schematic is intended for any readers unfamiliar with a P&ID.	
12	MM	MW		31			Last sentence: This is non-technical, unprofessional wording. We don't talk about what "ails the system". We might discuss "inoperability" or "deficiencies".	Language has been changed in the document.	
13	MM	MW		35			3.3: We state here that the population of is "estimated to grow" to 93 residents. That estimation exists only in this report for purposes of planning. We should be clear where this comes from and refer the reader to the page where that is was established.	Section 1.3 has been referenced in this section.	
14	MM	MW		36			Table 6: ANTHC Technical Directive identifies a 20 year design period. This table establishes 25 years. Why is this?	Updated in the report.	
15	MM	MW		36			Table 6: The number of homes to be served is not supported by other parts of this report. This must be addressed uniformly somewhere in the report.	Noted. The report will be changed to service 32 homes.	
16	MM	CS		36			Table 6: ANTHC Technical Directive identifies daily water usage rates. This table uses numbers different than what is in the directives with no explanation. Why is this? There is some explanation for alternative 2 on Page 37, but since the basis for this reduced rate is the cost of producing water and the user costs are already far beyond the reach of community members, this argument is not strong in support of the number chosen (at least for alternative 2).	Section 4.1.2.1 provides explanation for this design choice. Reducing the monthly rate is a factor but this decision was also made to reduce the need for storage. There is very limited space to construct new storage and storing an excess of water would increase rates. Having a reduced water demand was encouraged during community meetings. Language will be added to this section to further support this descion.	

17	MM	CS		37			Table 7: How were these usage rates established? What is the source of this data?	These rates were reported from Community Water and Sewer Assessments for ANTHC. In most cases the total water use was divided by the population to estimate gpcd. If ANTHC would like to provide additional information related to systems to adjust the numbers we welcome the information. The sources are: 95% Savoonga Water Storage Tank Replacement submitted to ANTHC Nov. 27, 2023; City of Gambell Water and Sewer System Assessment Categorized deficiencies submitted to ANTHC October 25, 2021; Final Report for the Groundwater Well Assessment; Washeteria Well Koyuk AK, submitted to ANTHC October 28, 2019; Taylor Road Piped Water and Sewer Kiana, AK (65%) submitted to ANTHC March 2023; Evaluation of Clear Lakes System Water Resources, Stebbins Alaska (St. Micheal estimate), submitted to ANTHC April 14, 2020.	
18	MM	MW		38			Table 8: This table is not really necessary since these numbers are already presented in table 6:	Daily water demand table deleted from the design criteria table and is now referred to as Table 8.	
19	MM	CN		38			4.1.2.2, first paragraph: This whole discussion is a bit odd, but why would we ever be comparing the circulation flow rate with the peak design flow? Are we considering circulation flow rate as a consideration for pit orifice use? I see no discussion of this or home circulation pumps.	The discussion has been edited to convey the concept that a minimum circulation velocity for freeze protection will be maintained while peak demand is occurring. Pit orifice use will not be identified until the design phase. Mention of Circulating service lines was added to the fully - piped Alternative 2 under Section 4.3.1 and also 4.1.5.3	
20	MM	CN		38			4.1.2.2, second paragraph: The last sentence recommends 6" sewer main "to run pipe under boardwalks". The diameter of the main is not the critical consideration with respect to installation of pipe under boardwalks. The exterior diameter of the arctic pipe housing the main IS relevant but absent from the discussion.	This section will be updated to reflect the external jacket diameter will be 16".	
21	MM	MW		39			4.1.4, third paragraph: Why are we only considering the need for 100 feet of shore protection. Figure 7 essentially shows the storm surge danger area to be the entire shore line. What will 100' of protection be capable of doing?	At this stage, 100LF of shore protection is assumed to protect pipe that may need to be installed below the wave run-up height. The existing WTP and WST is below wave run up so pipe in that area will need protection, the rest of the alignment does not require protection.	
22	MM	CN		39			Last paragraph: This discussion of piping being placed UNDER the boardwalks is an unlikely and unproven concept. Pictures of much of the existing boardwalk suggests it cannot be done, certainly not community-wide. If Kawerak is planning to install new boardwalks, an example of their plans should be included in this report so the possibility of this type of installation could be better visualized. Further, this paragraph allows that this will be done "whenever possible". What is proposed for those cases where it is not possible?	The original boardwalk plans are included in the report as appendix 11. Kawerak has not provided plans for future boardwalks; however, have communicated an offer to update the boardwalks to accommodate hanging mains where possible. We have reached out to Kawerak for future boardwalk updates and have requested enough space beneath the boardwalks for at least three pipes (gravity sewer, and two circulating water mains). Where mains can not hang from the boardwalks, either micro piles will be installed to support the pipes or they will be anchored to the talus. This will need to be assessed in the field on a case by case basis.	
23	MM	CS		42			Alternatives Dismissed, first bullet, second paragraph: It is not true that the planned WTP (under construction) requires the community to store raw water. This is not true.	In the case of adding piped water to every home the expected demand would increase therefore requiring more stored water. This was intended to mean that the WTP under construction will not be able to treat enough water during the summer to fill the storage tanks and provide year round access to treated water. Clarifying language has been added to the report.	
24	MM	CS		43			Figure 19: What is the proposed: Fill material, slope, pipe material, pipe wrap material, perimeter material? What is the purpose of the catch basin? What volume would the catch basin be? Is there really such a natural basin similar to what we are showing here?	Figure 19 is a concept. A survey of the proposed location of the intake has not yet been performed; therefore, there is no slope indicated. The fill material would be a drainage material (gravel or sand) size dependent on the natural sediment generation. The size of the basin is intended to be 40' wide and 6' deep. Based on aerial imagery the natural channel is approximately 40 feet wide. Based on the preliminary estimates outlined in the water resources desktop water capture should be shallow and does not need to extend deep.	
