CONCEPT DESIGN MEMORANDUM UPDATE

Chefornak Wash Station

Prepared for

Village Safe Water

September 2015
Updated: January 2016

949 East 36th Ave, Suite 500
Anchorage, AK 99508

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SECTION 1

Introduction and Background

The City of Chefornak uses honey buckets to collect and haul human waste from homes to the tundra pond currently being used as a sewage lagoon. The buckets are currently lined with plastic bags in an effort to keep the buckets sanitary, and the bags of waste are piling up in the pond and preventing breakdown of the waste. An engineered lagoon is under construction, and when complete will be too far from the village to be practical to haul buckets to the lagoon for disposal. The City is seeking an alternate method for cleaning and sanitizing buckets and improving public health.

This Conceptual Design Memorandum (CDM) is a starting point for developing the concept and preliminary details for this project. It includes a summary of technology and methodology evaluated for bucket washing systems. With any bucket washing technology, water for washing is required as well as a way to transport the waste from the wash station to the new sewage lagoon. This report provides recommendations for the final design. The concept will be developed further in a Design Analysis Report (DAR). The DAR will also address the sewage collection system as a whole since the lagoon project is driving large scale changes in sewage processing in Chefornak.

SECTION 2

Site Selection

The Wash Station will rely on the proposed washeteria to be constructed in Chefornak for its water source for running the washing equipment as well as heat and other building systems. The washeteria will be located on the same property as the village electrical generator building to utilize waste heat from power generation in the washeteria. Locating the Wash Station near the washeteria will simplify the integration of the wash station into the washeteria design.

Three sites on Tract A, Block 7 of US Survey 4421 were evaluated for suitability for the wash station, as described below. Criteria evaluated for each site include:

- Road/boardwalk access
- Proximity to new washeteria
- City of Chefornak owned property
- Site elevation relative to new washeteria
- Snow drifting

2.1 Lot 5 – City Garage

An area immediately south of and adjacent to the existing Chefornak city garage (Lot 5) was considered as a location for the proposed wash station. This lot faces F Street, so it has easy road access for hauling buckets, and already houses some city facilities. The site is at a lower elevation than the washeteria, which is desirable for connection to the washeteria.

Utilization of this lot would require a longer utilidor that would require easements or ownership of three different properties to connect the wash station to the washeteria. Additionally, this lot is not currently owned by the City.

2.2 Lot 6 – Existing Washeteria

The existing transitional washeteria site (Lot 6) was identified as an option for locating the wash station during a site visit by the project team on July 24, 2015 while meeting with city staff. Like Lot 5, the lot faces F Street and has road access, and is lower in elevation than the proposed washeteria. The shed and conex containers on the north end of the property are scheduled to be removed. This site will also result in fewer drifting issues than other alternatives. The City already owns this property. This location is the City's preferred location.

This site requires a longer utilidor to connect to the new washeteria but the utilidor would be located entirely on City owned property

2.3 Lot 7 – Power Generation & Future Washeteria

The new washeteria will be located on Lot 7. Locating the wash station as close to the washeteria as possible reduces the amount of utilidor needed to connect the two facilities.

This site would require a new boardwalk for pedestrian and vehicular (4-wheeler) access to haul buckets. Additionally, the wash station and boardwalk would increase drifting behind the generator building.

2.4 Recommendation

Based on the site details discussed above and consultation with City leaders, Lot 6, the existing washeteria property is the recommended location for the wash station. It provides the greatest ease of

access, fewest ownership issues, and good site characteristics for coordination with the new washeteria. The City Council approved this location during their July 23, 2015 meeting.

SECTION 3

Design Requirements

Developing the wash station on Lot 6 (the current washeteria site) will require a building and supporting facilities. This section details these system components as well as the design criteria for the wash station/lift station itself.

3.1 Site Civil

The wash station will be located on Lot 6, as discussed in the previous section and as shown on Drawing C-1. It will have a driveway for access to F Street.

Potable water for wash down and tank filling, and grey water for supplying the wash station will be routed through an utilidor connected to the new washeteria. A sanitary sewer lift station will be located in a separate room within the wash station, and the force main will be routed to the new lagoon. The pump station will be designed to accept hauled waste from the City's wastewater haul trailer.

3.2 Building

The wash station equipment will be housed in a building. The building will be designed for simplicity of construction and durability in harsh arctic and maritime environments.

3.2.1 Foundation

The wash station building will be pile supported due to the site civil requirements subgrade properties and the cost of gravel. The piles will extend above grade to meet the elevation requirements of the washeteria and wash station integration. A grid of structural timbers or glulam beams will be framed atop the piles to provide a base for the superstructure. The pile foundation type will be further developed in the DAR.

3.2.2 Architectural

The building will be a gabled rectangle to allow for panelized construction, made of parts that can be carried to the site with small vehicles and assembled by hand. The building footprint will be roughly 20 by 24 feet with a minimum inside clearance of 10 feet.

