

Agency: Commerce, Community and Economic Development

Grants to Municipalities (AS 37.05.315)

Grant Recipient: Bethel

Project Title:

Project Type: Remodel, Reconstruction and Upgrades

Bethel - Fire Station Repairs/Upgrades

State Funding Requested: \$2,200,000
One-Time Need

House District: 38 / S

Brief Project Description:

Fire Station Repairs and Upgrades

Funding Plan:

Total Cost of Project: \$2,200,000

	<u>Funding Secured</u>		<u>Other Pending Requests</u>		<u>Anticipated Future Need</u>	
	<i>Amount</i>	<i>FY</i>	<i>Amount</i>	<i>FY</i>	<i>Amount</i>	<i>FY</i>
Federal Funds			\$1,000,000	2011		
State Funds	\$1,200,000	2008				
Total	\$1,200,000		\$1,000,000			

Detailed Project Description and Justification:

The Bethel Fire Station will use its \$1.2 million state grant to repair and replace parts of the roof, side walls, and floor. An additional \$1 million is needed from the State in FY 2011 to repair any part of the building not covered in the \$1.2 million fix. The \$1 million will also be used to purchase and install two new boilers, windows, doors, sprinkler system, security system, lift station, carpet, kitchen cabinets and counters, outdoor electric outlets for vehicle block heaters, garage doors, gear racks, wiring, plumbing pipes, and wall covering. New insulation, sheetrock, and paint will be purchased and applied by a contractor. The apartment in the Fire Station will be remodeled with new carpet, light fixtures, telecommunications connectivity, and wall and ceiling repairs made.

By repairing and upgrading the Bethel Fire Station, the community will be safer and the City will have a building that will last 20 more years. The City will also save money. It spent \$424,439 on temporary repairs and engineer estimates thus far. We need a permanent solution. One good fix.

Project Timeline:

- June 18, 2010 - State announces FY 2011 legislative awards.
- July 25, 2010 - City of Bethel receives grant agreement.
- August 15, 2010 - City begins ordering equipment, materials, and supplies.
- September 15, 2010 - City issues Request for Proposals for projects expected to cost more than \$20,000.
- October 15, 2010 - Responses to RFP received, evaluated, and one vendor for each bidding process selected.
- October 15, 2010 - September 30, 2011 - Project elements completed.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

City of Bethel

For use by Co-chair Staff Only:

**\$1,000,000
Approved**

Grant Recipient Contact Information:

Name:	John Sargent
Address:	300 State Highway Bethel, AK 99559
Phone Number:	(907)543-1386
Email:	jsargent@cityofbethel.net

Has this project been through a public review process at the local level and is it a community priority? Yes No

Bethel Fire Station Repairs & Upgrades

FY 2011 State of Alaska Capital Budget Request



**City of Bethel
P.O. Box 1388
Bethel, AK 99559
907-543-1373**

Six full-time firefighter/EMTs and 17 volunteers respond to 150 fire-related calls and 800 EMS calls per year in the largest rural community in Alaska (pop. 5,803).

A repaired fire station will help keep firefighter/EMTs safe, protect emergency response vehicles and life-saving equipment.

City of Bethel

Bethel Fire Station Repairs and Upgrades

FY 2011 State of Alaska Capital Budget Request

Contact Person

John Sargent, Grant Development Manager
City of Bethel
P.O. Box 1388
Bethel, AK 99559
907-543-1386
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jsargent@cityofbethel.net



1. Summary Statement

The City of Bethel requests that \$1,000,000 be put in the State Capital Budget to provide money for repairs and upgrades to the Bethel Fire Station. The City is in the process of issuing a Request for Proposals to spend the \$1.2 million it received from the State Legislature in 2008 to repair/replace the roof, north and south walls, and floor damage—all caused by water intrusion over the building’s 27-year life. The City is requesting an additional \$1,000,000 from the State in the FY 2011 Capital Budget to insure that it has sufficient funds to cover **ALL** repairs needed to the building and provide other repairs and upgrades.

The Bethel Fire Station needs physical alterations to the building to improve safety, enhance energy efficiency, and improve the functionality of the structure. Major upgrades must be made to the heating system, sewage lift station, cement floor in the vehicle bays, windows and doors, wall insulation, and emergency vehicle driveway. A new sprinkler system and security system must be installed.

FY 2011 State Budget Request	City of Bethel 2008 State Grant	Total Project Cost
\$1,000,000	\$1,200,000	\$2,200,000
45%	55%	100%

2. Brief Community Profile

Physical Environment

The City of Bethel is located alongside the Kuskokwim River, the second largest river in Alaska. Isolated from the road network of Alaska, the city is four hundred air miles from Anchorage and forty air miles from the Bering Sea. The City encompasses approximately 44 square miles in

Southwest Alaska, including six miles of Kuskokwim River that encompasses 21 miles of shoreline due to islands and river bank formations. The Kuskokwim River becomes a frozen road in the winter, connecting Bethel to many villages along the river.