25	MM	CN		44			4.1.5.3, first paragraph: If the project "may need to include housing renovation funds" this report should provide a list/map of the homes that would need renovations and what those renovations would be. This could be done based on a minimum footprint size.	This is not part of the proposed scope.	
26	MM	MW		44			4.1.5.3, first paragraph: The ANTHC arctic box and flexible service connection are two different service line types. To which are we referring here?	Correction made.	
27	MM	CN		44			4.1.5.3, first paragraph: How would wastewater holding tanks be installed under homes, particularly since some of our options propose 500 gallon tanks? This does not seem possible.	Many of the houses are built on considerable slopes, where three sides of the home are elevated above the ground surface creating a significant amount of space below the homes. Many residents take advantage of that space as storage and a few have closed the space in.	
28	MM	MW		44			4.1.5.3, first paragraph: What is envisioned for the "resilient housing and heating system"?	What was meant is a combination of insulation and mechanical heating. Paragraph changed to "freeze protection"	
29	MM	CS		44			4.1.5.3, second paragraph: When we say that "most foundations appear to be unsupported" and the other ominous statements about homes "sliding down the hill" do you feel this report is fairly estimating the viability of serving the majority of the dwellings in question? The recommended piping system cannot be designed to uniformly "slide down the hill". Are we not making a strong argument for a satellite system here? Again, this underscores a point I made earlier about coordinating the data we have in one map/chart. Wasn't an assessment of all these homes part of this contract?	The ominous statements were removed; however, as indicated previously an assessment of the structural stability of each home by a qualified structural engineer is recommended. A very basic visual assessment of each home was performed; however, a structural evaluation was not a part of the scope. DOWL and the CDT PM can discuss a budget reallocation to bring a structural engineer to assess each home.	
30	MM	CS		44			4.1.5.4: To what "proposed pipe layout" is this section referring? Are we sure that there will be no pump stations required?	Based on the elevation data we have at this time, gravity is a viable and preferred option, without a lift station. In the cost estimates, three residential pump stations were included as contingency for when a updated survey is completed. The proposed pipe layout can be seen in Figure 20 and 22.	
31	MM	CS		45			Alternatives Dismissed, second bullet: What do we mean by "there would be little resilience for ground movement"? We have vacuum on adjustable foundations all over the state.	Gravity sewer main slopes are expected to be significant which provides an allowance for ground movement without compromising function. What was meant by "little resilience" when referring to vacuum sewer was the need to keep the grade consistent as designed.	

32	MM	CS		49			4.3.1, first bullet, second sub bullet: How long do we expect snow fencing constructed on a slope in a high wind application to survive? How would it be anchored?	Snow fencing is conceptual like the majority of items included in a PER. Without knowing the subsurface conditions near the location of the optimal location for fencing, we do not know the optimal anchor system (drilled rock socket is a high possibility). Wooden snow fencing has been used and proved to be a durable long-term investment if designed properly in high wind environments such as Wyoming that relies on up to 450 miles of snow fencing along their roads. The development of light weight plastics are slowly replacing wood fencing that has been in place for upwards of 20 years. The new plastic versions may be more applicable for a near coastal environment where humidity can be much higher. We understand snow fencing has been constructed in Wales and could be an analog for design. The strategic highway research council has quite a bit of information on the topic.	
33	MM	CS		49			4.3.1, bullet 4, first sub bullet: There is no mention of the OD of the artic piping proposed. This will have a significant impact on the constructability of this option. Including a glycol circulation main in the gravity sewer line will likely force at least a 16" sewer main. The same will likely happen for the water line. This larger OD will complicate an already difficult construction problem.	An outside diameter of 16 inches was included in the text. Based on the boardwalk plans and visual observations there is more than 32" of both horizontal and vertical space underneath the majority of the existing boardwalk.	
34	MM	CS		49			4.3.1, bullet 4, second sub bullet: Explain how micro piles would be installed in this environment. This is reportedly all boulders and talus.	All construction will be accomplished without the use of drill rigs. These micro piles would be three- tosix-inch diameter posts drilled 5-10 feet into the talus. Bedrock anchoring is preferred. If bedrock is out of depth then stable rock would be cored and anchor bonded in place. Further assessment of the subsurface conditions is needed to confirm the possibility of engineered foundations and depth of bedrock.	
35	MM	CS		49			4.3.1, third bullet: Why would we install exactly the same size tank now that the community can make water all year round? This could cause excessive water age in the system if not managed closely.	Due to Diomede's remote location, extreme conditions, and inconsistent access, DOWL suggests that a tank capable of storing more than 30 days of water to allow for potential repairs of the RO system. We are seeking feedback on timeline for getting replacement membranes to Diomede. Preliminarily it appears more than 30 days of storage is necessary. Also, included in the large tank is the ability to fight fire without putting the community at risk of a water storage. The community already manages excessive water age in the system due to their current system where they treat all their water in a three to four month period and use it over the remaining 8 to 9 months. Further discussion needed to move forward.	
36	MM	MW		50			Service Connections: Substantiate to which structures the 33 residential service connections will be made.	Service connections will be made to the 32 currently occupied homes.	
37	MM	CS		50			Wastewater Treatment, second bullet: We state we are planning to pump septage solids to a "lagoon" on the south end of the community. How would such a thing be constructed?	Report updated to read "septage vault". See section 4.1.5.5 for further details.	
38	MM	CS		50			Wastewater Treatment, third bullet: We refer to a "vault" in this bullet [I can only assume this is the "lagoon" referred to in the previous bullet.] that "can be place on a slope" through the use of some sort of "downslope posts". We are given only a square footage. There needs to be a better explanation of what is being proposed here.	See section 4.1.5.5 and 6.1.2.3 for further details on the septage vault.	