The roof will have a steep enough slope (3:12 minimum) to shed snow, and will have generous overhangs. Gutters and leaders will be provided. The door and stairs will have a sloped roof overhead. A durable metal roof with good uplift resistance and a corrosion (salt air) resistant coating will be provided.

Building access will be through insulated roll up doors and one single wide man door to access the lift station and bucket thawing areas. Double and single man doors will be provided for access within the building. No windows are included in the lift station. Exterior man doors will be hollow metal insulated doors, and roll up doors will also be metal and insulated. LED lighting will be provided inside, and an entrance/stairway light outside. The door alternatives will be further evaluated in the DAR as the equipment is selected and access requirements finalized.

Similar to the washeteria and Pump Station 1, the walls and roof will likely be Structural Insulated Panel System (SIPS) construction and possibly the floor as well. This system sandwiches 8 inches of rigid insulation between two layers of oriented strand board or plywood to form a stiff panel that insulates well and can span over 10 feet without additional support. Panels connect to one another with overlapping plywood ends making a weathertight seal at joints. Modular construction is a possible alternative that will be evaluated in the DAR.

The lift station will be enclosed in a separate room with access from the interior of the wash station. The details of the separation wall will be included in the DAR.

The walls and ceiling will be fabricated from or lined with a material suitable for wash-down or painted inside with a washable coating, and the floor will be covered with a flexible, chemical resistant coating that will allow repeated wash down and scrubbing. The floor coating will be slip resistant. Specific coatings and cleaning requirements will be evaluated in the DAR to reduce pathogen transmission. The exterior walls will be protected by a fully adhered water barrier under metal paneling similar to the roof paneling.

3.2.3 Structural

The superstructure will consist of light-framed wood panels sheathed with OSB or plywood. The exterior bearing and shear walls will have a minimum of 6” nominal studs. The superstructure will be partially or completely modular or panelized to reduce field construction.

Codes and Standards

This facility will be designed in accordance with the following building codes and standards:

- International Building Code (IBC), 2009 Edition
- American Society of Civil Engineers (ASCE), Publication 7, Minimum Design Loads for Buildings and Other Structures, 2005 Edition.
- American Forest and Paper Association (AF&PA), 2005 National Design Specification (NDS) for Wood Construction.
- American Institute of Steel Construction (AISC), Publication 360, Specification for Structural Steel Buildings, 2005 Edition.
- AISC, Publication 303, Code of Standard Practice for Steel Buildings and Bridges, 2005 Edition.
- American Welding Society (AWS), Publication D1.1-04, Structural Welding Code – Steel.

Structural Design Criteria and Loads

This facility is classified as an Occupancy Category II facility. The Occupancy Category is important for structural design as it defines the acceptable performance of the building.

Floor Loading:

- Dead Loads: Actual Equipment Self-Weight
- Live Load: 100 psf

Seismic Design Parameters:

- Site Class: D
- MCE Spectral Acceleration, Short Period (S_s): 0.113 g
- MCE Spectral Acceleration, 1 Second (S_1): 0.058 g
- Design Spectral Acceleration, Short Period (S_{DS}): 0.121 g
- Design Spectral Acceleration, 1 Second (S_{D1}): 0.092 g
- Importance Factor (I_E): 1.0
- Seismic Design Category (SDC): B
- Long-Period Transition Period (T_L): 16
- Analysis Procedure: Equivalent Lateral Force
- Seismic Force Resisting System: Light-Framed Wood Shear Walls
- Response Modification Factor (R): 6.5
- System Overstrength Factor (Ω_0): 2.5

- Deflection Amplification Factor (C_d): 4
- Seismic Response Coefficient (C_s): 0.019

Wind Design Parameters:

- Basic Wind Speed (V): 130 mph
- Exposure Category: D
- Importance Factor (I_w): 1.0
- Topographic Factor (K_{zt}): 1.0
- Wind Directionality Factor (K_d): 0.85
- Enclosure Classification: Enclosed
- Internal Pressure Coefficient (GC_{pi}): +/- 0.18

Snow Design Parameters:

- Ground Snow Load: 50 psf
- Importance Factor (I_s): 1.0
- Snow Exposure Category (Ce): 0.9
- Thermal Factor (Ct): 1.0

3.2.4 Building Mechanical

The new washeteria will utilize waste heat from the City's electrical power generators and has boilers to provide heat when waste heat is unavailable. Since the utilidor will connect the washeteria and wash station, the building mechanical services for the wash station will be provided from the washeteria. This will incrementally increase the sizing of these systems for the washeteria. Though the equipment will be slightly larger, the capital expenditure for the City will be only incrementally larger, since only one set of boilers and supporting equipment will need to be provided rather than two sets. This will also simplify operations for the City maintenance staff, since there will be no additional equipment to maintain. Additionally, utilizing the washeteria building systems allows the wash station footprint to be smaller, since no space is required for building services.