Regional Hub

Bethel is a hub community for approximately 56 Yukon-Kuskokwim villages in the region. The city is home to the third busiest airport in the state of Alaska, due largely to its cargo shipments, and the largest medium draft port in the state in terms of tonnage off-loaded. Goods destined for Kuskokwim River villages land in Bethel first and then are repackaged and taken to villages by plane, river barge, automobile, four-wheeler, boat, or snowmobile. Petroleum products are handled the same way, off-loaded to smaller river fuel barges.

Government

The City of Bethel was incorporated in 1957 while Alaska was still a territory and has since evolved to become a second-class city with a Council-Manager form of government. The seven elected City Council members hire and direct the City Manager, who oversees nine departments: Administration, Finance, Fire, Police, Port, Planning, Parks and Recreation, Technology, and Public Works. Bethel is a municipal government in the unorganized borough area of western Alaska and contains no other cities within its boundaries.

The Bethel City Council develops its annual budget by June 15 for the following fiscal year, which runs from July 1 to June 30. The total annual budget is approximately \$14 million.

Population

Sporting a population of 5,803, Bethel is the eighth largest town in Alaska (Alaska Department of Community and Economic Development website, 2010). As such, Bethel is the major source for government, education, transportation, and health services, as well as a major shopping center for food, equipment, clothing, and other products. According to the Bethel Chamber of Commerce, the number of people in Bethel on a given day could be 6,400 or higher.

3. Justification and Level of Need

The Fire Station was built in 1982 on wooden pilings that keep it four feet off of the ground so that the permafrost ground stays frozen and the building stays level. The building was constructed using sprayed foam on the inside of the roof, walls, and floors for insulation. Over its 28-year life, water has penetrated the roof, run down the walls, and dispersed under the floor. The foam helped trap the water next to the wooden supports, causing severe rot. The City has had the Fire Station evaluated by CH2MHill, PND Engineering, and Bratslavsky Consulting, Inc., and Michael Anderson, an independent state certified engineer. Each evaluation required that more wall, ceiling, and floor sheets be cut open and greater damage was revealed each time. One day in July 2009, construction company Little Susitna cut into and removed some sheetrock on the ceiling as part of an exploratory cut. When the worker pulled the sheetrock free, the entire roof moved down. He and his partner dove to the floor in surprise and fear. Many of the trusses have rotted through and the only thing holding up that section of roof was the sheetrock.

Upon hearing the news of the roof settling, structural engineer Tanya Bratslavsky examined it closely and declared the building unsafe to occupy and use. She posted signs all over the outside of the building that read, “DANGER This Structure is Declared Unsafe For Human Occupancy or Use. It is Unlawful For Any Person To Use or Occupy This Building After 07/15/2009.”

In the last three years, the City spent \$424,440 on three engineer estimates, temporary shoring of the four-bay garage, roof and side walls, and small roof and exterior siding repairs. These repairs allowed the Bethel Fire Department to continue to operate out of the station and allowed the City’s insurance carrier to continue coverage of the building. But, a permanent fix has yet to be implemented. If the State provides the City with \$1,000,000 in the FY 2011 State Capital Budget, the City will be able to complete all essential repairs as part of the permanent fix and complete much-needed upgrades.

Importance of Fire Department

The department must have a safe building from which to work 24-hour shifts, protect vehicles from the elements, and keep equipment warm and dry. Paid firefighter/EMTs and volunteers on call during the night need a comfortable place to “live,” work, eat, sleep, and rest before rushing to a call.

The fire station classroom doubles as the Emergency Operations Center (EOC). It has satellite phones, radio charging stands, radio programmable laptop, whiteboards, maps, internet capability, and projector.

The Bethel Fire Department serves a very important role in Bethel:

- They respond to 800 calls for service a year, of which about 150 calls are fire-related.
- Bethel Fire Department assists in western Alaska regional responses. During the 2006 fire in Hooper Bay that consumed 13 buildings, three Bethel Firefighter/EMTs responded and took command upon arrival in Hooper Bay.
- Bethel Fire Department has an agreement with the Bureau of Land Management to respond to wildland fires in and around Bethel.
- Bethel Fire Department works with the Alaska Division of Homeland Security and U.S. Army National Guard during flood and fire season to prepare for and respond to emergencies occurring in Bethel and surrounding villages.
- The Emergency Operations Center (EOC) for Bethel and the region, when needed, is located inside the Bethel Fire Station. The training classroom that becomes the EOC contains computer equipment, satellite phones, telephones, radios, and maps.
- Bethel Fire Department routinely engages in search and rescue operations with the Civil Air Patrol, Alaska State Troopers, and Bethel Search and Rescue. Fire Department has a response boat, four-wheelers, pick-up trucks, and ambulances to assist in the search.
- The Bethel Fire Department oversees a cache of wildland firefighting equipment stationed in Bethel by the Alaska Department of Natural Resources, Division of Forestry.