39	MM	CS		50			Wastewater Treatment, fourth bullet: We state we will install a 6" buried pipe (despite having mentioned over and over that burial here is very difficult) to pump solids to this lagoon/vault. Buried, uninsulated pipe takes a VERY long time to thaw. After filling this line with solids and letting it go through a few freeze thaw cycles, do we really expect to be able to move new solids through it?	Pumping of solids would only need to happen every 1-3 years and would take less than three days to empty the tank. The line would be flushed after use.	
40	MM	CN		50			Wastewater Treatment, fifth bullet: We state that the "transmission line will be a return line". How could this be accomplished? If you want to be able to decant from the lagoon/vault back to the WWTP it seems like you would need two lines. Again, how would you clear the outgoing line of solids after transfer? Since most of the decanted fluid would be from precipitation, what are we actually gaining by treating it? Wouldn't most of the precipitation overflow long before the decant line was thawed enough to drain it?	There will be two lines, a septage transfer and a decant return. The document will be updated for consistency. The line would be flushed after septage transfer. The vault will theoretically be a closed system (a box) so precipitation will not be the decanted liquid. The liquid will come from the septage. We expect that septage stored in this matter will produce liquid after going through natural freeze thaw cycles. ADEC provided guidance that discharge of any liquid from the vault would not be permittable so treating the liquid is the only option.	
41	MM	CS		50			4.3.3: Where IS the existing boardwalk ROW referenced here? I don't see that included anywhere in this document. In fact, this is the only instance of the phrase "right of way" I find in this document other than in the abbreviations table.	Existing boardwalk ROW plans are provided as appendix 11. All known property information has been included in this report. To our knowledge there are no residential lot lines.	
42	MM	MW		51			Figure 20: It appears from the label on this graphic that there may be the intention of two lines to the lagoon/vault but because of the use of the singular "line" it is difficult to be sure.	There will be two lines, a septage transfer and a decant return. The document will be updated for consistency.	
43	MM	MW		51			Figure 20: It is odd that from the inset, the proposed "Septage Vault" is located just south of where the main graphic terminates. Why would we do this? It seems advisable to just shift the map a bit to the North so all proposed facilities would be visible. This applies to all the other similar graphics that leave this element just off the sheet.	Noted. This will be adjusted to show the septage vault area.	
44	MM	CN		52			Third bullet: We start with "Septage Vault" and make it only 5 words before reverting back to the word lagoon. This is so disjointed it is embarrassing.	Language has been changed in the document.	
45	MM	CN		52			4.3.4, last line: Are we installing more than one tank?	No, language has been changed in the document.	
46	MM	MW		53			Second bullet, first sentence: There are words missing from this sentence that are necessary for it to make sense. Also, are we suggesting that there is a time when water is treated? This alternative has proposed a year round source. Seasonal water treatment is no longer an issue.	This bullet has been revised in the document.	
47	MM	CS		53			Third bullet: We are proposing a year round treatment routine using RO and a 450K-gallon WST. Wind power to offset energy costs for water treatment and winter warming would absolutely be a benefit. With a huge WST you also have great dump load capacity. An appropriately sized windmill would be the best way to lower user costs for this community. It would be a shame to complete this PER without considering the inclusion of wind power, the one distinct advantage available for inexpensive power.	Diomede's current electrical distribution system, due to its aging infrastructure, may require comprehensive upgrades to accommodate the input from wind generation. Furthermore, Diomede is categorized as a class 7 wind area, requiring specialized equipment capable of withstanding extreme conditions such as gale force winds, arctic climate, and potential corrosion or wave-related events. Additionally, there are uncertainties regarding the feasibility of constructing a stable foundation suitable for a wind turbine, given the limited confidence in establishing even a basic tank foundation. Further discussion is warranted.	
48	MM	CN		53			4.3.4.2: Isn't the first sentence a given considering the topic of the section?	The document does not have a 4.3.4.2. The affordability section includes an introductory sentence that emphasizes the importance of affordability to the sustainability of the project.	
49	MM	MW		53			4.3.5.3: We don't need the "a" before "pump maintenance".	Removed.	

50	MM	CS		54			4.3.5.4, second paragraph: We keep switching between calling the proposed water source brackish and seawater. We need to choose one and stick with it.	"Brackish" has been removed from the report. The Raw water will be from a coastal adjacent well and the specific water quality has to be assumed until a test well can be drilled. The report will use "seawater" for consistency and because the RO calculations are based off standard seawater treatment until we have more information.	
51	MM	CS		54			4.3.5.4, second paragraph: We say here that we are "retaining the ability to treat surface water" but we are proposing removal of all existing treatment equipment from the WTP. These ideas seem to be at odds with each other. Is the intent to treat surface water AND brackish water with RO? Won't the head works and membranes have to be a bit different depending on the source?	Treating surface water in the summer months could be accomplished by changing out the membrane, which should be done as maintenance every 6 months. Treating freshwater would require a lower pressure across the membrane and would result in energy savings. If a clean-in-place unit was incorporated the membranes would last up to five years this historically been a point of failure and would require considerably more chemicals onsite and more training. Without cleaning the membrane (depending on water quality) the membrane will be replaced once or twice every year. Refer to comment 79 or section 6.1.1.2 in the doc.	
52	MM	MW		55			4.3.6.2, second to last sentence: This should read "could decrease by an estimated $100 per month per household,"	Changed in the report.	
53	MM	CN		56			Table 13: What does "Power Consumption" for the Piped user cost cover? Heat trace? Circulation pump?	Yes, heat trace and circulation pump.	
54	MM	CN		56			Table 13: What does "Maintenance and Replacement" cover? Circulation pump? What else?	Maintence and replacement is calculated as 10% of the annual electrical cost to the homeowner. This line items covers all plumbing inside the home.	
