



**SPECIAL CONSIDERATIONS**

DISASTER		APPLICANT NAME	PW REF NO.	FIPS NO.	DATE
4050	AK	City of Shaktoolik	SHC-F02	180-68890-00	03/21/12
<p>1. Does the damaged facility or item of work have insurance and/or is it an insurable risk? (e.g., buildings, equipment, vehicles, etc.)</p> <p><input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure</p> <p>Unsure at this time <del>whether</del> a policy is in place. <i>whether</i></p>					
<p>2. Is the damaged facility located within a floodplain or coastal high hazard area, or does it have an impact on a floodplain or wetland?</p> <p><input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unsure</p> <p>Area is in an unmapped area (refer to FIRM panel #020083).</p>					
<p>3. Is the damaged facility or item of work located within or adjacent to a Coastal Barrier Resource System Unit or an Otherwise Protected Area?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>4. Will the proposed facility repairs/reconstruction change the pre-disaster condition? (e.g., footprint, material, location, capacity, use or function)</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>5. Does the applicant have a hazard mitigation proposal or would the applicant like technical assistance for a hazard proposal?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>6. Is the damaged facility on the National Register of Historic Places or the state historic listing? Is it older than 50 years? Are there more, similar buildings near the site?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p> <p style="text-align: right;">Facility Constructed In: 1978</p>					
<p>7. Are there any pristine or undisturbed areas on, or near, the project site? Are there large tracts of forestland?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>8. Are there any hazardous materials at or adjacent to the damaged facility and/or item of work?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>9. Are there any other environmentally or controversial issues associated with the damaged facility and/or item of work?</p> <p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unsure</p>					
<p>10. Is the damaged facility or item of work located within two-hundred feet of a body of water?</p> <p><input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unsure</p> <p>Norton Bay and Tagoomenik River.</p>					
PREPARED BY:		Greg Fewins			

**LOCATION MAP**

APPLICANT:	City of Shaktoolik	CATEGORY:	F
FIPS NO.:	180-68890-00	PW REF NO.:	SHC-F02