Federal responsibility furthered by project:

Fully repairing and upgrading the Bethel Fire Station in Bethel will assist the U.S. Department of Homeland Security in its efforts to increase the capacity of the City to prevent, deter, respond to, mitigate, and recover from natural disasters and terrorism events. Common natural disasters in and around Bethel are flooding, severe winter storms, and fires and to a lesser extent, earthquakes.

The Bureau of Land Management will be able to manage its property in accordance with developed plans as long as the City Fire Department continues to monitor and respond to wildland fires in the area.

The United States Army National Guard is able to rely on the Bethel Police Department and Bethel Fire Department for assistance during national, regional, and local emergencies.

4. Project Description

The City of Bethel plans to use the \$1,000,000 requested herein to complement its expenditure of \$1,200,000 on a permanent fix of the roof, sidewalls, and floors and make other repairs and upgrades to the facility. Construction-related upgrades include insulation, new energy efficient windows and doors, wiring for communications, roof overhang, driveway leveling and paving, and apartment remodel. Building system upgrades include a new heating system (two boilers and zone configuration) and new sewage lift station. New safety elements include a new sprinkler system and security system.

The purpose of the \$1,000,000 request is to make the Bethel Fire Station last twenty more years, improve the capability of the firefighter/EMTs to perform their duties, provide a safe, secure work environment, and reduce the costs incurred on temporary shoring and engineer estimates.

5. Budget

FY 2011 State Budget Request	City of Bethel 2008 State Grant	Total Project Cost
\$1,000,000	\$1,200,000	\$2,200,000
45%	55%	100%

The City of Bethel requests that \$1,000,000 be put in the FY 2011 State of Alaska Capital Budget to repair and upgrade the Bethel Fire Station. The City of Bethel has \$1,200,000 from a 2008 State of Alaska Designated Legislative Capital Grant for fire station roof repair or replacement. The Alaska Department of Commerce, Community and Economic Development who oversees the grant, confirmed that the money can be spent to repair parts of the building other than the roof, as long as the roof is completely repaired or replaced in the process.

The City will use the competitive bidding to obtain the best value in a contractor. The City planner, City Property Maintenance Division, and City Streets and Roads Division will assist in project development, as needed.

The City of Bethel is requesting \$1,000,000 for its number one priority, to accomplish repairs and upgrades to the Bethel Fire Station. This number one priority is clearly delineated in City of Bethel Resolution #10-15 attached.

6. Operation and Maintenance

Fire Department firefighter/EMTs will operate in their newly repaired building with improved effectiveness and efficiency. The Fire Department's annual budget will continue to fund operations. Current funding provides for a fire chief, captain, and four full-time firefighter/EMTs. Seventeen volunteer firefighter/EMTs from the community stand ready to participate in fire suppression, detection, investigation, rescue, and education.

The City's Property Maintenance Division will be responsible for maintaining the new Public Safety Building. The Division is funded annually in the City Budget and has all the necessary tools, materials, supplies, and shop space to maintain the building. The three-person staff of the Division has vast experience in the construction, electrical, and plumbing fields.

7. What if no State Capital Funds are provided?

The picture is bleak if no state capital funds are provided to repair and upgrade the Bethel Fire Station. Public safety will be compromised because the aging condition of the building will shorten its life expectancy, hinder the performance of the first responders who use the building, and cost the City money for temporary patches.

8. What if State Capital Funds are provided?

Bid documents to use the City's \$1,200,000 to repair the roof, side walls, and floor have been prepared and are being reviewed by PND Engineers. The City hired PND to assist in the Request for Proposals process and evaluate and select the best proposal submitted.

If the State funds the City's \$1,000,000 request as described herein, the City will ensure that there are sufficient funds for ALL repairs and upgrades that are needed at the fire station. The funds will cover investigation, insulation, sheetrock, mudding/taping, wood, cement for vehicle bays, windows, doors, leveling, and driveway rehabilitation. The funds will cover the purchase and installation of a new heating system with zone valves, a new sewage lift station, and a new fire suppression sprinkler system and a new security system.

A repaired fire station will allow the firefighter/EMTs to feel safe working in the building and safe while sleeping. The vehicles valued at over \$2 million will be protected from the elements and safe from building collapse. All equipment, supplies, personal protective ensembles will be ready for use, ready for immediate response.

The 5,803 residents of Bethel and thousands of visitors every year will be safer when the firefighter/EMTs have a new building from which to reside, prepare, and respond. The department will be in a better position to recruit and retain firefighter/EMTs. Response times from the station to Bethel destinations should increase. An fit station means more lives will be saved, less injuries will result, and less property damage will occur.

The City will take an active role in the planning, design, construction, and oversight of the repairs and upgrades to the fire station.

Introduced by: Lee Foley, City Manager
Date: February 9, 2010
Action: Passed
Vote: 7-0

CITY OF BETHEL

Resolution # 10-15

CITY OF BETHEL PRIORITIES FOR THE FY 2011 STATE OF ALASKA CAPITAL BUDGET

WHEREAS, the City plans to hire a construction company to complete each project, creating a short-term demand for architects, engineers, and laborers in the construction, electrical, and mechanical trades;

WHEREAS, the City intends to exhibit transparency, oversight, and accountability for all funds awarded through this request;

WHEREAS, the Bethel City Council is a seven-member body elected by resident voters of Bethel to act in the best interest of the community;

WHEREAS, the priorities established herein are rank-ordered and vital to the well-being of the community and municipality of Bethel;

WHEREAS, a summary of the City of Bethel's priorities and requested funding amounts are listed in the following table:

Top Three Priorities	Request
1. Bethel Fire Station (repairs)	\$1,000,000
2. Bethel Police Station (new construction)	\$3,000,000
3. Bethel Aquatic Training and Health Center (new construction)	\$4,000,000
Total	\$8,000,000

#1 Bethel Fire Station

WHEREAS, the Bethel Fire Station is more than 28 years old and has deteriorated over time due to water intrusion, a faulty roof design that allowed no ventilation in the roof cavity, and the use of sprayed foam insulation instead of fiberglass insulation as required in the original building plans;

WHEREAS, the station's failing structural condition that includes roof trusses and sheeting, rotted top wall plates, delaminated siding/plywood, decayed wall studs and disintegrating

Introduced by: Lee Foley, City Manager
Date: February 9, 2010
Action: Passed
Vote: 7-0

beams, while temporarily mitigated through emergency repairs, has not been sufficient to extend the operational life of the facility;

WHEREAS, the City of Bethel was awarded \$1,200,000.00 in a Legislative Grant from the State of Alaska to repair, or replace the fire station roof, and plans to use the funds requested herein, if approved, to effect the additional repairs necessary to extend the life expectancy of the building;

WHEREAS, the Bethel Fire Station serves as a regional emergency assistance hub for fire and emergency medical services, search and rescue support, and as the Emergency Operations Center for the community of Bethel;

NOW, THEREFORE, BE IT RESOLVED that the Bethel City Council, as elected representatives of the community and city of Bethel, do hereby formally request that the State of Alaska provide \$1,000,000.00 in its FY 2011 Capital Budget to be used in repairing the fire station.

#2 New Bethel Police Station

WHEREAS, the current Bethel Police Station is more than 30 years old and was constructed by combining 3 mismatched smaller structures that are incapable of supporting the twelve sworn officers, five dispatchers, and one administrative assistant who provide public safety needs for a community of approximately 6,000 souls in bush Alaska;

WHEREAS, the current facility is almost impossible to heat, is cramped to the point of seriously restricting internal performance duties, projects a consistently offensive odor that cannot be eliminated, has mold buildup in the walls, no protection for police vehicles in periods of extreme inhospitable weather, and no place to interview victims, or suspects;

WHEREAS, the deplorable conditions stated herein have had a negative impact on recruitment and retention of police officers and dispatchers;

WHEREAS, if this request is approved, the City intends to construct the new facility so as to minimize impact on current operations and ability to serve the public;

WHEREAS, the essential nature of the emergency services provided by Bethel Police Department personnel require that a new, improved, and healthy environment be created by constructing a totally new police station;

NOW, THEREFORE, BE IT RESOLVED that the Bethel City Council, as elected representatives of the community and city of Bethel, do hereby formally request that the State of Alaska provide \$3,000,000.00 in its FY 2011 Capital Budget to be used for constructing a new police station.

Introduced by: Lee Foley, City Manager
Date: February 9, 2010
Action: Passed
Passed: 7-0

3 Bethel Aquatic Training and Health Center

WHEREAS, the need for a multi-use recreation facility that included a swimming pool has been expressed by the community of Bethel in numerous community plans since the early 1970s;

WHEREAS, the Yukon-Kuskokwim Delta region experiences one of the highest drowning rates in Alaska—largely because residents and visitors live near the Yukon and Kuskokwim Rivers, engage in boating and water play activities, do not know how to swim, do not know how to rescue individuals from the water, and do not know how to resuscitate victims;

WHEREAS, the City of Bethel Aquatic Training and Health Center Plan, completed by Agnew Beck Consultants in 2005, identifies a swimming pool as the number one activity voted on by community members to include in the Aquatic Training and Health Center;

WHEREAS, the pool in the Bethel Aquatic Training and Health Center would provide the following benefits to any of the YK-Delta's 26,000 residents: allow children and adults to learn how to swim, provide courses to certify lifeguards, provide a place where families and friends come together to recreate and exercise, reduce the onset of diabetes, obesity, and other health problems, provide a venue for physical therapy, and provide special programs for seniors, youth, and people with physical disabilities;

WHEREAS, the Bethel Aquatic Training and Health Center Committee is a group of concerned citizens formed in November 2007 that meet twice a month to assist in the development of the multi-use recreation center, make recommendations to the City Manager, and assure that the project design, construction, operation, and maintenance costs are affordable;

WHEREAS, the City of Bethel signed a contract with Architects Alaska, Inc. in January 2009 and agreed to pay \$390,933 for the architects to complete the 35% schematic design by July 31, 2009, which has been accomplished;

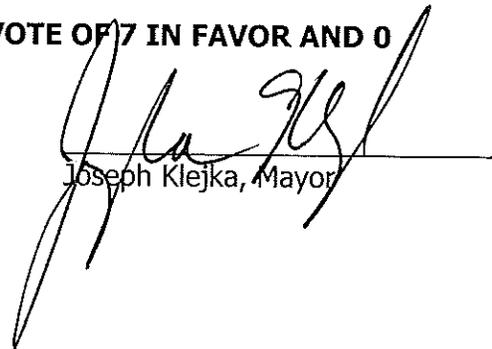
WHEREAS, the City requests that \$4,000,000 be put in the FY 2011 State of Alaska Capital Budget for the City of Bethel to pay for the first phase of construction of the new Bethel Aquatic Training and Health Center;

Introduced by: Lee Foley, City Manager
Date: February 9, 2010
Action: Passed
Passed: 7-0

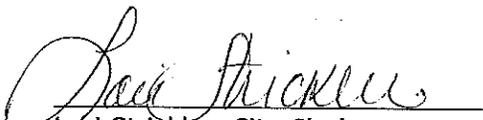
NOW, THEREFORE, BE IT RESOLVED that the Bethel City Council, as elected representatives of the community and city of Bethel, do hereby formally request that the State of Alaska provide \$4,000,000.00 in its FY 2011 Capital Budget to be matched with other designated and approved funding sources to construct a new Aquatic Training and Health Center.

THEREFORE, BE IT FURTHER RESOLVED that the Bethel City Council, as elected representatives of the community and city of Bethel, hereby set and reaffirm the three funding priorities for the FY 2011 State of Alaska Capital Budget as: 1) Bethel Fire Station, 2) Bethel Police Station, and 3) Bethel Aquatic Training and health Center.

ENACTED THIS 9th DAY OF FEBRUARY 2010 BY A VOTE OF 7 IN FAVOR AND 0 OPPOSED.


Joseph Klejka, Mayor

ATTEST:


Lori Strickler, City Clerk

Structural Investigation of the Bethel Fire Station



Prepared by
Michael N. Anderson, P.E.

4661 Natrona Avenue

Anchorage, Alaska 99516

Phone 345-3377

Fax 345-1391

October 3, 2009

Structural Summary:

After reviewing the structure and the two engineering reports written by PND Engineers Inc and Bratslavsky Consulting Engineering, Inc it is my professional opinion that the structure is safe to occupy if new temporary bracing is added to reinforce the damaged roof joist and wall framing on the north and south ends of the building. A detailed wall and roof bracing design will follow with this report.

Building Description:

The Bethel Fire Station was designed and constructed in 1980 and consists of a 9,912 square foot of wood framed structure supported on treated wood thermosiphon piles. The building foot print is approximately 121 feet long by 72 feet wide, with the long axis facing north-south. The roof is a simple 3:12 pitch with a metal panel roof covering. The roof framing, consist of open web wood trusses supported on bearing walls or wood Glu-Lam-Beams (GLB). The floor and roof framing on the south end are similar to the roof with open web trusses while the floor on the north end consists of heavy GLB timbers supported from the wood piles. From the asbuilt drawings the roof framing in the living area calls out 20 to 26 inch TJL trusses, however the building has 24 to 28 inch parallel cord 2x4 pre-manufactured trusses. The asbuilts also reference fiberglass insulation when urethane foam was installed both in the walls and the roof.

Structural Observations:

Personal at the Bethel Fire Station included Lee Foley and Bill Howell, with Bill Howell giving the tour of the building and explaining the buildings history and the previous two engineering reports. The damaged areas on the north and south ends of the building were opened up and temporary bracing had been installed by Little Susitna Construction before my inspection. Numerous exploration holes were made in the foam insulation for viewing of the wood framing members. During the inspection it was determined that only the north exterior garage wall-roof joist and the south exterior wall-roof joist in the living area have been damaged by water infiltration. Additional holes were cut into various walls throughout with only minimal water infiltration.

The roofing system consists of corrugated metal roof sheathing attached directly to the plywood underlayment with exposed fasteners. Numerous screws were found loose on the metal decking, having backed out over the years. During a discussing with Bill Howell it was stated that Little Susitna Construction filled all of the empty holes in the metal decking during their last site visit and the water leakage was greatly reduced. It appeared that new screws were added and the old holes filled with silicone.

Structural Recommendation:

Critical Issues.

The north and south ends of the building need to be temporary shored-up to resist all of the lateral and vertical loads. The existing bracing is not adequate to safely resist all of the building design loads from wind and snow loading. The foam insulation has made the roof trusses and plywood roof sheathing act as a composite member, thus allow the roof trusses to not totally fail. Over the past 20 plus years insulated wall and roof panels have been tested and found to be very strong with only foam core and plywood sheathing glued to the exterior. If the additional temporary bracing is revised for the actual building design loads, the Fire Department will not have to relocate and in the spring the building can be repaired during the normal building season.

Long Term Issues.

The existing metal roof is old technology and has leaked for many years and it should be removed and replaced. An up-to-date concealed fastener metal roof system needs to be installed along with approximately 32 roof joist on the south-side and 33 roof joist on the north-side, plus the 2x wall framing below them. At the time of the roof repairs all of the plywood sheathing under the metal deck should be inspected for possible water damage. The current roof is a hot roof design and should be reviewed for possible altering to a cold roof if possible. If the roof is changed to total cold roof it will facilitate other hot and cold venting issues on the roof system.



Figure 1, damaged roof trusses and wall plate connection, south wall.

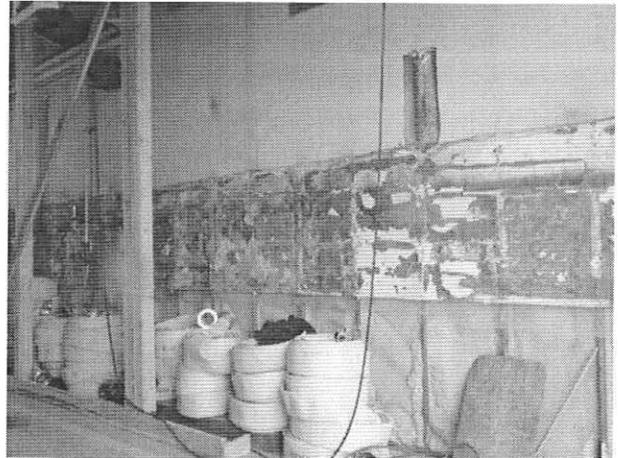


Figure 2, damaged wall studs at the north end of garage wall.

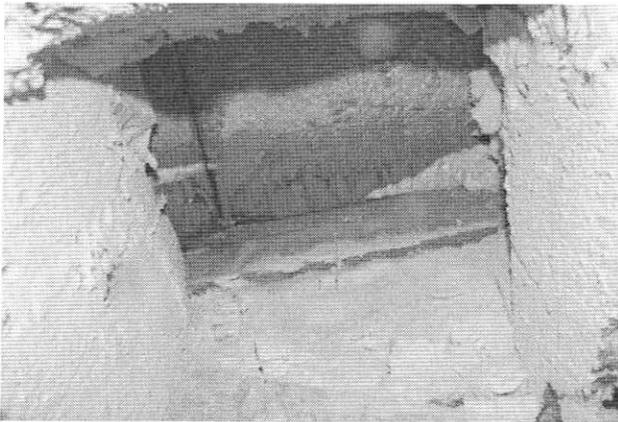


Figure 3, roof truss above garage area with foam removed to show truss top cord, no



Figure 4, damaged south exterior bottom wall plate and studs.



Figure 5, exterior view of the south wall, with siding removed for inspection.



Figure 6, main entry, damaged south wall and roof trusses on the left.

City of Bethel, Alaska

Fire Station Building - Structural Inspection Report

TO: Lee Foley, Acting City Manager, City of Bethel

COPIES: Thomas S. Wolf, P.E.

FROM: Dennis Pearson, P.E.

DATE: August 29, 2008

The purpose of this report is to describe damage that was observed during a structural inspection at the City of Bethel Fire Station building on July 17, 2008 by Dennis Pearson, P.E. from CH2M Hill. A discussion of the damage and associated hazards is provided in this report. Recommendations are included for repairing existing damage. This report does not address the cost of any work that may result from the recommendations in this report. Recommendations provided in this report are conceptual in nature and are not intended to represent engineered solutions. This report does not address the impacts to City of Bethel employees and activities if repair or mitigation is performed on this facility. It is anticipated that The City of Bethel will procure estimating and project management services to help develop an understanding of the impacts associated with repair and mitigation.

The Fire Station building has a conventional wood framed super-structure. Engineered wood roof trusses span wood stud walls that function as bearing and shear walls. Wood sheathing provides shear resistance at bearing walls and also forms the structural roof diaphragm. Stud walls bear on laminated wood floor girders. The foundation for the Fire Station Building includes round wood piles embedded approximately 26 feet into permafrost and extending to approximately 2'-6" above grade creating a clear space below the building. Steel angle cross bracing is provided between piles to provide lateral support for the building during earthquakes and wind storms. Laminated wood girders ranging from 15 to 24 inches deep span the foundation piles. In the administrative and living areas of the building, engineered wood joists span the laminated girders at 24 inches on center and plywood fastened to the wood joists forms the structural floor diaphragm. In the garage area of the building where fire trucks are parked, 16-1/2 inch deep laminated joists span the laminated wood girders at 24 inches on center. Tongue and groove plywood is fastened to the laminated wood joists and a four inch concrete slab is placed on top of the plywood. The four inch slab is reinforced with 6 inch by 6 inch welded wire mesh.

This facility houses fire-fighting personnel and equipment required to respond during emergencies. This facility is classified by modern building codes as an essential facility. Essential facilities are required to be over designed to increase redundancy in the structure and provide additional strength and stiffness for the structural members. These requirements exist because impairment of an essential facility during an emergency is considered unacceptable by modern building code and building jurisdictions.

Below the building, sheathing is typically fastened to the underside of the floor structure. During our structural inspection, this sheathing had been removed in the north east corner of the building between the two northernmost lines of piles under the north parking bay where floor movement was previously detected by City of Bethel employees. Removal of this sheathing permitted viewing of the laminated wood floor structure in this area. Visible damage included widespread and severe wood rotting of the laminated wood joists and girders. Several of the laminated joists are experiencing de-lamination and horizontal splitting. The laminated girder that supports the structure directly below the garage door opening has experienced a shear failure that is almost total in nature. The girder shows signs of complete water saturation and significant rot throughout. Previous efforts to prop this beam included installation of steel supports that are attached to an adjacent bulkhead. Severe sagging of the beam, shear deformations, and a shear failure at the connection to an adjacent pile has caused the floor of the building to drop by approximately four inches at the north parking bay. The laminated girder supporting the north wall of the building also shows signs of thorough water saturation and rot throughout. Shear deformations are visible at several locations along the girder as it passes over the wood piles. Steel connectors that attach the laminated wood girder to the piles and suspend the laminated joists from laminated girders are showing signs of severe corrosion in the areas inspected. The source of the wood rot and corrosion appears to be water infiltration at the perimeter of the building, particularly at the built up gravel ramps that provide vehicle access into the parking bays. The floor structure was originally coated with a spray applied insulation that likely trapped water between the insulation and the wood structure accelerating corrosions and rotting. This insulation has either fallen away, or it has been removed by City of Bethel employees.

City of Bethel employees removed sheet rock ceilings in areas where water damage to the sheet rock was noticed. Where roof trusses are exposed by the removed sheetrock, City employees have also removed the spray applied insulation from the roof trusses. These areas occur in the living quarters of the building and above the north parking bay wall. Inspection of these areas reveals that the engineered wood roof trusses have experienced

severe rotting in these areas. The typical condition at these trusses is that the last diagonal in the truss has significantly rotted, and in some cases completely rotted through. It's possible that other parts of the truss have rotted as well, however, only the ends of the truss were visible during our inspections. Further demolition and inspection is required to determine if additional damage is present at the roof trusses. The source of the wood rot appears to be water infiltration through old roof finishes. The roof trusses are coated with a spray applied insulation that likely trapped water between the insulation and the wood trusses accelerating rotting. The roof finishes have been replaced, and this may have eliminated water infiltration. However, the insulation currently in place may be hiding existing damage that occurred when the previous roof finishes were in place.

The condition of the laminated wood joists and girders at the floor of the northeast corner of the building represent a significant collapse hazard that places the safety of occupants and city property at risk. The ability of the fire department to respond in the event of an emergency is also reduced because this part of the building can no longer be used to support loads, including fire trucks. Because this area of the building is at significant risk of collapse, it is our strong recommendation that this bay remain empty until repairs or replacement of the parking bay are implemented. De-lamination and horizontal splitting of the laminated floor joists greatly reduce the joist's ability to transfer shear stresses out to their supports. In the absence of shear resistance, the joists are at substantial risk of a bending failure whereby the beams will break at their midspan. In the event of beam failure, equipment above would likely fall through the floor, causing significant damage to the equipment and the building and possibly causing injury or death to personnel.

The girder that has experienced significant shear failure below the north garage door renders this parking bay unusable. This girder supports the wood posts, headers, and shear walls that frame out the garage door openings above. These parts of the structure resist lateral loads caused by earthquakes or windstorms. Lateral loads result in overturning forces imparted to the girder. Because the girder at the north garage door is no longer effective in resisting loads, the lateral stiffness of the garage bay as a whole is reduced. The girder that is rotted and experiencing shear deformation under the north wall of the garage represents a significant collapse hazard. This girder supports a bearing wall above. The bearing wall supports roof joists which carry large snow loads in the winter. Shear or bending failure of this girder are possible in the current condition and could result in collapse of the bearing wall above and consequently, the roof structure above.

We believe the damage to the floor structure in the area described is irreparable and we recommend replacement of the garage floor structure in the areas described. This

represents an area approximately 16 feet by 33 feet. Replacement of the floor in this area represents a significant challenge as the joists support a concrete slab and the perimeter girders in this area support garage door frames and bearing walls above. A significant engineered shoring plan would be required to support the building during replacement of the floor structure. The concrete slab in this area would likely need to be demolished and replaced as well. It is possible that costs of temporarily shoring the superstructure and replacing the floor structure will be more than total replacement of this part of the building.

The rotting of wood roof trusses represents a significant collapse hazard for the roof structure. The diagonal elements of the truss are required to transfer roof loads to the bottom truss chord so that the top and bottom chords both resist roof loads via tension and compression in the truss chords. When the diagonal element in the truss is damaged, the top chord of the truss is required to support the full load of the roof by bending at the truss support. The magnitude of these bending stresses places the roof trusses at substantial risk of collapse because the top chords are not intended to perform this way and may fracture where the truss bears on bearing walls. During our inspection, we noticed that in areas where sheet rock was removed several consecutive roof trusses were rotted. This represents a significant risk of progressive roof collapse. This could occur if a single roof truss failed. The roof loads that the failed truss were intended to carry would transfer to adjacent roof trusses. Because these trusses are also rotted, the additional load to the adjacent trusses may cause them to collapse as well. This chain reaction could continue until a very large portion of the roof has collapsed.

Only a small portion of the roof structure has been inspected for the damage described above. We recommend removal of the spray applied insulation from the roof structure to expose the roof structure and prevent potential moisture trapping in the future. New loose or batt insulation would be required to replace the spray applied insulation. Re-inspection of the roof trusses should be performed when the trusses are exposed. If little additional damage is found, the existing damage could likely be repaired by local retrofit of the roof trusses. If a significant number of roof trusses are damaged, or if the damaged trusses are rotted at other locations along their length, replacement of the roof trusses may be required. This would likely require removal of existing ceilings, electrical and mechanical elements, roof sheathing and roof finishes at locations where roof trusses are replaced.

Please do not hesitate to contact Tom Wolf at CH2M HILL if you have any questions or comments about the information provided in this report.



August 22, 2006

Project No. 625.06

City of Bethel
PO Box 1388
Bethel, AK 99599

Attn: Wally Baird, City Manager
Tel. 907-543-2047

Re: Bethel Fire Station Roof Condition Inspection

Dear Mr. Baird,

I inspected the Fire Station on August 18, 2006, on behalf of Bratslavsky Consulting Engineers, Inc. (BCE) along with Andrei Bukareff, representing Little Susitna Construction Company.

The weather was cloudy with drizzling rain as I arrived on site. Little Sustina Company personnel removed several sheets of metal roofing on the east side of the building (above the sleeping rooms)

Felt saturated with tar underlain the metal roofing was exposed, and was noted to be wet with signs of regular exposure to water. The contractor removed the felt in several areas and exposed plywood. Two 18" x 18" sections of plywood were removed to verify the condition of roof trusses. The plywood was wet throughout with significant delamination and damage. Sprayed foam insulation was applied to the bottom of the plywood sheathing, and also was fairly wet. The insulation thickness varied from 9 to 14 inches. Of particular concern was water damage noted at top chord of the roof trusses, which were encapsulated in insulation foam. (Wood trusses were measured to be 28" high and are spaced at 16" on centers.)

Later we met with Captain Bill Howell, who allowed us inside the building. It appears that the water was leaking for a long time. The insulation foam held the moisture in close proximity to the roof trusses, which caused the top chords and truss web member in some areas to completely rot through. The roof trusses have been compromised and damaged according to our evaluation. The employees have propped them up with some temporary 2 x members that are likely not strong enough. The ceiling was only removed above the sleeping quarters, but there is a reason to suspect that this may be the situation throughout the building.

While the goal of my inspection was to get familiar with the roof problems and come up with good (architectural) details for re-roofing, the situation I observed at the Bethel Fire Station building was an emergency situation. Because the building has sleeping rooms for the firemen, and is an emergency response building, it is especially critical that this building is at the point of a catastrophic collapse. Snow and/or high winds could actually cause this collapse.

It is imperative the Fire Station must undergo major repairs before it can be considered a useable building.

Please don't hesitate to contact me with any question or comments.

Sincerely,


Tanya Bratslavsky, P.E.
President

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