City of Bethel

P.O. BOX 1388
Bethel, Alaska 99559
Phone: 907- 543-2047
Fax: 907-543-4171

Regular City Council Meeting
August 28, 2012
6:30 P.M.
Council Chambers; Bethel, Alaska

City Council Meeting Agenda
Regularly Scheduled Meeting
August 28, 2012-6:30 pm
City Hall 300 State Highway, Bethel, AK
City of Bethel Council Chambers

Joseph Klejka
Mayor
Term Expires 2012
543-2984
jklejka@cityofbethel.net

Gene Peltola Jr.
Vice-Mayor
Term Expires 2013
543-3151
gpeltola@cityofbethel.net

Rick Robb
Council Member
Term Expires 2013
543-1879
rrobb@cityofbethel.net

Mary Sattler
Council Member
Term Expires 2013
543-1588
msattler@cityofbethel.net

Gene Peltola Jr.
Council Member
Term Expires 2013
543-3151
gpeltola@cityofbethel.net

Kent Harding
Council Member
Term Expires 2012
54[illegible]2276
[illegible]ng@cityofbethel.net

Mark Springer
Council Member
Term Expires 2013
545-1450
mspringer@cityofbethel.net

Eric Whitney
Council Member
Term Expires 2012
545-1309
ewhitney@cityofbethel.net

Lee Foley
City Manager
543-2047
lfoley@cityofbethel.net

Lori Strickler
City Clerk
543-1384
lstrickler@cityofbethel.net

Michael Gatti
City Attorney

Paul Richards
Lobbyist
paul_richards@gci.net

I. **CALL TO ORDER**

II. **PLEDGE OF ALLEGIANCE**

III. **ROLL CALL**

IV. **PEOPLE TO BE HEARD** – Five minutes per person

V. **APPROVAL OF CONSENT AGENDA AND REGULAR AGENDA**

VI. **APPROVAL OF MEETING MINUTES**

a) *7-24-2012 Regular City Council Meeting Minutes
b) *7-30-2012 Special City Council Meeting Minutes

VII. **REPORTS OF STANDING COMMITTEES**

a) Public Safety and Transportation Commission
b) Port Commission
c) Planning Commission
d) Parks and Recreation Committee
e) Finance Committee
f) Public Works Committee
g) Energy Committee

VIII. **SPECIAL ORDER OF BUSINESS**

a) **Pg 21** Morgan Merritt From The Department Of Transportation Will Be Providing A Status Update On The Tundra Ridge Road Project (Council Member Sattler)
b) Morgan Merritt From The Department Of Transportation Will be Providing An Update On The Bethel Airport Rehabilitation Project (Mayor Klejka)
c) Introduction of City Planner, Rachael Pitt (City Manager Foley)

IX. **UNFINISHED BUSINESS**

a) **Pg 31** *Resolution 12-15: A Resolution Of The City Council Of The City of Bethel Requesting An Ordinance Requiring Food Establishment To Post State Health Inspection Results For Scores (Public Safety and Transportation Commission)
b) Review Of The Yukon Kuskokwim Regional Aquatic Health And Safety Center Request For Proposal (City Manager Foley)
c) National Oceanic and Atmospheric Administration (NOAA) Alaska Fisheries Science Center (AFSC) Bethel Community Profile Review (Mayor Klejka)

X. **NEW BUSINESS**

a) **Pg 35** *Resolution 12-16: Providing For A Complete Streets Policy And Directing Staff To Develop Implementation Strategies To Increase The Usability Of All Streets For All Modes Of Travel For Citizens Of All Ages And Abilities In Bethel (Public Safety and Transportation Commission)
b) **Pg 41** AM 12-28: Contract For CH2MHILL To Conduct A Water And Sewer Utilities Cost Analysis And Rate Study (City Manager Foley)

[illegible]la posted on August 22, 2012, at City Hall, AC Co., Swansons, and the Post Office.

Lori Strickler, City Clerk's Office

(Items on the agenda noted with an asterisk (*) are considered the consent agenda.
All Resolutions noted with an asterisk (*) will automatically be adopted on the consent agenda unless removed from the consent agenda by Council.
Ordinances introduced with an asterisk (*) on the consent agenda will automatically be introduced and set for **Public Hearing September 11, 2012**)

c) **Pg 61** AM 12-29: Contract For Larsen Consulting Group, LLC To Complete Water And Sewer Master Plan Update (2013-2018) (City Manager Foley)
d) Exploring Options Regarding The Armory Building And Lease (Mayor Klejka)
e) Transit System Operation Feasibility Update (Mayor Klejka)
f) **Pg 63** AM 12-30: Review And Determination Of State Priority Request (City Manager Foley)
g) *City Manager Leave Request September 7-17th (City Manager Foley)
h) *Administrative Leave Request For The City Attorney August 30th To Meet With Previous Attorney Michael Gatti (Mayor Klejka)

XI. MAYOR'S REPORT
XII. MANAGER'S REPORT
XIII. CLERK'S REPORT
XIV. COUNCIL MEMBER COMMENTS
XV. ADJOURNMENT

da posted on August 22, 2012, at City Hall, AC Co., Swansons, and the Post Office.

Lori Strickler, City Clerk's Office
(Items on the agenda noted with an asterisk (*) are considered the consent agenda.
All Resolutions noted with an asterisk (*) will automatically be adopted on the consent agenda unless removed from the consent agenda by Council.
Ordinances introduced with an asterisk (*) on the consent agenda will automatically be introduced and set for **Public Hearing September 11, 2012**)

Approval of the Minutes

City of Bethel City Council Meeting Minutes

July 24, 2012 Regular Meeting Bethel, Alaska

I. CALL TO ORDER

A Regular Meeting of the Bethel City Council was held on July 24, 2012 at 6:30pm, at the City Council Chambers, Bethel, Alaska.

With the telephonic participation of the Mayor and the Absence of the Vice-Mayor, City Clerk, Lori Strickler called the meeting to order.

II. PLEDGE OF ALLEGIANCE

III. ROLL CALL

PRESENT:
Council Member Gene Jr. Peltola
Council Member Mark Springer
Council Member Rick Robb

ABSENT:
Council Member Kent Harding
Council Member Joseph Klejka
Council Member Mary Sattler
Council Member Eric Whitney

STAFF:
City Clerk Lori Strickler
City Manager Lee Foley

Due to a lack of a quorum, a meeting was not held.

_____
Joseph Klejka, Mayor

ATTEST:

_____
Lori Strickler, City Clerk

City of Bethel City Council Meeting Minutes

July 30, 2012 Special Meeting Bethel, Alaska

I. CALL TO ORDER

A Special Meeting of the Bethel City Council was held on July 30, 2012 at 6:30pm, at the City Council Chambers, Bethel, Alaska.

Mayor Joseph Klejka called the meeting to order.

II. PLEDGE OF ALLEGIANCE

III. ROLL CALL

PRESENT: Council Member Robb
Council Member Whitney (Participated telephonically)
Council Member Harding
Council Member Sattler
Council Member Springer
Vice-Mayor Peltola
Mayor Klejka

ABSENT: None

OTHERS PRESENT: City Manager Foley
City Clerk Strickler

IV. PEOPLE TO BE HEARD

No one wished to be heard.

V. APPROVAL OF AGENDA

MOVED:	Robb	Motion to approve the agenda.
SECONDED:	Harding	
VOTE ON MAIN	All in favor	

MOTION		

MOVED:	Robb	Motion to move into a committee of the whole.
SECONDED:	Harding	
VOTE ON MAIN MOTION	All in favor	

MOVED:	Robb	Motion to move out of committee of the whole.
SECONDED:	Harding	
VOTE ON MAIN MOTION	All in favor	

VI. UNFINISHED BUSINESS

Item A- Council's Review And Modification To The Draft Employment Contract Between The City Of Bethel And The In House City Attorney.

MOVED:	Springer	Motion to amend the employment contract to insert under section A of Section 9. The employer agrees to compensate the employee for all remaining PTO hours at the time of termination of employment. Section 9. C. to replace current language with "A. Employees called for jury duty shall be treated as being on approved leaved without loss of longevity, leave or pay. Service in court when subpoenaed as a witness shall be treated the same as jury duty. Fees paid by the court, other than those for an Employee's appearance at any time outside the Employee's regularly scheduled shift, for travel, parking and subsistence allowances, shall be remitted to the City. B. An Employee shall provide the City Council with a copy of a notice to call for jury duty immediately upon receipt by the
SECONDED:	Robb	

		Employee. When excused or released from Jury Duty for the day, the employee shall return to work immediately, allowing for delay for the period of time reasonably necessary to travel to and from home to change into work clothing. Section 5. B. strike ~~90 days~~ and insert 30 days.
VOTE ON MAIN MOTION	All in favor	

MOVED:	Robb	Motion to approve the outside employment currently held by Mrs. Burley, specifically her ownership of Raven Fabrics and for the Women's Auxiliary.
SECONDED:	Springer	
VOTE ON MAIN MOTION	All in favor	

Item B- Personal Leave For The City Manager From August 6th Through August 24th.

MOVED:	Springer	Motion to approve the City Manager's PTO from August 24th to September 7th.
SECONDED:	Peltola	
VOTE ON MAIN MOTION	All in favor	

VII. ADJOURNMENT

MOVED:	Springer	Motion to adjourn.
SECONDED:	Harding	
VOTE ON MAIN MOTION	All in favor	

Council adjourned at 7:02pm.

_____

Joseph A. Klejka, Mayor

ATTEST:

_____

Lori Strickler, City Clerk

Reports of Standing Committees

Reports of Standing Committees

City of Bethel
Finance Committee Agenda

Regular Meeting | **Thursday August 23, 2012 – 6:45 p.m.** | City Hall, Bethel, Alaska

Carol Ann Willard
Finance Committee Chair

Clark Davis
Finance Committee Vice Chair

Gene Peltola Jr
Council Representative

Kevin Kristof
Finance Committee Member

Sadie McDaniel
Finance Committee Member

Dave Trantham, Jr.
Finance Committee Member

Ann Willert
Finance Committee Member

Lee Foley
City Manager
543-1373
lfoley@cityofbethel.net

Bobby Sutton
Finance Director
543-1376
bsutton@cityofbethel.net

LaRae Sullivan
Assistant Finance Director
543-1375
lsullivan@cityofbethel.net

I. CALL TO ORDER

II. ROLL CALL

III. PEOPLE TO BE HEARD – Five minutes per person

IV. APPROVAL OF AGENDA

V. APPROVAL OF MINUTES OF REGULAR MEETINGS OF April 26, 2012 May 24, 2012 and June 28, 2012, MINUTES OF SPECIAL MEETING June 4, 2012

VI. UNFINISHED BUSINESS

VII. NEW BUSINESS

A: Review of Amended Ordinance Purchasing 4.20.030(M), 4.20.090(E), 4.20.100 (E) In reference to Local Business Preference.

B: Review of Proposed Resolution; Directing Administration to issue a request for a proposal to conduct a cost of service survey on water usage and rates and to establish a flat rate for residential piped water until the cost of service survey is finalized- Requested by City Council

C: Review of the first draft of the Request For Proposal; for the cost analysis of the City of Bethel's water and sewer utilities. - Requested by City Council

D: Rescheduling Finance Committee Meeting- BMC: 2.52.130- Requested by Chair

E: Review of Proposed Ordinance Establishing a Sales tax on the sale on sugar-sweetened beverages- Requested by Public Safety and Transportation commission

VIII. COUNCIL MEMBER COMMENTS

IX. FINANCE DIRECTOR'S COMMENTS

X. FINANCE COMMITTEE MEMBER COMMENTS

XI. ADJOURNMENT

Posted on August 17, 2012 at City Office, AC Co., Swanson's & Post Office

Sharri Salyers, Recorder

City of Bethel, Alaska
Public Works Committee Minutes

July 18, 2012 Regular Meeting Bethel, Alaska

CALL TO ORDER
A regular meeting of the Public Works Committee Meeting was held on July 18, 2012 at 6:35 p.m. in the City Shop Conference Room, Bethel, Alaska was called to order by Committee Member Chair Frank Neitz.

ROLL CALL
Present: Frank Neitz, Jennifer Dobson, Bill Schreiner, Jeff Sanders, Bill Arnold and Brian Lefferts
Excused absence(s): Joseph Klejka and Scott Guinn
Unexcused absence(s): none

Also in attendance were the following:
Chuck Willert, Public Works Director
Cheryl Roberts, Public Works Admin, Recorder of Minutes

PEOPLE TO BE HEARD
Brian Lefferts, Chairman for Public Safety & Transportation Committee - Talked about a Complete Streets Policy for the City of Bethel to incorporate all modes of traffic.

APPROVAL OF MINUTES

MOVED BY:	J. Sanders	To approve the minutes of the regular meeting of May 16, 2012 & June 20, 2012 - as corrected.
SECONDED BY:	J. Dobson	

VOTE ON MOTION	Motion carried by unanimous voice vote.

APPROVAL OF AGENDA

MOVED BY:	J. Sanders	To move Item G in UNFINISHED BUSINESS, to before the Directors Report as to involve Brian Lefferts in the discussion.
SECONDED BY:	J. Dobson	

VOTE ON MOTION	Motion carried by unanimous voice vote.

DIRECTORS REPORT
Mr. Tilbury signed the Utility Easement for B.U.C.

UNFINISHED BUSINESS
Item A - Update - Closeout of 2 Outstanding Grants
Bill Arnold mentioned they are working forward & as the paperwork comes in they are working on it.

Item B - Update - Sewer Lagoon
Bill Arnold - Normally we only discharge 2 weeks out of the spring, this year we did 3 weeks.

Item C - Update - 5 Year Plan
No discussion ensued on this topic.

Item D - Update - Recycle Center
Jennifer and/or Frank will follow-up on this. Frank will check the City Councils' Agenda.

Item E - Neptune - Update Rate Study - Meter Housing
Bill Arnold has backed off for now due to the questionnaire from USDA Rural Development, but also wants it funded by the grant.

Item F - Institutional Corridor
Discussion had ensued by the committee & they would like to put in a recommendation to the City Council to support YK & all other users of the Corridor. And to put in for a Motion to support a draft to be written in favor of the Institutional Corridor & the proposal by the applicants to City Council.

Item G - Dust Control
A discussion ensued about calcium chloride and options of dust control for the city.

Item H - Proposed Resolution for Council Consideration
No discussion ensued on this topic.

Item I - RFP - Cost Analysis of the City of Bethel's Water & Sewer Utilities
The proposals had to be in by July 12th.

Item J - RFP - Water & Sewer Master Plan Update
The Committee believes this is still at the City Council level.

NEW BUSINESS
Item A - City Engineer/Project Manager for a multi-use Engineer for the Pool
Tabled until our next meeting in August.

MEMBER COMMENTS
Frank - Talked with Allen with Alaska Logistics & he is concerned about it taking a week to get the vehicles from the Dump on the Barge.

Bill - He would support a Resolution requesting the vehicles for Alaska Logistics to be stacked for them to be quickly & easily removed. Encourages everybody to take Brian Lefferty up on his offer of looking at the road on BIA with the new road material they used.

Jennifer - Was wondering if the Grant Manager has reviewed the series of comments for the RFP for the cost of water & sewer; and were the comments were taken into consideration & she would also like an update at our next meeting of any proposals.

Jeff - He feels we owe Richard Olson some gratitude for bringing the city some lightly contaminated diesel soil for the dump from a fuel spill this past winter.

Bill Arnold - DOT is building a new winter storage building for their equipment to thaw them out. By what the code reads it has to come to the committee because it's considered 'Industrial Waste'.

ADJOURNMENT

MOVED BY:	J. Sanders	To adjourn the meeting.
SECONDED BY:	B. Schreiner	

VOTE ON MOTION	Motion carried by unanimous voice vote.

With no further business before the Committee, the meeting adjourned at 7:36 p.m.

APPROVED THIS ____ DAY OF AUGUST 2011.

Frank Neitz, Chair

Cheryl Roberts
Recorder of Minutes

City of Bethel, Alaska
Planning Commission

August 9, 2012 Regular Meeting Bethel, Alaska

I. CALL TO ORDER

A regular meeting of the Planning Commission was held on August 9, 2012 at 6:30 pm in the City Hall Council Chambers, in Bethel, Alaska.

Vice-Chair, Joy Shantz, called the meeting to order at 6:30 pm.

II. ROLL CALL

Compromising a quorum of the Commission, the following members were present for roll call:

Joy Shantz, Rick Robb, Abe Palacios, Cliff Linderoth; Absent: John Guinn and Mike Walter

Ex -Officio members present were the following:

Rachael Pitts, Planning Director Betsy Jumper, Recorder

III. PEOPLE TO BE HEARD

- **None**

IV. APPROVAL OF AGENDA

MOTION TO APPROVE THE AGENDA OF August 9, 2012

MOVED:	Abe Palacios	To approve the agenda for the August 9, 2012 meeting.
SECONDED:	Rick Robb	
VOTE ON MAIN MOTION	All in favor 4-0 Motion passes; 4 yes and 0 opposed.	

V. APPROVAL OF MINUTES

MOTION TO APPROVE THE MINUTES FROM the May 10, 2012 Meeting

MOVED:	Abe Palacios	To approve the minutes of the May 10, 2012 meeting.
SECONDED:	Rick Robb	
VOTE ON MAIN MOTION	All in favor 4-0 Motion passes; 4 yes and 0 opposed.	

VI. COMMUNICATIONS: Have a new copier at Public Works; will distribute a listing of all the site plan permits issued since January 1, 2012 for the next meeting.

VII. PLANNER'S REPORT: None at this time.

VIII. **COMMISSIONER'S COMMENTS: Bubba**, happy to have a Planning Director; **Cliff,** glad to have Director as well, and was wondering about the status of the new store/theatre; **Rick;** Welcomes Rachael to Bethel and the Planning Department and updated the group on the RFP for the rate study-- going to include rates as well as costs-- and will include the proposed utility corridor as well. Rick stated also that the customers (i.e., YKHC, the jail, etc.) are not going to fork up the bucks for it; hopefully will get legislative appropriations; Joy, good to be back in a sunny Bethel and welcomes Rachael.

IX. **UNFINISHED BUSINESS:** None

X. NEW BUSINESS: A. Welcome and Introduction of Ms. Rachael Pitts, New Planning Director; Rachael introduced herself and gave an overview of her planning background to the Planning Commission. Welcome to Bethel and Planning!!!

XI. B. Acceptance of Planning Commission Member David Hames' Verbal Resignation (Action Item)

Motion made to accept David Hames' Verbal Resignation

MOVED:	Rick Robb	To accept Planning Commission member David Hames' verbal resignation from the Planning Commission.
SECONDED:	Abe Palacios	
VOTE ON MAIN MOTION	All in favor 4-0 Motion passes; 4 yes and 0 opposed.	

XII. **ADJOURNMENT, Motion to adjourn the meeting.**

MOVED:	Abe Palacios	To adjourn the meeting at 6:50.
SECONDED:	Cliff Linderoth	
VOTE ON MAIN MOTION	All in favor 4-0 Motion passes; 4 yes and 0 opposed.	

Next meeting on Sept. 13, 2012

John Guinn, Chairman

Betsy Jumper, Recorder

City of Bethel
Port Commission Meeting Agenda

Regularly Scheduled Meeting
August 20 - 7 pm
City Council Chambers, City Hall, Bethel, AK

Commissioners
Alan Murphy
Chair
Term Expires 2011
(907)543-2805

Greg Roczicka
Vice-Chair
Term Expires 2013
(907)543-2903
groczicka@hotmail.com

Mark Springer
Council Rep.
Term Expires 2013
(907)543-1297
mspringer@cityofbethel.net

Richard Pope
Port Commissioner
Term Expires 2013
(907)543-1900
bethelalaskapc@gci.net

John Dickens
Port Commissioner
Term Expires
(907)543-0684

Pat Jennings
Port Commissioner
Term Expires
(907)543-3838

Ex-Officio
Peter A. Williams,
Port Director
(907)545-4150
pwilliams@cityofbethel.net

i. **CALL TO ORDER**

ii. **ROLL CALL**

iii. **PEOPLE TO BE HEARD**

iv. **APPROVAL OF AGENDA**

v. **APPROVAL OF MINUTES FROM THE REGULAR MEETINGS**

vi. **DEPARTMENT HEAD COMMENTS**

vii. **UNFINISHED BUSINESS**
-Small Boat Harbor
-Budget
-14.03.010 Composition, Term of office and procedures.

viii. **NEW BUSINESS**
-Budget: Expenditures Revenues

ix. **COMMISSION MEMBER'S COMMENTS**

x. **ADJOURNMENT**

Special Order of Business

STATE OF ALASKA

FRANK MURKOWSKI, GOVERNOR

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

STATEWIDE DESIGN & ENGINEERING SERVICES DIVISION
CENTRAL REGION – HIGHWAY DESIGN

4111 AVIATION AVE.
ANCHORAGE, AK 99502 or
P.O. BOX 196900
ANCHORAGE, ALASKA 99519-6900
(907) 269-0590 FAX (907) 243-4409

February 6, 2003

RE: Tundra Ridge Road MOA
STP-0001(207)\54289

Mr. Robert E. Herron
City Manager
City of Bethel
P.O. Box 388
Bethel, Alaska 99559

Dear Mr. Herron:

We received the City's signed copies of the Memorandum of Agreement (MOA) for Tundra Ridge Road on January 24 and our Regional Director has subsequently signed them both. One copy is enclosed for your files.

As mentioned in previous letters the design of the Tundra Ridge Road project is 50% complete. We will now continue the design process and reinitiate negotiations to acquire ROW across the two native allotments. We will continue to set as a goal construction in 2004 with the knowledge that acquisitions of this type often take up to two years to complete, potentially slipping the project into 2005.

Please call me if you have any other questions concerning this matter.

Sincerely,

John E Dickenson

John Dickenson
Project Manager

/bjs

Enclosure: Final-Signed MOA Tundra Ridge Road

cc: Carl Berger, City Council Member, City of Bethel
Jerry Drake, City Council Member, City of Bethel
Adrei Jacobs, City Council Member, City of Bethel
Joy Shantz, City Council Member, City of Bethel
Stanley "Tundy" Rogers, City Council Member, City of Bethel
Hugh Short, Mayor, City of Bethel
Brad Sworts, Kuskokwim Area Planner
John Tolley, Chief, Planning and Administration
David E. Trantham, Jr. City Council Member, City of Bethel
Hank Wilson, P.E., Chief, Highway Design

Memorandum of Agreement
Between State of Alaska and
City of Bethel

The parties to this agreement of the State of Alaska acting through its Department of Transportation and Public Facilities (hereafter DOT&PF) and City of Bethel, a municipality established under Alaska law (hereafter the Municipality)

WHEREAS, DOT&PF has the authority to plan, design, and construct Tundra Ridge Road Paving, identified as Project STP-0001(207), located within the boundaries of the Municipality (hereafter the project);

WHEREAS, the Municipality desires that DOT&PF plan, design and construct the project; and

WHEREAS, the Municipality has by resolution or ordinance agreed to accept title to the project and to maintain and operate the project upon its completion.

IT IS THEREFORE AGREED by the parties, in consideration of the mutual promises contained in this agreement, as set forth below, regarding the planning, design, construction, maintenance, and operation of the project:

1. PROJECT RANKING

(a) DOT&PF shall, while ranking this project with other projects during the preparation of the State Transportation Improvement Plan (STIP) and capital budgeting process, recognize that the Municipality has agreed to accept title to the project and to maintain and operate the project upon completion.

(b) If the Municipality withdraws its promise, before the advertisement for construction has begun, to accept title, and maintain and operate the project upon completion, DOT&PF will re-score the project and place it in the STIP according to its revised ranking.

(c) If the local agency withdraws its promise after the construction advertisement, the DOT&PF may proceed forward with construction. In the evaluation of Municipality projects for 6 years after the breach of promise, the DOT&PF will not include any consideration in project scoring for contribution toward the cost of construction, and the assumption of maintenance and title, until the Municipality has cured the breach to the DOT&PF's satisfaction.

2. PLANNING, DESIGN, AND CONSTRUCTION

DOT&PF shall plan, design, and construct the project within the approved scope and funding. DOT&PF will obtain all local, state and federal permits necessary to complete the project. DOT&PF shall have no claim against the Municipality for cost overruns or if the money available is not adequate to complete the project.

3. MAINTENANCE AND OPERATIONS

(a) The Municipality agrees to maintain and operate the project consistent with the 23 CFR §1.27 and DOT&PF's Alaska Highway Maintenance and Operations Manual (AHMOM)

- for the project's design life which is 10 (ten) years

commencing upon the substantial completion of the construction of the project. DOT&PF shall inform municipality of that date. In the event of conflict between 23 CFR §1.27 and AHMOM, the more stringent provisions set the minimum standards.

(b) The Municipality shall perform its activities under this agreement at its sole cost and expense and without reimbursement from DOT&PF. The Municipality's maintenance activities include, but are not limited to:

(1) planning, scheduling, administration, and logistics of maintenance activities,

(2) traffic control and safety;

(3) preservation of drainage in an as-built condition, including maintenance of all culverts, ditches, storm sewers, gutters, dry wells, and under-drains if any are constructed as part of the project;

(4) embankment protection, including erosion control, to as-built conditions;

(5) roadside management;

(6) snow and ice removal;

(7) snow and ice control, including all plowing, sanding, culvert and storm sewer thawing, snow hauling, winging, opening of shoulders, ice scraping, drift control, snow slide removal, and associated tasks as may be required for the safe and timely passage of the public;

(8) maintaining signs and delineators in an as-built condition and their replacement, including posts and foundations, when damaged, unreadable, or worn out;

(9) highway marking and repainting as required to maintain performance of their intended function, but only to the extent completed as part of the project;

(10) repair of street lights as required to ensure a functioning system, including repair/replacement of lenses, light bulbs, photo cells, contacts, relays, and wiring if any are constructed as part of the project;

(11) removal of debris, rubbish, and dead animals;

(12) signing of seasonal weight restrictions as may be required by local conditions;

(13) pothole repair using asphalt products on an as-needed basis;

(14) annual crack sealing;

(15) repairs of minor rutting, waves, sags, humps, corrugations, raveling, alligator cracks, pitting and bleeding on a basis; and

(16) minor bridge repairs, which includes painting of localized rust areas, re-decking, and repair of guardrail and railing sections to the extent any are constructed as part of the project.

4. INDEMNIFICATION

The Grantee shall hold the State, its officers, employees, and agents (collectively, "the State") harmless from and defend and indemnify the State for liability, claims, or causes of action arising out of this Deed and Assignment or relating to the property and facilities being deeded and the obligations being assigned.

Notwithstanding the foregoing, the Grantee shall have no obligation to hold harmless and indemnify the State to the extent the State is determined to be liable for its own acts or omissions, except that:

to the maximum extent allowed by law, the Grantee shall hold the State harmless from and indemnify the State for liability, claims, or causes of action arising from an alleged defect in the design or construction of facilities existing on the premises at the date of this grant, regardless of negligence or other fault, if such liability, claim, or cause of action arises out of an incident that occurs more than two years after the Grantee assumes maintenance responsibilities for the facilities.

The Grantee's duty to defend shall apply regardless of whether it is also alleged that the State's acts or omissions contributed to the injury (including injury to personal property, real property or persons, including fatal injury).

Neither liability, claims or causes of action arising from injuries which occurred prior to the date of this transfer nor liabilities imposed by, or claims or causes of action arising from or asserted under AS 46.03.822 shall be governed by this paragraph.

5. TITLE DOCUMENTS

(a) Upon completion of the project, DOT&PF shall execute a quit claim deed that conveys all of its right, title, and interest in the real property occupied by the project to the Municipality, subject to utility permits issued under 17 AAC 15, encroachment permits issued under 17 AAC 10.010-17 AAC 10.015, and driveway permits issued under 17 AAC 10.020-17 AAC 10.990, and subject to Alaska Statute requirements for disposal of land.

(b) The quit claim deed issued under this paragraph shall revert to DOT&PF if any real property occupied by the project ceases, for any reason, to be used for a public facility.

6. PROPERTY MANAGEMENT

The Municipality agrees that its management of the right of way is subject to the provisions of 23 CFR §1.23. The Municipality may not allow any encroachment within the right of way of the project without the prior consent of DOT&PF and the Federal Highway Administration. The Municipality may not sell any portion of the right of way without the prior consent from DOT&PF and the Federal Highway Administration. In the event that DOT&PF and the Federal Highway Administration give their consent to the disposal of any portion of the right of way for the project, the Municipality shall pay proceeds of the sale to DOT&PF, which DOT&PF will credit to the appropriate federal aid accounts.

7. DISPUTE RESOLUTION

(a) Except for disputes for third party claims for which the provisions of paragraph 4 are applicable, in the event of a dispute under this agreement that the parties cannot resolve within 15 days, the DOT&PF and the Municipality each agree that they shall each appoint an arbitrator, who shall between them agree to the appointment of a third arbitrator. The three arbitrators shall decide the matter of the appropriate fees for their services. Each party

shall bear the expenses of any arbitrator that they appoint and shall pay half of the cost of the third arbitrator.

(b) The arbitrators may conduct such proceedings as they believe are necessary to resolve the matter before them. They may, in the exercise of their discretion, proceed on the record, and the cost of such record to be borne equally by the parties.

(c) The arbitrators' decision of a matter before them is final and may only be changed or modified under the provisions of AS 9.43.120 and AS 9.43.130.

8. THE WHOLE AGREEMENT

This agreement constitutes the entire agreement between the parties. There are no other understandings or agreements between the parties, either oral or memorialized in writing regarding the matters addressed in this agreement. This agreement may not be amended by the parties unless agreed to in writing with both parties signing through their authorized representatives.

Dated: 1/28/03

State of Alaska
Department of Transportation
and Public Facilities

By: _____
David R. Eberle
Title: Regional Director, Central Region

DATED: 01/14/03

City of Bethel

By: _____
Robert E. Herron
Title: City Manager

ACKNOWLEDGMENT OF MUNICIPALITY

Subscribed and sworn to or affirmed before me by Robert Herron, who is City Manager of the City of Bethel, a municipality established under Alaska law, on this 14 day of Jan, 2003.

STATE OF ALASKA
NOTARY PUBLIC
Colleen Soberay
My Commission Expires July 13, 2005

Colleen Soberay
Notary Public, State of Alaska
My commission expires: 7/13/05

ACKNOWLEDGMENT OF STATE OF ALASKA

Subscribed to and sworn to or affirmed before me by David R. Eberle, who is Regional Director of the Department of Transportation and Public Facilities on this 28 day of January, 2003.

CANDACE EDWARDS
NOTARY
PUBLIC
STATE OF ALASKA

Candace Edwards
Notary Public, State of Alaska
My commission expires: 4/20/05

ACKNOWLEDGMENT OF THE ASSEMBLY
OR COUNCIL OF THE MUNICIPALITY

Be it remembered that on the 14th day of Jan, 2003 at a regular meeting, of the City Council of Bethel, a municipality established under Alaska law, granted its approval of the foregoing instrument.

Dated: 1/14/03

_____
Clerk

Unfinished Business

Unfinished Business

Introduced by: Public Safety and Transportation Commission
Date: July 24, 2012
Action:
Vote:

CITY OF BETHEL, ALASKA

RESOLUTION #12-15

A RESOLUTION OF THE BETHEL CITY COUNCIL PROVIDING FOR THE REQUIREMENT THAT FOOD ESTABLISHMENTS POST STATE HEALTH INSPECTION RESULTS OR SCORES

WHEREAS, public safety and health are critical to the general welfare of its inhabitants;

WHEREAS, a safe and sanitary food supply is essential for every inhabitant of the City of Bethel;

WHEREAS, the State of Alaska regularly inspects all commercial food preparation facilities to ensure safe and sanitary handling of food and provides a written report as to the compliance with applicable standards of food safety; and

WHEREAS, every food preparation facility is required by State law to provide such report to anyone asking to see the report;

WHEREAS, not every inhabitant is willing or knowledgeable concerning the availability of such report;

WHEREAS, informing the inhabitants of Bethel as to the safety and sanitation of their food sources is critical to their general welfare;

WHEREAS, the average patron of a food preparation facility has neither the access nor the skill and training to identify and evaluate a majority of the factors affecting food safety and sanitation beyond the obvious;

WHEREAS, requiring the posting of an inspection report will not impose new regulations nor significant costs to existing and future food preparation facilitate, but simply inform the public as to the results of existing inspection reports complete by the State;

NOW, THEREFORE, BE IT RESOLVED by the City Council of Bethel, Alaska that an ordinance be adopted requiring inspection results and scores from inspections by the State of Alaska Division of Environmental Conservation be posted immediately upon completion of any food inspection. .

PASSED AND APPROVED THIS __ DAY OF JULY 2012, BY A VOTE OF _ IN FAVOR AND __IN OPPOSITION.

_____
Joseph A. Klejka, Mayor

ATTEST:

_____
Lori Strickler, City Clerk

New Business

Introduced by: Public Safety and Transportation Commission
Date: July 24, 2012
Action:
Vote:

CITY OF BETHEL, ALASKA

RESOLUTION #12-16

A RESOLUTION OF THE CITY COUNCIL PROVIDING FOR A COMPLETE STREETS POLICY AND DIRECTING STAFF TO DEVELOP IMPLEMENTATION STRATEGIES TO INCREASE THE USABILITY OF ALL STREETS FOR ALL MODES OF TRAVEL FOR CITIZENS OF ALL AGES AND ABILITIES IN BETHEL

WHEREAS, the City of Bethel wishes to ensure that all users of our transportation system are able to travel safely and conveniently on all streets and roadways within the public right-of-way in Bethel;

WHEREAS, a complete street is defined as one which provides a safe, convenient, and context-sensitive facility for all modes of travel, for users of all ages and all abilities;

WHEREAS, complete streets better serve the needs of those who use transit by providing access to transit systems;

WHEREAS, complete streets have public health benefits, such as encouraging physical activity and improving air quality, by providing the opportunity for more people to bike and walk safely;

WHEREAS, complete streets improve access and safety for those who cannot or choose not to drive motor vehicles;

WHEREAS, complete streets are essential in providing safe routes to school for children;

WHEREAS, complete streets policies have been adopted legislatively by at least five states, and by at least 36 localities – of which 13 are by local law (resolutions or ordinances);

WHEREAS, the City of Bethel currently has a limited complete streets policy;

WHEREAS, it is the desire of the City of Bethel to formalize a commitment to the principles of complete streets for all of our streets;

NOW, THEREFORE, BE IT RESOLVED by the City Council of Bethel Alaska as follows: that Bethel commits to a Complete Streets Policy which has the following elements:

1. Any roadway in the City of Bethel which is to be newly constructed or completely reconstructed must be designed and constructed to
    a. Provide for the safety and convenience of all users of all ages and of all abilities: pedestrians, bicyclists, transit users, and motorists; and
    b. Address the needs of all users both along roadway corridors and crossing the corridors.
2. Any project in which an existing roadway surface is to be restored or rehabilitated, and any remediation of deficient or non-existent sidewalks, shall be reviewed for the potential of making the roadway a complete street. Consideration shall particularly include proportionality: is the scope of work needed to make a complete street reasonable in relation to the scope of the proposed roadway maintenance or improvement?
3. Any exception to applying this Complete Streets Policy to a specific roadway project must be approved by the City Council, with documentation of the reason for the exception.
4. An annual report will be made to the City Council by the City Administration showing progress made in implementing this policy.

AND BE IT FURTHER RESOLVED, that this Complete Streets Policy will apply to the scoping, design, and construction of projects.

AND BE IT FURTHER RESOLVED, that the Public Works Department will review current design standards which apply to new roadway construction, to assure that they reflect the best available design standards and guidelines, and effectively implement the Complete Streets Policy above stated.

AND BE IT FURTHER RESOLVED, that these design standards also serve as guidance for all existing roadway rehabilitation, reconstruction, or resurfacing, to the extent that the work required is reasonably proportional to the scale of the proposed rehabilitation, reconstruction, or resurfacing.

AND BE IT FURTHER RESOLVED, that application of design standards will be flexible to permit context-sensitive design, fitting the roadway design within the context of the neighborhood, recognizing that all streets are different and user needs will be balanced.

AND BE IT FURTHER RESOLVED, that staff in the Public Works Department be directed to develop ordinances, resolutions, programs, and recommendations for funding to implement the Complete Streets Policy, for consideration by the City Council; and that

these shall identify the complete streets needs and recommend a plan to meet those needs, including for sidewalks, throughout the city.

AND BE IT FURTHER RESOLVED, that the City Council commits to including Complete Streets Policy and principles in all future City plans.

PASSED AND APPROVED THIS __ DAY OF AUGUST 2012, BY A VOTE OF _ IN FAVOR AND __IN OPPOSITION.

_____
Joseph A. Klejka, Mayor

ATTEST:

_____
Lori Strickler, City Clerk

City of Bethel
Committees and Commissions

Recommendation to City Council

Committees and Commissions that wish to make a recommendation to City Council should turn this form in to the City Clerk or to the City Council representative on the committee or commission.

Committee/Commission: Public Works	**Chairman:** Frank Neitz
Date Submitted: Aug. 17, 2012	**Council Rep:** Joe

Issue: ~~Roads~~ Complete Streets Ordinance Recommendation #12-??

Recommendation:

To Support ~~Roads~~ Complete Streets Ordinance Recommendation for the Public Safty & Transportation Committee #12-??

Frank

Other:

Received by: [signature]
Date: 8-17-2012

City of Bethel Action Memorandum

Action memorandum No.	#12-28		
Date action introduced:	August 28, 2012	Introduced by:	Lee M. Foley
Date action taken:		☐ Approved	☐ Denied
Confirmed by:			

SUBJECT/ACTION: Approve and affirm the contract between the City of Bethel and CH2MHill to perform the following professional services: cost analysis and rate study of the City of Bethel's water and sewer utilities.

Route to Department/Individual	Initials	Remarks
Administration/John Sargent		City of Bethel used input from three committees/commissions and Bethel City Council to prepare and issue Request for Proposals document. City administrators evaluated four proposals received and mutually agreed on the final selection. Contract was written by Grant Manager and vetted (revised) by City attorney, City's insurance agent, and approved by Consultant.

Attachment(s):

1. Proposed contract between City of Bethel and CH2MHill for the performance of a cost analysis and rate study of the City of Bethel's water and sewer utilities.

Amount of fiscal impact	Description	Account information
$69,395	Budget Modification with full funding details will be brought to Council during September 11, 2012 council meeting.	To be determined

Summary statement

The Bethel City Council provided feedback and direction to City Administration to prepare and issue a Request for Proposals document in order to hire a consultant to conduct a detailed cost analysis and rate study of the City's water utility and sewer utility. City administrators scored four proposals received and selected the one with the highest score as the most favorable to the City. A contract was prepared and approved by the Consultant and City Administration and is now before City Council for final approval. Consultant will present final report to City Council on December 11, 2012.

CONTRACT
BETWEEN CITY OF BETHEL AND CH2MHILL
TO CONDUCT WATER AND SEWER UTILITIES
COST ANALYSIS AND RATE STUDY

THIS CONTRACT is made at Bethel, Alaska, by and between the City of Bethel ("City"), a municipal corporation, and CH2MHill ("Consultant") for the purpose of completing a cost analysis and rate study of the City's water and sewer utilities.

WHEREAS, City does not have sufficient personnel to perform the services required herein thereby necessitating this Contract for consulting services.

NOW, THEREFORE, the Parties covenant and agree, for good consideration hereby acknowledged, to the following provisions:

SECTION 1: CONSULTANT SERVICES

A. Consultant shall perform a comprehensive cost analysis of the water and sewer utilities owned and operated by the City of Bethel. The cost analysis should include all relevant costs for current operations of the City's hauled and piped systems, a discussion of near-term (within 5 years) water and sewer development projects, and the impact they will have on the cost of operations.

B. Evaluate current water utility and sewer utility rate structures on several relevant criteria, including fairness, household location, piped/hauled, residential neighborhoods or geographic zones, tank size range, amount of water consumed, number of deliveries, household occupancy time throughout the year, and other relevant factors.