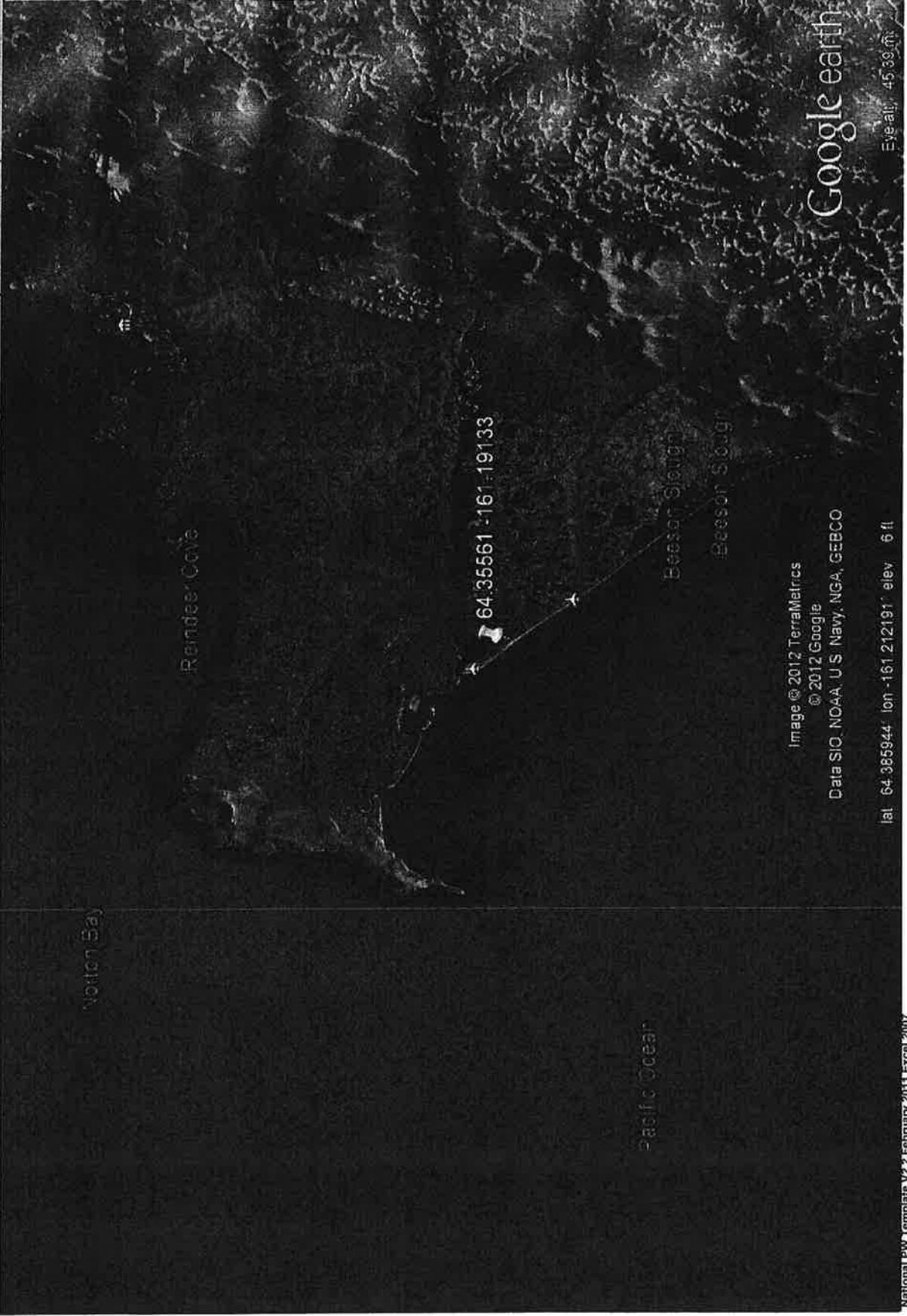
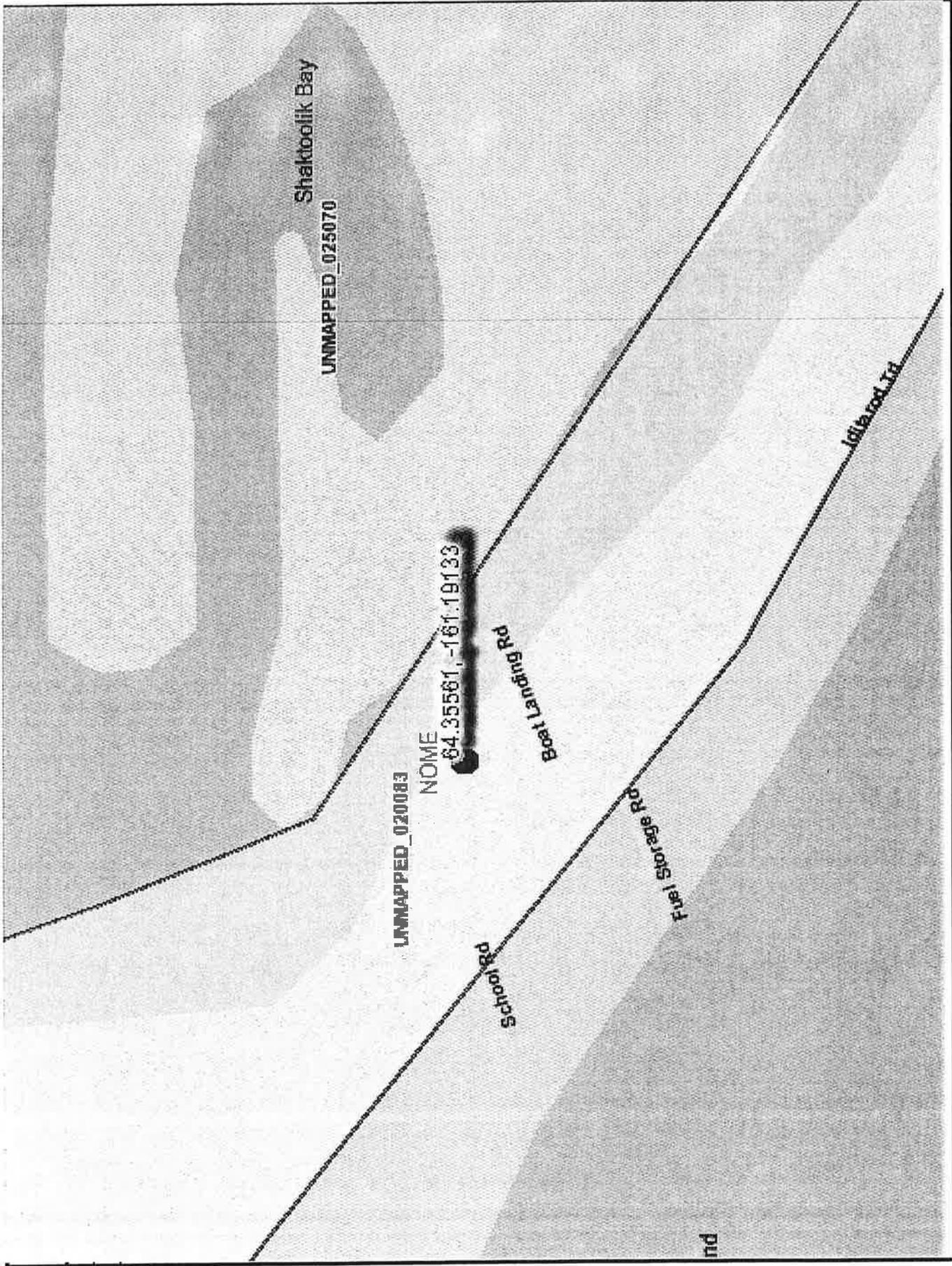
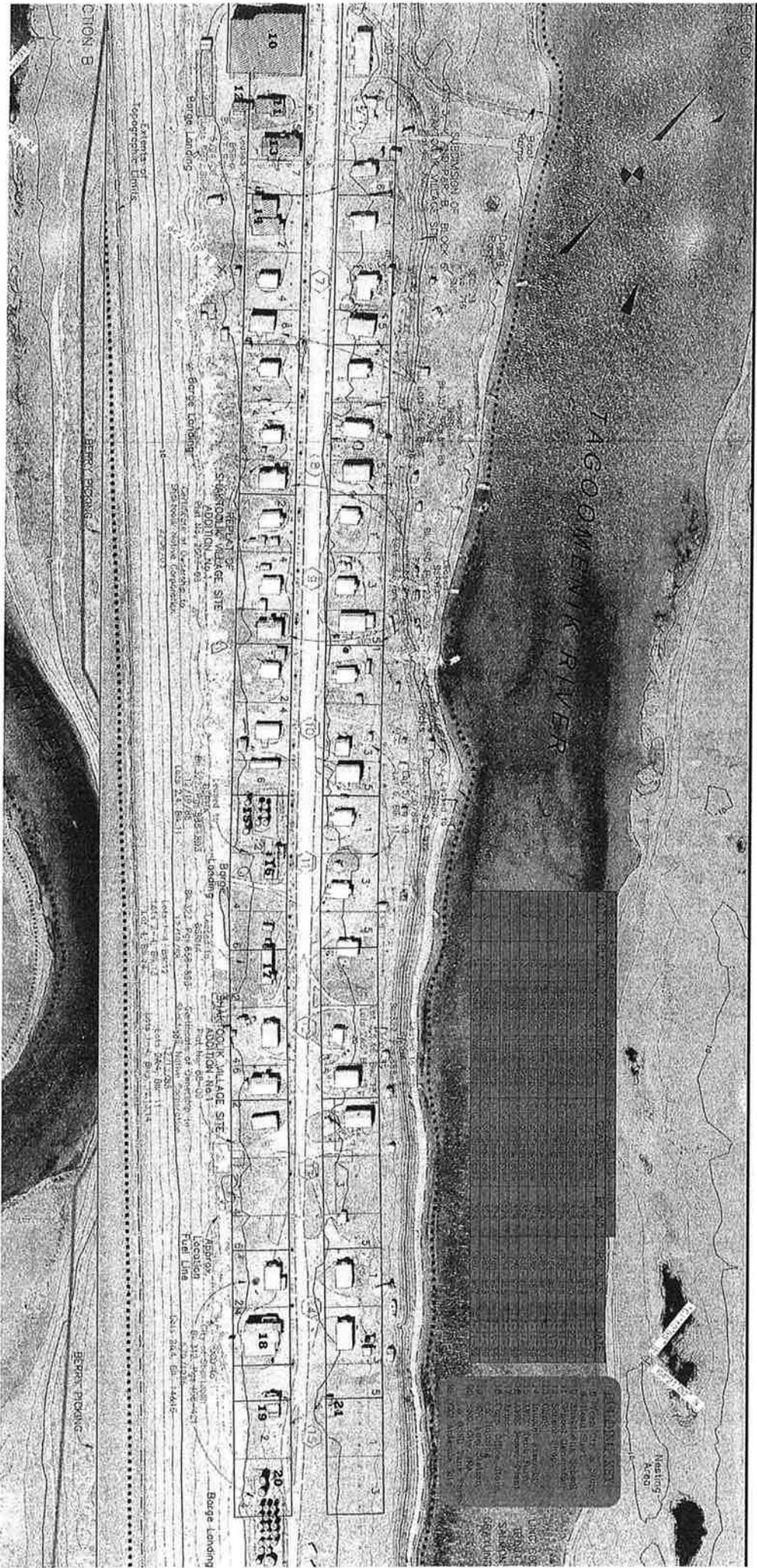