55	MM	CN		56			Table 13: What does "Piped User Additional Cost" cover? This line item is even higher than the "Power Consumption" cost.	Piped User Additional cost is the sum of the power consumption and Maintence costs.	
56	MM	CN		56			4.3.6.3: What does the last sentence mean?	All of the financial calculations are based on the assumed price for the school and clinic services. The actual rate that BSSD and NSHC will pay is worked out by the city and our assumption is based on the current rate and other communities commercial rates. Section 6.6 goes into detail about the contributions expected from different entities.	
57	MM	CN		57			Table 14: From whom would this subsidy come?	Unknown at this time. This is a required table for the document and finding funding sources is outside our scope of work.	
58	MM	CN		57			4.4.1, second paragraph: How do we justify a design demand of 30 gpcpd? Upon what is this based?	Satellite delivery is considered a modified haul. The amount of 30 gpcd was chosen because it is a more conservative estimate than haul water use (3-12 gpcd) specified in the ANTHC technical directive for service levels. The conservative amount is based on DOWLs experience with water use associated with haul systems. This was discussed with the community at the 65% community meeting. See section 4.1.2.1 for further explanation.	
59	MM	CN		58			Third bullet, second sub bullet: What kind of vacuum pump would be housed in the satellite buildings? Why would it have to be vacuum? Why couldn't a regular centrifugal trash pump be used?	The satellite buildings will house the sewage evacuation pump to empty the wastewater tanks. This would be similar to evacuation pumps on a septic tank pumper truck.	
60	MM	CS		58			Fourth bullet, second sub bullet: Why the large disparity in holding tank sizes? What advantage does this provide? It will be more expensive and difficult to construct, more costly to heat and will be more difficult to completely empty.	The water tank will be inside of the home, based on footprint and weight the tanks should not exceed 100-gallons. The WW tanks will be outside of the home on the ground. The advantage of a larger tank is reduced labor hours for the operators to service the homes.	
61	MM	CN		59			4.4.2: We state that "there does not appear to be residential property parcels". This is not something that should be unknown at this point. There is a land status map in this report. Is there any reason to question the validity of that graphic/data collection effort?	The land in Diomede is owned by the village corporation, and not by individual homeowners. There are agreements between the village corporation and the homeowners, most of which are not recorded. Uncertain language will be removed.	
62	MM	CN		61			4.4.3, fifth paragraph: If the preferred locations of the satellite stations have not been assessed for constructability, then why have they been proposed in those locations? This is a 95% submittal.	Our community survey team has conducted a visual inspection, but additional assessment through design is needed. These sites appear to have the most available land and are the best options at this level. These sites have been reviewed with the community also. Through design, additional survey and site information needs to be collected.	
63	MM	CN		61			4.4.4.1: The first two sentences seem to contradict each other. Also, there is not really any reason that a satellite system would be unable to deliver as much water as a piped system, depending on how it was managed.	Paragraph has been rewritten for clarity and mention of water savings has been removed from this section as it isn't relevant to energy consumption. A satellite system could deliver the same amount of water but based on other communities with haul systems we would expect that the residents would use less water. Water savings is considered a benefit with this alternative.	
64	MM	CS		61			4.4.4.1, second and third bullets: Are these items that were considered or just some random buzzwords thrown into a list?	No these items were evaluated in compliance with the ANTHC technical directive 21-5, Energy efficiency considerations for rural sanitation facilities.	
65	MM	MW		62			4.4.4.3: Won't the satellites require more complexity such as three different circulation/warming loops/pumps/controls?	Agreed. This will be added to this section.	
66	MM	CN		62			4.4.4.3: There is another significant operational problem with the satellite systems that is not discussed at all in this alternative. How will the community manage the settled sludge that will surely build up in the 500 gallon wastewater holding tanks? There will be sludge accumulation in these tanks over time. How will this be removed/treated?	The satellite system is modeled off of other communities with haul systems. Tank maintence is included in the O&M costs and will most likely by using trash pumps.	
67	MM	CS		63			4.4.4.4, third paragraph: Why are we considering the existing seasonal water source. The water source in this proposal is a year-round source. That is why it was recommended.	Alternatives include continued use of the existing seasonal water source, because surface water will be less expensive to treat than seawater.	
68	MM	CN		66			4.5: It is not clear to me why this alternative was even assessed. This seems like an attempt to blend two totally different service philosophies. The stated reasoning is that it provides a "high level of wastewater service". How would the homeowner experience a higher level of service than the alternative 2 or 3? All alternatives include flush toilets with no handling of fecal material. Also, the proposed 500 gallon wastewater holding tanks in alternative 3 ensure a low likelihood of service stoppage due to inadequate room in the holding tank. The only advantage I see to this alternative it not having to find an operational solution to the removal of sludge from the WW holding tanks (see comment #63).	This alternative has been included throughout this process as a hybrid option for the community. Trying to respond to community feedback which has consistently been that their priorities are improving sanitation while keeping maintenance on the system low. The labor required for emptying the wastewater holding tanks would be eliminated with a fully piped collection. Also, the fully piped connection decreases the risk of human contact with waste versus pumping out wastewater could result in spilled septage. The levels of service do place pipes above haul systems which is why we used LOS language. If ANTHC would like this alternative removed, we can do that and list Alternative 4 as a dismissed alternative.	
69	MM	MW		66			4.5: I have not included specific comments for this alternative but many of my comments from the previous alternative apply to the relevant sections of here as well.	Noted.	

70	MM	CN		75			Table 21: These are certainly the highest monthly user costs I have seen in any projection anywhere in the SOA so far. How does the do nothing alternative still cost the users $160/month? Are they billed now?	The estimated O&M cost of proposed WTP (as already designed by ANTHC), the transmission line, and the propsoed WST is approximately $100,000. The costs come from the ANTHC PER for the water source and the CRW master plan from 2012. The resulting fee for each service is then approximately $160 per month. This assumes 35 services and therefore will be adjusted to assume 32 services. The community has a subsidy to pay for the first two years of operation but it is unknown how it will be covered after that. Residents are not currently billed for water.	