The wash station and lift station rooms require ventilation to make sure the working environment is safe for operators to remove any odors generated from the bucket washing system. The Universal Mechanical Code suggests 1.0 cubic foot/minute ventilation rate is required. The ventilation system will consist of an exhaust fan with a damper and hood, and a make-up air unit with damper, hood, heating coil, and control system. The controls for the make-up air unit will measure the supply air and room temperature and regulate the air temperature in the room. Additional details of the ventilation system will be evaluated and included in the DAR.

The wash station will include floor drains that are plumbed from hub drains in the wash-down areas directly to the lift station. This will allow operators to regularly clean and sanitize the wash station. Additionally, a hose-bib will be provided to supply water for wash-down service. The hose will have a backflow preventer to safeguard the potable water from contamination from the wash station. The backflow preventer will be located where it can be tested and serviced.

Mechanical and plumbing systems will be designed in accordance with applicable codes and standards.

3.2.5 Electrical

A panelboard will be installed in the wash station to feed interior and exterior electrical loads. Electrical service is likely to be supplied one of two ways, either from a nearby power pole or from the washeteria via the utilidor. These options will need further investigation in subsequent design phases. The electrical

service will be sized to accommodate both SCAT Machines, ventilation equipment, lighting, general purpose receptacles, and future anticipated loads.

General purpose receptacles will be installed inside the wash station to provide power for maintenance personnel and equipment. Hose-down rated and corrosion resistant receptacles will be installed where required.

Interior lighting will be installed to provide sufficient illumination of spaces inside wash station for operation of SCAT Machines and safe occupancy. Interior luminaires will be rated for corrosive environments and hose-down where required. The application of occupancy sensors or other energy saving features will be evaluated in future design phase but it is unlikely due to safety considerations in the space. Exterior lights will be installed at exit doors and will have integral battery backup to provide sufficient egress illumination upon power failure.

Electrical construction materials and methods will be used in accordance with the edition of the National Electrical Code adopted by the State of Alaska.

3.2.6 Lift Station

A lift station will be incorporated into the wash station design. The bucket washing system will drain waste from the collected honey buckets and the water used to clean the buckets to a lift station. The manual bucket dump system will also drain to the lift station. The lift station will then pump the waste from the wash station to the new sewage lagoon. During a preliminary review of bucket washing technology, grey water from the washeteria was identified as the best water source for the bucket washing supply. Further evaluation determined that relocating the lift station from the washeteria to the wash station would simplify the design of both facilities.

The lift station at the wash station is sized to handle the flow from the washeteria as well as the wash station. Since grey water is used for bucket washing prior to final disposal, the lift station will not be substantially larger than the lift station that was previously included in the washeteria design. The lift station sizing will be fully evaluated in the DAR after a final configuration of bucket washing equipment is selected.

Design of the lift station will include duty and standby pumps that are sized for the full anticipated washeteria and wash station flows. The station will be designed for ease of maintenance and removal of the pumps. The depth of the lift station will depend on the final elevation of the wash station, and the sump and other pump details will be designed accordingly.

3.3 Wash Station Equipment

The equipment identified for the bucket wash system is the SCAT Machine. The SCAT Machine was developed to provide a sanitary means to clean buckets used for transporting and storing human waste on recreational multi-day river trips. With refinement the SCAT Machine use was expanded to disaster relief and undeveloped countries where honey-bucket systems are common, similar to rural Alaskan villages. Alternate bucket washing and disposal mechanisms were also evaluated and are discussed below.

3.3.1 SCAT Machine Details

The SCAT Machine consists of a stainless steel box that houses the pumps, tanks, hoses, and controls for the operation of the machine. The SCAT Machine cleans buckets by a user manually loading the bucket and lid onto a platform and strapping it down. The platform is tilted so the bucket empties into the machine, and the cleaning process begins. The standard SCAT Machine has an option to select the degree of cleaning needed and will customize the wash cycle accordingly. Figure 3-1 shows a SCAT

Machine installed at a recreational facility. After the cleaning cycle is complete, the waste is discharged to the lift station located at the wash station and then pumped to the new lagoon.

Figure 3-1: SCAT Machine Installation

3.3.1.1 Utility Requirements

The SCAT Machine requires the following connections, water, wastewater, and power. Details of each of these components are outlined in the sections below. The information provided here comes from the manufacturer for typical recreational use. Use in Chefornak may be similar, but some custom design details are included. The typical installation does not use a sanitizing agent in the bucket wash. If this is desired, a sanitizing agent can be used in the wash process.

Approximately 40 buckets per day are expected to be washed in Chefornak. A typical wash cycle from loading the bucket into the machine to unloading the cleaned bucket takes approximately 5 minutes. Not including the time required for collecting or returning buckets, all 40 buckets could be processed with about 3.5 hours of continuous use. If buckets are not collected or delivered on a daily basis, the amount of time to clean the buckets at any one time will increase. However, the utility requirements for the SCAT Machine will not change on a weekly basis. All 40 buckets could be processed with about 3.5 hours of continuous use. Table 3-1 summarizes the utility requirements for the SCAT Machine.