Image © 2012 TerraMetrics  
 © 2012 Google  
 Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
 lat: 64.35561 lon: -161.19133 elev: 6 ft  
 Eye alt: 45.39 m







**PLANNING**

1. Project Title: [Blank]  
 2. Project No.: [Blank]  
 3. Client: [Blank]  
 4. Date: [Blank]  
 5. Scale: [Blank]  
 6. Author: [Blank]  
 7. Date: [Blank]  
 8. Date: [Blank]  
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 22. Date: [Blank]  
 23. Date: [Blank]  
 24. Date: [Blank]

STATION B

HERR PICKING

YAGOOMENIK RIVER

REMAIN OF  
HISTORICAL VILLAGE SITE  
ADDITION No. 1  
Site No. 1001-01  
18/10/85

BARGE LANDING  
Location  
Site No. 1001-01  
18/10/85

APPROX  
LOCATION  
FUEL LINE  
Site No. 1001-01  
18/10/85

BARGE LANDING

## **6.0 EXISTING WATER AND SEWER FACILITIES**

### **6.1 HISTORY OF SANITATION IMPROVEMENTS**

The Shaktoolik water system was initially constructed in 1978 as a PHS Indian Health Service (IHS) project as part of the relocation of the community from the old townsite. The following is a brief summary of the development of the City's sanitation infrastructure:

- 1978: Construction of WTP, WST, and water distribution system;
- 1990-1993: Construction of the winter pump house. Extension of winter fill line. Installation of 10 communal septic systems for 10 U.S. Department of Housing and Urban Development (HUD) homes. WTP improvements which included replacement of boiler system, roof repairs, new office, interior renovations, new washers and dryers, new chlorination and fluoridation equipment, new pressure tanks and pumps, new day tanks, hydronic system replacement, fire suppression system, duct and venting modifications, and lighting and electrical upgrades;
- 1997: Construction of a new septic system for the school and installation of five flushing ports in the water distribution system;
- 2003 (March): A fire occurred at the WTP. The source of the fire was the distribution system pump panel. There was a second fire in 2005 or 2006 at this same location. This panel was repaired in 2010;
- 2004-2005: Repairs to the 790,000-gallon WST (installation of steel columns for an emergency roof repair);
- 2007: New landfill and partial closure of old dump site near airport.
- 2010-2011: WTP repairs (pump panel, tank circulation pumps, and piping), valve pit heater, boiler improvements. The winter intake pump was replaced. The winter intake line to the river was replaced with movable arctic pipe.

Photographs of the WTP and other water system infrastructure are included in Appendix F. Applicable record drawings of the water system are included in Appendix G.

### **6.2 WATER SOURCE**

Water is taken from the Tagoonmenik River. The community has two separate intakes for both summer and winter. The summer intake is located approximately 6,500 feet upriver from the community. Since the summer intake line is not heated, a winter intake near the WTP is used during the winter months in a portion of the river that is tidally influenced. The winter intake has variable salinity, depending on tidal conditions.

Tidal fluctuations do not generally affect the water quality of the summer intake, although during high tides in the summer, floods can occur for durations of up to one week, causing potential contamination of the City water supply. The City does not pump during these flood events.

The winter pump station was built in 1990. The winter pump house is a 5'x8' structure with a bin wall foundation. The building contains the control equipment, alarms, meters, and check valves for the pumps. During the winter, the operator has to cut a hole in the ice (at the Tagoonmenik River) during each fill. The winter pump station pumps are currently not used because the pump station control panel is non-functional. Repairs are currently planned for 2011. The City currently uses the summer diesel powered pump during winter fill operations. Raw water from the winter intake travels through a buried 650-linear-foot (LF) 4-inch arctic pipe high-density polyethylene (HDPE) with electric heat tape protection from the pump to the WTP.

The summer fills last approximately one week, on average. The operator typically completes one fill per month during the summer months. The summer fill line is a 6,500-LF 4-inch HDPE main. The summer raw water main sits on the ground surface, and has countless perpendicular cuts across the top of the main from snowmachine traffic. This damage is much more significant closer to town. The City regularly has to repair leaks along the pipe every summer. Damage to this line will continue over time, and it is expected that catastrophic failures would occur on a regular basis. The operator uses about 150 gallons of fuel per month to fill up the WST.

Water service in Shaktoolik is primarily for residential usage, and to serve the school. There is limited commercial service. Shaktoolik does not have a small boat harbor.

### **6.2.1 Water Rights**

The City has an expired "Permit to Appropriate" for 20,000 gallons per day (gpd) from the Tagoomenik River under Alaska Department of Natural Resources permit number LAS13439. The City should apply for increased water rights for withdrawal and file for a new permit. It is recommended that the City apply for up to 300,000 gpd, to allow for flexibility in their fill operations. Existing water rights permits are included in Appendix H.

### 6.3 WATER TREATMENT

Shaktoolik's water system (water system identification number AK 2340442) is classified as a Class A public water system. The ADEC classifies the system operation as Class 1 for water treatment and Class P for water distribution.

The City operates a conventional pressure filtration WTP. The WTP was originally constructed in 1978 by PHS/IHS, and was remodeled during improvements between 1990-1993, and 2003. The WTP/washeteria is a single-story wood frame building, approximately 2,800 square feet in area. The building is supported by a beam and pile foundation, which is overlain by a 3-inch concrete floor, with 6 inches of fiberglass insulation below. The building contains a laboratory/office, laundry facilities, bathroom/shower facilities, equipment storage, and a boiler room. Equipment in the WTP includes piping, a generator, a heat exchanger, control switches, circulation pumps, monitoring equipment, alarms, disinfection equipment, pressure pumps, pneumatic pressure tanks, sand pressure filters, a 5-micron micro-filter, a tank level indicator, compressor, and a tank level controller. A structural evaluation of the building was not completed for this project, although needed repairs for the roof and exterior entries were noted.

Two 317-gallon hydro-pneumatic pressure tanks (Well-X-Trol 454) are used to maintain consistent distribution pressure, and to relieve pressure surges. The existing heat exchanger appears to meet the facility's heat demands. Electrical equipment is thought to be suitable for continued use. The control panel for the distribution system circulation pumps was damaged during the fire in 2003, and was upgraded in 2010.

The system has an estimated average flow-through of approximately 25,000 gpd. Flow readings were not available, and have not been recorded in the past. The WTP receives waste heat from the Alaska Village Electric Cooperative (AVEC) electric generation plant.

Overall treatment involves rapid sand filtration of the raw water without the addition of any coagulants, followed by chlorination. Calcium hypochlorite is fed into the raw water system for disinfection. Fluoridation equipment is available, but is not currently used as part of the treatment process. The pressure filters are assumed to use sand alone rather than a mixed media (i.e., gravels and anthracite) for filtration. The PHS probably installed sand filters

during the time of the WTP construction (mid-1980s). Mixed media filters generally did not start getting installed in the villages until the 1990s. The existing media has not been inspected by the City or RMW. Apparently, the media has not been replaced since the filtration system was installed. No air scour is available in the existing pressure filtration system.

