VALUE ENGINEERING STUDY

DoD SERVICE: USACE

Value Engineering & Design Criteria Study

for

EVACUATION SHELTER

Newtok, Alaska

U.S. Army Engineer District, Alaska

VALUE ENGINEERING STUDY TEAM LEADER: Chelan Schreifels (907) 753-5527

VALUE ENGINEERING STUDY TEAM MEMBERS

Stanley Tom	Joseph Inakak	Mary George
Sally Russell-Cox	Andy Jones	Morgan Merritt
Andrea Elconin	Mary Azelton	Brenda Kerr
Gregory Carpenter	Robert Tedrick	Steve Geppert
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MAY 2008

VALUE ENGINEERING & DESIGN CRITERIA STUDY

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PROJECT DESCRIPTION AND BACKGROUND

PROJECT TITLE: Evacuation Center for Newtok, Alaska

PROJECT LOCATION: Newtok, Alaska

The community of Newtok is on the Yukon-Kuskokwim Delta where the Kealavik River flows into Baird Inlet/ Ninglick River. Newtok is 494 miles northwest of Anchorage, 94 miles northwest of Bethel, and is 15 miles from the Bering Sea coast. (See Figure 1)

Newtok is susceptible to flooding from storm surge events and the damages to the community have been increasing over time. The residents state that the strongest winds are from the south, with a 25-year wind of 100 miles per hour. Winds from storms entering the Bering Sea from the south to southwest can stack up water on the shallow coast at Newtok and cause elevated tides or storm surge of 10 to 15 feet above normal. As erosion along the Ninglick River continues, the wave action from the south is reaching the community more often and storm surge flooding within the community is more severe. In September 2005, a portion of the community was flooded and damaged by storm surge.

The rivers and lakes in the area usually freeze up in November. Ice thickness on the Ninglick River can be as thick as 6-8 feet. The last safe date to be on the river ice is reported to be around the early part of May.

The report "Section 117 Storm Damage Reduction Project-Newtok, Alaska" recommends constructing an Evacuation Center at the Metarvik site on Nelson Island. The Mertarvik site is located approximately 8 miles across the Ninglick River from Newtok. The center could provide shelter during severe storms if Newtok residents received timely warning, and would provide a dry sanitary shelter for the residents after a severe storm while they worked at restoring their village. The proposed shelter site is hundreds of feet higher than the existing community site, has a good source of drinking water nearby, and has ready access by water.

The Section 117 recommendation is as follows: "The proposed shelter would consist of a building, generator, water supply, sewage lagoon, and road from the proposed multi-use marine support center at the shore of the Ninglick River. The shelter would be sized to provide temporary housing for 100 people with movable dividers in one large space. Permanent spaces are the support areas including kitchen, latrine/shower rooms, storage area, first aid room, and communications and office areas. The storage area will have space for food, water, cots, blankets, and miscellaneous items needed for an evacuation center. Detail design will be similar to the design noted in "Design Analysis, Emergency Shelter, Shishmaref, Alaska" dated October 2004 prepared by U.S. Army Corps of Engineers, Alaska District. Estimated space requirement is shown in Table 4 and estimated cost in Table 5. Cost estimates are based on parametric estimates for the "Design Analysis, Emergency Shelter- Shishmaref, Alaska" and escalated to the October 2007 price level.

The following Tables 4 and 5 and subsequent paragraph are from page 21 of the Section 117 TAB E - Project Fact Sheet (see Appendix E of this report for copy of full TAB E):

Table 4. Space Requirement (SF)	
Main Space	5,400
Kitchen	300
Toilets and Shower Facilities	775
Food/Water Storage	235
Miscellaneous Storage	130
Office/Communications	170
First Aid Station	80
Arctic Entry/Circulation	385
Janitorial	20
Mechanical	250
Electrical/Communications	50
Total Facility Area	**7,795**

Table 5. Estimated Cost	($000's)
Mob/Demob	3,500
Building	7,377
Access Road	1,500
Water Supply	426
Wastewater Treatment	840
Powerplant	100
Site Improvements	495
Utilities	494
LERRD	30
Planning Engineering and Design	900
Construction Management	1,000
20% Contingency	3,332
Total (use 20,000)	**19,994**

When not being used for emergency and temporary housing, the evacuation center may be reconfigured for NTC offices and community facilities and other such purposes as designated by NTC. The NTC will be responsible for all operations and maintenance costs for the evacuation center. The NTC has approved a location in the center of the proposed community at Mertarvik as the site for the evacuation center."

MESSAGE FROM NEWTOK TRADITIONAL COUNCIL REPRESENTATIVE

Mr. Joseph Inakak, a Member of the Newtok Traditional Council, Mary George, the Secretary of the Newtok Traditional Council, and Mr. Stanley Tom, the Newtok Traditional Council Administrator and liaison for relocation participated in the Value Engineering working session for a proposed Evacuation Center-Mertarvik, Alaska on May 6 and 7, 2008. The working session was held in Anchorage, Alaska. At the close of day two, Mr. Joseph Inakak spoke to the participants in Yupik. Mr. Stanley Tom translated the information into English as Mr. Inakak spoke. The words are as follows:

- (Quayanna.) {Thank you}
- (When there is high flood water there is no low tide for three to four days.)

- (Sometimes when there is high water we have a hard time getting to our own boats because the water is too high.)

- (These documents (referring to the draft “Analysis of Flood Potential-Newtok Alaska”, December 2007 prepared by Alaska District U.S. Army Corps of Engineers for Newtok Traditional Council) prove that the water is getting higher every year and erosion is getting nearer.)

- (Worries the flooding occurs in the late evening time.)

- (Concerned with elders and now don’t have evacuation plan and would like to get it done as soon as possible.)

- (Quayanna)

- (Not many big boats.)

- (Big families and small boats.)

- (If clothing gets wet how will we help young kids?)

- (If no medicine occur, how will get the medicine to Newtok?)

- (How will we save our children?)

- (Appreciate the help to try to solve these problems.)

- (Even though we are having a hard time, as we go along things will get easier to work with the Newtok relocation effort)

EXECUTIVE SUMMARY

Value Engineering (VE) is a process used to identify and evaluate the functions a project is to provide. Critical and creative teamwork is used to ensure the project meets the required performance and value at the lowest overall cost.

The VE study was conducted in the Boardroom at the Anchorage Federal Building Annex, 222 West 8TH Avenue, Anchorage, Alaska.

This project was studied using the U.S. Army Corps of Engineers (Corps) standard VE methodology, consisting of five phases:

Information Phase: The Team studied the draft feasibility report and Project Delivery Team (PDT) member descriptions of project work, critical constraints and assumptions, and cost estimate to fully understand the work to be performed and the functions to be achieved. The project was analyzed to determine the basic and any secondary functions to be achieved by the proposed project. The cost estimate was also examined to determine areas of relative high cost to ensure the team focused on those parts of the project which offered the highest potential for cost reductions.

Speculation Phase: The Team speculated by conducting a brainstorming session to generate ideas for alternative designs. All team members contributed ideas and critical analysis of the ideas was discouraged (see Appendix C).

Analysis Phase: Evaluation, testing, and critical analysis of all ideas generated during speculation were performed to determine potential for savings and possibilities for risk. Ideas that did not survive critical analysis were deleted.

Development Phase: The VE Team developed the priority ideas during a technical development session. Additional VE Team Comments were included for items of interest, but were not developed as proposals, and these comments follow the study proposals.

Presentation Phase: The published VE Study Report is distributed for review to project supporters and decision makers. The Alaska District will be responsible for implementation of accepted proposals and ideas.

Most of first day was dedicated to understanding the need for and requirements to be met by an Evacuation Center for Newtok, Alaska (see Information Gathering and Discussion section for more information). The size of the Evacuation Center was increased from 100 person to 150 person to accommodate approximately half the population of Newtok (young and elderly).

During the Speculation/Brainstorming Phase, 22 ideas were proposed to optimize the evacuation center and 13 ideas to optimize the access road.

During the Analysis Phase of the study, the proposed ideas were discussed and evaluated. Of the ideas for the evacuation center, 5 were accepted, 4 were rejected, and 13 were classified as 'maybe'. Of the ideas for the access road from barge landing to evacuation center, 2 were accepted, 5 were rejected, and 6 were classified as 'maybe'.

During the Development Phase, the ideas that were accepted were incorporated into the proposed facility design. Many of the 'maybe' ideas were wrapped into the idea of 'prefab metal building with sandwich panels' that the resultant cost estimate will be based on. For the access road, the ideas involving road width and grade were designed subsequent to the study, and analysis will be included once cost estimates are completed for them. The remainder of the building and access road 'maybe' ideas will be considered during the detail design of the facility and road.

Value Engineering Study Findings and Recommendation: Much of this study was devoted to defining the requirements for an Evacuation Center for a remote village (i.e. size, layout, interior facilities, durability, sustainability, location, access, etc.). Thus the study team was able to propose the most cost-effective design (both initial and life-cycle).

Although up to 300 people may use the evacuation center for a couple of days, it was determined that about 150 people would need to stay at the center for at least 3 weeks. The facility was resized to house 150 people (increase from 7,800 square feet in the Section 117 report to 12,500 square feet) but the water and wastewater systems were sized to handle usage by 300 people. Although the building increased 60% in size, by optimizing the building facilities and construction method using the proposed ideas resulted in a 4% decrease in estimated building costs ($7.477M to $7.211M since power-plant included in building costs for this study). Also the water and wastewater treatment systems were optimized thus reducing costs.

Using road design criteria to protect the permafrost from degradation under the proposed access road resulted in an $17.3M increase in road construction ($7.9M for construction + $9.4M for barging material

to site) even with selecting a shorter route for the access road than was previously being considered.

A cost estimate for developing a quarry on Nelson Island near project site so that barging of soil material would not be necessary was computed. Due to the lack of geological information, many assumptions were made and the resultant estimated cost was $9.42M. This cost can be refined in the future if this option is pursued.

Cost estimates for adjustments to the access road from 18' wide driving surface with a maximum 6% alignment grade to 1) 12' wide with max 6% grade resulted in a decrease of about $2.7M, while 2) maintaining at 18' wide but changing the maximum grade to 10% resulted in a decrease of about $6.5M. Due to the road use by basically small 4-wheelers after construction, acceptance of the first alternative was recommended. Acceptance of the second alternative would be contingent on a study to determine in the people can safely drive and walk up the steeper grades during freezing weather.

Estimated Cost Summary	**($000's)**	**($000's)**
(Price Level)	In Section 117 Report (October 2007)	VE Study (Early 2008)
Mob/Demob	3,500	1,612
Building	7,377	7,211
Access Road	1,500	18,777
Water Supply	426	188 *
Wastewater Treatment	840	560 *
Landfill		13
Powerplant	100	
Site Improvements	495	1,029 *
Utilities	494	
LERRD	30	
Planning Engineering and Design	900	2,361 (8.5%)
Construction Management	1,000	2,204 (7.5%)
Contingency	3,332 (20%)	4,409 (15%)
Total	**19,994**	**38,364**

NOTES: - Access Road cost includes barging cost for the soil materials as a price item separate from material. For costs marked with "*", the cost of barging soil materials was lumped into Access Road barging item.

- Quarry development cost for the soil materials adjacent to project site would be about $9.42M for the total project, which is about equal to estimated barging cost.

- Access Road can be reduced via reducing width of road from 18' to 12' ($2.7M decrease) or by increasing grade on portion of road from maximum of 6% to maximum of 10% ($6.5M decrease).

Newtok VE Study – AM Session May 6, 2007

8:10 AM – Introductions

Chelan Schreifel-introduced VE requirements and agenda

Brenda Kerr presented information on Newtok with slide show
- Newtok on Ninglick River
-70ft/year annual erosion rate of Ninglick River bank
-Ninglick River now has a direct hydrological connection to community
    *For more info look to Brenda's slide show
-Sept. 22, 2005 ~ 20-year flood event
    *Major flooding in the community
-Newtok experiencing a housing shortage
-For more information refer to Flood Potential Analyses for Newtok
-Health situation
    ~One of worst in Bethel area
    ~Sanitary problem due to flooding
    ~25% of all infants hospitalized for lower respiratory disease
-Future
    ~Newtok is scared about the future
    ~Want to relocate
-COE is going to meet the immediate needs of community with evacuation center and fresh water supply

Steve Geppert's presented a slide show on the civil/sanitary for proposed new 'Newtok Village' at Mertarvik site on Nelson Island
-Village Safe Water (VSW) may be putting in a second test well closer to the proposed evacuation center site and future community
-Sewage treatment considerations
    ~Cost effective
    ~Low maintenance
    ~Sewage lagoon-best option
-Question: Does building need fire sprinklers? – Not required per direction received at charrette based on building type and for temporary occupancy
-This project will need to include pump to get water from well

Sally Cox presented information on plans for proposed new 'Newtok Village' at Mertarvik site
-Community has draft layout for new site
-Sally worked with HDR, Inc. to prepare plans ~ did community planning workshops at Newtok
-Dump site road money has been approved
-Community wanted airport to be as close as possible
    ~Not in location that ADOT&PF originally intended
-Community wants evacuation center to become part of community plan
-Room for future expansion at new site
-Land available for wind farm

Stanley Tom noted
-Electricity currently costs $.72/Kilowatt
-Right now-one spring delivery of fuel per year for community and severe fuel shortages occurs at critical subsistence times
-Possible pipeline put in so barges will not have to navigate Newtok River ~ giving community 2 fuel deliveries per year
-Fuel tanks are deteriorating
~Created a capacity issue
-2 diesel generators in existing community for electricity

Andy Jones of HOMELAND SECURITY discussed the state's plans to contract for a study to determine operations and logistics during an evacuation
Questions that will be answered include:
-How are we going to get people over there?
~Concern for them
-Is fuel an issue during the storm time period?
-Will skiffs be able to transport people during these storm conditions?
-Newtok has "V-Bottomed" aluminum skiffs
~They build "tents" inside skiffs for shelter
-Wants community to have evacuation plan and training
-Resource Management will be crucial

-Andrea Elconin spoke of her vision:
~People weathering storm in school
~Once waves die down elderly and kids are transported to evacuation center
~Able-bodies stay to clean up

Newtok Council Member Stated:
(Spoken in Yupik)
~Ninkligik River ~ fast current
-During storm conditions ~ will not go out on it, at this point village is safer
~Low tide is best time to go across
-Communication between old site & new site will be crucial
-ATV's will have to possibly be stored at the site
-Any winds make travel on river dangerous
-Critical stuff will always be there at evacuation center
~Will just evacuate people
-May need possible water craft for evacuation center
-Pickup as well
-Community is worried about what will happen to houses impacted by flooding
~No heavy equipment is located at the existing site
-FEMA does not mitigate erosion
~Applications for mitigation need to be worded very carefully
-Newtok has grant from AVCP to come up with relocation plan for community
-Joseph is very concerned about contamination during flood events
~Trash everywhere
~Honey buckets
-Newtok experiences continuous erosion as well as storm accelerated erosion
-Evacuation Center is a start to moving community to new site
-Evacuation Center will be sustainable

~office
~Pet storage
~Etc.

Worst Case Scenario (100- Year event)
~Homeland Security warns community
~Activate response team
~Have National Guard take them out
~Community must ask for help and then NWS talks to Governor
~Many things must happen before people are brought back to community – Is it livable?
~FEMA does not take substance hunting/fishing/foraging into account
~would probably not take community to new site but to a bigger hub with more resources
~All villages have VHF radios for when telecom goes down
~Evacuation Center will give community a way to evacuate people before the state has to become involved during a disaster
~During Joseph's younger days he says that Newtok never flooded
~People can evacuate to school if conditions do not permit evacuation to the new site

Erosion and increased storm surge flooding at Newtok is a slow moving emergency scenario
~Evacuation Center becomes a 'new animal' (i.e. New concept)
~Start of Village
~The village of Newtok is relatively young people
~Only 5 to 10 elders are left
~Possibly 100 kids enrolled in school
~US Army Corps of Engineers has authority and funding to start design of evacuation center

EVACUATION CENTER NEEDS
-waste facilities
-infirmary
-water
-power/heat with fuel storage
-dry storage – emergency supplies/food
-communication center
-sleeping space
-pet storage
-food prep area
-garbage/solid waste storage & disposal
-freezer/refrigerator
-locker for personal/family storage
-partition walls
-sleeping & living space w/ pads/not cots
-arctic entry/mudroom
-flushing toilets
-shower facilities
-laundry facilities
-janitorial storage
-dining space
-adequate ventilation
-folding tables
-access by water & land

-Evacuation center will be a predecessor to the new school
~Could be used temporarily for kids living at new site

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Future use of Evacuation Center
-multi-purpose tribal office
-school
-youth center
-tribal Court
-community Center
-basketball is very important part of the community
-public internet site
-arts and crafts center
-museum/cultural resource display space
-possible rental space/ living quarters for travelers

Environmental Constraints on Constructing Evacuation Center
-late May-June ~ must not disturb birds nesting
-Aug-Sept ~ must not disturb geese feeding off berries
-Mid May-Jun ~must not disturb nesting waterfowl
-End of May-Oct. ~ open water on Ninglick River
-Newtok is located in Yukon-Kuskokwim Delta Wildlife Refuge
-site location is fixed
-first water test well is fixed
-weather must always be taken into account

Road Location
-2 possible alignments
-one is longer then the other
-Tribe likes alternative #2
~they said eventually people will take short cut no matter where the road is
-both alternatives have approximately the same grade
- funding for the Corps to construct the project has not been appropriated
(this facility may be funded by Congressional adds)
-Road to potential materials site (quarry) is not part of Corps project
-Contractor may choose to develop materials site or bring materials in on a barge
Road
-Gravel and silty sand fill

Communications Center
-emergency facility
-need satellite phone
-VFH radio is currently used to communicate between new and existing village
-in February 2006 the existing village was flooded and without communication for 3 weeks

-internet and existing site
-will want internet in evacuation center

Questions:
-Should the building be allowed to go cold in the winter? (Consensus was yes to minimize operating costs so waterlines should be readily drainable, heating should be hot-air, and other systems in the facility should be non-freezable.
    -Tribe thinks that the building will be used by different agencies for projects at new site
    -Contractors and people staying in building would have to bring in the fuel they use, or not drain tank below a certain level

Sizing of Evacuation Center
-How many people should building be designed for and for how long?
-Tribe of Newtok envisions a place for 300 people for a couple of days with people slowly moving out as conditions improve
-Newtok must be prepared for flooding even in the winter time
-150 people would be at the center for at least 3 weeks
-Building should not be so big that the village will not be able to maintain it or operate it
-Shouldn't be unreasonably large
-Idea came about to size building for 150 and in the short term, building could house more
-Might be possible to change sf. needed per person
-Utilities would need to be sized for max people (300) and sleeping area could be downsized
-Additional 15% for circulation
-5% for mechanical space
-Building needs to utilize sustainable design features
-Water, sewage, food storage, food prep, utilities- 300 people

Analysis of Alternative Ideas
Attendees listed a number of alternatives for improving the function of the project and/or for maintaining performance while reducing costs. These ideas were then evaluated according to the following criteria:
    * YES
    + MAYBE
    X NO WAY

How do we provide this "area" to Newtok?
-Pet space on exterior (*)
-Metal siding (+) {included in '-prefab metal building with sandwich panels'}
-Low Ceiling (+)
-Low roofs (+)
-Prefab building (+) {included in '-prefab metal building with sandwich panels'}
-Divide square footage into 2 or 3 smaller buildings (+)
-Build houses instead (x)
-Prefab metal building with sandwich panels (+)
(various types of modular building)
-Piece-meal project for incremental funding (+)
    -structure may not be suited to incremental funding
    -VE report should assume full funding
-Single mob/demob (*)
    -for this project we are going to assume that there is single mob/demob for VE Study
-Construct 1 support facility before building big building (+)

-building will be able to be added out as funding becomes available
-Separate service areas with insulation so they could be heated with out heating main assembly area (+)
-Use wind turbines for power generation (+)
-Day lighting (natural light) (*)
-orient building to take advantage of sunlight
-would definitely like to see windows incorporated into design
-Snow drifting will also be an issue, orient bldg to minimize (*)
-Underground building (x)
-Alternative energy sources – coal, wood (+)

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Facility Brainstorming
-Prefab insulation panels (+) {included in -prefab metal building with sandwich panels}
-Metal construction – not timber (+){included in -prefab metal building with sandwich panels}
-Wind proof (*)
-Use spring structures (x)
-Use FEMA trailers was brought up from lower-48 (x)
-trailers are usually not long term
-not very heat efficient

Road Brainstorming
-Use Alternative 2 instead of longer route (Alternative 1) (*)
-section of alternative 2 has not been drilled -more geotechnical investigations needed for alternative 2
-ADOT&PF was consulted when working on the design on the road
- proposed future barge ramp, being provided by different governmental agency (not under this project) has concrete surface ramp couple hundred feet into tidelands plus a staging area (130' X 65')
-BIA has several typical road cross-sections
-ADOT&PF recommends 3:1 slope from shoulders
-possible $3 million in state budget that may be used to build the road
-Corps will start design with more geotech and survey eventually may pass package to DOT or U.S. Navy
-State standards may come into play if ADOT&PF money is used
-we should try to stick to ASSHTO design guidance
-Newtok Traditional Council should try to obtain plenty of Right-of-Way for road in case the road is expanded in the future
-Lessen road width (+)
-11 ft. width
-4 wheeler lane
-turn out by sewage lagoon
- ASSHTO minimum road width -18' (but there are exceptions)
-Increase grade to reduce fill in some areas (+)
-ice conditions preclude using slope on road greater than 6%
-10% may work given type of vehicles on this road
-Stockpile material to grade road after it settles (+)
-may get FAA funds to pay for grader or loader
-Just have a 1-lane road with shoulder (+)
-Snow fencing (x)

-Build thick to reduce permafrost settlement (+)
-Convective cooling to prevent permafrost melting(x)
-Chip seal – reduce dust (x – would increase permafrost degradation)
-Asphalt (x – would increase permafrost degradation)
-Call gravel cap as D1 layer (*)
-Cobble stone road (x)
-Seasonal road – go straight up hill barge landing (+)

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-FEMA does not have evacuation center manual
-Corps should be positioned to construct the road in the summer of 2009 if funding is made available
-would like to be prepared to construct facility in 2009 as well if funding is made available
-Navy would likely want to construct both the road and evacuation center
    -wouldn't move this summer
-funding is very up in the air
    -will depend on Congressional adds
    -Newtok Tribal Council and Sally Cox left at approximately 1415 to attend another meeting
-design talks continued with Corps and DHS&EM still at meeting
-Building square feet total is 12,500
-50 square feet per person

Attendees next analyzed the advantages and disadvantages on all items selected as "* yes" and (+ maybe). This information is presented in Appendix C-Speculation and Analysis List.

ATTENDEES	ORGANIZATION	TELEPHONE	EMAIL
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Value Engineering Study on

Newtok Evacuation center
NEWTOK, ALASKA

U.S. Army Engineer District, Alaska

LOCATION: ANCHORAGE FEDERAL BUILDING ANNEX
222 WEST 8TH AVENUE
ANCHORAGE, AK
BETWEEN 8TH AND 9TH

Room: THE BOARDROOM

Tuesday 06 May 2008; Time: 0800-1600

- 08:00-08:10 – Introductions
- 08:10-08:15 – Why is a value engineering study useful? To "Ensure Best Value Is Obtained for Resources Expended to Achieve the Objective or Desired Function for Project"
- 08:15-08:40 – Presentation of Evacuation Center need and purpose
- 08:40-9:00 – Evacuation Center Design
- 9:00-09:15 – Long term relocation considerations and perspective from Sally Cox, Division of Commerce, Community and Economic Development.
- 09:15-09:30 – Break
- 09:30-11:00 – Evacuation considerations and perspectives from Newtok Traditional Council and State of Alaska (Department of Homeland Security & Emergency Management and Newtok Traditional Council)
- 11:00-12:00 – Question & Answer session and group discussion.
- 12:00-1:00 – Lunch
- 1:00-2:30 – How would the evacuation center really work? What would be the evacuation considerations? Brainstorming of other solutions for the community. (Is there a better way to meet the needs of the problem?)
- 2:30-2:45 – Break
- 2:45-3:45 – Continue discussion…….How would the evacuation center really work? What would be the evacuation considerations? Brainstorming of other solutions for the community.
- 3:45-4:00 – Wrap up & adjourn

Wednesday 07 May 2008; Time: 0800-1600

- 08:00-10:00 – Analyze and Evaluate Ideas from brainstorming session.
- 10:00-10:15 – Break
- 10:15-12:00 – Develop acceptable ideas with changes required and reasoning for acceptance or rejection
- 12:00-1:00 – Lunch
- 1:00-2:30 – Continue…… Develop acceptable ideas with changes required and reasoning for acceptance or rejection
- 2:30-2:45 – Break
- 2:45-3:45 – Review items needed to complete the value engineering study and report,
- 3:45-4:00 – Wrap up & adjourn

Wednesday 14 May 2008 - Draft VE Study Report distributed to participants for review

Friday 23 May 2008 - All review comments submitted

Friday 6 June 2008 – Final Value Engineering Report Distributed.

Facility **RATINGS: *-yes x-no +-maybe (only 'yes' & 'maybe' listed)**

Change	Advantages	Disadvantages	Cost impact?	Schedule impact?
Pet Storage exterior (*)	Less costly, it will save interior space, less maintenance. Safer. Better sanitation. Less noise. Allergies.	Pets exposed to elements. Stressful on pets & owners used to having them inside.	Savings	none
One mobilization & demob (*)			Savings if it can be done	
Day lighting/Passive solar energy (*)	Positive emotional effects, less use of electrical lighting. Safety issue for egress. Can enhance safety during daylight hours. Can provide additional ventilation & cooling.	Security of building, increased heat loss through buildings. Increased cost compared to walls.	Increase cost for more windows during construction. Increase heat cost lifecycle. Increase cost for maintenance for broken windows.	None
Shutters for windows (*)	Security of building during non-use. Wind resistance. Can Increase R-value of windows.	Cost. Maintenance issue is not secured properly. Can be safety issue if not secured properly.	Increase initial and possible for decrease lifecycle.	None
Wind proof construction (*)	Reduce heat loss			
Design building so it can be constructed in phases (+)	Could work for incremental funding.	Overall more costly to construct. Only partially usable for evacuation center.		
Insulate walls between main hall and service areas (+)	mechanical & heating can be turned off in main hall when not needed. Would allow the building to be left partially cold. Increase energy savings.	It would be harder on the interior materials in the building because of fluctuating temperatures.	Increase in 1st cost.	None
Wind turbines for power supplement (+)	Ready supply of energy w/ minimal additional cost		Increase initial and decrease lifecycle. Being investigated by Alaska Energy Authority for relocated community.	
Wood stoves (+)	Backup heat source			

Change	Advantages	Disadvantages	Cost impact?	Schedule impact?
Building orientation – snow drift (*)	Reduces roof loading.			
Building orientation – sun light (*)	See comments for day lighting.			
Exterior color for low reflectance (+)	Increased solar radiation.		None	None
Low maintenance building exterior (+)	Decreased maintenance, no paint.	Could impact visual aesthetics.	Possible impacts.	None.
Lower ceilings. (+)	Less heating due to lower interior volume to heat. Easier & safer to maintain.	Can't play basketball. Space can feel smaller, more closed in, if too short can affect ventilation.	Possibly lower cost for construction and lifecycle for heating & maintenance.	None.
Smaller interior spaces (+)	Separate areas could provide more privacy & flexibility for use.	Heating issues need to provide more climate zones. More privacy. Could take more square footage to provide same capacity of space.	Increase cost for construction & lifecycle heating costs.	Adds more time to build more.
Low roof pitch (+)	Safety for shoveling snow.			
Pre-engineered metal building (+),	Cost could be significantly lower.	Less creativity for design. Lower service life. Fewer options for building configurations.	Less first cost	Faster construction time
Thick exterior insulation (+)	Increased r-value and decreased heating cost	Increased construction cost.	Increase construction cost, reduced lifecycle cost.	none
Metal construction (+)	Lower fire danger. Lower cost for construction.	Could be less aesthetic than timber.	?	None
Solar wall (+)	Could decrease heating cost.	Could cost more and take additional engineering.	Increases first cost.	Could have a slight increase to construction schedule.