Water Use

The amount of water used by the SCAT Machine varies on the degree of soiling of the buckets that are washed. Typically about 25 gallons of water per bucket is required for a wash cycle, or 1,000 gallons per day. The water used for the wash cycle will come from the grey water produced by the washeteria. In case the grey water is not available, potable water will also be connected to the system for use.

The washing machines in the washeteria are estimated to use approximately 1,900 gallons/day of water. This is an adequate quantity of water to meet the needs of the SCAT Machine. Since laundry discharge and bucket washing are likely to occur at different times, the wash station will include a grey water storage tank (located at the washeteria) to supply the SCAT Machine. The tank will be outfitted with an overflow type drain to convey the excess water to the sanitary sewer. It will be outfitted with a separate drain for periodic cleaning of the tank since solids from the washing machine discharge may accumulate

in the tank. A potable water supply connection will be included in case the volume of water in the storage tank is inadequate to wash the buckets.

Water from washing machine discharge has more particulates than is desirable in the SCAT Machine. A strainer will be installed between the water storage tank and the SCAT Machine. There are several strainer types available, ranging from a manually changed particulate strainer to an automatic-backwashing strainer that would require little operator input. The exact type of strainer needed requires further evaluation.

Wastewater

The same amount of water consumed, plus the volume of waste emptied from each bucket is generated by the SCAT machine for each wash. For Chefornak, approximately 30 gallons per bucket, or 1,200 gallons/day of sewage and wash water can be expected. This waste will be routed to the lift station located in a separate room at the wash station, and pumped to the lagoon.

Power

The power supply for a SCAT Machine is 220V. Typical power consumption for a SCAT machine is 3.5 kW per hour of use, assuming a mix of cleaning cycles. If a majority of the buckets are heavily soiled, the energy use would increase to 4.2 kW. The anticipated power consumption of the SCAT machine is 12.6-14.7 KW/day.

Table 3-1. SCAT Machine Utility Requirements

Utility	Requirements	
Water	25 gallons/bucket	1000 gallons/day
Wastewater	30 gallons/bucket	1200 gallons/day
Power	220 volt supply 3.5-4.2 kW/hour of operation	12.25-14.7 kW/day

Estimates for SCAT Machine use only. Additional utilities will be required.

3.3.1.2 Additional Design Considerations

Several customized design considerations are required for a successful installation of a SCAT Machine in Chefornak. With the remote nature of Chefornak, providing two machines would provide important standby capacity in case one machine is out of service for regular maintenance. The building for the wash station will include space for frozen buckets to thaw before being emptied and cleaned.

Waste Quality

The SCAT Machine is designed for use with a fairly “clean” waste stream consisting of urine, feces, and toilet paper. Any additional items discharged into the machine, especially garbage (including diapers), food scraps, and other foreign materials can clog the machine. To mitigate this potential, the machine will be outfitted with an integrated grinder unit that would pulverize this material. The grinder pump is susceptible to clogging by small items such as twist-ties or other similar material. After installation of the SCAT Machine, the village will require coaching and reinforcement to move away from using the honey buckets as a general trash receptacle and only use them for defined acceptable waste. The DAR will include a comprehensive discussion of sewage collection and handling recommendations.

Chefornak residents currently use plastic bags to line their buckets. These bags, while not posing a problem to the SCAT machine, will be a problem if pulverized and sent to the landfill as the small plastic pieces are easily transported by wind. It is essential that residents stop using bags to line their buckets

and do not dispose of garbage in their buckets. To facilitate sanitary handling of the honey buckets, the buckets will be fitted with Gamma Seal™ screw top lids that will provide an airtight seal and prevent spillage during handling and transport.

Bucket Thawing

The SCAT Machine will not work with frozen honey buckets, so buckets must be thawed prior to washing. If inadequate space for thawing is available, thawing can be expedited by using an electric resistance bucket or drum heater. The time and cost to thaw the buckets will vary, and depends on how frozen the buckets are and the nature of the contents. Space has been provided in the building for bucket thawing. Additional details of bucket thawing including considerations for heated floors or other bucket heating mechanisms as well as how to evaluate if a bucket has been thawed completely or not will be included in the DAR.

Pilot System

The SCAT Machine is a new technology for Alaska, so a pilot project could provide operational experience and allow stakeholders to see the machine in use prior to full installation in Chefornak. Locating the pilot in Anchorage would allow for relative ease of access for interested parties. It would also have adequate water, sewer, and power to allow for simple set-up. The main obstacle with a pilot system would be generation and collection of honey buckets to use in the pilot. The bucket washing characteristics could be studied by washing empty buckets, but to truly evaluate the performance, buckets filled with sewage would need to be generated and transported to the site. Due to these challenges, a bucket washing pilot is not recommended at this time.