The ADEC Monitoring Summary (in Appendix H) shows that the system has experienced a number of treatment-related violations over the last several years, including exceeding disinfection by-product (DBP) limits, high turbidity in the finished water, and high copper from corrosion in the system. Many of these violations reflect the inability of the current treatment system to meet the more stringent regulations that have gone into effect since the system was built.

Appendix H shows a snapshot of water quality data for samples taken from both summer and winter intakes in October 2010. This data should be referenced for various discussion topics for this section and its subsections. It should be understood that because water quality within the Togoomenik River can change dramatically during the year, this data does not represent the overall water quality variability for this system. However, the data does corroborate some of the problems identified by ADEC.

The following subsections describe specific areas of concern for the water treatment system.

### 6.3.1 Lead and Copper

The U.S. Environmental Protection Agency (EPA) has established limits on the lead and copper content of public drinking water. The major cause of lead and copper in public water systems is corrosion within the distribution system or residential plumbing.<sup>3</sup>

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<sup>3</sup>If the level of lead or copper exceeds 15 micrograms per liter ( $\mu\text{g/L}$ ) or 1.3 milligrams per liter ( $\text{mg/L}$ ), respectively, the WTP must implement corrosion control. Samples are taken at the tap and take into account any contributions from fixtures and piping from the plumbing within the individual residences. The Langelier Index (LI) is a common measure of the corrosivity of a given water sample. The value is calculated using various water quality factors, including pH, alkalinity, total solids, and concentrations of a number of specific ions, including calcium, chloride, and sulfate. The LI value relates the potential of the water to deposit calcium carbonate on internal piping surfaces, protecting them from corrosion. It has been generally accepted that LI values between -0.5 to + 0.5 indicate water that is neutral and may or may not have a corrosive tendency. Values greater than +0.5 indicate non-corrosive water, while more corrosive water will have a value less than -0.5.

REVISIONS		REVISIONS	
NO.	DATE	BY	DESCRIPTION

**Norton Sound**

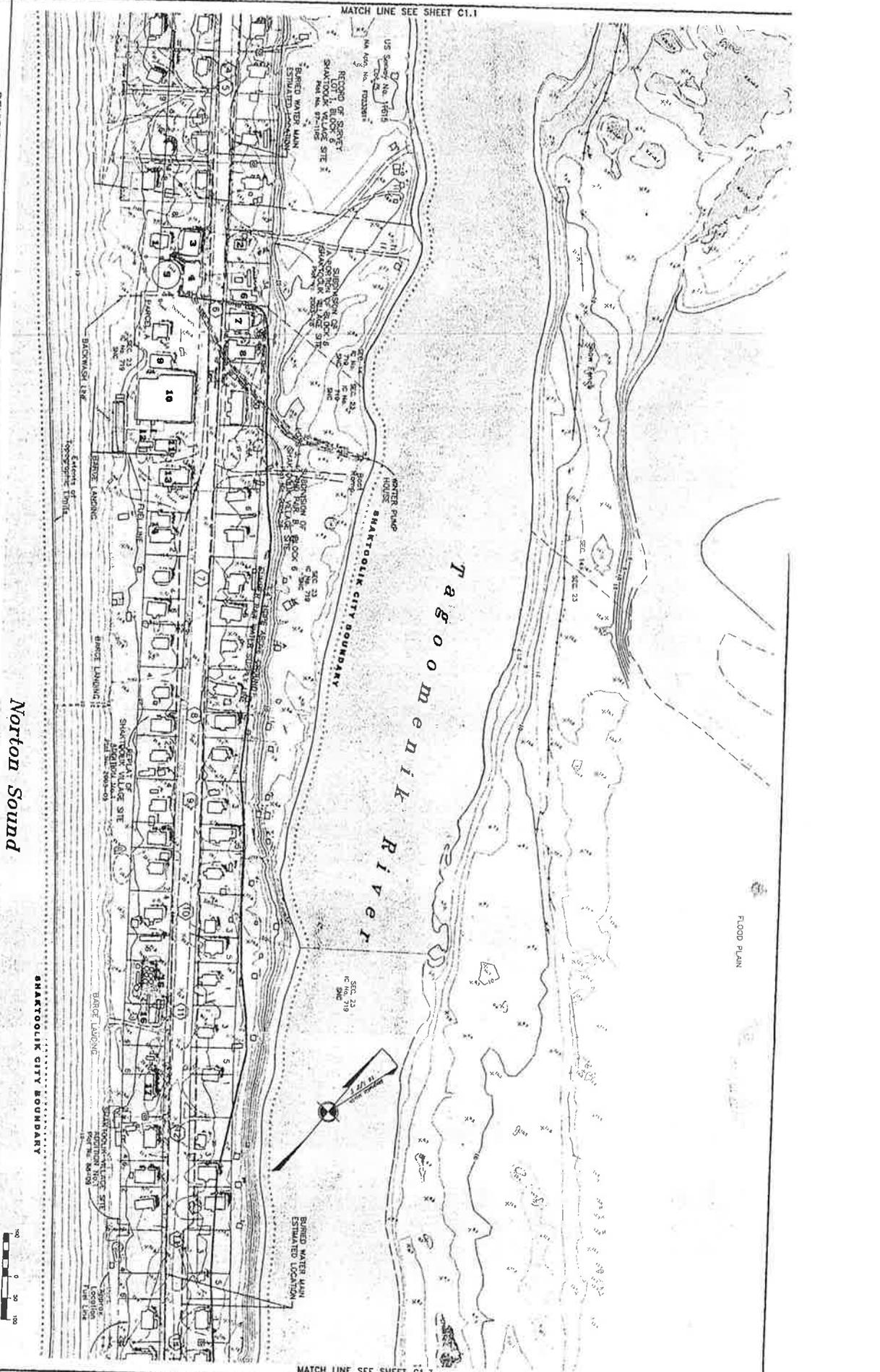


**Bristol**  
 ENGINEERING SERVICES  
 CORPORATION  
 Phone (807) 565-0013 Fax (807) 565-0173  
 Project No. 210066

**DRAFT**

CITY OF SHAKTOOLUK  
 SANITATION FACILITIES MASTER PLAN  
 WATER  
 AS-BUILT MAPPING

SCALE: SHOWN | DESIGNED: KLP | CHECKED: FAV | DRAWN: SWW | DATE: 06/07/11 | SHEET 4 OF 9



SHAKTOOLIK SANITATION FACILITIES MASTER PLAN

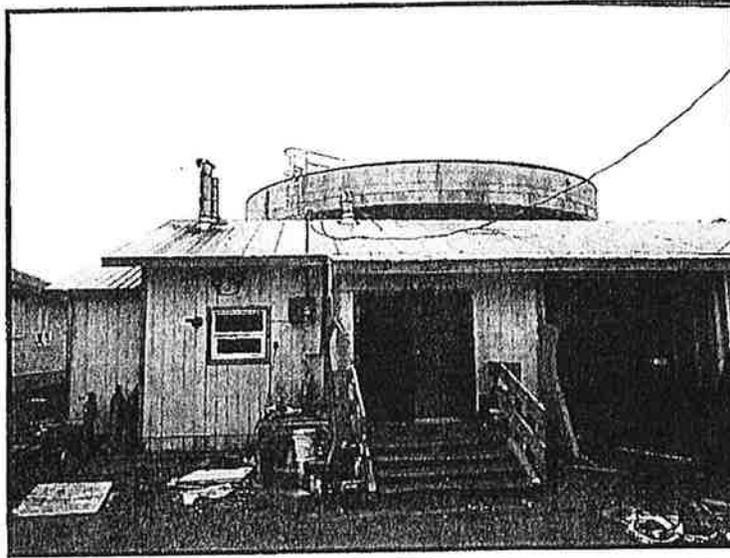


Photo 1: Shaktoolik Water Treatment Plant/washeteria.

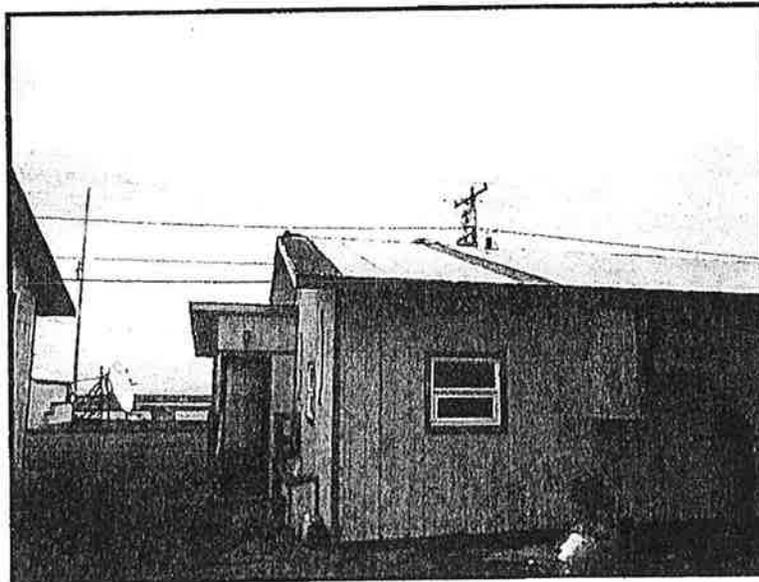


Photo 2: Roof damage at water treatment plant.

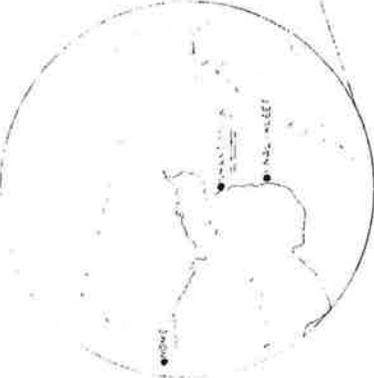
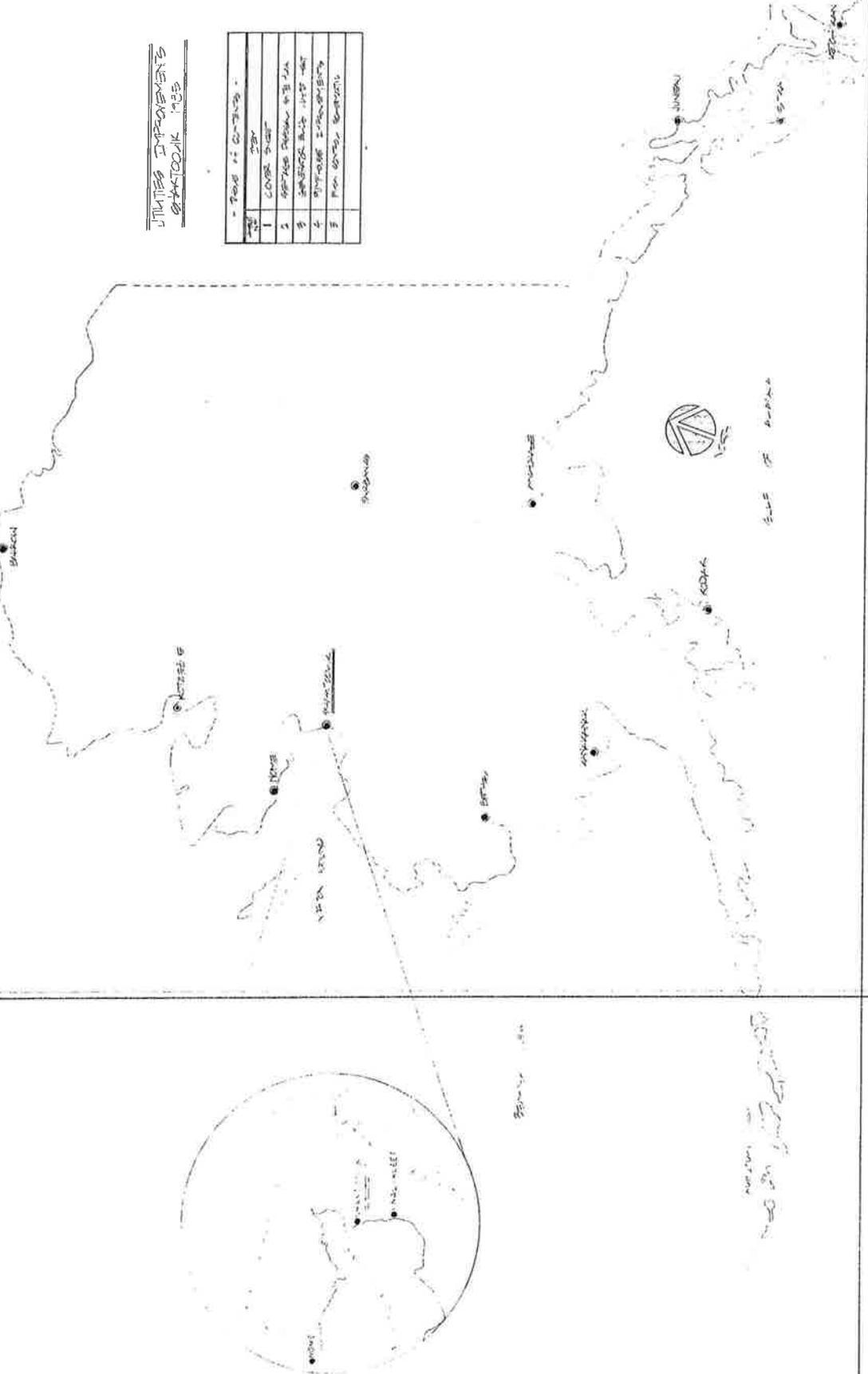
# CONSTRUCTION PLANS SHIAKTOOLIK, ALASKA