71	MM	CN		76			First set of bullets 1,2, 5, and 8: This is supposed to be a consideration of non-monetary factors. Why then are the referenced bullets all discussing costs or ways of curbing costs?	Our exploration of "non-monetary" considerations was driven by community input, and the overarching concern throughout the process was to minimize end-user costs and maintenance for the community. The O&M cost factor can be reframed as "O&M requirements," serving as an umbrella term for the community's overall burden. Excluding this priority from the non-monetary factor sections would overlook the largest piece of community feedback we received.	
72	MM	CN		76			Second set of bullets 1: Again, this concern is about costs. Why is this in a non-monetary costs consideration?	See response to comment 71.	
73	MM	CN		76			Bottom paragraph: Who did the weighting of these factors? Was the community involved in this weighing of factors?	The community leadership ranked the four factors as a team and weights were applied based on the ranking.	
74	MM	CN		77			Table 22: I don't see any scores, ratings or totals tallied here.	Tallies were generated, and the best scoring alternative is consistent with the preferred alternative. Reporting quantitative values was not suitable for our qualitative discussions. This can be included if needed. Should discuss at review meeting.	
75	MM	CN		77			Table 22: Why is there a "high" homeowner responsibility for the Satellite system?	The satellite system has high homeowner responsibility because homeowners will be responsible for their storage tanks, including heating the WWST and maintenance. Homeowners are often responsible for maintaining access to their tanks which can involve shoveling and more coordination with the utility.	
76	MM	CN		77			Table 22: What is the point of the Resiliency row? All three options have the same resiliency.	Resiliency was a factor important to the community and therefore included in the matrix. There are different levels of resiliency for each alternative. Mainly, alternative 2 is the only option that uses the RO system instead of the inconsistent surface water source. Other factors considered include infrastructure in the wave runup zone and allowance for ground movement.	
77	MM	CS		78			6.1.1.1, first paragraph: We need to stop using "sea water" and "brackish water" interchangeably. They are not the same thing. Are we saying this because we are concerned there will not be enough fresh water mixed into the seawater? Are we worried that the TDS will not be below 15,000 mg/L in the newly proposed water source? We say the geology would act as a natural primary filter in this section. This would certainly reduce the amount of pre-RO treatment necessary.	Language has been changed in the report to say "seawater" for consistency. We will not be mixing freshwater with seawater for the RO treatment. There uncertainty about the specific water quality until a test well can be drilled. The RO calculations are based on a "worst-case" scenario of standard seawater so that is what we will refer to the source on from here out.	
78	MM	CS		78			6.1.1.1, third paragraph: How would snow fencing possibly be anchored in this environment? Wind gusts are excessive. This would have to be very heavily anchored.	See response to comment 32.	
79	MM	CN		78			6.1.1.2, second paragraph: Better discussion of the economics behind the recommendation to just treat the RO membranes as "disposable" is warranted. If this has been done in an estimates section, please refer the reader to that analysis.	Details added to the section supporting the recommendation to treat membranes as disposable. Economically, both options are similar due to the shipping costs of chemicals. The main argument is reduce operational complexity and the risk of system failure.	
80	MM	CN		79			Bullet: Are we proposing a SCADA system? Is it part of the estimate? Why is this not part of the description in the earlier part of the report? This seems out of place.	SCADA will be required. Information on the SCADA system will be improved. The RO manufacturer will need to have access to monitor performance and work with operators to make adjustments, especially following start-up and commissioning.	
81	MM	CS		79			6.1.1.3: The decision to not add water storage is sound with the assumption of a year round water source. However, the replacement of a tank with one of equal size that allows the community 60-days of storage capacity is complete overkill. 10 days of storage is more common, and given the remoteness, 20 days or even 30 is arguably reasonable, but 60 days seems unwarranted.	See response to comment 35.	
82	MM	MW		80			First bullet: 100LF of riprap is not going to make any real difference. There is a very large fetch for this community. Wave heights, wind speeds and tidal surges will simply drive water around this barrier. Also, it is hard to determine if this 100LF is going to be one section or several. It is not shown on Figure 23 at all.	Rip rap is aimed to dissipate wave energy not protect from flooding. Much of the community structures are below wave run up height, so rip rap will help mitigate some of the damage from waves. The 100LF is intended for the section of pipe that is below wave run up height. See previous comment response 21.	
83	MM	MW		80			6.1.1.5, third paragraph: The number of homes quoted here does not take into account the number of homes that are considered structurally unsound.	Noted. Service connections will be made to the 32 currently occupied homes.	
84	MM	CN		80			6.1.1.5, third paragraph: Why would we want to have circulating glycol in the service lines? What about water circulation pumps in the homes? That is much easier to accomplish.	Glycol will not circulate in the service lines, only along the mains. Homes would have a water service circulation pump and electric heat trace out to the main. This will be clarified in the report.	
85	MM	MW		81			6.1.2.1, third paragraph: If we are proposing a 6-inch main with a circulating glycol loop, the OD of the arctic pipe will need to be bigger than 12". Why not use 16" OD pipe so many of the co-located mains (water & sewer) are the same height?	Noted. Alternatives will be updated.	
86	MM	CN		81			6.1.2.1, third paragraph: Why would we want to have circulating glycol in the service lines? This is not how sewer lines are typically warmed. Electric heat trace would be more common.	Glycol will not circulate in the service lines, only along the mains. Homes would have a water service circulation pump and electric heat trace out to the main. This will be clarified in the report.	
87	MM	MW		81			6.1.2.1, second bullet: This is not a component of the sewage collection system. This is something that will need to be determined as part of the design, and arguably a preliminary layout of the grading of the WW collection system should have been presented as part of this 95% submittal.	Language has been changed to "other components needed to design" the wastewater system. We do not have a survey of the community in order to make a grading plan.	
88	MM	CN		81			6.1.2.1, third bullet: This is late in the analysis that our gravity WW collection system will require several lift stations. This should be mentioned sooner.	We would like to understand the ANTHC decision not to raise the building before incorporating into our preferred alternative recommendations. Further discussion needed on this topic.	
89	MM	CN		81			6.1.2.1, fourth bullet: This is not a component of the sewage collection system. This is something that will need to be determined as part of the design, and arguably should have already been tabulated and presented in this report.	An updated survey, which was not included in the ePER scope, will be required to finalize the gravity sewer design.	

90	MM	CN		82			6.1.2.3, third paragraph: Here is a bit more information on the proposed septage vault/lagoon. Through this description is appears that this element is to be something ultimately "removable". Will there need to be a lift station for the effluent? How will this be protected in winter? How will it be operated?	The septage vault concept is preliminary. Based on available topographic information, it does appear decant could drain by gravity back to the wastewater plant. Our preliminary plan is that the vault would be covered, and it will be allowed to freeze in winter. The vault would be designed as removable. We intend to include more information on the vault in the next submittal. More discussion with ANTHC is needed on this comment.	
91	MM	MW		82			6.2: From what existing ROW might the design deviate? Is there a map of existing ROWs in this report?	Figure 5 shows all available ownership information.	
92	MM	CN		83			Bullet 1, sub-bullet 3: The power grid in the community should have been assessed already at least with respect to whether or not proposed elements could be supported.	This was not included in the scope.	
93	MM	MW		83			Bullet 1, sub-bullet 4: Housing studies should have been carried out as part of this effort. It is not clear how many houses have not been visited.	Noted. This information will be added in the housing assessment figure.	
94	MM	MW		84			Bullet 5: How is this a careful design choice? This is just a simplistic observation.	Removed from this section.	
95	MM	CN		85			Figure 23: This graphic is depicts service lines and mains passing through (or under?) homes. It does not indicate how water mains would be looped. I does not depict water separate from sewer mains/services as the legend shows both (and all other line types) as simple black line. Is this intended to show water or sewer mains/services? In fact the entire legend represents all components in the same line work. The drawing even lacks a descriptive title indicating the point of the illustration. Where are the homes that will potentially need individual lift stations? Why does this depict a tank that does not exist and is not a part of the recommended alternative? As the single "detailed" graphic component of the recommended alternative, this is woefully inadequate to represent the ideas put forth in the recommended alternative.	Water mains are "looped' as out and back lines. Proposed alignments will be updated, title will be added, and 315,000-gallon tank will be removed. We will indicate the homes that will be served and those that have been preliminarily identified for residential lift stations.	
96	LBC	MW		page 7 of 626 - Introduction and page 32 of 626 - 2.2 History			the WTP construction is now in progress	Noted.	
97	LBC	MW		page 12 of 626 - Figure 4			Is there a reason not to mark the school, washeteria and clinic as plumbed? I believe all three buildings have at least seasonal housing	This is correct and will be updated.	
98	LBC	MW		page 31 of 626 - Figure 14			The raw water system was cut and capped during the new water plant construction and doesn't connect to the WTP anymore. The routing of the service lines is a bit off in this figure see the snip below where bright green means delete and light blue means add	Noted. Snip has not been included in our comment documents.	
99	LBC	MW		page 34 of 626 - 2.3.2			Construction completion of the WTP is planned for 2024	Updated in report.	
100	LBC	MW		page 35 of 626 Distribution System			Can you explain the use of bypass here? Are foks bypassing the treatment?	Residents are bypassing the watering point by going into the WTP to collect their water. The hose being used delivers treated water.	
101	LBC	MW		page 36 of 626 - Figure 16			The renovations to the water plant no longer include raising the building. The existing FF was matched.	Noted.	
102	LBC	MW		page 39 of 626 - 2.3.5			"reduce the coast of backhaul" typo?	Yes and resolved.	
103	LBC	CS		page 57 - 4.3.1 water treatment and page 87 of 626			I think it is work estimating the cost of a new WTP building rather than a second renovation of the aging water plant. Depending on the anticipated design life, that may be the only feasible option.	Alternatives include continued use of the existing seasonal water source, because surface water will be less expensive to treat than seawater.	
104	LBC	CS		page 93 of 626 - figure 23			The well is next to the fuel tanks, could be a bad location if there were a spill	Noted. The proposed location is a potential but field testing will need to be completed before finishing design.	
105	LBC	MW		page 97 of 626 - 7.0			no geotechnical investigations were specifically performed as part of the WTP design	Noted.	
106	KB	MW		I			2nd paragraph, 2nd line, add "tank" after "aboveground treated water storage"	Added.	
107	KB	MW		1			Alts Considered: 1st sentence, has ANTHC not worked with the community on this project?	Added.	
108	KB	MW		I			Define first use of Tri-Org	Added.	
109	KB	MW		I			Preferred alt - WST acronym should appear in first use see paragraph 2	Changed in the report.	
110	KB	MW		II			last paragraph, add the appendix number where the resolution is included in the PER	Added.	
111	KB	MW		1			Label helipad on Fig 3 as discussed in first sentence of 3rd pargraph1	Added.	
112	KB	MW		13			Sectopm 1;2;7.1 paragraph 2 Sentence 2 - add "and" and remove "in" between "spring in summer"	Changed in the report.	
113	KB	MW		14			1.2.8 does not refer figure 10.	Added.	
114	KB	MW		16			1.3 3rd paragraph, last sentence. Not aware of new WTP project. Current project expands and rehabs existing. Would remove last part of sentence "…and may encourage a return of residents to the community"	Noted.	
115	KB	MW		17			1.4.1 update acronyms, first use of A::B only	1.4.1 is first use of A::B.	
116	KB	MW		30			last paragraph, 2nd sentence "has had to been" - correct grammar "is"	Changed in the report.	
117	KB	MW		31			last sentence remove "it is unknown what ails the system" replace with "the cause is unknown"	Changed in the report.	
118	KB	MW		42			Alts Dismissed paragraph 2 - not a new WTP, just rehabbing the existing one - please fix throughout document.	Changed in the report.	
119	CA	MW		39			fourth paragraph "The history of the community increases the likelihood of historic cultural materials within amongst current residences." delete within or amongst.	Changed in the report.	

120	CA	MW		50			section 4.3.2 "and will be a positive impact on endangered polar bears and all wildlife in the area." no proof or data to support this, please delete it here and in other environmental impact sections.	removed.	
121	CA	MW		85			Add mean higher-high and mean high water mark to diagram.	noted.	
122	CA	CS		83			Can you explain why USACE 404/10 permit is needed? If because of seepage pit this falls under NWP 3. Is it because of this mechanized wastewater unit?	USACE 404 is needed for all construction that impacts waters of the U.S.	
123	CA	CS		83			Is there an existing ADNR tidelands permit for the existing seepage pit? If not, will need to obtain one.	We have noted that the existing seepage pit lacks the necessary permits. Fortunately, through the proper maintenance of a lifewater system, the reliance on a seepage pit can be eliminated, as an ocean outfall proves sufficient for secondary treatment.	
124	NSHC	MW		31			Figure 14 typo on "Approximate Wastewater Outfall Location" callout	Fixed.	
125	NSHC	MW		39			End of third paragraph. Typo "Coast" instead of "Cost"	Noted.	
126	NSHC	MW		42			Table 5. Is labor for the WST really only $2 annually? Labor for tank cleaning should make this higher.	This is a mistake and has been fixed.	
127	NSHC	MW		58			Sec 4.3.1. The septage vault is referred to as a lagoon in one bullet and a vault in another. I think it's supposed to be vault - language needs to be consistent.	Noted. Updated throughout the report.	
128	NSHC	CN		85			Table 22 doesn't show any numerical scoring but the last paragraph on the previous page makes reference to numerical scoring	See response to comment 77.	
129	NSHC	MW		General			With this PER recommending R/O, will the ANTHC project to install ion exchange in the WTP still go forward?	Yes. The ANTHC WTP upgrade is separate from this first service project.	
130	NSHC	CN		General			What will the septage vault be constructed from?	The vault design is not yet developed, it could be made of HDPE similar to above ground Lifewater SSTs, or of another material that can withstand freezing.	
131	NSHC	MW		General			Is the septage liquid return line heated?	No.	
132	NSHC	MW		General			Will the liquid return from the septage vault to the treatment unit require power? Unclear if there is currently power at that location	No. The septage system will not require heat.	
133	WE	MW					App 8 - Do the WTP design plans provide value to this ePER? I know its part of the options considered, but I suggest that they be removed and referenced. If they need to be included the IFC set has been complete for some time, so they should be included. **This was originally part of the 65% comments and wanted to ensure is was addressed in ePER**	WTP design plans were not included in this 95% submittal.	
134	WE	CS					**Late Breaking Development:** In order to accommodate construction, DEHE has decided to not raise the WTP finish floor as shown in the IFC design. The reminder of the project will be constructed, just at the current elevation. As a result any option here that plans to utilize that facility will need to include elevating the structure to properly protect it for inundation and ice damage. **This was originally part of the 65% comments and wanted to ensure is was addressed in ePER**	Our understanding is that construction phasing was delayed and had to be adjusted to finish the project therefore elevating the structure was eliminated to continue construction. If this is correct, we can include elevating the structure or building a entire new structure as suggested in comment 103. We just need clear direction from ANTHC.	
135	WE	MW		2.3.2			Change WTP construction completion schedule to summer 2024	Noted.	
136	WE	MW		4.1.5.1			Is there a reference for the statement "climate change affecting the snowpack" indicating a loss of snowpack?	Yes, the Water source desktop is referenced as an appendix.	
137	WE	MW		4.1.5.1			The intake site is not "limited" access for equipment, it is not accessible for anything other than a number 2 shovel.	Correct.	
138	WE	MW		4.1.5.5			Says an above ground septic system presented to ADEC? What does an above ground system include?	An above-grade septic system and seepage pit would resemble the current washeteria septic system already in use. This was dismissed by ADEC because primary discharge is not acceptable.	
139	WE	MW		4.1.5.5			Was primary treatment with septic tanks and outfall discharge of effluent considered?	Primary treatment was dismissed after conversations with ADEC.	
140	WE	MW		4.3.1 Para 1			A "major increase in storage" - please clarify this wrt replacing the tank with the same size as proposed for this option?	Correct. Statement has been removed.	
141	WE	CS		6.1.1.2			The existing building even after the current retrofit project will not have a 20 year design life. The long term solution needs to be elevated as well to protect from sea level rise / storm surges.	See response to comment 134.	
142	WE	CN					For discussion: Agreed that Diomede location justifies greater than our standard 10 days storage - 60 days may be too much? But with RO may be a good idea. A reduction in storage capacity could get the tank to more optimal dimensions for thermal considerations.	See response to comment 35.	
143	WE	CN		6.1.1.5			PM direction needed here; does the building additions cost get included in this PER?	Not meant for DOWL response?	
144	WE	MW		6.1			Has a Backup generator been included in the project?	Yes.	
145	WE	CN		6.1.1.3 Para 3			Please re-evaluate this statement regarding lower operating costs with a half full tank. the air temp inside a tank is close to the water temp, and will not yield anytime that miniscule savings on storage.	Noted.	
146	WE	MW		Fig 23.			As the "ANTHC proposed" 315k gal tank and piping not included on this alternative and should not be shown here.	Noted. Information will be removed from figure.	
147	WE	MW		6.1.1			This says there is a figure 24, yet no figure 24 has been included.	Fixed.	
148	WE	MW		6.4.1			sixth Bullet: please evaluate this statement. This would only be true for a fill and draw system.	Correct. Statement has been removed.	
149	KMW	MW		13			1.2.7.1 Foxes are present in spring and summer, not "in summer"?	Fixed.	
150	KMW	MW		22			2.1 Existing sanitation facilities are 6-30 feet above sea level? Or did you intend to use "and" twice"?	Fixed.	
151	KMW	MW		29			Washeteria: The first paragraph contradicts the last paragraph in page 27. On page 27, the watering point is bypassed so the meter and I'm guessing coin-op system aren't used. It sounds like the City would prefer community members to use the watering point, though. On page 29, it sounds like the City has no intention of charging for hauled water. Please clarify	The report will updated for consistency. The city has told us that they will not charge residents for water unless it meets drinking water standards, which it doesn't. Residents are charged for laundry and showers.	
152	KMW	MW		38			A 1.8 fps circ rate is needed for systems that use pit orifices to induce circulation in service connections. Low circulating systems (with 6-inch pipes) are operated at 0.5 fps	Noted. Design will be checked.	
153	KMW	CS		41			Does ADEC allow drain back for brackish wells? That would reduce reliance on the heat tape and potentially decrease operational costs	A drain back valve can be installed below the frost line in some cases; however, drain back into the well can be considered unsanitary. In this case the seawater well is anticipated to be quite shallow and under the influence of surface water and therefore adequate treatment will be installed. We assume that ADEC would allow drain back into the well and therefore reduce operational costs associated with heating the well head. We can assume a heat trace will still be needed and heating the well house. Drain back will be further evaluated at the design stage.	

154	KMW	CN		45, 82			4.1.5.5 and 6.1.2.3: If septage disposal is not allowed in Nome, where is the nearest disposal facility? I'm assuming the cost of disposing of the septage vault will be extremely high, so the community will need to start budgeting for its disposal as soon as it's constructed. Did ADEC offer any guidance for how to safely abandon the septage vault in place once its full (a more likely outcome than it getting shipped out)?	We are unable to locate an accepting facility at this time. The city has plans to utilize land on the mainland for a landfill and that would potentially be the solution in the long-term. ADEC has not provided guidance on abandoning the vault.	
155	KMW	CN		54, 63, 72, 84			4.3.5.5, 4.4.4.5, 4.5.5.5, and 6.4.2: Are these sections required by the funding agency? If not, I would just remove them, or discuss any plans to repair the heat recovery system	It's our understanding that these sections are required.	
156	KMW	MW		78			The wellhead is stated as within 100 ft. of the WTP on page 41, but it's within 50 feet on page 78	Noted. Report will be updated for consistency.	
157	KMW	CN		80			6.1.1.5 Circulating glycol heat trace is not standard for service connections. Is there a reason why it was included here? Is the service connection glycol heat trace an extension of the main glycol heat trace? If so, will homes need a second circulation pump to induce glycol circulation?	Glycol will not circulate in the service lines, only along the mains. Homes would have a water service circulation pump and electric heat trace out to the main. This will be clarified in the report.	
158	KMW	MW		86			6.6.1 I share the community's concern about the reliability of external subsidies. Based on previous sections in the PER, $250 per month sounds unaffordable for much of the community	Agreed.	
159	KMW	MW		Appendix 9			Repairing the heat recovery system could reduce the WTP fuel consumption substantially. Also, the homeowner costs do not mention a glycol heat trace (noted on page 80).	Agreed. Further assessment will be needed to understand the repair needed for the heat recovery system. Heating the glycol would not be a homeowner cost.	
160	KMW	MW		General			Overall, a really nice PER. Thank you!	Thank you!	
161	DH	MW		29 - Fig. 13			Requested Modification: Expand the RCS summary table to include all of the essential information: occupied year-round, space available for bathroom, presence of indoor plumbing, building envelope (including insulation) is intact	Noted.	
162	DH	MW		29 - Fig 13			Requested Modification: Add to the RCS summary table the 3 homes that are occupied but for which a RCS could not be completed, and indicate the reason that a survey was not done, ie. homeowner did not want to participate in the survey	Noted.	
163	DH	MW		44 - Design Criteria			Requested Modification: The design criteria is based on 33 homes but only 30 homes were identified as occupied. Please add an explanation for the additional three homes, ie. active or planned construction	Noted. Service connections will be made to the 32 currently occupied homes.	
164	DH	CN		63 - Capital Cost			Question: Table 12 - Alternative 2 Capital Costs. What are the percentages listed based off of as they do not seem to be based off of the Construction cost of $16,060,000? Ie. Design (10%) would only be $1.6M if taken as a percentage of construction, but instead $3.8M is listed	The design cost is 10% of total project cost, inluding contingencies. See appendix 8 for capital cost details.	
165	RH	MW		78-82, Fig. 20		95% ePER	Prior evaluations and SHPO consultations resulted in SHPO concurrences for the proposed work on the water treatment plant and water storage tank under projects AN 19-N7P and AN 19-T84 (respectively, SHPO Files 3130-1R ANTHC 2022-01313, and 3130-1R ANTHC/2020-00600). SHPO consultation has not been done for the water distribution and sewage collection systems proposed as selected Alternative 2. Due to the significant number of cultural resources present in the project APE, a SHPO consultation is required. Construction monitoring for the water distribution and sewage collection systems may be required.	Noted.	
END OF COMMENTS									