3.3.2 Alternate Bucket Washing & Waste Disposal Mechanisms

The SCAT Machine provides the highest level of service and sanitation while minimizing operator contact with raw sewage. Other communities using honey buckets have a manual dump station, the details of which are described below. Additionally, commercial bucket washers used in the food industry may also be suitable for use in conjunction with a manual dump station.

3.3.2.1 Manual Dump Station

Other communities in rural Alaska that utilize honey buckets have developed manual dumping stations. In these stations buckets are dumped into a hopper or other container and the waste is then washed to a sump, sent to a lift station, and pumped to a lagoon or other treatment location.

An example of this type of system is in place in Nome to serve residents who are not on the piped sewer system. The Nome bag collection system consists of a bar screen over a collection chamber. Buckets are dumped on the bar screen, the bags are cut open with a utility knife attached to a steel rod, and the waste drains into a chamber under the bar screen. Once the bags are empty, operators use a rake to pull the bags and any other large waste up the screen and place the material in a bag lined trash can for disposal. The liquid waste is then washed into the wet-well for a grinder pump and pumped to the treatment system. The Nome system is shown in Figure 3-2.

Figure 3-2: Nome Honey Bucket Dump Station

The advantages of a manual dump station are that there is less equipment that may break, and it can provide a back-up to a more automated cleaning process. A manual system can also continue to accept bagged waste and can accept partially frozen bags (which will thaw resting on the bar screen) There are reduced utility requirements for a manual dump station since the buckets are not washed or sanitized before returning to homes.

Disadvantages of a manual dump station are that they do not include a method to clean or disinfect the buckets, and that bags are still used in all honey buckets. Using bags then means that the operator must come into closer contact with the raw sewage to cut or otherwise open the bag and then to collect the bag for disposal. If bags are not used, there is significant operator exposure to raw sewage as an operator manually hoses out a bucket.

3.3.2.2 A manual dump station is not recommended without providing bucket washing and sanitizing equipment, but may provide a valuable backup to a SCAT Machine. Commercial Bucket Washer

Several commercial bucket washers utilized in various industries are also potential solutions for Chefornak. The Douglas Machines Corporation Bucket Washer 1536-FBW was evaluated for this CDM. These bucket washers hold empty buckets on a horizontal rack. Once the machine is loaded the door is closed, a cycle is selected and the buckets are washed and rinsed using detergents, sanitizing agents, and hot water.

Table 3-2. Commercial Bucket Washer Utility Requirements

Utility	Requirements	
Water	25 gallons/cycle	205 gallons/day

Power	36.5 kW/hour of operation	36.5 kW/day

Estimates for bucket washing use only. Additional utilities will be required.

Advantages of these bucket washers include the ability to wash up to nine buckets in one seven minute cycle. This allows the operator to wash buckets more quickly after manually dumping the majority of the contents. The commercial bucket washer has lower water requirements than the SCAT Machine, as summarized in Table 3-2. This is because the water is washed and recycled within the machine during the washing and rinse cycles.

Disadvantages of a commercial bucket washer include that the machines cannot process full buckets, so they must be emptied and then manually loaded into the washer, increasing operator exposure to any waste remaining in the bucket. The commercial bucket washer is not able to handle grey water, so a clean water supply is required. Additionally, the bucket washing equipment has higher power requirements than the SCAT Machine since the wash and rinse water are heated with electric heaters prior to use.

3.3.3 Wash Station Technology Recommendation

Based on the evaluation of the SCAT Machine, bucket dump stations, and commercial bucket washers, the SCAT Machine is the recommended alternative. This provides clean and sanitized buckets while minimizing the potential for operator exposure to raw sewage. Additionally the SCAT Machine will allow Chefornak residents to move away from using plastic bags to line their honey buckets, which will improve waste degradation in the lagoon and eliminate one source of litter from the environment, maximizing the return on investment for sewage handling in the community.

Inclusion of a manual dump station is a reasonable provision for households that are slow to adapt to not using bags to line honey buckets and can provide a back-up method for emptying buckets if there is a failure with the SCAT Machine.

3.4 Agency Approval and Permitting

The wash station design will require review and approval by the following agencies:

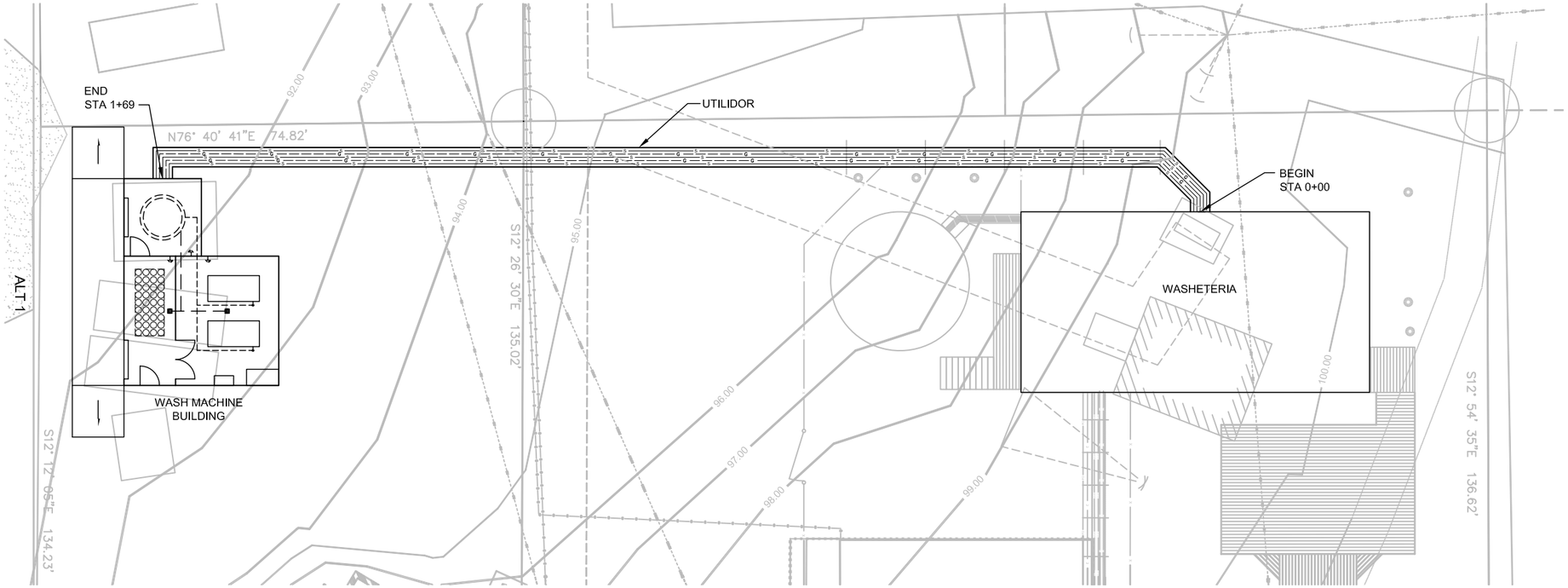
- Alaska Department of Environmental Conservation – Wastewater Plan Review/Approval to Construct and Operate
- State of Alaska Fire Marshal

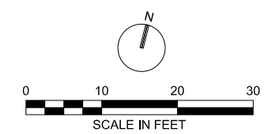
Preliminary Plans

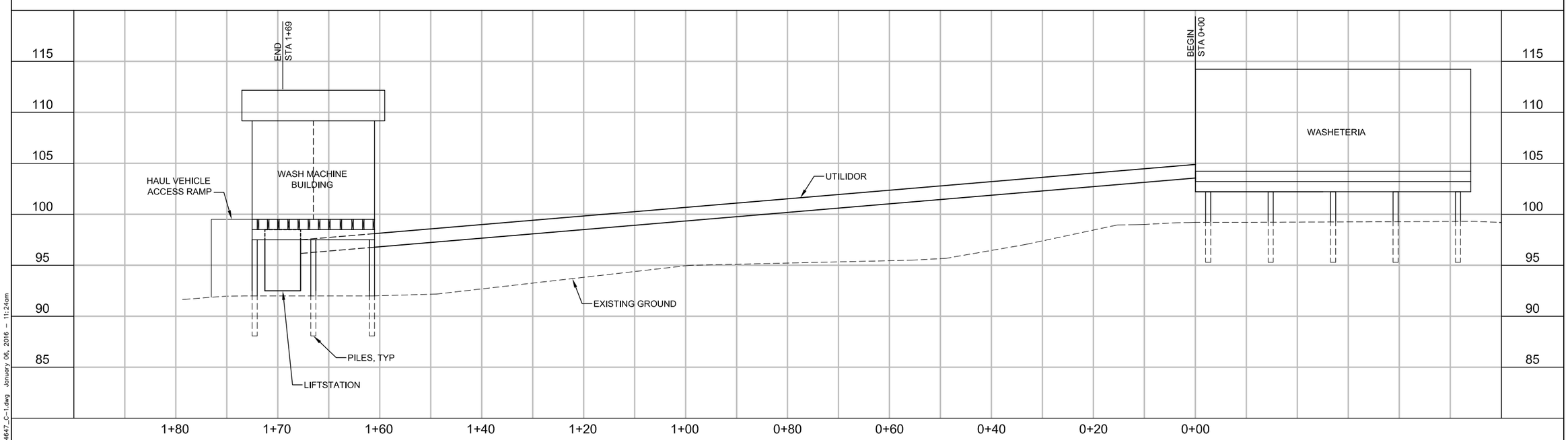
Preliminary plans for the wash station are attached to this CDM and include the following:

- Site Layout and Elevation (C-1)
- Wash Station Layout Alternative 1 (P-1)
- Wash Station Layout Alternative 2 (P-1)

The two alternatives for the wash station layout show space for bucket thawing and the space requirements for either two SCAT Machines, or one SCAT Machine and one manual bucket dump station.







VILLAGE SAFE WATER

ch2m.

VERIFY SCALE
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CITY OF CHEFORNAK
CHEFORNAK, ALASKA
WASH MACHINE
CONCEPTUAL LAYOUT

CIVIL
PLAN AND PROFILE

REVISION	BY	DATE

Project No. 664647
Date JANUARY 2016
Designed R. Venot
Drawn R. Benfield
Approved T. Wolf

Sheet No. C-1
SHEET 1 OF 3

CONCEPTUAL LAYOUT

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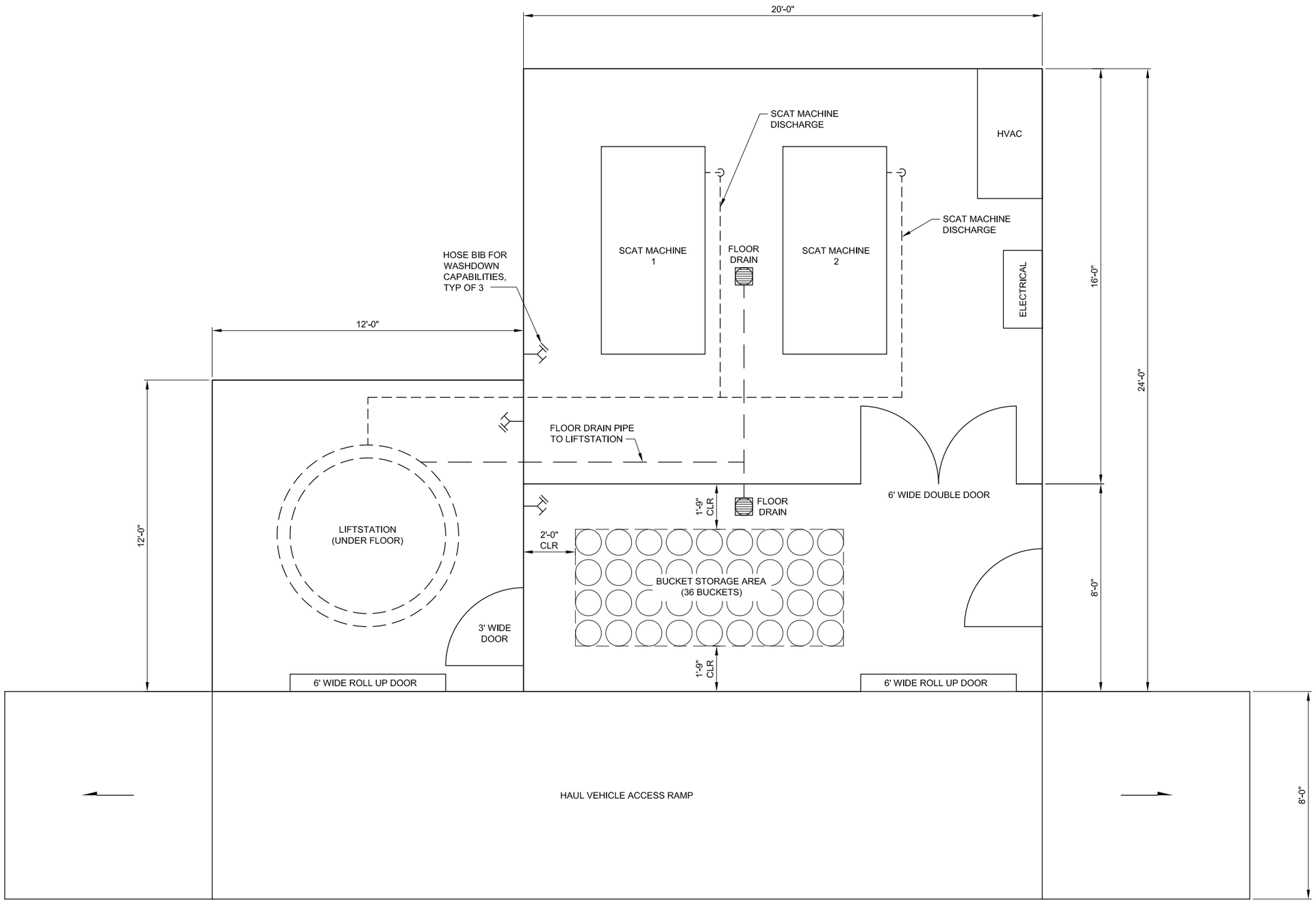

WASH MACHINE BUILDING PLAN - ALTERNATIVE 1

1/2" = 1'-0"

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VILLAGE SAFE WATER

ch2m.

VERIFY SCALE
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

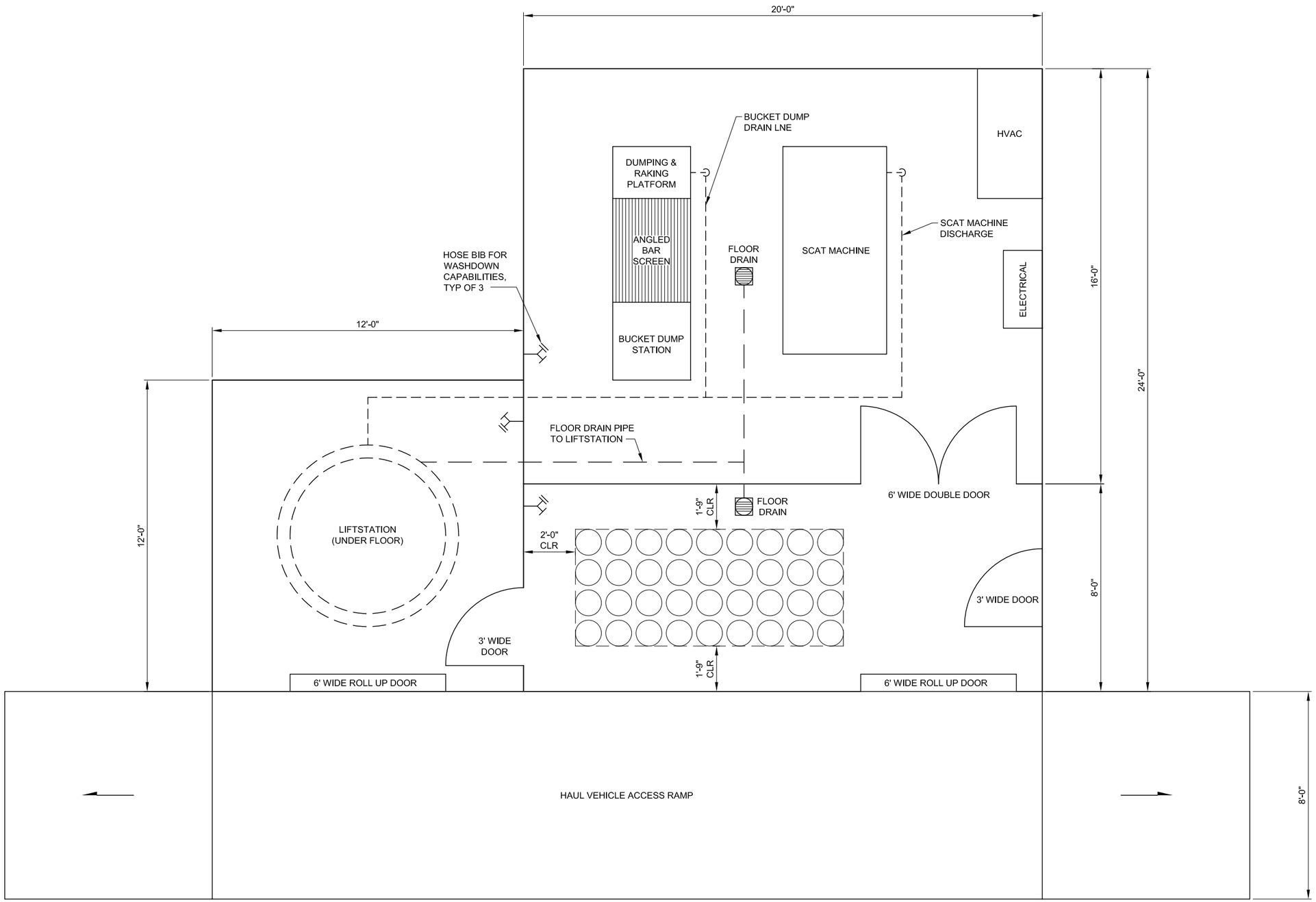
CITY OF CHEFORNAK
CHEFORNAK, ALASKA
WASH MACHINE
CONCEPTUAL LAYOUT
PROCESS
WASH MACHINE
BUILDING PLAN - ALT 1

REVISION	BY	DATE

Project No. 664647
Date JANUARY 2016
Designed R. Venot
Drawn R. Benfield
Approved T. Wolf

Sheet No. P-1
SHEET 2 OF 3

CONCEPTUAL LAYOUT



WASH MACHINE BUILDING PLAN - ALTERNATIVE 2

1/2" = 1'-0"

N

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VILLAGE SAFE WATER

ch2m.

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CITY OF CHEFORNAK
CHEFORNAK, ALASKA
WASH MACHINE
CONCEPTUAL LAYOUT

PROCESS
WASH MACHINE
BUILDING PLAN - ALT 2

REVISION	BY	DATE

Project No. 664647
Date JANUARY 2016
Designed R. Venot
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Approved T. Wolf

Sheet No. P-2
SHEET 3 OF 3

CONCEPTUAL LAYOUT