UTILITIES IMPROVEMENTS  
SHIAKTOOLIK 1935

- ROAD NO. 10-21-30-10 -

NO.	DESCRIPTION
1	CONCRETE DRIVE
2	CONCRETE DRIVE 4' x 8' x 4"
3	CONCRETE DRIVE 4' x 8' x 4"
4	CONCRETE DRIVE 4' x 8' x 4"
5	CONCRETE DRIVE 4' x 8' x 4"



IN 1 BUILDERS

DATE: \_\_\_\_\_  
 SHEET NO.: \_\_\_\_\_  
 PROJECT: \_\_\_\_\_  
 DRAWING NO.: \_\_\_\_\_  
 SCALE: \_\_\_\_\_

1 OF 1

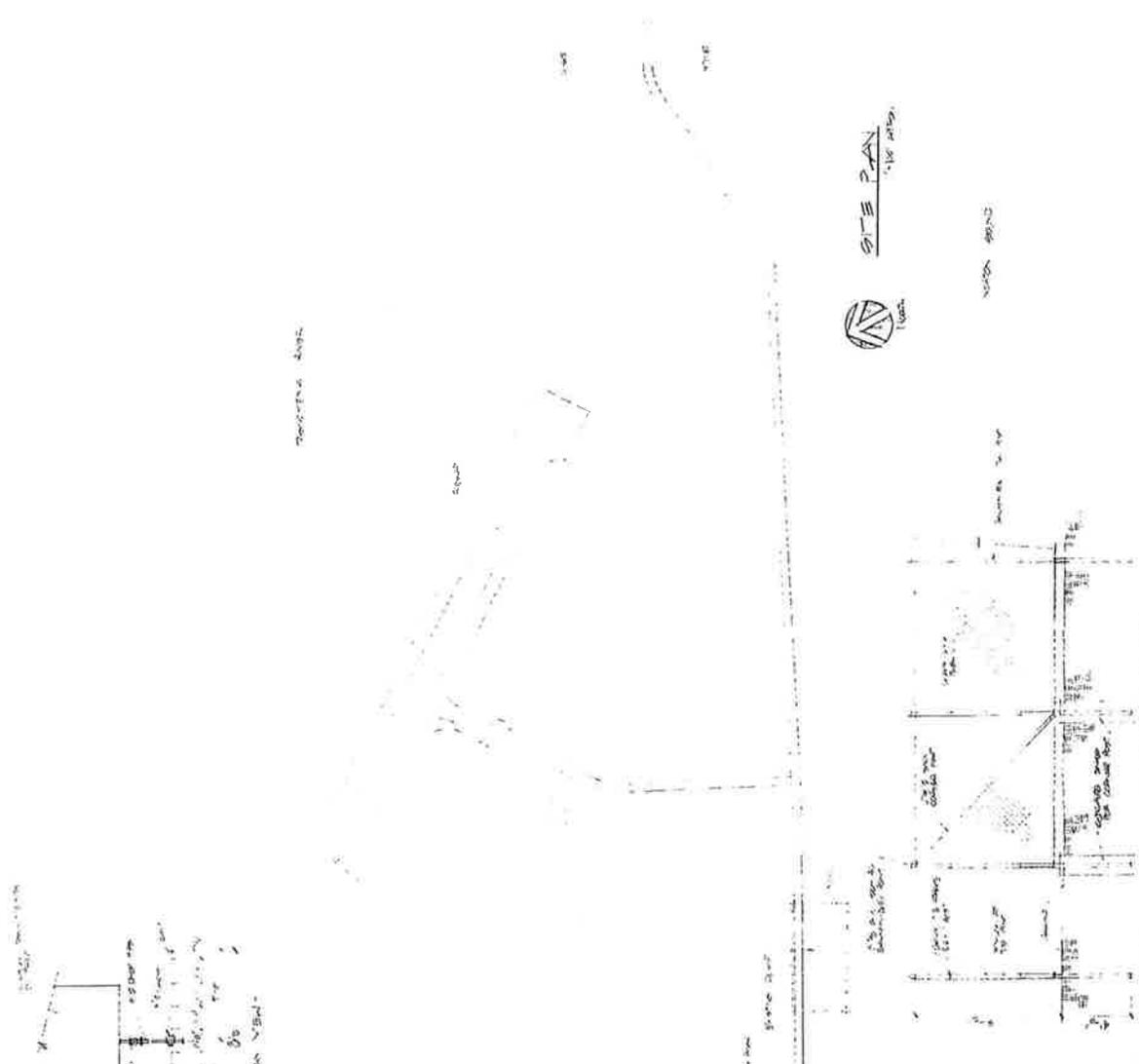


# INI BUILDERS

1122 NUMBERS  
SUNBELT BLVD  
DALLAS, TEXAS

DATE	11/20/2014
BY	W. J. [unclear]
SCALE	AS SHOWN
PROJECT	1122 NUMBERS
DESCRIPTION	SEPTIC TANK
OWNER	INI BUILDERS

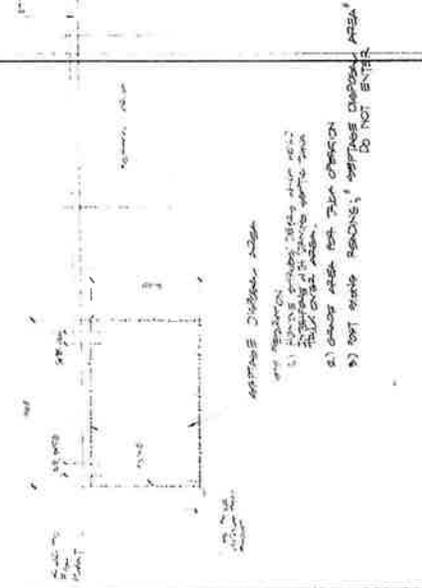
Sheet No. **2**



PUMP MODIFICATION FOR EXISTING SEPTIC TANK TANK



EXISTING SEPTIC TANK



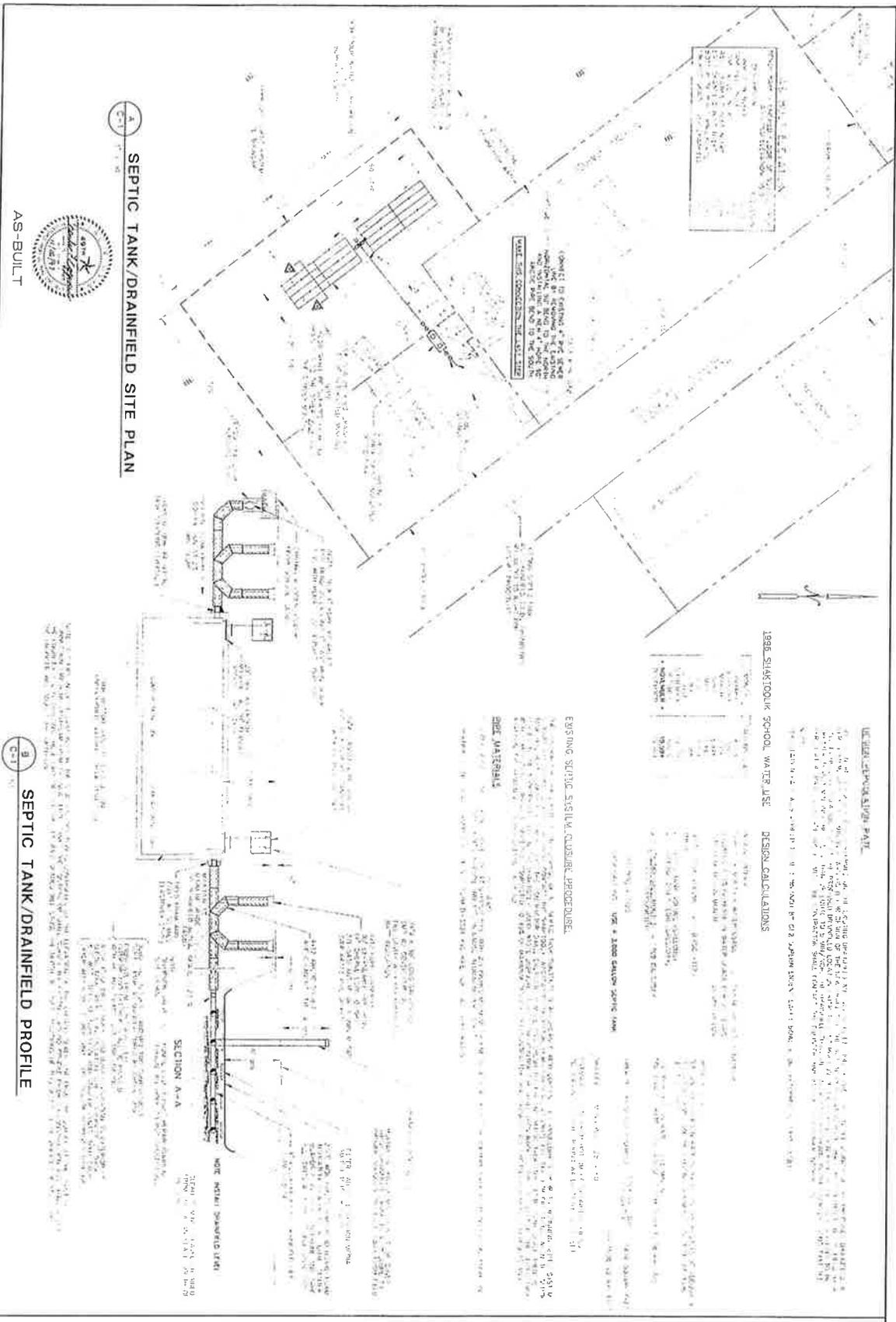
FENCE DETAILS

- 1) EXISTING SEPTIC TANK
- 2) EXISTING SEPTIC TANK
- 3) EXISTING SEPTIC TANK
- 4) EXISTING SEPTIC TANK
- 5) EXISTING SEPTIC TANK
- 6) EXISTING SEPTIC TANK
- 7) EXISTING SEPTIC TANK
- 8) EXISTING SEPTIC TANK
- 9) EXISTING SEPTIC TANK
- 10) EXISTING SEPTIC TANK









**A** SEPTIC TANK/DRAINFIELD SITE PLAN

AS-BUILT



**B** SEPTIC TANK/DRAINFIELD PROFILE

C-1

**LOCAL DEPENDENT PART**

1. This drawing is a part of a larger project and is not to be used in isolation. It is subject to the same terms and conditions as the entire project. 2. The design is based on the information provided and is not a guarantee of performance. 3. The contractor is responsible for obtaining all necessary permits and approvals. 4. The design is based on the current code requirements and standards. 5. The design is based on the current market conditions and materials. 6. The design is based on the current site conditions and data. 7. The design is based on the current project schedule and budget. 8. The design is based on the current project goals and objectives. 9. The design is based on the current project risks and challenges. 10. The design is based on the current project opportunities and benefits.

**1997 SHAKTOOLIK SCHOOL WATER USE DESIGN CALCULATIONS**

Category	Flow Rate (GPM)	Flow Rate (MGD)
Classrooms	100	0.001
Offices	50	0.0005
Restrooms	20	0.0002
Drinking Water	10	0.0001
Other	10	0.0001
<b>Total</b>	<b>190</b>	<b>0.0018</b>

**EXISTING SEPTIC SYSTEM QUANTIFICATION**

The existing septic system consists of a 1000-gallon septic tank and a 1000-gallon drainfield. The septic tank is located in the basement of the school building. The drainfield is located in the yard behind the school building. The septic tank is made of concrete and has a float valve. The drainfield is made of concrete and has a baffle. The septic tank and drainfield are in good condition and are being replaced with a new system.

**PIPE MATERIALS**

The new septic tank and drainfield will be constructed using the following materials: 1. Septic Tank: 1000-gallon concrete septic tank with a float valve. 2. Drainfield: 1000-gallon concrete drainfield with a baffle. 3. Pipes: 4-inch diameter concrete pipes for the septic tank and drainfield. 4. Manhole: 48-inch diameter concrete manhole for the septic tank. 5. Vent: 4-inch diameter vent pipe for the septic tank. 6. Grate: 24-inch square concrete grate for the manhole. 7. Foundation: 12-inch concrete foundation for the septic tank. 8. Backfill: 12-inch concrete backfill for the septic tank. 9. Gravel: 1/2-inch gravel for the drainfield. 10. Sand: 1/2-inch sand for the drainfield. 11. Geotextile: 1/2-inch geotextile fabric for the drainfield. 12. Topsoil: 2-inch topsoil for the drainfield. 13. Grass: 1/2-inch grass seed for the drainfield. 14. Mulch: 2-inch mulch for the drainfield. 15. Fertilizer: 1/2-inch fertilizer for the drainfield. 16. Water: 1/2-inch water for the drainfield. 17. Air: 1/2-inch air for the drainfield. 18. Light: 1/2-inch light for the drainfield. 19. Sound: 1/2-inch sound for the drainfield. 20. Heat: 1/2-inch heat for the drainfield. 21. Cold: 1/2-inch cold for the drainfield. 22. Dry: 1/2-inch dry for the drainfield. 23. Wet: 1/2-inch wet for the drainfield. 24. Hot: 1/2-inch hot for the drainfield. 25. Cold: 1/2-inch cold for the drainfield.

**CE2 INC.**  
CONSULTING ENGINEERS  
ANCHORAGE, ALASKA

**1997 SCHOOL SEPTIC SYSTEM REPLACEMENT SITE PLAN**  
SHAKTOOLIK, ALASKA



SCALE: AS SHOWN

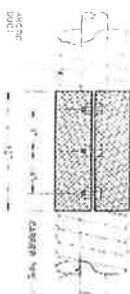
**RECORD DRAWING CERTIFICATE**  
THIS DRAWING IS A PART OF A LARGER PROJECT AND IS NOT TO BE USED IN ISOLATION. IT IS SUBJECT TO THE SAME TERMS AND CONDITIONS AS THE ENTIRE PROJECT. THE DESIGN IS BASED ON THE INFORMATION PROVIDED AND IS NOT A GUARANTEE OF PERFORMANCE. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THE DESIGN IS BASED ON THE CURRENT CODE REQUIREMENTS AND STANDARDS. THE DESIGN IS BASED ON THE CURRENT MARKET CONDITIONS AND MATERIALS. THE DESIGN IS BASED ON THE CURRENT SITE CONDITIONS AND DATA. THE DESIGN IS BASED ON THE CURRENT PROJECT SCHEDULE AND BUDGET. THE DESIGN IS BASED ON THE CURRENT PROJECT GOALS AND OBJECTIVES. THE DESIGN IS BASED ON THE CURRENT PROJECT RISKS AND CHALLENGES. THE DESIGN IS BASED ON THE CURRENT PROJECT OPPORTUNITIES AND BENEFITS.



2" O.D. PIPE  
 2" DIA. VALVE  
 AS REQUIRED

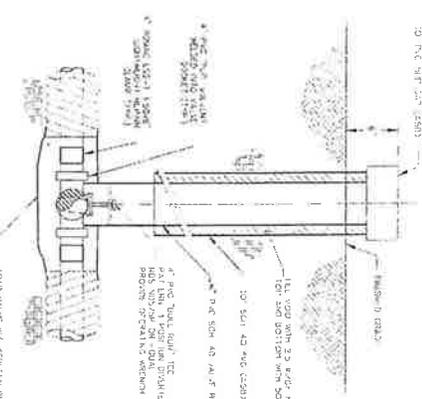


END VIEW



SIDE VIEW

**A** PIPE COUPLING BAND DETAIL  
 C-3



**B** DIVERTER VALVE AND VALVE BOX INSTALLATION DETAIL  
 C-3

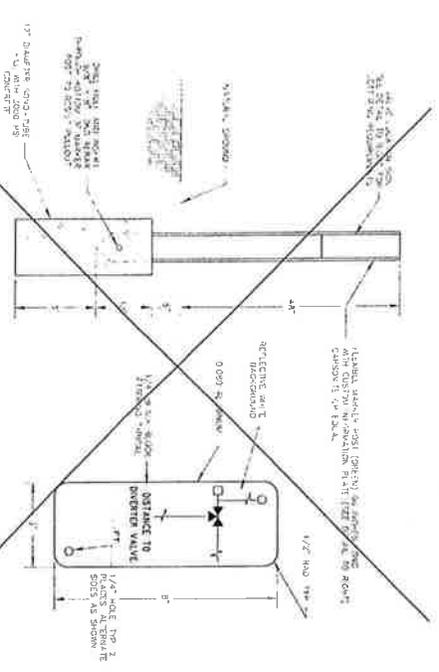
NOTE: VALVES SHALL BE MARKED WITH  
 55001 NUMBER. SEE DETAIL C-3



AS-BUILT

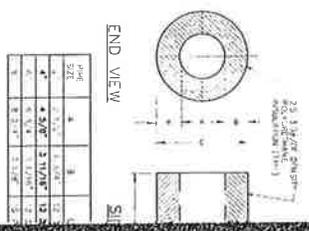


**C** SEWER INSULATION HALET  
 C-3



**D** VALVE BOX MARKER POST DETAIL  
 C-3

NOT USED IN SIGN CONSTRUCTION  
 (2 EA. REQUIRED THIS PROJECT)



END VIEW

HALET SIZE	A	B	C
4"	3 1/2"	3 1/2"	1 1/2"
6"	5 1/2"	5 1/2"	2 1/2"
8"	7 1/2"	7 1/2"	3 1/2"
10"	9 1/2"	9 1/2"	4 1/2"

**E** INSULATION HALET  
 C-3

(FOR FLUSHING PORT / HYDR)



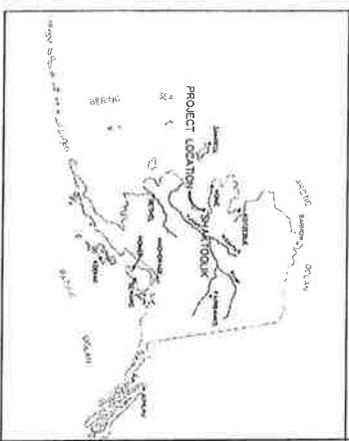
# CITY OF SHAKTOOLIK, ALASKA

## 1997 WATER AND SEWER IMPROVEMENTS

THIS PROJECT INCLUDES CONSTRUCTION OF A NEW SEPTIC SYSTEM FOR THE SCHOOL AND INSTALLATION OF 5 FLUSHING PORTS IN THE WATER DISTRIBUTION SYSTEM

In Cooperation with the State of Alaska  
 Department of Environmental Conservation  
 Village Safe Water Program

# AS-BUILT



Location Map

**CE 2**  
 CONSULTING ENGINEERS  
 ANCHORAGE, ALASKA

Consultant

RECORD DRAWING CERTIFICATE

THESE DRAWINGS REFLECT RECORDED INFORMATION OBTAINED DURING CONSTRUCTION. INFORMATION PROVIDED HEREIN IS ACCURATE TO THE BEST OF MY KNOWLEDGE.

*Garry Bowley*  
 DATE: \_\_\_\_\_  
 DATE: \_\_\_\_\_

DATE RECORDED: \_\_\_\_\_  
 CONSULTING ENGINEER: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DATE: \_\_\_\_\_

STEVE ENG. P.E.  
 GARRY BOWLEY  
 JULY 1997  
 AUGUST 21, 1997  
 SEPT 15, 1997  
 OCT 1, 1997  
 OCTOBER 23, 1997

### SHEET INDEX

NO.	Title
C-1	COVER SHEET
C-1	SEPTIC SYSTEM SITE PLAN AND DETAILS
C-2	DRAINFIELD DETAILS
C-3	DRAINFIELD DETAILS
C-4	FLUSHING PORT DETAILS