C. List the advantages and disadvantages of the current water utility rate system and sewer utility rate system.

E. Consultant tasks are provided in detail in Appendix A.

F. Task Timeline

Task	Schedule in 2012
Collect data	August 29 – September 10
Develop Financial Model	August 29 – November 19
Develop Revenue Requirements	August 29 – October 1
Prepare Revenue Requirements Tech. Memo	September 10 – October 1
Conduct Cost of Service Analysis	September 24 – October 29
Prepare Cost Allocation Tech. Memo	October 8 – November 5
Develop Rate Structure	October 29 – November 19
Prepare Draft Final Report	November 5 – December 3
Prepare Final Report	December 3 – December 17
Presentation to Bethel City Council	December 11
Deliverables	**Due Date**
Draft Financial Plan Technical Memorandum (35% Complete)	September 28
Draft Cost Allocation Technical Memorandum (65% Complete)	October 26
Draft Final Report (95% Complete)	November 28
• Excel Model Training of City Staff • Presentation to Bethel City Council	December 11
Final Report (100% Complete)	December 19

G. City Responsibility

The City of Bethel will:

1. Furnish all reasonably available records and information, including financial reports, budgets, debt and consumption data.
2. The City is responsible for getting feedback to consultant two weeks from due date once deliverable is received. Feedback will be delivered in writing by email and/or verbally over the telephone.
3. Allow consultant access to all facets of City water and sewer utility operations that relate to the completion of this study, including access to both water treatment plants, City Shop where the water and sewer trucks are stored, and all piped facilities and lift stations.
4. Allow consultant access to water and sewer utility foremen, utility maintenance crew, drivers, and water plant operators and other City personnel, as needed for answers to questions, ideas, and feedback.
5. Meet with Consultant in person and via teleconferences, email, and telephone, as needed throughout the work performance period.
6. Provide work space in the City Hall break room to consultants who desire to work in Bethel for one or more days during the performance period. The break room has a table, chairs, electrical outlets, and open wireless internet access. The consultant is required to provide laptops, office equipment and other office materials.

SECTION 2: COMPENSATION AND REIMBURSEMENT OF COSTS

A. City shall pay Consultant for services rendered pursuant to this Contract, at the times and in the manner set forth herein in a total amount not to exceed sixty nine thousand three hundred ninety-five dollars ($69,395). This sum includes all out-of-pocket travel, lodging and incidental expenses incurred by Consultant that are reasonably associated with the provision of services under this Contract.

B. Consultant shall submit monthly invoices to City for work completed by the date of the invoice. All invoices shall be itemized to reflect the employees performing the requested tasks, the billing rate for each employee, and the hours worked.

C. All correct, complete and undisputed invoices sent by Consultant to City shall be paid by the City within 30 days.

SECTION 3: TERM AND TERMINATION

A. Consultant shall commence work on or about August 29, 2012 with formal approval from Bethel City Council and complete said work no later than December 15, 2012. Time is of the essence.

B. If Consultant fails to perform its duties to the satisfaction of City, or if Consultant fails to fulfill its obligations under this Contract in a timely and professional manner, then City shall have the right to terminate this Contract for breach effective immediately upon City giving written notice to Consultant.
   1. Written notice shall be provided within five (5) days of the City's dissatisfaction and election to terminate the breach.
   2. Consultant will then have ten (10) days to cure the breach.
   3. If consultant cannot, or chooses not to, cure the breach, the Contract shall be terminated for breach.
   4. Both parties may elect, in writing, to extend the timeframe in which consultant has to cure the breach.

C. If the contract is terminated for breach, the City may, at its sole discretion, hire another contractor to complete the cost analysis and rate study. If City does so, contractor is responsible for all additional costs and fees which City incurs as a result of the original breach.

D. In the event that City gives notice of termination, Consultant shall promptly provide to City any and all finished and unfinished reports, data, studies, photographs, charts or other work product prepared by Consultant pursuant to this Contract. City shall have full ownership, including, but not limited to, intellectual property rights, and control of all such finished and unfinished reports, data, studies, photographs, charts or other work product.

E. In the event that City terminates the Contract, City shall pay Consultant the reasonable value of services rendered by Consultant pursuant to this Contract; provided, however, that City shall not in any manner be liable for lost profits which might have been made by Consultant had Consultant completed the services required by this Contract. Consultant shall, not later than ten (10) calendar days after termination of this Contract by City, furnish to City such financial information as in the judgment of the City's representative is necessary to determine the reasonable value of the services rendered by Consultant.

SECTION 4: MISCELLANEOUS TERMS AND CONDITIONS OF CONTRACT

A. City shall make its facilities accessible to Consultant as required for Consultant's performance of its services under this Contract, and, upon request of Consultant, provide labor and safety equipment as required by Consultant for such access.

B. Consultant represents and warrants to City that it has all licenses, permits, qualifications and approvals of any nature whatsoever that are legally required for Consultant to practice its profession. Consultant represents and warrants to City that Consultant shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this Contract any licenses, permits and approvals that are legally required for Consultant to practice its profession.

C. Consultant shall, during the entire term of this Contract, be construed to be an independent contractor and nothing in this Contract is intended, nor shall it be construed, to create an employer/employee relationship, association, joint venture relationship, trust or partnership or to allow City to exercise discretion or control over the professional manner in which Consultant performs under this Contract; provided, however, that the services to be provided by Consultant shall be provided in a manner consistent with the professional standards applicable to such services. The sole interest of City is to insure that services are rendered and performed in a competent, efficient and satisfactory manner. Consultant shall be fully responsible for payment of all taxes due to state and federal governments which would be withheld from compensation if Consultant were a City employee. City shall not be liable for deductions for any amount for any purpose relating to Consultant's compensation. Consultant shall not be eligible for coverage under City's workers' compensation insurance plan, benefits under the Public Employee Retirement System or be eligible for any other City benefit. No party shall be the agent of, or have a right or power to bind, the other Party without its express written consent.

D. No provision of this Contract is intended to, or shall be for the benefit of, or construed to create rights in, or grant remedies to, any person or entity not a party hereto.

E. No portion of the work or services to be performed under this Contract shall be assigned, transferred, conveyed or subcontracted without the prior written approval of City. Consultant may use the services of independent contractors and subcontractors to perform a portion of its obligations under this Contract with the prior written approval of City. Independent contractors and subcontractors shall be provided with a copy of this Contract and Consultant shall have an affirmative duty to assure that said independent

contractors and subcontractors comply with the same and agree to be bound by its terms. Consultant shall be the responsible party with respect to all actions of its independent contractors and subcontractors, and shall obtain such insurance and indemnity provisions from its contractors and subcontractors as City shall determine to be necessary.

F. Consultant shall maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to this Contract and such other records as may be deemed necessary by City to assure proper accounting for all project funds. These records shall be made available for audit purposes to state and federal authorities, or any authorized representative of City. Consultant shall retain such records for three (3) years after the expiration of this Contract, unless prior permission to destroy them is granted by City.

G. Consultant shall perform all services required pursuant to this Contract in the manner and according to the standards observed by a competent practitioner of the Consultant's profession. All products of whatsoever nature which Consultant delivers to City pursuant to this Contract shall be prepared in a professional manner and conform to the standards of quality normally observed by a person practicing the profession of Consultant and its agents, employees and subcontractors assigned to perform the services contemplated by this Contract.

H. Consultant shall be entitled to rely upon the accuracy and completeness of all data furnished by City to Consultant that is used by Consultant in providing its services under this Contract. Consultant may retain and use all data furnished to it, except such data which may be marked "confidential" and required to be returned, and may use all plans, designs, specifications and other work product created by Consultant in providing services hereunder. Any use of such work product that includes proprietary information shall not identify City; nor shall the manner of such use have the effect of identifying City.

I. All completed reports and other data or documents, or computer media including CDs, and other materials provided or prepared by Consultant in accordance with this Contract are the property of City, and may be used by City. City shall have all intellectual property rights including, but not limited to, copyright and patent rights, in said documents, computer media, and other materials provided by Consultant.

J. Consultant, including its employees, agents, and sub-consultants, shall not maintain or acquire any direct or indirect interest that conflicts with the performance of this Contract. Consultant shall comply with all requirements of laws and regulations relating to conflicts of interest.

SECTION 5: INSURANCE

A. Unless modified in writing by City Manager, Consultant shall maintain the following noted insurance during the duration of the Contract:

Coverage	Required
Commercial General Liability	X
Comprehensive Vehicle Liability	X
Workers' Compensation and Employers' Liability	X
Professional Liability (Errors and Omissions)	X

B. Coverage shall be at least as broad as:

1. Commercial General Liability Insurance, in an amount not less than $1,000,000 per occurrence and $2,000,000 general aggregate for bodily injury, personal injury and property damage; Include a waiver of subrogation endorsement.

2. Comprehensive Automobile Liability Insurance, which provides for total limits of not less than $1,000,000 combined single limits per accident applicable to all owned, non-owned and hired vehicles;

3. Statutory Workers' Compensation required by the State of Alaska and Employers' Liability Insurance in an amount not less than $1,000,000 per occurrence. Both the Workers' Compensation and Employers' Liability policies shall contain the insurer's waiver of subrogation in favor of the City, its elected officials, officers, employees, agents and volunteers;

4. Professional Liability (Errors and Omissions) Insurance, appropriate to Consultant's profession, against loss due to error or omission or malpractice in an amount not less than $1,000,000. Architects' and Engineers' coverage is to be endorsed to include contractual liability.

C. Any deductibles or self-insured retentions must be declared to and approved by City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its elected officials, officers, employees, agents and volunteers or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claims administration and defense expenses.

D. The General Liability and Automobile Liability policies are to contain or be endorsed to contain the following provisions:

1. City, its elected officials, officers, employees, agents and volunteers are to be covered as additional insured as respects liability arising out of work or operations performed

by or on behalf of Consultant; premises owned, leased or used by Consultant; or automobiles owned, leased, hired or borrowed by Consultant. The coverage shall contain no special limitations on the scope of protection afforded to City, its elected officials, officers, and employees.

2. The insurance coverage of Consultant shall be primary insurance as respects City, its elected officials, officers, and employees. Any insurance or self-insurance maintained by City, its elected officials, officers, employees, agents and volunteers, shall be in excess of Consultant's insurance and shall not contribute with it.

3. Coverage shall state that the insurance of Consultant shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

4. The Subcontractor shall maintain in effect all insurance coverage required under this Subcontract at the Subcontractor's sole expense and with insurance companies mutually agreeable to the Contractor and Subcontractor, All insurance policies shall contain a provision that the coverages afforded thereunder shall not be canceled or not renewed, nor restrictive modifications added, until at least thirty (30) calendar days once prior written notice has been given to the Contractor, unless otherwise required in the Subcontract Documents.

E. Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A-VII.

F. Consultant shall designate the City of Bethel as a Certificate Holder of the insurance. Consultant shall furnish City with certificates of insurance and original endorsements effecting the coverage required by this clause. Certificates and endorsements shall be furnished to: Chuck Willert, Public Works Director, City of Bethel, P.O. Box 1388, Bethel, Alaska 99559. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. All endorsements are to be received and approved prior to the commencement of contracted services. The City may withhold payments to Consultant if adequate certificates of insurance and endorsements required have not been provided, or not been provided in a timely manner.

G. The requirements as to the types and limits of insurance coverage to be maintained by Consultant as required by Section 5 of this Contract, and any approval of said insurance by City, are not intended to and will not in any manner limit the liabilities and obligations otherwise assumed by Consultant pursuant to this Contract, including, without limitation, provisions concerning indemnification.

H. If any policy of insurance required by this Section is a "claims made" policy, Consultant shall keep said insurance in effect for a period of twenty-four (24) months after the termination of this Contract.

I. If any damage, including death, personal injury or property damage, occurs in connection with the performance of this Contract, Consultant shall immediately notify City Manager by telephone at (907) 543-1373 or cell phone at 907-545-1373. No later than three (3) calendar days after the event, Consultant shall submit a written report to the City Manager containing the following information, as applicable: 1) name and address of injured or deceased person(s); 2) name and address of witnesses; 3) name and address of Consultant's insurance company; and 4) a detailed description of the damage and whether any City personnel or property was involved.

SECTION 6: INDEMNIFICATION AND HOLD HARMLESS

A. Consultant agrees to indemnify City for any claims, damages, losses, and costs, including, but not limited to, attorney's fees and litigation costs, arising out of claims by third parties for property damage or bodily injury, including death, to the proportionate extent caused by the negligence or willful misconduct of Consultant, Consultant's employees, affiliated corporations, and subcontractors in connection with this Contract. The City agrees to indemnify Consultant from any claims, damages, losses, and costs, including, but not limited to, attorney's fees and litigation costs, arising out of claims by third parties for property damage or bodily injury, including death, to the proportionate extent caused by the negligence or willful misconduct of the City, or its employees or contractors in connection with this Contract.

B. Consultant shall also defend, indemnify and hold harmless City for any adverse determination made by the Internal Revenue Service or any State of Alaska taxing or regulatory agency and/or any other taxing or regulatory agency and shall defend, indemnify and hold harmless City with respect to Consultant's "independent contractor" status that would establish a liability on City for failure to make social security deductions or contributions or income tax withholding payments or any other legally mandated payment.

C. The obligation to defend, indemnify and hold harmless set forth in this Section applies to all claims and liability regardless of whether any insurance policies are applicable. The policy limits of said insurance policies do not act as a limitation upon the amount of indemnification to be provided by Contractor.

D. City shall release, defend, indemnify and hold harmless Consultant from all claims, costs, expenses, damage or liability arising out of or resulting from the use or modification of any reports, data, documents, drawings, specifications or other work product prepared by Consultant, except use by City on those portions of the project for which such items were prepared.

SECTION 7: CONTRACT INTERPRETATION, VENUE AND ATTORNEY FEES

A. This Contract shall be deemed to have been entered into in Bethel, Alaska. All questions regarding the validity, interpretation or performance of any of its terms or of any rights or obligations of the parties to this Contract shall be governed by Alaska law, and any action brought by either party to enforce any of the terms of this Contract shall be filed in the

Bethel District Court. If any claim, at law or otherwise, is made by either party to this Contract, the prevailing party shall be entitled to its costs and reasonable attorneys fees.

B. This document, the proposal selected for contract, and the Request for Proposals comprise the entire agreement between the parties and supersedes whatever oral or written understanding each may have had prior to the execution of this Contract. This Contract shall not be altered, amended or modified except by writing signed by City and Consultant. No verbal agreement or conversation with any official, officer, agent or employee of City, either before, during or after the execution of this Contract, shall affect or modify any of the terms or conditions contained in this Contract, nor shall any such verbal agreement or conversation entitle Consultant to any additional payment whatsoever under the terms of this Contract.

C. If any portion of this Contract or the application thereof to any person or circumstance shall be invalid or unenforceable to any extent, the remainder of this Contract shall not be affected thereby and shall be enforced to the greatest extent permitted by law.

D. The headings in this Contract are inserted for convenience only and shall not constitute a part hereof.

E. A waiver of any party of any provision or a breach of this Contract shall not be construed as a waiver of any other provision or any succeeding breach of the same or any other provisions herein.

F. Each Party hereto declares and represents that in entering into this Contract, it has relied and is relying solely upon its own judgment, belief and knowledge of the nature, extent, effect and consequence relating thereto. Each Party further declares and represents that this Contract is made without reliance upon any statement or representation not contained herein of any other Party or any representative, agent or attorney of the other Party. The Parties agree that they are aware that they have the right to be advised by counsel with respect to the negotiations, terms, and conditions of this Contract and that the decision of whether or not to seek the advice of counsel with respect to this Contract is a decision which is the sole responsibility of each of the Parties. Accordingly, no party shall be deemed to have been the drafter hereof, and the principle of law that contracts are construed against the drafter shall not apply.

G. In the event of a conflict between the term and conditions of the body of this Contract and those of any exhibit or attachment hereto, the terms and conditions set forth in the body of this Contract proper shall prevail. In the event of a conflict between the terms and conditions of any two or more exhibits or attachments hereto, those prepared by City shall prevail over those prepared by Consultant.

SECTION 8: SURVIVAL

The provisions set forth in Sections 5 and 6 of this Contract shall survive termination of the Contract for a period of thirty (30) days.

SECTION 9: COMPLIANCE WITH LAWS - NONDISCRIMINATION

A. Consultant shall comply with all applicable laws, ordinances and codes of federal, state and local governments.

B. In the performance of this Contract, Consultant shall not discriminate against any employee or applicant for employment because of race, color, ancestry, national origin, religious creed, sex, sexual orientation, disability, age, marital status, political affiliation, or membership or non-membership in any organization. Consultant shall take affirmative action to ensure applicants are employed and that employees are treated during their employment without regard to their race, color, ancestry, national origin, religious creed, sex, sexual orientation, disability, age, marital status, political affiliation, or membership or non-membership in any organization. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training.

SECTION 10: REPRESENTATIVES

A. All of Consultant's questions pertaining to this Contract shall be referred to the below-named person or to the representative's designee. City's representative for this Contract is:

Primary Contact	Secondary Contact
Chuck Willert, Public Works Director	Bill Arnold, Utilities Maintenance Foreman
cwillert@cityofbethel.net	warnold@cityofbethel.net
(907) 543-3110	(907)-543-1957
Cell (907)-545-4695	Cell (907)-545-0111
Fax (907) 543-3366	Fax (907)543-1996

B. All of City's questions pertaining to this Contract shall be referred to the below-named person or to the representative's designee. Consultant's representative for this Contract is:

Tom Wolf, Principal in Charge
Tom.Wolf@ch2m.com
(907) 762-1707
cell (907)-632-6763
fax (907) 257-2000

C. The representatives set forth herein shall have authority to give all notices required herein. Amendments to this Contract shall be executed as required by the Bethel Municipal Code and the granting agencies.

SECTION 11: NOTICES

A. All notices, requests, demands and other communications hereunder shall be deemed given only if in writing signed by an authorized representative of the sender (may be other than the representatives referred to in Section 10) and delivered by facsimile, email, with a hard copy mailed first class, postage prepaid; or when sent by a courier or an express service guaranteeing overnight delivery to the receiving party, addressed to the respective parties as follows:

To City:
Chuck Willert, Public Works Director
P.O. Box 1388
Bethel, Alaska 99559
907- 543-3110

To Consultant:
Tom Wolf, Principal in Charge
949 E. 36th Ave., Suite 500
Anchorage, AK 99518
907-762-1707

B. Either party may change its address for the purposes of this paragraph by giving written notice of such change to the other party in the manner provided in this Section.

C. Notice shall be deemed effective upon: 1) delivery in person or 2) 48 hours after an email or fax has been sent.

SECTION 12: AUTHORITY TO CONTRACT

Each of the undersigned signatories hereby represents and warrants that they are authorized to execute this Contract on behalf of the respective parties to this Contract; that they have full right, power and lawful authority to undertake all obligations as provided in this Contract; and that the execution, performance and delivery of this Contract by said signatories has been fully authorized by all requisite actions on the part of the respective parties to this Contract.

SECTION 13: DATE OF CONTRACT

The effective date of this Contract shall be the latest date it is signed.

IN WITNESS WHEREOF, City and Consultant have executed this Contract on the days and year set forth below:

CITY OF BETHEL

_____ _____

Lee M. Foley **Date**
City Manager

CH2MHill

_____ _____

Thomas S. Wolf **Date**
Principal in Charge

Appendix A

Consultant Work Plan

Task 1 – Project Kick Off

Consultant will hold a project chartering meeting with the City's project team in Bethel. Consultant will refine the work plan and schedule, establish project lines of communication, identify and agree to City staff levels of responsibility and participation, discuss the specific project issues, collect data from the City, and develop key project action items and milestones.

Deliverables: Summary notes from project team kickoff meeting.

City Tasks: Participate in the kickoff meeting and assist in developing the project's work plan.

Task 2—Data Collection

Consultant will provide the City with a complete data request list. This may include, but not be limited to, operational, financial and customer billing data for the water and sewer utilities, as well as broader financial planning and policy information.

The Data request list will include the following items:

- Current budget and historical financial records
- Capital improvement plan for both utilities
- Estimated capital and operating costs for expanded service for the Institutional Corridor.
- Number of water customers, water produced, water sold, and water demand data
- Number of sewer customers, wastewater collected, wastewater treated, BOD/TSS levels
- Current rate structure

For those items where data is not available, Consultant will work with City staff to make appropriate assumptions.

Deliverables: Data request list.

City Tasks: Collect and provide requested data within timeframe agreed to at the time of the request.

Task 3—Design Water and Sewer Rate Models

Consultant will develop the water and sewer rate models by working closely with City staff to confirm that the models allow for efficient transfer of the City's accounting and budget information for future model updating and analysis. Hauled and piped systems will have individual worksheets in order to keep the costs for each system separate.

Consultant will develop an Excel spreadsheet model that summarizes recent historical performance and projects system costs, usage, planned capital outlays and financing, other financial commitments, and resulting cash flow and revenue requirements for a 10-year forecast period. The rate study models will be developed as integrated sheets within a single Microsoft

Excel workbook. In developing financial and rate study models, cross-references and links to facilitate alternative scenario evaluations will be created.

Consultant will review the City's existing rates, its cost allocation process and assumptions, and the City's budget and financing plans. Rate and financial policies that are reflected in the City's current rates will be carried forward to the new rate model, unless those policies have since changed, or the City desires they change at this time.

The project team will also conduct a training session for appropriate City personnel on how to update and maintain the financial planning model. A training manual will be developed and the training session will provide hands on experience using the model.

Deliverables: Water and wastewater rate model.

City Tasks: Provide input and feedback regarding model format and features.

Task 4—Determine Revenue Requirements

Consultant will develop projected cash flows, expenditures, and revenue requirements for up to three capital and operating cost scenarios. These will be identified for evaluation during the project initiation workshop. The projected revenue requirements for each identified scenario will include provisions for:

- Operation and maintenance costs for hauled and piped services
- Administrative costs
- Renewal and replacement costs based on service life
- Cash-funded capital outlays
- Debt-funded capital outlays, including existing outstanding debt service and projected debt for bonds and loans anticipated to fund future CIP projects
- Debt service requirements, including required reserves and coverage
- Any other financial commitments identified during the project initiation workshops

One of the scenarios to be developed will assume the City continues to subsidize the water and sewer utilities at the same amount as the most recently completed fiscal year. Another scenario for which revenue requirements will be identified will be a "break-even" scenario where the City fully covers the cost to operate the water and sewer utilities. For each scenario, assumptions will be made regarding:

- Cost estimates and implementation schedules for all major new capital projects and any renewal and replacement projects included in the scenario. This will include capital costs associated with expanded water service along the Institutional Corridor.
- Operation and maintenance costs for current and planned future facilities, including an estimate of future operating costs associated with the expansion of service to the Institutional Corridor.

The capital and operating scenarios will be developed to bracket the realistic range of costs for the activities and improvements identified during the project chartering meeting. Consultant will

work closely with the City to identify the appropriate scenarios for evaluation. To the extent possible, future projected expenditures (i.e. operating, capital, etc.) will be estimated using existing data provided by the City. Any cost opinions or Project economic evaluations provided by Consultant will be on a basis of experience and judgment, but, since Consultant has no control over market conditions or bidding procedures, Consultant cannot warrant that bids, ultimate construction cost, or Project economics will not vary from these opinions.

Deliverables: Projections of system revenue requirements and non-rate revenues for the water system and for the sewer system.

City Tasks: Provide input to determine appropriate scenarios.

Task 5—Project Revenues under Existing Rates

Consultant will analyze current and historical revenue and billing data to estimate the relative rate forecast's reliability for the 10-year study period. Consultant will compare the projected revenues under the current rates and fees with the revenue requirements under the selected alternative capital and operating scenarios developed in Task 3. Rate revenue adjustments needed to cover the projected costs allocable to existing users under each scenario will be estimated.

Consultant will discuss our revenue requirement analysis findings with City staff (Task 4). This will provide the City the opportunity to review the assumptions (for example, customer growth and usage and operating cost escalation) used to develop each scenario and evaluate the impact of changes in these assumptions on rate revenue requirements and the utility's financial performance. This approach results in rate development process understanding by City staff, anticipated system costs, and the implications of the study assumptions for their planned expenditures and activities.

Deliverables: Financial plan technical memorandum.

City Tasks: Participate in conference call to discuss findings from comparison of rate revenue requirements against project rate revenues under existing rates.

Task 6—Perform Cost of Service Analyses

Consultant will use proven methods, based on experience and industry guidance documents, to allocate costs to service functions and customer groups.

The revenue requirements identified as part of Task 4 will be allocated to utility functions (i.e. hauled and piped sewer system, hauled and piped water system, customer service and billing, fire protection).

The cost analysis will include all costs to pipe or haul water and/or wastewater to city customers. All maintenance and capital related costs will be included in the analysis. Various cost metrics will be developed that will analyze costs on a per gallon basis, per mile of pipe, per mile of hauled service, per hour, per household, and other relevant metrics.

Costs associated with a specific utility will be allocated based on customer demands. Revenue requirements will be allocated to customer classes based on service characteristics (for example,

sewer flows, strength characteristics, water demands, and number of accounts) and cost causation.

Deliverables: Technical memorandum summarizing the allocation of system costs to water and sewer systems (both piped and hauled) and recommendations for any customer classification modifications.

City Tasks: Review and provide input on methodological issues.

Task 7—Develop and Evaluate Water and Sewer Rate Options

Based on the revenue requirements and cost-of-service study results, Consultant will evaluate rate options. The City's utility system financial and policy objectives will be carefully considered in identifying and evaluating rate structure and fee options. Generally accepted utility rate-making practice will be followed when developing the rate options. The relative importance of the following factors will be considered:

- Full recovery of all of the water and sewer system's costs and revenue and rate stability
- Equity (for example, fairness)
- Support to utility system policy objectives such as water conservation; support to City policy objectives such as economic development or financial assistance to low-income and elderly residents
- Ease of understanding by customers and other stakeholders
- Ease of implementation and administration (data requirements, complexity of billing system needs)

Consultant will discuss with City staff the rate and fee structure options based on the technical study results. Consultant will work closely with the City in formulating a recommended rate and fee strategy. This will be based on the technical studies findings, the City's utility systems financial and policy goals, and generally accepted utility rate making industry practice.

Based on the findings and discussions with City staff, Consultant will develop and recommend a rate structure and rate levels suited to the City's financial situation and policy objectives. The recommendations will include suggested staging for any changes from the current structure.

A teleconference meeting with City staff will be held to discuss the findings from the rate structure studies and Consultant recommendations. City will evaluate changes in the rate structure on system revenues and customer charges.

Deliverables: Draft rates and charges, including typical user bills

City Tasks: Provide input as needed and participate in meeting to evaluate user bill comparisons.

Task 8—Prepare and Present Draft and Final Reports

Consultant will prepare draft and final rate study reports that include detailed technical analysis documentation. The executive summary will clearly identify how the concerns and issues raised by the project team and City staff are reflected in the final recommendations. The report will be

a single rate study report with separate sections and appendices where appropriate for the water and sewer analyses.

At least two rate alternatives for each system will be included in the report. Consultant will decide, in conjunction with the City's project team, which alternative will be identified as "preferred."

Up to two members of the project team will make the final report presentation to City Administration and City Council representatives at a regularly scheduled City Council meeting on December 11, 2012. Comments and questions provided by the City will be considered by the Consultant and changes related thereto made to the final report (100% complete).

Deliverables: A hard copy of the draft report and a CD containing the draft report and pertinent data and information used to develop the analysis will be delivered to the City's Project Manager for review. The financial planning model will also be included on the CD. For the final report, Consultant will submit five comb-bound copies and one unbound copy to the Project Manager, and include a PDF version of the final report on CD. A presentation will be prepared and presented to City Administration and City Council.

City Tasks: Comment on draft report; participate in presentations of the final report.

City of Bethel Action Memorandum

Action memorandum No.	#12-29		
Date action introduced:	August 28, 2012	Introduced by:	Lee M. Foley
Date action taken:		☐ Approved	☐ Denied
Confirmed by:			

SUBJECT/ACTION: Approve and affirm the contract between the City of Bethel and Larsen Consulting Group, Inc. to perform the following professional services: develop a water and sewer utilities master plan update for five-year period (2013-1017).

Route to Department/Individual	Initials	Remarks
Administration/John Sargent		City of Bethel issued Request for Proposals document to hire a consultant to complete City water and sewer utilities master plan update. One firm responded. Contract to hire consultant was written by Grant Manager and vetted (revised) by City attorney, City's insurance agent, and approved by Consultant.

Attachment(s):

1. Proposed contract between City of Bethel and Larsen Consulting Group, Inc. for the completion of a City of Bethel water and sewer utilities master plan update.

Amount of fiscal impact	Description	Account information
$63,044.60	Budget Modification with full funding details will be brought to Council during September 11, 2012 council meeting.	43-53-669 ($50,000) Account # to be determined ($13,044.60)

Summary statement

At Bethel City Council direction, the City of Bethel Administration went out to bid to hire consultants to complete the City's water and sewer master plan update (2013-2017). One consultant with City of Bethel water and sewer system development experience responded. A contract was prepared and approved by the Consultant and City Administration and is now before City Council for final approval. Consultant will present final master plan update to City Council on January 22, 2012.

LEASE AGREEMENT

THIS INDENTURE OF LEASE is made this 12th day of August, 1976, by and between THE CITY OF BETHEL, a municipal corporation, hereinafter called Landlord, and STATE OF ALASKA, DEPARTMENT OF MILITARY AFFAIRS, hereinafter called the Tenant;

WITNESSETH:

1. Premises. Landlord, for and in consideration of the rents, covenants and conditions hereinafter specified to be paid, performed and observed by Tenant, does hereby let, lease and demise to Tenant that certain real property hereinafter called "Leased Premises", situated in Bethel, Alaska, and more particularly described as:

Lots 7 through 17, Block 7, BETHEL TOWNSITE, designated as Municipal Reserve on official townsite plat, United States Survey 3230-A and 3230-B.

2. Appurtenances, Etc. Landlord leases and grants to Tenant all easements, parking and loading rights, right of ingress and egress, fixtures and appurtenances now or hereafter belonging or appertaining to said premises.

3. Encumbrances. The described premises are leased, subject to deed restrictions, easements, rights-of-way, if any, zoning and building restrictions and governmental regulations now in effect or hereafter adopted by any governmental authority.

4. Term. The term of this lease shall be forty years, commencing August 12, 1976, through and including August 11, 2016, unless sooner terminated as hereinafter provided. Tenant may extend the term at Tenant's option for two (2) additional ten (10) year terms. The conditions of such extensions shall be as if this lease were originally written for fifty (50) and sixty (60) years, respectively. The Tenant shall give the Landlord notice of exercise of the option at least one (1) year prior to the expiration of the term.

5. Rental. Tenant agrees to pay an annual rental fee of One Dollar ($1.00) for each and every year of the entire term hereof, payable on or before January 31, of each year.

6. Compliance with Laws and Care of Premises. Tenant shall comply with all applicable laws, ordinances and regulations of duly constituted public authorities now or hereafter enacted in any manner affecting the demised premises or the sidewalks, alleys, streets, and way adjacent thereto or any buildings, structures, fixtures and improvements or the use thereof, whether or not any such laws, ordinances or regulations which may be hereafter enacted involve a change of policy on the part of the governmental body enacting the same. Tenant agrees to hold Landlord financially harmless (a) from the consequences of any violation of such laws, ordinances and/or regulations, and (b) from all claims for damages on account of injuries, death or property damage resulting from such violation. Tenant further agrees that it will not permit any unlawful occupation, business or trade to be conducted on said premises or any use to be made thereof contrary to any law, ordinance or regulation as aforesaid with respect thereto.

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

Tenant, at its own cost and expense, shall keep the leased premises and all improvements which at any time during the term of this lease may be situated thereon, in good condition and repair during the entire term of this lease, hereby expressly waiving the right to make repairs at the expense of Landlord as provided for in any statute or law in effect at the time of the execution of this lease or any amendment thereof, or any other statute or law which may be hereafter passed during the term of this lease.

7. Tenant's Right, Etc. Tenant, when not in default of performance of any of its obligations hereunder shall have the following rights, during the term of this Lease, from time to time, in such manner, and to such extent as Tenant may in its sole judgment deem advisable:

(a) To demolish, remove or otherwise dispose of any improvements presently or subsequently situated upon the demised premises.

(b) To erect, place, or install upon the leased premises buildings, structures, and improvements as from time to time it shall deem advisable.

(c) To make such alterations, additions and repairs to the leased premises as it may desire.

(d) All buildings, structures and permanent improvements, including signs which have been or may be installed, placed or attached in or about the leased premises by Tenant, shall remain the property of Tenant. At the expiration or termination of the term of the Lease, or any extended term thereof, Tenant shall:

(1) Remove all improvements located on the leased land, and upon his failure to do so Landlord may, at his option, remove, demolish, or otherwise dispose of such improvements at the expense of the Tenant, and

(2) Leave said lease land in a clean, cleared and saleable condition.

(e) Upon termination by expiration of time or otherwise of this Lease, or of any renewal thereof, Tenant shall remove all trade fixtures and other moveable items of personalty, provided that any damage caused to the leased premises by reason of such removal shall be paid by Tenant. Any trade fixtures and other moveable items of personalty not so removed by Tenant shall become the property of Landlord. Tenant may, as part of a rebuildin or expansion program, demolish any part or all of the buildings, structures or improvements to be located on the leased premises.

8. Liens. Tenant will not permit any mechanics', laborers' or materialmen's liens to stand against the leased premises or improvements for any labor or materials furnished to Tenant or claimed to have been furnished to Tenant or to Tenant's agents, contractors, or sublessees, in connection with work of any character performed or claimed to have been performed on said premises or improvements by or at the direction or sufferanco

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

of Tenant; provided, however, that Tenant shall have the right to contest the validity or amount of any such lien or claimed lien. In the event of such contest, Tenant shall give to Landlord reasonable security as may be demanded by Landlord to insure payment thereof and prevent any sale, foreclosure or forfeiture of the premises or improvements by reason of such nonpayment. Such security need not exceed one and one-half times the amount of such lien or such claim of lien or Tenant may record the bond contemplated by Section 34.35.072, Alaska Statutes. Tenant will immediately pay any judgment rendered with all proper costs and charges and shall have such lien released or judgment satisfied at Tenant's own expense.

9. Use of premises. The Tenant covenants that the demised premises will be used only for purposes directly related to the operation of the Department of Military Affairs and no commercial use whatsoever shall be made of the demised premises. The Tenant further covenants that he will neither cause, nor maintain, nor permit any public or private nuisance to exist on the leased land, nor will Tenant fail to maintain the land in an orderly, neat, and clean condition, free of hazard and nuisance.

10. Indemnification. Tenant agrees to protect, defend, indemnify and save harmless Landlord from and against any and all claims, demands and causes of action and of any nature whatsoever, and any expenses incident to defense of and by Landlord therefrom, for any injury to or death of persons or loss of or damage to property occurring on the demised premises, or in any manner arising out of Tenant's use and occupation of said premises, or the condition thereof, during the term of this Lease.

Tenant shall procure and maintain public liability insurance coverage, naming Landlord as an insured, which coverage, pertaining to the demised premises, shall not be less than (1) $_____ per person, $_____ in the aggregate per accident, and $_____ property damage; or (2) amounts which the Landlord reasonably requires to adequately cover the risks involved, whichever is greater. Tenant agrees to furnish copies of certificates evidencing insurance coverage of the demised premises to Landlord.

11. Condemnation. If the whole or any part of the demised premises shall be taken for any public or quasi-public use, under any statute or by right of eminent domain or private purchase in lieu thereof by a public body vested with the power of eminent domain, then, when possession shall be taken thereunder of the demised premises, or any part thereof, the following provisions shall be operative:

(a) Taking of All Premises. The term herein demised and all rights of Tenant hereunder shall immediately cease and terminate, and the rent shall be adjusted as of the time of such termination so that Tenant shall have paid rent up to the time of taking only; provided, however, that Tenant shall be entitled to that portion of the award attributable to the value of the buildings or improvements put up by Tenant with its own funds.

(b) Taking of Substantial Part of Premises. If the taking reduces the ground area of the demised premises by at least fifty (50%) percent and materially affects the use being made by the Tenant of the demised premises, Tenant shall have the right, by written notice to Landlord effected not later than thirty (30) days after possession shall be taken, to elect to terminate this lease.

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

(1) If the election to terminate be made: The provisions of (a) of this section relating to the taking of the whole shall govern; or

(2) If the election not be made:

(a) The lease shall continue;

(b) The Landlord shall be entitled to the full condemnation proceeds except the portion thereof attributable to the value of the buildings or improvements put up by Tenant; and

(c) Rent at the old rate shall be adjusted as of the date of taking of possession, and the rent for the balance of the term, except as modified from time to time under provision 8 hereof, shall be reduced so that the new rent shall be that part of the former rent (before condemnation) which the unimproved value of the untaken premises (appraised after the taking, and repair of any building damage) bears to the unimproved value of the entire premises demised immediately before the taking.

(d) Taking of Insubstantial Part of Premises. -- If the taking is of such an insubstantial portion of the ground area that the use being made by Tenant of the leased premises is not materially affected, the provisions of (b)(2) above of this section (where election not made) shall govern.

12. Quiet Enjoyment. -- Provided Tenant is not in default hereunder, Landlord covenants that Tenant shall have peaceful and quiet enjoyment of the leased premises without let or hindrance on the part of Landlord, and that Landlord will warrant and defend Tenant in the peaceful and quiet enjoyment of the demised premises.

13. Notices. -- Any and all notices required or permitted under this lease, unless otherwise specified in writing by the party whose address is changed, shall be as follows:

Landlord: CITY OF BETHEL
Bethel, Alaska 99559

Tenant: STATE OF ALASKA
DEPARTMENT OF MILITARY AFFAIRS
ALASKA NATIONAL GUARD - BETHEL
P.O. Box 508
BETHEL, ALASKA 99559

14. Default. -- If Tenant at any time during the term of this lease shall (a) fail to make payment of any installment of rent or of any other sum herein specified to be paid by Tenant, or (b) fail to observe or perform any of Tenant's other covenants, agreements or obligations [illegible] such default [illegible]

in such notice, the term of this lease and all rights granted Tenant hereunder shall come to an end as fully as if the lease then expired by its own terms, and Tenant hereby covenants peaceably and quietly to yield up and surrender to Landlord said leased premises and all structures, buildings, improvements and equipment located thereon, and to execute and deliver to Landlord such instrument or instruments as shall be required by Landlord as will properly evidence termination of Tenant's rights hereunder or its interest therein.

In the event of termination of this lease as in this paragraph above provided, Landlord shall have the right to repossess the leased premises and such structures, buildings, improvements and equipment, either with process of law or through any form of suit or proceeding, as well as the right to sue for and recover all rents and other sums accrued up to the time of such termination, and damages arising out of any breach on the part of Tenant, including damages for rent not then accrued. Landlord shall also have the right, without resuming possession of the premises or terminating this lease, to sue for and recover all rents and other sums, including damages, at any time and from time to time accruing hereunder.

15. Costs Upon Default. -- In the event either party shall be in default in the performance of any of its obligations under this lease and an action shall be brought for the enforcement thereof, the defaulting party shall pay to the other all the expenses incurred therefor, including a reasonable attorney's fee.

16. Rights or Remedies. -- Except insofar as this is inconsistent with or contrary to any provision of this lease, no right or remedy herein conferred upon or reserved to Landlord is intended to be exclusive of any other right or remedy, and each and every right and remedy shall be cumulative and in addition to any other right or remedy given hereunder, or now or hereafter existing at law or in equity or by statute.

17. Waiver and Forebearance. -- Except to the extent that Landlord may have otherwise agreed in writing, no waiver by Landlord of any breach by Tenant of any of its obligations, agreements or covenants hereunder shall be deemed to be a waiver of any subsequent breach of the same or any other covenant, agreement or obligation. Nor shall any forebearance by Landlord to seek a remedy for any breach of Tenant be deemed a waiver by Landlord of its rights or remedies with respect to such breach.

18. Inspection. -- Landlord shall at all reasonable times during Tenant's business hours have access to the premises for the purpose of inspection.

19. Successors in Interest. -- This lease shall be binding upon and inure to the benefit of the respective heirs, successors and assigns of the parties hereto.

20. Underground Conditions and Water Drainage. --

(a) Tenant has made, or prior to the construction of any building will make, its own soil tests and this lease is made subject to and without liability because of or resulting from any fill or any subsurface or soil condition upon the leased land.

(b) Tenant shall not drain or discharge water from the leased land on to adjoining land; the leased land shall be

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

graded and drained to cause the discharge of all water on the street adjoining the leased land or into an established drainage easement, if any, on the leased land.

21. Mineral Reservation Clause. -- Landlord expressly reserves unto itself, its successors and assigns, all oil, gas, associated hydro-carbons and minerals and the right to prospect for, mine and remove said oil, gas, hydro-carbons and minerals. The Tenant's use of the surface and such portion of subsurface as is necessary for effective use of the surface shall not be disturbed or impaired by this mineral reservation or the exercise of any rights pertaining thereto.

22. Destruction of Improvements on Demised Premises. -- If all or part of the improvements placed by Tenant on the demised premises are destroyed by fire, earthquake or other cause, Tenant shall remove the debris and clean up the affected area within 270 days of the occurrence of such destruction.

23. Screening of Garbage Storage Area. Tenant must provide a screened or fenced area for the temporary storage of garbage or trash pending removal of such material. Plans for such screening or fencing are subject to Provision 10 hereof.

24. Assignment or Subletting. Tenant must not assign or sublet the demised premises or any part thereof without the prior written consent of Landlord to such subletting or assignment provided that Tenant may assign this Lease, or any part thereof, to a lending institution, for loan security purposes, and provided that this right to assign shall not be construed as a subordination of Landlord's rights hereunder, nor a subordination of its fee. Landlord's permission to subletting or assignment will not be unreasonably withheld. Tenant's request to assign or sublease must be in writing and must show name and address of the proposed assignee or sublessee.

25. Holding Over. In the event that the Tenant holds over at or after the end of the term, or any extended term, the tenancy shall be deemed a month-to-month tenancy commencing on the first day of the holding over period.

26. Integration and Modification. This document contains the entire agreement of the parties hereto. All negotiations, statements, representations, warranties, and assurances, whether oral or written, which are in any way related to the subject matter of this lease and the performance of either party hereto are merged and integrated into the terms of this document.

This Lease may not be modified nor amended except by a writing signed by both parties hereto, and any purported amendment or modification is without effect until reduced to a writing signed by both parties hereto.

IN WITNESS WHEREOF, the parties have hereunto executed this Lease Agreement the day and year first hereinabove written.

TENANT
STATE OF ALASKA

Donald J. Shank
DEPARTMENT OF MILITARY AFFAIRS
ALASKA NATIONAL GUARD

LANDLORD
CITY OF BETHEL

By: [signature]
Bruce L. Bartlett
City Manager

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

STATE OF ALASKA)
) ss:
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this 12th day of August, 1976, before me, the undersigned Notary Public, personally appeared Bruce L. Bartlett to me known and known to be the City Manager of the CITY OF BETHEL, and he acknowledged to me that he executed the foregoing instrument as a free and voluntary act and deed of said corporation for the uses and purposes therein stated, and on oath stated that he was authorized to execute said instrument, and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year hereinabove written.

Rebecca J. Nelson
Notary Public, State of Alaska
My Commission Expires: 4-2-79

STATE OF ALASKA)
) ss:
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this 12th day of August, 1976, before me, the undersigned Notary Public, personally appeared Donald Shantz to me known and known to be the Administrative Ass't of the STATE OF ALASKA, DEPARTMENT OF MILITARY AFFAIRS, and he acknowledged to me that he executed the foregoing instrument as a free and voluntary act and deed of said corporation for the uses and purposes therein stated, and on oath stated that he was authorized to execute said instrument, and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year hereinabove written.

Rebecca J. Nelson
Notary Public, State of Alaska
My Commission Expires: 4-2-79

DICKSON & EVANS
ATTORNEYS AT LAW
880 H STREET
ANCHORAGE, AK. 99501
(907) 276-2272

City of Bethel Action Memorandum

Action memorandum No.	12-30		
Date action introduced:	August 28, 2012	Introduced by:	City Manager
Date action taken:		☐ Approved	☐ Denied
Confirmed by:			

SUBJECT/ACTION: Approval of State Priority Requests for preparation of the Annual State Priority Resolution.

Route to:	Department/Individual:	Initials:	Remarks:
X	Port		
X	Finance		
X	Public Works		
X	Planning		
X	Parks and Recreation		
X	Police		
X	Fire		

Attachment(s): None

Amount of fiscal impact		Account information:
To Be Determined	No fiscal impact	
	Funds are budgeted for.	
	Funds are not budgeted. Budget modification is required. Affected account number:	

The following items were compiled through recommendations and suggestions received from department heads and others in the Administration. They are listed in no particular order:

- **New Dog Pound ($400K)** –The current facility was not designed as an animal shelter. The structure is rotting from within and is located too far away for animal control purposes. This proposed building for animal control would be constructed on the new Police Station property. The City could possibly enter into an agreement with Yuut Elitnaurviat whereby the City would provide funding and trainees from the People's Learning Center would build the structure to Police design specifications.

- **Institutional Corridor ($20M)** – Essentially, a new water main would be run from City Sub water treatment plant along Chief Eddie Hoffman Highway to a new water storage facility capable of holding approximately 655K gallons of water. From the new storage tank, the water main would then run to several institutions and commercial buildings along the Institutional Corridor. Additionally, new pumps would be installed at the storage tank. In discussions, the more expanded project cost estimate was $14.5M. However, that figure was based on concept without a developed design. Requesting $16M

Action memorandum No.	12-30		
Date action introduced:	August 28, 2012	Introduced by:	City Manager
Date action taken:		☐ Approved	☐ Denied
Confirmed by:			

would enable the City to engage an engineering firm for design purposes and then solidify the concept and move forward with construction.

- **Petro Port Expansion ($12.5M)** – Present facility allows for only one barge loading or discharging at a time. Adding an 800 foot face on the river would enable Port to handle two (2) fuel barges simultaneously. It would also allow one freight barge to moor, either for loading/off-loading, or temporary holding while waiting for the freight dock to become available. Currently, freight barges moor to the seawall, putting undue stress and pressure on a wall that was not built for this purpose.

- **Dust Control & Road Maintenance ($5.4M)** – Purchase gravel, calcium chloride, and sodium chloride for use on roads, and hydro-seed materials for road side slopes. Purchasing in large quantities would enable Public Works to provide dust control measures on all gravel roads throughout the City, not just the main thoroughfares. Grant would also allow for purchase of one (1) new water spray truck to augment current equipment.

- **Renovate Youth Center & Log Cabin ($2M)** – The current facilities do not have ADA-compliant restrooms, foundations are damaged, roofs are at the end of useful service life, the interiors are not designed for food service, parking lot is unsafe and poorly designed, and fencing is vitally needed. Grant would include purchasing land from BUC across from Youth Center to develop into a safe and user-friendly parking lot.

- **Propose Kaligtuq Road ($5.0M)** – This proposed route, submitted to Council last year as a viable alternative to continuing to pursue completing Tundra Ridge Road through the Polk property (and shared with Senator Hoffman), would restore two (2) access and egress avenues from Tundra Ridge Subdivision by expanding Kaligtuq Road from Ptarmigan Road to the existing H-Marker Lake Road. The cost would include obtaining a 100-foot ROW, sand fill, gravel, culverts, hydro-seeding, 3 stop signs, 1 right curve sign, 1 left curve sign, 2 speed limit signs, 2 children at play signs, road markers, an Environmental Impact Assessment, soil sampling, License and Bonding, Insurance, Corp of Engineer's fee, core samples and crane costs to set the concrete culverts.

- **City Dock ($7M)** – The latest City Dock Structural Condition Report states that the East timber wall and East sheet-pile wall must be replaced or face eventual failure and collapse. By using a Design Build Model, funding for entire project could be obtained at once and speed up project completion.

- **Old Moravian Cemetery Access ($350K)** – Current bridge structure has deteriorated to such a degree that access to the cemetery is extremely unsafe and almost untenable. The new bridge would be a 6-foot by 50-foot aluminum gangplank style bridge with helical galvanized pilings and 80 linear feet of galvanized 4' X 6" I beam support. Request funding would also be used to purchase ROW to construct bridge.

- **Recycling Center ($500K)** – Funding for two (2) operators for two (2) years and make the Recycling Center fully operational for that period of time.

Action memorandum No.	12-30		
Date action introduced:	August 28, 2012	Introduced by:	City Manager
Date action taken:		☐ Approved	☐ Denied
Confirmed by:			

- **Port Office Complex ($1.5M)** – Current Port office is insufficient for conducting Port operations and offers no meeting facility for the Port Commission. New building could be constructed on present site.

- **Equipment Support for Upgraded Telephone System ($250K)** – Current CAT5 cable is faulty and would cause new system to fail. New CAT6 cable must be installed to speed up internet access by all 70 City computers in use. The new cable will fully support the new telephone system into the future, improving internet speed and performance and decreasing maintenance requirements.

- **Suction Dredge ($1.5M)** – Funding would be used to purchase and operate one 8-inch suction dredge to reduce the quantity of sludge in the Lagoon, thereby reducing the quantity of lagoon liquids released into the Kuskokwim River. We currently release about 230M gallons of Lagoon liquids into the river every spring and fall.

Mayor's Report

CITY OF BETHEL

P.O. Box 1388 Bethel, Alaska 99559
907-543-2047
FAX # 543-3817

August 20, 2012

The Honorable Sean Parnell
Alaska State Capitol Building
Third Floor
P.O. Box 110001
Juneau, AK 99811-0001

Dear Governor Parnell,

I am writing to you as the Mayor of Bethel with community concerns regarding completion of the Bethel Airport runway prior to the winter season. As you are aware, our airport not only provides service for our community of 6,000 individuals, but is also the hub for the entire Yukon-Kuskokwim Delta with a population of 28,000.

The current construction has not only halved the usable width of the runway, but has also disabled ILT for passenger jets landing at our airport. FAA regulations therefore preclude landings by passenger jets within a narrower band of crosswinds. I have heard that 83 Alaska Airline flights have already been prevented this summer due to these limitations. This has placed a hardship on Bethel, that while tolerable during the summer months while barge service is available, will become untenable once the harsher weather patterns of the winter months come upon us.

I urge you to take action to assure that not only will the full width of the runway become available to the airport before winter, but also that the ILT once again become fully operable. For this to be possible, all your efforts must be directed toward accomplishing this before it becomes impossible to lay pavement.

Not only would a partially operable airport through the winter have huge economic effects on our businesses and increase costs to our consumers for foods, but life/limb risk for the numerous patients our regional hospital sends daily to Anchorage would be incurred.

We were assured that completion would occur by September 30th at the time of the first delay. Now that a second delay has been announced, time is running

CITY OF BETHEL

P.O. Box 1388 Bethel, Alaska 99559
907-543-2047
FAX # 543-3817

out. Please make this your top priority for the Alaska Department of Transportation and Public Facilities.

Sincerely,

Joseph A. Klejka, MD
Mayor of the City of Bethel

cc. Senator Lyman Hoffman
Representative Bob Herron
Marc A. Luiken

Manager's Report

CITY OF BETHEL

Post Office Box 1388
Bethel, Alaska 99559
Voice: 907-543-1373
Fax: 907-543-1394

August 21, 2012

From: Lee M. Foley, City Manager

To: Bethel City Council

-

Info: Lori Strickler, City Clerk

Subj: City Manager's Report

Listed below are some of the action items and activities that I've been working on, and involved in, for the period July 24 – Aug 21, 2012. Due to the AML Conference, the Council meeting on August 14 was cancelled. To ensure that Council was aware of activities during the rather long interval between meetings, I provided weekly updates. Therefore, this report may appear brief, but it does contain updates and amplifications of subject matter previously provided to Council members.

CITY ADMINISTRATION ACTION ITEMS AND ACTIVITIES

Projects:

- **YK Regional Aquatic & Health Center –** All of the materials for the 168 pilings have been delivered to Arctic Foundations and the crew is working diligently to ensure at least 120 pilings are produced and shipped on the last Northland barge of the season coming to Bethel. I will have a more detailed update when Arctic Foundations' Chief Engineer, Ed Yarmak, returns next week from a conference in Quebec. The RFP for a Project Manager closes at 4:00 p.m. on Wednesday, August 22, 2012. I will brief Council verbally on the results when I give my Manager's Report.

- **Water & Sewer Cost Analysis & Rate Study –** The draft contract between COB and CH2MHill has been vetted by the City Attorney, Doug Brown, our insurance broker, and is on Council's Agenda for review. Upon authorization by Council, the Administration will execute the contract and commence the project (please see Agenda AM).

- **Bethel Water & Sewer Mater Plan Five-Year Update –** The draft contract between COB and the Larsen Consulting Group has been vetted by the City Attorney, Doug Brown, our insurance broker, and is on Council's Agenda for review. Upon authorization by Council, the Administration will execute the contract and commence the project (please see Agenda AM).

Legal Issues:

- **Legal Representation Transition –** The transition from a remote City Attorney to an in-house City Attorney is moving forward seamlessly. With the exception of a handful of issues, the transition will be completed by close of business on Friday, August 31, 2012.

- **Nuisance Issues –** Please see enclosures that deal with a private citizen and with the Yukon Lodge.

Financial:

- **Assistant Finance Director –** The Finance Department has hired Mr. Eric Johnson as the new Assistant Finance Director

- **Annual Audit Preparations –** Preparations for the City's annual financial audit are ongoing. The audit is scheduled to commence on October 8, 2012, and will last for approximately 7-10 business days.

Miscellaneous:

- **City Dock –** The MV Miktuuq has been abandoned on the City Dock for a number of years with efforts to get it removed to no avail. However, in the Port's latest effort to get this hulk removed, the requirements for impoundment as delineated in the Bethel Municipal Code, Section 14.02.100(a) have been met. Therefore, pursuant to BMC 14.02.100(b), the Port Director now has the authority to dispose of the Miktuuq as junk, donate it to a governmental agency, or local nonprofit agency, or destroy it, at his discretion and will dispose of the hulk as quickly as possible. This will free up vitally needed storage space on the City Dock.

- **Personal Leave –** I had to cancel my previously approved leave due to extreme weather conditions in the Philippines. Therefore, a new request for personal leave has been placed on the Agenda for Council's consideration (September 6-17, 2012).

Thank you.

Enclosures

CITY OF BETHEL

Post Office Box 1388
Bethel, Alaska 99559
Voice: 907-543-1373
Fax: 907-543-1394

August 21, 2012

Ms. Hazel Keezer
Post Office Box 242
Bethel, Alaska 99559

RE: Public Nuisance

Dear Ms. Keezer:

I wrote to you on July 20, 2012 to advise you of the health hazard you are creating for your neighbors by not having any water service. To date, you have failed to respond concerning that matter.

You are hereby notified that you must cease and desist from dumping your wastewater and sewage until such time as you can reinitiate utility services that will eliminate the health hazard being created, especially onto neighboring properties.

Now, in addition to the health hazard situation that is still ongoing, your residence and its occupants have been identified as public nuisances. The Bethel Municipal Code (BMC) defines Public Nuisance as the occurrence of two (2) or more separate violations of the BMC within ninety (90) days. Between April 21, 2012 and August 13, 2012, the Bethel Police responded to your house for seven (7) separate calls including public disturbances and public intoxication. These calls resulted in a disruption of your neighbor's rights to be undisturbed in their own domiciles.

This letter serves as official notice and order that a civil penalty in the amount of $300.00 is being assessed for the call made to your residence by the Bethel Police Department on August 13, 2012. Please be advised that the next time police are called to your residence for a disturbance or your neighbors complain of water or sewer issues emanating from your house the penalty will automatically increase to $700.00. Subsequent calls or complaints will cost $1,000.00 per each separate violation. These penalties must be paid within fifteen (15) days of service of the notice and order. Each day that you fail to comply after the fifteen (15) day response timeline constitutes a separate violation and can be further assessed.

If you do not agree with the purpose and intent of this notice and order, you may appeal the decision in writing to the City Council within ten (10) business days

following receipt of the service. Failure to contest the City's action will constitute acceptance and will make you liable for any future penalties that may arise from this matter.

Sincerely,

Lee M. Foley
City Manager

Cc: City Council, Bethel Police Department, City Attorney's Office

CITY OF BETHEL

Post Office Box 1388
Bethel, Alaska 99559
Voice: 907-543-1373
Fax: 907-543-1394

August 21, 2012

Henry & Elsie Active
PO Box 1382
Atmauthluak AK 99559-1382

RE: NOTICE OF PULIC NUISANCE
BMC 09.36

Dear Mr. & Mrs. Active:

I am writing to you in follow-up to the telephone call from our office on August 17, 2012 alerting you to the numerous nuisance calls received by the City on your property located in Bethel, Alaska and currently housing the Yukon Lodge.

It is estimated that in an 18 month period of time (January 2011 to the present), the Bethel Police Department has been called out to the property over 400 times. Looking back to 2010-2011, there were 147 police calls to the property. A very rare number of those calls were for serious medical emergencies, most were for public intoxication, subject removals, welfare checks and requests for protective custody of intoxicated individuals.

As the property owner, you are hereby notified that the Bethel Municipal Code (BMC) defines Public Nuisance as the occurrence of two (2) or more separate violations of the BMC within ninety (90) days. Per the Bethel Municipal Code (BMC), you have fifteen (15) days to abate the problem (BMC 09.36.040). Should you need more time, you may request it, in writing, to the City Manager, before the fifteen (15) days have passed. Should you fail to abate the problem in the required timeframe (or longer if agreed to by the City) a civil penalty in the amount of $300.00 will be assessed for the repeated calls made to the property by the Bethel Police Department and the non-abatement.

It is the City's desire to work together to resolve this issue and discontinue the continuous nuisance violations.

Sincerely,

Lee M. Foley
City Manager

cc: City Council, Bethel Police Department, City Attorney's Office

Management Team Reports

Management Team Reports

MEMORANDUM

DATE: **August 1, 2012**

TO: **Lee Foley, City Manager**

FROM: **Chuck Willert, Public Works Director**

SUBJECT: **Manager's Report –**

Programs/Divisions

Public Works Director:

We have been dealing with accidents from the Hauled Utility Department this month. A water truck backed into a fuel stand and tank knocking over the fuel tank and spilling between 10 and 15 gallons of fuel. We worked with the property owners and Bob Carlson, with ADEC, and finished cleaning up the spill. We also had a sewer truck blow sewage back into a residence in Tundra Ridge Subdivision causing the sewer tank to split and pump sewage back into the house. We called Hector Lopez in to clean up the spill but will have to replace flooring, carpet, and linoleum as well. We have our City insurance addressing the sewer spill in Tundra Ridge.

Utility Maintenance:

This month we responded to three emergency calls. We also discharged our lagoon for three weeks. We had one utility connect and assisted with another. We also changed out two fire hydrant valves. We also continue to assist billing on Blue tagging and shutting on and off water accounts. We also assisted in removing school bridge boardwalk. Our water plants have been running seven days a week. Also assisted the Fire Dept. in testing fire hydrants. We also continue to monitor our lift stations on a daily basis and rebuild pumps when needed.

Hauled Utilities:

We've been keeping up with the routes and extra calls pretty good, even though there was days when we were short drivers. More of the drivers have been working on getting their CDL drivers license current with State

regs. A water tank that was tapped last winter has been inspected for damage, and actual size it's been plumbed for. It is ready for spray foaming now to be reinsulated . John and his V & E crew have been easy to work with even though it can be tough to keep up with the breakdowns. Getting through summer okay.

Property Maintenance:

I have started working on our projects that were put in the budget this year. Materials will be coming in and hopefully be done before there is any hint of cold weather that might affect the projects. We have been installing L.E.D. lights, and have more on order to finish some of these building/projects as we have been doing in phases in the last year. I spoke with the Director at Yuut Elitnaurviat to see if they wanted a project for aspiring young carpenters. We had a need to replace the deck and stairs at the Log Cabin and they brought out a class to do it. Basic carpentry 101 a nice project to learn basics. I will send a letter thanking them. We have been repairing decks and stairs on a number of buildings. Break-ins and vandalism has been keeping us busy everywhere. Accidents from the drivers has been keeping us busy as well. Repairs to water/ fuel tanks, handrail, fences and other items.

We have hired another employee that was put in the budget. The additional position will certainly help with our work load. He has experience in all aspects of maintenance and should be a tremendous addition to the department. Thanks for the extra help.

Road Maintenance:

Streets and Road has now started on replacing, culverts that goes across, roads, and drive ways, now that the ground is thawed. These are some of the problem culverts that we been having, in the spring, when it come to thawing them out. This will make it a lot easy on us in the spring time when in thaws out.
Streets and Roads, is now done with green up, clean up this year. We hauled over 59 vehicles, and over 22 large and heavy items to the landfill. Streets and Roads, has been hauling vehicles, large items, and heavy items to the landfill for clean up, green up. With one loader down, it has been taking a little longer to get the vehicles, and other items hauled to the landfill. We use the loader as it becomes available. We will have a few

more days before we are done hauling to the landfill.
Streets and Roads now has the 966F loader running , and with the 966 loader running it makes it a little easier on us, when we have two things going on at once . We also have been working on the gun range, by building up the back dike 5 more feet, and now we have been working on the south side building up the dike 15 feet. This will be a, ongoing thing, as we have time, between other projects. We are doing the south side first, so that the 100 yard range will be operational for the Police, Troopers, and the public, before hunting season.

Vehicles and Equipment:

Basic up- keep and maintenance on city vehicles as they come in. Getting transit busses a good going though for the state inspection. Josh Howell has the 966 loader up and going. Vince Devlin has been great to work with more communication on truck maintenance.

Transit System:

For the month of July, the Bethel Transit System transported a total of 1,062 passengers, 58 of those riders had a disability and 236 were Elders. The cash fares totaled $1,808.00 while the passes used totaled $556.00.

Our FY2012 ridership numbers of 26,321 were up from the previous fiscal year 2011 total of 24,259.

Comparing the rides given for the month of July 2011 with July 2012, we are down over 1400 rides for the month. I'm hoping as the community gets used to the new bus schedules those numbers will pick up. I knew that the numbers would reflect the downsized schedule, but I've also heard how people are upset that we've raised the fares only to have a more limited schedule. In the past, fishing season didn't affect us much, but with the fishing restrictions during the king salmon run, maybe it was just that there were more people than normal at fish camps and that would account for such a drastic drop.

We are preparing for a site visit from AKDOT that will be happening Aug. 2 & 3rd. I'm sure that it will go well and I'm looking forward to any suggestions they may have for us.

I am taking the week of Aug. 6th off to help get my household in order for when I leave Bethel the first part of September. My full time driver Brenda will be taking care of the deposits that week. I'm hoping to train someone soon to take this position as there is a lot to learn. There is a mandatory transit new manager's training and refresher course for current transit managers in Juneau on August 28th – 30th. I hope someone is in place by then as I wish I could have had that training. It's pretty intensive from what I understand, but valuable beyond belief, especially for a new transit manager.

Staffing Issues/Concerns/Training:

Dave Stovner and Gary Watson will be attending OHSA training in September.

Budget/Financial:

I will put in the Budget expenditure numbers next month as our new fiscal year has just started.

TO: Lee Foley

FROM: Peter A. Williams, Port Director

SUBJECT: July 2012 Managers Report

SBH

- Larsen Consulting finished field work of plat 82-13 the 59 ½ acres of the SBH. We are now able to find our property lines for improving parking and to create a access road too dispose of the tailings from the SBH entrance channel.
- The funds from the City of Bethel for the boat ramps were forwarded to the COE 7/16/12.
- The COE reports that the bids for both projects, boat ramps and dredging, will close September 30, 2012.
- There have not been anymore reports of vandalism.
- We will need three new SBH attendants starting at various times in August. These workers are heading back to school.

City Dock

- The project on the City Dock, the East Timber Wall Reconstruction, Denali Comm. Award # 1414, was forwarded to the COE too see if they would consider administrating this project. This request was fast tracked due to the COE having to forward the request to Wash. D.C. HQs by 8/15/12. The 2006 Bethel Dock Structural Survey and the 2005 Port Feasibility and Expansion study were passed on to COE and McKinnon and Assoc. for review. We were advised that by having the COE do the design it will put the Port in a stronger position when we seek funds for construction .I would like to make construction funds a Legs. request for next year with matching funds to come from the Denali Comm. The City owns the uplands adjacent to the timber wall.

I would like to see the City Administration and the Port would like to ask Senator Hoffman and Rep. Herron advice on pursuing funds for the sheet pile portion of the City Dock. The issue is that the State of Alaska wants us to transfer ownership of the upland portion, four acres, adjacent to the sheet pile that the State owns, to the City. The States position has been that they will not provide funds for the City Dock till we transfer the four acres from the state to the city. Their position is that is when the dock was built that the city installed the sheet pile and they are not responsible for the fix. Our position has been that the sheet pile is part of the uplands that the State of Alaska owns.

Even if this issue was resolved that fact is the City dock is four feet below flood plain and could continue to have problems even after this fix.

If we do nothing either to the timber wall or sheet pile the engineers have cautioned about dredging to close along the wall on the east side of the dock. There is at least 600' of moorage that is unused, along with skiffs using Brown Slough unable to do so safely.

- USCG inspected the City Dock and requested we fix the lights that are on the East side of the dock. We are waiting for materials and have asked Anvil Electric to repair what is damaged.
- Bumpers were replaced on the Dock face.
- There have been five (5) industry accidents involving loaders, telehandlers, bobcats, and barges. A memo was sent out to facility users, after a third accident per user, the Port Director will oversee loading/discharging ops at a hourly rate of $105.00 plus a 18% admin. fee until safety procedures have improved. All the vehicle accidents were from overloading the equipment lifting capabilities.

- 1,500 Ton of river run gravel was secured from Knik, the only bidder
- Hydrographic survey was put out to bid.

Brown Slough

East Addition

Petro Port

Equipment

The Excavator that was purchased this spring is on schedule and will arrive in Seattle August 15th.

Pick-up truck ordered in spring should be in Wasilla August 15th and shipped on the last barge.

We have ordered four tires for the 950 loader. We had one tire fail which meant two had to be purchased and we found four at a good price. This loader is going to be worked pretty hard this winter.

The telehandler, JD 350 and D-5 are being used by public works now and then.

Memorandum

DATE: August 22, 2012

TO: Lee Foley, City Manager

FROM: Bobby Sutton, Finance Director

SUBJECT: Manager's Report – July 2012

Finance Committee

The Finance Committee was scheduled to meet on Thursday, July 26th but did not achieve a necessary quorum. Its next regularly scheduled meeting is August 23, 2012 at 6:45 pm.

Staffing Issues/Concerns/Training

The Finance Department has recently hired two new employees: Eric Johnson, Assistant Finance Director and Ashley McCabe, Accounting Clerk. We are excited to welcome both Eric and Ashley to the Finance Department.

Budget/Financial

As of June 30, 2012, the Finance Department had expended $680,897 (93%) of its annual budget of $733,970 with 100% of the year elapsed. The Utility Billing Department, which is also managed by the Finance, had expended $136,190 (91%) of its annual budget of $150,104.

Project Updates

- Sales Tax Audits
  Final copies of the latest round of sales tax audits conducted by Altman Rogers were distributed confidentially to City Council for the upcoming Council meeting.

- Preparation for the Closing of Fiscal Year 2012
  The Finance Department is in the processing of completing all closing entries for FY12. We anticipate no major issues in the closing of the fiscal year and in preparation for the upcoming Annual Audit set for October 8-12.

Clerk's Report

City of Bethel, Alaska

City Clerk's Office

To: City Council
From: Lori Strickler
Subject: Clerk's Report

Upcoming Council Events:
September 11 Regular City Council Meeting
September 25 Regular City Council Meeting

Alaska Municipal League Summer Meeting
The City Clerk's Office has prepared thank you cards to the many organizations and individuals who provided assistance and donations to the AML Conference.

Check requests have been submitted for all invoices received thus far and the City is approximately $7, 000 under budget for the event.

Council Chamber Audio Equipment
The Chariot Group will be out the week of September 17th to install the audio equipment in the Council Chambers as well as to provide training to key personnel.

Projects
Looking into ways to modify out Conflicts of Interest Code.

Beginning the third phase of the document retention preservation. Three more books are sent to be preserved for this fiscal year.

City of Bethel Regular Election October 2, 2012
The City Clerk's Office has certified three candidates for the three vacant City Council seats. Sharon Sigmon, Eric Whitney and Joseph Klejka will be listed on the ballot. Anyone interested in running a write in campaign must submit their notice along with the Alaska Public Offices Commission Financial Disclosure form to the City Clerk's Office.

Memory card programming for the accuvote machines as well as the ballot layout have been submitted to vendors.

Ballot language translation for proposition 1 was provided to one of the approved translators. This translation will be a tool for the election officials when assisting Yupi'k voters.

Election officials for the Regular election have been identified and many of them have been through the mandatory training. For those who have not gone through the training, a video will be provided outlining in detail their roll on Election Day.

The Council has been requested to contact the City Clerk's Office with requested attendance and travel dates for the AML Conference which will be held in Anchorage from November 12-16.

2012 Election Calendar

August 28	**PRIMARY ELECTION DAY**
August 31	Post notice for City Regular Election.
Sept. 17	Absentee in person voting begins for City Regular Election.
October 2	**CITY OF BETHEL REGLAR ELECTION/REAA ELECTION DAY**
October 4	Canvass Board meets to certify the election.
October 9	City Council meeting to certify the election.
October 15	Special City Council meeting election of mayor/vice and appointment to committees and commissions.
October 22	Absentee in person voting available in the City Clerk's Office.
Nov. 6	**GENERAL ELECTION DAY**

Passport Acceptance
Annette Sutton, the City Manager's Assistant, has been set up for the passport acceptance agent training and should have the courses complete in time for my maternity leave.

Additional Information
While on maternity leave, Bing Santamour will providing the basic assistance to the City Council and administrative staff. Due to her limited availability, she will not be able to provide research or writing assistance with ordinances,

resolutions, proclamations ect. In addition to Ms. Santamour, Kajena Baty will providing assistance with council meetings and packet preparation.

Due to the timely responses required for claims against the City as well as burial permits, the City Clerk has requested Administration take on those duties while I am out of the office.

My initial plan for leave will be from October 29th until December 10th (six weeks) depending on the health of myself and the baby. If warranted, I may be available to come back to work part-time prior to the six week end date. With the ongoing function of the City Clerk's Office the responsibility of the City Clerk, if you have any concerns regarding the functions of the office while I am out please contact me immediately.

Alaska Municipal League

Annual Local Government Conference

November 12-16, 2012

Strengthening Communities

Registration Packet

The Hotel Captain Cook ~ Anchorage, AK

Alaska Municipal League

Cultivating Partnerships!

This year's theme is Cultivating Partnerships, Strengthening Communities.

During these challenging economic times, it is more important than ever that Alaska's municipalities partner with those people, agencies and industries that work to make Alaska a better place. We may all have different methods to accomplish this goal, but we all strive for the same result.

This coming year, let's work on bringing a spirit of partnership to our dealings with the state, the federal government and the businesses that help our communities be successful.

Municipal Policy

An important part of the Annual Local Government Conference is to discuss and approve the 2013 AML Policy Statement and Legislative Priorities, adopt Resolutions, and create consensus on key legislative issues. AML members are invited to comment and/or propose amendments to the Policy Statement, Legislative Priorities and Resolutions during the four "policy sections." The process is completed at the 62nd Annual Business Meeting where the entire membership will review and adopt the 2013 documents.

Newly Elected Officials

Building a solid leadership foundation begins with AML's Newly Elected Officials (NEO) Seminar. It is one of Alaska's most highly regarded training programs for local leaders. Officials who would like a refresher course and those who are newly elected to office are invited to attend.

The NEO Seminar takes place on Monday & Tuesday, November 12 & 13, starting at 8:00 a.m. A separate registration fee is required. A $50 discount is offered for NEO participants who also attend the Local Government Conference. Please come and join us!

Training & Networking

AML provides the best training in the state on issues facing municipal leaders. The conference also offers networking opportunities between communities and municipal officials. Preconference events for AML Affiliate Associations begin Saturday, November 10, 2012.

Affiliate Pre-Conference Events & Contact Information

Saturday - Tuesday
Nov. 10-13, 2012

Alaska Association of Municipal Clerks
Kacie Paxton, MMC
AAMC President
Phone: 907 228-6604
Fax: 907 228-6697
kaciep@kgbak.us
www.alaskaclerks.org

American Planning Association - AK Chapter
Lauren Kruer
Phone: 907 315-6164
lkruer@yahoo.com

Monday & Tuesday
Nov. 12 & 13, 2012

Alaska Association of Assessing Officers
Ronald E. Brown
AAAO President
Phone: 907 228-6653
Fax: 907 228-6655
ronb@kgbak.us

Alaska Government Finance Officers Association
Walter Sapp
AGFOA President
Phone: 907 834-3461
Fax: 907 834-3403
wsapp@ci.valdez.ak.us
www.agfoa.com

Monday & Tuesday
Nov. 12 & 13, 2012

Alaska Municipal Attorneys Association
Todd Sherwood
Phone: 907 343-4545
Fax: 907 343-4550
Sherwoodtk@
ci.anchoarge.ak.us

Alaska Municipal Management Association
Betty Svensson, AML
Phone: 907 586-1325
Fax: 907 463-5480
betty@akml.org

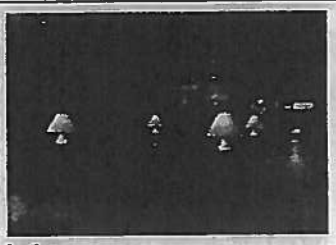
Tuesday
Nov. 13, 2012

Alaska Conference of Mayors
Betty Svensson, AML
Phone: 907 586-1325
Fax: 907 463-5480
betty@akml.org

Check our website often for updates @ www.akml.org

Hotel & Travel Information

Hotel



The Hotel Captain Cook
939 W. 5th Avenue
Anchorage, AK 99501
Phone: (907) 276-6000
Toll Free: 1-800-843-1950

RATE: Single/Dbl: **$89/night**
***does not include 12% occupancy tax*

To receive the conference rates above you must **Mention AML** when registering .
Rates are guaranteed until October 12, 2012.

Rental Cars

Hertz Rental Car is offering AML discounted rates during the Annual Conference. Call: **1-800-654-2240** or book online at Hertz.com Code: **CV# 022Q5793**. Please visit www.akml.org for a complete list of rates.

Airlines

Alaska Airlines: A 7% discount is available on all regular Alaska Airlines fares to Anchorage.

- Go online to **www.alaskaair.com** and use the e-certificate code *ECMA104* when searching for flights or
- Call the Alaska Airlines Group Reservation Desk: **1-800-445-4435** and use the code *MA104*. A $15.00 ticketing fee will apply for bookings made by calling Group Reservation Desk.

ERA Aviation: A 10% discount is available for all flights on ERA related to Annual Conference travel. Call: **1-800-866-8394** and use the code *AML11* to receive this discount. Some restrictions apply.

Alaska Municipal League
Pre-Conference & Conference Overview

Pre-Conference

Monday & Tuesday, Nov. 12 & 13, 2012

Newly Elected Officials (NEO) Training

- Roles and Responsibilities of Municipal Officials
- Budget and Governmental Accounting
- Open Meetings Act
- Quasi-Judicial Role and Ex Parte Contact
- Ethics and Conflicts of Interest
- Parliamentary Procedures and Conducting Effective Meetings
- Lobbying
- Local Taxes and much more!

Conference

Wednesday, Nov. 14, 2012

- All Day - Registration & Exhibits
- Opening Session
- Opening Day Luncheon & Keynote
- Day One Workshops I, II
- Policy Change & Resolution Submission
- Resolution Committee Meeting
- Municipality of Anchorage Host Reception

Thursday, Nov. 15, 2012

- All Day - Registration & Exhibits
- Policy Section Meetings
- Day Two Workshops III, IV
- Day Two Luncheon
- ACoM Silent Auction & AML President's Reception
- 62nd Annual Awards Banquet

Friday, Nov. 16, 2012

- Board of Directors Elections
- Annual Business Meeting

Newly Elected Officials Training in Fairbanks 2011

Cultivating Partnerships, Strengthening Communities!

2012 CONFERENCE REGISTRATION

Skip This Visit: **WWW.AKML.ORG**
To Register & Pay Online By Credit Card

Conference Fees

$50.00 discount with joint Conference & NEO registration.

AML Member*		AML Non-Member*	
Conference	_____$325	Conference	_____$400
Newly Elected Officials (NEO)	___$225	Newly Elected Officials (NEO)	___$300
Conference & NEO	_____$500	Conference & NEO	_____$650
One Day Attendance:		One Day Attendance:	
Wednesday	_____$175	Wednesday	_____$225
Thursday	_____$175	Thursday	_____$225
Friday	_____$175	Friday	_____$225
After 10/12/12	_____$50	After 10/12/12	_____$50
TOTAL	**$_____**	**TOTAL**	**$_____**

**Member Rates apply to employees and local officials of member municipalities, and to AML Affiliate and Associate organizations.*

Cancellation Policy

Cancellations or changes must be made in writing on municipal/organization letterhead and received by mail or fax no later than Friday October 26, 2012. No refunds will be made for "no-shows" or cancellations after this date. "No-shows" will be billed for the full amount. AML can not be responsible for cancellations due to weather. If you have any questions, please contact Betty Svensson at (907) 586-1325 or betty@akml.org.

Credit Card Payment:

☐Visa ☐Mastercard

_____
Card Number Exp. CVC#

_____
Name On Card

_____
Billing Address

Return Registration Form & Check/ Money Order To:

MAIL: **Alaska Municipal League**
217 2nd St., Ste. 200, Juneau, AK 99801

Delegate Information

(Please Copy and Attach Additional Forms for Multiple Attendees)

_____
Delegate Name

_____
Name to Appear on Badge

_____
Municipality/Organization

_____
Title

_____
Preferred E-mail Address (contact reasons only)

Billing Information

_____
Name

_____
Title

_____
Address

_____
City, State, Zip

_____
Telephone/Fax

_____
E-mail Address (contact reasons only)

DO YOU HAVE SPECIAL DIETARY NEEDS?
If so, AML would like to help out! Please call us at (907) 586-1325 to discuss alternate menu options.

Additional Information

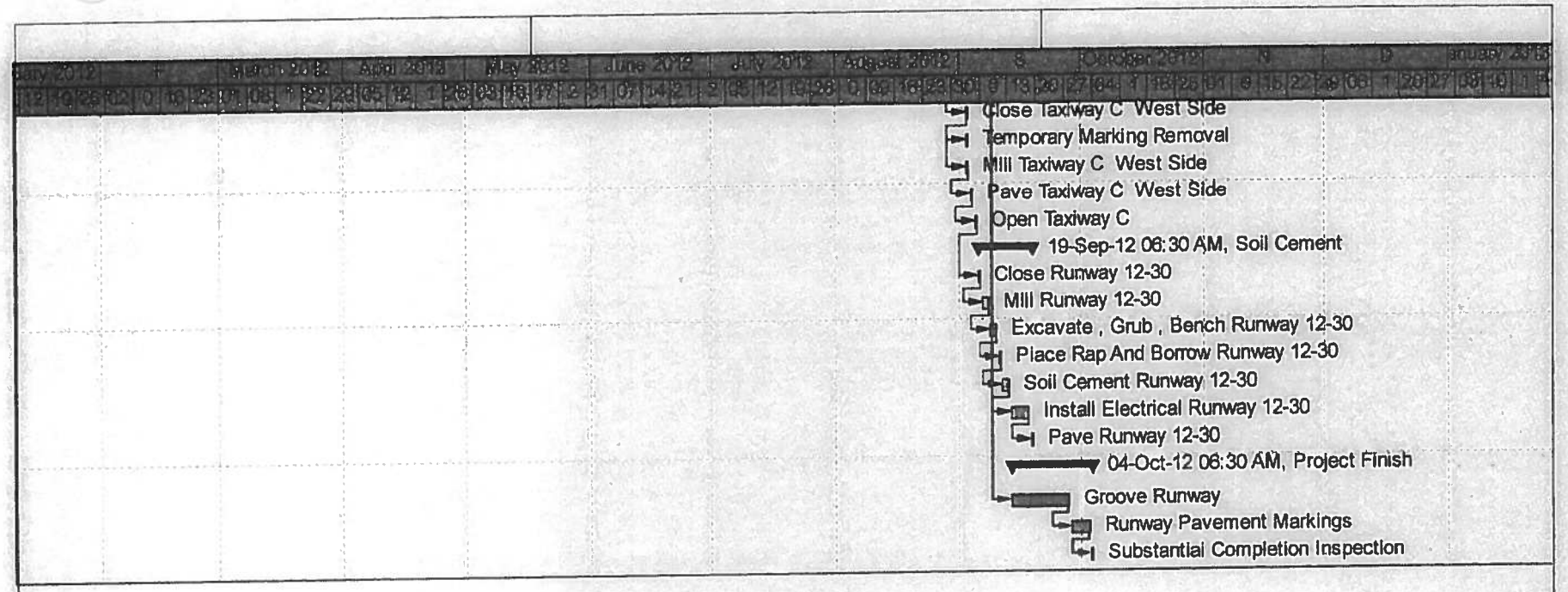
Additional Information

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
	Bethel Airport Rehab	324d	324d	15-Nov-11 10:00 PM	04-Oct-12 06:30 AM
	Mobilization And start Up	170d	170d	15-Nov-11 10:00 PM	06-May-12 06:30 AM
Mob 0010	Construction Survey	6d	6d	15-Nov-11 10:00 PM*	21-Nov-11 06:30 AM
Mob 0020	Notify Faa of Closure	1d	1d	02-Apr-12 10:00 PM*	03-Apr-12 06:30 AM
Mob 0030	Disturb Vegetated Areas	1d	1d	02-May-12 10:00 PM*	03-May-12 06:30 AM
Mob 0040	SET Up Engineers Office And Lab	1d	1d	02-May-12 10:00 PM*	03-May-12 06:30 AM
	West Half Runway	77d	77d	31-May-12 10:00 PM	16-Aug-12 06:30 AM
PHS1 0000	Close West half Runway	1d	1d	31-May-12 10:00 PM*	01-Jun-12 06:30 AM
PHS1 0010	Install And Maintain Temporary Lighting	43d	43d	31-May-12 10:00 PM	13-Jul-12 06:30 AM
PHS1 0020	Temporary Runway Painting And Removal	1d	1d	31-May-12 10:00 PM	01-Jun-12 06:30 AM
PHS1 0030	Place and Grade Matreial RFP 3	1d	1d	31-May-12 10:00 PM	01-Jun-12 06:30 AM
PHS1 0040	Mill west half Runway	14d	14d	01-Jun-12 10:00 PM	15-Jun-12 06:30 AM
PHS1 0050	Mill For Prelevel	2d	2d	15-Jun-12 10:00 PM	17-Jun-12 06:30 AM
PHS1 0060	Prelevel	2d	2d	17-Jun-12 10:00 PM	19-Jun-12 06:30 AM
PHS1 0070	Mill , Prelevel Pave Sta. 68 to sta 70	1d	1d	19-Jun-12 10:00 PM	20-Jun-12 06:30 AM
PHS1 0080	Mill , Prelevel , Pave Sta. 6 To Sta 8 ,TXWY A to Sta 202-	2d	2d	20-Jun-12 10:00 PM	22-Jun-12 06:30 AM
PHS1 0085	Test Strip	1d	1d	08-Aug-12 10:00 PM	09-Aug-12 06:30 AM
PHS1 0090	Pave West Half Runway	5d	5d	09-Aug-12 10:00 PM	14-Aug-12 06:30 AM
PHS1 0100	Paint Temprorary markings	2d	2d	14-Aug-12 10:00 PM	16-Aug-12 06:30 AM
PHS1 0110	Open west half Runway	2d	2d	14-Aug-12 10:00 PM	16-Aug-12 06:30 AM
	East Half Runway	23d	23d	14-Aug-12 10:00 PM	06-Sep-12 06:30 AM
PHS2 0000	Close East half Runway	1d	1d	14-Aug-12 10:00 PM	15-Aug-12 06:30 AM
PHS2 0010	Paint Marking Removal	2d	2d	14-Aug-12 10:00 PM	16-Aug-12 06:30 AM
PHS2 0030	Maintain Temp Lighting	22d	22d	15-Aug-12 10:00 PM	06-Sep-12 06:30 AM
PHS2 0090	Mill East half Runway	8d	8d	15-Aug-12 10:00 PM	23-Aug-12 06:30 AM
PHS2 0100	Mill For prelevel	1d	1d	23-Aug-12 10:00 PM	24-Aug-12 06:30 AM
PHS2 0110	Prelevel	1d	1d	24-Aug-12 10:00 PM	25-Aug-12 06:30 AM
PHS2 0130	Pave Runway	5d	5d	25-Aug-12 10:00 PM	30-Aug-12 06:30 AM
PHS2 0140	Apply 25% Paint , Temporary Paint Marking Removal	2d	2d	30-Aug-12 10:00 PM	01-Sep-12 06:30 AM
PHS2 0150	Open Full Width Runway	1d	1d	30-Aug-12 10:00 PM	31-Aug-12 06:30 AM
	Taxiway C East Side	4d	4d	30-Aug-12 10:00 PM	03-Sep-12 06:30 AM
PHS3 0000	Close Taxiway C East Side	1d	1d	30-Aug-12 10:00 PM	31-Aug-12 06:30 AM
PHS3 0010	Temporary Markings And Removal	1d	1d	30-Aug-12 10:00 PM	31-Aug-12 06:30 AM
PHS3 0020	Mill East Side	2d	2d	30-Aug-12 10:00 PM	01-Sep-12 06:30 AM
PHS3 0030	Pave East Side Taxiway C	1d	1d	01-Sep-12 10:00 PM	02-Sep-12 06:30 AM
PHS3 0040	Open Taxiway C East Side	1d	1d	02-Sep-12 10:00 PM	03-Sep-12 06:30 AM
	Taxiway C west Side	17d	17d	02-Sep-12 10:00 PM	19-Sep-12 06:30 AM

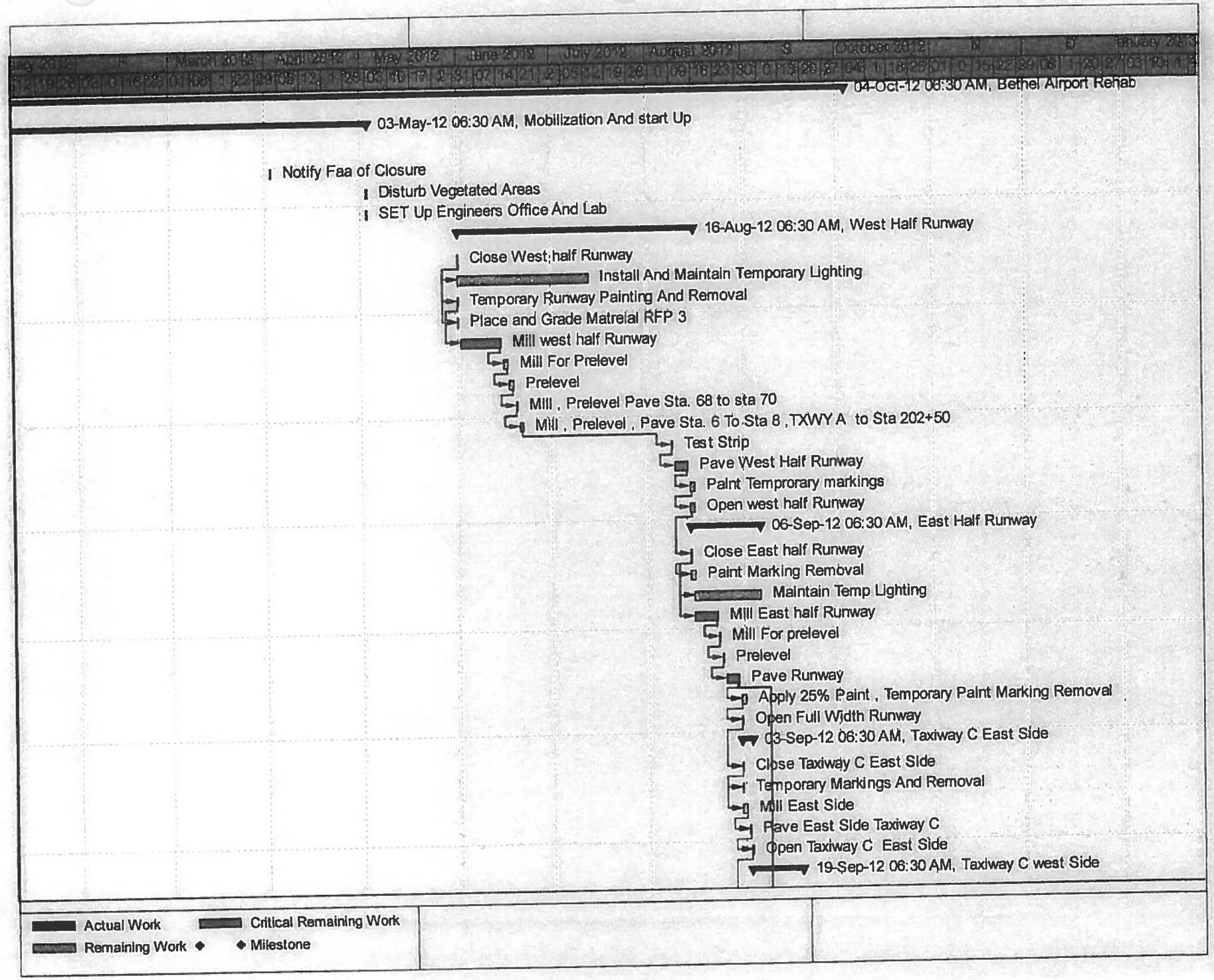
Actual Work — Critical Remaining Work
Remaining Work — Milestone

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
PHS4 0000	Close Taxiway C West Side	1d	1d	02-Sep-12 10:00 PM	03-Sep-12 06:30 AM
PHS4 0010	Temporary Marking Removal	1d	1d	02-Sep-12 10:00 PM	03-Sep-12 06:30 AM
PHS4 0020	Mill Taxiway C West Side	1d	1d	02-Sep-12 10:00 PM	03-Sep-12 06:30 AM
PHS4 0030	Pave Taxiway C West Side	1d	1d	03-Sep-12 10:00 PM	04-Sep-12 06:30 AM
PHS4 0040	Open Taxiway C	1d	1d	04-Sep-12 10:00 PM	05-Sep-12 06:30 AM
Soil Cement		14d	14d	05-Sep-12 10:00 PM	19-Sep-12 06:30 AM
PHS2 0020	Close Runway 12-30	1d	1d	05-Sep-12 10:00 PM	06-Sep-12 06:30 AM
PHS2 0040	Mill Runway 12-30	2d	2d	06-Sep-12 10:00 PM	08-Sep-12 06:30 AM
PHS2 0050	Excavate , Grub , Bench Runway 12-30	2d	2d	08-Sep-12 10:00 PM	10-Sep-12 06:30 AM
PHS2 0080	Place Rap And Borrow Runway 12-30	1d	1d	10-Sep-12 10:00 PM	11-Sep-12 06:30 AM
PHS2 0060	Soil Cement Runway 12-30	2d	2d	11-Sep-12 10:00 PM	13-Sep-12 06:30 AM
PHS2 0070	Install Electrical Runway 12-30	5d	5d	13-Sep-12 10:00 PM	18-Sep-12 06:30 AM
PHS2 0120	Pave Runway 12-30	1d	1d	18-Sep-12 10:00 PM	19-Sep-12 06:30 AM
Project Finish		21d	21d	19-Sep-12 10:00 PM	04-Oct-12 06:30 AM
PF 0000	Groove Runway	15d	15d	13-Sep-12 10:00 PM	28-Sep-12 06:30 AM
PF 0010	Runway Pavement Markings	5d	5d	28-Sep-12 10:00 PM	03-Oct-12 06:30 AM
PF 0020	Substantial Completion Inspection	1d	1d	03-Oct-12 10:00 PM	04-Oct-12 06:30 AM

Actual Work | Critical Remaining Work
Remaining Work ◆ | ◆ Milestone



Actual Work
Critical Remaining Work
Remaining Work
Milestone


04-Oct-12 06:30 AM, Bethel Airport Rehab
03-May-12 06:30 AM, Mobilization And start Up
Notify Faa of Closure
Disturb Vegetated Areas
SET Up Engineers Office And Lab
16-Aug-12 06:30 AM, West Half Runway
Close West half Runway
Install And Maintain Temporary Lighting
Temporary Runway Painting And Removal
Place and Grade Matreial RFP 3
Mill west half Runway
Mill For Prelevel
Prelevel
Mill , Prelevel Pave Sta. 68 to sta 70
Mill , Prelevel , Pave Sta. 6 To Sta 8 ,TXWY A to Sta 202+50
Test Strip
Pave West Half Runway
Paint Temprorary markings
Open west half Runway
06-Sep-12 06:30 AM, East Half Runway
Close East half Runway
Paint Marking Removal
Maintain Temp Lighting
Mill East half Runway
Mill For prelevel
Prelevel
Pave Runway
Apply 25% Paint , Temporary Paint Marking Removal
Open Full Width Runway
03-Sep-12 06:30 AM, Taxiway C East Side
Close Taxiway C East Side
Temporary Markings And Removal
Mill East Side
Pave East Side Taxiway C
Open Taxiway C East Side
19-Sep-12 06:30 AM, Taxiway C west Side
Actual Work
Critical Remaining Work
Remaining Work
Milestone

ENERGY AUDIT – FINAL REPORT

BETHEL CITY HALL
220 State Highway
Bethel, Alaska

Prepared for:

Mr. Lee Foley
PO Box 1388
Bethel, Alaska

Prepared by:

David Lanning PE, CEA
Jeremy Spargur EIT, CEA-IT

July 12, 2012

Acknowledgment: "This material is based upon work supported by the Department of Energy under Award Number DE-EE0000095"

NORTECH

Environmental Engineering & Industrial Hygiene Consultants

Managing Office
2400 College Road
Fairbanks, Alaska 99709
p. 907.452.5688
f. 907.452.5694

3105 Lakeshore Dr. Suite 106A
Anchorage, Alaska 99517
p. 907.222.2445
f. 907.222.0915

4402 Thane Road
Juneau, Alaska 99801
p: 907.586.6813
f: 907.586.6819

www.nortechengr.com

TABLE OF CONTENTS

APPENDICES

1.0 EXECUTIVE SUMMARY

NORTECH has completed an ASHRAE Level II Energy Audit of the Bethel City Hall, a 7,623 square foot facility. The audit began with benchmarking which resulted in a calculation of the energy consumption per square foot. A site inspection was completed on November 11, 2011 to obtain information about the lighting, heating, ventilation, cooling and other building energy uses. The existing usage data and current systems were then used to develop a building energy consumption model using AkWarm.

Once the model was calibrated, a number of Energy Efficiency Measures (EEMs) were developed from review of the data and observations. EEMs were evaluated and ranked on the basis of both energy savings and cost using a Savings/Investment Ratio (SIR). While these modeling techniques were successful in verifying that many of the EEMs would save energy, not all of the identified EEMs were considered cost effective based on the hardware, installation, and energy costs at the time of this audit.

While the need for a major retrofit can typically be identified by an energy audit, upgrading specific systems often requires collecting additional data and engineering and design efforts that are beyond the scope of the Level II energy audit. The necessity and amount of design effort and cost will vary depending on the scope of the specific EEMs planned and the sophistication and capability of the entire design team, including the building owners and operators. During the budgeting process for any major retrofit identified in this report, the building owner should add administrative and supplemental design costs to cover the individual needs of their own organization and the overall retrofit project.

The following table, from AkWarm, is a summary of the recommended EEMs for the Bethel City Hall. Additional discussion of the modeling process can be found in Section 3. Details of each individual EEM can be found in Appendix A of this report. A summary of EEMs that were evaluated but are not currently recommended is located in Appendix B.

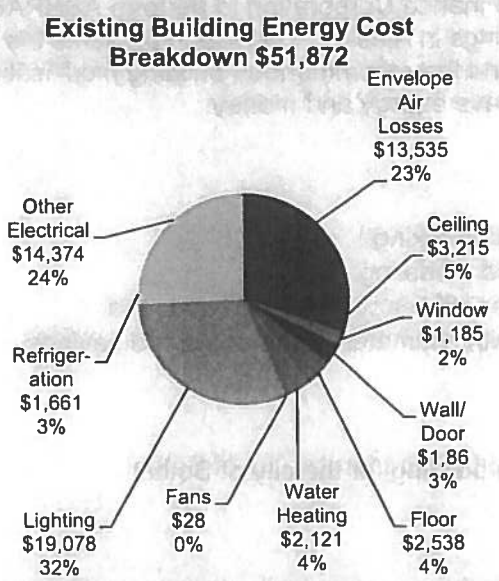
PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)

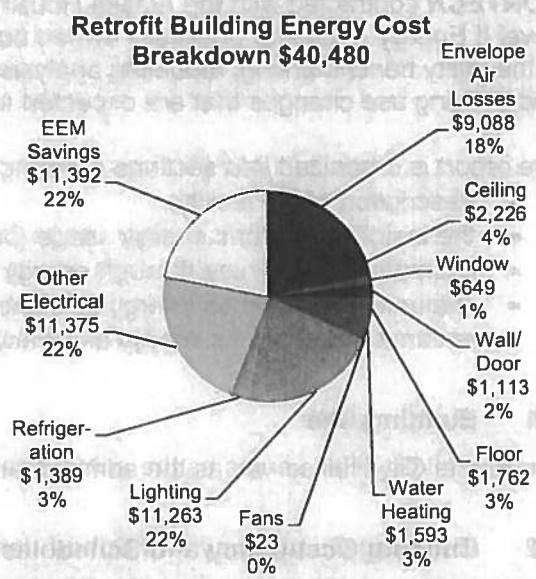
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
1	Lighting: Server Room	Replace with FLUOR (5) CFL, A Lamp 20W	$176	$25	44	0.1
2	Lighting: Hall B	Replace with FLUOR (2) CFL, A Lamp 20W	$35	$10	22	0.3
3	Setback Thermostat: Bethel City Hall	Implement a Heating Temperature Unoccupied Setback to 60.0 deg F for the Bethel City Hall space.	$3,605	$3,200	15	0.9
4	Lighting: Corridor, Office 1	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$220	$264	5.1	1.2

PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
5	Lighting: Exit Signs: Reception, Office 3, Lobby, Assembly Chambers, Hall B, Office 4, Exit, DMV	Replace with 8 LED (2) 4W Module StdElectronic	$286	$400	4.4	1.4
6	Lighting: Hall A, Secure Storage, Assembly Chambers, Kitchen 2, Human Resources, Storage (Safe Room)	Replace with 7 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$910	$1,400	4.0	1.5
7	Lighting: Hall A	Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$67	$132	3.1	2.0
8	Lighting: Toilet 7	Replace with FLUOR (4) CFL, A Lamp 20W	$9	$20	2.9	2.1
9	Lighting: Lobby	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$120	$264	2.8	2.2
10	Lighting: Office 6	Replace with 2 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$155	$400	2.4	2.6
11	Lighting: Office 6, Assembly Chambers, Hall B, Hall C, Human Resources, Secure Files, Visitor's Office, Server Room	Replace with 11 FLUOR (4) T8 4' F32T8 25W Energy-Saver Program StdElectronic	$655	$2,200	1.8	3.4
12	Lighting: CFO, Office 2, Files/Archive, Conference, Hall D, Mail/Copy, DMV	Replace with 12 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$629	$2,400	1.6	3.8
13	Lighting: Hall A, Assembly Chambers, Hall C, Server Room	Replace with 24 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$741	$3,168	1.5	4.3
14	Lighting: Kitchen	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$62	$264	1.5	4.3
15	HVAC And DHW	replace boiler and furnace	$2,800	$30,000	1.4	11

PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
16	Lighting: Rest Room	Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$25	$132	1.2	5.2
17	Lighting: Lobby, Files/Archive, Corridor, DMV	Replace with 12 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$304	$1,584	1.2	5.2
18	Exterior Door: Metal 1/2 lite foam	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$53	$1,074	1.2	20
19	Other Electrical: Vehicle Plug-In	Replace with 5 Engine Block Heaters and Remove Manual Switching and Add new Clock Timer or Other Scheduling Control	$538	$4,000	1.1	7.4
TOTAL, cost-effective measures			**$11,391**	**$50,937**	**2.4**	**4.5**

Modeled Building Energy Cost Breakdown





The preceding charts are a graphical representation of the modeled energy usage for the Bethel City Hall. The greatest portions of energy cost for the building are envelope air losses, lighting, and other electrical. This indicates that the greatest savings can be found in reducing the amount of outside air provided to the building mechanically or through air leakage, upgrading lighting, and potentially changing user behavior to use less energy. Detailed improvements for ventilation, lighting and other cost effective measures can be found in Appendix A. The chart breaks down energy usage by cost into the following categories:

- Envelope Air Losses—the cost to provide heated fresh air to occupants, air leakage, heat lost in air through the chimneys and exhaust fans, heat lost to wind and other similar losses.
- Envelope
  - Ceiling—quantified heat loss transferred through the ceiling portion of the envelope.
  - Window—quantified heat loss through the window portion of the envelope.
  - Wall/Door—quantified heat loss through the wall and door portions of the envelope.
  - Floor—quantified heat loss through the floor portion of the envelope.
- Water Heating—energy cost to provide domestic hot water.
- Fans—energy cost to run ventilation, and exhaust fans.
- Lighting—energy cost to light the building.
- Refrigeration—energy costs to provide refrigerated goods for the occupants.
- Other Electrical—includes energy costs not listed above including cooking loads, laundry loads, other plug loads and electronics. These energy uses are amenable to reduction only through user behavior changes which can be accomplished with goal driven employee teamwork.

2.0 INTRODUCTION

NORTECH contracted with the Alaska Housing Finance Corporation to perform ASHRAE Level II Energy Audits for publically owned buildings in Alaska. This report presents the findings of the utility benchmarking, modeling analysis, and the recommended building modifications, and building use changes that are expected to save energy and money.

The report is organized into sections covering:

- description of the facility,
- the building's historic energy usage (benchmarking),
- estimating energy use through energy use modeling,
- evaluation of potential energy efficiency or efficiency improvements, and
- recommendations for energy efficiency with estimates of the costs and savings.

2.1 Building Use

The Bethel City Hall serves as the administrative building for the city of Bethel.

2.2 Building Occupancy and Schedules

Approximately 13 people occupy this building from 8 am – 5 pm Monday through Friday. Occasionally, the occupancy increases due to public meetings and visitors.

2.3 Building Description

The City Hall, built in 1976, is a one-story wood-framed building that sits on pilings. The walls are made of 2x6 studs and insulated with fiberglass batt insulation. The elevated floor is made of 2x12 joists insulated with fiberglass batt insulation. The hot flat roof is insulated with approximately 6-7" of Styrofoam. Windows are double pane vinyl and doors are insulated metal, insulated metal with windows, and wood with a metal exterior.

Building Envelope

Building Envelope: Walls			
Wall Type	**Description**	**Insulation**	**Notes**
Above-grade walls	Wood-framed with 2x6 studs.	R-19 fiberglass batt.	No signs of insulation damage.

Building Envelope: Floors			
Floor Type	**Description**	**Insulation**	**Notes**
Elevated Floor	2x12 Joists	R-38 fiberglass batt	None

Building Envelope: Roof			
Roof Type	Description	Insulation	Notes
All Roofs	Hot roof framed with wood trusses.	7-inches of Styrofoam	No signs of insulation damage.

Building Envelope: Doors and Windows			
Door and Window Type	Description	Estimated R-Value	Notes
Exterior door	Flush metal with foam insulation	5	2 doors
Exterior door	Wood door with metal exterior	3.7	1 door
Exterior door	Half lite metal door with foam insulation	3.0	2 doors
Window	Double pane vinyl, <3/8" air gap	1.9	20 windows
Window	Single pane wood	1.1	3 windows
Window	Double pane vinyl, <3/8" gap, south facing	1.9	10 windows
Window	Double pane aluminum, thermal break, >3/8" air gap	1.2	1 window

Heating and Ventilation Systems

A single oil fired boiler provides heat to baseboards in the majority of the building. The council chambers and the lobby outside the chambers are heated with an oil fired forced air furnace.

An HRV unit is installed in the building for use in the offices, but has not operated very often since its installation. An HRV serves an important part in maintaining the air quality in a building. This HRV is the only form of ventilation form the City Hall and should be repaired, maintained, and returned to service.

Air Conditioning System

Several window mounted air conditioning units are installed throughout the building, but the majority does not see much use. The air conditioner in the DMV office was running at the time of the visit.

Energy Management

There are no energy management systems in the Bethel City Hall.

Lighting Systems

The primary lighting type in this building consists of ceiling mounted fixtures containing T12 (1 1/2" diameter, 4' long) tubes. The reception area has been retrofitted with energy saving ceiling mounted LED fixtures. The exterior lighting utilizes a timer and photocell and consists of LEDs and 70 watt high pressure sodium lamps.

Domestic Hot Water

The domestic hot water is heated by a heat exchanger coil in the boiler.

3.0 BENCHMARKING 2010 UTILITY DATA

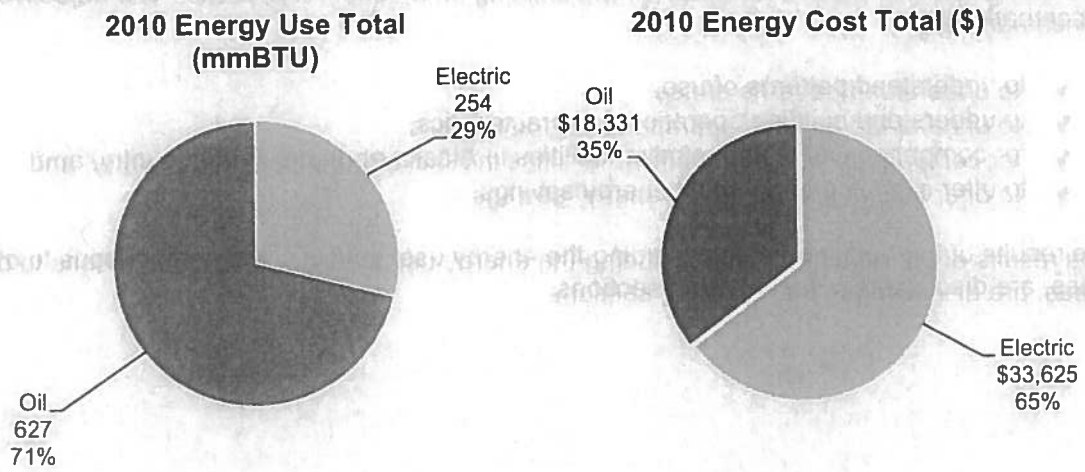
Benchmarking building energy use consists of obtaining and then analyzing two years of energy bills. The original utility bills are necessary to determine the raw usage and charges as well as to evaluate the utility's rate structure. The metered usage of electrical and natural gas consumption is measured monthly, but heating oil, propane, wood, and other energy sources are normally billed upon delivery and provide similar information. During benchmarking, information is compiled in a way that standardizes the units of energy and creates energy use and billing rate information statistics for the building on a square foot basis. The objectives of benchmarking are:

- to understand patterns of use,
- to understand building operational characteristics,
- for comparison with other similar facilities in Alaska and across the country, and
- to offer insight in to potential energy savings.

The results of the benchmarking, including the energy use statistics and comparisons to other areas, are discussed in the following sections.

3.1 Total Energy Use and Cost of 2010

The energy use profiles below show the energy and cost breakdowns for the City Hall. The total annual energy use was 881 mmBTU and the cost for energy was $51,956. These charts show the portion of use for a fuel type and the portion of its cost.



The above charts indicate that the highest portion of energy use is for oil and the highest portion of cost is for electricity. Fuel oil consumption correlates directly to space heating and domestic hot water while electrical use can correlate to lighting systems, plug loads, and HVAC equipment. The energy type with the highest cost often provides the most opportunity for savings.

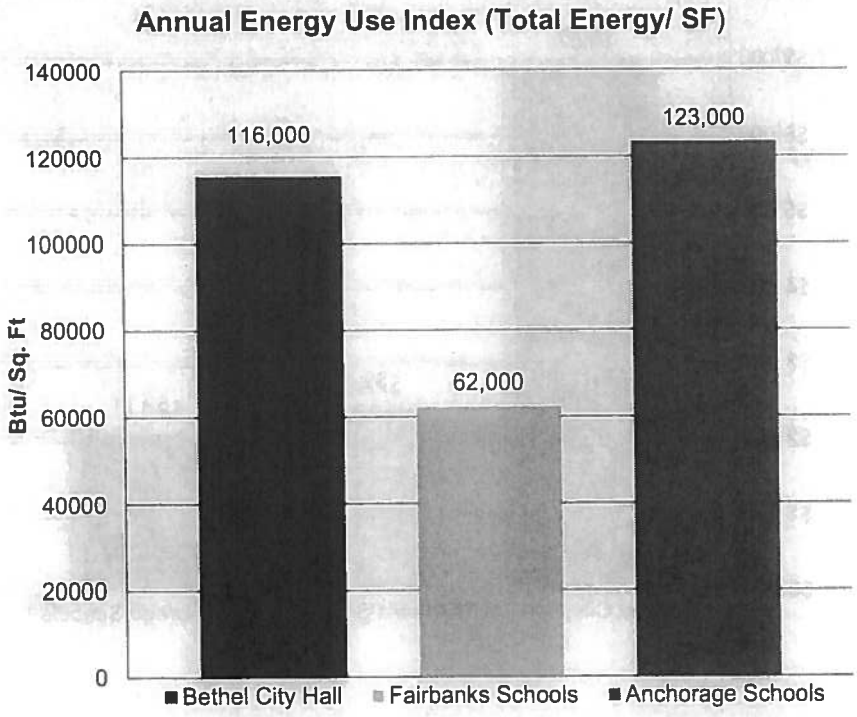
3.2 Energy Utilization Index of 2010

The primary benchmarking statistic is the Energy Utilization Index (EUI). The EUI is calculated from the utility bills and provides a simple snapshot of the quantity of energy actually used by the building on a square foot and annual basis. The calculation converts the total energy use for the year from all sources in the building, such as heating fuel and electrical usage, into British Thermal Units (BTUs). This total annual usage is then divided by the number of square feet of the building. The EUI units are BTUs per square foot per year.

The benchmark analysis found that the Bethel City Hall has an EUI of 116,000 BTUs per square foot per year.

The EUI is useful in comparing this building's energy use to that of other similar buildings in Alaska and in the Continental United States. The EUI can be compared to average energy use in 2003 found in a study by the U.S. Energy Information Administration of commercial buildings (abbreviated CBECS, 2006). That report found an overall average energy use of about 90,000 BTUs per square foot per year while studying about 6,000 commercial buildings of all sizes, types, and uses that were located all over the Continental U.S. (see Table C3 in Appendix I).

In a recent and unpublished state-wide benchmarking study sponsored by the Alaska Housing Finance Corporation, schools in Fairbanks averaged 62,000 BTUs per square foot and schools in Anchorage averaged 123,000 BTUs per square foot annual energy use. The chart below shows the Bethel City Hall relative to these values. These findings are discussed further in Appendix H.



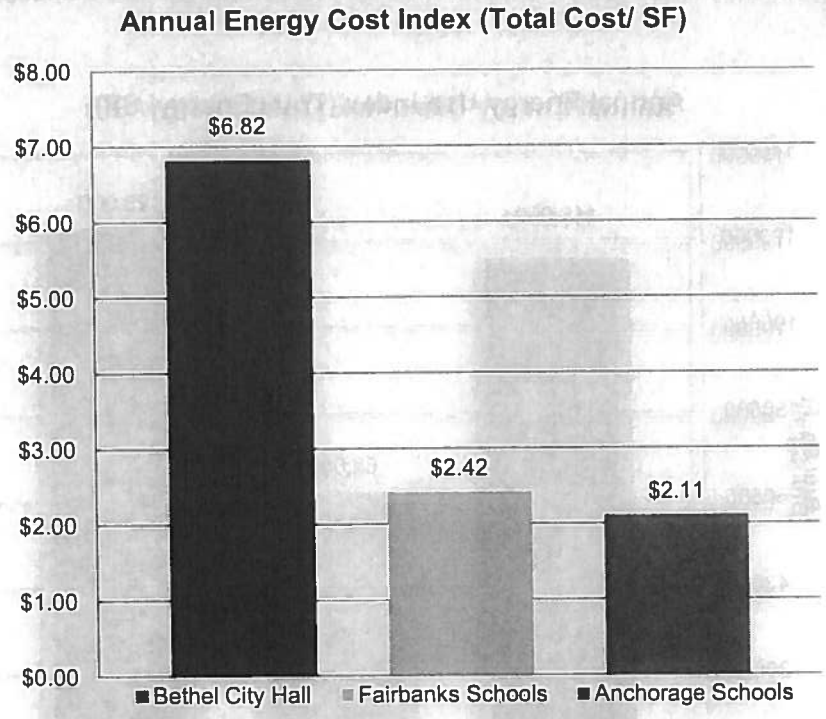
3.3 Cost Utilization Index of 2010

Another benchmarking statistic that is useful is the Cost Utilization Index (CUI), which is the cost for energy used in the building on a square foot basis per year. The CUI is calculated from the cost for utilities for a year period. The CUI permits comparison of buildings on total energy cost even though they may be located in areas with differing energy costs and differing heating and/or cooling climates. The cost of energy, including heating oil, natural gas, and electricity, can vary greatly over time and geographic location and can be higher in Alaska than other parts of the country.

The CUI for Bethel City Hall is about $6.82. This is based on utility costs from 2010 and the following rates:

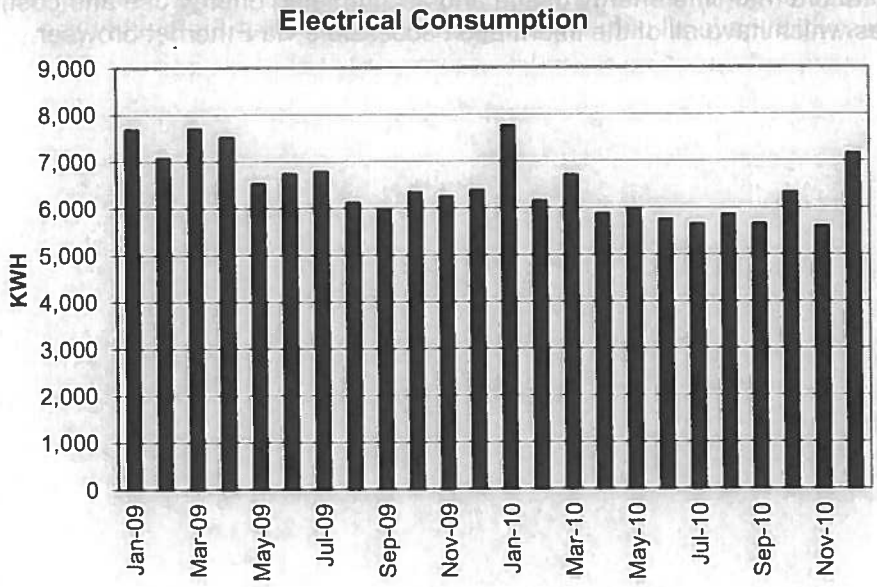
Electricity	at	$0.45 / kWh	($13.18 / Therm)
# 2 Fuel Oil	at	$4.19 / gallon	($2.99 / Therm)

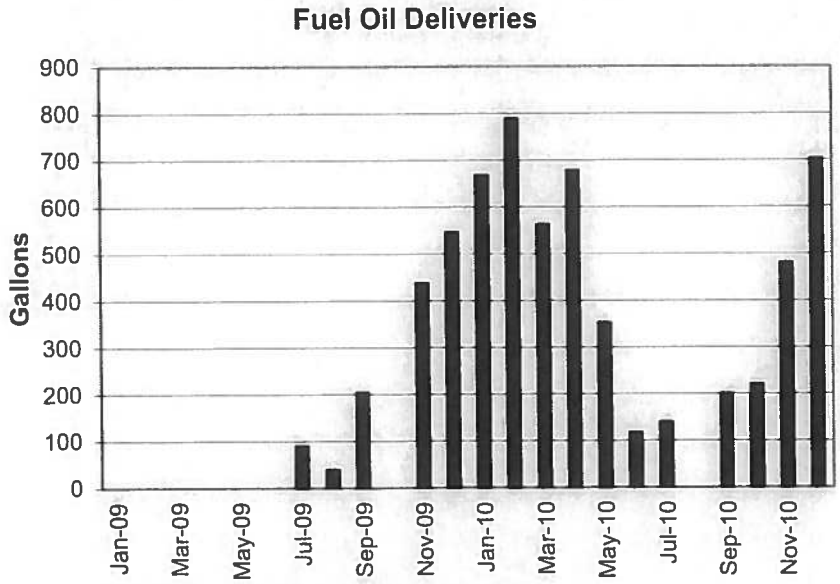
The Department of Energy Administration study, mentioned in the previous section (CBECS, 2006) found an average cost of $2.52 per square foot in 2003 for 4,400 buildings in the Continental U.S (Tables C4 and C13 of CBDES, 2006). Schools in Fairbanks have an average cost for energy of $2.42 per square foot while Anchorage schools average $2.11 per square foot. The chart below shows the Bethel City Hall relative to these values. More details are included in Appendix H.



3.4 Seasonal Energy Use Patterns

Energy consumption is often highly correlated with seasonal climate and usage variations. The graphs below show the electric and fuel consumption of this building over the course of two years. The lowest monthly use is called the baseline use. The electric baseline often reflects year round lighting consumption while the heating fuel baseline often reflects year round hot water usage. The clear relation of increased energy usage during periods of cold weather can be seen in the months with higher usage.

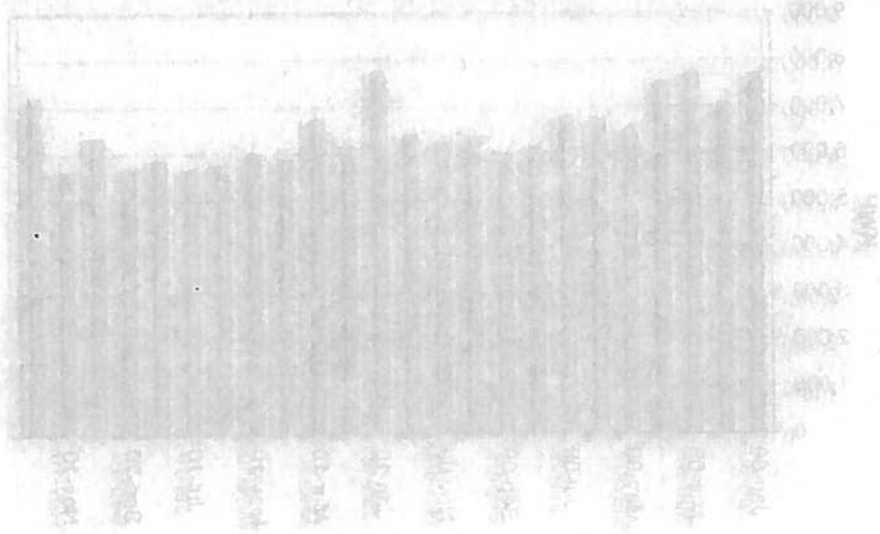


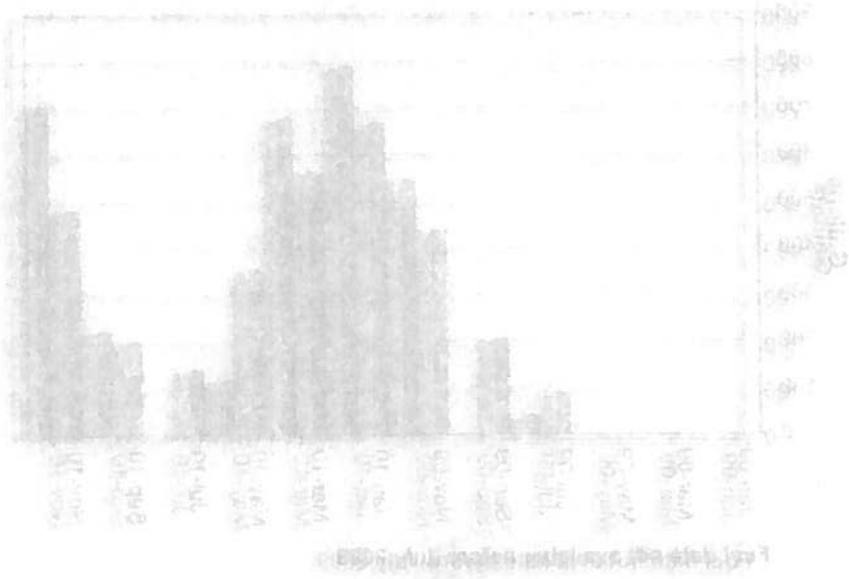


Fuel data not available before July 2009

3.5 Future Energy Monitoring

Energy accounting is the process of tracking energy consumption and costs. It is important for the building owner or manager to monitor and record both the energy usage and cost each month. Comparing trends over time can assist in pinpointing major sources of energy usage and aid in finding effective energy efficiency measures. There are two basic methods of energy accounting: manual and automatic. Manual tracking of energy usage may already be performed by an administrative assistant: however if the records are not scrutinized for energy use, then the data is merely a financial accounting. Digital energy tracking systems can be installed. They display and record real-time energy usage and accumulated energy use and cost. There are several types which have all of the information accessible via Ethernet browser.





4.0 MODELING ENERGY CONSUMPTION

After benchmarking of a building is complete and the site visit has identified the specific systems in the building, a number of different methods are available for quantifying the overall energy consumption and to model the energy use. These range from relatively simple spreadsheets to commercially available modeling software capable of handling complex building systems. ***NORTECH*** has used several of these programs and uses the worksheets and software that best matches the complexity of the building and specific energy use that is being evaluated.

Modeling of an energy efficiency measure (EEM) requires an estimate of the current energy used by the specific feature, the estimated energy use of the proposed EEM and its installed cost. EEMs can range from a single simple upgrade, such as light bulb type or type of motor, to reprogramming of the controls on more complex systems. While the need for a major retrofit can typically be identified by an energy audit, the specific system upgrades often require collecting additional data and engineering and design efforts that are beyond the scope of the Level II energy audit.

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. Common EEMs that could apply to almost every older building include:

- Reduce the envelope heat losses through:
  - increased building insulation, and
  - better windows and doors
- Reduce temperature difference between inside and outside using setback thermostats
- Upgrade inefficient:
  - lights,
  - motors,
  - refrigeration units, and
  - other appliances
- Reduce running time of lights/appliances through:
  - motion sensors,
  - on/off timers,
  - light sensors, and
  - other automatic/programmable systems

The objective of the following sections is to describe how the overall energy use of the building was modeled and the potential for energy savings. The specific EEMs that provide these overall energy savings are detailed in Appendix A of this report. While the energy savings of an EEM is unlikely to change significantly over time, the cost savings of an EEM is highly dependent on the current energy price and can vary significantly over time. An EEM that is not currently recommended based on price may be more attractive at a later date or with higher energy prices.

4.1 Understanding How AkWarm Models Energy Consumption

NORTECH used the AkWarm model for evaluating the overall energy consumption at Bethel City Hall. The AkWarm program was developed by the Alaska Housing Finance Corporation (AHFC) to model residential energy use. The original AkWarm is the modeling engine behind the successful residential energy upgrade program that AHFC has operated for a number of years. In the past few years, AHFC has developed a version of this model for commercial buildings.

Energy use in buildings is modeled by calculating energy losses and consumption, such as:

- Heat lost through the building envelope components, including windows, doors, walls, ceilings, crawlspaces, and foundations. These heat losses are computed for each component based on the area, heat resistance (R-value), and the difference between the inside temperature and the outside temperature. AkWarm has a library of temperature profiles for villages and cities in Alaska.
- Window orientation, such as the fact that south facing windows can add heat in the winter but north-facing windows do not.
- Inefficiencies of the heating system, including the imperfect conversion of fuel oil or natural gas due to heat loss in exhaust gases, incomplete combustion, excess air, etc. Some electricity is also consumed in moving the heat around a building through pumping.
- Inefficiencies of the cooling system, if one exists, due to various imperfections in a mechanical system and the required energy to move the heat around.
- Lighting requirements and inefficiencies in the conversion of electricity to light; ultimately all of the power used for lighting is converted to heat. While the heat may be useful in the winter, it often isn't useful in the summer when cooling may be required to remove the excess heat. Lights are modeled by wattage and operational hours.
- Use and inefficiencies in refrigeration, compressor cooling, and heat pumps. Some units are more efficient than others. Electricity is required to move the heat from inside a compartment to outside it. Again, this is a function of the R-Value and the temperature difference between the inside and outside of the unit.
- Plug loads such as computers, printers, mini-fridges, microwaves, portable heaters, monitors, etc. These can be a significant part of the overall electricity consumption of the building, as well as contributing to heat production.
- The schedule of operation for lights, plug loads, motors, etc. is a critical component of how much energy is used.

AkWarm adds up these heat losses and the internal heat gains based on individual unit usage schedules. These estimated heat and electrical usages are compared to actual use on both a yearly and seasonal basis. If the AkWarm model is within 5 % to 10% of the most recent 12 months usage identified during benchmarking, the model is considered accurate enough to make predictions of energy savings for possible EEMs.

4.2 AkWarm Calculated Savings for the Bethel City Hall

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. These EEMs are then entered into AkWarm to determine if the EEM saves energy and is cost effective (i.e. will pay for itself). AkWarm calculates the energy and money saved by each EEM and calculates the length of time for the savings in reduced energy consumption to pay for the installation of the EEM. AkWarm makes recommendations based on the Savings/Investment Ratio (SIR), which is defined as ratio of the savings generated over the life of the EEM divided by the installed cost. Higher SIR values are better and any SIR above one is considered acceptable. If the SIR of an EEM is below one, the energy savings will not pay for the cost of the EEM and the EEM is not recommended. Preferred EEMs are listed by AkWarm in order of the highest SIR.

A summary of the savings from the recommended EEMs are listed in this table.

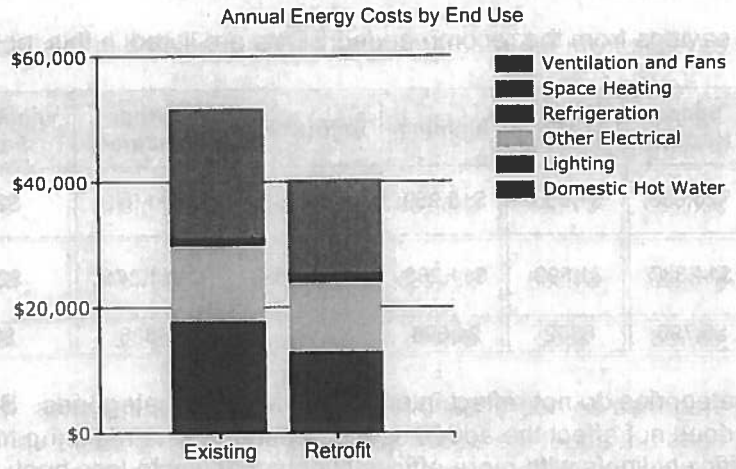
Description	Space Heating	Water Heating	Lighting	Refrigeration	Other Electrical	Ventilation Fans	Total
Existing Building	$20,633	$1,955	$15,959	$1,389	$11,913	$23	**$51,872**
With All Proposed Retrofits	$14,837	$1,593	$11,263	$1,389	$11,375	$23	**$40,470**
Savings	$5,796	$362	$4,696	$0	$538	$0	**$11,402**

Savings in these categories do not reflect interaction with other categories. So, for example, the savings in lighting does not affect the added space heating cost to make up for the heat saved in replacing less-efficient lights with more-efficient lights that waste less heat.

4.3 AkWarm Projected Energy Costs after Modifications

The AkWarm recommended EEMs appear to result in significant savings in lighting and space heating. The energy cost by end use breakdown was provided by AkWarm based on the field inspection and does not indicate that all individual fixtures and appliances were directly measured. The current energy costs are shown below on the left hand bar of the graph and the projected energy costs, assuming use of the recommended EEMs, are shown on the right.

This graphical format allows easy visual comparison of the various energy requirements of the facility. In the event that not all recommended retrofits are desired, the proposal energy savings can be estimated from visual interpretation from this graph.



4.4 Additional Modeling Methods

The AkWarm program effectively models wood-framed and other buildings with standard heating systems and relatively simple HVAC systems. AkWarm models of more complicated mechanical systems are sometimes poor due to a number of simplifying assumptions and limited input of some variables. Furthermore, AKWarm is unable to model complex HVAC systems such as variable frequency motors, variable air volume (VAV) systems, those with significant digital or pneumatic controls or significant heat recovery capacity. In addition, some other building methods and occupancies are outside AkWarm capabilities.

This report section is included in order to identify benefits from modifications to those more complex systems or changes in occupant behavior that cannot be addressed in AkWarm.

The Bethel City Hall could be modeled well in AkWarm. Retrofits for the HVAC system were adequately modeled in AkWarm and did not require additional calculations.

5.0 BUILDING OPERATION AND MAINTENANCE (O & M)

5.1 Operations and Maintenance

A well-implemented operation and maintenance (O & M) plan is often the driving force behind energy savings. Such a plan includes preserving institutional knowledge, directing preventative maintenance, and scheduling regular inspections of each piece of HVAC equipment within the building. Routine maintenance includes the timely replacement of filters, belts and pulleys, the proper greasing of bearings and other details such as topping off the glycol tanks. Additional benefits to a maintenance plan are decreased down time for malfunctioning equipment, early indications of problems, prevention of exacerbated maintenance issues, and early detection of overloading/overheating issues. A good maintenance person knows the building's equipment well enough to spot and repair minor malfunctions before they become major retrofits.

Operations and Maintenance staff implementing a properly designed O & M plan will:

- Track and document
  - Renovations and repairs,
  - Utility bills and fuel consumption, and
  - System performance.
- Keep available for reference
  - A current Building Operating Plan including an inventory of installed systems,
  - The most recent available as-built drawings,
  - Reference manuals for all installed parts and systems, and
  - An up-to-date inventory of on-hand replacement parts.
- Provide training and continuing education for maintenance personnel.
- Plan for commissioning and re-commissioning at appropriate intervals.

5.2 Commissioning

Commissioning of a building is the verification that the HVAC systems perform within the design or usage ranges of the Building Operating Plan. This process ideally, though seldom, occurs as the last phase in construction. HVAC system operation parameters degrade from ideal over time due to incorrect maintenance, improper replacement pumps, changes in facility tenants or usage, changes in schedules, and changes in energy costs or loads. Ideally, re-commissioning of a building should occur every five to ten years. This ensures that the HVAC system meets the potentially variable use with the most efficient means.

5.3 Building Specific Recommendations

The maintenance staff for the Bethel City Hall does a good job with maintaining the equipment. A few heating zone valves and thermostats should be repaired in order to prevent them from simultaneously heating while the wall mounted air conditioning units are cooling as they seem to do in the DMV office.

An HRV is an important and energy efficient tool in maintaining good air quality in a building. The HRV in the City Hall should be repaired, maintained, and returned to operation to help the air quality and comfort in the building.

APPENDICES

Appendix A Recommended Energy Efficiency Measures

A number of Energy Efficiency Measures (EEMs) are available to reduce the energy use and overall operating cost for the facility. The EEMs listed below are those recommended by AkWarm based on the calculated savings/investment ration (SIR) as described in Appendix E. AkWarm also provides a breakeven cost, which is the maximum initial cost of the EEM that will still return a SIR of one or greater.

This section describes each recommended EEM and identifies the potential energy savings and installation costs. This also details the calculation of breakeven costs, simple payback, and the SIR for each recommendation. The recommended EEMs are grouped together generally by the overall end use that will be impacted.

A.1 Temperature Control

Approximately 16 programmable thermostats should be installed and programmed in the Bethel City Hall. Programmable thermostats allow for automatic temperature setback, which reduce usage more reliably than manual setbacks. Reduction of the nighttime temperature set point in the City Hall will decrease the energy usage.

Rank	Building Space			Recommendation		
3	Bethel City Hall			Implement a Heating Temperature Unoccupied Setback to 60.0 deg F for the Bethel City Hall space.		
Installation Cost	$3,200	Estimated Life of Measure (yrs.)		15	Energy Savings (/yr.)	$3,605
Breakeven Cost	$48,879	Savings-to-Investment Ratio		15	Simple Payback yrs.	1

A.2 Electrical Loads

A.2.1 Lighting

The electricity used by lighting eventually ends up as heat in the building. In areas where electricity is more expensive than other forms of energy, or in areas where the summer temperatures require cooling; this additional heat can be both wasteful and costly. Converting to more efficient lighting reduces cooling loads in the summer and allows the user to control heat input in the winter. The conversion from T12 (one and a half inch fluorescent bulbs) to T8 (one inch), T5 (5/8 inch), Compact Fluorescent Lights (CFL), or LED bulbs provides a significant increase in efficiency. LED bulbs can be directly placed in existing fixtures. The LED bulb bypasses the ballast altogether, which removes the often irritating, "buzzing" noise that magnetic ballasts tend to make.

Replacing the incandescent lamps in the city hall is inexpensive with a low cost of replacement present a large savings. Also, replacing the current 32 watt T8 lamps with energy saving 25 watt lamps is an inexpensive retrofit with a high savings.

Rank	Location	Existing Condition		Recommendation	
1	Server Room	INCAN (5) A Lamp, Halogen 60W with Manual Switching		Replace with FLUOR (5) CFL, A Lamp 20W	
Installation Cost	$25	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$176
Breakeven Cost	$1,090	Savings-to-Investment Ratio	44	Simple Payback yrs.	0

Rank	Location	Existing Condition		Recommendation	
2	Hall B	INCAN (2) A Lamp, Std 40W with Manual Switching		Replace with FLUOR (2) CFL, A Lamp 20W	
Installation Cost	$10	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$35
Breakeven Cost	$218	Savings-to-Investment Ratio	22	Simple Payback yrs.	0

Rank	Location	Existing Condition		Recommendation	
4	Corridor, Office 1	2 FLUOR (2) T12 4' F40T12 34W Energy-Saver Magnetic with Manual Switching		Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$264	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$220
Breakeven Cost	$1,337	Savings-to-Investment Ratio	5.1	Simple Payback yrs.	1

Rank	Location	Existing Condition		Recommendation	
5	Exit Signs: Reception, Office 3, Lobby, Assembly Chambers, Hall B, Office 4, Exit, DMV	8 FLUOR [Unknown Lamp] with Manual Switching		Replace with 8 LED (2) 4W Module StdElectronic	
Installation Cost	$400	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$286
Breakeven Cost	$1,773	Savings-to-Investment Ratio	4.4	Simple Payback yrs.	1

Rank	Location	Existing Condition		Recommendation	
6	Hall A, Secure Storage, Assembly Chambers, Kitchen 2, Human Resources, Storage (Safe Room)	7 FLUOR (4) T12 4' F40T12 34W Energy-Saver (2) StdElectronic with Manual Switching		Replace with 7 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$1,400	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$910
Breakeven Cost	$5,632	Savings-to-Investment Ratio	4.0	Simple Payback yrs.	2

Rank	Location	Existing Condition		Recommendation	
7	Hall A	FLUOR (4) T12 4' F40T12 34W Energy-Saver (2) StdElectronic with Manual Switching		Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$132	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$67
Breakeven Cost	$414	Savings-to-Investment Ratio	3.1	Simple Payback yrs.	2

Rank	Location	Existing Condition		Recommendation	
8	Toilet 7	INCAN (4) A Lamp, Halogen 60W with Manual Switching		Replace with FLUOR (4) CFL, A Lamp 20W	
Installation Cost	$20	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$9
Breakeven Cost	$58	Savings-to-Investment Ratio	2.9	Simple Payback yrs.	2

Rank	Location	Existing Condition		Recommendation	
9	Lobby	2 FLUOR (2) T12 4' F40T12 34W Energy-Saver StdElectronic with Manual Switching		Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$264	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$120
Breakeven Cost	$745	Savings-to-Investment Ratio	2.8	Simple Payback yrs.	2

Rank	Location	Existing Condition		Recommendation	
10	Office 6	2 FLUOR (4) T12 4' F40T12 40W Standard (2) Magnetic with Manual Switching		Replace with 2 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$400	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$155
Breakeven Cost	$946	Savings-to-Investment Ratio	2.4	Simple Payback yrs.	3

Rank	Location	Existing Condition	Recommendation
11	Office 6, Assembly Chambers, Hall B, Hall C, Human Resources, Secure Files, Visitor's Office, Server Room	11 FLUOR (4) T12 4' F40T12 34W Energy-Saver (2) Magnetic with Manual Switching	Replace with 11 FLUOR (4) T8 4' F32T8 25W Energy-Saver Program StdElectronic

Installation Cost	$2,200	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$655
Breakeven Cost	$4,055	Savings-to-Investment Ratio	1.8	Simple Payback yrs.	3

Rank	Location	Existing Condition	Recommendation
12	CFO, Office 2, Files/Archive, Conference, Hall D, Mail/Copy, DMV	12 FLUOR (4) T12 4' F40T12 34W Energy-Saver (2) Magnetic with Manual Switching	Replace with 12 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic

Installation Cost	$2,400	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$629
Breakeven Cost	$3,838	Savings-to-Investment Ratio	1.6	Simple Payback yrs.	4

Rank	Location	Existing Condition	Recommendation
13	Hall A, Assembly Chambers, Hall C, Server Room	24 FLUOR (2) T12 4' F40T12 34W Energy-Saver Magnetic with Manual Switching	Replace with 24 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic

Installation Cost	$3,168	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$741
Breakeven Cost	$4,588	Savings-to-Investment Ratio	1.4	Simple Payback yrs.	4

Rank	Location	Existing Condition	Recommendation
14	Kitchen	2 FLUOR (2) T12 4' F40T12 34W Energy-Saver Magnetic with Manual Switching	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic

Installation Cost	$264	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$62
Breakeven Cost	$382	Savings-to-Investment Ratio	1.4	Simple Payback yrs.	4

Rank	Location	Existing Condition	Recommendation
16	Rest Room	FLUOR (2) T12 4' F40T12 34W Energy-Saver Magnetic with Manual Switching	Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic

Installation Cost	$132	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$25
Breakeven Cost	$155	Savings-to-Investment Ratio	1.2	Simple Payback yrs.	5

Rank	Location	Existing Condition		Recommendation	
17	Lobby, Files/Archive, Corridor, DMV	12 FLUOR (2) T12 4' F40T12 34W Energy-Saver Magnetic with Manual Switching		Replace with 12 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$1,584	Estimated Life of Measure (yrs.)	7	Energy Savings (/yr.)	$304
Breakeven Cost	$1,857	Savings-to-Investment Ratio	1.2	Simple Payback yrs.	5

A.2.2 Other Electrical Loads

Having the head bolt heaters on for the entire day is not always necessary. Installing a timer to alternate the head bolt heaters will help decrease energy usage. When the temperature is above 20°F all of the outlets will be off, when the temperature is between -20°F and 20°F half of the outlets will be off and rotate to on for one-half hour cycles through the day, and at below -20°F all the outlets will be on.

Rank	Location	Existing Condition		Recommendation	
21	Vehicle Plug-In	5 Engine Block Heaters with Manual Switching		Remove Manual Switching and Add new Clock Timer or Other Scheduling Control	
Installation Cost	$4,000	Estimated Life of Measure (yrs.)	10	Energy Savings (/yr.)	$538
Breakeven Cost	$4,532	Savings-to-Investment Ratio	1.1	Simple Payback yrs.	7

A.3 Building Envelope: Recommendations for change

A.3.1 Exterior Walls

No EEMs are recommended in this category. The cost to increase the insulation on the walls outweighs the energy savings.

A.3.2 Foundation and/or Crawlspace

No EEMs are recommended in this category. The cost to increase the insulation on the floor outweighs the energy savings.

A.3.3 Roofing and Ceiling

Increasing the insulation value by adding rigid board insulation to the ceiling is a not cost effective at this time.

A.3.4 Windows

Replacing windows with more energy efficient windows is not cost effective at this time.

A.3.5 Doors

Increasing the insulation value of some of the doors by replacing the half-lite doors with common exterior doors is a cost effective way to save energy.

Rank	Location	Size/Type, Condition		Recommendation	
18	Exterior Door: Metal 1/2 lite foam	Door Type: Entrance, Metal, EPS core, metal edge, half-lite Modeled R-Value: 3		Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	
Installation Cost	$1,074	Estimated Life of Measure (yrs.)	30	Energy Savings (/yr.)	$53
Breakeven Cost	$1,244	Savings-to-Investment Ratio	1.2	Simple Payback yrs.	20

A.4 Building Heating System / Air Conditioning

A.4.1 Heating and Heat Distribution

Installing a new triple pass boiler and high efficiency furnace will decrease the energy usage in the City Hall. The estimated annual savings achieved by replacing each unit with more efficient units makes the retrofit economical.

Rank	Recommendation				
15	replace boiler and furnace				
Installation Cost	$30,000	Estimated Life of Measure (yrs.)	20	Energy Savings (/yr.)	$2,800
Breakeven Cost	$41,598	Savings-to-Investment Ratio	1.4	Simple Payback yrs.	11

A.4.2 Air Conditioning

The City Hall is not equipped with and air conditioning system.

A.4.3 Ventilation

No EEMs are recommended in this category.

A.4.4 Air Changes and Air Tightening

No EEMs are recommended in this area because of the difficulty of quantifying the amount of leaking air and the savings. However, by using a blower door to depressurize the building and an infra-red camera, the location of significant air leaks can be determined so they can be repaired. Several locations on the envelope in the City Shop have damage that allows heat to escape that should be repaired.

Appendix B Energy Efficiency Measures that are NOT Recommended

As indicated in other sections of the report, a number of potential EEMs were identified that were determined to be NOT cost effective by the AkWarm model. These EEMs are not currently recommended on the basis of energy savings alone because each may only save a small amount of energy, have a high capital cost, or be expensive to install. While each of these EEMs is not cost effective at this time, future changes in building use such as longer operating hours, higher energy prices, new fixtures or hardware on the market, and decreases in installation effort may make any of these EEMs cost effective in the future. These potential EEMs should be reviewed periodically to identify any changes to these factors that would warrant re-evaluation.

Although these upgrades are not currently cost effective on an energy cost basis, the fixtures, hardware, controls, or operational changes described in these EEMs should be considered when replacing an existing fixture or unit for other reasons. For example, replacing an existing window with a triple-pane window may not be cost effective based only on energy use, but if a window is going to be replaced for some other reason, then the basis for a decision is only the incremental cost of upgrading from a less efficient replacement window to a more efficient replacement window. That incremental cost difference will have a significantly shorter payback, especially since the installation costs are likely to be the same for both units.

The following measures were not found to be cost-effective:						
Rank	Feature/Location	Improvement Description	Annual Energy Savings	Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
20	Window/Skylight: Single Wood Other	Replace existing window with triple pane, 2 low-E, argon window.	$94	$1,651	0.99	18
21	Window/Skylight: Dbl Alum No Thrm Brk Other	Replace existing window with triple pane, 2 low-E, argon window.	$24	$491	0.86	20
22	Exterior Door: Flush Wood W/ Metal Exterior	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$17	$506	0.77	31
23	Lighting: CFO, Kitchen, Conference, Hall D, Mail/Copy	Replace with 9 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$214	$1,800	0.73	8.4
24	Lighting: DMV	Replace with FLUOR (3) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$18	$166	0.65	9.4
25	Lighting: Lobby, Assembly Chambers, Hall C, Server Room	Replace with 8 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$107	$1,056	0.63	9.8
26	Above-Grade Wall: House	Install R-30 rigid foam board to exterior and cover with T1-11 siding or equivalent.	$766	$31,279	0.58	41
27	Window/Skylight: Dbl Wood/Vyn <3/8 Gas South	Remove existing glass and install triple, 1 low-E, argon glass.	$100	$3,253	0.53	33
28	Lighting: Files/Archives, Corridor, Office 1	Replace with 4 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$44	$528	0.51	12

29	Cathedral Ceiling: House	Install R-10 rigid board insulation. No cost included for covering insulation.	$690	$36,431	0.45	53
30	Window/Skylight: Dbl Wood/Vyn <3/8 Gas Other	Replace existing window with triple pane, 2 low-E, argon window.	$267	$12,170	0.38	46
31	Exterior Door: Flush 2" Metal Foam	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$13	$1,064	0.29	82
32	Lighting: Mechanical Room	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$3	$264	0.08	77

Appendix C Significant Equipment List

HVAC Equipment

Equipment	Manufacturer	Model No.	Fuel Type	Notes
Boiler	Weil McLain	WTGO-9 Series 3	#2 Fuel Oil	Only one boiler
Pump	Grundfos	UP 40-240	Electric	1 1/4 HP
Forced Air Furnace	n/a	0WH0VF	#2 Fuel Oil	1 gph
Furnace Fan	n/a	n/a	Electric	1/2 HP

Lighting

Location	Lighting Type	Bulb Type	Quantity	KWH/YR	Cost/YR
Hall A, Secure Storage, Assembly Chambers, Kitchen 2, Human Resources, Storage (Safe Room)	Fluorescent	T12	28	7,454	$ 3,354
CFO, Office 2, Files/Archive, Conference, Hall D, Mail/Copy, DMV	Fluorescent	T12	48	3,783	1,702
Hall A, Assembly Chambers, Hall C, Server Room	Fluorescent	T12	48	3,783	1,702
Reception, Office 3, Office 7, Office 4, City Manager, Office 5	LED	48 W	32	3,550	1,598
Office 6, Assembly Chambers, Hall B, Hall C, Human Resources, Secure Files, Visitor's Office, Server Room	Fluorescent	T12	44	3,468	1561
CFO, Kitchen, Conference, Hall D, Mail/Copy	Fluorescent	T12	36	2,139	963
Lobby, Files/Archive, Corridor, DMV	Fluorescent	T12	24	1,892	851
Corridor, Office 1	Fluorescent	T12	4	1,413	636
Exit Signs: Reception, Office 3, Lobby, Assembly Chambers, Hall B, Office 4, Exit, DMV	Exit Signs	Incandescent	8	1,403	631
Lobby	Fluorescent	T12	4	1,065	479
Lobby, Assembly Chambers, Hall C, Server Room	Fluorescent	T12	16	951	428
Exterior	HPS	70 W	2	701	315
Server room	Incandescent	60 W	5	587	264

Energy Consumption calculated by AkWarm based on wattage, schedule, and an electricity rate of $0.45/kWh

Plug Loads

Equipment	Location	Manufacturer	KWH/YR	Cost/YR
Window mounted air conditioners	Offices	Varies	6452	$ 2903
Head bolt Heaters	Exterior	n/a	3417	1538
Fans	Offices	Varies	3264	1469
IT equipment	Offices	Varies	2849	1282
Computer towers	Offices	n/a	2661	1197
Refrigerator	Break rooms	n/a	2087	939
Desktop Printers	Offices	n/a	1628	733
computer monitors	Offices	n/a	1331	599
mini refrigerators	Offices	n/a	1000	450

Energy Consumption calculated by AkWarm based on wattage, schedule, and an electricity rate of $0.45/kWh

Appendix D Local Utility Rate Structure

The information in this section was provided directly from the local utility or gathered from the local utility's publicly available information at the time of the audit. All language used in this section was provided by the local utility and believed to be current at the time of the audit. Energy use terms, specific fees, and other specific information are subject to change. Updated rate structure information should be gathered from the utility during future discussion of rates, rate structures and utility pricing agreements.

Bethel Utilities Corporation Rate Structure for March 1, 2011 bill:

RATE TYPE	
Customer Charge	$42.93
Demand Charge	$30.02/KW
Energy Charge	$0.2925/KWH
Power Adjustment Surcharge	$0.0820/KWH
RCC	$0.000552/KWH
Effective Rate	**$0.4662/KWH**

*****The effective rate is all of the charges totaled together and divided by the kilowatt hour used.**

Customer Charge

A flat fee that covers costs for meter reading, billing and customer service.

Utility Charge (kWh charge)

This charge is multiplied by the number of kilowatt-hours (kWh) used in a monthly billing period. It covers the costs to maintain power plants and substations, interest on loans as well as wires, power poles and transformers.

Fuel and Purchased Power

This charge is based on a combination of forecasted and actual power costs. The monthly charge allows Golden Valley to pass on increases and decreases in fuel and energy purchases to our members. It is calculated quarterly and multiplied by the kilowatt-hours used each month.

Regulatory Charge

This charge of .000492 per kWh is set by the Regulatory Commission of Alaska (RCA). Since November 1, 1992, the Regulatory Commission of Alaska has been funded by a Regulatory Charge to the utilities it regulates rather than through the State general fund. The charge, labeled "Regulatory Cost Charge." on your bill, is set by the RCA, and applies to all retail kilowatt-hours sold by regulated electric utilities in Alaska.

Appendix E Analysis Methodology

Data collected was processed using AkWarm energy use software to estimate current energy consumption by end usage and calculate energy savings for each of the proposed energy efficiency measures (EEMs). In addition, separate analysis may have been conducted to evaluate EEMs that AkWarm cannot effectively model to evaluate potential reductions in annual energy consumption. Analyses were conducted under the direct supervision of a Certified Energy Auditor, Certified Energy Manager, or a Professional Engineer.

EEMs are evaluated based on building use, maintenance and processes, local climate conditions, building construction type, function, operational schedule and existing conditions. Energy savings are calculated based on industry standard methods and engineering estimations. Each model created in AkWarm is carefully compared to existing utility usage obtained from utility bills. The AkWarm analysis provides a number of tools for assessing the cost effectiveness of various improvement options. The primary assessment value used in this audit report is the Savings/Investment Ratio (SIR). The SIR is a method of cost analysis that compares the total cost savings through reduced energy consumption to the total cost of a project over its assumed lifespan, including both the construction cost and ongoing maintenance and operating costs. Other measurement methods include Simple Payback, which is defined as the length of time it takes for the savings to equal the total installed cost and Breakeven Cost, which is defined as the highest cost that would yield a Savings/Investment Ratio of one.

EEMs are recommended by AkWarm in order of cost-effectiveness. AkWarm first calculates individual SIRs for each EEM, and then ranks the EEMs by SIR, with higher SIRs at the top of the list. An individual EEM must have a SIR greater than or equal to one in order to be recommended by AkWarm. Next AkWarm modifies the building model to include the installation of the first EEM and then re-simulates the energy use. Then the remaining EEMs are re-evaluated and ranked again. AkWarm goes through this iterative process until all suggested EEMs have been evaluated.

Under this iterative review process, the savings for each recommended EEM is calculated based on the implementation of the other, more cost effective EEMs first. Therefore, the implementation of one EEM affects the savings of other EEMs that are recommended later. The savings from any one individual EEM may be relatively higher if the individual EEM is implemented without the other recommended EEMs. For example, implementing a reduced operating schedule for inefficient lighting may result in relatively higher savings than implementing the same reduced operating schedule for newly installed lighting that is more efficient. If multiple EEMs are recommended, AkWarm calculates a combined savings.

Inclusion of recommendations for energy savings outside the capability of AkWarm will impact the actual savings from the AkWarm projections. This will almost certainly result in lower energy savings and monetary savings from AkWarm recommendations. The reality is that only so much energy is consumed in a building. Energy savings from one EEM reduces the amount of energy that can be saved from additional EEMs. For example, installation of a lower wattage light bulb does not save energy or money if the bulb is never turned on because of a schedule or operational change at the facility.

Appendix F Audit Limitations

The results of this audit are dependent on the input data provided and can only act as an approximation. In some instances, several EEMs or installation methods may achieve the identified potential savings. Actual savings will depend on the EEM selected, the price of energy, and the final installation and implementation methodology. Competent tradesmen and professional engineers may be required to design, install, or otherwise implement some of the recommended EEMs. This document is an energy use audit report and is not intended as a final design document, operation, and maintenance manual, or to take the place of any document provided by a manufacturer or installer of any device described in this report.

Cost savings are calculated based on estimated initial costs for each EEM. Estimated costs include labor and equipment for the full up-front investment required to implement the EEM. The listed installation costs within the report are conceptual budgetary estimates and should not be used as design estimates. The estimated costs are derived from Means Cost Data, industry publications, local contractors and equipment suppliers, and the professional judgment of the CEA writing the report and based on the conditions at the time of the audit.

Cost and energy savings are approximations and are not guaranteed.

Additional significant energy savings can usually be found with more detailed auditing techniques that include actual measurements of electrical use, temperatures in the building and HVAC ductwork, intake and exhaust temperatures, motor runtime and scheduling, and infrared, air leakage to name just a few. Implementation of these techniques is the difference between a Level III Energy Audit and the Level II Audit that has been conducted.

Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

Appendix G References

Although not all documents listed below are specifically referenced in this report, each contains information and insights considered valuable to most buildings.

Alaska Department of Education and Early Development; Education Support Services/Facilities. (1999). *Alaska School Facilities Preventative Maintenance Handbook.* Juneau, AK: Alaska Department of Education and Early Development.

Alaska Housing Finance Corportation. (2010). *Retrofit Energy Assessment for Loans.* AHFC.

ASHRAE. (1997). *1997 ASHRAE Handbook: Fundamentals.* Atlanta, GA: ASHRAE.

ASHRAE. (2007). *ASHRAE Standard 105-2007 Expressing and Comparing Building Energy Performance.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2007). *ASHRAE Standard 90.1-2007 Energy Standards for buildings Except Low-Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.1-2010 Ventilaton for Acceptable Indoor Air Quality.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.2-2010 Ventilation and Acceptable Indoor Air Quality in Low Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE RP-669 and SP-56. (2004). *Procedures for Commercial Building Energy Audits.* Atlanta, GA: ASHRAE.

Coad, W. J. (1982). *Energy Engineering and Management for Building Systems.* Scarborough, Ontario, Canada: Van Nostrand Reinhold Company.

Daley, D. T. (2008). *The Little Black Book of Reliability Management.* New York, NY: Industrial Press, Inc.

Federal Energy Management Program. (2004, March 3). *Demand Controlled Ventilation Using CO2 Sensors.* Retrieved 2011, from US DOE Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/femp/pdfs/fta_co2.pdf

Federal Energy Management Program. (2006, April 26). *Low-Energy Building Design Guidelines.* Retrieved 2011, from Department of Energy; Federal Energy Management Program: http://www.eren.doe.gov/femp/

Institute, E. a. (2004). *Variable Speed Pumping: A Guide to Successful Applications.* Oxford, UK: Elsevier Advanced Technology.

International Code Council. (2009). *International Energy Conservation Code.* Country Club Hills, IL: International Code Council, Inc.

Leach, M., Lobato, C., Hirsch, A., Pless, S., & Torcellini, P. (2010, September). *Technical Support Document: Strategies for 50% Energy Savings in Large Office Buildings.* Retrieved 2011, from National Renewable Energy Laboratory: http://www.nrel.gov/docs/fy10osti/49213.pdf

Thumann, P.E., C.E.M., A., Younger, C.E.M., W. J., & Niehus, P.E., C.E.M., T. (2010). *Handbook of Energy Audits Eighth Edition.* Lilburn, GA: The Fairmont Press, Inc.

U.S. Energy Information Administration. (2006). *Commercial Building Energy Consumption Survey (CBECS).* Retrieved 2011, from Energy Information Administration: http://www.eia.gov/emeu/cbecs/

Appendix H Typical Energy Use and Cost – Fairbanks and Anchorage

This report provides data on typical energy costs and use on selected building in Fairbanks and Anchorage, Alaska for comparative purposes only. The values provided by the US Energy Information Administration CBECS study included a broader range of building types for the Continental U.S. are not necessarily good comparatives for buildings and conditions in Alaska. An assortment of values from CBECS may be found in Appendix I.

The Alaska data described in this report came from a benchmarking study NORTECH and other Technical Services Providers (TSPs) completed on publicly owned buildings in Alaska under contract with AHFC. This study acquired actual utility data for municipal buildings and schools in Alaska for the two recent full years. The utility data included costs and quantities including fuel oil, electricity, propane, wood, steam, and all other energy source usage. This resulted in a database of approximately 900 buildings. During the course of the benchmarking study, the comparisons made to the CBECS data appeared to be inappropriate for various reasons. Therefore, this energy use audit report references the average energy use and energy cost of Anchorage and Fairbanks buildings as described below.

The Alaska benchmarking data was evaluated in order to find valid comparison data. Buildings with major energy use information missing were eliminated from the data pool. After detailed scrutiny of the data, the most complete information was provided to NORTECH by the Fairbanks North Star Borough School District (FNSBSD) and the Anchorage School District (ASD). The data sets from these two sources included both the actual educational facilities as well as the district administrative buildings and these are grouped together in this report as Fairbanks and Anchorage schools. These two sources of information, being the most complete and reasonable in-state information have been used to identify an average annual energy usage for Fairbanks and for Anchorage in order to provide a comparison for other facilities in Alaska.

Several factors may limit the comparison of a specific facility to these regional indicators. In Fairbanks, the FNSBSD generally uses number two fuel oil for heating needs and electricity is provided by Golden Valley Electric Association (GVEA). GVEA produces electricity from a coal fired generation plant with additional oil generation upon demand. A few of the FNSBSD buildings in this selection utilize district steam and hot water. The FNSBSD has recently (the last ten years) invested significantly in envelope and other efficiency upgrades to reduce their operating costs. Therefore a reader should be aware that this selection of Fairbanks buildings has energy use at or below average for the entire Alaska benchmarking database.

Heating in Anchorage is through natural gas from the nearby natural gas fields. Electricity is also provided using natural gas. As the source is nearby and the infrastructure for delivery is in place, energy costs are relatively low in the area. As a result, the ASD buildings have lower energy costs, but higher energy use, than the average for the entire benchmarking database.

These special circumstances should be considered when comparing the typical annual energy use for particular buildings.

Appendix I Typical Energy Use and Cost – Continental U.S.

Released: Dec 2006

Next CBECS will be conducted in 2007

Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003

	All Buildings*			Sum of Major Fuel Consumption			
	Number of Buildings (thousand)	Floor space (million square feet)	Floor space per Building (thousand square feet)	Total (trillion BTU)	per Building (million BTU)	per Square Foot (thousand BTU)	per Worker (million BTU)
All Buildings*	4,645	64,783	13.9	5,820	1,253	89.8	79.9
Building Floor space (Square Feet)							
1,001 to 5,000	2,552	6,789	2.7	672	263	98.9	67.6
5,001 to 10,000	889	6,585	7.4	516	580	78.3	68.7
10,001 to 25,000	738	11,535	15.6	776	1,052	67.3	72.0
25,001 to 50,000	241	8,668	35.9	673	2,790	77.6	75.8
50,001 to 100,000	129	9,057	70.4	759	5,901	83.8	90.0
100,001 to 200,000	65	9,064	138.8	934	14,300	103.0	80.3
200,001 to 500,000	25	7,176	289.0	725	29,189	101.0	105.3
Over 500,000	7	5,908	896.1	766	116,216	129.7	87.6
Principal Building Activity							
Education	386	9,874	25.6	820	2,125	83.1	65.7
Food Sales	226	1,255	5.6	251	1,110	199.7	175.2
Food Service	297	1,654	5.6	427	1,436	258.3	136.5
Health Care	129	3,163	24.6	594	4,612	187.7	94.0
Inpatient	8	1,905	241.4	475	60,152	249.2	127.7
Outpatient	121	1,258	10.4	119	985	94.6	45.8
Lodging	142	5,096	35.8	510	3,578	100.0	207.5
Retail (Other Than Mall)	443	4,317	9.7	319	720	73.9	92.1
Office	824	12,208	14.8	1,134	1,376	92.9	40.3
Public Assembly	277	3,939	14.2	370	1,338	93.9	154.5
Public Order and Safety	71	1,090	15.5	126	1,791	115.8	93.7
Religious Worship	370	3,754	10.1	163	440	43.5	95.6
Service	622	4,050	6.5	312	501	77.0	85.0
Warehouse and Storage	597	10,078	16.9	456	764	45.2	104.3
Other	79	1,738	21.9	286	3,600	164.4	157.1
Vacant	182	2,567	14.1	54	294	20.9	832.1

This report references the Commercial Buildings Energy Consumption Survey (CBECS), published by the U.S. Energy Information Administration in 2006. Initially this report was expected to compare the annual energy consumption of the building to average national energy usage as documented below. However, a direct comparison between one specific building and the groups of buildings outlined below yielded confusing results. Instead, this report uses a comparative analysis on Fairbanks and Anchorage data as described in Appendix F. An abbreviated excerpt from CBECS on commercial buildings in the Continental U.S. is below.

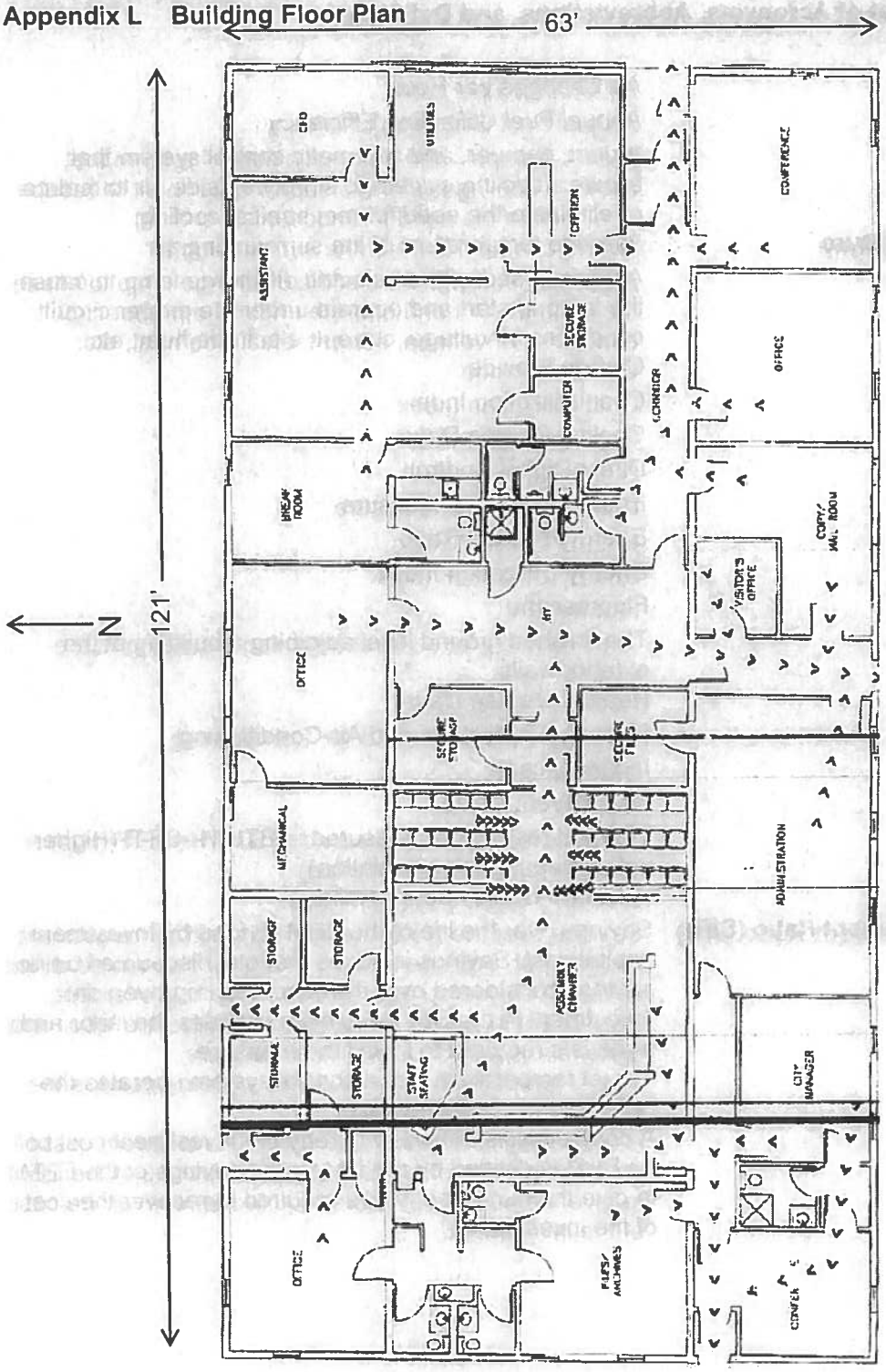
Appendix J List of Conversion Factors and Energy Units

1 British Thermal Unit	is the energy required to raise one pound of water one degree F°
1 Watt	is approximately 3.412 BTU/hr
1 horsepower	is approximately 2,544 BTU/hr
1 horsepower	is approximately 746 Watts
1 "ton of cooling"	is approximately 12,000 BTU/hr, the amount of power required to melt one short ton of ice in 24 hours
1 Therm	= 100,000 BTU
1 KBTU	= 1,000 BTU
1 KWH	= 3413 BTU
1 KW	= 3413 BTU/Hr
1 Boiler HP	= 33,400 BTU/Hr
1 Pound Steam	= approximately 1000 BTU
1 CCF of natural gas	= approximately 1 Therm
1 inch H2O	= 250 Pascal (Pa) = 0.443 pounds/square inch (psi)
1 atmosphere (atm)	= 10,1000 Pascal (Pa)
BTU	British Thermal Unit
CCF	100 Cubic Feet
CFM	Cubic Feet per Minute
GPM	Gallons per minute
HP	Horsepower
Hz	Hertz
kg	Kilogram (1,000 grams)
kV	Kilovolt (1,000 volts)
kVA	Kilovolt-Amp
kVAR	Kilovolt-Amp Reactive
KW	Kilowatt (1,000 watts)
KWH	Kilowatt Hour
V	Volt
W	Watt

Appendix K List of Acronyms, Abbreviations, and Definitions

ACH	Air Changes per Hour
AFUE	Annual Fuel Utilization Efficiency
Air Economizer	A duct, damper, and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling.
Ambient Temperature	Average temperature of the surrounding air
Ballast	A device used with an electric discharge lamp to cause the lamp to start and operate under the proper circuit conditions of voltage, current, electrode heat, etc.
CO_2	Carbon Dioxide
CUI	Cost Utilization Index
CDD	Cooling Degree Days
DDC	Direct Digital Control
EEM	Energy Efficiency Measure
EER	Energy Efficient Ratio
EUI	Energy Utilization Index
FLUOR	Fluorescent
Grade	The finished ground level adjoining a building at the exterior walls
HDD	Heating Degree Days
HVAC	Heating, Ventilation, and Air-Conditioning
INCAN	Incandescent
NPV	Net Present Value
R-value	Thermal resistance measured in BTU/Hr-SF-°F (Higher value means better insulation)
SCFM	Standard Cubic Feet per Minute
Savings to Investment Ratio (SIR)	Savings over the life of the EEM divided by Investment capital cost. Savings includes the total discounted dollar savings considered over the life of the improvement. Investment in the SIR calculation includes the labor and materials required to install the measure.
Set Point	Target temperature that a control system operates the heating and cooling system
Simple payback	A cost analysis method whereby the investment cost of an EEM is divided by the first year's savings of the EEM to give the number of years required to recover the cost of the investment.

Appendix L Building Floor Plan



Copy of on-site fire escape plan

ENERGY AUDIT

BETHEL COURT BUILDING
204 State Highway
Bethel, Alaska

Prepared for:

Mr. Lee Foley
PO Box 1388
Bethel, Alaska

Prepared by:

David Lanning PE, CEA
Jeremy Spargur EIT, CEAIT

March 21, 2012

NORTECH
Environmental Engineering & Industrial Hygiene Consultants

Managing Office
2400 College Road
Fairbanks, Alaska 99709
p. 907.452.5688
f. 907.452.5694

3105 Lakeshore Dr. Suite 106A
Anchorage, Alaska 99517
p. 907.222.2445
f. 907.222.0915

4402 Thane Road
Juneau, Alaska 99801
p: 907.586.6813
f: 907.586.6819

www.nortechengr.com

NORTECH
ENVIRONMENTAL ENGINEERING, HEALTH & SAFETY
Anch: 3105 Lakeshore Dr. Ste 106A, 99517 907.222.2445 Fax: 222.0915
Fairbanks: 2400 College Road, 99709 907.452.5688 Fax: 452.5694
Juneau: 4402 Thane Road, 99801 907.586.6813 Fax: 586.6819
info@nortechengr.com www.nortechengr.com

TABLE OF CONTENTS

APPENDICES

1.0 EXECUTIVE SUMMARY

NORTECH has completed an ASHRAE Level II Energy Audit of the Bethel Court Building, a 28,820 square foot facility. The audit began with benchmarking which resulted in a calculation of the energy consumption per square foot. A site inspection was completed on November 16, 2011 to obtain information about the lighting, heating, ventilation, cooling and other building energy uses. The existing usage data and current systems were then used to develop a building energy consumption model using AkWarm.

Once the model was calibrated, a number of Energy Efficiency Measures (EEMs) were developed from review of the data and observations. EEMs were evaluated and ranked on the basis of both energy savings and cost using a Savings/Investment Ratio (SIR). While these modeling techniques were successful in verifying that many of the EEMs would save energy, not all of the identified EEMs were considered cost effective based on the hardware, installation, and energy costs at the time of this audit.

The following table, from AkWarm, is a summary of the recommended EEMs for the Bethel Court Building. Additional discussion of the modeling process can be found in Section 3. Details of each individual EEM can be found in Appendix A of this report. A summary of EEMs that were evaluated but are not currently recommended is located in Appendix B.

PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	**Feature/ Location**	**Improvement Description**	**Estimated Annual Energy Savings**	**Estimated Installed Cost**	**Savings to Investment Ratio, SIR**	**Simple Payback (Years)**
1	Ventilation	Reduce outside air to by repairing controls closing dampers (4000 CFM)	$43,102	$20,000	29	0.5
2	Lighting: Probation Bathroom, Elevator	Replace with 2 LED 8W Module StdElectronic	$158	$75	13	0.5
3	Lighting: Office 1, Visiting Judge	Replace with 2 LED 17W Module StdElectronic	$98	$75	7.9	0.8
4	Lighting: Hall A, Hall G, Hall H, S/L, Grand Jury	Replace with 6 LED (2) 17W Module StdElectronic	$381	$960	5.8	2.5
5	Lighting: Jury Deliberation 2,	Replace with LED (3) 17W Module StdElectronic	$94	$240	5.7	2.6
6	Lighting: JS Office, Hall 3, Hearing Room 1, Court Room 2, Court Room 4, Court Room 6,	Replace with 10 LED (3) 17W Module StdElectronic	$941	$2,400	5.7	2.6

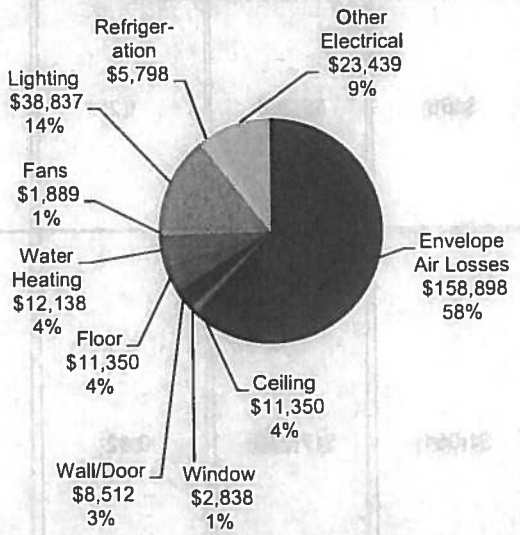
PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
7	Lighting: Customer Lobby, Clerk's Office, Security Screening, Arctic North,	Replace with 4 LED (3) 17W Module StdElectronic	$268	$960	3.8	3.6
8	Other Electrical: headbolts	Remove Manual Switching and Add new Clock Timer or Other Scheduling Control	$2,187	$4,000	3.4	1.8
9	HVAC And DHW	grundfos ups 40-80 to Magna ($2000),, replace two ups 40/240s to magna ($4500)	$1,605	$6,500	3.3	4.1
10	Refrigeration: Full Size Refrigerator	Replace with 2 Full Size Refrigerator	$726	$1,690	2.6	2.3
11	Lighting: Exterior Wall/Ceiling Pack	Replace with 25 LED 17W Module StdElectronic	$2,298	$6,000	2.4	2.6
12	Lighting: clerk of court reception, clerk of court, stor 100E, offices:1-7,9,11, conference 1, rr 1, attorney 1, district attorney, jury deliberation, vistiting judge, judicial asst, district ct judge, jury deliberation 120	Replace with 69 LED (2) 17W Module StdElectronic	$1,811	$11,040	2.2	6.1
13	Lighting: Hall A, Hall B, Hall C, Hall D, ASAP 110, Hall E, Hall F, Toilet 137B, Toilet 132A, Hall G, Hall H, Courtroom 5, Toilet 115A, Toilet 115B, Holding Corridor, Sound Lock 45L, 1SL, 2SL, Toilet 220A, Toilet 220B, Elevator House, Court 5 Corridor, Hall X, Hall Y, AHU 2 3 6,	Replace with 56 LED (2) 17W Module StdElectronic	$1,112	$8,960	1.8	8.1

PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
14	Lighting: Holding Corridor, Juvinile HC 1, HC 2, HC3, HC4,	Replace with 9 LED (2) 17W Module StdElectronic	$179	$1,440	1.8	8.1
15	Lighting: DOL Storage, DOL Storage 2, Hall F, File #1, Reception Area, Corrections Reception, Probation Clerical, Probation Bath, Hall H, Courtroom 5, Jury Deliberation 2, Hall 3, Hearing Room 1, 1/2 SL, Court Room 2, Court Room 4, Court Room 6, AC, Law Library, Jury 102, Grand Jury, AC 104,	Replace with 72 LED (3) 17W Module StdElectronic	$2,117	$17,280	1.8	8.2
16	Lighting: copy room, sec/rec, conf 2, visiting attorney, DOL bath, conf 3, JS off	Replace with 24 LED (2) 17W Module StdElectronic	$896	$3,840	1.4	4.3
17	Lighting: Women's W-1, Men's W-1, Women's HC, Men's HC, Toilet 128A, Toilet 138A, Toilet 134A, Stair 1,	Replace with 16 LED (2) 17W Module StdElectronic	$226	$2,560	1.2	11.3
18	Lighting: Storage 100E, Arctic 1, Arctic 2, Office 13, 132SL, Toilet 124A, Toilet 122, Hall 100E, Hall 100C, Hall J, Hall K, S/L, Holding Corridor 217, Corridor 2, Lobby 210, Sump Room, Sump Room 2,	Replace with 28 LED (2) 17W Module StdElectronic	$396	$4,480	1.2	11.3

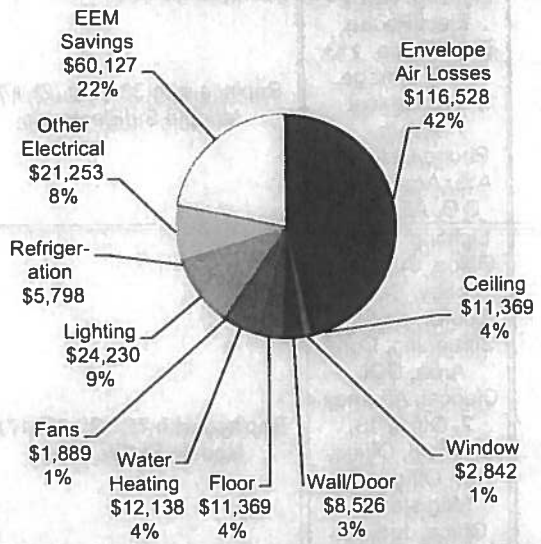
PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
19	Lighting: Jan J-1, Elect/Phone, Elev. Equip. 113, COC Storage, Mechanical Room, Phone/Data C1, Attic Access A B C D, AHU 4 5,	Replace with 33 LED (2) 17W Module StdElectronic	$466	$5,280	1.2	11.3
20	Lighting: Clerk's Office, Customer Lobby, Courts Coord., Security Screening, Copy Area, DOL Clerical, Attorney 2, Office 13, Office 8, Office 10, Office 12, Magistrates Office, Judicial Assistant, Superior Court Judge, Judge 138, Law Clerk	Replace with 72 LED (3) 17W Module StdElectronic	$1,051	$17,280	0.82	16.4
21	Lighting: Exterior Storage	Replace with LED (2) 17W Module StdElectronic	$14	$160	0.53	11.4
TOTAL, cost-effective measures			**$60,127**	**$115,220**	**6.68**	**1.9**

Modeled Building Energy Cost Breakdown

Existing Building Energy Cost Breakdown $275,048



Retrofit Building Energy Cost Breakdown $214,921



The preceding charts are a graphical representation of the modeled energy usage for the Bethel Court Building. The greatest portions of energy cost for the building are envelope air losses and lighting. This indicates that the greatest savings can be found in reducing the amount of outside air provided to the building mechanically or through air leakage, upgrading lighting and potentially upgrading the envelope. Detailed improvements for ventilation, lighting and other cost effective measures can be found in Appendix A.

The chart breaks down energy usage by cost into the following categories:

- Envelope Air Losses—the cost to provide heated fresh air to occupants, air leakage, heat lost in air through the chimneys and exhaust fans, heat lost to wind and other similar losses.
- Envelope
  - Ceiling—quantified heat loss transferred through the ceiling portion of the envelope.
  - Window—quantified heat loss through the window portion of the envelope.
  - Wall/Door—quantified heat loss through the wall and door portions of the envelope.
  - Floor—quantified heat loss through the floor portion of the envelope.
- Water Heating—energy cost to provide domestic hot water.
- Fans—energy cost to run ventilation, and exhaust fans.
- Lighting—energy cost to light the building.
- Refrigeration—energy costs to provide refrigerated goods for the occupants.
- Other Electrical—includes energy costs not listed above including cooking loads, laundry loads, other plug loads and electronics.

2.0 INTRODUCTION

NORTECH contracted with the Alaska Housing Finance Corporation to perform ASHRAE Level II Energy Audits for publically owned buildings in Alaska. This report presents the findings of the utility benchmarking, modeling analysis, and the recommended building modifications, and building use changes that are expected to save energy and money.

The report is organized into sections covering:

- description of the facility,
- the building's historic energy usage (benchmarking),
- estimating energy use through energy use modeling,
- evaluation of potential energy efficiency or efficiency improvements, and
- recommendations for energy efficiency with estimates of the costs and savings.

2.1 Building Use

The Bethel Court Building serves as the legal hub for the Kuskokwim River communities and consists primarily of court rooms and office space for the Alaska State Court System.

2.2 Building Occupancy and Schedules

Approximately 50 people occupy this building from 8 am – 5 pm Monday through Friday. Several people are in the building for a few hours on each weekend day as well. On occasion, up to 200 people can occupy this building for trials and other public events.

2.3 Building Description

The Bethel Court Building is a two story-wood framed building that sits on pilings. The single story portion of the building was built in 2000 and the two story addition was built in 2006. The windows are primarily double pane vinyl windows and the doors are insulated metal doors, some with windows.

Building Envelope

Building Envelope: Walls			
Wall Type	**Description**	**Insulation**	**Notes**
Above-grade walls	Wood-framed with 2x8 studs spaced 16-inches on center.	R-25 fiberglass batt.	No signs of insulation damage.

Building Envelope: Floors			
Floor Type	**Description**	**Insulation**	**Notes**
Elevated Floor	2x12 Joists	R-38 fiberglass batt	None

Building Envelope: Roof			
Roof Type	Description	Insulation	Notes
All Roofs	Hot roof with 2x12	R-38 fiberglass batts	No signs of insulation damage.

Building Envelope: Doors and Windows			
Door and Window Type	Description	Estimated R-Value	Notes
Window	Double pane, vinyl, air gap >3/8, not south	2	None
Window	Double pane, vinyl, air gap >3/8, south	2	None
Window	Double pane, aluminum with thermal break, air gap >3/8, not south	1.6	None
Window	Double pane, aluminum with thermal break, air gap >3/8, south	1.6	None

Heating and Ventilation Systems

The building is heated with a single boiler, six air handling units (AHUs) and two heat recovery ventilation units (HRV). Three sets of pumps distribute the heat from the boiler to the following building zones:

- Baseboards and AHUs in the original portion of the building
- Heat trace
- Baseboards and AHUs in the two story addition

The AHUs operate on a schedule from 6 am-10 pm seven days a week.

Air Conditioning System

The Court Building is not equipped with an air conditioning system, but utilizes economizer cooling. Installation of an air conditioning system is being considered.

Energy Management

The Court Building is equipped with an energy management system. The ventilation system utilizes CO_2 sensors and Demand Control Ventilation during the winter months and temperature sensors in the summer to limit outside air intake.

Lighting Systems

The primary lighting type in this building is ceiling mounted fluorescent fixtures containing 32 watt T8 (1" diameter, 4' long) lamps. The exterior is lit with wall packs containing high pressure sodium lamps.

Domestic Hot Water

The domestic hot water is produced by a two-stage heating system. In order to save on electric costs, the water is initially heated through a heat exchanger, then an electric heater. The water is provided at approximately 140°F.

3.0 BENCHMARKING 2010 UTILITY DATA

Benchmarking building energy use consists of obtaining and then analyzing two years of energy bills. The original utility bills are necessary to determine the raw usage, and charges as well as to evaluate the utility's rate structure. The metered usage of electrical and natural gas consumption is measured monthly, but heating oil, propane, wood, and other energy sources are normally billed upon delivery and provide similar information. During benchmarking, information is compiled in a way that standardizes the units of energy and creates energy use and billing rate information statistics for the building on a square foot basis. The objectives of benchmarking are:

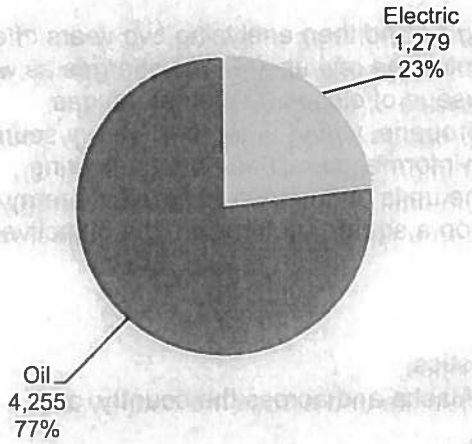
- to understand patterns of use,
- to understand building operational characteristics,
- for comparison with other similar facilities in Alaska and across the country, and
- to offer insight in to potential energy savings.

The results of the benchmarking, including the energy use statistics and comparisons to other areas, are discussed in the following sections.

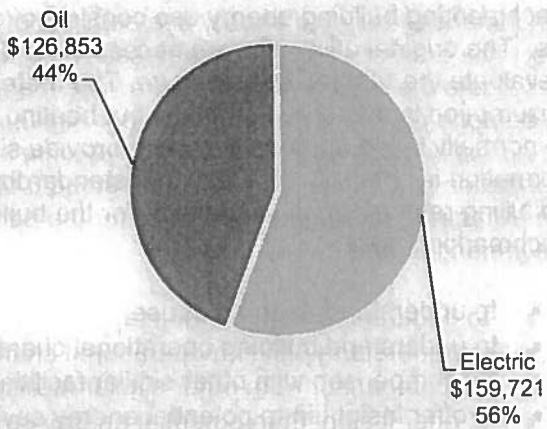
3.1 Total Energy Use and Cost in 2010

The energy use profiles below show the energy and cost breakdowns for the Bethel Court Building. The total annual energy use was 5,534 MMBTUs and cost for the building was $286,574. These charts show the portion of use for a fuel type and the portion of its cost.

2010 Energy Use Total (mmBTU)



2010 Energy Cost Total



The above charts indicate that the highest portion of energy use is for oil and the highest portion of cost is for electricity. Fuel oil consumption correlates directly to space heating and domestic hot water while electrical use can correlate to lighting systems, plug loads, and HVAC equipment. The fuel type with the highest cost often provides the most opportunity for savings.

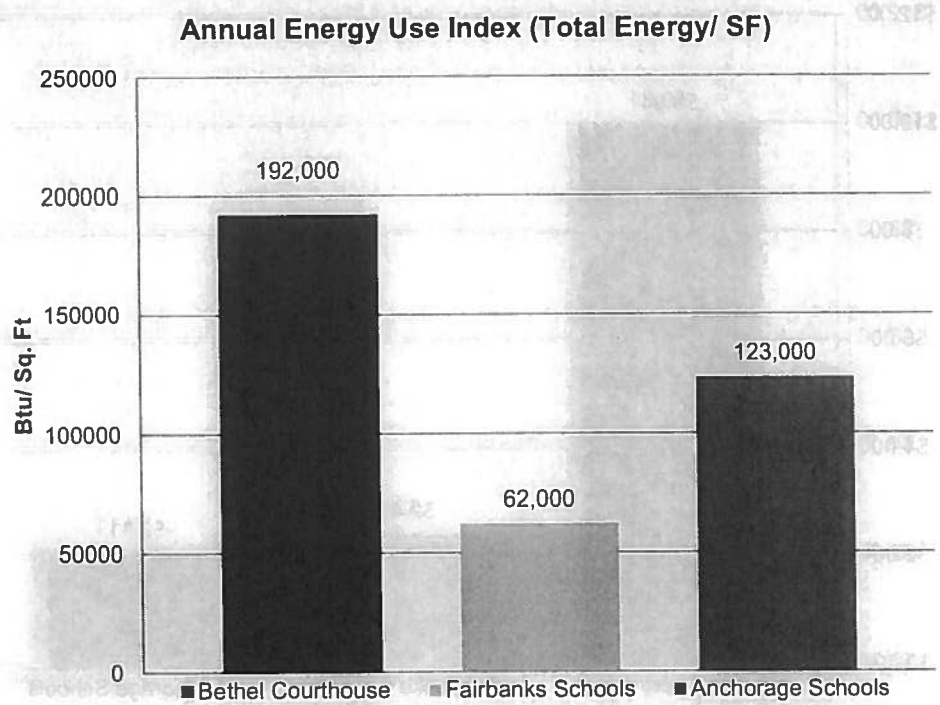
3.2 Energy Utilization Index for 2010

The primary benchmarking statistic is the Energy Utilization Index (EUI). The EUI is calculated from the utility bills and provides a simple snapshot of the quantity of energy actually used by the building on a square foot and annual basis. The calculation converts the total energy use for the year from all sources in the building, such as heating fuel and electrical usage, into British Thermal Units (BTUs). This total annual usage is then divided by the number of square feet of the building. The EUI units are BTUs per square foot per year.

The benchmark analysis found that the Bethel Court Building has an EUI of 192,000 BTUs per square foot per year. This is high for a wood building with a well managed HVAC system.

The EUI is useful in comparing this building's energy use to that of other similar buildings in Alaska and in the Continental United States. The EUI can be compared to average energy use in 2003 found in a study by the U.S. Energy Information Administration of commercial buildings (abbreviated CBECS, 2006). That report found an overall average energy use of about 90,000 BTUs per square foot per year while studying about 6,000 commercial buildings of all sizes, types, and uses that were located all over the Continental U.S. (see Table C3 in Appendix I).

In a recent and unpublished state-wide benchmarking study sponsored by the Alaska Housing Finance Corporation, schools in Fairbanks averaged 62,000 BTUs per square foot and schools in Anchorage averaged 123,000 BTUs per square foot annual energy use. The chart below shows the Bethel Court Building relative to these values. These findings are discussed further in Appendix H.



3.3 Cost Utilization Index for 2010

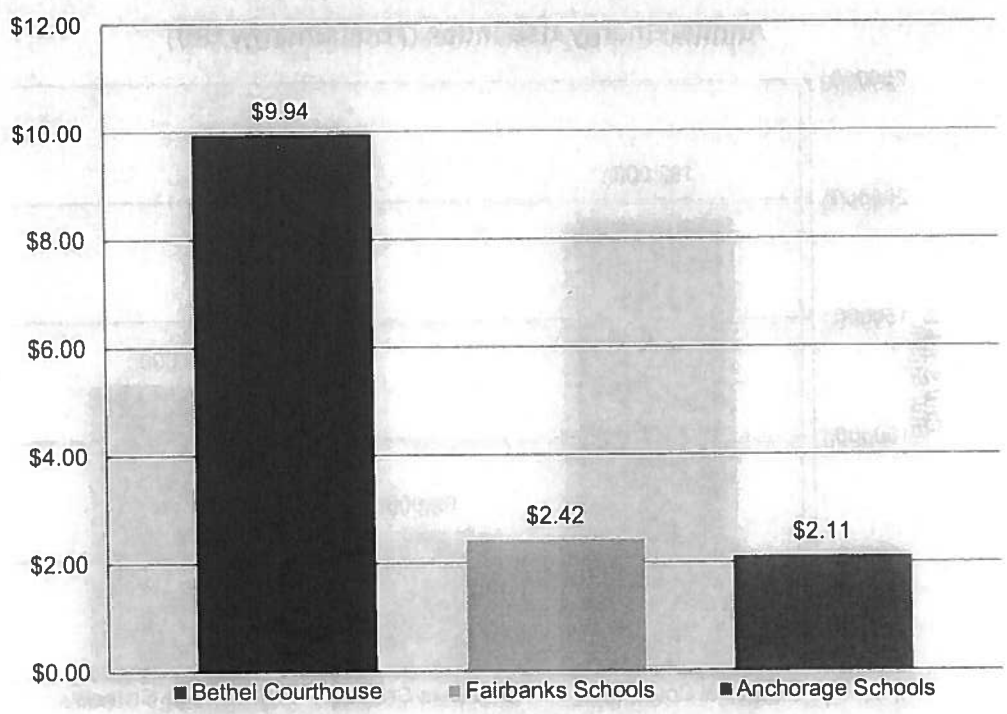
Another benchmarking statistic that is useful is the Cost Utilization Index (CUI), which is the cost for energy used in the building on a square foot basis per year. The CUI is calculated from the cost for utilities for a year period. The CUI permits comparison of buildings on total energy cost even though they may be located in areas with differing energy costs and differing heating and/or cooling climates. The cost of energy, including heating oil, natural gas, and electricity, can vary greatly over time and geographic location and can be higher in Alaska than other parts of the country.

The CUI for Bethel Court Building is about $9.94/SF. This is based on utility costs from 2010 and the following rates:

Electricity	at	$ 0.43 / kWh
# 1 Fuel Oil	at	$ 4.27 / gallon

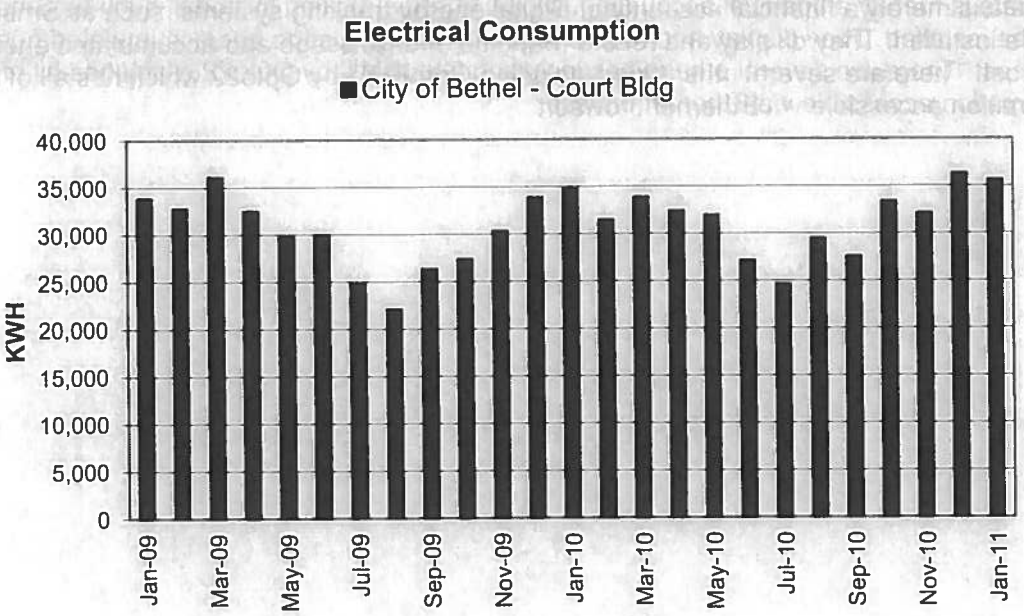
The Department of Energy Administration study, mentioned in the previous section (CBECS, 2006) found an average cost of $2.52 per square foot in 2003 for 4,400 buildings in the Continental U.S (Tables C4 and C13 of CBDES, 2006). Schools in Fairbanks have an average cost for energy of $2.42 per square foot while Anchorage schools average $2.11 per square foot. The chart below shows the Bethel Court Building relative to these values. More details are included in Appendix H.

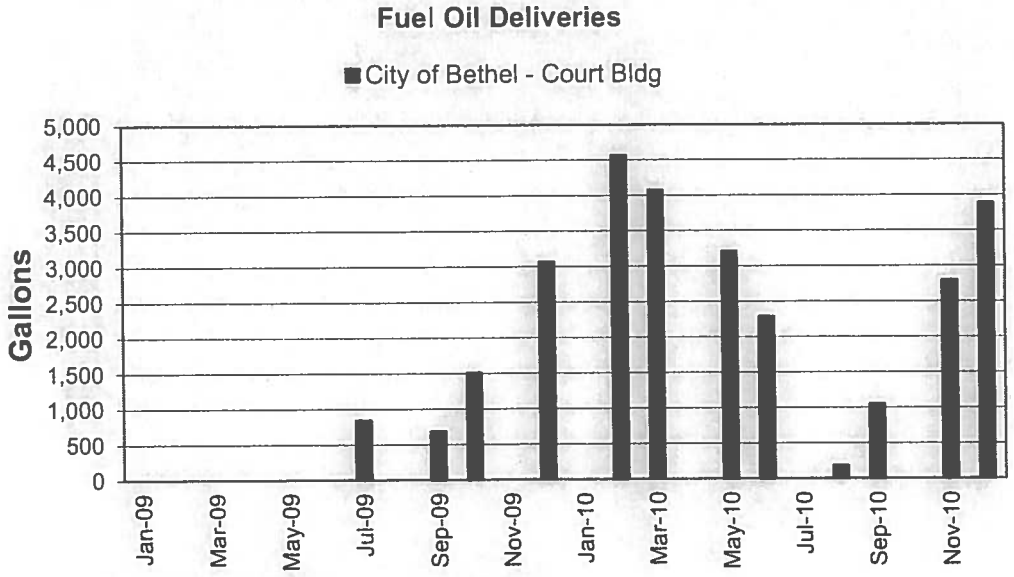
Annual Energy Cost Index (Total Cost/ SF)



3.4 Seasonal Energy Use Patterns

Energy consumption is often highly correlated with seasonal climate and usage variations. The graphs below show the electric and fuel consumption of this building over the course of two years. The lowest monthly use is called the baseline use. The electric baseline often reflects year round lighting consumption. The clear relation of increased energy usage during periods of cold weather can be seen in the months with higher usage.





No fuel data available prior to July 2009.

3.5 Future Energy Monitoring

Energy accounting is the process of tracking energy consumption and costs. It is important for the building owner or manager to monitor and record both the energy usage and cost each month. Comparing trends over time can assist in pinpointing major sources of energy usage and aid in finding effective energy efficiency measures. There are two basic methods of energy accounting; manual and automatic. Manual tracking of energy usage may already be performed by an administrative assistant, however if the records are not scrutinized for energy use, then the data is merely a financial accounting. Digital energy tracking systems, such as Smart Meters can be installed. They display and record real-time energy usage and accumulated energy use and cost. There are several other types including OptoEMU by Opto22 which has all of the information accessible via Ethernet browser.

4.0 MODELING ENERGY CONSUMPTION

After benchmarking of a building is complete and the site visit has identified the specific systems in the building, a number of different methods are available for quantifying the overall energy consumption and to model the energy use. These range from relatively simple spreadsheets to commercially available modeling software capable of handling complex building systems. ***NORTECH*** has used several of these programs and uses the worksheets and software that best matches the complexity of the building and specific energy use that is being evaluated.

Modeling of an energy efficiency measure (EEM) requires an estimate of the current energy used by the specific feature, the estimated energy use of the proposed EEM and its installed cost. EEMs can range from a single simple upgrade, such as light bulb type or type of motor, to reprogramming of the controls on more complex systems. While the need for a major retrofit can typically be identified by an energy audit, the specific system upgrades often require engineering and design expertise beyond the scope of the standard energy audit.

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. Common EEMs that could apply to almost every older building include:

- Reduce the envelope heat losses through:
  - increased building insulation, and
  - better windows and doors
- Reduce temperature difference between inside and outside using setback thermostats
- Upgrade inefficient:
  - lights,
  - motors,
  - refrigeration units, and
  - other appliances
- Reduce running time of lights/appliances through:
  - motion sensors,
  - on/off timers,
  - light sensors, and
  - other automatic/programmable systems

The objective of the following sections is to describe how the overall energy use of the building was modeled and the potential for energy savings. The specific EEMs that provide these overall energy savings are detailed in Appendix A of this report. While the energy savings of an EEM is unlikely to change significantly over time, the cost savings of an EEM is highly dependent on the current energy price and can vary significantly over time. An EEM that is not currently recommended based on price may be more attractive at a later date or with higher energy prices.

4.1 Understanding How AkWarm Models Energy Consumption

NORTECH used the AkWarm-C model for evaluating the overall energy consumption at Bethel Court Building. The AkWarm program was developed by the Alaska Housing Finance Corporation (AHFC) to model residential energy use. The original AkWarm is the modeling engine behind the successful residential energy upgrade program that AHFC has operated for a number of years. In the past few years, AHFC has developed a version of this model for commercial buildings, referred to AkWarm-C. Although this report and commercial energy auditors often refer to AkWarm, the actual model program used for this project is AkWarm-C.

Energy use in buildings is modeled by calculating energy losses and consumption, such as:

- Heat lost through the building envelope components, including windows, doors, walls, ceilings, crawlspaces, and foundations. These heat losses are computed for each component based on the area, heat resistance (R-value), and the difference between the inside temperature and the outside temperature. AkWarm has a library of temperature profiles for villages and cities in Alaska.
- Window orientation, such as the fact that south facing windows can add heat in the winter but north-facing windows do not.
- Inefficiencies of the heating system, including the imperfect conversion of fuel oil or natural gas due to heat loss in exhaust gases, incomplete combustion, excess air, etc. Some electricity is also consumed in moving the heat around a building through pumping.
- Inefficiencies of the cooling system, if one exists, due to various imperfections in a mechanical system and the required energy to move the heat around.
- Lighting requirements and inefficiencies in the conversion of electricity to light; ultimately all of the power used for lighting is converted to heat. While the heat may be useful in the winter, it often isn't useful in the summer when cooling may be required to remove the excess heat. Lights are modeled by wattage and operational hours.
- Use and inefficiencies in refrigeration, compressor cooling, and heat pumps. Some units are more efficient than others. Electricity is required to move the heat from inside a compartment to outside it. Again, this is a function of the R-Value and the temperature difference between the inside and outside of the unit.
- Plug loads such as computers, printers, mini-fridges, microwaves, portable heaters, monitors, etc. These can be a significant part of the overall electricity consumption of the building, as well as contributing to heat production.
- The schedule of operation for lights, plug loads, motors, etc is a critical component of how much energy is used.

AkWarm adds up these heat losses and the internal heat gains based on individual unit usage schedules. These estimated heat and electrical usages are compared to actual use on both a yearly and seasonal basis. If the AkWarm model is within 5 % to 10% of the most recent 12 months usage identified during benchmarking, the model is considered accurate enough to make predictions of energy savings for possible EEMs.

4.2 AkWarm Calculated Savings for the Bethel Court Building

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. These EEMs are then entered into AkWarm to determine if the EEM saves energy and is cost effective (i.e. will pay for itself). AkWarm calculates the energy and money saved by each EEM and calculates the length of time for the savings in reduced energy consumption to pay for the installation of the EEM. AkWarm makes recommendations based on the Savings/Investment Ratio (SIR), which is defined as ratio of the savings generated over the life of the EEM divided by the installed cost. Higher SIR values are better and any SIR above one is considered acceptable. If the SIR of an EEM is below one, the energy savings will not pay for the cost of the EEM and the EEM is not recommended. Preferred EEMs are listed by AkWarm in order of the highest SIR.

A summary of the savings from the recommended EEMs are listed in this table.

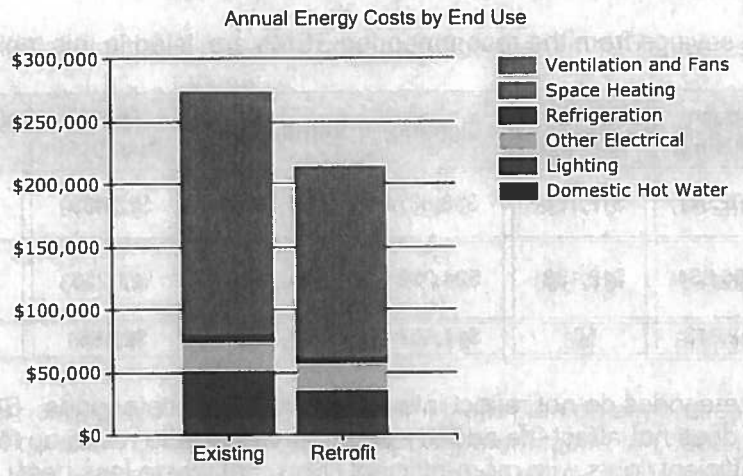
Description	Space Heating	Water Heating	Lighting	Refrigeration	Other Electrical	Ventilation Fans	Total
Existing Building	$192,947	$12,138	$38,837	$5,798	$23,439	$1,889	**$275,048**
With All Proposed Retrofits	$150,634	$12,138	$24,230	$4,777	$21,253	$1,889	**$214,921**
Savings	$42,313	$0	$14,607	$1,021	$2,186	$0	**$60,127**

Savings in these categories do not reflect interaction with other categories. So, for example, the savings in lighting does not affect the added space heating cost to make up for the heat saved in replacing less-efficient lights with more-efficient lights that waste less heat.

4.3 AkWarm Projected Energy Costs after Modifications

The AkWarm recommended EEMs appear to result in significant savings in space heating and lighting. The energy cost by end use breakdown was provided by AkWarm based on the field inspection and does not indicate that all individual fixtures and appliances were directly measured. The current energy costs are shown below on the left hand bar of the graph and the projected energy costs, assuming use of the recommended EEMs, are shown on the right.

This graphical format allows easy visual comparison of the various energy requirements of the facility. In the event that not all recommended retrofits are desired, the proposal energy savings can be estimated from visual interpretation from this graph.



4.4 Additional Modeling Methods

The AkWarm program effectively models wood-framed and other buildings with standard heating systems and relatively simple HVAC systems. AkWarm models of more complicated mechanical systems are sometimes poor due to a number of simplifying assumptions and limited input of some variables. Furthermore, AKWarm is unable to model complex HVAC systems such as variable frequency motors, variable air volume (VAV) systems, those with significant digital or pneumatic controls or significant heat recovery capacity. In addition, some other building methods and occupancies are outside AkWarm capabilities.

This report section is included in order to identify benefits from modifications to those more complex systems or changes in occupant behavior that cannot be addressed in AkWarm.

The Court Building could be modeled well in AKWarm. Retrofits for the HVAC system were adequately modeled in AkWarm and did not require additional calculations.

5.0 BUILDING OPERATION AND MAINTENANCE (O & M)

5.1 Operations and Maintenance

A well-implemented operation and maintenance (O & M) plan, by preserving institutional knowledge and directing preventative maintenance, is often the driving force behind energy savings. Such a plan includes a regularly scheduled inspection of each piece of HVAC equipment within the building. Routine maintenance includes the timely replacement of filters, belts and pulleys, the proper greasing of bearings and other details such as topping off the glycol tanks. Additional benefits to a maintenance plan are decreased down time for malfunctioning equipment, early indications of problems, prevention of exacerbated maintenance issues, and early detection of overloading/overheating issues. A good maintenance person knows the building's equipment well enough to spot and repair minor malfunctions before they become major retrofits.

Operations and Maintenance staff implementing a properly designed O & M plan will:

- Track and document
  - Renovations and repairs,
  - Utility bills and fuel consumption, and
  - System performance.
- Keep available for reference
  - A current Building Operating Plan including an inventory of installed systems,
  - The most recent available as-built drawings,
  - Reference manuals for all installed parts and systems, and
  - An up-to-date inventory of on-hand replacement parts.
- Provide training and continuing education for maintenance personnel.
- Plan for commissioning and re-commissioning at appropriate intervals.

5.2 Commissioning

Commissioning of a building is the verification that the HVAC systems perform within the design or usage ranges of the Building Operating Plan. This process ideally, though seldom, occurs as the last phase in construction. HVAC system operation parameters degrade from ideal over time due to incorrect maintenance, improper replacement pumps, changes in facility tenants or usage, changes in schedules, and changes in energy costs or loads. Ideally, re-commissioning of a building should occur every five to ten years. This ensures that the HVAC system meets the potentially variable use with the most efficient means.

5.3 Building Specific Recommendations

The maintenance staff for the Bethel Court Building does a good job with maintaining the equipment and is currently replacing faulty CO_2 sensors which are believed to be responsible for poorly controlled excess ventilation.

APPENDICES

Appendix A Recommended Energy Efficiency Measures

A number of Energy Efficiency Measures (EEMs) are available to reduce the energy use and overall operating cost for the facility. The EEMs listed below are those recommended by AkWarm based on the calculated savings/investment ration (SIR) as described in Appendix E. AkWarm also provides a breakeven cost, which is the maximum initial cost of the EEM that will still return a SIR of one or greater.

This section describes each recommended EEM and identifies the potential energy savings and installation costs. This also details the calculation of breakeven costs, simple payback, and the SIR for each recommendation. The recommended EEMs are grouped together generally by the overall end use that will be impacted.

A.1 Temperature Control

Programmable thermostats are not recommended to be installed in the Bethel Court Building which provide an automatic temperature setback. Analysis of utility bills and on-site inspections indicates that the current boiler is not large enough to reheat the building after a setback on the coldest day of the year. On other days of the year that are not as cold setbacks could be implemented and energy saved.

A.2 Electrical Loads

A.2.1 Lighting

The electricity used by lighting eventually ends up as heat in the building. In areas where electricity is more expensive than other forms of energy, or in areas where the summer temperatures require cooling; this additional heat can be both wasteful and costly. Converting to more efficient lighting reduces cooling loads in the summer and allows the user to control heat input in the winter. The conversion from T12 (one and a half inch fluorescent bulbs) to T8 (one inch), T5 (5/8 inch), Compact Fluorescent Lights (CFL), or LED bulbs provides a significant increase in efficiency. LED bulbs can be directly placed in existing fixtures. The LED bulb bypasses the ballast altogether, which removes the often irritating, "buzzing" noise that magnetic ballasts tend to make.

The cost of electricity in Bethel makes it cost effective to retrofit the current T8 lamps in the ceiling mounted fixtures with 17 watt LED tubes. Furthermore, decreasing the amount of wattage used in lighting will decrease the amount of heat entering the building. During the summer a building gains heat from human occupancy and lighting. Decreasing the heat from the lights will allow the building to be able to run the economizer cooling more effectively and longer into the season as well as decrease the air conditioning size and run time when installed.

Rank	Location		Existing Condition		Recommendation	
2	Probation Bathroom, Elevator		2 INCAN [Unknown Lamp] with Manual Switching		Replace with 2 LED 8W Module StdElectronic	
Installation Cost		$75	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$158
Breakeven Cost		$980	Savings-to-Investment Ratio	13	Simple Payback yrs	0

Rank	Location		Existing Condition		Recommendation	
3	Office 1, Visiting Judge		2 INCAN A Lamp, Halogen 75W with Manual Switching		Replace with 2 LED 17W Module StdElectronic	
Installation Cost		$75	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$98
Breakeven Cost		$594	Savings-to-Investment Ratio	7.9	Simple Payback yrs	1

Rank	Location		Existing Condition		Recommendation	
4	Hall A, Hall G, Hall H, S/L, Grand Jury		6 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 6 LED (2) 17W Module StdElectronic	
Installation Cost		$960	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$381
Breakeven Cost		$5,573	Savings-to-Investment Ratio	5.8	Simple Payback yrs	3

Rank	Location		Existing Condition		Recommendation	
5	Jury Deliberation 2,		FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with LED (3) 17W Module StdElectronic	
Installation Cost		$240	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$94
Breakeven Cost		$1,375	Savings-to-Investment Ratio	5.7	Simple Payback yrs	3

Rank	Location	Existing Condition		Recommendation	
6	JS Office, Hall 3, Hearing Room 1, Court Room 2, Court Room 4, Court Room 6,	10 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 10 LED (3) 17W Module StdElectronic	
Installation Cost	$2,400	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$941
Breakeven Cost	$13,744	Savings-to-Investment Ratio	5.7	Simple Payback yrs	3

Rank	Location	Existing Condition		Recommendation	
7	Customer Lobby, Clerk's Office, Security Screening, Arctic North,	4 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 4 LED (3) 17W Module StdElectronic	
Installation Cost	$960	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$268
Breakeven Cost	$3,621	Savings-to-Investment Ratio	3.8	Simple Payback yrs	4

Rank	Location	Existing Condition		Recommendation	
11	Exterior Wall/Ceiling Pack	25 HPS 70 Watt StdElectronic with Manual Switching		Replace with 25 LED 17W Module StdElectronic	
Installation Cost	$6,000	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$2,298
Breakeven Cost	$14,227	Savings-to-Investment Ratio	2.4	Simple Payback yrs	3

Rank	Location	Existing Condition		Recommendation	
12	clerk of court reception, clerk of court, stor 100E, offices:1-7,9,11, conference 1, rr 1, attorney 1, district attorney, jury deliberation, vistiting judge, judicial asst, district ct judge, jury deliberation 120	69 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching, Multi-Level Switch		Replace with 69 LED (2) 17W Module StdElectronic	
Installation Cost	$11,040	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$1,811
Breakeven Cost	$24,545	Savings-to-Investment Ratio	2.2	Simple Payback yrs	6
Delamping					

Rank	Location	Existing Condition	Recommendation
13	Hall A, Hall B, Hall C, Hall D, ASAP 110, Hall E, Hall F, Toilet 137B, Toilet 132A, Hall G, Hall H, Courtroom 5, Toilet 115A, Toilet 115B, Holding Corridor, Sound Lock 45L, 1SL, 2SL, Toilet 220A, Toilet 220B, Elevator House, Court 5 Corridor, Hall X, Hall Y, AHU 2 3 6,	56 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching	Replace with 56 LED (2) 17W Module StdElectronic

Installation Cost	$8,960	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$1,112
Breakeven Cost	$16,253	Savings-to-Investment Ratio	1.8	Simple Payback yrs	8

Rank	Location	Existing Condition	Recommendation
14	Holding Corridor, Juvinile HC 1, HC 2, HC3, HC4,	9 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching	Replace with 9 LED (2) 17W Module StdElectronic

Installation Cost	$1,440	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$179
Breakeven Cost	$2,612	Savings-to-Investment Ratio	1.8	Simple Payback yrs	8

Rank	Location	Existing Condition	Recommendation
15	DOL Storage, DOL Storage 2, Hall F, File #1, Reception Area, Corrections Reception, Probation Clerical, Probation Bath, Hall H, Courtroom 5, Jury Deliberation 2, Hall 3, Hearing Room 1, 1/2 SL, Court Room 2, Court Room 4, Court Room 6, AC, Law Library, Jury 102, Grand Jury, AC 104,	72 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching	Replace with 72 LED (3) 17W Module StdElectronic

Installation Cost	$17,280	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$2,117
Breakeven Cost	$30,925	Savings-to-Investment Ratio	1.8	Simple Payback yrs	8

Rank	Location	Existing Condition		Recommendation	
16	copy room, sec/rec, conf 2, visiting attorney, DOL bath, conf 3, JS off	24 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 24 LED (2) 17W Module StdElectronic	
Installation Cost	$3,840	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$896
Breakeven Cost	$5,411	Savings-to-Investment Ratio	1.4	Simple Payback yrs	4
Delamping					

Rank	Location	Existing Condition		Recommendation	
17	Women's W-1, Men's W-1, Women's HC, Men's HC, Toilet 128A, Toilet 138A, Toilet 134A, Stair 1,	16 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 16 LED (2) 17W Module StdElectronic	
Installation Cost	$2,560	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$226
Breakeven Cost	$3,063	Savings-to-Investment Ratio	1.2	Simple Payback yrs	11

Rank	Location	Existing Condition		Recommendation	
18	Storage 100E, Arctic 1, Arctic 2, Office 13, 132SL, Toilet 124A, Toilet 122, Hall 100E, Hall 100C, Hall J, Hall K, S/L, Holding Corridor 217, Corridor 2, Lobby 210, Sump Room, Sump Room 2,	28 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 28 LED (2) 17W Module StdElectronic	
Installation Cost	$4,480	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$396
Breakeven Cost	$5,353	Savings-to-Investment Ratio	1.2	Simple Payback yrs	11

Rank	Location	Existing Condition		Recommendation	
19	Jan J-1, Elect/Phone, Elev. Equip. 113, COC Storage, Mechanical Room, Phone/Data C1, Attic Access A B C D, AHU 4 5,	33 FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with 33 LED (2) 17W Module StdElectronic	
Installation Cost	$5,280	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$466
Breakeven Cost	$6,297	Savings-to-Investment Ratio	1.2	Simple Payback yrs	11

Rank	Location	Existing Condition	Recommendation
20	Clerk's Office, Customer Lobby, Courts Coord., Security Screening, Copy Area, DOL Clerical, Attorney 2, Office 13, Office 8, Office 10, Office 12, Magistrates Office, Judicial Assistant, Superior Court Judge, Judge 138, Law Clerk	72 FLUOR (3) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching, Multi-Level Switch	Replace with 72 LED (3) 17W Module StdElectronic

Installation Cost	$17,280	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$1,051
Breakeven Cost	$14,202	Savings-to-Investment Ratio	0.8	Simple Payback yrs	16

Rank	Location	Existing Condition	Recommendation
21	Exterior Storage	FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching	Replace with LED (2) 17W Module StdElectronic

Installation Cost	$160	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$14
Breakeven Cost	$85	Savings-to-Investment Ratio	0.5	Simple Payback yrs	11

A.2.2 Other Electrical Loads

Having the headbolt heaters on for the entire day is not always necessary. Installing a timer to control the headbolt heaters will help decrease energy usage. When the temperature is above 20°F all of the outlets will be off, when the temperature is between -20°F and 20°F half of the outlets will be off and rotate on half hour cycles through the day, and at below -20°F all the outlets will be on. Also, eliminating the use of two full size refrigerators with one will decrease energy usage.

Rank	Location	Existing Condition	Recommendation
8	headbolts	16 headbolt outlets with Manual Switching	Remove Manual Switching and Add new Clock Timer or Other Scheduling Control

Installation Cost	$4,000	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$2,187
Breakeven Cost	$13,535	Savings-to-Investment Ratio	3.4	Simple Payback yrs	2

Rank	Location	Existing Condition	Recommendation
10	Full Size Refrigerator	2 Full Size Refrigerator	Replace with Full Size Refrigerator

Installation Cost	$1,690	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$726
Breakeven Cost	$4,384	Savings-to-Investment Ratio	2.6	Simple Payback yrs	2

A.3 Building Envelope: Recommendations for change

A.3.1 Exterior Walls

No EEMs are recommended in this category. The cost to increase the insulation on the walls outweighs the energy savings.

A.3.2 Foundation and/or Crawlspace

No EEMs are recommenced in this category. The cost to increase the insulation on the foundation outweighs the energy savings.

A.3.3 Roofing and Ceiling

No EEMs are recommended in this category. The cost to increase the insulation on the ceiling outweighs the energy savings.

A.3.4 Windows

No EEMs are recommended in this category. The cost to replace the windows with better insulated windows outweighs the energy savings.

A.3.5 Doors

No EEMs are recommended in this category. The cost to replace the doors with better insulated doors outweighs the energy savings.

A.4 Building Heating System / Air Conditioning

A.4.1 Heating and Heat Distribution

Replacing the current circulation pumps with variable speed pumps such as the Grundfos Magna pumps will decrease the electrical consumption and cost.

Rank	Location	Existing Condition	Recommendation
9	grundfos ups 40-80 to Magna ($2000),, replace two ups 40/240s to magna ($4500)		

Installation Cost	$6,500	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$1,605
Breakeven Cost	$21,686	Savings-to-Investment Ratio	3.3	Simple Payback yrs	4

A.4.2 Air Conditioning

The court building is not equipped with an air conditioning system. The City of Bethel is considering installing air conditioning in the building to make the summer months more comfortable. The size of these units may not need to be as large a previously thought because the recommended EEMs will significantly reduce the heating load. The Court Building currently utilizes economizer cooling with the air handlers. It is believed that the lighting heat savings will not negate the need for air conditioning but will reduce the required size, capital cost, and run time expense.

A.4.3 Ventilation

A lot of energy is needed to heat outside air to a comfortable temperature. Significant savings can be achieved by ensuring that only the necessary amount of outside air is brought into the building and heated. This can be achieved in the court building by recommissioning the HVAC system and repairing all demand control ventilation sensors and controls.

A large portion of the building energy costs involve ventilation and additional inspection is warranted to achieve all possible savings. An ASHRAE Level III Energy Audit is recommended. This involves more detailed inspection and modeling than this limited audit and would result in very specific equipment and control retrofit recommendations for the HVAC system. Additional energy savings are likely to be found with an ASHRAE Level III Energy Audit. Requesting this second audit should occur approximately one year after these retrofits are implemented and in the intervening time, all efforts to track energy usage and savings should be made.

Rank	Location	Existing Condition	Recommendation
1	Reduce outside air to by repairing controls closing dampers (4000 CFM)		

Installation Cost	$20,000	Estimated Life of Measure (yrs)	15	Energy Savings (/yr)	$43,102
Breakeven Cost	$581,456	Savings-to-Investment Ratio	29	Simple Payback yrs	0

A.4.4 Air Changes and Air Tightening

No EEMs are recommended in this area because of the difficulty of quantifying the amount of leaking air and the savings. However, by using a blower door to depressurize the building and an infra-red camera, the location of significant air leaks can be determined so they can be repaired. Several locations on the envelope in the City Shop have damage that allows heat to escape that should be repaired.

Appendix B Energy Efficiency Measures that are NOT Recommended

As indicated in other sections of the report, a number of potential EEMs were identified that were determined to be NOT cost effective by the AkWarm model. These EEMs are not currently recommended on the basis of energy savings alone because each may only save a small amount of energy, have a high capital cost, or be expensive to install. While each of these EEMs is not cost effective at this time, future changes in building use such as longer operating hours, higher energy prices, new fixtures or hardware on the market, and decreases in installation effort may make any of these EEMs cost effective in the future. These potential EEMs should be reviewed periodically to identify any changes to these factors that would warrant re-evaluation.

Although these upgrades are not currently cost effective on an energy cost basis, the fixtures, hardware, controls, or operational changes described in these EEMs should be considered when replacing an existing fixture or unit for other reasons. For example, replacing an existing window with a triple-pane window may not be cost effective based only on energy use, but if a window is going to be replaced for some other reason, then the basis for a decision is only the incremental cost of upgrading from a less efficient replacement window to a more efficient replacement window. That incremental cost difference will have a significantly shorter payback, especially since the installation costs are likely to be the same for both units.

The following measures were not found to be cost-effective:						
Rank	Feature/Location	Improvement Description	Annual Energy Savings	Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
21	Exterior Door: Half/Full Lite Metal Foam	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$196	$5,672	0.81	28.9
22	Above-Grade Wall: House	Install R-30 rigid foam board to exterior and cover with T1-11 siding or equivalent.	$3,650	$129,438	0.66	35.5
23	Lighting: Exterior Storage	Replace with LED (2) 17W Module StdElectronic	$14	$160	0.53	11.3
24	Window/Skylight: Double Alum Therm Brk >3/8 Other	Replace existing window with U-0.30 vinyl window	$447	$16,829	0.46	37.7
25	Window/Skylight: Double Alum Therm Brk >3/8: South	Replace existing window with U-0.30 vinyl window	$248	$9,617	0.45	38.8
26	Cathedral Ceiling: House	Install R-10 rigid board insulation. No cost included for covering insulation.	$2,078	$127,197	0.38	61.2
27	Window/Skylight: Double Vynil >3/8: South	Replace existing window with U-0.30 vinyl window	$157	$8,819	0.31	56.1
28	Window/Skylight: Doubel vinyl >3/8 Other	Replace existing window with U-0.30 vinyl window	$771	$43,242	0.31	56.1

Appendix C Significant Equipment List

HVAC Equipment

Equipment	Manufacturer	Model No.	Fuel Type	Notes
Boiler	Burnham	n/a	#1 Fuel Oil	Only one boiler
Pump	Grundfos	UPS 40-80/4F	Electric	1/2 HP
Pump	Fasco	V12508E2JAB687D	Electric	5 HP
Pump	Grundfos	40-240	Electric	2 Units, 1 1/8 HP
AHU2 supply motor	AO Smith	n/a	Electric	2 HP
AHU2 return motor	Century	n/a	Electric	1 HP
AHU3 supply motor	Century	n/a	Electric	1 1/2 HP
AHU3 return motor	AO Smith	n/a	Electric	1/2 HP
AHU4 supply motor	Century	n/a	Electric	3 HP
AHU4 return motor	Marathon	n/a	Electric	1 1/2 HP
AHU5 supply motor	Century	n/a	Electric	1 1/2 HP
AHU5 return motor	n/a	n/a	Electric	3/4 HP
AHU6 supply motor	Century	n/a	Electric	1 1/2 HP
AHU6 return motor	Century	n/a	Electric	3/4 HP
AHU7 motor	Century	n/a	Electric	7 1/2 HP
Water Heater	American	E61	Electric	4.5 kw
Pump	Grundfos	UP 15-42	Electric	n/a
Heaters	n/a	n/a	Electric	15 units

Lighting

Location	Lighting Type	Bulb Type	Quantity	KWH/YR
DOL Storage, DOL Storage 2, Hall F, File #1, Reception Area, Corrections Reception, Probation Clerical, Probation Bath, Hall H, Courtroom 5, Jury Deliberation 2, Hall 3, Hearing Room 1, 1/2 SL, Court Room 2, Court Room 4, Court Room 6, AC, Law Library, Jury 102, Grand Jury, AC 104	Fluorescent	T8	216	16,782
Clerk's Office, Customer Lobby, Courts Coord., Security Screening, Copy Area, DOL Clerical, Attorney 2, Office 13, Office 8, Office 10, Office 12, Magistrates Office, Judicial Assistant, Superior Court Judge, Judge 138, Law Clerk	Fluorescent	T8	216	11,748
clerk of court reception, clerk of court, stor 100E, offices:1-7,9,11, conference 1, rr 1, attorney 1, district attorney, jury deliberation, vistiting judge, judicial asst, district ct judge, jury deliberation 120	Fluorescent	T8	207	11,258
Hall A, Hall B, Hall C, Hall D, ASAP 110, Hall E, Hall F, Toilet 137B, Toilet 132A, Hall G, Hall H, Courtroom 5, Toilet 115A, Toilet 115B, Holding Corridor, Sound Lock 45L, 1SL, 2SL, Toilet 220A, Toilet 220B, Elevator House, Court 5 Corridor, Hall X, Hall Y, AHU 2 3 6	Fluorescent	T8	112	8,827

JS Office, Hall 3, Hearing Room 1, Court Room 2, Court Room 4, Court Room 6	Fluorescent	T8	30	7,549
Exterior	HPS	70W	25	6,788
copy room, sec/rec, conf 2, visiting attorney, DOL bath, conf 3, JS off	Fluorescent	T8	72	5,594
Jan J-1, Elect/Phone, Elev. Equip. 113, COC Storage, Mechanical Room, Phone/Data C1, Attic Access A B C D, AHU 4 5	Fluorescent	T8	66	5,202
Storage 100E, Arctic 1, Arctic 2, Office 13, 132SL, Toilet 124A, Toilet 122, Hall 100E, Hall 100C, Hall J, Hall K, S/L, Holding Corridor 217, Corridor 2, Lobby 210, Sump Room, Sump Room 2	Fluorescent	T8	56	4,414
Hall A, Hall G, Hall H, S/L, Grand Jury	Fluorescent	T8	12	3,027
Customer Lobby, Clerk's Office, Security Screening, Arctic North	Fluorescent	T8	12	2,984
Women's W-1, Men's W-1, Women's HC, Men's HC, Toilet 128A, Toilet 138A, Toilet 134A, Stair 1	Fluorescent	T8	32	2,522
Holding Corridor, Juvinile HC 1, HC 2, HC3, HC4	Fluorescent	T8	18	1,419
Jury Deliberation 2	Fluorescent	T8	3	746
Probation Bathroom, Elevator	incandescent	A lamp	2	526
Office 1, Visiting Judge	incandescent	A lamp	2	411
Exit Sign	LED	4W	4	383
Exterior Storage	Fluorescent	T8	2	158
Office 1	Fluorescent	Cfl	1	74

Energy Consumption calculated by AkWarm based on Wattage and Schedule

Plug Loads

Equipment	Location	Manufacturer	KWH/YR
Headbolt Heaters	Exterior	n/a	15255
Computer Monitors	Offices	Varies	9971
IT Equipment	n/a	Varies	9073
Computer Towers	Offices	Varies	5040
Full Size Refrigerators	Breakrooms	n/a	4174
Pop Machines	Breakrooms	n/a	4000
Mini Refrigerators	Offices	n/a	3600
Water Coolers	Offices	n/a	1710
Battery Backups	Offices	n/a	1688
Laptops	Offices	n/a	1643
Elevator Hydraulic Pump	Elevator Room	n/a	1603
Desk Radios	Offices	Varies	1578
Vending Machine	Breakrooms	n/a	1578
Microwaves	Offices	Varies	1148

Energy Consumption calculated by AkWarm based on Wattage and Schedule

Appendix D Local Utility Rate Structure

The information in this section was provided directly from the local utility or gathered from the local utility's publicly available information at the time of the audit. All language used in this section was provided by the local utility and believed to be current at the time of the audit. Energy use terms, specific fees, and other specific information are subject to change. Updated rate structure information should be gathered from the utility during future discussion of rates, rate structures and utility pricing agreements.

Bethel Utilities Corporation Rate Structure for March 1, 2011 bill:

RATE TYPE	
Customer Charge	$42.93
Demand Charge	$30.02/KW
Energy Charge	$0.2925/KWH
Power Adjustment Surcharge	$0.0820/KWH
RCC	$0.000552/KWH
Effective Rate	**$0.4662/KWH**

*****The effective rate is all of the charges totaled together and divided by the kilowatt hour used.**

Customer Charge

A flat fee that covers costs for meter reading, billing and customer service.

Utility Charge (kWh charge)

This charge is multiplied by the number of kilowatt-hours (kWh) used in a monthly billing period. It covers the costs to maintain power plants and substations, interest on loans as well as wires, power poles and transformers.

Fuel and Purchased Power

This charge is based on a combination of forecasted and actual power costs. The monthly charge allows Golden Valley to pass on increases and decreases in fuel and energy purchases to our members. It is calculated quarterly and multiplied by the kilowatt-hours used each month.

Regulatory Charge

This charge of .000492 per kWh is set by the Regulatory Commission of Alaska (RCA). Since November 1, 1992, the Regulatory Commission of Alaska has been funded by a Regulatory Charge to the utilities it regulates rather than through the State general fund. The charge, labeled "Regulatory Cost Charge." on your bill, is set by the RCA, and applies to all retail kilowatt-hours sold by regulated electric utilities in Alaska.

Appendix E Analysis Methodology

Data collected was processed using AkWarm energy use software to estimate current energy consumption by end usage and calculate energy savings for each of the proposed energy efficiency measures (EEMs). In addition, separate analysis may have been conducted to evaluate EEMs that AkWarm cannot effectively model to evaluate potential reductions in annual energy consumption. Analyses were conducted under the direct supervision of a Certified Energy Auditor, Certified Energy Manager, or a Professional Engineer.

EEMs are evaluated based on building use, maintenance and processes, local climate conditions, building construction type, function, operational schedule and existing conditions. Energy savings are calculated based on industry standard methods and engineering estimations. Each model created in AkWarm is carefully compared to existing utility usage obtained from utility bills. The AkWarm analysis provides a number of tools for assessing the cost effectiveness of various improvement options. The primary assessment value used in this audit report is the Savings/Investment Ratio (SIR). The SIR is a method of cost analysis that compares the total cost savings through reduced energy consumption to the total cost of a project over its assumed lifespan, including both the construction cost and ongoing maintenance and operating costs. Other measurement methods include Simple Payback, which is defined as the length of time it takes for the savings to equal the total installed cost and Breakeven Cost, which is defined as the highest cost that would yield a Savings/Investment Ratio of one.

EEMs are recommended by AkWarm in order of cost-effectiveness. AkWarm first calculates individual SIRs for each EEM, and then ranks the EEMs by SIR, with higher SIRs at the top of the list. An individual EEM must have a SIR greater than or equal to one in order to be recommended by AkWarm. Next AkWarm modifies the building model to include the installation of the first EEM and then re-simulates the energy use. Then the remaining EEMs are re-evaluated and ranked again. AkWarm goes through this iterative process until all suggested EEMs have been evaluated.

Under this iterative review process, the savings for each recommended EEM is calculated based on the implementation of the other, more cost effective EEMs first. Therefore, the implementation of one EEM affects the savings of other EEMs that are recommended later. The savings from any one individual EEM may be relatively higher if the individual EEM is implemented without the other recommended EEMs. For example, implementing a reduced operating schedule for inefficient lighting may result in relatively higher savings than implementing the same reduced operating schedule for newly installed lighting that is more efficient. If multiple EEMs are recommended, AkWarm calculates a combined savings.

Inclusion of recommendations for energy savings outside the capability of AkWarm will impact the actual savings from the AkWarm projections. This will almost certainly result in lower energy savings and monetary savings from AkWarm recommendations. The reality is that only so much energy is consumed in a building. Energy savings from one EEM reduces the amount of energy that can be saved from additional EEMs. For example, installation of a lower wattage light bulb does not save energy or money if the bulb is never turned on because of a schedule or operational change at the facility.

Appendix F Audit Limitations

The results of this audit are dependent on the input data provided and can only act as an approximation. In some instances, several EEMs or installation methods may achieve the identified potential savings. Actual savings will depend on the EEM selected, the price of energy, and the final installation and implementation methodology. Competent tradesmen and professional engineers may be required to design, install, or otherwise implement some of the recommended EEMs. This document is an energy use audit report and is not intended as a final design document, operation, and maintenance manual, or to take the place of any document provided by a manufacturer or installer of any device described in this report.

Cost savings are calculated based on estimated initial costs for each EEM. Estimated costs include labor and equipment for the full up-front investment required to implement the EEM. The listed installation costs within the report are conceptual budgetary estimates and should not be used as design estimates. The estimated costs are derived from Means Cost Data, industry publications, local contractors and equipment suppliers, and the professional judgment of the CEA writing the report and based on the conditions at the time of the audit.

Cost and energy savings are approximations and are not guaranteed.

Additional significant energy savings can usually be found with more detailed auditing techniques that include actual measurements of electrical use, temperatures in the building and HVAC ductwork, intake and exhaust temperatures, motor runtime and scheduling, and infrared, air leakage to name just a few. Implementation of these techniques is the difference between a Level III Energy Audit and the Level II Audit that has been conducted.

Appendix G References

Although not all documents listed below are specifically referenced in this report, each contains information and insights considered valuable to most buildings.

Alaska Department of Education and Early Development; Education Support Services/Facilities. (1999). *Alaska School Facilities Preventative Maintenance Handbook.* Juneau, AK: Alaska Department of Education and Early Development.

Alaska Housing Finance Corportation. (2010). *Retrofit Energy Assessment for Loans.* AHFC.

ASHRAE. (1997). *1997 ASHRAE Handbook: Fundamentals.* Atlanta, GA: ASHRAE.

ASHRAE. (2007). *ASHRAE Standard 105-2007 Expressing and Comparing Building Energy Performance.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2007). *ASHRAE Standard 90.1-2007 Energy Standards for buildings Except Low-Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.1-2010 Ventilaton for Acceptable Indoor Air Quality.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.2-2010 Ventilation and Acceptable Indoor Air Quality in Low Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE RP-669 and SP-56. (2004). *Procedures for Commercial Building Energy Audits.* Atlanta, GA: ASHRAE.

Coad, W. J. (1982). *Energy Engineering and Management for Building Systems.* Scarborough, Ontario, Canada: Van Nostrand Reinhold Company.

Daley, D. T. (2008). *The Little Black Book of Reliability Management.* New York, NY: Industrial Press, Inc.

Federal Energy Management Program. (2004, March 3). *Demand Controlled Ventilation Using CO2 Sensors.* Retrieved 2011, from US DOE Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/femp/pdfs/fta_co2.pdf

Federal Energy Management Program. (2006, April 26). *Low-Energy Building Design Guidelines.* Retrieved 2011, from Department of Energy; Federal Energy Management Program: http://www.eren.doe.gov/femp/

Institute, E. a. (2004). *Variable Speed Pumping: A Guide to Successful Applications.* Oxford, UK: Elsevier Advanced Technology.

International Code Council. (2009). *International Energy Conservation Code.* Country Club Hills, IL: International Code Council, Inc.

Leach, M., Lobato, C., Hirsch, A., Pless, S., & Torcellini, P. (2010, September). *Technical Support Document: Strategies for 50% Energy Savings in Large Office Buildings.* Retrieved 2011, from National Renewable Energy Laboratory: http://www.nrel.gov/docs/fy10osti/49213.pdf

Thumann, P.E., C.E.M., A., Younger, C.E.M., W. J., & Niehus, P.E., C.E.M., T. (2010). *Handbook of Energy Audits Eighth Edition.* Lilburn, GA: The Fairmont Press, Inc.

U.S. Energy Information Administration. (2006). *Commercial Building Energy Consumption Survey (CBECS).* Retrieved 2011, from Energy Information Administration: http://www.eia.gov/emeu/cbecs/

Appendix H Typical Energy Use and Cost – Fairbanks and Anchorage

This report provides data on typical energy costs and use on selected building in Fairbanks and Anchorage, Alaska for comparative purposes only. The values provided by the US Energy Information Administration CBECS study included a broader range of building types for the Continental U.S. are not necessarily good comparatives for buildings and conditions in Alaska. An assortment of values from CBECS may be found in Appendix I.

The Alaska data described in this report came from a benchmarking study NORTECH and other Technical Services Providers (TSPs) completed on publicly owned buildings in Alaska under contract with AHFC. This study acquired actual utility data for municipal buildings and schools in Alaska for the two recent full years. The utility data included costs and quantities including fuel oil, electricity, propane, wood, steam, and all other energy source usage. This resulted in a database of approximately 900 buildings. During the course of the benchmarking study, the comparisons made to the CBECS data appeared to be inappropriate for various reasons. Therefore, this energy use audit report references the average energy use and energy cost of Anchorage and Fairbanks buildings as described below.

The Alaska benchmarking data was evaluated in order to find valid comparison data. Buildings with major energy use information missing were eliminated from the data pool. After detailed scrutiny of the data, the most complete information was provided to NORTECH by the Fairbanks North Star Borough School District (FNSBSD) and the Anchorage School District (ASD). The data sets from these two sources included both the actual educational facilities as well as the district administrative buildings and these are grouped together in this report as Fairbanks and Anchorage schools. These two sources of information, being the most complete and reasonable in-state information, have been used to identify an average annual energy usage for Fairbanks and for Anchorage in order to provide a comparison for other facilities in Alaska.

Several factors may limit the comparison of a specific facility to these regional indicators. In Fairbanks, the FNSBSD generally uses number two fuel oil for heating needs and electricity is provided by Golden Valley Electric Association (GVEA). GVEA produces electricity from a coal fired generation plant with additional oil generation upon demand. A few of the FNSBSD buildings in this selection utilize district steam and hot water. The FNSBSD has recently (the last ten years) invested significantly in envelope and other efficiency upgrades to reduce their operating costs. Therefore a reader should be aware that this selection of Fairbanks buildings has energy use at or below average for the entire Alaska benchmarking database.

Heating in Anchorage is through natural gas from the nearby natural gas fields. Electricity is also provided using natural gas. As the source is nearby and the infrastructure for delivery is in place, energy costs are relatively low in the area. As a result, the ASD buildings have lower energy costs, but higher energy use, than the average for the entire benchmarking database.

These special circumstances should be considered when comparing the typical annual energy use for particular buildings.

Appendix I Typical Energy Use and Cost – Continental U.S.

Released: Dec 2006

Next CBECS will be conducted in 2007

Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003

	All Buildings*			Sum of Major Fuel Consumption			
	Number of Buildings (thousand)	Floorspace (million square feet)	Floorspace per Building (thousand square feet)	Total (trillion BTU)	per Building (million BTU)	per Square Foot (thousand BTU)	per Worker (million BTU)
All Buildings*	4,645	64,783	13.9	5,820	1,253	89.8	79.9
Building Floorspace (Square Feet)							
1,001 to 5,000	2,552	6,789	2.7	672	263	98.9	67.6
5,001 to 10,000	889	6,585	7.4	516	580	78.3	68.7
10,001 to 25,000	738	11,535	15.6	776	1,052	67.3	72.0
25,001 to 50,000	241	8,668	35.9	673	2,790	77.6	75.8
50,001 to 100,000	129	9,057	70.4	759	5,901	83.8	90.0
100,001 to 200,000	65	9,064	138.8	934	14,300	103.0	80.3
200,001 to 500,000	25	7,176	289.0	725	29,189	101.0	105.3
Over 500,000	7	5,908	896.1	766	116,216	129.7	87.6
Principal Building Activity							
Education	386	9,874	25.6	820	2,125	83.1	65.7
Food Sales	226	1,255	5.6	251	1,110	199.7	175.2
Food Service	297	1,654	5.6	427	1,436	258.3	136.5
Health Care	129	3,163	24.6	594	4,612	187.7	94.0
Inpatient	8	1,905	241.4	475	60,152	249.2	127.7
Outpatient	121	1,258	10.4	119	985	94.6	45.8
Lodging	142	5,096	35.8	510	3,578	100.0	207.5
Retail (Other Than Mall)	443	4,317	9.7	319	720	73.9	92.1
Office	824	12,208	14.8	1,134	1,376	92.9	40.3
Public Assembly	277	3,939	14.2	370	1,338	93.9	154.5
Public Order and Safety	71	1,090	15.5	126	1,791	115.8	93.7
Religious Worship	370	3,754	10.1	163	440	43.5	95.6
Service	622	4,050	6.5	312	501	77.0	85.0
Warehouse and Storage	597	10,078	16.9	456	764	45.2	104.3
Other	79	1,738	21.9	286	3,600	164.4	157.1
Vacant	182	2,567	14.1	54	294	20.9	832.1

This report references the Commercial Buildings Energy Consumption Survey (CBECS), published by the U.S. Energy Information Administration in 2006. Initially this report was expected to compare the annual energy consumption of the building to average national energy usage as documented below. However, a direct comparison between one specific building and the groups of buildings outlined below yielded confusing results. Instead, this report uses a comparative analysis on Fairbanks and Anchorage data as described in Appendix F. An abbreviated excerpt from CBECS on commercial buildings in the Continental U.S. is below.

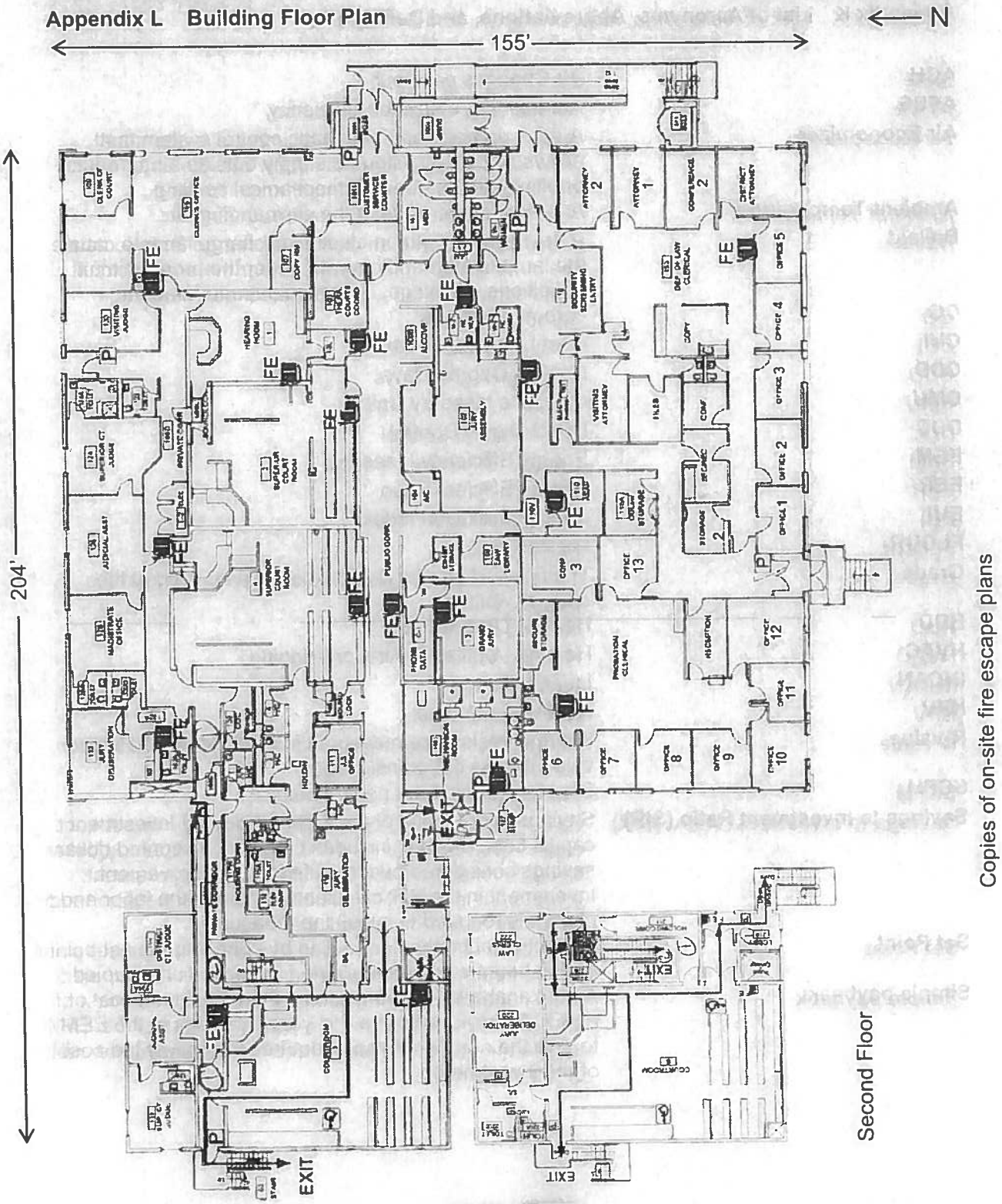
Appendix J List of Conversion Factors and Energy Units

1 British Thermal Unit	is the energy required to raise one pound of water one degree
1 Watt	is approximately 3.412 BTU/hr
1 horsepower	is approximately 2,544 BTU/hr
1 horsepower	is approximately 746 Watts
1 "ton of cooling"	is 12,000 BTU/hr, the amount of power required to melt one short ton of ice in 24 hours
1 Therm	= 100,000 BTU
1 KWH	= 3413 BTU
1 KW	= 3413 BTU/Hr
1 Boiler HP	= 33,400 BTU/Hr
1 Pound Steam	= 1000 BTU
1 CCF of natural gas	= about 1 Therm
1 Pascal (Pa)	= 1 inch H2O = 0.363 pounds/square inch (psi)
1 Pascal (Pa)	= 0.0025 atmospheres (atm)
BTU	British Thermal Unit
CCF	100 Cubic Feet
CFM	Cubic Feet per Minute
GPM	Gallons per minute
HP	Horsepower
Hz	Hertz
kg	Kilogram (1,000 grams)
kV	Kilovolt (1,000 volts)
kVA	Kilovolt-Amp
kVAR	Kilovolt-Amp Reactive
KW	Kilowatt (1,000 watts)
KWH	Kilowatt Hour
V	Volt
W	Watt

Appendix K List of Acronyms, Abbreviations, and Definitions

ACH	Air Changes per Hour
AFUE	Annual Fuel Utilization Efficiency
Air Economizer	A duct, damper, and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling.
Ambient Temperature	Average temperature of the surrounding air
Ballast	A device used with an electric discharge lamp to cause the lamp to start and operate under the proper circuit conditions of voltage, current, electrode heat, etc.
CO	carbon monoxide
CUI	Cost Utilization Index
CDD	Cooling Degree Days
CMU	Concrete Masonry Unit
DDC	Direct Digital Control
EEM	Energy Efficiency Measure
EER	Energy Efficient Ratio
EUI	Energy Utilization Index
FLOUR	Fluorescent
Grade	The finished ground level adjoining a building at the exterior walls
HDD	Heating Degree Days
HVAC	Heating Ventilation Air-Conditioning
INCAN	Incandescent
NPV	Net Present Value
R-value	Thermal resistance measured in BTU/Hr-SF-°F (Higher value means better insulation)
SCFM	Standard Cubic Feet per Minute
Savings to Investment Ratio (SIR)	Savings over the life of the EEM divided by Investment capital cost. Savings includes the total discounted dollar savings considered over the life of the improvement. Investment in the SIR calculation includes the labor and materials required to install the measure.
Set Point	Reduction of heating or cooling by changing the set point during hours when the building or space is unoccupied
Simple payback	A cost analysis method whereby the investment cost of an EEM is divided by the first year's savings of the EEM to give the number of years required to recover the cost of the investment.

Appendix L Building Floor Plan



ENERGY AUDIT – FINAL REPORT

BETHEL CITY SHOP
220 State Highway
Bethel, Alaska

Prepared for:

Mr. Lee Foley
PO Box 1388
Bethel, Alaska

Prepared by:

David Lanning PE, CEA
Jeremy Spargur EIT, CEAIT

July 13, 2012

Acknowledgment: "This material is based upon work supported by the Department of Energy under Award Number DE-EE0000095"

NORTECH

Environmental Engineering & Industrial Hygiene Consultants

Managing Office
2400 College Road
Fairbanks, Alaska 99709
p. 907.452.5688
f. 907.452.5694

3105 Lakeshore Dr. Suite 106A
Anchorage, Alaska 99517
p. 907.222.2445
f. 907.222.0915

4402 Thane Road
Juneau, Alaska 99801
p: 907.586.6813
f: 907.586.6819

www.nortechengr.com

NORTECH
ENVIRONMENTAL ENGINEERING, HEALTH & SAFETY
Anch: 3105 Lakeshore Dr. Ste 106A, 99517 907.222.2445 Fax: 222.0915
Fairbanks: 2400 College Road, 99709 907.452.5688 Fax: 452.5694
Juneau: 4402 Thane Road, 99801 907.586.6813 Fax: 586.6819
info@nortechengr.com www.nortechengr.com

TABLE OF CONTENTS

APPENDICES

1.0 EXECUTIVE SUMMARY

NORTECH has completed an ASHRAE Level II Energy Audit of the Bethel City Shop, a 35,925 square foot facility. The audit began with benchmarking which resulted in a calculation of the energy consumption per square foot. A site inspection was completed on November 17, 2011 to obtain information about the lighting, heating, ventilation, cooling and other building energy uses. The existing usage data and current systems were then used to develop a building energy consumption model using AkWarm.

Once the model was calibrated, a number of Energy Efficiency Measures (EEMs) were developed from review of the data and observations. EEMs were evaluated and ranked on the basis of both energy savings and cost using a Savings/Investment Ratio (SIR). While these modeling techniques were successful in verifying that many of the EEMs would save energy, not all of the identified EEMs were considered cost effective based on the hardware, installation, and energy costs at the time of this audit.

While the need for a major retrofit can typically be identified by an energy audit, upgrading specific systems often requires collecting additional data and engineering and design efforts that are beyond the scope of the Level II energy audit. The necessity and amount of design effort and cost will vary depending on the scope of the specific EEMs planned and the sophistication and capability of the entire design team, including the building owners and operators. During the budgeting process for any major retrofit identified in this report, the building owner should add administrative and supplemental design costs to cover the individual needs of their own organization and the overall retrofit project.

The following table, from AkWarm, is a summary of the recommended EEMs for the Bethel City Shop. Additional discussion of the modeling process can be found in Section 3. Details of each individual EEM can be found in Appendix A of this report. A summary of EEMs that were evaluated but are not currently recommended is located in Appendix B.

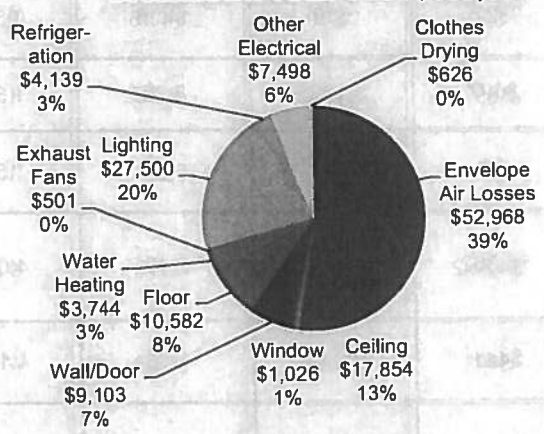
PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)

Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
1	Lighting - Power Retrofit: Sauna	Replace with 2 FLUOR CFL, A Lamp 20W	$119	$10	76.15	0.1
2	Setback Thermostat: Bethel City Shop	Implement a Heating Temperature Unoccupied Setback to 60.0 deg F for the Bethel City Shop space.	$14,122	$5,000	41.59	0.4
3	Lighting - Power Retrofit: Rest Room, Understair Area	Replace with FLUOR (4) CFL, A Lamp 20W	$71	$20	22.66	0.3
4	Lighting - Power Retrofit: Main Shop	Replace with 4 FLUOR (4) T5 45.2" F54W/T5 HO Energy-Saver (2) StdElectronic	$3,936	$1,520	22.63	0.4

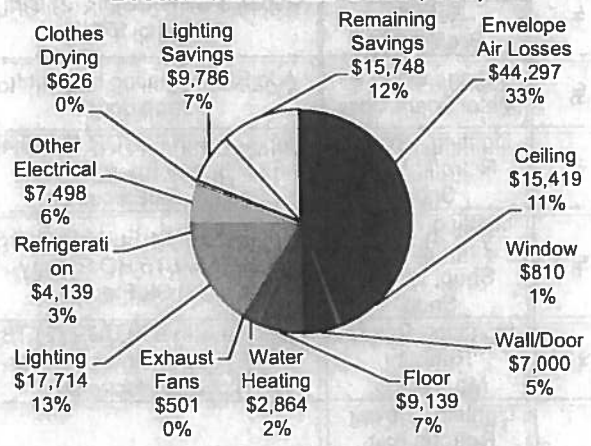
PRIORITY LIST – ENERGY EFFICIENCY MEASURES (EEMs)						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
5	Lighting - Power Retrofit: Breakroom	Replace with FLUOR (2) CFL, A Lamp 15W	$22	$10	14.16	0.5
6	Garage Door: 2" Metal Foam Core	Add R-5 insulating blanket to garage door	$697	$1,225	8.38	1.8
7	Lighting - Power Retrofit: Main Shop	Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$5	$8	4.27	1.5
8	Lighting - Power Retrofit: Main Shop, Water Shop	Replace with 51 FLUOR (4) T5 45.2" F54W/T5 HO Energy-Saver (2) StdElectronic	$4,862	$19,380	2.19	4.0
9	Lighting - Power Retrofit: Mezzanine	Replace with 9 FLUOR (2) T8 8' F96T8 57W Energy-Saver HighEfficElectronic	$441	$1,800	1.56	4.1
10	Lighting - Power Retrofit: Exit Signs: Hall A, Mezzanine, Hall D, Dressing Room, Water Office, Water Shop, Boiler Room	Replace with 10 LED 4W Module StdElectronic	$114	$500	1.46	4.4
11	HVAC And DHW	replace UPS 80-60 with variable speed magna pumps, remove direct fired water heater and add side arm to boiler	$929	$11,000	1.44	11.8
12	Lighting - Power Retrofit: Hall D	Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$23	$132	1.10	5.8
13	Lighting - Power Retrofit: Hall A, Shop Office, Main Shop, Laundry Room	Replace with 6 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$193	$1,200	1.03	6.2
TOTAL, cost-effective measures			$25,534	$41,805	7.59	1.6

Modeled Building Energy Cost Breakdown

Existing Building Energy Cost Breakdown Total Cost $135,539



Retrofit Building Energy Cost Breakdown Total Cost $110,005



The preceding charts are a graphical representation of the modeled energy usage for the Bethel City Hall. The greatest portions of energy cost for the building are envelope air losses, lighting, and other electrical. This indicates that the greatest savings can be found in reducing the amount of outside air provided to the building mechanically or through air leakage, upgrading lighting, and potentially changing user behavior to use less energy. Detailed improvements for ventilation, lighting and other cost effective measures can be found in Appendix A. The chart breaks down energy usage by cost into the following categories:

- Envelope Air Losses—the cost to provide heated fresh air to occupants, air leakage, heat lost in air through the chimneys and exhaust fans, heat lost to wind and other similar losses.
- Envelope
  - Ceiling—quantified heat loss transferred through the ceiling portion of the envelope.
  - Window—quantified heat loss through the window portion of the envelope.
  - Wall/Door—quantified heat loss through the wall and door portions of the envelope.
  - Floor—quantified heat loss through the floor portion of the envelope.
- Water Heating—energy cost to provide domestic hot water.
- Fans—energy cost to run ventilation, and exhaust fans.
- Lighting—energy cost to light the building.
- Refrigeration—energy costs to provide refrigerated goods for the occupants.
- Other Electrical—includes energy costs not listed above including cooking loads, laundry loads, other plug loads and electronics. These energy uses are amenable to reduction only through user behavior changes which can be accomplished with goal driven employee teamwork.

2.0 INTRODUCTION

NORTECH contracted with the Alaska Housing Finance Corporation to perform ASHRAE Level II Energy Audits for publically owned buildings in Alaska. This report presents the findings of the utility benchmarking, modeling analysis, and the recommended building modifications, and building use changes that are expected to save energy and money.

The report is organized into sections covering:

- description of the facility,
- the building's historic energy usage (benchmarking),
- estimating energy use through energy use modeling,
- evaluation of potential energy efficiency or efficiency improvements, and
- recommendations for energy efficiency with estimates of the costs and savings.

2.1 Building Use

The City Shop is where the vehicles and equipment owned by the city of Bethel are serviced and repaired.

2.2 Building Occupancy and Schedules

This building is occupied by approximately 13 city workers during the work week from 7am to 5pm Monday through Friday with the occasional weekend worked.

2.3 Building Description

The City Shop is a prefabricated metal framed building that sits on and insulated wooden floor on pilings. The insulated floor on the office portion of the building is constructed with 2x12 joists with additional urethane foam sprayed to the bottom. The floor under the shop portion is made with 2x8 beams laminated together. The walls and ceiling consist of 4" insulated metal panels.

Building Envelope

Building Envelope: Walls			
Wall Type	**Description**	**Insulation**	**Notes**
Above-grade walls	Stressed skin panels	4"	Wall damage in several locations

Building Envelope: Floors			
Floor Type	**Description**	**Insulation**	**Notes**
Exposed Shop Floor	Wood Laminate	None	None
Exposed Office Floor	Wood-framed 2x12 floor joists.	4-inches of polyurethane foam.	None

Building Envelope: Roof			
Roof Type	Description	Insulation	Notes
All Roofs	Stressed Skin Panel Hot Roof	4" insulated panel	Minor damage

Building Envelope: Doors and Windows			
Door and Window Type	Description	Estimated R-Value	SF
Exterior door	Flush 2" insulated door	5	105
Exterior door	½ lite 2" insulated door	3	21
Exterior door	¼ lite 2" insulated door	3.6	42
Garage Doors	2" metal foam core	3.4	500
Window	Double pane, vinyl, air gap >3/8	2	99
Window	Triple pane, vinyl, <3/8 gap, not south	2.5	66
Window	Triple pane, vinyl, >3/8 gap, south	2.7	22
Window	Double pane, aluminum with thermal break, <3/8 gap	1.5	96

Heating and Ventilation Systems

The city shop is heated with a two boiler system. One set of pumps is used to deliver heat to unit heaters in the shops and another set of pumps is used to deliver heat to office area baseboards. A third pump was installed to deliver heat to air handlers that are no longer in operation. This building is equipped with exhaust fans in bathrooms, shops, and storage rooms.

Air Conditioning System

The City Shop is not equipped with an air conditioning system.

Energy Management

The City Shop is not equipped with an energy management system.

Lighting Systems

The primary lighting type in the office area of the City Shop is ceiling mounted fluorescent fixtures with T12 (1 ½" diameter 4' long) lamps. The shops are lit with high bay fixtures containing 400 watt metal halide lamps. Approximately 25% of the shop lights several of the office lights are on 24 hours a day.

Domestic Hot Water

An oil fired water heater provides 180°F domestic hot water to the City Shop. The temperature of the water is high because of the great demand for hot water due bathrooms, laundry, and truck washing. The current system is old, inefficient, and undersized.

3.0 BENCHMARKING 2010 UTILITY DATA

Benchmarking building energy use consists of obtaining and then analyzing two years of energy bills. The original utility bills are necessary to determine the raw usage, and charges as well as to evaluate the utility's rate structure. The metered usage of electrical and natural gas consumption is measured monthly, but heating oil, propane, wood, and other energy sources are normally billed upon delivery and provide similar information. During benchmarking, information is compiled in a way that standardizes the units of energy and creates energy use and billing rate information statistics for the building on a square foot basis. The objectives of benchmarking are:

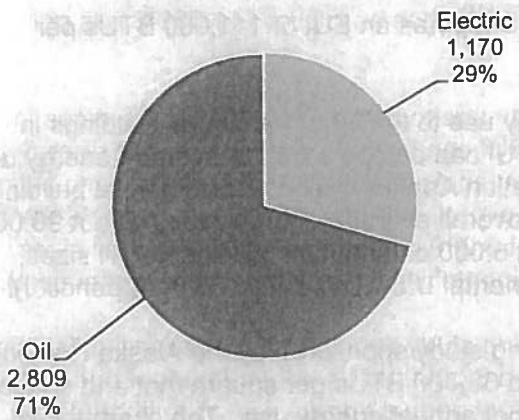
- to understand patterns of use,
- to understand building operational characteristics,
- for comparison with other similar facilities in Alaska and across the country, and
- to offer insight in to potential energy savings.

The results of the benchmarking, including the energy use statistics and comparisons to other areas, are discussed in the following sections.

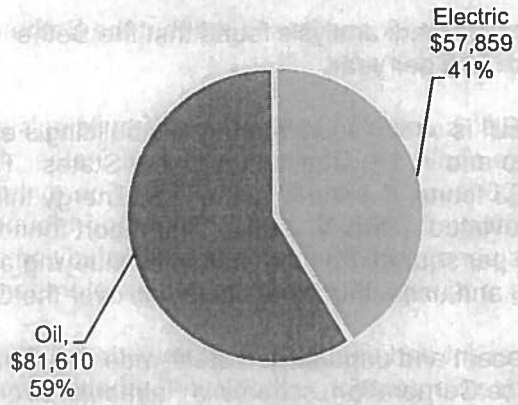
3.1 Total Energy Use and Cost of 2010

The energy use profiles below show the energy and cost breakdowns for the Bethel City Shop. The total annual energy cost for the building is approximately $140,000 per year. These charts show the portion of use for a fuel type and the portion of its cost.

2010 Energy Use Total (mmBTU)



2010 Energy Cost Total



The above charts indicate that the highest portion of energy use is for oil and the highest portion of cost is for oil. Fuel oil consumption correlates directly to space heating and domestic hot water while electrical use can correlate to lighting systems, plug loads, and HVAC equipment. The energy type with the highest cost often provides the most opportunity for savings.

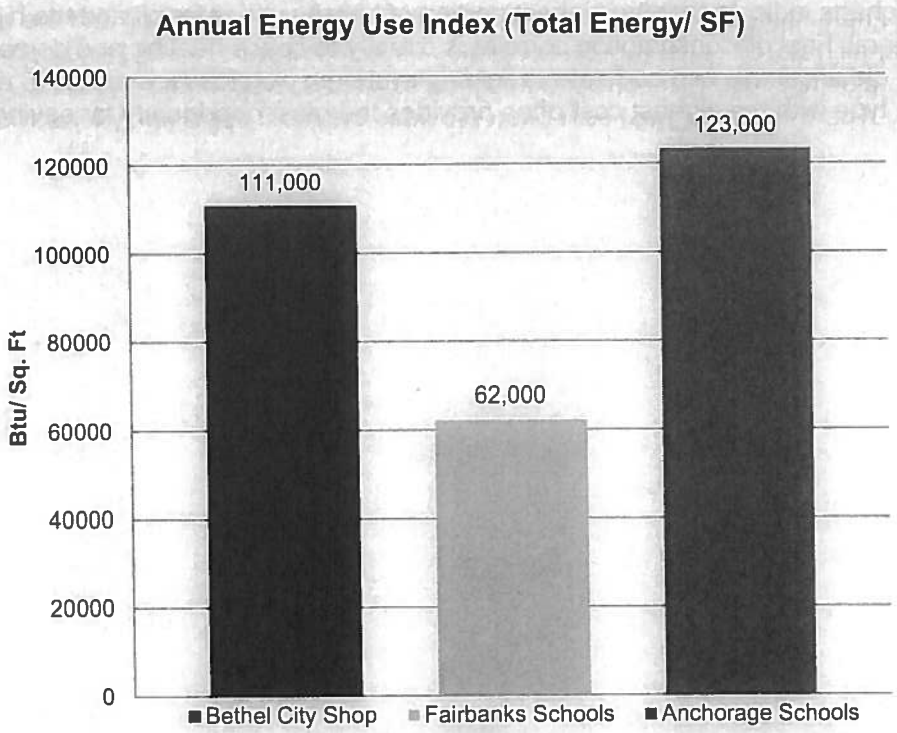
3.2 Energy Utilization Index of 2010

The primary benchmarking statistic is the Energy Utilization Index (EUI). The EUI is calculated from the utility bills and provides a simple snapshot of the quantity of energy actually used by the building on a square foot and annual basis. The calculation converts the total energy use for the year from all sources in the building, such as heating fuel and electrical usage, into British Thermal Units (BTUs). This total annual usage is then divided by the number of square feet of the building. The EUI units are BTUs per square foot per year.

The benchmark analysis found that the Bethel City Shop has an EUI of 111,000 BTUs per square foot per year.

The EUI is useful in comparing this building's energy use to that of other similar buildings in Alaska and in the Continental United States. The EUI can be compared to average energy use in 2003 found in a study by the U.S. Energy Information Administration of commercial buildings (abbreviated CBECS, 2006). That report found an overall average energy use of about 90,000 BTUs per square foot per year while studying about 6,000 commercial buildings of all sizes, types, and uses that were located all over the Continental U.S. (see Table C3 in Appendix I).

In a recent and unpublished state-wide benchmarking study sponsored by the Alaska Housing Finance Corporation, schools in Fairbanks averaged 62,000 BTUs per square foot and schools in Anchorage averaged 123,000 BTUs per square foot annual energy use. The chart below shows the Bethel City Shop relative to these values. These findings are discussed further in Appendix H.



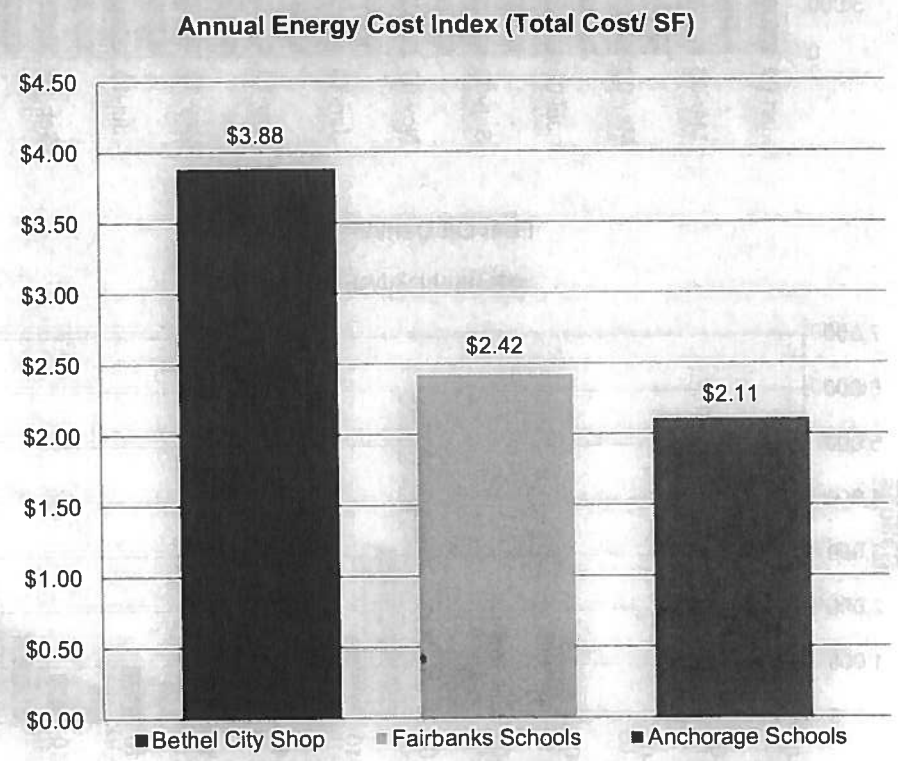
3.3 Cost Utilization Index of 2010

Another benchmarking statistic that is useful is the Cost Utilization Index (CUI), which is the cost for energy used in the building on a square foot basis per year. The CUI is calculated from the cost for utilities for a year period. The CUI permits comparison of buildings on total energy cost even though they may be located in areas with differing energy costs and differing heating and/or cooling climates. The cost of energy, including heating oil, natural gas, and electricity, can vary greatly over time and geographic location and can be higher in Alaska than other parts of the country.

The CUI for Bethel City Shop is about $3.88. This is based on utility costs from 2010 and the following rates:

Electricity	at	$0.17 / kWh	($4.98 / Therm)
# 1 Fuel Oil	at	$4.07 / gallon	($2.99 / Therm)

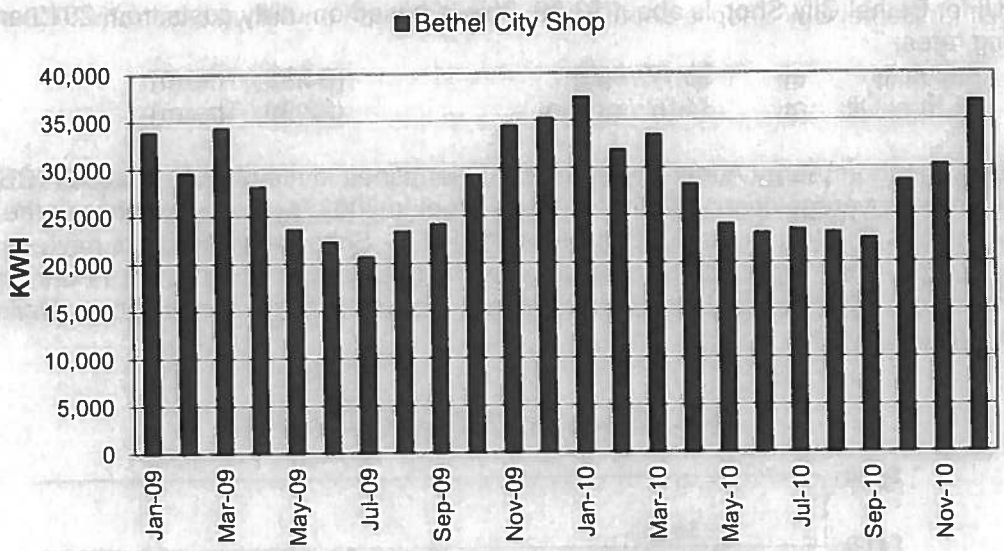
The Department of Energy Administration study, mentioned in the previous section (CBECS, 2006) found an average cost of $2.52 per square foot in 2003 for 4,400 buildings in the Continental U.S (Tables C4 and C13 of CBDES, 2006). Schools in Fairbanks have an average cost for energy of $2.42 per square foot while Anchorage schools average $2.11 per square foot. The chart below shows the Bethel City Shop relative to these values. More details are included in Appendix H.



3.4 Seasonal Energy Use Patterns

Energy consumption is often highly correlated with seasonal climate and usage variations. The graphs below show the electric and fuel consumption of this building over the course of two years. The lowest monthly use is called the baseline use. The electric baseline often reflects year round lighting consumption while the heating fuel baseline often reflects year round hot water usage. The clear relation of increased energy usage during periods of cold weather can be seen in the months with higher usage. Oil data is not available before July 2009.

Electrical Consumption



Fuel Oil Deliveries

3.5 Future Energy Monitoring

Energy accounting is the process of tracking energy consumption and costs. It is important for the building owner or manager to monitor and record both the energy usage and cost each month. Comparing trends over time can assist in pinpointing major sources of energy usage and aid in finding effective energy efficiency measures. There are two basic methods of energy accounting: manual and automatic. Manual tracking of energy usage may already be performed by an administrative assistant: however if the records are not scrutinized for energy use, then the data is merely a financial accounting. Digital energy tracking systems can be installed. They display and record real-time energy usage and accumulated energy use and cost. There are several types which have all of the information accessible via Ethernet browser.

4.0 MODELING ENERGY CONSUMPTION

After benchmarking of a building is complete and the site visit has identified the specific systems in the building, a number of different methods are available for quantifying the overall energy consumption and to model the energy use. These range from relatively simple spreadsheets to commercially available modeling software capable of handling complex building systems. ***NORTECH*** has used several of these programs and uses the worksheets and software that best matches the complexity of the building and specific energy use that is being evaluated.

Modeling of an energy efficiency measure (EEM) requires an estimate of the current energy used by the specific feature, the estimated energy use of the proposed EEM and its installed cost. EEMs can range from a single simple upgrade, such as light bulb type or type of motor, to reprogramming of the controls on more complex systems. While the need for a major retrofit can typically be identified by an energy audit, the specific system upgrades often require collecting additional data and engineering and design efforts that are beyond the scope of the Level II energy audit.

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. Common EEMs that could apply to almost every older building include:

- Reduce the envelope heat losses through:
  - increased building insulation, and
  - better windows and doors
- Reduce temperature difference between inside and outside using setback thermostats
- Upgrade inefficient:
  - lights,
  - motors,
  - refrigeration units, and
  - other appliances
- Reduce running time of lights/appliances through:
  - motion sensors,
  - on/off timers,
  - light sensors, and
  - other automatic/programmable systems

The objective of the following sections is to describe how the overall energy use of the building was modeled and the potential for energy savings. The specific EEMs that provide these overall energy savings are detailed in Appendix A of this report. While the energy savings of an EEM is unlikely to change significantly over time, the cost savings of an EEM is highly dependent on the current energy price and can vary significantly over time. An EEM that is not currently recommended based on price may be more attractive at a later date or with higher energy prices.

4.1 Understanding How AkWarm Models Energy Consumption

NORTECH used the AkWarm model for evaluating the overall energy consumption at Bethel City Shop. The AkWarm program was developed by the Alaska Housing Finance Corporation (AHFC) to model residential energy use. The original AkWarm is the modeling engine behind the successful residential energy upgrade program that AHFC has operated for a number of years. In the past few years, AHFC has developed a version of this model for commercial buildings.

Energy use in buildings is modeled by calculating energy losses and consumption, such as:

- Heat lost through the building envelope components, including windows, doors, walls, ceilings, crawlspaces, and foundations. These heat losses are computed for each component based on the area, heat resistance (R-value), and the difference between the inside temperature and the outside temperature. AkWarm has a library of temperature profiles for villages and cities in Alaska.
- Window orientation, such as the fact that south facing windows can add heat in the winter but north-facing windows do not.
- Inefficiencies of the heating system, including the imperfect conversion of fuel oil or natural gas due to heat loss in exhaust gases, incomplete combustion, excess air, etc. Some electricity is also consumed in moving the heat around a building through pumping.
- Inefficiencies of the cooling system, if one exists, due to various imperfections in a mechanical system and the required energy to move the heat around.
- Lighting requirements and inefficiencies in the conversion of electricity to light; ultimately all of the power used for lighting is converted to heat. While the heat may be useful in the winter, it often isn't useful in the summer when cooling may be required to remove the excess heat. Lights are modeled by wattage and operational hours.
- Use and inefficiencies in refrigeration, compressor cooling, and heat pumps. Some units are more efficient than others. Electricity is required to move the heat from inside a compartment to outside it. Again, this is a function of the R-Value and the temperature difference between the inside and outside of the unit.
- Plug loads such as computers, printers, mini-fridges, microwaves, portable heaters, monitors, etc. These can be a significant part of the overall electricity consumption of the building, as well as contributing to heat production.
- The schedule of operation for lights, plug loads, motors, etc. is a critical component of how much energy is used.

AkWarm adds up these heat losses and the internal heat gains based on individual unit usage schedules. These estimated heat and electrical usages are compared to actual use on both a yearly and seasonal basis. If the AkWarm model is within 5 % to 10% of the most recent 12 months usage identified during benchmarking, the model is considered accurate enough to make predictions of energy savings for possible EEMs.

4.2 AkWarm Calculated Savings for the Bethel City Shop

Based on the field inspection results and discussions with the building owners/operators, auditors developed potential EEMs for the facility. These EEMs are then entered into AkWarm to determine if the EEM saves energy and is cost effective (i.e. will pay for itself). AkWarm calculates the energy and money saved by each EEM and calculates the length of time for the savings in reduced energy consumption to pay for the installation of the EEM. AkWarm makes recommendations based on the Savings/Investment Ratio (SIR), which is defined as ratio of the savings generated over the life of the EEM divided by the installed cost. Higher SIR values are better and any SIR above one is considered acceptable. If the SIR of an EEM is below one, the energy savings will not pay for the cost of the EEM and the EEM is not recommended. Preferred EEMs are listed by AkWarm in order of the highest SIR.

A summary of the savings from the recommended EEMs are listed in this table.

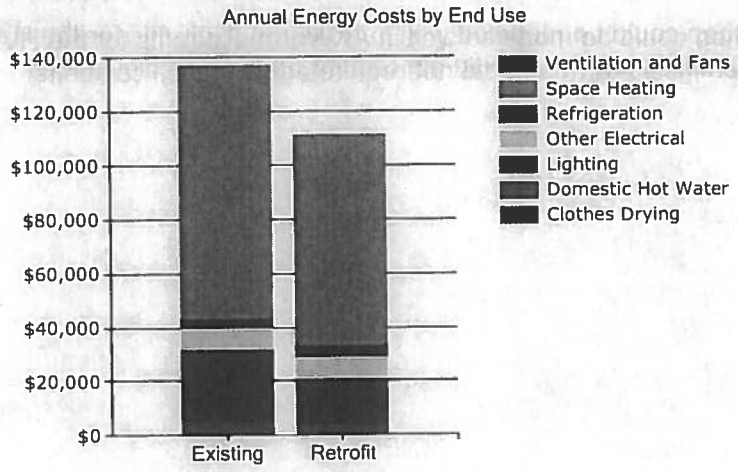
Description	Space Heating	Water Heating	Lighting	Refrigeration	Other Electrical	Clothes Drying	Ventilation Fans	Total
Existing Building	$91,532	$3,744	$27,500	$4,139	$7,498	$626	$501	**$135,539**
With All Proposed Retrofits	$76,664	$2,864	$17,714	$4,139	$7,498	$626	$501	**$110,005**
SAVINGS	$14,868	$880	$9,786	$0	$0	$0	$0	**$25,534**

Savings in these categories do not reflect interaction with other categories. So, for example, the savings in lighting does not affect the added space heating cost to make up for the heat saved in replacing less-efficient lights with more-efficient lights that waste less heat.

4.3 AkWarm Projected Energy Costs after Modifications

The AkWarm recommended EEMs appear to result in significant savings in lighting and space heating. The energy cost by end use breakdown was provided by AkWarm based on the field inspection and does not indicate that all individual fixtures and appliances were directly measured. The current energy costs are shown below on the left hand bar of the graph and the projected energy costs, assuming use of the recommended EEMs, are shown on the right.

This graphical format allows easy visual comparison of the various energy requirements of the facility. In the event that not all recommended retrofits are desired, the proposal energy savings can be estimated from visual interpretation from this graph.



4.4 Additional Modeling Methods

The AkWarm program effectively models wood-framed and other buildings with standard heating systems and relatively simple HVAC systems. AkWarm models of more complicated mechanical systems are sometimes poor due to a number of simplifying assumptions and limited input of some variables. Furthermore, AKWarm is unable to model complex HVAC systems such as variable frequency motors, variable air volume (VAV) systems, those with significant digital or pneumatic controls or significant heat recovery capacity. In addition, some other building methods and occupancies are outside AkWarm capabilities.

This report section is included in order to identify benefits from modifications to those more complex systems or changes in occupant behavior that cannot be addressed in AkWarm.

The Bethel City Shop could be modeled well in AKWarm. Retrofits for the HVAC system were adequately modeled in AkWarm and did not require additional calculations.

5.0 BUILDING OPERATION AND MAINTENANCE (O & M)

5.1 Operations and Maintenance

A well-implemented operation and maintenance (O & M) plan is often the driving force behind energy savings. Such a plan includes preserving institutional knowledge, directing preventative maintenance, and scheduling regular inspections of each piece of HVAC equipment within the building. Routine maintenance includes the timely replacement of filters, belts and pulleys, the proper greasing of bearings and other details such as topping off the glycol tanks. Additional benefits to a maintenance plan are decreased down time for malfunctioning equipment, early indications of problems, prevention of exacerbated maintenance issues, and early detection of overloading/overheating issues. A good maintenance person knows the building's equipment well enough to spot and repair minor malfunctions before they become major retrofits.

Operations and Maintenance staff implementing a properly designed O & M plan will:

- Track and document
  - Renovations and repairs,
  - Utility bills and fuel consumption, and
  - System performance.
- Keep available for reference
  - A current Building Operating Plan including an inventory of installed systems,
  - The most recent available as-built drawings,
  - Reference manuals for all installed parts and systems, and
  - An up-to-date inventory of on-hand replacement parts.
- Provide training and continuing education for maintenance personnel.
- Plan for commissioning and re-commissioning at appropriate intervals.

5.2 Commissioning

Commissioning of a building is the verification that the HVAC systems perform within the design or usage ranges of the Building Operating Plan. This process ideally, though seldom, occurs as the last phase in construction. HVAC system operation parameters degrade from ideal over time due to incorrect maintenance, improper replacement pumps, changes in facility tenants or usage, changes in schedules, and changes in energy costs or loads. Ideally, re-commissioning of a building should occur every five to ten years. This ensures that the HVAC system meets the potentially variable use with the most efficient means.

5.3 Building Specific Recommendations

There is damage to the exterior envelope of the City Shop in several locations. In order to avoid the severe heat loss that occurs at these locations, appropriate repairs should be made.

The building is equipped with several air handling units (AHUs) that do not operate properly. There are several benefits to having operational AHUs such as a cleaner, more comfortable work environment, and the ability to more adequately control the temperature of the building. Repairs should be made to these AHUs.

A major reason for not running the AHUs is dust. The dust that is accumulated in the building circulates creating and uncomfortable environment. Extra measures should be taken to lower the dust levels in the building such as:

- Cleaning the vehicles before they enter the shop
- Placing boot cleaners at entrances
- Installing additional air filters.

APPENDICES

Appendix A Recommended Energy Efficiency Measures

A number of Energy Efficiency Measures (EEMs) are available to reduce the energy use and overall operating cost for the facility. The EEMs listed below are those recommended by AkWarm based on the calculated savings/investment ration (SIR) as described in Appendix E. AkWarm also provides a breakeven cost, which is the maximum initial cost of the EEM that will still return a SIR of one or greater.

This section describes each recommended EEM and identifies the potential energy savings and installation costs. This also details the calculation of breakeven costs, simple payback, and the SIR for each recommendation. The recommended EEMs are grouped together generally by the overall end use that will be impacted.

A.1 Temperature Control

Approximately 25 programmable thermostats should be installed and programmed in the City Shop. Programmable thermostats allow for automatic temperature setback, which reduce usage more reliably than manual setbacks. Reduction of the nighttime temperature set point in the City Shop will decrease the energy usage.

Rank	Building Space			Recommendation		
2	Bethel City Shop			Install approximately 25 thermostats and Implement a Heating Temperature Unoccupied Setback to 60.0 deg F for the Bethel City Shop space.		
Installation Cost	$5,000	Estimated Life of Measure (yrs)		15	Energy Savings (/yr)	$14,122
Breakeven Cost	$207,926	Savings-to-Investment Ratio		42	Simple Payback yrs	0

A.2 Electrical Loads

A.2.1 Lighting

The electricity used by lighting eventually ends up as heat in the building. In areas where electricity is more expensive than other forms of energy, or in areas where the summer temperatures require cooling; this additional heat can be both wasteful and costly. Converting to more efficient lighting reduces cooling loads in the summer and allows the user to control heat input in the winter. The conversion from T12 (one and a half inch fluorescent bulbs) to T8 (one inch), T5 (5/8 inch), Compact Fluorescent Lights (CFL), or LED bulbs provides a significant increase in efficiency. LED bulbs can be directly placed in existing fixtures. The LED bulb bypasses the ballast altogether, which removes the often irritating, "buzzing" noise that magnetic ballasts tend to make.

Several economical retrofit opportunities are available for the City Shop. Replacing the high bay metal halide fixtures in the shops with high bay fluorescent fixtures with T5 lamps will save the City Shop a significant amount of money and energy. Also, replacing incandescent lamps with CFLs and current fluorescent tubes with energy saving 25 watt T8s will be economical at this time.

Rank	Location		Existing Condition		Recommendation	
1	Sauna		2 INCAN A Lamp, Halogen 60W with Manual Switching		Replace with 2 FLUOR CFL, A Lamp 20W	
Installation Cost		$10	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$119
Breakeven Cost		$76	Savings-to-Investment Ratio	76	Simple Payback yrs	0

Rank	Location		Existing Condition		Recommendation	
3	Rest Room, Under stair Area		INCAN (4) A Lamp, Halogen 60W with Manual Switching		Replace with FLUOR (4) CFL, A Lamp 20W	
Installation Cost		$20	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$71
Breakeven Cost		$453	Savings-to-Investment Ratio	23	Simple Payback yrs	0

Rank	Location		Existing Condition		Recommendation	
4	Main Shop		4 MH 400 Watt StdElectronic with Manual Switching		Replace with 4 FLUOR (4) T5 45.2" F54W/T5 HO Energy-Saver (2) StdElectronic	
Installation Cost		$1,520	Estimated Life of Measure (yrs)	10	Energy Savings (/yr)	$3,936
Breakeven Cost		$34,403	Savings-to-Investment Ratio	23	Simple Payback yrs	0

Rank	Location		Existing Condition		Recommendation	
5	Break room		INCAN (2) A Lamp, Std 40W with Manual Switching		Replace with FLUOR (2) CFL, A Lamp 15W	
Installation Cost		$10	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$22
Breakeven Cost		$142	Savings-to-Investment Ratio	14	Simple Payback yrs	0

Rank	Location	Existing Condition		Recommendation	
7	Main Shop	FLUOR (2) T8 4' F32T8 32W Standard Instant StdElectronic with Manual Switching		Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$8	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$5
Breakeven Cost	$34	Savings-to-Investment Ratio	4.3	Simple Payback yrs	1

Rank	Location	Existing Condition		Recommendation	
8	Main Shop, Water Shop	51 MH 400 Watt StdElectronic with Manual Switching		Replace with 51 FLUOR (4) T5 45.2" F54W/T5 HO Energy-Saver (2) StdElectronic	
Installation Cost	$19,380	Estimated Life of Measure (yrs)	10	Energy Savings (/yr)	$4,862
Breakeven Cost	$42,494	Savings-to-Investment Ratio	2.2	Simple Payback yrs	4

Rank	Location	Existing Condition		Recommendation	
9	Mezzanine	9 FLUOR (2) T12 8' F96T12/HO 95W Energy-Saver Magnetic with Manual Switching		Replace with 9 FLUOR (2) T8 8' F96T8 57W Energy-Saver HighEfficElectronic	
Installation Cost	$1,800	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$441
Breakeven Cost	$2,815	Savings-to-Investment Ratio	1.6	Simple Payback yrs	4

Rank	Location	Existing Condition		Recommendation	
10	Exit Signs: Hall A, Mezzanine, Hall D, