# MERTARVIK EVACUATION CENTER (MEC)
## BUILDING SHELL -- 35% CONCEPTUAL DESIGN NARRATIVE

## TABLE OF CONTENTS

## A. INTRODUCTION & GOALS

This conceptual design report has been prepared by LCG Lantech (LCG) for basic architectural and engineering design for the building shell, basic core areas, and any necessary appurtenances for the Mertarvik Evacuation Center (MEC) building. This work is being completed under contract with ANTHC. Initial goals for this project include:

- Provide a facility that will support the eventual relocation of the Village of Newtok, Alaska, with a population of approximately 320.
- Make use of the existing foundation and platform framing (approximately 7,000 square feet) constructed in 2011 by Cornerstone Construction.
- Incorporate an adaptive re-use of the existing 4'X8' SIP's panels previously procured and stored on site.
- Design wall and roof framing components of lightweight components, suitable for light truck transport and construction by hand with limited use of heavy equipment.
- Tie in to the existing well and septic system installed on site.
- Program for phased flexible multi-use space that can serve as a staging area, storage area, meeting space, emergency shelter, classroom space, or other uses.
- Provide a highly energy efficient building shell, with R-values similar to the scheme put forward by CCHRC (walls R-66, roof R-70, soffit R-70).
- Phase the development of this facility, making best use of services provided by the nearby construction camp facility.
- Provide basic (temporary) mechanical and electrical systems to allow usage of the space.

## B. PROPOSED PROGRAM PHASING

The use of this building has been reviewed and discussed numerous times. Will the primary use be an evacuation center for the emergency housing of village residents, or will it have another use related to the village relocation? Any investment in time and funding should result in a building that can readily be put to practical use and ultimately become an asset for the Village of Mertarvik.

To get the MEC project moving, and keep initial construction costs low, we are proposing a phased construction process. This will provide greater flexibility in the future, allowing the interior build-out of the building to best meet the actual needs of the community. The ultimate use and build-out of this shell may evolve over the next 2 to 5 years.

1. Phase I – Pioneering Phase:
    a. Evacuation Shelter: Use of this structure as an evacuation shelter can occur once the building shell is completed. A separation wall would be constructed to provide a multi-use assembly space with a maximum occupancy of approximately 265 persons.
        i. An A-3 assembly space would be a more accurate International Building Code (IBC) occupancy classification. A fire sprinkler and fire

alarm system would not be required if the A-3 occupant load is less than 300 people.

ii. If utilized as a 24-hour emergency shelter, full-time supervision and a fire watch would be recommended. This approach should be reviewed and accepted by the State Fire Marshal.

b. Storage for Logistics and Support: A portion of the building will initially be dedicated to storage for food and supplies needed by evacuees during the transition period before permanent housing is developed.

c. Flexible Multi-Use Space: The initial design and construction will provide a flexible-use building shell, with basic heating, ventilation, and lighting provided.

d. Toilet Rooms and Showers: During this phase, toilets and showers would be available in the construction man-camp facility, and shared with evacuees.

e. Kitchen Facilities: During this phase, commercial kitchen facilities would be located in the construction man-camp facility, and shared with evacuees.

f. Heating and Ventilation Systems: Initial building heat would be provided by oil fired Monitor (Toyo) direct vented wall heaters. Occupied spaces would be ventilated with operable windows or a simplified mechanical ventilation system (controlled with CO detection).

2. Phase II – Programmed Mixed Use:

a. Educational Space: A temporary home for K-12 classrooms could be incorporated into this facility. This would need to be carefully designed to remain within a building without a fire sprinkler system.

i. Use of the facility for educational purposes could result in the need for a fire sprinkler system. Buildings with educational occupancies having 49 or fewer occupants are not required to be sprinklered, by State of Alaska amendment to the IBC.

ii. Layouts for a K-12 classroom space would need to be configured in such a way to limit the occupant load to 49, or a fire sprinkler would need to be installed.

b. Flexible-Use Multipurpose Space: A large gathering space is a benefit in a small village. This could be used for community celebrations, potlatch gatherings, village IRA meetings, religious gatherings, and more.

c. Yupik Cultural Center: In the future, we see a portion of this structure used as a Yupik Cultural, Education, Lifestyle, and Arts Center. This could work in conjunction with a village K-12 school.

d. Vocational Education: In the future, we see a strong potential for developing classroom spaces into a Village Vocational Education program.

e. Other Future Uses: This facility should ultimately meet the needs of the village community. Optional uses for this structure include a washeteria, health clinic, or village administrative offices.

## C. SHARED-USE AND MATERIAL RECLAMATION

1. Potential Shared Use with On-Site Man-Camp: To keep initial costs down, we see shared-use of projected Mertarvik facilities a viable solution. The proposed construction man-camp will be built near the MEC and will include commercial kitchen facilities, dining hall, restrooms, and shower facilities. Under proper management and scheduling, these facilities should be made available for use by evacuees during the period they are displaced from their homes.
2. Reclaimed / Salvaged Newtok Building Materials: Newtok facilities, including the school building, will ultimately be evacuated. At that time, selected materials from those structures should be identified and salvaged for re-use. These materials could potentially be used in the future build-out of the MEC or other Mertarvik public facilities. High value items for reclamation would include:
    a. Windows and Doors
    b. Siding
    c. Door Hardware
    d. Fixtures and Equipment
    e. Commercial Kitchen Equipment

## D. EXISTING FOUNDATION & PLATFORM CONDITION

LCG performed an on-site inspection of the existing foundation and floor deck framing on April 20, 2017. This is the MEC construction built in 2011 that we intend to re-use. Following is a summary of the findings from Danny Graham PE, structural engineer.

1. The driven heavy “H” Pile foundation system appears to be in a very serviceable condition and holding up against the weather with no excessive settling or frost heaving. The driven depths of several piles were verified. The required driving depths (per the original design) were painted on the piles during driving and are still visible. I noted three piles on the east exterior gridline were driven to a depth of at least 27 to 28 feet.
2. The floor framing system is comprised of steel beams with both manufactured wood ”I” and gang-nail floor joists. The steel beams and wood floor joists appear to be in reasonably good shape. Some of the joists are exhibiting lateral deflections along the bottom chords. Joists should be able to be repaired during construction and stabilized with a suitable diaphragm to remain in use.
3. The floor sheathing system has been damaged by water intrusion from a constant exposure to the weather. Several areas have started to delaminate and need to be repaired. A new layer of floor sheathing can be placed over the existing sheathing to provide a very serviceable working surface.
4. The Structural Insulated Panels (SIPs) purchased and stored at the building site are still present. Several of the panels packages were opened and those panels have been exposed to weather and have deteriorated. It is the intent of the owner to salvage as many of the panels as possible for the final build-out and I agree with this approach.

5. The existing steel decks and stairs are in reasonably good condition and can be incorporated into the final design. Some handrails are in place but might need to be modified to meet the final design requirements.

6. Conclusion: It is our professional opinion that the existing primary foundation and platform structural members are in satisfactory condition and should be serviceable for the life of the structure with little or no alteration.

## E. PROPOSED SHELL DESIGN

1. Floorplan Layout: During the initial Pioneering Phase of the project, the floorplan for the MEC will initially be very simple, an open floor with one dividing wall to separate the A-3 multi-use assembly space from the remaining floor area. Based on an emergency shelter occupancy of 240 persons this room would be a maximum of 3,600 square feet in area. See the attached Conceptual Floorplan attached.
2. Floor Framing: The proposed scheme will take full advantage of the existing on-site foundation and floor framing system. Repairs to the existing protection layer of ¾" plywood sheathing will be required to correct any delamination and to provide a sound, level surface. The existing ¾" plywood sheathing will be overlain with a second layer of ¾" T&G floor sheathing.
3. Floor Soffit: The floor joist space would be soffited from below with existing 6-3/8" thick R-33 SIPS panels and the joist cavity insulated with 10" to 12" of blown in fiberglass insulation. This would result in a floor assembly with a total insulation value of R-70.
4. Wall System: Exterior walls would be framed with 2x6 wood studs and ½" structural sheathing. Existing SIPs panels would be attached to the exterior of the sheathing in two layers, with staggered joints. Walls would be clad with metal siding. This approach will leave stud cavities open for future placement of window headers, door headers, electrical wiring and additional batt insulation. The initial construction would provide an insulation value of approximately R-66. At final build-out an additional 5-1/2" of fiberglass batt insulation and an interior finish could be added, resulting in a wall insulation value of approximately R-85.
5. Roof Construction: The roof structure would be framed with lightweight wood trusses at 24" O.C., bearing on exterior walls and girder trusses bearing on timber columns aligning with the existing foundation framing. Trusses would be sheathed with ½" plywood. Roofing would be a standing seam metal roof over ice & water shield; an alternate roofing would be a single-ply EPDM membrane. A ceiling of ½" cedar plywood would be secured to the bottom chord of the trusses, over a 10-mil poly vapor retarder. The roof system would be insulated with 20" to 24" of blown-in fiberglass insulation, providing an insulation value of R-70. The roof system cavity would be ventilated with a continuous baffled eve and rake vent.
6. Mechanical Plumbing, Heating & Ventilation:
    a. Future Mechanical Room: Due to the height of the main floor platform, a future mechanical room would be framed in below the floor framing, with grade level access. See the attached Conceptual Design Floorplan.
    b. Prior design heat load was approximately 140MBh (Jack Hebert-CCHRC).

c. Initial building heat would be provided by oil-fired Monitor (Toyo) direct vented wall heaters.

d. Occupied spaces would be ventilated with operable windows and/or a simplified mechanical ventilation system. Fresh air would be drawn into the facility using wall mounted exhaust fans controlled by carbon dioxide (CO2) detectors.

7. Electrical Systems:

   a. The electrical service would be sized to meet future needs. Assume a 400amp service (verify). Initial electrical loads will be only lighting and convenience receptacles.

   b. Initially there would be electrical power receptacles located throughout the interior of the facility on the exterior wall. Outdoor GFCI outlets in weatherproof enclosures would be provided near each entry door.

   c. Interior and exterior lighting would be provided to provide a safe level of general illumination. LED type fixtures would be provided to reduce the electrical loads and safe energy.

   d. Lighting load will likely be 0.25 to 0.50 W/SF, or about 3kW max connected lighting load.

   e. Initial photovoltaic estimate is 10kW; at 200watts per panel it would require about 50 panels (1,050 SF) at a weight of approximately 4,000 pounds.

8. Existing Exterior Stairs and Ramp: The existing steel stair and ramp components would be re-used. The missing handrail for the existing ramp will be provided. The existing stair and ramp are each 4'-0" in width.

## F. MECHANICAL DESIGN

Plumbing Systems – Phase 1

General Plumbing: The initial phase of the facility is not anticipated to have any plumbing fixtures, and the building will not be provided with plumbing systems such as cold water, hot water, waste and vent piping systems. A plumbing vent through roof (VTR) assembly will be installed at a central location and capped for future use.

Fuel Oil: A 2,000 gallon fuel oil storage tank will be provided at grade level. The primary storage tank will be skid mount, double wall construction. The primary storage tank will feed a 50 gallon day tank within the building. The day tank assembly will be provided with appropriate pumps to transfer fuel from the primary tank to the day tank. The day tank will gravity feed fuel fired terminal heating devices (toyo heaters).

Plumbing Systems – Phase 2

General Plumbing: Plumbing systems including cold water, hot water, waste and vent piping systems will be installed within the building to serve applicable fixtures. Cold water will be supplied from an existing well adjacent to the facility. Hot water will be produced by an oil fired water heater, or indirect fired water heater served by an oil fired boiler as determined in the future.

Fuel Oil: The existing fuel oil system will remain in place and revised as applicable to serve new fuel oil fired appliances.

HVAC Systems – Phase 1

Building Heat: The building will be heated by fuel oil fired terminal heat units (toyo heaters). Three (3) heaters will be required to serve the Open Area, and two (2) heaters will be required to serve the Storage Area. Heating units are not anticipated in small ancillary spaces such as the Corridor and Entry, and the spaces will rely on conduction from the heated spaces. These small ancillary spaces will get cool under winter design conditions.

Building Ventilation: Ventilation will be provided by operable exterior openings per IBC requirements. A mechanical ventilation system is not anticipated during the initial phase of construction.

HVAC Systems – Phase 2

Building Heat: Appropriate building heat will be determined as applicable to proposed building use. It is likely that the toyo heaters will eventually be removed and an oil fired boiler serving a perimeter hydronic heating system will be installed. The hydronic system would most likely serve perimeter baseboard with multiple control zones as applicable to the building layout.

Building Ventilation: Appropriate building ventilation will be determined as applicable to proposed building use. It is likely that heat recovery ventilators (HRVs) will be installed to provide mechanical ventilation to various spaces as applicable to building use and layout.

## G. ELECTRICAL DESIGN

Power Systems – Phase 1

Electrical Service: An overhead electrical service will be installed at the exterior of the building. The service will conform to the local utility company's standards and will be sized as required for the building's anticipated future loads. It is anticipated that the electrical service will be rated 400 amps 120/240 volts single phase. A manual transfer switch will be installed on the load side of the electrical service for connection to the construction camp's generator to power the building during Phase 1. The electrical service will be connected to a grounding electrode system complying with the NEC and local electrical utility requirements.

Panels: A Main Distribution Panel will be provided to power the initial electrical loads installed under Phase I. The panel will be sized to allow for future panels and loads to be added in the future as the building use is developed. Provisions for future connection to Solar Photovoltaic Panels will be made for energy usage cost savings.

Power Outlets: Convenience outlets will be distributed on the inside of the exterior building walls, on the exterior of the building near doors, and in the utility spaces to allow for general use. Receptacles throughout the building will be 20 amp rated, commercial spec grade, NEMA 5-20R. GFCI protected duplex receptacles will be provided where receptacles are located on the exterior of the building, in wet or damp locations, and as required by codes. Receptacles located in wet or damp locations will also be a listed weather resistant type. All receptacles and electrical devices located outside and where susceptible to water spray will be provided with "extra duty" weatherproof covers. Branch circuitry will be installed from the Main Distribution Panel to the power receptacles as appropriate.

Power Systems – Phase 2

Electrical Service: Once the local electrical utility infrastructure has been established, connections will be provided between the electrical utility and the building electrical service to provide for permanent utility power to the building.

Panels: Additional panels will be added as necessary to provide power to the new loads added during this phase. The panels will be supplied by new circuit breakers and feeders originating in the Main Distribution Panel.

Power Outlets: Additional power outlets will be added in quantities and locations as appropriate for the use of each space.

Lighting Systems – Phase 1

Interior Lighting: New energy efficient LED lights will be added in all areas of the building to provide general illumination. The quantity and location of fixtures will be as required to provide adequate illumination levels as recommended by IES standards. To keep costs to a minimum, fixtures are anticipated to be economical, contractor grade, surface or pendant mount LED type with lenses as appropriate for the space.

Exit/Emergency Lighting: Emergency exit signs will be LED type with battery backup and emergency egress lighting will consist of self-contained emergency units with integral battery, charger, and adjustable lamps to automatically illuminate upon loss of normal power and be sized to provide emergency illumination for a minimum of 90 minutes. Exit signs will be located to provide clear direction to all exits and as required to comply with all applicable codes. Emergency lighting units will be located as required by code to provide the necessary illumination at all paths of egress including at the exterior of each exit.

Exterior Lighting: Exterior luminaires will utilize LED lamps and be of a type listed and suitable for wet locations and cold temperatures. Fixtures shall be located on the building exterior, around the building perimeter to illuminate and provide security at entrances, and walkways adjacent to the building. The majority of fixtures will be wall mount type and where located under the building or where canopies are provided, surface mount fixtures will be utilized. Fixtures shall be appropriate for the location to be installed.

Lighting Controls: Interior lighting will be controlled with manual on/off switches at entrances and exits to allow for individual control of lighting within each space. Exterior lights shall be controlled by photocell and switch controls.

Lighting Systems – Phase 2

Interior Lighting: As the building usage develops, existing fixtures will be replaced and/or relocated to provide desired illumination levels and appearance as appropriate for each space.

Exit/Emergency Lighting: As the building usage develops, existing fixtures will be replaced and/or relocated to provide desired illumination levels and appearance appropriate for each space.

Lighting Controls: Lighting controls will be replaced and/or relocated as appropriate for the layout and usage. For energy savings, occupancy sensor controls will be added where appropriate to automatically turn off lighting fixtures when the areas become unoccupied.

Telecommunication Systems – Phase 1

General: Conduit sleeves will be provided through the exterior of the building to allow future telecommunication connectivity with the serving telecomm utility provider. Telecommunication systems are not anticipated during the initial phase of construction.

Telecommunication Systems – Phase 2

General: Once the local telecommunication utility infrastructure has been established, connections will be provided between the telecommunication utility and the building for phone and data service in the facility. A complete telecommunication system infrastructure including rack, patch panels, pathways, cabling, jacks, etc will be provided as appropriate for the use of the space.

Fire Alarm Systems

General: Fire Alarm systems are not anticipated to be provided during the intial phase of construction unless required by code.

## H. CODE SUMMARY

1. BACKGROUND:

   LCG contacted Tim Fisher at the Alaska State Fire Marshal's office (FM) to confirm the status of this project. They have quite a large file on this project, but since it has been inactive for a number of years, a new Application for Fire and Life Safety Plan Review will be required. Mr. Fisher confirmed the following:

   a. Most recent submittal to the FM office was approved for foundation & framing only, and did not get a final approval. Since then, codes have changed and the FM would need to review again.
   b. An A-3 occupancy with an occupant load of one person per 15 square feet is reasonable for multi-purpose shelter use (cots/beds, chairs & tables, living space) but not for auditorium seating with chairs only.
   c. A Fire Barrier wall will need to be maintained to reduce the Fire Area of the multi-purpose space to 300 occupants of less. An occupant load exceeding 300 will require a fire sprinkler system.
   d. According to a State of Alaska code amendment, a single educational "E" occupancy within this structure with 49 or fewer occupants would be exempt from the requirement for a fire sprinkler system.

2. APPLICABLE CODES:

   a. 2012 INTERNATIONAL BUILDING CODE (IBC)
   b. 2012 INTERNATIONAL FIRE CODE (IFC)
   c. 2012 INTERNATIONAL MECHANICAL CODE (IMC)
   d. 2012 UNIFORM PLUMBING CODE (UPC)
   e. 2014 NFPA 70 NATIONAL ELECTRICAL CODE (NEC)
   f. ADA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG)

3. OCCUPANCY CLASSIFICATIONS: Multi-Purpose Room: A-3 Community Hall

Office, Future Clinic: B Office

Storage: S-2 Low Hazard Storage

Classroom Space: E Educational

4. CONSTRUCTION TYPE: V-B non-rated
5. SPRINKLER SYSTEM: Not required when A-3 occupant load < 300 and E occupant load is < 50
6. FIRE ALARM SYSTEM: Not required when A-3 occupant load < 300
7. FIRE EXTINGUISHERS: Provide 3-A, 40-B:C dry chemical fire extinguishers
8. ALLOWABLE AREA CALCULATION: A-3 Occupancy (most restrictive)

| | |
|---|---|
| BASE AREA: | 6,000 SF |
| FRONTAGE INCREASE: | 4,500 SF |
| SPRINKLER INCREASE: | N/A |
| TOTAL ALLOWABLE AREA: | 10,500 SF |
| ACTUAL GROUND FLOOR AREA: | 7,000 SF ***OK*** |

9. ALLOWABLE HEIGHT: 1 story
10. FIRE RATED CONSTRUCTION: A 2-hour occupancy separation is typically required between A or E occupancies and B occupancies. A 1-hour separation is typically required between A or E occupancies and S-2 occupancies. This design conforms to IBC 508.3 for non-separated occupancies.
11. Egress Width: The total building occupant load is currently governed by the width of the existing exterior stair and ramp. Each of these two exiting elements is approximately 48” in width, allowing safe egress for 240 occupants. Without additional exit stairs or ramps the total building occupant load is limited to 480 persons.

**End of Report**

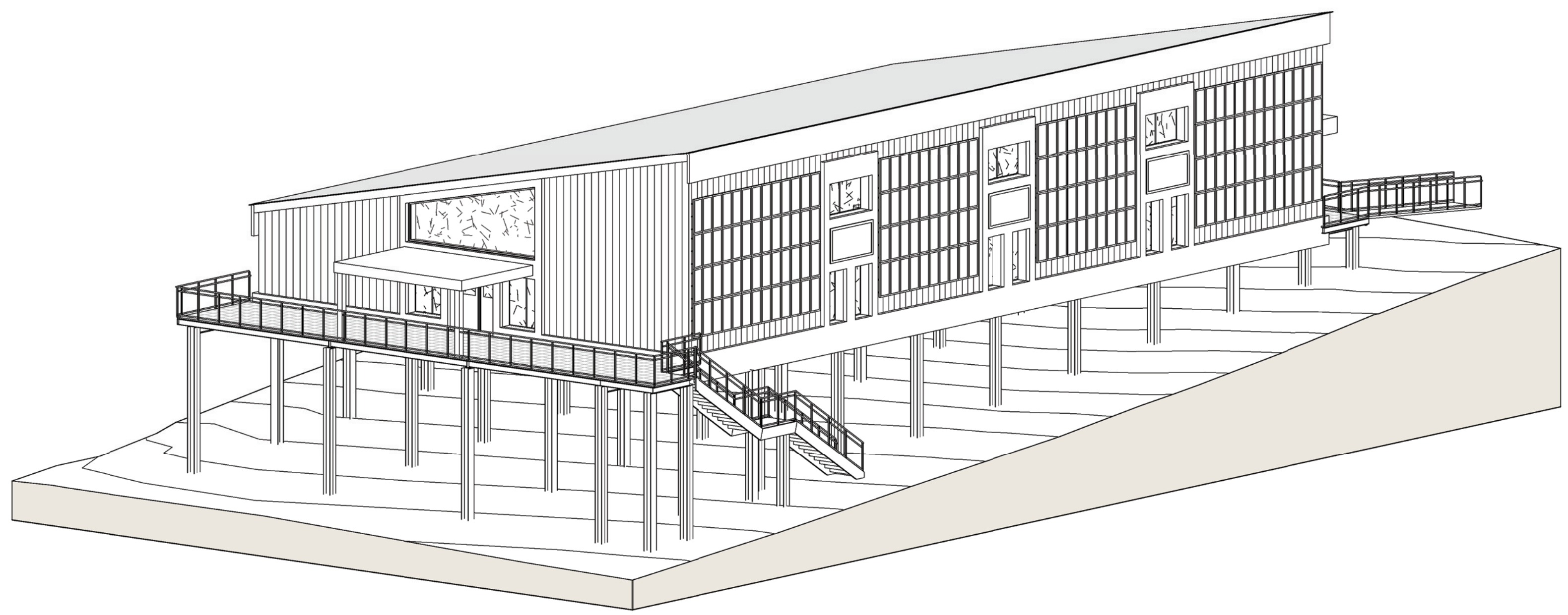
# MERTARVIC EVACUATION CENTER (MEC)

## NATIVE VILLAGE OF MERTARVIK

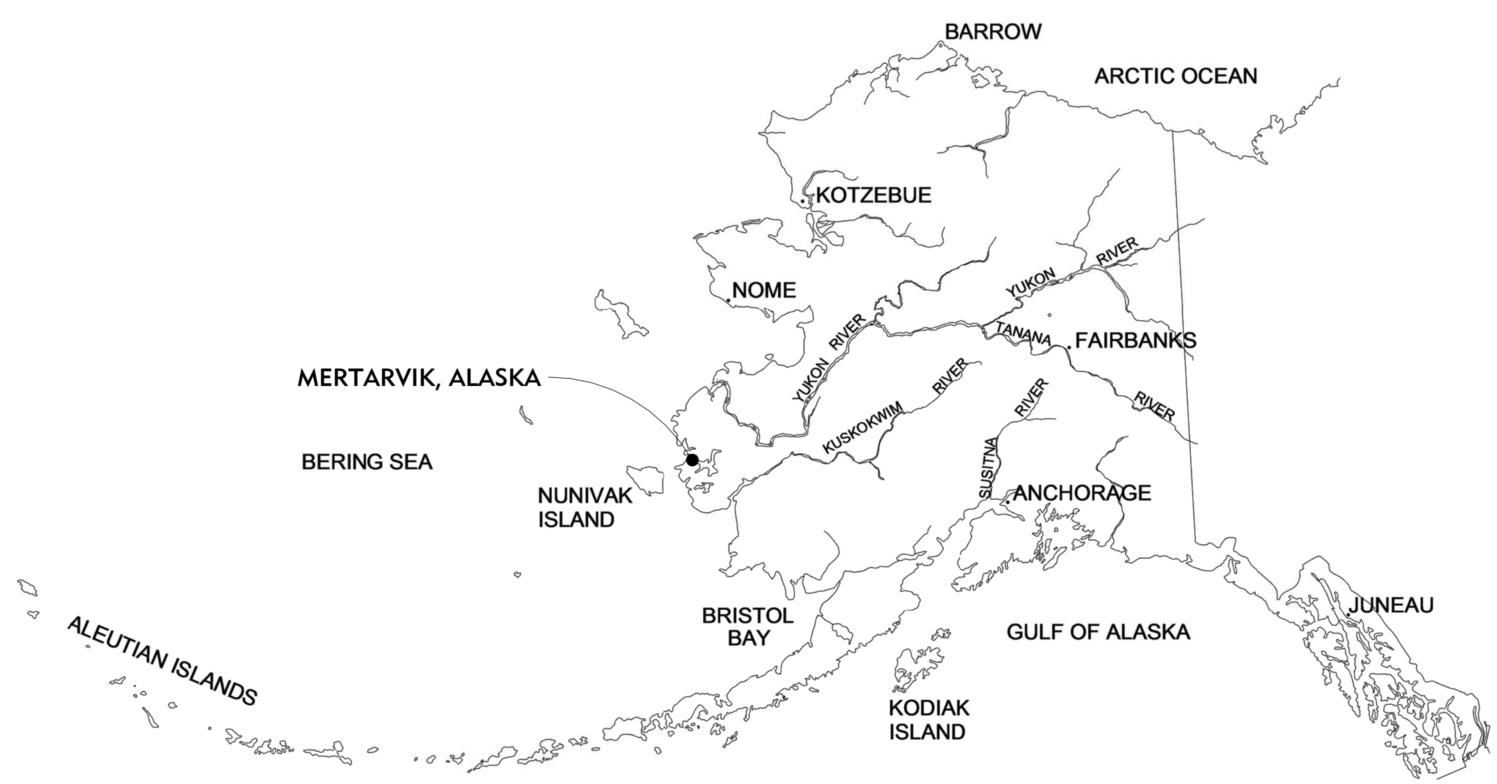
MERTARVIK, ALASKA

## 35% DESIGN

06/09/17



### PROJECT LOCATION




### PROJECT TEAM

ARCHITECTURE, CIVIL AND STRUCTURAL ENGINEERING


LCG Lantech Inc
architecture . engineering . surveying

250 H Street
Anchorage, AK 99501
P (907) 243-8985
F (907) 243-5629
www.lcgak.com


MECHANICAL AND ELECTRICAL ENGINEERING

### DRAWING LIST

#### ARCHITECTURAL DRAWINGS

| | |
|---|---|
| A1 | ARCHITECTURAL FLOOR PLANS |
| A2 | EXTERIOR ELEVATIONS |
| A3 | BUILDING SECTIONS |

#### STRUCTURAL DRAWINGS

| | |
|---|---|
| S1 | STRUCTURAL FRAMING PLANS |

6/9/2017 11:24:19 AM

P:\901-950\939 ANTHC IDIQ\939.31 Mertarvik Evacuation Center_Architecture\939.31 Mertarvik MEC - A.rvt

MERTARVIC EVACUATION CENTER (MEC)

939.31

*HMS Project No. 17065*

Mertarvik Relocation Project
Steering Committee Mtg #9
**4a_MEC**

35% DESIGN SUBMITTAL
CONSTRUCTION COST ESTIMATE

MERTARVIK EVACUATION CENTER
PHASE I CORE AND SHELL PACKAGE
MERTARVIK, ALASKA

*PREPARED FOR:*

LCG Lantech Inc.
250 H Street
Anchorage, Alaska 99501

June 15, 2017

HMS inc

*4103 Minnesota Drive • Anchorage, Alaska 99503 p: 907.561.1653 • f: 907.562.0420 • e: mail@hmsalaska.com*