Road

Change	Advantage	Disadvantage	Cost impact?	Schedule impact?
Thicker sub-base to reduce permafrost settlement (+)	Less settlement of roadway.	Takes longer to build, uses more material, larger footprint.	Increases first cost.	Longer schedule for construction.
D1 cap instead of gravel (*)	Reduce dust and possible road surface erosion and maintenance.	More expensive, takes longer to produce at the quarry.	Higher first cost but reduced lifecycle costs due to less erosion of surface.	Longer schedule for construction.
Seasonal road use (+)	Don't have to maintain the road during the winter	Road is only passable by vehicle seasonably	Less maintenance cost	none
Alternative 2 alignment (*)	Shorter road alignment, shorter travel time between barge landing and evacuation center. Less material required. Less environmental impacts.	Deeper fill sections in some portions of alignment.	Less cost and less maintenance cost.	Shorter schedule, less construction and wouldn't have to revisit NEPA for EA.
Reduce width of road section (+)	Reduce quantity, reduce footprint. Reduce cost. Reduce maintenance. Road sized appropriately for community vehicle use.	Smaller road surface. Increased vehicle confrontations & traffic hazards. Limits the size of vehicles that can use road. Increased pedestrian hazard. May have to make the road bigger later.	Reduced cost for construction and lifecycle.	Shorter construction time.
Increase maximum grade to 10% to reduce fill (+)	Less material for fill areas. Reduces cost.	Safety issue. Possibly limits loads & puts more strain on tow vehicles. Increased maintenance cost.	Reduced construction cost & increased maintenance cost.	Negligible

CIVIL DESIGN ANALYSIS

Water:

There is an existing 4-inch test well located near the site that can be used for the emergency shelter. Provide unheated structure over the well head. Provide one lane access road and turnaround.

300 personnel at 25 gallon per day (gpd)
300(25) = 7,500 gpd = 312.5 gallon per hour (gph) = 5.2 gallon per minute (gpm)
Peak loading 2x = 10.4 gpm
Use 12 gpm pump; 1-1/4"

Test Well – 110 foot (ft) depth; 6-inch steel outer casing lined with 4-inch pvc with a nominal 3-inch diameter, 6.7 foot long well screen and tailpipe. Groundwater encountered at a depth of 104 feet. Static water level measured at 98 feet. 2-hour pump test at 15 gpm had no measurable drawdown. Total available drawdown if a pump is installed within the screen is about 10 to 12 feet. A small diameter pump will be required to fit in the current well screen. The pump would also need to be shrouded to direct water across the pump motor to prevent the motor from over heating. The analytical results indicate that the groundwater quality meets the primary and secondary drinking water quality standards presented in 18 AAC 80, with one exception. Total iron, at a concentration of 0.357 mg/l slightly exceeds the secondary standard of 0.3 mg/l.

3,100 linear feet (LF) of 3-inch preinsulated water line buried 2 feet deep and heat traced. One road crossing – 20 ft encasement sleeve

Wastewater:
300 personnel at 25 gpd for 14 days
Rain 20 inches per year.
300(25)(14) = 105,00 gallons = 14,040 cubic feet
Assume depth of 4 ft for sewage storage plus 20 inch for rain and 1 ft freeboard
14,040/5.67 = 2,476 sq ft = approximately 50 ft by 50 ft
Use 60 sq ft Temporary Sewage Lagoon
14,040/3,600 = 3.9 ft
3.9 + 1.67 + 1 = 6.57 total depth

Lagoon shall be lined. The lagoon shall be fenced and covered to prevent birds and wildlife from consuming the waste.

6-inch preinsulated HDPE sewer; 1960 LF with 4 manholes buried 6 feet deep.

Solid Waste:

Assume 5 pounds (lbs) per person
Assume 400 lbs/cubic yards (cy) for garbage
300 personnel at 5 lbs for 14 days
300(5)14 = 21,000 lbs
21,000/400 = 52.5 cy
Landfill shall be fenced in with cover.

ARCHITECTURAL DESIGN ANALYSIS

Two conceptual exterior elevations for the Newtok Emergency Shelter are attached. The graphic and dimensional enhancements displayed include the following:

1. Primary vertical dimensions of the building are shown.
2. Stair railings are delineated in greater detail.
3. Roof panels and exterior wall panels are indicated.
4. Door swings are shown.
5. The roof slope is shown.
6. A scale symbol is provided.
7. Window frames are indicated.
8. The drawing is dated "REV: 5-12-08".

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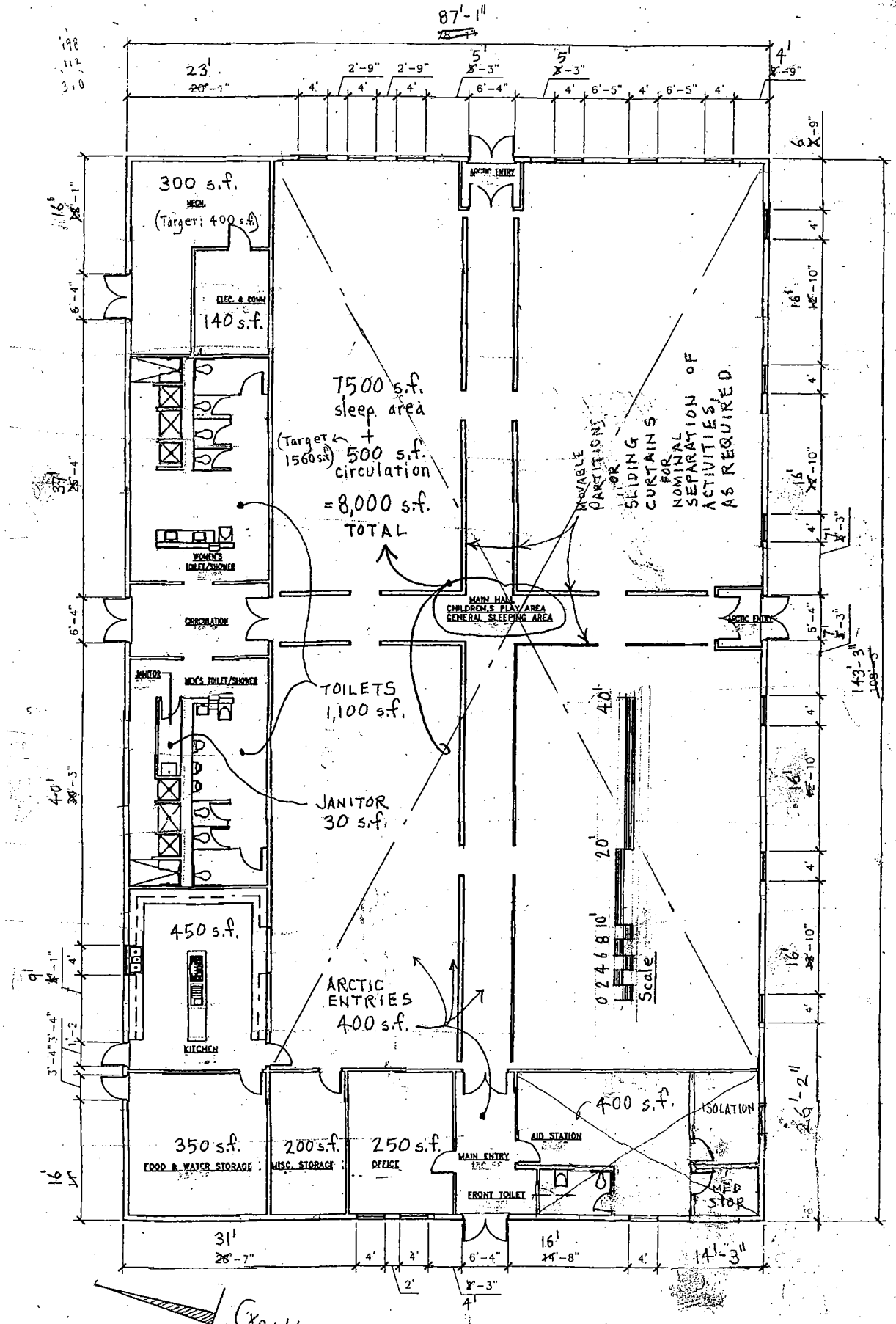
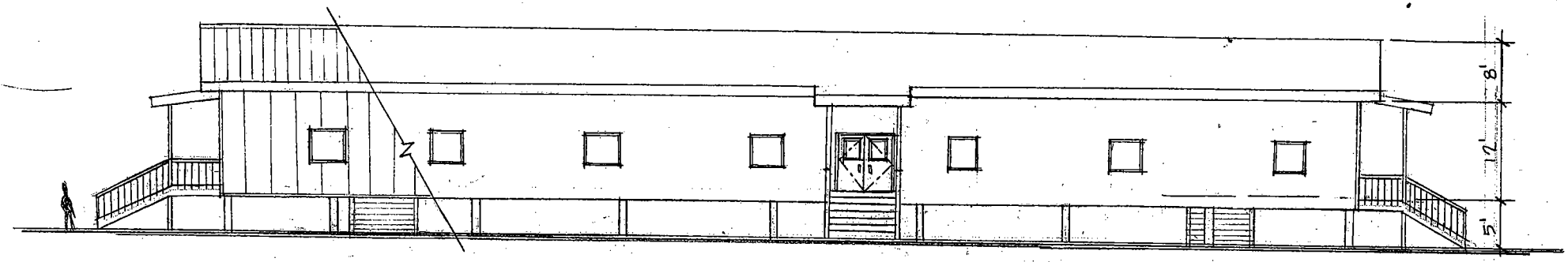
A "switchback"-type, ADA-compliant entry ramp will be required. This is not included in the drawing but is within the cost estimates. The ramp will probably be located at the west entry to the building. Each leg of the ramp will be about 30-to-35 feet long, which will then produce a ramp whose slope will be slightly less than the maximum ADA ramp slope of 1-to-12.



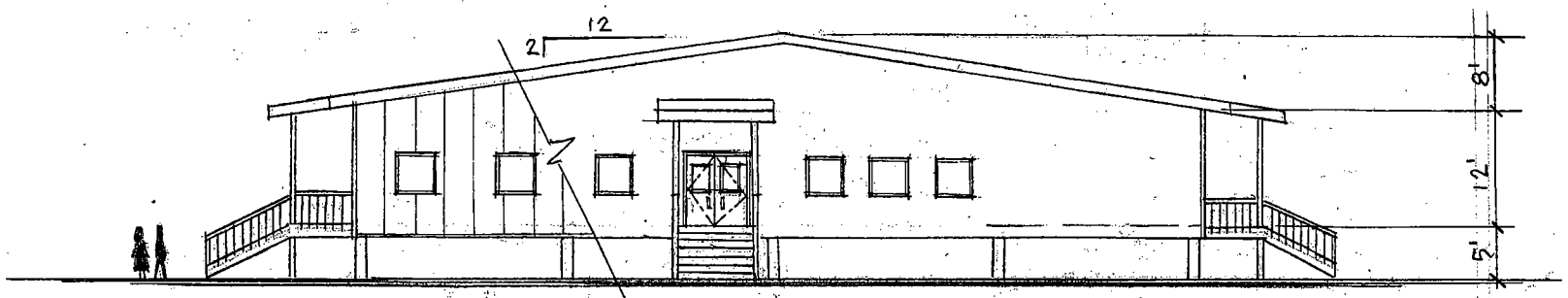
TOTAL BUILDING AREA: 12,500 s.f.

9 May 2008



SOUTH ELEVATION

0 2 4 6 8 10' 20' 40'



EAST ELEVATION

5-9-08
REV: 5-12-08

STRUCTURAL DESIGN ANALYSIS

Design Loads: The design loads for the structure of this building are in accordance with the American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures, ASCE 7-98 (or more current edition) and the International Building Code (IBC) 2003 (or more current edition):

Dead Loads: Weight of Materials.
Live Loads: 100 psf floor load (based on assembly occupancy)
Building Classification for Wind, Snow and Earthquake Loads:
Category IV (based on emergency shelter)
Snow Load:
Ground Snow Load: 40 psf (based on Bethel)
Roof Snow Load: 40 psf minimum (based on Engineer's judgment)
Drift: Per ASCE 7
Wind Loads (ASCE 7):
130 mph, Exposure C
Seismic Loads:
International Building Code (IBC – 2003)
0.2 Sec. Period Acceleration, S_s = 0.18g
1.0 Sec. Period Acceleration, S_1 = 0.08g
Site Class D Soils
Seismic Use Group is III (emergency shelter)
Seismic Design Category is C
Redundancy Coefficient (rho) = 1.0
Structural System, Ordinary Steel Moment Frames (Pre-engineered metal building assumed)
R = 3 1/2, C_d = 3
The Equivalent Lateral Force System shall be used
W = Dead Load + 20% of Roof Snow Load
V = Equivalent Lateral Force (Base Shear) = C_sW = 0.06 W
It appears that wind will control based on the above seismic evaluation.

Building Structural System & Comments: After the V.E. conference, it is assumed that this building will be a pre-engineered metal building with moment frame bents in one direction and braced frame construction in the other direction. The slab is currently planned to be elevated and supported on piles. The slab will incorporate tie beams between the bases of columns which form the moment frame bents. Ground snow load has been estimated based on Bethel and the reported accumulation of 28 inches. Rather than reduce this per the code equations, this value has also been suggested for the roof snow load to be used.

ELECTRICAL NARRATIVE

EXTERIOR ELECTRICAL SYSTEMS

- There is no existing exterior electrical infrastructure at the site. The evacuation center will be served mainly from a diesel powered generator that will be installed near the building. Alternative, renewable sources of energy will be taken into consideration.
- The generator chosen will be one that could be used in the future as part of the future power plant for the village.
- A water pump remote from the building will require power. Because of the distance of the current well from the building, approximately 3,000 feet away, this may require a separate power source near the well site.
- Generating units will have weatherproof enclosures that will withstand the harsh environment to which they will be exposed. They will be protected from flying debris to ensure that they will continuously operate during emergency events.

Area Lighting

- To minimize energy usage exterior lighting will only be provided at the building entrances.
- Exterior lighting will have both manual and automatic controls. Manual control will be through a switch inside the building. Automatic control will be via motion and photo sensing. The intent is to conserve energy by automatically turning off the lights when it is not needed, that is when it is bright outside and when there is no activity outside.
- Exterior lighting fixtures will have weatherproof enclosure that will withstand the harsh environment to which they will be exposed. Additional protection will be provided to prevent them from being damaged by flying debris.

EXTERIOR TELECOM SYSTEM

- There is no existing exterior telecom infrastructure at the site and none will be provided for this project, but the building will be provided with the capability to connect to a future telecom infrastructure.

INTERIOR ELECTRICAL SYSTEM

Service to the Building

- As mentioned above the building will be served by a generator installed adjacent to the building.
- The service entrance equipment will be designed to be able to connect to both the generator and the future exterior electrical infrastructure of the future village.
- Connection to the generator will be through conductors that run in an underground RGS conduit.
- Projected load requirement will be 75 kVA, which is based on a projected demand density of 5.8 W per square feet. Service voltage will be 208/120V, 3-phase, 4-wire.
- At the above load requirement and service voltage the current rating for the service entrance will be approximately 250 A.
- Above electrical load requirement is based on the assumption that space heating will not be electrically powered.

Power Distribution

- use copper conductors only
- wirings will be run in metallic conduit
- Branch circuit will be protected by molded case circuit breakers in a panelboard at the dedicated electrical room.
- Power and lighting loads shall not be combined in the same circuit.

Interior Lighting

- Illumination level for space ambient lighting will be based on minimum IESNA lighting level standards. Levels for emergency lighting will be based on NFPA 101 requirements.
- To minimize energy usage and not exceed the lighting power allowance of ASHRAE STD 90.1-2004, energy efficient fixtures that are energy star rated will be used.
- Room lights will have manual or/and automatic control. Lights in areas with more than one entrance/exit point shall be controlled by a switch at each entrance/exit point. Lights in areas not frequently occupied shall be controlled by an occupancy sensor.
- Emergency lighting will be provided at areas required by NFPA 101 and any areas critical for the operation of the evacuation center, such as the clinic and the communication center.

Power Receptacles

- Each room in the building will be provided with accessible 120V convenience receptacle outlet. Outlet will be laid out so that habitable spaces will have wall outlets no more than 12 feet from each other. Utility spaces will have at least one convenience outlet for maintenance purpose.
- Tamper resistant receptacles will be provided in spaces most likely occupied by children

Power Equipment Connections

- Dedicated branch circuit for mechanical equipment (motors, heating control, etc)
- Dedicated circuit for certain appliances such as in the kitchen area
- Dedicated receptacles required by NEC
- Dedicated circuit for emergency communication equipment (VHF radio, ALMR, Satellite Phone base unit, etc)
- Dedicated circuit for future telecom equipment (phone, internet, CATV)
- Dedicated circuit for Fire Detection/Alarms System

INTERIOR TELECOM SYSTEM

- As mentioned there is no existing telecommunication infrastructure at the site.
- No interior telecom cabling will be provided
- Only raceways (1" metallic conduit) and boxes with blank faceplates will be provided at location for future phone/data outlets. Raceways for telecom will run back to one wall of the electrical room. This wall will have a plywood backboard for future installation of telecom equipment. An empty 4" conduit that goes from the room to the exterior of the building will be provided for the future telecom service cable to the building.

- At the designated communication center a raceway and cabling for the radio antennas will be provided. A dedicated circuit with provision for battery operated standby power will also be provided at this area.

LIFE SAFETY/SECURITY SYSTEM

- Local fire detection/alarm system will be provided which will be tied to the fire suppression system of the building, if provided.

References

A. Electrical Design, Interior Electrical System, TM 5-811-2/AFM 88-9, Chapter 2.

B. IES Lighting Handbook, published by the Illuminating Engineering Society (IES).

C. National Electrical Code, NFPA 70

D. National Fire Alarm Code, NFPA 72.

E. Life Safety Code, NFPA 101.

F. Design and Construction Guidance for Community Shelters, FEMA 361

MECHANICAL DESIGN ANALYSIS

Assumptions:

Building is well constructed with tight air barrier.
Winter Design temperature is – 20F

Discussions:

Heated Enclosure – Heat enclosure w/ three 150,000 btu/hour furnaces spaced and ducted in the facility.

13,000 SF Nominal Building, 13' sidewalls, insulation at roof pitched at 3/12, exterior 75 W x 175 L

Windows 5% total enclosure

Closure from Training Barracks, climate zone 7A

Walls – R 30
Ceiling/Roof – R 60
Floor – R 30

Infiltration .2 AC/H (well installed air barrier)

Windows – U=0.33 – operable to provide limited ventilation

Provide heating using fuel oil fired furnace

Ventilation –

No ventilation will be provided due to the temporary use nature of the facility – ventilation could be later added to the large open area possibly located in the roof structure area.

Hot Water –

Oil fired with recovery to suite 150 people in an apartment scenario

Oil Storage –

5,000 Gallon dual wall tank – 1050 gal for heating, 800 gal for hot water gen, 1475 gal to operate 75 kw generator, 1500 gal spare

ROAD DESIGNS

The road designed in conjunction with the Newtok Evacuation Center connects the evacuation center located roughly at 300 feet above mean sea level to the barge landing on the river bank. The primary purpose of the road is to allow for the safe movement of evacuees from the barge landing on the river bank to the evacuation center near the top of the hill. The road is designed to minimize permafrost thaw and ponding of water to minimize differential settlement. A gravel surface was chosen to minimize maintenance costs in response to road settling.

This road was designed in accordance with Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400) published by the American Association of State Highway and Transportation Officials (AASHTO) in 2001. A design speed of 30 miles per hour was used to calculate minimum curve radius and stopping distances. The road width initially used was 18 feet in accordance to the minimum width allowed by this code. A width of 12 feet was also considered since the design vehicle after construction is completed will be an ATV. Grades were kept to a maximum of 6% as a safety precaution for snow and ice conditions, though a short stretch of 10% grade was also considered.

The road section is based on the Nelson Island Sub-Regional Transportation Plan currently being used by the State of Alaska Department of Transportation and Public Facilities (DOT&PF). The road surface is a 6" gravel cap which covers a 36" layer of pit run gravel to maximize drainage of the road surface. These layers rest on a leveling course of silty sand at least 24" thick. The minimum cross section height is 60" and increases to level the undulating terrain of the site. In constructing this section, no cuts will be made in the subgrade and no vegetation is to be removed. Historically, removing the vegetation from permafrost and making cuts into the soil result in severe permafrost thaw. To prevent this from happening, geotextile will be laid over the vegetation and the road section will be placed on top.

The road alignment selected crosses the slope in front of the evacuation center obliquely creating a barrier for drainage of the site. To prevent water from ponding, culverts will be installed at low points at the toe of the uphill side of the section. These culverts will be insulated to minimize the thaw bulb created by the water and oversized to minimize the around of time during breakup that the culvert is blocked by ice.

Barge Dock Road (18' Road w/ 6% max slope)

D-1 surface volume =	4,827	CY
pit run gravel volume =	22,276	CY
silty sand fill volume =	59,526	CY
geotextile area =	706,146	SF

Landfill & Lagoon Road

D-1 surface volume =	167	CY
pit run gravel volume =	1,786	CY
silty sand fill volume =	657	CY
geotextile area =	49,598	SF

Well Road

D-1 surface volume =	753	CY
pit run gravel volume =	8,029	CY
silty sand fill volume =	12,517	CY
geotextile area =	126,851	SF

Quarry Road*

D-1 surface volume =	4,322	CY
pit run gravel volume =	35,831	CY
silty sand fill volume =	25,481	CY
geotextile area =	873,384	SF

Evacuation Center Pad

D-1 surface volume =	610	CY
pit run gravel volume =	4,105	CY
silty sand fill volume =	18,560	CY
geotextile area =	110,647	SF

Landfill & Lagoon Road Turning pad

D-1 surface volume =	116	CY
pit run gravel volume =	905	CY
silty sand fill volume =	1,111	CY
geotextile area =	20,475	SF

Well Road Turning Pad

D-1 surface volume =	116	CY
pit run gravel volume =	905	CY
silty sand fill volume =	4,752	CY
geotextile area =	32,164	SF

Barge Dock Road Alternative 2 Quantity Estimate
12 ft road with 6% max grades

alignment length =	6680.88	ft

D-1 surface

thickness =	6	in
lane width =	6	ft
lane slope =	0.03	
number of lanes =	2	
lane gravel area =	6.00	ft^2
shoulder width =	0	ft
shoulder slope =	0.06	
edge slope =	0.333	
shoulder gravel area =	0.75	ft^2
gravel sectional area =	13.51	ft^2
D-1 surface volume =	**3,342**	**CY**

Pit Run Gravel

thickness =	36	in
top width =	15.0	ft
side slipe =	0.333	
bottom width =	33.0	ft
pit run gravel area =	72.0	ft^2
pit run gravel volume =	**17,820**	**CY**

Geotextile Filter Layer

thickness =	0	in
average width =	33.0	ft
fabric area =	**220,505**	**SF**

Silty Sand Fill

thickness =	12	in
top width =		33.0
side slope =	0.333	
bottom width =	39.0	ft
pit run gravel area =	36.0	ft^2
stlty sand fill volume =	8,909	CY
corridoor prism volume =	76,262	CY
silty sand fill volume =	**55,101**	**CY**

Geotextile Underlayment

fabric area =	**424,750**	**SF**

Summary

Barge Dock Road

D-1 surface volume =	3,342	CY
pit run gravel volume =	17,820	CY
silty sand fill volume =	55,101	CY
geotextile area =	645,255	SF

Barge Dock Road 18' Road w 10% Grade

D-1 surface volume =	4,827	CY
pit run gravel volume =	22,276	CY
silty sand fill volume =	27,241	CY
geotextile area =	648,193	SF
alignment length =	6680.88	ft

D-1 surface

thickness =	6	in
lane width =	9	ft
lane slope =	0.03	
number of lanes =	2	
lane gravel area =	9.00	ft^2
shoulder width =	0	ft
shoulder slope =	0.06	
edge slope =	0.333	
shoulder gravel area =	0.75	ft^2
gravel sectional area =	19.51	ft^2
D-1 surface volume =	**4,827**	**CY**

Pit Run Gravel

thickness =	36	in
top width =	21.0	ft
side slipe =	0.333	
bottom width =	39.0	ft
pit run gravel area =	90.0	ft^2
pit run gravel volume =	**22,276**	**CY**

Geotextile Filter Layer

thickness =	0	in
average width =	39.0	ft
fabric area =	**260,608**	**SF**

Silty Sand Fill

thickness =	30	in
top width =	39.0	
side slope =	0.333	
bottom width =	54.0	ft
pit run gravel area =	116.3	ft^2
stlty sand fill volume =	28,770	CY
corridoor prism volume =	54,343	CY
silty sand fill volume =	**27,241**	**CY**

Geotextile Underlayment

fabric area =	**387,585**	**SF**

TAB E
SECTION 117 STORM DAMAGE REDUCTION PROJECT
For
NEWTOK, ALASKA
Dated
18 April 2008

Post-Study Cost Estimate
With
Material Source and Access Road Options

TAB E

Date: April 3, 2008
Division: POD
District: POA

SECTION 117 PROJECT FACT SHEET

1. **Project**.
Section 117 Storm Damage Reduction Project- Newtok, Alaska.

2**. Location of Project/Congressional District.**
The community of Newtok is on the Yukon-Kuskokwim Delta in western Alaska where the Newtok River[1] flows into the Ninglick River. The tidally influenced Ninglick River connects Baird Inlet to the Bering Sea. Newtok is 94 air miles northwest of Bethel and accessible year round by small aircraft. The community, along with most communities in western Alaska, is not linked to a road system. Goods are shipped by air or barge, though barge deliveries have recently been suspended in Newtok. Local transportation is limited to snow machines, all terrain vehicles, and small vessels. Figure 1 is a location/vicinity map for Newtok.

The project area is in the Alaska Congressional District. The Congressional delegation is composed of:

Senator Ted Stevens (R)
Senator Lisa Murkowski (R)
Representative Don Young (R)

3. **Study Authority.**
The authority for this study is the Fiscal Year 2005 Consolidated Appropriations, Section 117, P.L. 108-447, which reads as follows;

> *Notwithstanding any other provision of law, the Secretary of the Army is authorized to carry out, at full Federal expense, structural and non-structural projects for storm damage prevention and reduction, coastal erosion, and ice and glacial damage in Alaska, including relocation of affected communities and construction of replacement facilities.*

Congressional direction is found on page 41, Senate Report 109-84, for the Energy and Water Development Appropriations Act, 2006, P.L. 109-103.

> *The Committee has provided $2,400,000 for Alaska Coastal Erosion. The following communities are eligible recipients of these funds: Kivalina, Newtok, Shishmaref, Koyukuk, Barrow, Kaktovik, Point Hope, Unalakleet, and Bethel. Section 117 of Public Law 108-447 will apply to this project.*

[1] The local community refers to the river adjacent to the community as the Newtok River. The official name of the river is the Kealavik River. For the purposes of this report the river is referred to as the Newtok River.

4. **Study Purpose.**
The purpose of this study is to evaluate structural and non-structural coastal erosion and storm damage alternatives, including relocation, for Corps of Engineers design and implementation of a Section 117 project at Newtok, Alaska.

5. **Related Programs, Prior Studies, Reports, and Existing Water Projects.**

a) Related Programs.

Planning Assistance to States (PAS). Section 22 of the Water Resources Development Act (WRDA) of 1974 (Public Law 93-251), as amended, provides authority for the Corps of Engineers to assist states, local governments, and other non-federal entities, including Native American Indian tribes, in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. This program was used by the Newtok Traditional Council (a Federally recognized tribe) beginning in 2000 to prepare the first formal reports on relocation. The PAS program has not been used in recent years for studies related to Newtok relocation.

Tribal Partnership Program. Since 2004 the Corps has provided limited assistance to the Newtok Traditional Council with relocation planning under the Tribal Partnership Program (Section 203, P.L. 106-541). Baseline studies of the community's preferred relocation site, Mertarvik, include a wetland delineation, fish and wildlife inventories including habitat surveys for two threatened sea ducks, cultural resources studies, social/cultural impact studies, water quality and quantity monitoring, erosion and flood assessments, geotechnical surveys, satellite photo imaging, aerial photography, and topographic mapping. Mertarvik is the Newtok Traditional Council's preferred relocation site. The Tribal Partnership Program will be used in 2007 to perform geotechnical investigations at Mertarvik and to perform a limited number of other studies.

Studies conducted and reports prepared under the above programs, along with those sponsored by the Newtok Traditional Council, other federal agencies and state and local governments, are listed below.

b) Prior Studies and Reports.

"Comprehensive Community Plan: Newtok on Nelson Island", Newtok Traditional Council, 2005. This Newtok Traditional Council report describes the community's vision, goals and objectives, the community involvement and participation process, and other factors important to the development of a new community at the preferred relocation site.

"Newtok-Background for Relocation Report," January 2004. The Newtok Traditional Council had ASCG, Inc. prepare this milestone report to document the severity of the erosion problem, the planning process the community used over a two-decade long period to address the severe erosion problem, and the community's preferred relocation site and preliminary site development plan. Planning Assistance to States funds were also used to prepare this report.

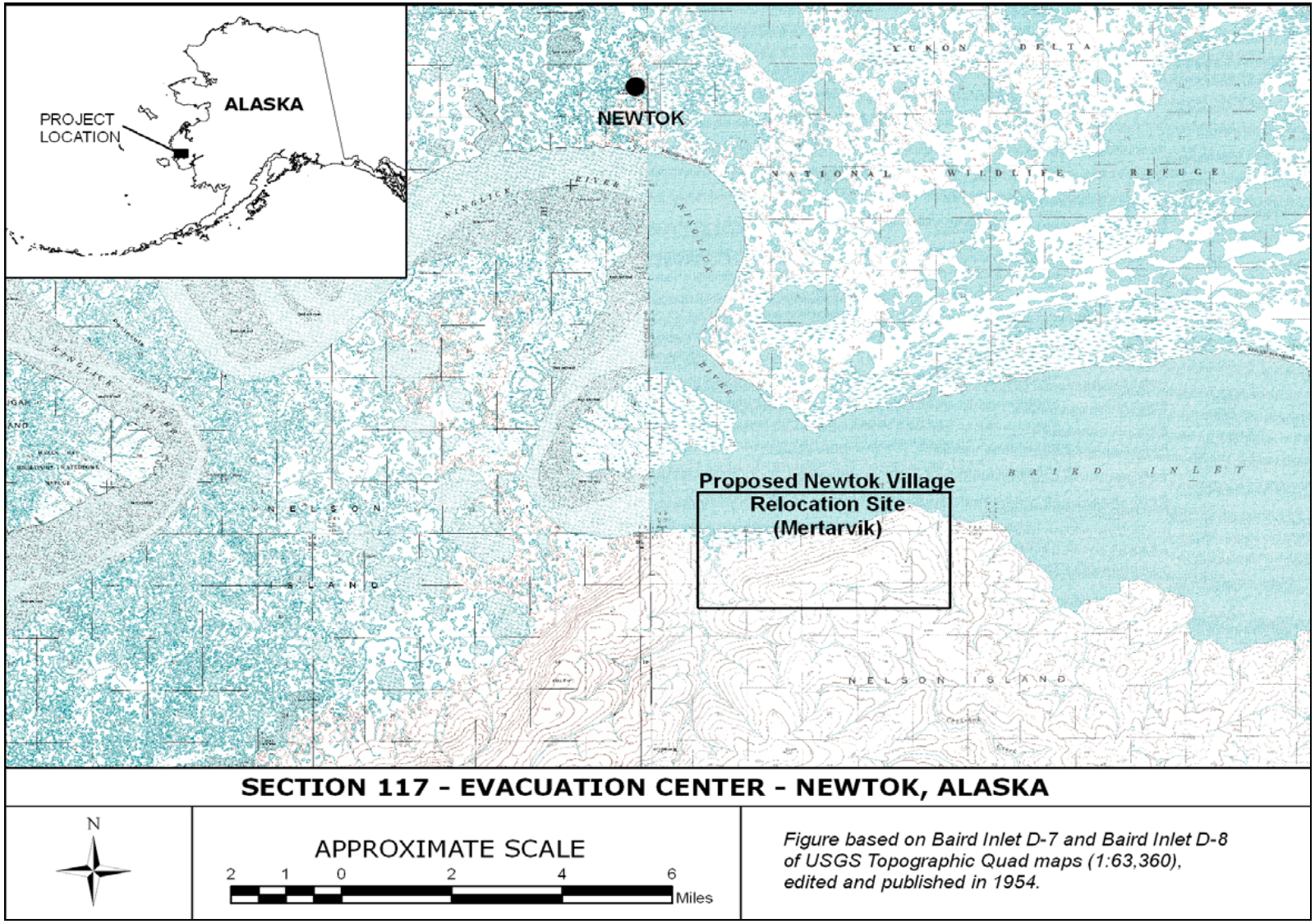


Figure 1. Newtok location and vicinity map.

"Newtok-Transportation Plan" prepared in December 2001 by ASCG, Inc. for the Newtok Traditional Council and the Bureau of Indian Affairs. The Newtok Traditional Council hired ASCG, Inc. to prepare a report that identifies and describes road needs and priorities for the community's preferred relocation site on Nelson Island. This study was a precursor to the more detailed "Newtok-Background for Relocation Report".

"Ninglick River Erosion Assessment," February 1984 and Addendum, November 1984 by Woodward-Clyde Consultants. Woodward-Clyde Consultants conducted an assessment of Ninglick River erosion in proximity to the village of Newtok. The purpose of the assessment was to evaluate the causes and rates of erosion at Newtok, as well as to examine potential mitigation of the impact of river advancement on the village. This report found relocation of the community to be the most cost-effective solution to the erosion problems.

"Preliminary Relocation Planning Analysis-Alaska Villages Erosion Technical Assistance-Newtok, Alaska," February 2006, revised April 2006, Tetra Tech, Inc. for the U.S. Army Corps of Engineers. This report documents state and federal agency workshops in December 2004 and September 2005. The report also presents a preliminary pre-construction listing and timeline for planning and design tasks, assuming no funding constraints and a non-critical timeline.

"Alaska Villages Erosion Technical Assistance-Newtok, Alaska-Preliminary Costs of Alternatives," April 2005, Tetra Tech, Inc. for the U.S. Army Corps of Engineers. This report presents preliminary costs for the alternatives of relocating the community of Newtok to their preferred relocation site, collocating the community of Newtok with another Nelson Island 'generic' community, and a stay-in-place alternative that includes the costs of a structural erosion control project. Erosion control efforts at Newtok by the state from 1983 to 1989 totaled almost $1.5 million dollars.

"Alaska Native Villages-Most Are Affected by Flooding and Erosion, But Few Qualify for Federal Assistance", December 2003, U.S. General Accounting Office (GAO) Report to Congressional Committees. Congress directed GAO to study Alaska Native villages affected by flooding and erosion and to 1) determine the extent to which these villages are affected, 2) identify federal and state flooding and erosion problems, 3) determine the current status of effects to respond to flooding and erosion in nine villages, and 4) identify alternatives that Congress may wish to consider when providing assistance for flooding and erosion. This report identified nine of the most critical villages, and of these, Kivalina, Koyukuk, Newtok and Shishmaref were identified as being in imminent danger from flooding and erosion and are making plans to relocate.

"Environmental Public Health Assessment: Newtok, Alaska", Troy Ritter, REHS, MPH, DAAS; Mark Stafford, PE, RS; Jennifer Dobson; Suzanne Edelman, BS, MS, September 2006. The executive summary of this report states: "A team of public health professionals representing Alaska's State and Tribal organizations conducted a comprehensive assessment of environmental public health conditions in Newtok, Alaska during the months of August and September 2006. The team found sanitation conditions in Newtok to be grossly inadequate for public health protection. The team's observations, along with the general body of research on

the subject of sanitation and health, and available health statistics from Newtok, suggest that the health of Newtok residents has been compromised by poor sanitation conditions. These conditions appear to result from an initial lack of infrastructure development and failure to properly maintain existing infrastructure. Further negative health consequences are likely if sanitation conditions do not improve dramatically."

6. Background Information.

a) General.

The Newtok Village is a Federally recognized tribe and the Newtok Traditional Council (NTC) is the local governmental entity. The people of Newtok and the neighboring Nelson Island communities of Tununak, Toksook Bay, and Nightmute are known as Qaluyaarmiut (Dip Net People). Place-based traditional knowledge of the land, climate, weather, and subsistence resources has evolved over centuries and subsistence harvesting of fish, meat, and other foods is an important part of their lives.

Newtok is in flat, soggy tundra with many lakes (see Photo 1). In the early 1950's the community relocated to Newtok from dispersed sites farther inland. This site was as far as the Bureau of Indian Affairs (BIA) barge with the new school could navigate and, as with many rural Alaska communities, people moved near the school. Through the 1960's, residents spent summers in fish camps on Nelson Island and winters in Newtok. By the 1970's, snow machines and modern housing replaced dog teams and sod houses. Extreme bank erosion has been a problem since Newtok was established. In 1954, Newtok was 4,000 feet from the Ninglick River. By 2006, the Ninglick River moved to within 800 feet of residences in the community.

b) Demographics.

Information is from the 2000 U.S. Census unless otherwise noted. In the Nelson Island area, Alaska Natives comprise more than 90 percent of the population. Newtok's population was 95.3 percent Alaska Native (primarily Yup'ik Eskimo) with 85.6 percent speaking a language other than English (likely Yup'ik Eskimo) at home. Residents are fairly young: 20.7 years compared with the statewide average of 32.4 years. The average Newtok household was five people. The Newtok population has remained relatively steady the last 5 years, following 50 years of modest growth (See Table 1). The Alaska Department of Labor and Workforce Development estimated the 2005 population at 315. The Alaska Department of Education and Early Development reports 2005-2006 school enrollment of 122 students in pre-elementary through high school.

Table 1. Newtok Population, 1950-2005

Community	1950	1960	1970	1980	1990	2000	2001	2002	2003	2004	2005
Newtok	69	129	114	131	207	321	321	326	334	308	315

Source: Alaska Department of Labor & Workforce Development

c) Infrastructure.

Census 2000 reveals none of the Newtok homes had complete plumbing or kitchen facilities and 21 percent lacked telephone service. Most residents haul water or have water storage tanks, thus they have no shower or washing facilities in their homes. "Honey buckets" (a 5 gallon bucket with a plastic bag liner) can be found in most homes in place of plumbing and sewage disposal. Raw sewage, collected in the honey bucket, is dumped into the Newtok River adjacent to

Photo 1. Newtok, Alaska.

the community. A washeteria, or public laundry facility, is in the community. Lake water is treated and pumped to a storage tank. In winter, melted ice is used when water in the storage tank runs dry or freezes. Refuse is collected and hauled to a landfill across the Newtok River. The health clinic uses flush/haul tanks and the school (Ayaprun School) has individual wells. Electricity is provided by Ungusraq Power Company. Newtok is classified as an isolated village and is found in EMS Region 7A in the Yukon-Kuskokwim Region. Emergency medical services have coastal and air access and medical care is provided by a health aid at the Newtok Health Clinic.

d) Employment.

The school, health clinic, village services, and commercial fishing provide employment. Work for wages is supplemented by transfer payments (e.g. social security, public assistance, and retirement income). Subsistence activities and trapping supplement cash income. Alaska Department of Fish and Game Commercial Fisheries Entry Commission 2004 data show 13 of 20 permit holders in Newtok landed 180,945 pounds of fish in the halibut, herring, and salmon fisheries with estimated gross earnings of $73,485. In addition to 20 permit holders in Newtok, there were 12 licensed crew members in 2004. Census data show an unemployment rate of 15.6 percent, which belies the true employment picture since 36.5 percent of the eligible working population is considered not in the workforce. Median annual household income was $32,188 compared with the statewide average of $51,571. Annual per capita income was $9,514 and 29.8 percent of the population was living below the poverty level.

e) Climate and Topography.

Newtok is in a transitional climatic zone, with characteristics of both maritime and continental climates, strongly influenced by storms to the south and southwest in the Bering Sea and weather of interior areas near Bethel, Alaska. The closest recorded climatic data station is at Hooper Bay, 55 miles to the northwest. Hooper Bay data indicates daily maximum temperatures range

from 56 to 60 degrees Fahrenheit (°F) in the summer and 18 to 19 °F in the winter. Daily minimums range from 2 to 5 °F in the winter and 42 to 47 °F in the summer. Record temperatures are a high of 80 to low of –35 °F.

Newtok averages 17 inches of precipitation a year, with most of it falling as rain during July and August. Snowfall occurs from November to March with 28 inches average accumulation. Rivers and lakes usually freeze in November with ice thickness on the Ninglick River of 6 to 8 feet. Sea-ice begins to freeze in late November and melts out in May. The last safe date to be on the river and lake ice is reported to be early May.

f) Winds.

Prevailing winds for the area are from the south to southwest during July and August, becoming predominantly north by northwest from September to June. Newtok residents indicate the strongest winds are from the south, with the extreme winds every 10 to 20 years directly from the east. Newtok wind design data lists a 25-year wind at 100 miles per hour.

g) Tides.

There are no tide stations in Newtok or most of western Alaska. Local residents report the tides generally have a range of 3 to 5 feet. Woodward-Clyde Consultants measured tidal elevations in the summer of 1983 and determined a tide range of 5.5 feet.

h) Storm Surges.

Powerful fall storms in the Bering Sea produce high winds combined with wind–driven storm surges resulting in severe and widespread coastal flooding along the western coast of Alaska. Storm-induced surges can produce short-term increases in water level resulting in water elevations considerably above expected tidal elevations. It is estimated that storm surge can raise tide levels 10 to 15 feet above normal.

i) Geology.

Newtok is in low-lying treeless tundra underlain by shallow continuous permafrost. Typical soil is deep frozen silty material layered with peat near the surface. Ice-rich permafrost begins in the upper two feet of soil extending to 600 feet in some areas. Degrading permafrost can be seen on the banks of the Ninglick River (see Photo 2). These soils remain saturated with water and have very low load bearing capacity. Drainage is poor due to the shallow permafrost layer.

7. **Plan Formulation.**

a) Identified Problems.

General. Newtok is threatened by severe erosion and storm surge flooding. Problems endemic to many rural Alaska communities, such as a lack of adequate drinking water and sanitary sewage disposal, have been worsened by the erosion and flooding. Most state and federal programs are set up to allocate scarce resources under normal or emergency circumstances. The problems at Newtok do not fall within the pre-established funding and priority-setting processes of most agencies because an emergency has not been declared. Failure of community attempts to secure assistance to deal with these problems in a timely manner highlight institutional constraints at the state and Federal levels. Many of the problems identified in Newtok reflect those expressed in the September 2000 Pacific Ocean Division Listening Session in

Photo 2. Degrading permafrost on the banks of the Ninglick River.

Anchorage, Alaska. The following conditions reported in this Listening Session exist in Newtok: 1) lack of sanitary water and sewage disposal, 2) fragmented planning and development of infrastructure projects, and, 3) lack of local planning capability.

Erosion. The Ninglick River has been eroding and moving in the direction of Newtok for decades. Figure 2 illustrates historical and projected erosion. The long-term average erosion rate near Newtok from 1957 to 2005 is estimated at 72 feet per year. Newtok residents indicate up to 300 feet of bank have been lost in one storm event. There are no geologic or channel geometry limitations evident that will slow down or stop the erosion before it reaches Newtok. The erosion took the community's landfill in 1996 and the barge landing in 2005. Community structures will fall to erosion in as little as 10 years if no action is taken.

In 1996 the Ninglick River captured a bend on the smaller Newtok River triggering a series of hydrological changes: 1) flows from the Newtok River watershed east of the captured bend are no longer added to the remnant Newtok River channel (remnant slough) adjacent to the village and it is filling in with sediment; and, 2) a direct hydrological connection, via the remnant Newtok channel, was made from the Ninglick River to the community.

Barge navigation on the Newtok River remnant slough has become difficult and in April 2006 a fuel barge was grounded for 3 days (See Photo 3). The barge company has informed the community that they will suspend future fuel barge deliveries. Fall 2006 fuel deliveries were not

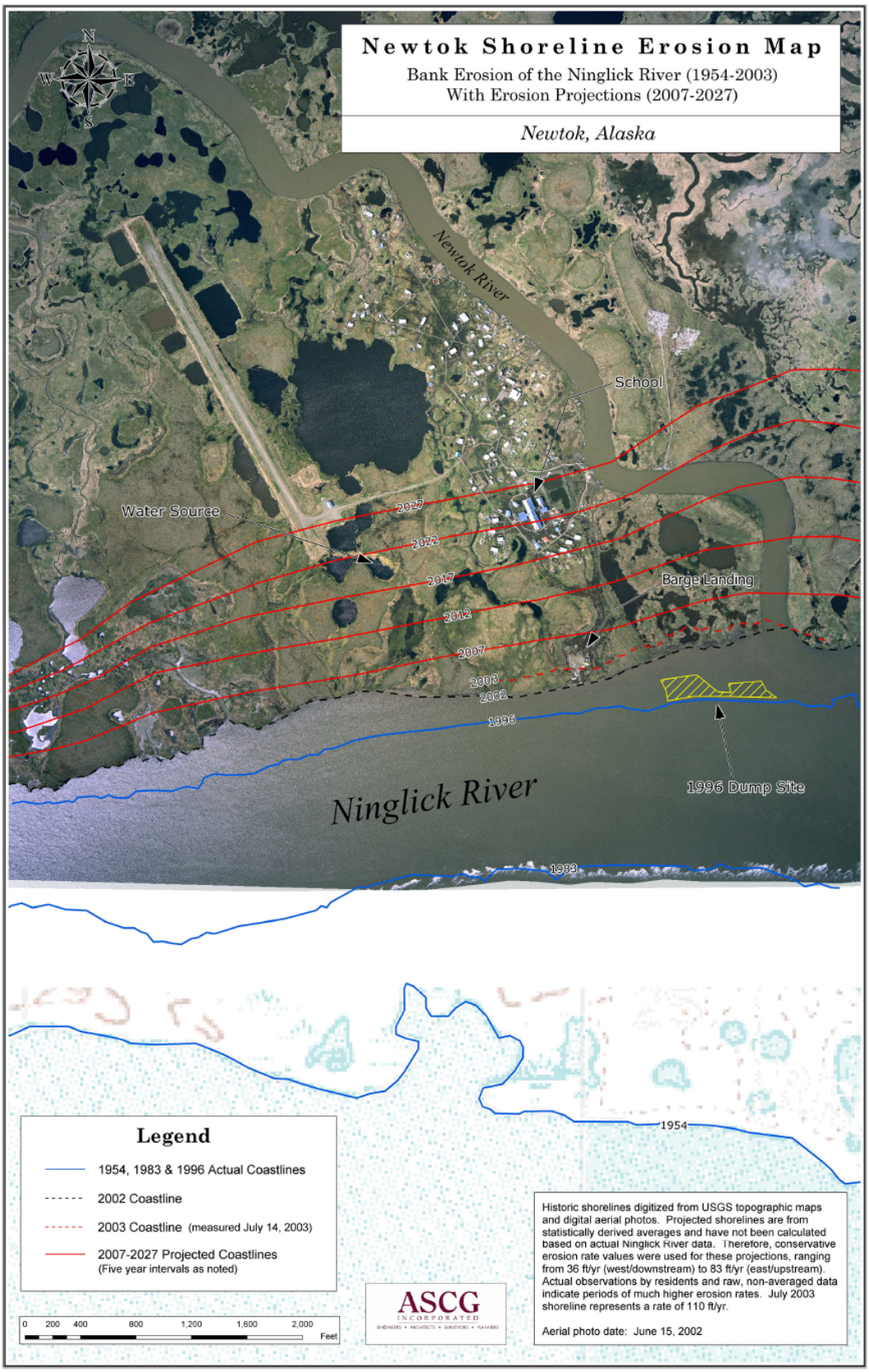


Figure 2. Ninglick River historical and projected erosion at Newtok Alaska.

made. The community is experiencing a fuel crisis.

The replacement community landfill is across the Newtok River and small boat waste hauling is now limited to high tide. Solid waste stacks up on the Newtok side of the channel waiting until high tide for hauling to the landfill (See Photo 4).

Photo 3. Barge stuck in Newtok River.

Photo 4. Trash boat waiting for high tide.

Flooding. Powerful fall storms in the Bering Sea produce high winds combined with wind–driven storm surges resulting in severe and widespread coastal flooding along the western coast of Alaska. In the past, the community was insulated from these storms by the landform between them and the Ninglick River. The recent cut-off of the Newtok River by the Ninglick River has made a direct hydrological connection between the Ninglick River and the community of Newtok. Wave action and storm surge can now directly impact the community. Bering Sea storms in recent years resulted in State of Alaska Declarations of Disaster Emergencies (October 2004 and September 2005) which included Newtok.

The September 2005 flood waters were at the floor level of the lowest houses in the community damaging three residences. Figure 3 shows the September 2005 Newtok flood area. Newtok also flooded in the February 2006 storms. Table 2 indicates the number of residences that are likely to be flooded in floods with varying probabilities of occurrence. There are 67 residences in Newtok.

Table 2-Newtok Residences Flooded in Various Flood Events

Chance of Occurrence in any year (%)	Chance of occurrence in a 10-year period (%)	Number of residences flooded
5	40	9
2	18	25
1	8	41

Also note in Figure 3 that the boardwalk from the community to the airport is flooded, impacting evacuation or emergency supply by air. Besides damaging houses, flood waters impact the community by: 1) flooding the water supply and interrupting the filling of the water storage tank in the fall, 2) potentially contaminating ice residents melt for drinking and bathing, and 3) spreading raw sewage throughout the community.

As a result, residents are subjected to increased health risks, for example, when protecting and securing property during flood events (See Photo 5).

Photo 5. Newtok residents working in flooded subsistence fish drying areas to secure property.

Communications. Communications with remote communities such as Newtok are often not possible during and following storms. This is accepted as the norm by many agencies, including the Department of Military & Veterans Affairs- Division of Homeland Security and Emergency Services. Contact with the state emergency services (Department of Military and Veterans Affairs Division of Homeland Security and Emergency Management) is by; 1) phone or email during working hours, and 2) the emergency services 24-hour telephone line after working hours and on weekends. The February 2006 storm hit Newtok on a 3-day weekend after working hours. The telephone system caught on fire and for a number of days communications were limited to a few e-mail accounts. Newtok was finally able to communicate with state emergency services by relaying email messages through contacts elsewhere in the state who called the 24-hour telephone line.

Water Supplies. Fresh water sources are extremely limited at the existing community of Newtok due to salt water intrusion. Under existing conditions fresh water is pumped from the top layer of a shallow tundra pond near the airport to a treatment facility and 220,000-gallon storage tank. The last filling of the storage tank in fall must last through the winter. Early fall storms in 2005 prevented final filling of the storage tank before the water supply froze for the winter. Early January 2006 the last stored water was used. The treated water is available to residents at a common pumping site and the washeteria in the summer and fall. The washeteria is closed in the winter to conserve stored water. Residents also supplement water supplies with rainwater and by melting ice.

Sewage Facilities. Newtok does not have a sanitary sewage disposal system. Human waste from the community is dumped directly into the Newtok River remnant slough adjacent to the community. Most of the waste is transferred from houses to the Newtok River using 5-gallon plastic buckets. The clinic and a few residences in Newtok have flush/haul systems for sewage.

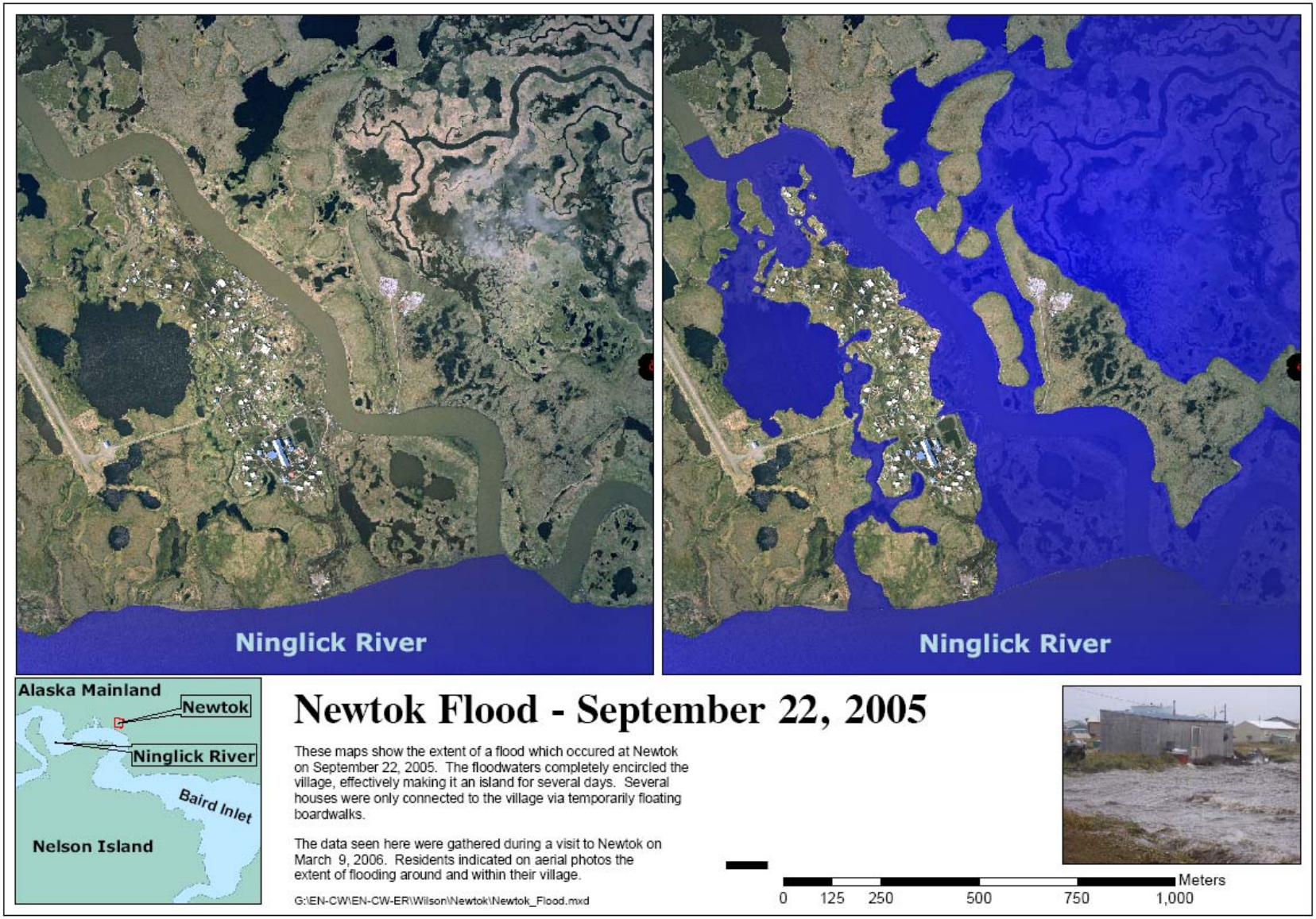


Figure 3. Newtok Flood—September 22, 2005.

For these, an ATV with a vacuum pump transfers waste to the river. The school sewage goes to a sewage lagoon between the school and the Newtok River. This sewage lagoon leaks into an area used by residents to dry subsistence fish and that is subject to flooding (See Photo 6).

Photo 6. Leaking sewage lagoon next to school and subsistence fish drying areas.

Local Resources. The resources of Newtok are appropriate to the needs of the community under normal conditions. Under stressed conditions, such as those caused by Ninglick River erosion and flood events, community resources are put under tremendous pressure. The Newtok Traditional Council has limited administrative and technical staff to work with dozens of state and federal agencies and at the same time attempt to maintain services under emergency situations. A Volunteer Newtok Traditional Council Relocation Liaison serves as the agency point of contact. Each agency has its own culture and sets of acronyms, language, policies, and requirements which the liaison translates for the Yup'ik speaking leaders of Newtok.

Many state and federal programs are competitive and geared towards communities with professional grant writing capability. The State of Alaska Department of Community Advocacy recently provided professional staff to write applications for state and federal assistance on behalf of the Newtok Traditional Council to partially mitigate for the lack of grant writing capability within the community.

Technical resources and powered equipment are limited. For example, Newtok does not have software such as the Geographic Information Systems (GIS) that is being used by other agencies. Motorized equipment is limited to All Terrain Vehicles (ATV's). Moving a structure, for example, is difficult with only ATV's and manual labor.

Infrastructure. Much of the existing infrastructure in Newtok is beyond its useful life. For example, the fuel tanks have leaks at joints and valves, failing foundations, inadequate liner and

dike systems, and are subject to flooding. There does not appear to be a feasible means of protecting new capital investments from flooding and erosion, so such investments have been deferred by the State of Alaska in accordance with their Administrative Orders No. 175 and No. 224.

Transportation. Access to Newtok is by either small aircraft or small boats. Newtok is not on any road network to other communities and structures are connected with wood boardwalks that can float during floods. All terrain vehicles (ATV's) and boats are used for local transportation. The barge landing was eroded in 2005. Snow machines are used in the winter, if conditions allow, for travel to nearby communities.

b) Alternative Plans Considered.

General. The erosion problem at Newtok has been evident for decades, and alternatives to address this problem have been developed over a similar time period. Structural alternatives, such as bank stabilization, were looked at early on. Bank stabilization efforts to date have not been successful. Non-structural alternatives, namely relocating the community, have been considered and analyzed for the last two decades. The NTC evaluated six sites for relocating Newtok and its residents, in survey polls in September 25, 1996 and May 22, 2001, preferred relocating to Mertarvik on Nelson Island. Mertarvik has several advantages over other sites including it's out of danger from flooding, erosion, and thawing permafrost. In August 27, 2003 the NTC conducted a final poll in order to reconfirm and officially document resident views on village relocation. There was a 94% voter turnout with 92% for relocating to Mertarvik. Other locations on Nelson Island received 3% and other solutions combined were 5%. There were no votes for collocating Newtok with one of the other area communities. Congress authorized a land exchange between the Newtok Village Corporation and the U.S. Fish and Wildlife Service in 2003, under the Alaskan Native Village and the Interior Department Land Exchange Act of November 17, 2003, Public Law 108-129, 117 Stat. 1358. The Department of Interior conveyed 10,943 acres at the Mertarvik site to the Newtok Village Corporation on April 28, 2004. See Figure 1 for Mertarvik location.

Alternative 1--No Action. Without state or federal action, the community of Newtok has begun to move themselves. The community has built a temporary timber barge landing. Three homes, in containerized packages, were delivered to Mertarvik in the fall of 2006. Given the extremely limited resources of the community, this alternative will be fraught with hardship and take many years. During the relocation, community cohesion will be disrupted and scarce community resources will be expended in maintaining two town-sites. New infrastructure on Mertarvik will take much longer to build and may need upgrading by the time a move is completed. Maintaining and operating the decaying infrastructure in the existing Newtok site will use scarce resources that would be better used on the new town site.

The cost for community services will be greater for two locations, for example operating two power plants. Accommodations for school children will take significant resources as schools will have to operate in Mertarvik and existing Newtok. Or dependable transportation will have to be developed to transport school children across nine miles of water on the Ninglick River.

Clean up of abandoned facilities will be deferred as scarce funding will necessarily go to

facilities in the new town site. Abandoned facilities constitute hazards to health and safety to Newtok residents waiting for homes in the new town site.

State of Alaska Administrative Order No. 224 states: "Needs of existing communities have priority. Priority will be given to the infrastructure needs of existing communities before consideration of proposals to create new communities, unless there is a congressionally directed relocation of an existing community." Public Law 108-129 dated Nov. 17, 2003 authorized a land exchange between the Newtok Native Corporation and the Department of Interior. However Public Law 108-129 does not direct the relocation of any existing community. Therefore it is unlikely facilities for relocating Newtok will have any priority in State of Alaska funding requests.

With no Federal and state action, relocation efforts will be piecemeal and uncoordinated and will increase ultimate costs many times over a coordinated, efficient relocation plan. Local efforts will take many years and the existing significant risk to health, life, and property will continue in Newtok. The disintegration of these people as a distinct tribe may result from splitting the community in two or more locations for many years as they relocate under their own efforts.

Alternative 2--Stay-in-Place. This alternative assumes construction of features to provide ongoing and long term protection for community infrastructure and upgrading/replacement of failing infrastructure to acceptable levels. Acceptable levels are defined as equivalent to infrastructure the community would have under a relocation alternative. For example fuel storage facilities would be upgraded or replaced as necessary.

Construction is assumed to be accomplished by Corps of Engineers for erosion protection and flood damage reduction measures. Other construction measures such as fuel storage and utilities are assumed to be accomplished by other organizations/agencies.

The causes of erosion appear to be wave action and thermal degradation of the ice rich riverbank along with tidal currents. Observations made by Woodward-Clyde indicate the erosion process is initiated by exposure of ice-rich soils in the riverbank to the relatively warm river water and sun. Very little site-specific data is available to design a structural fix to the erosion problem. A revetment would need to be placed along a mile of shoreline to protect the community (Figure 4).

The revetment would not contribute to any solutions for flood (storm surge) damage reduction measures. Reasonable flood (storm surge) damage reduction measures the Corps could provide for Newtok appear to consist of:

1. Flood proofing structures;
2. Raising the elevation of the boardwalk between the village; and,
3. Building and stocking an evacuation center for flood evacuees.

Conditions at the existing village site are deteriorating due to river bank erosion, failing water sources, increased flooding, decreasing sanitation, health, and quality of life conditions. The community of Newtok has already begun to move themselves to a new village site acquired by the Newtok Village Corporation in 2004 (See paragraph "General" and the No-Action

Alternative). A Newtok Planning Group composed of Newtok, state, and Federal agencies started in 2006. The Newtok Planning Group is actively working on site plans and identifying project and funding responsibilities for relocating Newtok. There are no local, state, or Federal priorities to permanently replace and upgrade facilities/infrastructure at the existing failing village site. Therefore the Stay-in-Place Alternative is no longer considered.

Alternative 3--Collocation. Schweitzer and Marino (2005) examined the cultural impacts of collocation of Shishmaref, Alaska, to either Nome or Kotzebue. Their conclusions can be applied more broadly throughout the circumpolar North. The research indicates that many aspects of culture (e.g. language, dancing, festivals, carving and sewing, and cultural values), as well as subsistence practices and lifestyles, would be adversely affected in some way by collocation. Members of the collocating community generally maintain spatial, social, and cultural segregation from the surrounding community in an attempt to maintain their identity. This results in retention of a group identity for at least a few generations, but can cause social tension and eventually the collocating group assimilates into the surrounding community. Most importantly, the study concluded, if a community is unwilling or unenthusiastic about collocating, then that move must be considered forced. "Historical cases show that this scenario of 'forced relocation' would have dramatic negative cultural, economic, health, and social impacts…" (Schweitzer and Marino 2005:146). Schweitzer, Peter P., PhD and Elizabeth Marino. 2005. *Coastal Erosion Protection and Community Relocation: Shishmaref, Alaska, Collocation Cultural Impact Assessment,* University of Alaska Fairbanks, prepared for U.S. Army Corps of Engineers, Alaska District.

The least disruptive to the Newtok community identity and lifestyle would be collocation with Nelson Island Communities. The people of Newtok share a heritage with the other Nelson Island communities of Nightmute, Tununak, and Toksook Bay. Their ancestors have lived on the Bering Sea coast for at least 2,000 years. However, problems and concerns the people of Newtok have with collocation include:

- The increased population would result in a lack of housing, overcrowded schools, stress on utilities and other infrastructure, high unemployment, and strain on local subsistence.
- Although there are strong bonds between communities, the unique Newtok tribe would be lost. They want to stay a separate, closely knit community.

Collocation would destroy the Newtok community identity. The community of Newtok has already begun to move themselves to a new village site acquired in 2004 through Public Law 108-128 (See paragraph "General" and the No-Action Alternative). For these reasons, the Collocation Alternative is no longer considered.

Alternative 4--100% Corps Relocation. The 100% Corps relocation alternative would consist of the Corps of Engineers taking the lead role in relocating Newtok from the existing community site to a new community site. This would encompass obtaining all funding, designing & building new facilities or relocating usable existing facilities to Mertarvik and collaborating with the NTC, residents, and the various state and federal agencies. Also the Corps of Engineers would accomplish demolition and closeout of the existing location. Since Newtok has already made the decision to move (See No-Action) and several state and federal agencies are already

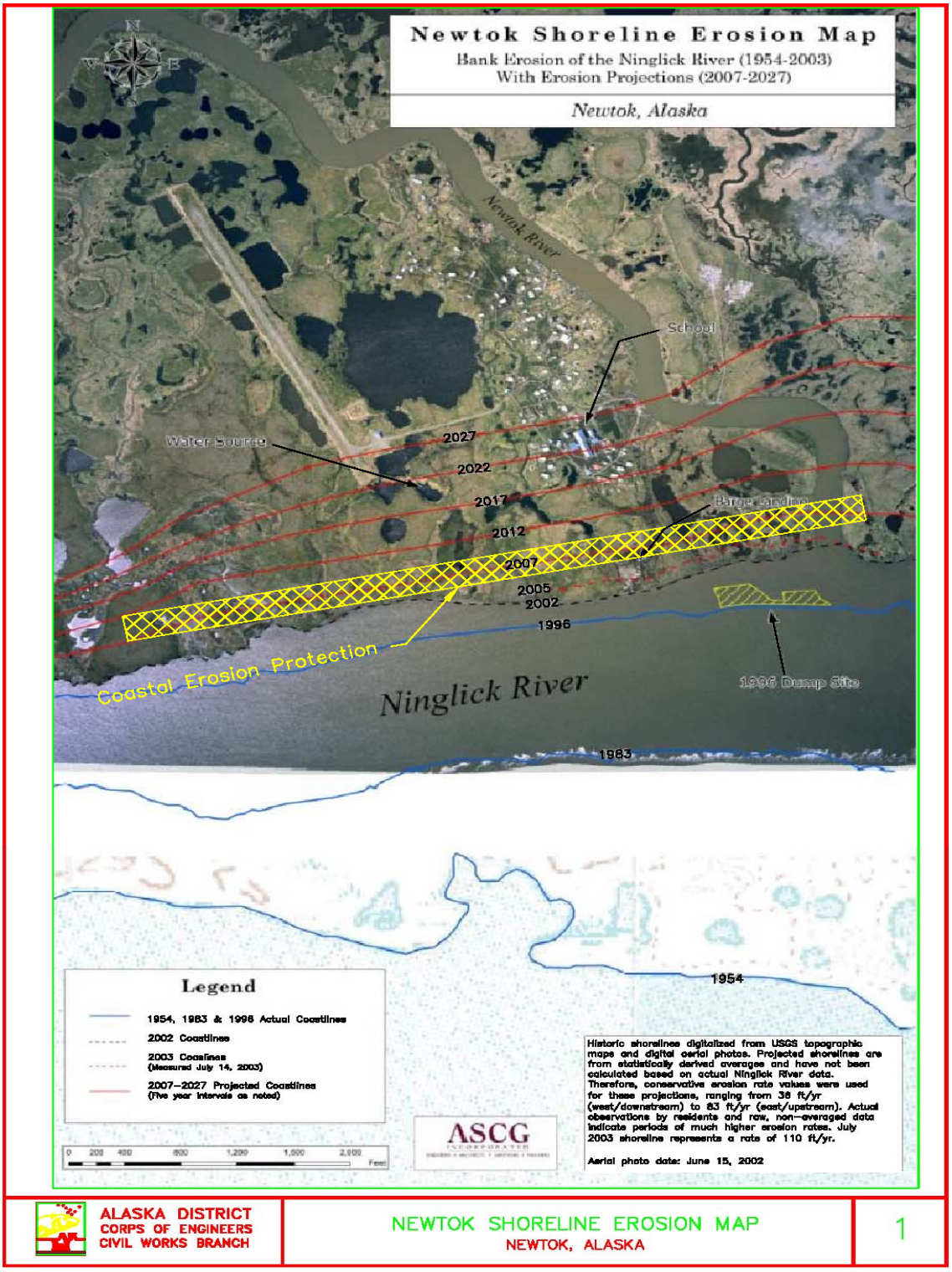


Figure 4. Potential revetment configuration at Newtok.

planning their participation in relocation through the Newtok Planning Group, the 100% Corps Relocation Alternative is no longer considered.

Alternative 5--Collaborative Relocation. The collaborative relocation alternative consists of cooperative efforts on the part of many entities to accomplish relocating Newtok from the existing community site to Mertarvik. The NTC will have the lead in coordinating relocation efforts of the various entities that would provide funding, studies, engineering and design, and construction. The NTC will also have final approval of designs and facilities location at Mertarvik. The Corps of Engineers, under the collaborative relocation alternative, would undertake relocation tasks the other state and federal agencies may not be able to accomplish under their authorities and funding mechanisms or those that fit with Corps of Engineers expertise. These tasks may include studies, engineering and design, and construction. The Corps of Engineers authority for undertaking relocation efforts is P.L. 108-447, SEC. 117 (see Section 3 Study Authority). Because the community of Newtok has already decided to move, are making efforts in moving to Mertarvik and several state and Federal entities are planning their participation in the move through the Newtok Planning Group, the collaborative relocation alternative is considered the most likely without-project condition.

Mertarvik is the name and location for the proposed relocation of Newtok. Currently there are no facilities with the exception of 3 houses constructed in late 2006/early 2007 by NTC. The materials for these homes were carried by hand and All Terrain Vehicle (ATV) from a marine landing craft to a building site near shore. See Photos 7 & 8.

Photo 7. Barge delivering house material.

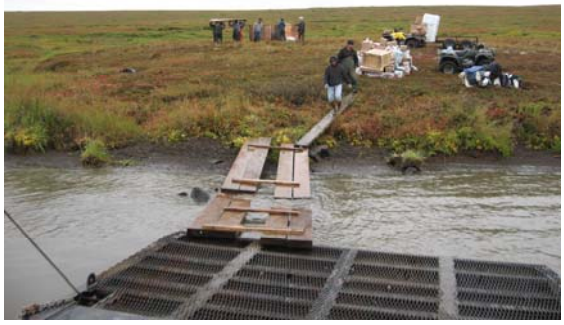


Photo 8. Offloading barge by hand.

The Alaska Department of Commerce, Community, and Economic Development (DCCED)-Division of Community Advocacy was directed by Alaska Administrative Order No. 231, dated 29 Nov 2006, to "…. Act as the state coordinating agency to coordinate with other state and federal agencies to propose long-term solutions to the ongoing erosion issues in the City of Kivalina and other affected coastal communities in this state." Division of Community Advocacy has taken an active role in organizing the Newtok Planning Group since the spring of 2006. The Newtok Planning Group is meeting and working on relocation plans. Table 3 lists organizations that are presently most active within the Newtok Planning Group. Participation within the Newtok Planning Group is expected to vary as agencies' roles in assisting with Newtok relocation varies. Organizations are seeking to integrate plans for strategic implementation of village relocation planning while working within their usual missions and programs.

Table 3 Newtok Planning Group

Organization	Organization Type	Acronym
Newtok Traditional Council	Federally recognized tribe government	NTC
Newtok Native Corporation	Village corporation	
Calista Regional Native Corporation	Alaska Native Regional Corporation	
U.S. Department of Commerce-Economic Development Administration	Federal	EDA
U.S. Army Corps of Engineers	Federal	COE
Denali Commission	Federal/State of Alaska	
Department of Commerce, Community & Economic Development-Division of Community Advocacy	State of Alaska	DCA
Alaska Department of Transportation & Public Facilities-Ports & Harbors	State of Alaska	ADOT&PF-Ports & Harbors
Federal Aviation Administration	Federal	FAA
Alaska Department of Transportation & Public Facilities-Airports:	State of Alaska	ADOT&PF-Airports
Alaska Energy Authority	Public Corporation of State of Alaska	AEA
Alaska Department of Environmental Conservation, Division of Water, Village Safe Water Program	State of Alaska	VSW
Housing and Urban Development	Federal	HUD
Rural Alaska Community Action Program, Inc.	Non-Profit	RuralCAP
Association of Village Council Presidents-Housing	Regional Housing Authority	AVCP
U.S. Department of Agriculture, Rural Development	Federal	
Lower Kuskokwim School District		LKSD
Alaska Army National Guard	State of Alaska	
Yukon–Kuskokwim Health Corporation		YKHC
US Fish and Wildlife Service	Federal	USFWS
Alaska Department of Natural Resources, Office of History and Archaeology	State of Alaska	
Department of Military and Veterans Affairs-Alaska Division of Homeland Security and Emergency Management	State of Alaska	
Coastal Village Region Fund	Non-Profit	CVRF
U.S. Department of Agriculture-Natural Resources Conservation Service	Federal	NRCS

The Corps is working collaboratively with the Newtok Planning Group to identify features that are not within the usual jurisdiction of other agencies or where there is agreement other agencies could not perform in a timely manner. Opportunities are also being identified for the Corps of Engineers to act as the design, contracting, and/or construction agent for others through cooperative agreements and existing authorities such as International and Interagency Support (IIS) on a reimbursable basis. These decisions would be made on a case-by-case basis in collaboration with others in the Newtok Planning Group.

Alaska Department of Transportation & Public Facilities-Airports planning for the Mertarvik site is well underway, with four alternative sites identified in a reconnaissance report and field investigation being conducted and planned for this year. Preliminary site and community plans have been approved by village residents and the NTC. (See Figure 5) However, these are concepts and plan details will change as coordination and design develops.

While integrated plans for strategic implementation of village relocation are being developed, focus has been given to near-term needs. Within the framework of the Newtok Planning Group, the Division of Community Advocacy was awarded a U.S. Department of Commerce-Economic Development Administration grant on behalf of the NTC in October 2006 to build a Multi-Use Marine Support facility at Mertarvik. The multi-use marine support facility will include a barge ramp, staging area, removable float system, and a fisheries support center. Construction is expected to begin in 2008.

c) Recommended Plan.

Newtok has a need for replacement facilities to house people on a short-term basis when storm surge flooding and river erosion are impacting houses and public facilities. This would be needed during storm events and while facilities are being cleaned and repaired. The Corps of Engineers proposes to provide an evacuation center in a safe location compatible with ongoing relocation plans for Newtok.

The evacuation center would be located on Mertarvik. The shelter would be self sufficient with regards to power, water, sewage disposal, and solid waste disposal. With the combination of deferred investment in infrastructure at the existing community of Newtok and impacts that have occurred and are expected to occur with coastal storms, power, water, sewage disposal, and solid waste disposal at the existing community of Newtok have been severely compromised. As stated in the "Environmental Public Health Assessment: Newtok, Alaska" the "[s]anitation conditions in Newtok are grossly inadequate for public health protection." These inadequacies will be compounded during coastal storm events. Opportunities for replacing these lost or compromised components of the community are hindered by the rapidly deteriorating physical conditions at the site and by public investment policies that preclude investments of new infrastructure at Newtok because it is subject to flooding and erosion.

At the existing community water is drawn from a tundra pond and stored part of the year and residents travel to more distant ponds when this supply runs out. The primary tundra pond will be lost to erosion by 2016 or 2012, given an average and maximum erosion rate, respectively. The more distant ponds are likely contaminated during coastal storm flooding. The school is the only reasonable shelter in the community now and the capacity of its well is limited by saline intrusion. The school will be lost to erosion shortly after the community's primary tundra pond is lost. Water quality and quantity information from Mertarvik, which in Yupik means "getting water at the spring water", points to the potential for good water quality and quantity at Mertarvik. At this time Village Safe Water (VSW) proposes to develop a water source that would be compatible with the shelter and future Newtok relocation. Investment at the existing site is precluded.

The proposed shelter would consist of a building, generator, water supply, sewage lagoon, and

road from the proposed multi-use marine support center at the shore of the Ninglick River. The shelter would be sized to provide temporary housing for 100 people with movable dividers in one large space. Permanent spaces are the support areas including kitchen, latrine/shower rooms, storage area, first aid room, and communications and office areas. The storage area will have space for food, water, cots, blankets, and miscellaneous items needed for an evacuation center. Detail design will be similar to the design noted in "Design Analysis, Emergency Shelter, Shishmaref, Alaska" dated October 2004 prepared by U.S. Army Corps of Engineers, Alaska District. Estimated space requirement is shown in Table 4 and estimated cost in Table 5. Cost estimates are based on parametric estimates for the "Design Analysis, Emergency Shelter-Shishmaref, Alaska" and escalated to the October 2007 price level.

Table 4. Space Requirement (SF)

Main Space	5,400
Kitchen	300
Toilets and Shower Facilities	775
Food/Water Storage	235
Miscellaneous Storage	130
Office/Communications	170
First Aid Station	80
Arctic Entry/Circulation	385
Janitorial	20
Mechanical	250
Electrical/Communications	50
Total Facility Area	**7,795**

Table 5. Estimated Cost ($000's)

Mob/Demob	3,500
Building	7,377
Access Road	1,500
Water Supply	426
Wastewater Treatment	840
Powerplant	100
Site Improvements	495
Utilities	494
LERRD	30
Planning Engineering and Design	900
Construction Management	1,000
20% Contingency	3,332
Total (use 20,000)	**19,994**

When not being used for emergency and temporary housing, the evacuation center may be reconfigured for NTC offices and community facilities and other such purposes as designated by NTC. The NTC will be responsible for all operations and maintenance costs for the evacuation center. The NTC has approved a location in the center of the proposed community at Mertarvik as the site for the evacuation center.

This alternative does not address the immediate needs of the community for an emergency potable water supply, protecting structures from flooding, and emergency communications systems. These needs still need to be coordinated with NTC and the Newtok Planning Group. They may be addressed under a separate Section 117 recommendation or other Corps program.

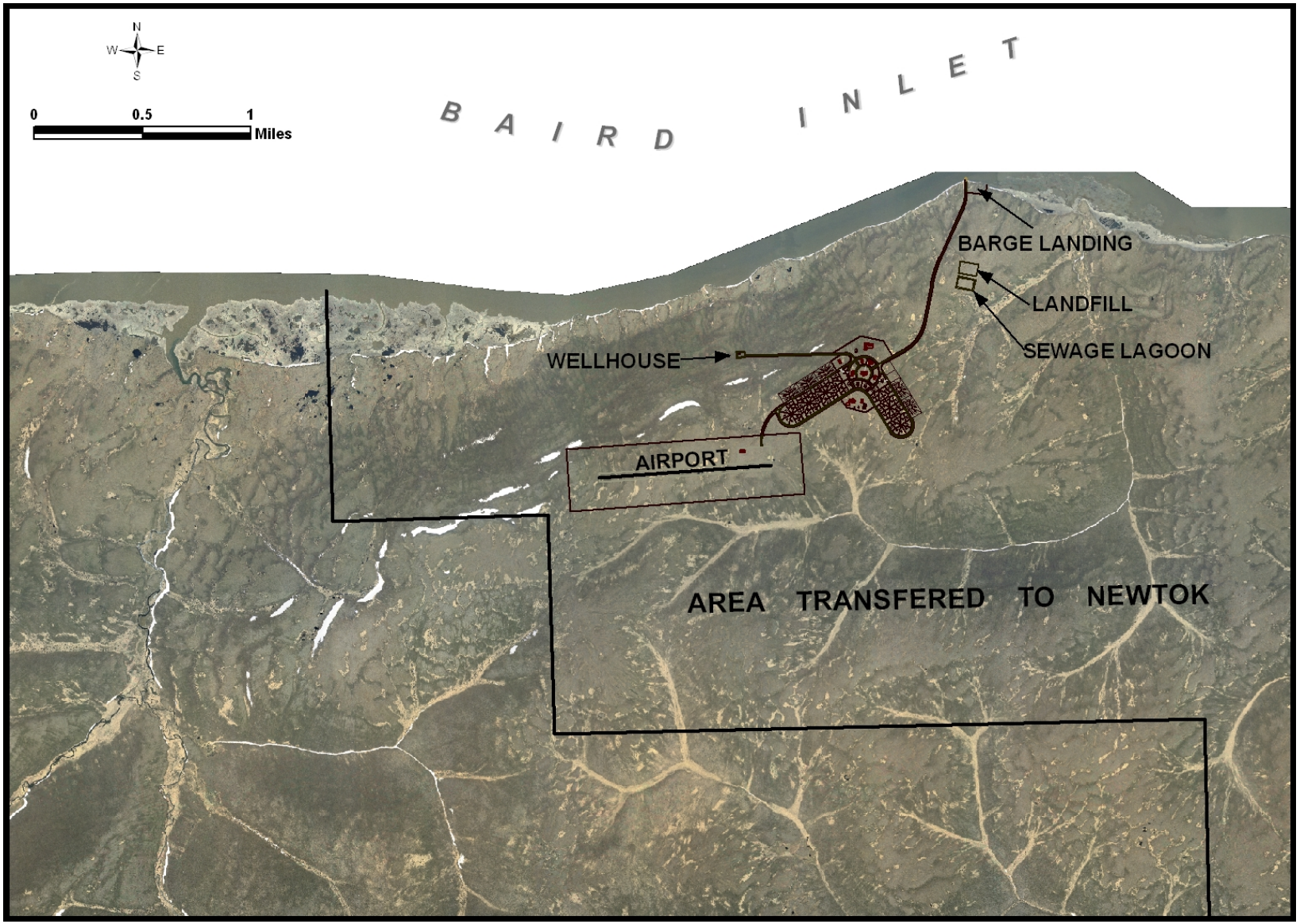


Figure 5. Concept Mertarvik Community Plan.

8. **Views of Sponsor.**

The Newtok Traditional Council is actively engaged in relocation efforts. Attachment A includes a letter from the Newtok Traditional Council dated June 11, 2007. This letter describes how the Newtok Traditional Council intends to cooperate with the Corps for design and construction of the recommended plan.

9. **Views of Federal, State, and Regional Agencies.**

The recommended plan was developed in collaboration with the Newtok Planning Group. A letter of support from the Alaska Department of Commerce, Community, and Economic Development-Division of Community Advocacy is included in Attachment A.

10. **Status of Environmental Statutes Compliance.**

Environmental baseline studies were conducted in order to assist the planning effort and to accelerate data collection and scoping needed for documenting impacts under the National Environmental Policy Act that would be required for an authorized Federal action. The collected environmental data has been made available to cooperating agencies. A survey was conducted by the U.S. Fish and Wildlife Service for the presence of nesting habitat for Spectacled and Steller's eiders, threatened sea ducks in the Takikchak marsh. The results indicated the marsh is unsuitable nesting habitat. A Cultural Resources survey was conducted. Several sites were noted but development in much of the Mertarvik town site would not have a significant effect to cultural resources. Further coordination with the State Historic Preservation Office will be conducted during the design phase based on specific project features. A wetland delineation report and Geographic Information System (GIS) mapping was accomplished to assist in wetland permitting under Section 404 of the Clean Water Act and community and infrastructure planning.

The approved Federal Action would require an evaluation under the National Environmental Policy Act which would include an evaluation of alternatives for consideration. During the scoping process it would be determined, in collaboration with participating agencies, the methodologies and types of data and level of detail required in the analysis of each alternative for the project. A 404 (b)(1) evaluation under the Clean Water Act on the discharge of fill in wetlands would be a large component of the analysis. Further coordination is required under the Fish and Wildlife Coordination Act and the Endangered Species Act.

Development of an evacuation shelter and associated structures at Mertarvik would have minor effects on nearby acreages of wetlands and associated wildlife habitat. Regionally large tracts of similar wetlands and wildlife habitats exist. Wildlife populations would not be affected Fish and fish habitat would not be affected. The project would not impact cultural sites.

Under the existing conditions in Newtok there is a significant risk to life and health, especially for children and elders, who are most susceptible to the risks associated with the lack of safe water and sewage disposal. It is significant to the human environment that deferred upgrades of crumbling facilities are occurring because of the anticipated village relocation. Relocation would have some significant social/cultural impacts to the community as well.

11. **Implementation Schedule.**

PED including completion of NEPA documents	FY 2008
PCA	Oct. 2008
Contract Award*	2nd Qtr FY 2009
Construction Complete*	FY 2010

*Subject to availability of funding

12. **Supplemental Information.**

a. Headquarters Guidance.

The VTC Fact Sheet dated 12 December 2005 contained the following instructions for implementing projects under the aforementioned legislation.

> *The Alaska Coastal Erosion Section 117 Program will follow the processes, procedures, and regulations for the Continuing Authorities Program, Section 14, Emergency Streambank and Shore Protection and any changes issued thereto, with the following exceptions.*
>
> 1. *Funding. Funding is 100 percent Federal.*
> 2. *Federal Limit. There is no statutory Federal cost limit.*
> 3. *PCA. A new model Project Cooperation Agreement is required and will be developed and submitted to ASA (CW) for approval.*
> 4. *No Limit. There is no limit on facilities eligible for protection.*
> 5. *Types of Projects. All types of projects authorized by Section 117 may be implemented.*

13. **Recommendations.**

The Newtok Traditional Council has indicated willingness to sign a project partnership agreement for the recommended project (*Project*) and understands the non-Federal sponsor responsibilities for this *Project*, including providing required lands, easements, and rights-of-way and the requirement to maintain and operate the *Project* after construction.

I recommend an emergency shelter be provided at Mertarvik, Alaska generally in accordance with the recommended plan herein, and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable, provided that prior to construction the non-Federal sponsor agrees to the following:

a) Cost Sharing.

All costs for design/construction of the *Project* carried out pursuant to Section 117 will be at full Federal expense, except as discussed in the following paragraphs. Each party will be solely responsible for its costs of participation in the Project Coordination Team.

b) Lands, Easements, and Rights-of-Way.

After consultation with the Newtok Traditional Council, the Federal Government shall determine the lands, easements, and rights-of-way required for construction, operation, and maintenance of the *Project*, including those required for *relocations*, the borrowing of material, and the disposal of

dredged or excavated material. The Federal Government in a timely manner shall provide the Newtok Traditional Council with general written descriptions, including maps as appropriate, of such required lands, easements, and rights-of-way.

The local sponsor shall provide, at no cost to the Federal Government, all lands, easements, and rights-of-way, including those required for *relocations*, the borrowing of material, and the disposal of dredged or excavated material, that the Federal Government determines the Newtok Traditional Council owns or controls on the effective date of the Project Partnership Agreement and which the Federal Government determines are required for the construction, operation, and maintenance of the *Project.* This project would be constructed with 100 percent federal funds and no credit would be given the sponsor for providing lands, easements, and rights-of-way.

All other LERRD requirements will be performed by the Government at full Federal expense. Title of any lands, easements, and rights-of-way acquired by the Government will be in the name of the local sponsor.

The local sponsor shall prevent obstructions or encroachments on the *Project* (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on *Project* lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the *Project* affords, hinder operation and maintenance of the *Project*, or interfere with the *Project's* proper function;

Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Newtok Traditional Council owns or controls for access if required by the Federal Government for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the *Project;* and,

Ensure that all lands, easements, and rights-of-way that the Federal Government determines to be required for the *Project* are retained in public ownership for uses compatible with the authorized purposes of the *Project*.

c) Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R).

The Newtok Traditional Council shall operate, maintain, repair, rehabilitate, and replace the entire *Project* or *functional portion of the Project*, at no cost to the Federal Government. All agreements for design/construction will state that, as between the Government and the local sponsor, the Government will have no responsibility for the OMRR&R of the project. The Newtok Traditional Council shall conduct operation, maintenance, repair, rehabilitation, and replacement responsibilities in a manner compatible with the *Project's* purposes and in accordance with applicable Federal and State laws and as prescribed by the Federal Government.

d) Hold and Save.

The local sponsor shall hold and save the United States free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the *Project* and any *betterments*, except for damages due to the fault or negligence of the United States or its contractors.

e) Federal and State Laws.

The local sponsor and the Federal Government shall comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c).

f) Hazardous Substances.

The Government will perform any investigations for hazardous substances that the Government determines to be necessary to identify the existence and extent of hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Sections 9601-9675, that may exist in, on, or under lands, easements, and rights-of-way that the Government determines to be required for the project. In addition, should the Government determine to initiate or continue with construction after considering any liability that may arise under CERCLA, the Government will be responsible, as between the Government and the local sponsor, for the costs of clean-up and response, to include the costs of any studies and investigations necessary to determine an appropriate response to the contamination for any contamination occurring prior to the end of the period of construction. Any costs of clean-up and response performed after the period of construction will be considered an OMRR&R obligation and will be the responsibility of the local sponsor.

g) Historic Preservation.

The Government will perform any identification, survey, or evaluation of historic properties and perform or ensure the performance of any mitigation activities or actions for historic properties or that are otherwise associated with historic preservation including data recovery activities that are required prior to the end of the period of construction. Any identification, survey, or evaluation of historic properties performed after the period of construction will be considered an OMRR&R obligation and will be the responsibility of the local sponsor.

h) Project Partnership Agreement.

Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 USC 1962d-5b), and Section 101 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 USC 2211), which require that the Secretary of the Army not commence construction of the project, or separable element thereof, until the local sponsor enters into a written agreement to furnish its required cooperation for the project or separable element.

The recommendations for construction of an evacuation center at Mertarvik, Alaska on Nelson Island with appropriate interim life-safety measures reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect the program and budgeting priorities inherent in the formulation of national civil works water resources program. Consequently, the recommendations may be changed at higher review levels

of the executive branch outside Alaska before they are used to support funding. Planning, design analysis, and construction will conform to the Department of Defense American Indian and Alaska Native Policy-Alaska Implementation Guidance, which honors the trust responsibility to recognized Indian Tribes, maintains a government-to-government relationship with those tribes, and recognizes the sovereignty of those tribes, as declared by Congress.

Kevin J. Wilson
Colonel, Corps of Engineers
District Commander

4/18/2008
Date

Attachment A

STATE OF ALASKA
DEPARTMENT OF
COMMERCE
COMMUNITY AND
ECONOMIC DEVELOPMENT
Division of Community Advocacy

Sarah Palin, Governor
Emil Notti, Commissioner
Michael Black, Director

June 28, 2007

Colonel Kevin J. Wilson
Alaska District Commander
U.S. Army Corps of Engineers
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Dear Colonel Wilson:

The Division of Community Advocacy (DCA) within the Alaska Department of Commerce, Community and Economic Development would like to express its support for the Corps of Engineers Proposed Emergency Shelter for the Village of Newtok's relocation site at Mertarvik, Alaska.

The DCA coordinates the Newtok Planning Group, a working group of State and Federal agencies assisting the Village of Newtok in its relocation efforts. As part of the development of a comprehensive relocation strategy for Newtok, the Newtok Planning Group has been exploring ways to address Newtok's critical infrastructure needs at the new village site. Due to the severe nature of storm surge flooding in the existing village, there is a need to identify an interim evacuation site should the existing village become uninhabitable before relocation takes place.

One option the Newtok Planning Group has been exploring to address Newtok's interim evacuation needs is the development of a pioneer camp at Mertarvik with basic, critical infrastructure, including shelter. Pioneer level infrastructure at Mertarvik could also support construction activities during the relocation process.

The Corps of Engineers Proposed Emergency Shelter consisting of a building, generator, water supply, sewage lagoon, and road would be a critical component of the pioneer camp at Mertarvik and would be consistent with the efforts of the Newtok Planning Group. We believe that the development of pioneering infrastructure can also encourage local initiative and participation in the relocation process and provide a catalyst for additional development at the new village site.

As such, we are pleased to provide our support to the Corps for the Proposed Mertarvik Emergency Shelter project.

Sincerely,

Michael L. Black, Director

550 W. 7th Avenue, Suite 1770, Anchorage, Alaska 99501-3510
Telephone: (907) 269-4501 Fax: (907) 269-4539 Text Telephone: (907) 465-5437
Email: questions@commerce.state.ak.us Website: http://www.commerce.state.ak.us/dca/

NEWTOK TRADITIONAL COUNCIL
P.O. BOX 5545 NEWTOK, ALASKA 99559 PHONE (907) 237-2314 FAX (907) 237-2321

Colonel Kevin J. Wilson
Commander
Attn: CEPOA-PM-C
U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

June 11, 2007

Dear Colonel Wilson:

The Newtok Traditional Council has reviewed the draft "SECTION 117 PROJECT FACT SHEET" for Newtok, Alaska and wished to express our strong support for the project as outlined by the U.S. Army Corps of Engineers. We agree with the findings of the draft report. We also agree with the provisions stated in the report as part of the recommended plan for construction of an emergency center and access road at the Mertarvik, Alaska site.

The Native Village of Newtok is federally recognized tribe and the Newtok Traditional Council (NTC) is the local governmental entity. The community of Newtok has 315 People. Since Newtok was established in 1954, the Ninglick River has eroded at an average fate of 72 feet per year and is now within 800 feet of the village taking the landfill and barge landing. Barge deliveries have been suspended. Erosion caused a direct hydrologic connection between Newtok and the Ninglick River causing severe flooding from Bering Sea Storms. State of Alaska Declarations of Disaster Emergencies in October 2004 and September 2005 included Newtok. Congress authorized a land swap between Newtok Village Corporation and U.S. Fish and Wildlife Service in 2003 for relocating Newtok. Relocation efforts are a collaboration of many entities including Federal and State of Alaska agencies. The Corps of Engineers is working collaboratively with the Newtok Planning Group to identify features that are not within the usual jurisdiction of other agencies and proposes to provide a shelter facility in a safe location compatible with ongoing relocation plans. The proposed shelter would consist of a building, generator, water supply, sewage lagoon, and road from the shore. Village Safe Water would develop a water source compatible with the emergency shelter and future Newtok relocation. The shelter would be used to house people during emergencies and during relocation efforts when houses are being moved from Newtok to Mertarvik.

We understand that the design and construction of this project will be fully funded by the Corps of Engineers, as appropriations are made available. We further understand that future operation and maintenance will be the responsibility of the Newtok Traditional Council. We understand that the Newtok Traditional Council will be required to

contribute the lands, easements and right-of-way which belong to, or are currently under the control of the Newtok Traditional Council. Any additional real estate requirements will be obtained by the Federal Government. Upon completion of the project the real estate interests will be transferred to the Newtok Traditional Council. This project would be constructed with 100 percent Federal funds and no credit would be given to the Newtok Traditional Council for lands, easements, and rights-of-way.

We are able and willing to enter into a Project Cooperation Agreement and are committed to proceeding to construction of this project.

Sincerely,

Moses Carl, President

NEW002 - NEWTOK EMERGENCY SHELTER -Rev 20080718
Current Working Estimate for Section 117 Feasitility Report
Prices current as on early 2008.

Estimated by	Kent Gamble of HMS
Designed by	USACE-CEPOA-EN
Prepared by	Kent Gamble of HMS
Preparation Date	
Effective Date of Pricing	
Estimated Construction Time	120 Days

Date	Author	Note
5/1/2008	Darrell Cullins	This cost estimate is a current working estimate for the Section 117 Feasibility Report for an Emergency Evacuation Shelter at Mertarvik on Nelson Island (new Newtok site). The facility will house the Newtok residents during a natural disaster. Work includes a new 8455 square foot single story Emergency Shelter or 100 people with kitchen, dining/living area, restrooms/showers, health clinic, office, storages, mechanical room, generator, water supply, sewage disposal, site work, and a 7700 foot access road from the barge landing site. Emergency Shelter layout and quantities based on the Design Analysis for Shishmeraf Emergency Shelter Report developed in October 2004. All site work quantities provided by Nathan Epps, CEPOA CW H&H.
5/1/2008	Darrell Cullins	Cost Estimating Assumptions: -
5/5/2008	Kent Gamble	New Project NoteThis cost estimate is a current working estimate for the Section 117 Feasibility Report for an Emergency Evacuation Shelter at Mertarvik on Nelson Island (new Newtok site). The facility will house the Newtok residents during a natural disaster. Work includes a new 8455 square foot single story Emergency Shelter or 100 people with kitchen, dining/living area, restrooms/showers, health clinic, office, storages, mechanical room, generator, water supply, sewage disposal, site work, and a 7700 foot access road from the barge landing site. Emergency Shelter layout and quantities based on the Design Analysis for Shishmeraf Emergency Shelter Report developed in October 2004. All site work quantities provided by Nathan Epps, CEPOA CW H&H. It has been reviewed and modified by Kent Gamble of HMS Inc. in preperation for a value engineering charrette to be held fron May 6 to May 8, 2008. Where no new or contrdictory design quantity information has been provided quantities have been retained as indicated in the COE estimate dated 5/2/08.
5/14/2008	Kent Gamble	This cost estimate is a current working estimate based on information generated during a charrette held from May 6 to 7 in Anchorage Alaska for the Emergency Evacuation Shelter at Mertarvik on Nelson Island (new Newtok site). The facility will house the Newtok residents during a natural disaster. Work includes a new12475 square foot single story Emergency Shelter for 150 people with kitchen, dining/living area, restrooms/showers, health clinic, office, storages, mechanical room, generator, water supply, sewage disposal, site work, and a 18 foot wide 6% access road from the barge landing site.It also includes road access to the landfill/sewage lagoon site, and well site.In addition it includes costs to develop a quarry site as discussed at the charrette. Emergency Shelter layout and quantities are based on very preliminary drawings as provided by the COE and additional scope items as discussed at the charrette. some scope items are based on the Design Analysis for Shishmeraf Emergency Shelter Report developed in October 2004 except where new project specific information has been made available. All site work quantities are provided by Nathan Epps with the COE.
5/14/2008	Kent Gamble	Prices escalated to May 2009 per section 117 report timeline
5/15/2008	Kent Gamble	This estimate was prepared by Kent Gamble with HMS Inc. General project properties show Darrell Cullins as the Author because of a glitch in this version of the software. This is incorrect. It will be corrected when the newest version of the software is incorporated. The note header in this section should indicate this project as follows: CURRENT WORKING ESTIMATE-POST CHARRETTE LEVEL. PRICES ARE CURRENT FOR 2008 AND ESCALATED TO SPRING 2009
6/9/2008	Kent Gamble	This estimate revision incorporates bid option items to construct the barge dock road as either a 12' wide road with a maximum grade of 6%, or a 18' wide road with a maximum grade of 10%. All other parts of the estimate remain unchanged. Note that all quantities are as provided by the project engineer, Nathan Epps of the COE. As a reminder the baseline estimate assumes a road width of 18' and maximum grade of 6%

Labor ID: LB06NatFD EQ ID: EP06R09 Currency in US dollars TRACES MII Version 3.0

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost
Project Cost Summary Report			**26,498,352**	**3,332,573**	**3,836,522**	**2,275,116**	**2,550,790**	**38,493,353**
			26,594,140.95					*38,363,861.58*
BASE WORK EFFORT	**1.00**	**EA**	**26,594,141**	**3,348,595**	**3,989,121**	**2,293,745**	**2,138,260**	**38,363,862**
00502 MOBILIZATION	**1.00**	**LS**	**1,416,647**	**179,511**	**212,497**	**122,186**	**43,783**	**1,974,625**
			3,208.92	*12.67%*	*15.00%*	*8.63%*	*3.09%*	*4,472.82*
USR Mob, Demob Site Crew assuming prime contractor is from Seattle area	30.00	MO	96,268	12,199	14,440	8,303	2,975	134,185
			98.74	*12.67%*	*15.00%*	*8.63%*	*3.09%*	*137.63*
USR Mob Equipment Allowance	480.00	HR	47,393	6,005	7,109	4,088	1,465	66,060
			43.20	*12.67%*	*15.00%*	*8.63%*	*3.09%*	*60.21*
USR Demob equipment (Standby)	480.00	HR	20,735	2,627	3,110	1,788	641	28,901
			1,056.52	*12.67%*	*15.00%*	*8.62%*	*3.09%*	*1,472.65*
USR Barge Mobilization/Demobilization To Newtok	750.00	HR	792,389	100,408	118,858	68,344	24,490	1,104,488
			81.46	*12.67%*	*15.00%*	*8.63%*	*3.09%*	*113.54*
USR MOB Worker Daily Subsistence (Per Man Day)	3,600.00	DAY	293,246	37,159	43,987	25,292	9,063	408,747
			1,234.20	*12.67%*	*15.00%*	*8.63%*	*3.09%*	*1,720.32*
USR Travel Time for Personnel say, 12 management persons, 18 skilled and semi-skilled	120.00	EA	148,104	18,767	22,216	12,774	4,577	206,438
USR Cleanup Project Site After Const Allowance	1.00	LS	18,513	2,346	2,777	1,597	572	25,805
			5,511.75					*8,143.64*
001 EMERGENCY SHELTER	**1,160.00**	**M2**	**6,393,635**	**810,173**	**959,045**	**551,451**	**732,318**	**9,446,623**
Generic Equipment	1,160.00	LS	1,862	236	279	161	213	2,751
Generic Labor	1,160.00	LS	3,351	425	503	289	384	4,951
Generic Material	1,334.00	LS	11,882	1,506	1,782	1,025	1,361	17,556
002 SITE WORK	**1.00**	**LS**	**18,783,858**	**2,358,910**	**2,817,579**	**1,620,108**	**1,362,159**	**26,942,614**
			91.60	*12.67%*	*15.00%*	*8.62%*	*11.45%*	*135.33*
RSM 028201300200 Chain link fence, industrial, galvanized steel, 3 strands barb wire, 50 mm posts @ 3 m Oc, 3.9 mm wire, 1800 mm high, remove fabric ties, top rail & couplings, includes excavation	80.00	M	7,328	929	1,099	632	839	10,827
			1,768.88	*12.67%*	*15.00%*	*8.63%*	*11.45%*	*2,613.53*
RSM 028201305060 Chain link fence, double swing gates, 1800 mm high, 3.7 m opening, includes excavation	2.00	OPN	3,538	448	531	305	405	5,227

Labor ID: LB06NatFD EQ ID: EP06R09 Currency in US dollars TRACES MII Version 3.0

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost
			5.84	*12.67%*	*15.00%*	*8.63%*	*11.45%*	*8.62*
RSM 023154240260 Excavating, bulk bank measure, 1.5 m3 capacity = 99 m3/hour, backhoe, hydraulic, crawler mounted	80.00	BM3	467	59	70	40	53	690
			95,788.87-					*129,491.59*
OPTIONS	**1.00**	**EA**	**95,789-**	**16,022-**	**152,599-**	**18,629-**	**412,530**	**129,492**
			6,375,741.67					*9,415,444.34*
QUARRY DEVELOPMENT	**1.00**	**EA**	**6,375,742**	**792,675**	**818,131**	**539,540**	**889,357**	**9,415,444**
RSM 023154124610 Budget Allowance for quarry development per BC Contractors	1.00	LS	1,382,304	159,928	69,115	108,856	39,007	1,759,211
			111.07	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*170.30*
Pit Run Gravel	27,394.00	M3	3,042,607	385,546	456,391	262,425	518,136	4,665,105
			129.51	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*198.58*
RSM 020601500100 D-1 sub-base	3,304.00	M3	427,916	54,224	64,187	36,908	72,871	656,106
			5.28	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*8.10*
RSM 027202006000 Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	81,169.00	M2	428,691	54,322	64,304	36,975	73,003	657,294
			44.13	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*67.67*
RSM 023151204200 Locally available silty sand base	19,482.00	LM3	859,806	108,951	128,971	74,158	146,419	1,318,306
			2.03	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*3.11*
RSM 023153105640 Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	50,180.00	EM3	101,725	12,890	15,259	8,774	17,323	155,971
			1.63	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*2.51*
RSM 027202008000 Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	81,169.00	M2	132,693	16,814	19,904	11,445	22,597	203,452
			1,888,365.23-					*2,740,654.40-*
12' Road at 6% grade	**1.00**	**EA**	**1,888,365-**	**236,528-**	**283,255-**	**162,872-**	**169,635-**	**2,740,654-**
			150.79	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*231.20*
Pit Run Gravel	3,406.00-	M3	513,586-	65,079-	77,038-	44,297-	87,460-	787,461-
			175.83	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*269.60*
RSM 020601500100 D-1 sub-base	1,135.00-	M3	199,569-	25,288-	29,935-	17,213-	33,985-	305,990-
			2.22	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*3.40*
RSM 027202008000 Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	5,659.00-	M2	12,560-	1,591-	1,884-	1,083-	2,139-	19,257-

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Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost
			2.50	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*3.84*
RSM 027202006000 Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	5,659.00-	M2	14,171-	1,796-	2,126-	1,222-	2,413-	21,728-
			69.30	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*106.25*
RSM 023151204200 Locally available silty sand base	3,383.00-	LM3	234,440-	29,707-	35,166-	20,220-	39,924-	359,458-
			2.75	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*4.22*
RSM 023153105640 Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	7,924.00-	EM3	21,808-	2,763-	3,271-	1,881-	3,714-	33,438-
			112.60	*12.36%*	*15.00%*	*8.62%*	*0.00%*	*153.12*
USR BARGING COSTS OF FILL MATERIALS	7,924.00-	M3	892,231-	110,302-	133,835-	76,955-	0	1,213,323-
			4,583,165.31-					*6,545,298.35-*
18' Road at 10% grade	**1.00**	**EA**	**4,583,165-**	**572,169-**	**687,475-**	**395,298-**	**307,191-**	**6,545,298-**
			2.22	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*3.40*
RSM 027202008000 Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	5,386.00-	M2	11,954-	1,515-	1,793-	1,031-	2,036-	18,328-
			2.50	*12.67%*	*15.00%*	*8.62%*	*17.03%*	*3.84*
RSM 027202006000 Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	5,386.00-	M2	13,487-	1,709-	2,023-	1,163-	2,297-	20,679-
			69.30	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*106.25*
RSM 023151204200 Locally available silty sand base	24,683.00-	LM3	1,710,521-	216,750-	256,578-	147,532-	291,291-	2,622,672-
			2.75	*12.67%*	*15.00%*	*8.63%*	*17.03%*	*4.22*
RSM 023153105640 Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	24,683.00-	EM3	67,932-	8,608-	10,190-	5,859-	11,568-	104,157-
			112.60	*12.36%*	*15.00%*	*8.62%*	*0.00%*	*153.12*
USR BARGING COSTS OF FILL MATERIALS	24,683.00-	M3	2,779,272-	343,587-	416,891-	239,712-	0	3,779,462-

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Description	Quantity	UOM	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
Contract Cost Summary Report			**18,164,214**	**1,726,709**	**19,890,924**	**6,607,428**	**26,498,352**
			17,000,272.37		*19,960,220.12*		*26,594,140.95*
BASE WORK EFFORT	**1.00**	**EA**	**17,000,272**	**2,959,948**	**19,960,220**	**6,633,921**	**26,594,141**
00502 MOBILIZATION	**1.00**	**LS**	**1,147,826**	**0**	**1,147,826**	**268,821**	**1,416,647**
			1,147,826.27		*1,147,826.27*		*1,416,647.18*
MOB, DEMOB, & PREP WORK	**1.00**	**EA**	**1,147,826**	**0**	**1,147,826**	**268,821**	**1,416,647**
			3,381.55		*3,987.37*		*5,511.75*
001 EMERGENCY SHELTER	**1,160.00**	**M2**	**3,922,598**	**702,748**	**4,625,347**	**1,768,289**	**6,393,635**
			3,140.81		*3,746.63*		*5,178.98*
001BLD00 150 PERSON EMERGENCY SHELTER	**1,160.00**	**M2**	**3,643,340**	**702,748**	**4,346,089**	**1,661,527**	**6,007,616**
			240.74		*240.74*		*332.78*
SPECIAL CONSTRUCTION	**1,160.00**	**M2**	**279,258**	**0**	**279,258**	**106,761**	**386,019**
002 SITE WORK	**1.00**	**LS**	**11,929,848**	**2,257,199**	**14,187,047**	**4,596,811**	**18,783,858**
			254.55		*336.77*		*465.51*
00200201 SANITARY SEWER	**1,067.00**	**M**	**271,610**	**87,719**	**359,329**	**137,373**	**496,702**
00200101 ACCESS ROADS	**1.00**	**LS**	**5,491,359**	**1,963,820**	**7,455,179**	**2,850,145**	**10,305,323**
003 BARGING COSTS OF ROAD & FILL AGGREGATE	**1.00**	**LS**	**5,583,600**	**0**	**5,583,600**	**1,307,679**	**6,891,279**
00200401 WATER DISTRIBUTION	**1.00**	**LS**	**88,995**	**31,826**	**120,821**	**46,190**	**167,012**
00200601 EXCAVATION, CUT AND FILL AT BUILDING SITE	**1.00**	**LS**	**486,086**	**173,834**	**659,920**	**252,290**	**912,210**
			8,198.21		*8,198.21*		*11,332.42*
LANDFILL	**1.00**	**EA**	**8,198**	**0**	**8,198**	**3,134**	**11,332**
			1,163,941.79		*69,296.53-*		*95,788.87-*
OPTIONS	**1.00**	**EA**	**1,163,942**	**1,233,238-**	**69,297-**	**26,492-**	**95,789-**
			4,612,401.95		*4,612,401.95*		*6,375,741.67*
QUARRY DEVELOPMENT	**1.00**	**EA**	**4,612,402**	**0**	**4,612,402**	**1,763,340**	**6,375,742**
			3,612,401.95		*3,612,401.95*		*4,993,437.67*
QUARRY ROAD DEVELOPMENT	**1.00**	**EA**	**3,612,402**	**0**	**3,612,402**	**1,381,036**	**4,993,438**
			1,006,246.09-		*1,366,099.81-*		*1,888,365.23-*

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Description	Quantity	UOM	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
12' Road at 6% grade	**1.00**	**EA**	**1,006,246-**	**359,854-**	**1,366,100-**	**522,265-**	**1,888,365-**
00200101 ACCESS ROADS	**1.00**	**LS**	**1,006,246-**	**359,854-**	**1,366,100-**	**522,265-**	**1,888,365-**
			2,442,214.08-		*3,315,598.67-*		*4,583,165.31-*
18' Road at 10% grade	**1.00**	**EA**	**2,442,214-**	**873,385-**	**3,315,599-**	**1,267,567-**	**4,583,165-**
00200101 ACCESS ROADS	**1.00**	**LS**	**2,442,214-**	**873,385-**	**3,315,599-**	**1,267,567-**	**4,583,165-**

Labor ID: LB06NatFD EQ ID: EP06R09 Currency in US dollars TRACES MII Version 3.0

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Project Direct Costs Report			**1,910,062**	**4,577,000**	**10,491,002**	**1,048,150**	**138,000**
			1,748,582.42	*6,440,510.37*	*8,625,029.57*	*48,150.00*	
BASE WORK EFFORT	**1.00**	**EA**	**1,748,582**	**6,440,510**	**8,625,030**	**48,150**	**138,000**
MOBILIZATION	**1.00**	**LS**	**198,470**	**498,757**	**312,600**	**0**	**138,000**
			198,469.68	*498,756.59*	*312,600.00*	*0.00*	
MOB, DEMOB, & PREP WORK	**1.00**	**EA**	**198,470**	**498,757**	**312,600**	**0**	**138,000**
			0.00	*0.00*	*2,500.00*	*0.00*	
Mob, Demob Site Crew assuming prime contractor is from Seattle area	30.00	MO	0	0	75,000	0	3,000
			0.00	*80.00*	*0.00*	*0.00*	
Mob Equipment Allowance	480.00	HR	0	38,400	0	0	0
			0.00	*35.00*	*0.00*	*0.00*	
Demob equipment (Standby)	480.00	HR	0	16,800	0	0	0
			264.63	*591.41*	*0.00*	*0.00*	
Barge Mobilization/Demobilization To Newtok	750.00	HR	198,470	443,557	0	0	0
			0.00	*0.00*	*66.00*	*0.00*	
MOB Worker Daily Subsistence (Per Man Day)	3,600.00	DAY	0	0	237,600	0	0
			0.00	*0.00*	*0.00*	*0.00*	
Travel Time for Personnel say, 12 management persons, 18 skilled and semi-skilled	120.00	EA	0	0	0	0	120,000
Cleanup Project Site After Const Allowance	1.00	LS	0	0	0	0	15,000
			908.62	*35.21*	*2,396.21*	*41.51*	
EMERGENCY SHELTER	**1,160.00**	**M2**	**1,053,994**	**40,849**	**2,779,606**	**48,150**	**0**
			859.73	*16.60*	*2,222.97*	*41.51*	
150 PERSON EMERGENCY SHELTER	**1,160.00**	**M2**	**997,285**	**19,259**	**2,578,646**	**48,150**	**0**
			96.37	*15.16*	*377.30*	*41.51*	
SUBSTRUCTURE	**1,160.00**	**M2**	**111,792**	**17,582**	**437,669**	**48,150**	**0**
			43.10	*12.70*	*173.37*	*41.51*	
SPECIAL FOUNDATION CONDITIONS	**1,160.00**	**M2**	**49,993**	**14,727**	**201,111**	**48,150**	**0**
			43.10	*12.70*	*173.37*	*41.51*	
PILE FOUNDATIONS	**1,160.00**	**M2**	**49,993**	**14,727**	**201,111**	**48,150**	**0**
			0.00	*0.00*	*0.00*	*16,050.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Piling special costs, testing, any type piles, test load is twice the design load, 45 metric ton design load, 90 metric ton test	3.00	EA	0	0	0	48,150	0
Piles, steel, pipe piles, no concrete, 15 m long, 250 mm diameter, 50 kg/m, excludes mobilization or demobilization	804.99	M	*25.68* 20,670	*9.42* 7,586	*182.03* 146,534	*0.00* 0	0
Piles, steel, pipe piles, points, standard, 250 mm diameter	88.00	EA	*106.80* 9,399	*21.31* 1,875	*441.39* 38,842	*0.00* 0	0
Piles, steel, pipe pile end plates, 250 mm diameter	88.00	EA	*37.79* 3,325	*0.00* 0	*178.81* 15,735	*0.00* 0	0
Piling special costs, cutoffs, steel pile or "H" pile	88.00	EA	*25.56* 2,250	*0.00* 0	*0.00* 0	*0.00* 0	0
Mobilization, large	1.00	EA	*14,348.86* 14,349	*5,266.17* 5,266	*0.00* 0	*0.00* 0	0
PILE CAPS AND GRADE BEAMS	**1,160.00**	**M2**	*41.05* **47,621**	*0.88* **1,026**	*100.68* **116,791**	*0.00* **0**	**0**
C.I.P. concrete forms, grade beam, plywood, 2 use, includes erecting, bracing, stripping and cleaning	374.99	M2C	*62.64* 23,489	*0.00* 0	*33.35* 12,504	*0.00* 0	0
C.I.P. concrete forms, pile cap, square or rectangular, plywood, 2 use, includes erecting, bracing, stripping and cleaning	147.00	M2C	*68.95* 10,135	*0.00* 0	*46.88* 6,891	*0.00* 0	0
Reinforcing steel, in place, typical, average, under 9 metic ton job, 10M to 20 M, A615, grade 60, incl access. Labor	5.92	MT	*1,688.46* 9,996	*0.00* 0	*5,667.20* 33,550	*0.00* 0	0
Structural concrete, field mix, fob forms, 21 MPa, includes material only	82.57	M3	*0.00* 0	*0.00* 0	*773.23* 63,846	*0.00* 0	0
Structural concrete, placing, grade beam, with crane and bucket, includes vibrating, excludes material	82.57	M3	*48.45* 4,001	*12.42* 1,026	*0.00* 0	*0.00* 0	0
FLOOR SLAB	**1,160.00**	**M2**	*12.22* **14,178**	*1.58* **1,829**	*103.25* **119,768**	*0.00* **0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			52.86	*13.55*	*0.00*	*0.00*	
Structural concrete, placing, slab on grade, with crane and bucket, 100 mm thick, includes vibrating, excludes material	135.01	M3	7,136	1,829	0	0	0
			0.00	*0.00*	*773.23*	*0.00*	
Structural concrete, ready mix, normal weight, high early, 21 MPa, includes material only	135.01	M3	0	0	104,396	0	0
			1,013.32	*0.00*	*2,883.51*	*0.00*	
Reinforcing steel, in place, slab on grade, #10 to #22, A615M, grade 300, incl access. Labor	5.00	MT	5,068	0	14,420	0	0
			54.85	*0.00*	*26.42*	*0.00*	
C.I.P. concrete forms, slab on grade, edge, wood, 180 mm to 305 mm high, 4 use, includes erecting, bracing, stripping and cleaning	36.00	M2C	1,974	0	951	0	0
			169.04	*0.20*	*525.00*	*0.00*	
EXTERIOR CLOSURE	**514.00**	**M**	**86,886**	**105**	**269,852**	**0**	**0**
			131.90	*0.18*	*415.86*	*0.00*	
EXTERIOR WALLS	**514.00**	**M**	**67,796**	**91**	**213,750**	**0**	**0**
			74.85	*0.00*	*304.45*	*0.00*	
EXTERIOR SKIN	**514.00**	**M**	**38,472**	**0**	**156,488**	**0**	**0**
			59.04	*0.00*	*299.62*	*0.00*	
Interlocking Metal Sandwich	**514.00**	**M2**	**30,347**	**0**	**154,005**	**0**	**0**
			59.04	*0.00*	*299.63*	*0.00*	
Composite Panels, insulated wall panels, galv. steel, with 100mm polystyrene, 0.6mm thk.	513.99	M2	30,347	0	154,005	0	0
			15.81	*0.00*	*4.83*	*0.00*	
152.4 mm(6") Mtl. Stud Non-Load	**514.00**	**M2**	**8,125**	**0**	**2,484**	**0**	**0**
			15.81	*0.00*	*4.83*	*0.00*	
Metal stud partition, non-load bearing, galvanized, 3000 mm H, 20 ga., 64 mm wide, 0.53 mm thick, 400 mm O.C., includes top & bottom track	513.92	M2	8,125	0	2,484	0	0
			2.82	*0.00*	*16.62*	*0.00*	
INSULATION & VAPOR BARRIER	**1,710.00**	**M2**	**4,827**	**0**	**28,424**	**0**	**0**
			1.67	*0.00*	*13.18*	*0.00*	
Building Paper, polyethylene vapor barrier, standard, 0.15mm thick, 2.74m x 120m roll	1,710.96	M2	2,851	0	22,546	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			3.84	*0.00*	*11.44*	*0.00*	
Wall Insulation, Non-Rigid, fiberglass, unfaced, batts or blankets, 88mm thick, 1.9m2.K/W, 600mm wide	513.99	M2	1,976	0	5,879	0	0
			34.48	*0.00*	*54.89*	*0.00*	
INTERIOR SKIN	**514.00**	**M2**	**17,723**	**0**	**28,213**	**0**	**0**
			19.27	*0.00*	*69.27*	*0.00*	
Fiberglass Reinforced Plastic Panels, on walls, adhesive mounted, fire rated, embossed surface, 2.3 mm thick	342.99	M2	6,609	0	23,759	0	0
			3.20	*0.00*	*1.06*	*0.00*	
5/8" Gypsum	**514.00**	**M2**	**1,647**	**0**	**546**	**0**	**0**
			3.20	*0.00*	*1.06*	*0.00*	
5/8" Gypsum	514.00	M2	1,647	0	546	0	0
			18.42	*0.00*	*7.60*	*0.00*	
Paint to Gypsum Board Walls	**514.00**	**M2**	**9,467**	**0**	**3,908**	**0**	**0**
			18.42	*0.00*	*7.60*	*0.00*	
Paints & Coatings, misc. paintin g, plaster or drywall, 1 coat pr	514.00	M2	9,467	0	3,908	0	0
			76.97	*1.03*	*7.09*	*0.00*	
EXTERIOR SOFFITS	**88.00**	**M2**	**6,773**	**91**	**624**	**0**	**0**
			76.97	*1.03*	*7.09*	*0.00*	
Exterior Soffits	**88.00**	**M2**	**6,773**	**91**	**624**	**0**	**0**
			76.97	*1.03*	*7.09*	*0.00*	
Vented Exterior Soffit panels	88.00	M2	6,773	91	624	0	0
			118.65	*0.00*	*182.69*	*0.00*	
EXTERIOR WINDOWS	**24.00**	**M2**	**2,848**	**0**	**4,385**	**0**	**0**
			118.65	*0.00*	*182.69*	*0.00*	
WINDOWS	**24.00**	**M2**	**2,848**	**0**	**4,385**	**0**	**0**
			118.65	*0.00*	*182.69*	*0.00*	
Aluminum Frm Casement Type	**24.00**	**M2**	**2,848**	**0**	**4,385**	**0**	**0**
			118.65	*0.00*	*153.04*	*0.00*	
Windows, aluminum, commercial gr ade, stock units, standard brush	24.00	M2	2,848	0	3,673	0	0
			0.00	*0.00*	*29.66*	*0.00*	
1/4" Tinted Insulated GlassUpgra de	24.00	M2	0	0	712	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			1,353.53	*1.22*	*4,309.82*	*0.00*	
EXTERIOR PERSONNEL DOORS	**12.00**	**LEF**	**16,242**	**15**	**51,718**	**0**	**0**
			5,359.34	*0.00*	*6,586.65*	*0.00*	
GLAZED DOORS	**2.00**	**PR**	**10,719**	**0**	**13,173**	**0**	**0**
			5,359.34	*0.00*	*6,586.65*	*0.00*	
1830 mm X 2130 mm(6'0" X 7'0")	**2.00**	**EA**	**10,719**	**0**	**13,173**	**0**	**0**
			5,359.34	*0.00*	*6,586.65*	*0.00*	
1830 mm X 2130 mm(6'0" X 7'0")	2.00	PR	10,719	0	13,173	0	0
			690.47	*1.82*	*4,818.07*	*0.00*	
SOLID DOORS	**8.00**	**LEF**	**5,524**	**15**	**38,545**	**0**	**0**
			127.23	*7.29*	*547.71*	*0.00*	
Door frames, steel channels with anchors and bar stops, 150 mm channel@ 12 kg/m, 915 mm x 2135 mm door, weighs 68 kg	2.00	EA	254	15	1,095	0	0
			79.04	*0.00*	*1,192.07*	*0.00*	
Doors, commercial, steel, insulated, full panel, 18 ga., 915 mm x 2035 mm x 44 mm thick	2.00	EA	158	0	2,384	0	0
			456.72	*0.00*	*2,416.35*	*0.00*	
Single door hardware complete set	2.00	EA	913	0	4,833	0	0
			1,399.25	*0.00*	*10,077.44*	*0.00*	
1830 mm X 2130 mm(6'0" X 7'0")	**3.00**	**EA**	**4,198**	**0**	**30,232**	**0**	**0**
			1,399.25	*0.00*	*10,077.44*	*0.00*	
1830 mm X 2130 mm(6'0" X 7'0")	3.00	EA	4,198	0	30,232	0	0
			41.35	*0.00*	*116.27*	*0.00*	
ROOFING	**1,285.00**	**M2**	**53,131**	**0**	**149,410**	**0**	**0**
			41.35	*0.00*	*116.27*	*0.00*	
ROOFING	**1,285.00**	**M2**	**53,131**	**0**	**149,410**	**0**	**0**
			33.08	*0.00*	*78.68*	*0.00*	
ROOF COVERINGS	**1,285.00**	**M2**	**42,508**	**0**	**101,104**	**0**	**0**
			33.08	*0.00*	*78.68*	*0.00*	
Standing Seam Metal Roof	**1,285.00**	**M2**	**42,508**	**0**	**101,104**	**0**	**0**
			28.72	*0.00*	*69.27*	*0.00*	
Composite Panels, insulated metal liner panel, galv., 35mm thick x 610mm wide, 1.2mm thk.	1,284.97	M2	36,899	0	89,008	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			30.94	*0.00*	*54.77*	*0.00*	
Aluminum flashing, flexible, mill finish, 1mm thick	156.00	M2	4,827	0	8,544	0	0
			8.68	*0.00*	*39.47*	*0.00*	
Snow guard, standing seam metal roofs	90.00	M	782	0	3,552	0	0
			7.10	*0.00*	*36.87*	*0.00*	
ROOF INSULATION & FILL	**1,285.00**	**M2**	**9,117**	**0**	**47,375**	**0**	**0**
			0.68	*0.00*	*4.70*	*0.00*	
Polyisocyanurate Insulation, for roof decks, 3" thick, R21.74, 2	2,569.94	M2	1,737	0	12,089	0	0
			6.17	*0.00*	*29.48*	*0.00*	
Roof Insulation, Non-Rigid, fiberglass, kraft faced, batts or blankets, 300mm thick, 6.7m2.K/W, 380mm wide	1,196.97	M2	7,380	0	35,286	0	0
			16.73	*0.00*	*10.34*	*0.00*	
GUTTERS AND DOWNSPOUTS	**90.00**	**M**	**1,506**	**0**	**931**	**0**	**0**
			16.73	*0.00*	*10.34*	*0.00*	
5" Box Gutters With Downspouts	**90.00**	**M**	**1,506**	**0**	**931**	**0**	**0**
			14.55	*0.00*	*7.75*	*0.00*	
5" Box Gutters With Downspouts	90.00	M	1,309	0	698	0	0
			3.50	*0.00*	*4.15*	*0.00*	
Blocking to Steel,2x4 to 2x8 Fir Douglas Fir	56.18	BF	197	0	233	0	0
			114.50	*0.00*	*268.86*	*0.00*	
INTERIOR FINISHES	**1,160.00**	**M2**	**132,816**	**0**	**311,874**	**0**	**0**
			22.44	*0.00*	*14.66*	*0.00*	
WALL FINISHES	**1,302.00**	**M2**	**29,219**	**0**	**19,094**	**0**	**0**
			4.42	*0.00*	*1.63*	*0.00*	
GYPSUM WALLBOARD FINISHES	**1,302.00**	**M2**	**5,757**	**0**	**2,125**	**0**	**0**
			14.13	*0.00*	*6.17*	*0.00*	
Two Layers Of 5/8" Fire	**145.00**	**M2**	**2,049**	**0**	**895**	**0**	**0**
			0.90	*0.00*	*2.12*	*0.00*	
1 Layer, 5/8", Fire Resistant	290.00	M2	261	0	614	0	0
			6.17	*0.00*	*0.97*	*0.00*	
Gypsum wallboard, on walls, stan dard, 5/8" thick, finish exclude	290.00	M2	1,788	0	280	0	0
			3.20	*0.00*	*1.06*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
5/8" Gypsum	**1,157.00**	**M2**	**3,708**	**0**	**1,230**	**0**	**0**
			3.20	*0.00*	*1.06*	*0.00*	
5/8" Gypsum	1,157.00	M2	3,708	0	1,230	0	0
			18.42	*0.00*	*7.60*	*0.00*	
PAINTING TO WALL	**1,157.00**	**M2**	**21,309**	**0**	**8,797**	**0**	**0**
			21.06	*0.00*	*8.70*	*0.00*	
Paint To Gypsum Board Walls	**1,011.71**	**M2**	**21,309**	**0**	**8,797**	**0**	**0**
			18.42	*0.00*	*7.60*	*0.00*	
Paints & Coatings, misc. paintin g, plaster or drywall,	1,156.97	M2	21,309	0	8,797	0	0
			19.27	*0.00*	*69.27*	*0.00*	
WALL COVERINGS	**51.00**	**M2**	**983**	**0**	**3,533**	**0**	**0**
			19.27	*0.00*	*69.27*	*0.00*	
Fiberglass Reinforced Plastic Panels, on walls, adhesive mounted, fire rated, embossed surface, 2.3 mm thick- At kitchen	51.00	M2	983	0	3,533	0	0
			39.00	*0.00*	*154.65*	*0.00*	
ACOUSTICAL TILES & PANELS TO	**30.00**	**M**	**1,170**	**0**	**4,639**	**0**	**0**
			39.00	*0.00*	*154.65*	*0.00*	
4' X 8' X 1" Fiberglass Sound	**30.00**	**M2**	**1,170**	**0**	**4,639**	**0**	**0**
			39.00	*0.00*	*154.65*	*0.00*	
Suspended Acoustic wall panels , fiberglass boards, glass cloth	30.00	M2	1,170	0	4,639	0	0
			14.58	*0.00*	*13.43*	*0.00*	
FLOORING & FLOOR FINISHES	**1,160.00**	**M2**	**16,911**	**0**	**15,574**	**0**	**0**
			33.60	*0.00*	*30.95*	*0.00*	
RESILIENT FLOORING	**503.00**	**M2**	**16,900**	**0**	**15,566**	**0**	**0**
			4.80	*0.00*	*6.35*	*0.00*	
Cove base, rubber or vinyl, standard colors, 3 mm thick, 100 mm h	502.99	M	2,414	0	3,192	0	0
			11.52	*0.00*	*11.60*	*0.00*	
Vinyl Tile 1/8" X 12" X 12"	**913.00**	**M2**	**10,518**	**0**	**10,589**	**0**	**0**
			11.52	*0.00*	*11.60*	*0.00*	
Vinyl Tile 1/8" X 12" X 12"	913.00	M2	10,518	0	10,589	0	0
			21.57	*0.00*	*9.70*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Sheet Vinyl Resilient Flooring	**184.00**	**M2**	**3,968**	**0**	**1,784**	**0**	**0**
			21.57	*0.00*	*9.70*	*0.00*	
Resilient Flooring, vinyl sheet goods, .070" thick	184.00	M2	3,968	0	1,784	0	0
			0.27	*0.00*	*0.18*	*0.00*	
OTHER FLOORING AND FLOOR	**41.00**	**M2**	**11**	**0**	**7**	**0**	**0**
			0.27	*0.00*	*0.18*	*0.00*	
Concrete Floor Sealer	**41.00**	**M2**	**11**	**0**	**7**	**0**	**0**
			26.94	*0.00*	*17.88*	*0.00*	
Curing, sprayed membrane compoun d	0.41	M2	11	0	7	0	0
			27.36	*0.00*	*8.84*	*0.00*	
CEILING & CEILING FINISHES	**1,160.00**	**M2**	**31,734**	**0**	**10,257**	**0**	**0**
			9.86	*0.00*	*5.61*	*0.00*	
GYPSUM WALLBOARD CEILING	**1,137.00**	**M2**	**11,208**	**0**	**6,374**	**0**	**0**
			9.86	*0.00*	*5.61*	*0.00*	
5/8" Gypsum Wallboard Ceiling,	**1,137.00**	**M2**	**11,208**	**0**	**6,374**	**0**	**0**
			9.86	*0.00*	*5.61*	*0.00*	
5/8" Gypsum Wallboard Ceiling,	1,137.00	M2	11,208	0	6,374	0	0
			1.29	*0.00*	*0.39*	*0.00*	
PAINTING & STAINING CEILINGS	**1,137.00**	**M2**	**1,466**	**0**	**440**	**0**	**0**
			7.19	*0.00*	*2.16*	*0.00*	
Painting To Drywall Or Plaster	**203.91**	**M2**	**1,466**	**0**	**440**	**0**	**0**
			1.29	*0.00*	*0.39*	*0.00*	
Paints & Coatings, misc. paintin g, plaster or drywall,	1,136.97	M2	1,466	0	440	0	0
			16.76	*0.00*	*3.03*	*0.00*	
SUSPENSION SYSTEMS	**1,137.00**	**M2**	**19,060**	**0**	**3,443**	**0**	**0**
			16.76	*0.00*	*3.03*	*0.00*	
Suspension System For Gypsum	**1,137.00**	**M2**	**19,060**	**0**	**3,443**	**0**	**0**
			16.76	*0.00*	*3.03*	*0.00*	
Suspension System For Gypsum	1,137.00	M2	19,060	0	3,443	0	0
			47.37	*0.00*	*230.13*	*0.00*	
INTERIOR CONSTRUCTION	**1,160.00**	**M2**	**54,952**	**0**	**266,949**	**0**	**0**
PARTITIONS	**1.00**	**LS**	**28,316**	**0**	**153,272**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			18.30	*0.00*	*4.90*	*0.00*	
FIXED PARTITIONS	**584.00**	**M2**	**10,686**	**0**	**2,861**	**0**	**0**
			19.70	*0.00*	*24.00*	*0.00*	
Metal stud partition, non-load bearing, galvanized, 3660 mm H, 20 ga., 152 mm wide, 0.53 mm thick, 400 mm O.C., includes top & bottom track	67.00	M2	1,320	0	1,608	0	0
			1.19	*0.00*	*1.06*	*0.00*	
Mtl Stud Partition, 4"	**117.00**	**M2**	**140**	**0**	**124**	**0**	**0**
			1.19	*0.00*	*1.06*	*0.00*	
Metal stud partition, non-load b earing, galvanized, 10' high, 4"	117.00	M2	140	0	124	0	0
			19.76	*0.00*	*2.42*	*0.00*	
Mtl Stud Partition, 4", Sound	**467.00**	**M2**	**9,226**	**0**	**1,128**	**0**	**0**
			19.76	*0.00*	*2.42*	*0.00*	
Mtl Stud Partition, 4", Sound	467.00	M2	9,226	0	1,128	0	0
			94.92	*0.00*	*59.60*	*0.00*	
INTERIOR WINDOWS	**3.00**	**M2**	**285**	**0**	**179**	**0**	**0**
			94.92	*0.00*	*59.60*	*0.00*	
Fixed Type Window With Aluminum	**3.00**	**M2**	**285**	**0**	**179**	**0**	**0**
			94.92	*0.00*	*59.60*	*0.00*	
Windows, aluminum, commercial gr ade, stock units, standard brush	3.00	M2	285	0	179	0	0
			82.20	*0.00*	*712.00*	*0.00*	
OPERABLE PARTITION	**211.00**	**M2**	**17,345**	**0**	**150,232**	**0**	**0**
			82.21	*0.00*	*712.02*	*0.00*	
Partitions, folding accordion, vinyl covered, commercial, 9.8 kg/m2, 5182 mm max height, over 13.9 m2, excl. frame	210.99	M2	17,345	0	150,232	0	0
			1,204.49	*0.00*	*3,449.35*	*0.00*	
INTERIOR PERSONNEL DOORS	**14.00**	**EA**	**16,863**	**0**	**48,291**	**0**	**0**
			438.87	*0.00*	*2,508.40*	*0.00*	
STANDARD INTERIOR DOORS	**14.00**	**EA**	**6,144**	**0**	**35,118**	**0**	**0**
			492.58	*0.00*	*2,738.53*	*0.00*	
3'0" X 7'0" Hollow Metal Door	**10.00**	**EA**	**4,926**	**0**	**27,385**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			492.58	*0.00*	*2,738.53*	*0.00*	
3'0" X 7'0" Hollow Metal Door assembly	10.00	EA	4,926	0	27,385	0	0
			609.16	*0.00*	*3,866.16*	*0.00*	
6'0" X 7'0" Pair Hollow Metal	**2.00**	**EA**	**1,218**	**0**	**7,732**	**0**	**0**
			609.16	*0.00*	*3,866.16*	*0.00*	
6'0" X 7'0" Pair Hollow Metal door assembly	2.00	EA	1,218	0	7,732	0	0
			5,359.34	*0.00*	*6,586.65*	*0.00*	
GLAZED INTERIOR DOORS	**2.00**	**EA**	**10,719**	**0**	**13,173**	**0**	**0**
			5,359.34	*0.00*	*6,586.65*	*0.00*	
6'0" X 7'0" Pair Aluminum And	**2.00**	**EA**	**10,719**	**0**	**13,173**	**0**	**0**
			5,359.34	*0.00*	*6,586.65*	*0.00*	
6'0" X 7'0" Pair Aluminum And	2.00	EA	10,719	0	13,173	0	0
			5.29	*0.00*	*39.06*	*0.00*	
INTERIOR SPECIALTIES	**1,160.00**	**M2**	**6,137**	**0**	**45,315**	**0**	**0**
COMPARTMENTS, CUBICLES, AND	**7.00**	**LS**	**1,119**	**0**	**15,787**	**0**	**0**
			159.79	*0.00*	*2,255.26*	*0.00*	
Toilet Partitions - Porcelain	**7.00**	**EA**	**1,119**	**0**	**15,787**	**0**	**0**
			159.79	*0.00*	*2,255.26*	*0.00*	
Toilet cubicles, floor mounted, porcelain enamel	7.00	EA	1,119	0	15,787	0	0
TOILET & BATH ACCESSORIES	**1.00**	**LS**	**1,764**	**0**	**10,505**	**0**	**0**
			19.09	*0.00*	*39.14*	*0.00*	
Toilet Paper Holder	**8.00**	**EA**	**153**	**0**	**313**	**0**	**0**
			19.09	*0.00*	*39.14*	*0.00*	
Toilet Accessories, toilet paper holder, box type, single	8.00	EA	153	0	313	0	0
			71.60	*0.00*	*1,240.39*	*0.00*	
Sanitary Napkin Dispenser	**2.00**	**EA**	**143**	**0**	**2,481**	**0**	**0**
			71.60	*0.00*	*1,240.39*	*0.00*	
Toilet Accessories, sanitary nap kin dispenser w/receptor, free,	2.00	EA	143	0	2,481	0	0
			57.28	*0.00*	*541.26*	*0.00*	
Paper Towel Dispenser And Waste	**5.00**	**EA**	**286**	**0**	**2,706**	**0**	**0**
			57.28	*0.00*	*541.26*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Toilet Accessories, waste recept acle, stainless steel, surface m	5.00	EA	286	0	2,706	0	0
			35.80	*0.00*	*99.88*	*0.00*	
Grab Bars	**6.00**	**EA**	**215**	**0**	**599**	**0**	**0**
			35.80	*0.00*	*99.88*	*0.00*	
Toilet Accessories, grab bars, s traight, stainless steel, 48" lo	6.00	EA	215	0	599	0	0
			28.64	*0.00*	*505.82*	*0.00*	
Bath Room Mirrors	**6.00**	**EA**	**172**	**0**	**3,035**	**0**	**0**
			28.64	*0.00*	*505.82*	*0.00*	
Toilet Accessories, mirror, 18" x 24", with 5" sst shelf & ss 3/	6.00	EA	172	0	3,035	0	0
			60.29	*0.00*	*66.05*	*0.00*	
Sanitary Napkin And Tampon	**5.00**	**EA**	**301**	**0**	**330**	**0**	**0**
			60.29	*0.00*	*66.05*	*0.00*	
Toilet Accessories, sanitary nap kin receptacle, surface mounted	5.00	EA	301	0	330	0	0
			28.64	*0.00*	*141.76*	*0.00*	
Soap Dispenser	**7.00**	**EA**	**200**	**0**	**992**	**0**	**0**
			28.64	*0.00*	*141.76*	*0.00*	
Toilet Accessories, soap dispens er, chrome, surface mounted, pow	7.00	EA	200	0	992	0	0
			109.55	*0.00*	*18.04*	*0.00*	
Wall Mirror	**2.68**	**M2**	**293**	**0**	**48**	**0**	**0**
			109.55	*0.00*	*18.04*	*0.00*	
Mirrors, wall type, polished edg e, 1/4" plate glass, over 15 SF,	2.68	M2	293	0	48	0	0
CHALKBOARDS & TACKBOARDS	**1.00**	**LS**	**689**	**0**	**304**	**0**	**0**
			440.42	*0.00*	*59.60*	*0.00*	
Porcelain Enamel Chalkboard	**1.50**	**M2**	**661**	**0**	**89**	**0**	**0**
			440.42	*0.00*	*59.60*	*0.00*	
Directory boards, glass enclosed , chalkboard, aluminum frame	1.50	M2	661	0	89	0	0
			3.79	*0.00*	*29.00*	*0.00*	
Tackboard	**7.40**	**M2**	**28**	**0**	**215**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			3.79	*0.00*	*29.00*	*0.00*	
Tack board, cork, less than 10 S .F.	7.40	M2	28	0	215	0	0
IDENTIFYING DEVICES	**1.00**	**LS**	**380**	**0**	**4,446**	**0**	**0**
			15.56	*0.00*	*35.44*	*0.00*	
Door Sign, 3" X 8"	**6.00**	**EA**	**93**	**0**	**213**	**0**	**0**
			15.56	*0.00*	*35.44*	*0.00*	
Signs, hard plastic door type, a dhesive back, 3" x 8", excludes	6.00	EA	93	0	213	0	0
			15.56	*0.00*	*67.66*	*0.00*	
Door Sign, 6" X 6"	**6.00**	**EA**	**93**	**0**	**406**	**0**	**0**
			15.56	*0.00*	*67.66*	*0.00*	
Signs, hard plastic door type, a dhesive back, 4" x 12", excludes	6.00	EA	93	0	406	0	0
			175.53	*0.00*	*3,479.54*	*0.00*	
SS Framed, Glass Encased	**1.10**	**M2**	**193**	**0**	**3,827**	**0**	**0**
			14.63	*0.00*	*289.96*	*0.00*	
Directory boards, glass enclosed directory, w/letters on felt ba	13.20	M2	193	0	3,827	0	0
			71.16	*0.00*	*573.48*	*0.00*	
LOCKERS	**20.00**	**EA**	**1,423**	**0**	**11,470**	**0**	**0**
			71.16	*0.00*	*573.48*	*0.00*	
18" X 15" X 72" Single Tier	**20.00**	**EA**	**1,423**	**0**	**11,470**	**0**	**0**
			71.16	*0.00*	*573.48*	*0.00*	
Lockers, steel, baked enamel, si ngle tier box, 18" x 15" x 72"	20.00	EA	1,423	0	11,470	0	0
			127.13	*0.00*	*467.16*	*0.00*	
FIRE EXTINGUISHER CABINETS	**6.00**	**EA**	**763**	**0**	**2,803**	**0**	**0**
			127.13	*0.00*	*467.16*	*0.00*	
Fire Extinguisher Cabinet, 8" X	**6.00**	**EA**	**763**	**0**	**2,803**	**0**	**0**
			127.13	*0.00*	*467.16*	*0.00*	
Fire equipment cabinets, portabl e extinguisher, large, steel box	6.00	EA	763	0	2,803	0	0
CASEWORK	**1.00**	**LS**	**3,636**	**0**	**20,072**	**0**	**0**
			62.64	*0.00*	*26.74*	*0.00*	

Labor ID: LB06NatFD EQ ID: EP06R09 Currency in US dollars TRACES MII Version 3.0

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
COUNTERS	**16.90**	**M**	**1,059**	**0**	**452**	**0**	**0**
			82.70	*0.00*	*35.30*	*0.00*	
Plastic Laminate Countertop	**12.80**	**M**	**1,059**	**0**	**452**	**0**	**0**
			62.64	*0.00*	*26.74*	*0.00*	
Counter Tops, stock, plastic lam inate, 24" wide, includes backsp	16.90	M	1,059	0	452	0	0
			859.23	*0.00*	*6,540.00*	*0.00*	
CABINETS	**3.00**	**M**	**2,578**	**0**	**19,620**	**0**	**0**
			201.85	*0.00*	*551.86*	*0.00*	
Plastic Laminate Cabinets With	**3.00**	**M**	**606**	**0**	**1,656**	**0**	**0**
			201.85	*0.00*	*490.68*	*0.00*	
Plastic Laminate Cabinets	3.00	M	606	0	1,472	0	0
			0.00	*0.00*	*61.18*	*0.00*	
Add For Hospital Base CabinetLam Plastic Drawer	3.00	M	0	0	184	0	0
			93.96	*0.00*	*512.27*	*0.00*	
Plastic Laminated Wall Cabinet	**14.60**	**M**	**1,372**	**0**	**7,479**	**0**	**0**
			93.96	*0.00*	*512.27*	*0.00*	
Custom Cabinets, kitchen, wall, plastic laminate on particle boa	14.60	M	1,372	0	7,479	0	0
			36.38	*0.00*	*635.48*	*0.00*	
Plastic Laminated Base Cabinet	**16.50**	**M**	**600**	**0**	**10,485**	**0**	**0**
			36.38	*0.00*	*635.48*	*0.00*	
Plastic Laminated Base Cabinet - 24"D	16.50	M	600	0	10,485	0	0
			90.24	*0.00*	*246.04*	*0.00*	
PLUMBING	**1,160.00**	**M2**	**104,683**	**0**	**285,403**	**0**	**0**
			297.15	*0.00*	*2,118.01*	*0.00*	
PLUMBING FIXTURES	**30.00**	**EA**	**8,915**	**0**	**63,540**	**0**	**0**
			307.03	*0.00*	*2,742.96*	*0.00*	
WATER CLOSETS	**8.00**	**EA**	**2,456**	**0**	**21,944**	**0**	**0**
			307.03	*0.00*	*2,742.96*	*0.00*	
Wall Mounted Water Closet	**8.00**	**EA**	**2,456**	**0**	**21,944**	**0**	**0**
			129.14	*0.00*	*1,615.33*	*0.00*	
Supports/carrier, caulk, sgl,4", horiz, adj, water closet,	8.00	EA	1,033	0	12,923	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			177.89	*0.00*	*1,127.63*	*0.00*	
Water closet, bowl only, wall hu ng, includes flush valve and sea	8.00	EA	1,423	0	9,021	0	0
			444.79	*0.00*	*1,759.10*	*0.00*	
URINALS	**3.00**	**EA**	**1,334**	**0**	**5,277**	**0**	**0**
			444.79	*0.00*	*1,759.10*	*0.00*	
Wall Mounted Urinal, Wash Down	**3.00**	**EA**	**1,334**	**0**	**5,277**	**0**	**0**
			444.79	*0.00*	*1,759.10*	*0.00*	
Wall Mounted Urinal, Wash Down	3.00	EA	1,334	0	5,277	0	0
			295.99	*0.00*	*1,703.80*	*0.00*	
LAVATORIES	**6.00**	**EA**	**1,776**	**0**	**10,223**	**0**	**0**
			191.06	*0.00*	*753.90*	*0.00*	
Lavatory, vanity top, vitreous china, white, single bowl, 550 mm x 325 mm, includes trim	2.00	EA	382	0	1,508	0	0
			749.00	*0.00*	*2,110.28*	*0.00*	
Wall Hung 16" By 14" White	**1.00**	**EA**	**749**	**0**	**2,110**	**0**	**0**
			749.00	*0.00*	*2,110.28*	*0.00*	
Wall Hung 16" By 14" White	1.00	EA	749	0	2,110	0	0
			128.97	*0.00*	*1,320.94*	*0.00*	
Wall Hung Lavatory, Cast Iron	**5.00**	**EA**	**645**	**0**	**6,605**	**0**	**0**
			128.97	*0.00*	*1,320.94*	*0.00*	
Lavatory, wall hung, porcelain e namel on cast iron, white, singl	5.00	EA	645	0	6,605	0	0
			393.78	*0.00*	*1,729.03*	*0.00*	
SINKS	**3.00**	**EA**	**1,181**	**0**	**5,187**	**0**	**0**
			665.46	*0.00*	*1,771.99*	*0.00*	
S.S. Kitchen Sink, Single Bowl	**1.00**	**EA**	**665**	**0**	**1,772**	**0**	**0**
			665.46	*0.00*	*1,771.99*	*0.00*	
S.S. Kitchen Sink, Single Bowl	1.00	EA	665	0	1,772	0	0
			257.93	*0.00*	*1,707.55*	*0.00*	
Service Sink - Enameled Cast	**2.00**	**EA**	**516**	**0**	**3,415**	**0**	**0**
			257.93	*0.00*	*1,707.55*	*0.00*	
Sink, service, wall, porcelain e namel on cast iron, roll rim, 24	2.00	EA	516	0	3,415	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			206.35	*0.00*	*1,465.92*	*0.00*	
SHOWERS/TUBS	**8.00**	**EA**	**1,651**	**0**	**11,727**	**0**	**0**
			206.35	*0.00*	*1,465.92*	*0.00*	
Fiberglass Shower Unit	**8.00**	**EA**	**1,651**	**0**	**11,727**	**0**	**0**
			206.35	*0.00*	*1,465.92*	*0.00*	
Shower, stall, fiberglass, one p iece with three walls, handicap,	8.00	EA	1,651	0	11,727	0	0
			257.93	*0.00*	*4,591.07*	*0.00*	
DRINKING FOUNTAINS & COOLERS	**2.00**	**EA**	**516**	**0**	**9,182**	**0**	**0**
			257.93	*0.00*	*4,591.07*	*0.00*	
Electric Water Cooler, Wall	**2.00**	**EA**	**516**	**0**	**9,182**	**0**	**0**
			257.93	*0.00*	*4,591.07*	*0.00*	
Water cooler, wall mounted, non- recessed, wheelchair type, 8 GPH	2.00	EA	516	0	9,182	0	0
DOMESTIC WATER SUPPLY	**1.00**	**LS**	**93,230**	**0**	**125,747**	**0**	**0**
PLUMBING ROUGH_INS	**30.00**	**LS**	**93,230**	**0**	**125,747**	**0**	**0**
			3,107.66	*0.00*	*4,191.56*	*0.00*	
PLUMBING ROUGH-IN	**30.00**	**EA**	**93,230**	**0**	**125,747**	**0**	**0**
			2,391.04	*0.00*	*3,563.31*	*0.00*	
Plumbing Rough-in per fixture including supply, waste and vent, Insulation, valves	30.00	EA	71,731	0	106,899	0	0
			1,653.73	*0.00*	*1,449.81*	*0.00*	
PLUMBING ROUGH-IN AT FLOOR DRAINS & HOSE BIBBS	**13.00**	**EA**	**21,498**	**0**	**18,848**	**0**	**0**
			716.62	*0.00*	*628.25*	*0.00*	
Plumbing Rough-in per floor drain and hose bibb	30.00	EA	21,498	0	18,848	0	0
SANITARY WASTE & VENT SYSTEM	**1.00**	**LS**	**1,128**	**0**	**8,160**	**0**	**0**
			125.28	*0.00*	*906.71*	*0.00*	
FLOOR DRAINS	**9.00**	**EA**	**1,128**	**0**	**8,160**	**0**	**0**
			125.28	*0.00*	*906.71*	*0.00*	
Medium Duty And Heavy Duty Cast	**9.00**	**EA**	**1,128**	**0**	**8,160**	**0**	**0**
			125.28	*0.00*	*906.71*	*0.00*	
Medium Duty And Heavy Duty Cast	9.00	EA	1,128	0	8,160	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
PLUMBING EQUIPMENT	**1.00**	**LS**	**1,411**	**0**	**87,955**	**0**	**0**
DOMESTIC WATER SUPPLY EQUIPMENT	**1.00**	**LS**	**1,411**	**0**	**87,955**	**0**	**0**
			1,411.23	*0.00*	*87,955.14*	*0.00*	
Water Supply Equip - 5678.12	**1.00**	**EA**	**1,411**	**0**	**87,955**	**0**	**0**
			1,411.23	*0.00*	*87,955.14*	*0.00*	
Water heater, oil fired, glass lined, 440 kW input, 1510 mL/s, includes standard controls, excludes vent	1.00	EA	1,411	0	87,955	0	0
			302.48	*0.57*	*495.70*	*0.00*	
H.V.A.C	**1,160.00**	**M2**	**350,880**	**661**	**575,018**	**0**	**0**
ENERGY SUPPLY	**1.00**	**LS**	**3,392**	**661**	**108,574**	**0**	**0**
FUEL OIL SYSTEM	**1.00**	**LS**	**3,392**	**661**	**108,574**	**0**	**0**
			1,752.87	*0.00*	*103,419.78*	*0.00*	
Storage Tanks, steel, above ground, double wall, 75 708 liter, incl. cradles, coating & fittings, excl. foundation, pumps or piping	1.00	EA	1,753	0	103,420	0	0
			25.00	*0.18*	*30.12*	*0.00*	
Fuel oil piping 25 mm diameter, schedule 40, excludes excavation or backfill	10.00	M	250	2	301	0	0
			21.39	*19.00*	*0.00*	*0.00*	
Excavating, utility trench, common earth, 24" wide, 30" deep, cable/wire burial, includes backfill	10.00	M	214	190	0	0	0
			58.77	*23.46*	*242.67*	*0.00*	
Tank Slab 200mm	20.00	M2	1,175	469	4,853	0	0
HEAT GENERATING SYSTEM	**1.00**	**LS**	**204,349**	**0**	**298,624**	**0**	**0**
			176.26	*0.00*	*257.58*	*0.00*	
Oil fired heat generation-parametric based on a similar type bush facility	1,159.33	M2	204,349	0	298,624	0	0
			48.53	*0.00*	*41.95*	*0.00*	
CONTROLS & INSTRUMENTATION	**1,160.00**	**M2**	**56,297**	**0**	**48,662**	**0**	**0**
HVAC CONTROLS	**1.00**	**LS**	**56,297**	**0**	**48,662**	**0**	**0**
			48.53	*0.00*	*41.95*	*0.00*	
DDC Control System-parametric	**1,160.00**	**M2**	**56,297**	**0**	**48,662**	**0**	**0**
			48.53	*0.00*	*41.95*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
DDC Control system-parametric	1,160.00	M2	56,297	0	48,662	0	0
SYSTEMS TESTING & BALANCING	**1.00**	**LS**	**12,000**	**0**	**2,577**	**0**	**0**
TESTING & BALANCING,	**1.00**	**LS**	**12,000**	**0**	**2,577**	**0**	**0**
			150.00	*0.00*	*32.22*	*0.00*	
Test and balance mechanical system	**80.00**	**HR**	**12,000**	**0**	**2,577**	**0**	**0**
			150.00	*0.00*	*32.22*	*0.00*	
Test and balance mechanical system	80.00	HR	12,000	0	2,577	0	0
			64.52	*0.00*	*100.50*	*0.00*	
Ventilation System, Mechanical	**1,160.00**	**M2**	**74,841**	**0**	**116,580**	**0**	**0**
			64.52	*0.00*	*100.50*	*0.00*	
Ventilation System, Mechanical parametric based on similar facility	1,160.00	M2	74,841	0	116,580	0	0
			101.12	*0.17*	*204.91*	*0.00*	
ELECTRIC POWER & LIGHTING	**1,160.00**	**M2**	**117,298**	**199**	**237,696**	**0**	**0**
			24.39	*0.25*	*100.24*	*0.00*	
SERVICE AND DISTRIBUTION	**800.00**	**EA**	**19,511**	**199**	**80,189**	**0**	**0**
			1,360.73	*0.00*	*12,242.84*	*0.00*	
Meter center, main fusible swich, rainproof, 1P 3W 120/240 V, 800 A	1.00	EA	1,361	0	12,243	0	0
			1,907.03	*199.22*	*27,143.67*	*0.00*	
Dry type transformer, single phase 480 V primary 120/240 V secondary, 167 kVA	1.00	EA	1,907	199	27,144	0	0
			768.81	*0.00*	*3,382.89*	*0.00*	
Panelboards, 3 phase 4 wire, main lugs, 277/480 V, 600 A	1.00	EA	769	0	3,383	0	0
			2,196.60	*0.00*	*10,148.67*	*0.00*	
Panelboards, assembled, 3 ph, 3 wire, main breaker, 277/480 V, 225 A, 42 - 20 A breakers	2.00	EA	4,393	0	20,297	0	0
			1,464.40	*0.00*	*5,557.61*	*0.00*	
Panelboards, assembled, 3 ph, 3 wire, main breaker, 277/480 V, 100 A, 24 - 20 A breakers	1.00	EA	1,464	0	5,558	0	0
Grounding allowance	1.00	LS	6,663	0	4,833	0	0
			100.89	*0.00*	*280.30*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Rigid galvanized steel conduit, 100 mm diameter, to 4.6 m H, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	15.00	M	1,513	0	4,204	0	0
			44.83	*0.00*	*86.99*	*0.00*	
Rigid galvanized steel conduit, 50 mm diameter, to 4.6 m H, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	15.00	M	672	0	1,305	0	0
			6.51	*0.00*	*12.47*	*0.00*	
Wire, aluminum, stranded, 600 V, 4/0, type THW, in raceway	50.00	M	325	0	623	0	0
			3.81	*0.00*	*4.35*	*0.00*	
Wire, aluminum, stranded, 600 V, #2, type THW, in raceway	50.00	M	190	0	217	0	0
			5.04	*0.00*	*7.64*	*0.00*	
Wire, aluminum, stranded, 600 V, 1/0, type THW, in raceway	50.00	M	252	0	382	0	0
			84.30	*0.00*	*135.78*	*0.00*	
LIGHTING & BRANCH WIRING	**1,160.00**	**M2**	**97,787**	**0**	**157,507**	**0**	**0**
			451.59	*0.00*	*709.93*	*0.00*	
BRANCH WIRING	**122.00**	**EA**	**55,094**	**0**	**86,612**	**0**	**0**
			22.78	*0.00*	*101.49*	*0.00*	
Duplex receptacle, ground fault interrupting, 20 amp	5.00	EA	114	0	507	0	0
			103.62	*0.00*	*95.01*	*0.00*	
120 Volt, 20 Amp Duplex	**5.00**	**EA**	**518**	**0**	**475**	**0**	**0**
			103.62	*0.00*	*95.01*	*0.00*	
120 Volt, 20 Amp Duplex	5.00	EA	518	0	475	0	0
			61.51	*0.00*	*77.55*	*0.00*	
120 Volt, 20 Amp Duplex	**50.00**	**EA**	**3,076**	**0**	**3,877**	**0**	**0**
			61.51	*0.00*	*77.55*	*0.00*	
120 Volt, 20 Amp Duplex	50.00	EA	3,076	0	3,877	0	0
			64.17	*0.00*	*111.65*	*0.00*	
Duplex Receptacle Long Run	**18.00**	**EA**	**1,155**	**0**	**2,010**	**0**	**0**
			64.17	*0.00*	*111.65*	*0.00*	
Duplex Receptacle Long Run	18.00	EA	1,155	0	2,010	0	0
			33.04	*0.00*	*133.77*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
120 Volt, 15 Amp Duplex Ground	**2.00**	**EA**	**66**	**0**	**268**	**0**	**0**
			33.04	*0.00*	*133.77*	*0.00*	
120 Volt, 15 Amp Duplex Ground	2.00	EA	66	0	268	0	0
			143.63	*0.00*	*159.14*	*0.00*	
120 Volt, 20 Amp Duplex Ground	**10.00**	**EA**	**1,436**	**0**	**1,591**	**0**	**0**
			52.37	*0.00*	*56.19*	*0.00*	
120 Volt, 20 Amp Duplex Ground	10.00	EA	524	0	562	0	0
			91.26	*0.00*	*102.95*	*0.00*	
Duplex Rcpt w/GFI,120V,20A,CnclS pecialty Devices	10.00	EA	913	0	1,029	0	0
			85.69	*0.00*	*141.34*	*0.00*	
120 Volt, 30 Amp Twistlock	**1.00**	**EA**	**86**	**0**	**141**	**0**	**0**
			85.69	*0.00*	*141.34*	*0.00*	
120 Volt, 30 Amp Twistlock	1.00	EA	86	0	141	0	0
			140.61	*0.00*	*257.55*	*0.00*	
230 Volt, 30 Amp Receptacle -	**6.00**	**EA**	**844**	**0**	**1,545**	**0**	**0**
			140.61	*0.00*	*257.55*	*0.00*	
230 Volt, 30 Amp Receptacle -	6.00	EA	844	0	1,545	0	0
			98.50	*0.00*	*240.09*	*0.00*	
230 Volt, 30 Amp Receptacle -	**5.00**	**EA**	**492**	**0**	**1,200**	**0**	**0**
			98.50	*0.00*	*240.09*	*0.00*	
230 Volt, 30 Amp Receptacle -	5.00	EA	492	0	1,200	0	0
			308.13	*0.00*	*999.47*	*0.00*	
Equipment Connections For Up To	**15.00**	**EA**	**4,622**	**0**	**14,992**	**0**	**0**
			308.13	*0.00*	*999.47*	*0.00*	
Equipment Connections For Up To	15.00	EA	4,622	0	14,992	0	0
			330.50	*0.00*	*1,052.72*	*0.00*	
Equipment Connections For Up To	**3.00**	**EA**	**992**	**0**	**3,158**	**0**	**0**
			330.50	*0.00*	*1,052.72*	*0.00*	
Equipment Connections For Up To	3.00	EA	992	0	3,158	0	0
			407.29	*0.00*	*1,336.72*	*0.00*	
480 Volt Equipment Connections	**1.00**	**EA**	**407**	**0**	**1,337**	**0**	**0**
			407.29	*0.00*	*1,336.72*	*0.00*	
480 Volt Equipment Connections	1.00	EA	407	0	1,337	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			432.58	*0.00*	*1,198.90*	*0.00*	
480 Volt Equipment Connections	**1.00**	**EA**	**433**	**0**	**1,199**	**0**	**0**
			432.58	*0.00*	*1,198.90*	*0.00*	
480 Volt Equipment Connections	1.00	EA	433	0	1,199	0	0
			154.06	*0.00*	*119.80*	*0.00*	
120 Volt 20 Amp Single Pole	**2.00**	**EA**	**308**	**0**	**240**	**0**	**0**
			102.71	*0.00*	*79.87*	*0.00*	
120 Volt 20 Amp Single Pole	3.00	EA	308	0	240	0	0
			30.12	*0.00*	*40.17*	*0.00*	
Conduit and conductor lighting & power	**1,346.00**	**M**	**40,546**	**0**	**54,071**	**0**	**0**
			3.91	*0.00*	*10.05*	*0.00*	
Wire, copper, stranded, 600 V, #8, type THWN-THHN, in raceway	1,346.00	M	5,263	0	13,530	0	0
			3.28	*0.00*	*6.35*	*0.00*	
Wire, copper, stranded, 600 V, #10, type THWN-THHN, in raceway	1,889.98	M	6,193	0	11,996	0	0
			2.52	*0.00*	*3.48*	*0.00*	
Wire, copper, stranded, 600 V, #12, type THWN-THHN, in raceway	2,682.97	M	6,765	0	9,336	0	0
			20.98	*0.00*	*29.06*	*0.00*	
Electric metallic tubing (EMT), 25 mm diameter, to 4.6 m high, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	202.00	M	4,239	0	5,870	0	0
			16.98	*0.00*	*13.53*	*0.00*	
Electric metallic tubing (EMT), 20 mm diameter, to 4.6 m high, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	472.99	M	8,033	0	6,400	0	0
			14.98	*0.00*	*10.34*	*0.00*	
Electric metallic tubing (EMT), 15 mm diameter, to 4.6 m high, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	670.99	M	10,054	0	6,939	0	0
			163.57	*0.00*	*271.63*	*0.00*	
LIGHTING EQUIPMENT	**261.00**	**EA**	**42,693**	**0**	**70,895**	**0**	**0**
			51.25	*0.00*	*35.44*	*0.00*	
Switch, SPST, 120 volt, 20 amp, exposed, complete	18.00	EA	923	0	638	0	0
			124.06	*0.00*	*187.58*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Four Foot Strip Fluorescent	**9.00**	**EA**	**1,117**	**0**	**1,688**	**0**	**0**
			124.06	*0.00*	*187.58*	*0.00*	
Four Foot Strip Fluorescent	9.00	EA	1,117	0	1,688	0	0
			146.03	*0.00*	*251.66*	*0.00*	
2' X 4' Lay-In Fluorescent	**30.00**	**EA**	**4,381**	**0**	**7,550**	**0**	**0**
			146.03	*0.00*	*251.66*	*0.00*	
2' X 4' Lay-In Fluorescent	30.00	EA	4,381	0	7,550	0	0
			143.66	*0.00*	*242.51*	*0.00*	
Fluorescent Troffer W/Parabolic	**40.00**	**EA**	**5,746**	**0**	**9,700**	**0**	**0**
			143.66	*0.00*	*242.51*	*0.00*	
Fluorescent Troffer W/Parabolic	40.00	EA	5,746	0	9,700	0	0
			229.08	*0.00*	*417.58*	*0.00*	
2' X 4' Lay-In Fluorescent	**11.00**	**EA**	**2,520**	**0**	**4,593**	**0**	**0**
			229.08	*0.00*	*417.58*	*0.00*	
2' X 4' Lay-In Fluorescent	11.00	EA	2,520	0	4,593	0	0
			162.61	*0.00*	*393.93*	*0.00*	
4' Vapor Tight Fluorescent	**8.00**	**EA**	**1,301**	**0**	**3,151**	**0**	**0**
			162.61	*0.00*	*393.93*	*0.00*	
4' Vapor Tight Fluorescent	8.00	EA	1,301	0	3,151	0	0
			142.51	*0.00*	*374.44*	*0.00*	
Surface Mounted 1' X 4'	**6.00**	**EA**	**855**	**0**	**2,247**	**0**	**0**
			142.51	*0.00*	*374.44*	*0.00*	
Surface Mounted 1' X 4'	6.00	EA	855	0	2,247	0	0
			141.64	*0.00*	*275.78*	*0.00*	
Ceiling Recessed Incandescent	**3.00**	**EA**	**425**	**0**	**827**	**0**	**0**
			141.64	*0.00*	*275.78*	*0.00*	
Ceiling Recessed Incandescent	3.00	EA	425	0	827	0	0
			175.44	*0.00*	*236.06*	*0.00*	
Recessed Fluorescent Square	**110.00**	**EA**	**19,298**	**0**	**25,967**	**0**	**0**
			175.44	*0.00*	*236.06*	*0.00*	
Recessed Fluorescent Square	110.00	EA	19,298	0	25,967	0	0
			64.22	*0.00*	*91.08*	*0.00*	
Recessed Fluorescent Down Light	**22.00**	**EA**	**1,413**	**0**	**2,004**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			64.22	*0.00*	*91.08*	*0.00*	
Recessed Fluorescent Down Light	22.00	EA	1,413	0	2,004	0	0
			165.85	*0.00*	*435.82*	*0.00*	
Recessed Fluorescent Down Light	**5.00**	**EA**	**829**	**0**	**2,179**	**0**	**0**
			165.85	*0.00*	*435.82*	*0.00*	
Recessed Fluorescent Down Light	5.00	EA	829	0	2,179	0	0
			246.94	*0.00*	*812.77*	*0.00*	
150 Watt Hps Recessed Fixture	**8.00**	**EA**	**1,975**	**0**	**6,502**	**0**	**0**
			246.94	*0.00*	*812.77*	*0.00*	
150 Watt Hps Recessed Fixture	8.00	EA	1,975	0	6,502	0	0
			268.86	*0.00*	*389.10*	*0.00*	
Vapor Tight Incandescent	**2.00**	**EA**	**538**	**0**	**778**	**0**	**0**
			268.86	*0.00*	*389.10*	*0.00*	
Vapor Tight Incandescent	2.00	EA	538	0	778	0	0
			196.03	*0.00*	*438.47*	*0.00*	
Exit Light With Battery Backup	**7.00**	**EA**	**1,372**	**0**	**3,069**	**0**	**0**
			196.03	*0.00*	*438.47*	*0.00*	
Exit Light With Battery Backup	7.00	EA	1,372	0	3,069	0	0
			29.91	*0.61*	*222.27*	*0.00*	
ELECTRICAL SYSTEMS	**1,160.00**	**M**	**34,693**	**711**	**257,828**	**0**	**0**
			16.49	*0.00*	*41.60*	*0.00*	
COMMUNICATION, SECURITY, &	**1,160.00**	**M2**	**19,129**	**0**	**48,259**	**0**	**0**
			15.03	*0.00*	*27.27*	*0.00*	
FIRE ALARM SYSTEMS	**1,160.00**	**M2**	**17,436**	**0**	**31,633**	**0**	**0**
			425.28	*0.00*	*771.54*	*0.00*	
FIRE ALARM	**41.00**	**EA**	**17,436**	**0**	**31,633**	**0**	**0**
			158.97	*0.00*	*268.89*	*0.00*	
Fire Alarm Horn Light	41.00	EA	6,518	0	11,025	0	0
			975.09	*0.00*	*2,964.06*	*0.00*	
Fire Alarm & Detection, control panel, 4 zone	1.00	EA	975	0	2,964	0	0
			78.01	*0.00*	*328.62*	*0.00*	
Fire Alarm & Detection, detectors, photoelectric smoke, single stage, 120V	21.00	EA	1,638	0	6,901	0	0
			82.11	*0.00*	*93.43*	*0.00*	

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Fire Alarm, pull station, manual, standard	4.00	EA	328	0	374	0	0
Fire Alarm, alarm testing, level annunciation, set point type	1.00	LS	1,677	0	0	0	0
			15.52	*0.00*	*10.37*	*0.00*	
Electric metallic tubing (EMT), 20 mm diameter, to 4.6 m high, incl 2 terminations, 2 elbows & 11 beam clamps per 30.5 m	305.00	M	4,734	0	3,164	0	0
			2.89	*0.00*	*18.36*	*0.00*	
Fire alarm cable, FEP teflon, 150 V, to 200 Deg.C, #22, 4 pair	330.00	M	953	0	6,060	0	0
			306.44	*0.00*	*572.84*	*0.00*	
Fire Alarm Duct Smoke Detector	2.00	EA	613	0	1,146	0	0
			0.90	*0.00*	*12.56*	*0.00*	
TELEPHONE SYSTEMS	**1,160.00**	**M2**	**1,047**	**0**	**14,566**	**0**	**0**
			261.76	*0.00*	*3,641.47*	*0.00*	
Sattelite phone	**4.00**	**EA**	**1,047**	**0**	**14,566**	**0**	**0**
			6.08	*0.00*	*3.39*	*0.00*	
1" EMT W/Coupling & Supp.	20.00	M	122	0	68	0	0
			925.42	*0.00*	*14,498.10*	*0.00*	
Sattelite phone antenna and base station	1.00	EA	925	0	14,498	0	0
			0.56	*0.00*	*1.78*	*0.00*	
PUBLIC ADDRESS SYSTEMS	**1,160.00**	**M2**	**645**	**0**	**2,060**	**0**	**0**
			2.36	*0.00*	*7.53*	*0.00*	
Sound And Public Address	**273.58**	**M2**	**645**	**0**	**2,060**	**0**	**0**
			0.56	*0.00*	*1.77*	*0.00*	
Sound And Public Address	1,160.97	M2	645	0	2,060	0	0
SPECIAL ELECTRICAL SYSTEMS	**1.00**	**LS**	**15,564**	**711**	**209,569**	**0**	**0**
EMERGENCY LIGHTING & POWER	**1.00**	**LS**	**6,811**	**711**	**158,835**	**0**	**0**
			6,810.83	*711.49*	*158,834.74*	*0.00*	
300 KW Diesel Generator	**1.00**	**EA**	**6,811**	**711**	**158,835**	**0**	**0**
			6,810.83	*711.49*	*158,834.74*	*0.00*	
Generator set, diesel, 3 phase 4 wire, 277/480 V, 300 kW, incl battery, charger, muffler & automatic transfer switch, excl conduit, wiring, & concrete	1.00	EA	6,811	711	158,835	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
ENERGY MANAGEMENT CONTROL	**1.00**	**LS**	**8,753**	**0**	**50,734**	**0**	**0**
			673.34	*0.00*	*3,902.64*	*0.00*	
Energy Management Control	**13.00**	**EA**	**8,753**	**0**	**50,734**	**0**	**0**
			0.00	*0.00*	*500.22*	*0.00*	
Energy Monitoring & Control Syst ems, field test	13.00	EA	0	0	6,503	0	0
			0.00	*0.00*	*1,127.63*	*0.00*	
Energy Monitoring & Control Syst ems, checkout/startup of control	13.00	EA	0	0	14,659	0	0
			673.34	*0.00*	*2,159.75*	*0.00*	
Energy Management Control	13.00	EA	8,753	0	28,077	0	0
			0.00	*0.00*	*20,007.38*	*0.00*	
Energy Monitoring & Control Syst ems, field equipment, processing	0.07	EA	0	0	1,496	0	0
			4.40	*0.00*	*46.46*	*0.00*	
EQUIPMENT	**1,160.00**	**M2**	**5,107**	**0**	**53,897**	**0**	**0**
FIXED & MOVEABLE EQUIPMENT	**1.00**	**LS**	**5,107**	**0**	**53,897**	**0**	**0**
FOOD SERVICE EQUIPMENT	**1.00**	**LS**	**5,000**	**0**	**45,000**	**0**	**0**
			5,000.00	*0.00*	*45,000.00*	*0.00*	
Commercial Kitchen Equipment	1.00	EA	5,000	0	45,000	0	0
CLINIC & OFFICE EQUIPMENT	**1.00**	**LS**	**107**	**0**	**8,897**	**0**	**0**
			35.73	*0.00*	*2,965.56*	*0.00*	
Clinic & Office Equipment	**3.00**	**EA**	**107**	**0**	**8,897**	**0**	**0**
			35.73	*0.00*	*2,965.56*	*0.00*	
Clinic & Office Equipment	3.00	EA	107	0	8,897	0	0
			48.89	*18.61*	*173.24*	*0.00*	
SPECIAL CONSTRUCTION	**1,160.00**	**M2**	**56,708**	**21,590**	**200,960**	**0**	**0**
			48.89	*18.61*	*173.24*	*0.00*	
PRE_ENGINEERED STRUCTURE	**1,160.00**	**M2**	**56,708**	**21,590**	**200,960**	**0**	**0**
			46.82	*17.46*	*165.92*	*0.00*	
Pre-Eng Steel Bldg, single post 2-span frame, roofing & siding with ext closure and roof, 30m W x 4.2m eave H	1,159.36	M2	54,284	20,243	192,364	0	0
			2.09	*1.16*	*7.41*	*0.00*	
Seismic Modifications	**1,160.00**	**M2**	**2,424**	**1,347**	**8,596**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
Generic Equipment	1,160.00	LS	0	1,347	0	0	0
Generic Labor	1,160.00	LS	2,424	0	0	0	0
Generic Material	1,334.00	LS	0	0	8,596	0	0
SITE WORK	**1.00**	**LS**	**496,119**	**5,900,905**	**5,532,824**	**0**	**0**
			66.22	*18.02*	*170.31*	*0.00*	
SANITARY SEWER	**1,067.00**	**M**	**70,653**	**19,232**	**181,724**	**0**	**0**
SITE PREPARATION	**1.00**	**LS**	**22,271**	**6,593**	**44,629**	**0**	**0**
SITE EARTHWORK	**1.00**	**LS**	**22,271**	**6,593**	**44,629**	**0**	**0**
COMMON EXCAVATION & DISPOSAL	**1.00**	**LS**	**2,718**	**2,081**	**0**	**0**	**0**
			60.50	*46.32*	*0.00*	*0.00*	
Cat 225, 1.15m3 (1.5 CY),	**44.93**	**M3**	**2,718**	**2,081**	**0**	**0**	**0**
			0.68	*0.52*	*0.00*	*0.00*	
Excavating, trench, medium soil, 6' to 10' deep, 1-1/2 C.Y. buck	4,000.39	BM3	2,718	2,081	0	0	0
FILL & BORROW	**1.00**	**LS**	**4,594**	**3,492**	**44,629**	**0**	**0**
			106.73	*81.20*	*0.00*	*0.00*	
950, 2.29m3 (3 CY), Backfill	**37.49**	**M3**	**4,002**	**3,044**	**0**	**0**	**0**
			1.18	*0.89*	*0.00*	*0.00*	
Trench Bkfill, 3CY, 950	3,405.33	M3	4,002	3,044	0	0	0
			83.27	*62.86*	*6,268.94*	*0.00*	
950, 2.29m3 (3 CY), Delivered &	**7.12**	**M3**	**593**	**448**	**44,629**	**0**	**0**
			1.00	*0.75*	*75.00*	*0.00*	
Sand Bkfill, 950 Dumped	595.06	M3	593	448	44,629	0	0
COMPACTION	**1.00**	**LS**	**14,958**	**1,020**	**0**	**0**	**0**
			398.97	*27.21*	*0.00*	*0.00*	
Compact Soil W/Vibrating Plate	**37.49**	**M3**	**14,958**	**1,020**	**0**	**0**	**0**
			3.25	*0.22*	*0.00*	*0.00*	
Compaction, around structures an d trenches, 2 passes, 18" wide,	4,595.44	EM3	14,958	1,020	0	0	0
SMALL SEWAGE LAGOON DEVELOPMENT ALLOWANCE	**2.00**	**LS**	**7,145**	**1,663**	**17,515**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			3.00	*0.26*	*14.00*	*0.00*	
Membrane lining systems, HDPE, 9290 m2 or more, 3 mm	375.00	M2	1,126	99	5,250	0	0
			1.26	*1.07*	*0.00*	*0.00*	
Excavating, bulk bank measure, 1.5 m3 capacity = 99 m3/hour, backhoe, hydraulic, crawler mounted	670.00	BM3	842	717	0	0	0
			9.13	*0.96*	*18.00*	*0.00*	
Lagoon cover	350.00	M2	3,194	336	6,300	0	0
			19.28	*4.98*	*65.50*	*0.00*	
Chain link fence, industrial, galvanized steel, 4.9 mm wire, 50 mm posts @ 3 m O.C., 1800 mm high, includes excavation	80.00	M	1,543	398	5,240	0	0
			440.84	*113.82*	*725.00*	*0.00*	
Chain link fence, double swing gates, 1800 mm high, 3.7 m opening, includes excavation	1.00	OPN	441	114	725	0	0
SITE CIVIL/MECHANICAL UTILITIES	**1.00**	**LS**	**41,237**	**10,976**	**119,580**	**0**	**0**
SANITARY SEWER SYSTEMS	**1.00**	**LS**	**41,237**	**10,976**	**119,580**	**0**	**0**
SANITARY SEWER PIPING	**1.00**	**LS**	**41,237**	**10,976**	**119,580**	**0**	**0**
			631.20	*79.69*	*915.00*	*0.00*	
Manholes, concrete, precast, 1200 mm I.D., 1800 mm deep, excludes base, excavation, backfill, frame and cover	4.00	EA	2,525	319	3,660	0	0
			36.28	*9.99*	*108.64*	*0.00*	
203.20mm (8") PVC Pipe Sanitary	**1,066.99**	**M**	**38,712**	**10,657**	**115,920**	**0**	**0**
			64.52	*17.76*	*193.20*	*0.00*	
6" HDPE Arctic Pipe including excavation and backfill	600.00	M	38,712	10,657	115,920	0	0
ACCESS ROADS	**1.00**	**LS**	**355,794**	**255,838**	**4,879,727**	**0**	**0**
SITE IMPROVEMENTS	**1.00**	**LS**	**300,373**	**248,058**	**4,748,206**	**0**	**0**
ROADWAYS	**1.00**	**LS**	**300,373**	**248,058**	**4,748,206**	**0**	**0**
BASES AND SUBBASES	**1.00**	**LS**	**300,373**	**248,058**	**4,748,206**	**0**	**0**
			10.18	*8.40*	*160.87*	*0.00*	
Gravel, Delivered & Dumped	**29,516.42**	**M3**	**300,373**	**248,058**	**4,748,206**	**0**	**0**
			3.70	*1.65*	*75.00*	*0.00*	
Pit Run Gravel	25,919.00	M3	96,006	42,665	1,943,925	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			3.60	*5.10*	*85.00*	*0.00*	
D-1 sub-base	4,572.44	M3	16,458	23,297	388,658	0	0
			0.64	*0.54*	*0.00*	*0.00*	
Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	86,915.88	M2	55,684	47,107	0	0	0
			0.19	*0.02*	*3.61*	*0.00*	
Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	86,915.88	M2	16,806	1,826	313,453	0	0
			0.79	*1.13*	*35.00*	*0.00*	
Locally available silty sand base	60,062.00	LM3	47,666	68,097	2,102,170	0	0
			0.75	*0.72*	*0.00*	*0.00*	
Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	90,565.77	EM3	67,753	65,065	0	0	0
SITE CIVIL/MECHANICAL UTILITIES	**1.00**	**LS**	**55,422**	**7,780**	**131,521**	**0**	**0**
STORM SEWER SYSTEMS	**1.00**	**LS**	**55,422**	**7,780**	**131,521**	**0**	**0**
CULVERTS	**1.00**	**LS**	**55,422**	**7,780**	**131,521**	**0**	**0**
			5,542.16	*777.97*	*13,152.09*	*0.00*	
10.36m (34') Complete, 609.60mm	**10.00**	**EA**	**55,422**	**7,780**	**131,521**	**0**	**0**
			5,542.16	*777.97*	*13,152.09*	*0.00*	
10.36m (34') Complete, 609.60mm	10.00	EA	55,422	7,780	131,521	0	0
BARGING COSTS OF ROAD & FILL AGGREGATE	**1.00**	**LS**	**0**	**5,583,600**	**0**	**0**	**0**
			0.00	*60.00*	*0.00*	*0.00*	
BARGING COSTS OF FILL MATERIALS	93,060.00	M3	0	5,583,600	0	0	0
WATER DISTRIBUTION	**1.00**	**LS**	**32,143**	**6,414**	**50,437**	**0**	**0**
SITE PREPARATION	**1.00**	**LS**	**11,108**	**3,572**	**16,345**	**0**	**0**
SITE EARTHWORK	**1.00**	**LS**	**11,108**	**3,572**	**16,345**	**0**	**0**
COMMON EXCAVATION & DISPOSAL	**1.00**	**LS**	**994**	**761**	**0**	**0**	**0**
			0.68	*0.52*	*0.00*	*0.00*	
Cat 225, 1.15m3 (1.5 CY),	**1,462.82**	**M3**	**994**	**761**	**0**	**0**	**0**
			0.68	*0.52*	*0.00*	*0.00*	
Excavating, trench, medium soil, 6' to 10' deep, 1-1/2 C.Y. buck	1,462.82	BM3	994	761	0	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
FILL & BORROW	**1.00**	**LS**	**2,302**	**2,104**	**16,345**	**0**	**0**
			1.18	*0.89*	*0.00*	*0.00*	
950, 2.29m3 (3 CY), Backfill	**1,247.18**	**M3**	**1,466**	**1,115**	**0**	**0**	**0**
			1.18	*0.89*	*0.00*	*0.00*	
Trench Bkfill, 3CY, 950	1,247.18	M3	1,466	1,115	0	0	0
			3.84	*4.54*	*75.00*	*0.00*	
950, 2.29m3 (3 CY), Delivered &	**217.93**	**M3**	**836**	**989**	**16,345**	**0**	**0**
			3.84	*4.54*	*75.00*	*0.00*	
Aggregrate base course, for road ways and large paved areas, sand	217.93	M3	836	989	16,345	0	0
COMPACTION	**1.00**	**LS**	**7,813**	**707**	**0**	**0**	**0**
			3.25	*0.22*	*0.00*	*0.00*	
Compact Soil W/Vibrating Plate	**1,247.18**	**M3**	**4,060**	**277**	**0**	**0**	**0**
			3.25	*0.22*	*0.00*	*0.00*	
Compaction, around structures an d trenches, 2 passes, 18" wide,	1,247.18	EM3	4,060	277	0	0	0
			17.22	*1.98*	*0.00*	*0.00*	
Compact With Pogosticks	**217.93**	**M3**	**3,753**	**431**	**0**	**0**	**0**
			17.22	*1.98*	*0.00*	*0.00*	
Backfill and compact, by hand, 6 " layers, air rammer/tamper	217.93	EM3	3,753	431	0	0	0
SITE CIVIL/MECHANICAL UTILITIES	**1.00**	**LS**	**21,035**	**2,842**	**34,092**	**0**	**0**
WATER SUPPLY & DISTRIBUTION	**1.00**	**LS**	**21,035**	**2,842**	**34,092**	**0**	**0**
			22.99	*3.11*	*37.26*	*0.00*	
POTABLE WATER DISTRIBUTION	**915.00**	**M**	**21,035**	**2,842**	**34,092**	**0**	**0**
			1,956.15	*176.30*	*12,316.50*	*0.00*	
Wells, domestic water, pump, 3.7 kW, installed in wells, 100 mm submersible, to 55 m deep	1.00	EA	1,956	176	12,317	0	0
			19.60	*2.82*	*21.09*	*0.00*	
Piping, HDPE, butt fusion joints, 12 m lengths, 100 mm diameter, SDR 21	945.00	M	18,524	2,666	19,931	0	0
			554.80	*0.00*	*1,845.00*	*0.00*	
Well Head Enclosure	**1.00**	**EA**	**555**	**0**	**1,845**	**0**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			61.64	*0.00*	*205.00*	*0.00*	
Well Head Shelter	9.00	M2	555	0	1,845	0	0
EXCAVATION, CUT AND FILL AT BUILDING SITE	**1.00**	**LS**	**34,938**	**35,023**	**416,125**	**0**	**0**
			33,920.37	*34,002.87*	*404,005.00*	*0.00*	
SITE PREPARATION	**1.03**	**HEC**	**34,938**	**35,023**	**416,125**	**0**	**0**
SITE EARTHWORK	**1.00**	**LS**	**34,938**	**35,023**	**416,125**	**0**	**0**
FILL & BORROW, AT STRUCTURE	**1.00**	**LS**	**34,938**	**35,023**	**416,125**	**0**	**0**
			3.60	*5.10*	*23.50*	*0.00*	
D-1 sub-base	466.00	M3	1,677	2,374	10,951	0	0
			3.70	*1.65*	*35.00*	*0.00*	
Pit Run Gravel	3,138.00	M3	11,623	5,165	109,830	0	0
			0.19	*0.02*	*1.12*	*0.00*	
Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	10,282.75	M2	1,988	216	11,517	0	0
			0.79	*1.13*	*20.00*	*0.00*	
Locally available silty sand base	14,191.37	LM3	11,262	16,090	283,827	0	0
			0.47	*0.63*	*0.00*	*0.00*	
Spread and compact, roadway enba nkment, 6" lift, sheepsfoot roll	17,796.72	EM3	8,387	11,177	0	0	0
			2,590.68	*797.53*	*4,810.00*	*0.00*	
LANDFILL	**1.00**	**EA**	**2,591**	**798**	**4,810**	**0**	**0**
			19.28	*4.98*	*42.00*	*0.00*	
Chain link fence, industrial, galvanized steel, 3 strands barb wire, 50 mm posts @ 3 m Oc, 3.9 mm wire, 1800 mm high, remove fabric ties, top rail & couplings, includes excavation	80.00	M	1,543	398	3,360	0	0
			440.84	*113.82*	*725.00*	*0.00*	
Chain link fence, double swing gates, 1800 mm high, 3.7 m opening, includes excavation	2.00	OPN	882	228	1,450	0	0
			2.08	*2.14*	*0.00*	*0.00*	
Excavating, bulk bank measure, 1.5 m3 capacity = 99 m3/hour, backhoe, hydraulic, crawler mounted	80.00	BM3	166	172	0	0	0
			161,479.63	*1,863,510.32-*	*1,865,972.48*	*1,000,000.00*	
OPTIONS	**1.00**	**EA**	**161,480**	**1,863,510-**	**1,865,972**	**1,000,000**	**0**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			234,059.87	*165,764.20*	*3,212,577.88*	*1,000,000.00*	
QUARRY DEVELOPMENT	**1.00**	**EA**	**234,060**	**165,764**	**3,212,578**	**1,000,000**	**0**
Budget Allowance for quarry development per BC Contractors	1.00	LS	0	0	0	1,000,000	0
			234,059.87	*165,764.20*	*3,212,577.88*	*0.00*	
QUARRY ROAD DEVELOPMENT	**1.00**	**EA**	**234,060**	**165,764**	**3,212,578**	**0**	**0**
			3.70	*1.65*	*75.00*	*0.00*	
Pit Run Gravel	27,394.00	M3	101,470	45,093	2,054,550	0	0
			3.60	*5.10*	*85.00*	*0.00*	
D-1 sub-base	3,304.00	M3	11,893	16,834	280,840	0	0
			0.19	*0.02*	*3.61*	*0.00*	
Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	81,169.00	M2	15,695	1,705	292,728	0	0
			0.79	*1.13*	*30.00*	*0.00*	
Locally available silty sand base	19,482.00	LM3	15,461	22,088	584,460	0	0
			0.75	*0.72*	*0.00*	*0.00*	
Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	50,180.00	EM3	37,540	36,051	0	0	0
			0.64	*0.54*	*0.00*	*0.00*	
Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	81,169.00	M2	52,002	43,992	0	0	0
			30,034.00-	*499,544.01-*	*476,668.08-*	*0.00*	
12' Road at 6% grade	**1.00**	**EA**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
ACCESS ROADS	**1.00**	**LS**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
SITE IMPROVEMENTS	**1.00**	**LS**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
ROADWAYS	**1.00**	**LS**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
BASES AND SUBBASES	**1.00**	**LS**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
			1.02-	*16.92-*	*16.15-*	*0.00*	
Gravel, Delivered & Dumped	**29,516.42**	**M3**	**30,034-**	**499,544-**	**476,668-**	**0**	**0**
			3.70	*1.65*	*75.00*	*0.00*	
Pit Run Gravel	3,406.00-	M3	12,616-	5,607-	255,450-	0	0
			3.60	*5.10*	*85.00*	*0.00*	
D-1 sub-base	1,135.00-	M3	4,085-	5,783-	96,475-	0	0

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectUserCost
			0.64	*0.54*	*0.00*	*0.00*	
Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	5,659.00-	M2	3,626-	3,067-	0	0	0
			0.19	*0.02*	*1.12*	*0.00*	
Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	5,659.00-	M2	1,094-	119-	6,338-	0	0
			0.79	*1.13*	*35.00*	*0.00*	
Locally available silty sand base	3,383.00-	LM3	2,685-	3,836-	118,405-	0	0
			0.75	*0.72*	*0.00*	*0.00*	
Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	7,924.00-	EM3	5,928-	5,693-	0	0	0
			0.00	*60.00*	*0.00*	*0.00*	
BARGING COSTS OF FILL MATERIALS	7,924.00-	M3	0	475,440-	0	0	0
			42,546.25-	*1,529,730.51-*	*869,937.32-*	*0.00*	
18' Road at 10% grade	**1.00**	**EA**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
ACCESS ROADS	**1.00**	**LS**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
SITE IMPROVEMENTS	**1.00**	**LS**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
ROADWAYS	**1.00**	**LS**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
BASES AND SUBBASES	**1.00**	**LS**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
			1.44-	*51.83-*	*29.47-*	*0.00*	
Gravel, Delivered & Dumped	**29,516.42**	**M3**	**42,546-**	**1,529,731-**	**869,937-**	**0**	**0**
			0.64	*0.54*	*0.00*	*0.00*	
Aggregate subbase, prepare and roll sub-base, large areas over 2100 m2	5,386.00-	M2	3,451-	2,919-	0	0	0
			0.19	*0.02*	*1.12*	*0.00*	
Aggregrate base course, for roadways and large paved areas, stabilization fabric, polypropylene, 200 gram/m2	5,386.00-	M2	1,041-	113-	6,032-	0	0
			0.79	*1.13*	*35.00*	*0.00*	
Locally available silty sand base	24,683.00-	LM3	19,589-	27,985-	863,905-	0	0
			0.75	*0.72*	*0.00*	*0.00*	
Compaction, 4 passes, 150 mm lifts, riding, sheepsfoot or wobbly wheel roller	24,683.00-	EM3	18,465-	17,733-	0	0	0
			0.00	*60.00*	*0.00*	*0.00*	
BARGING COSTS OF FILL MATERIALS	24,683.00-	M3	0	1,480,980-	0	0	0

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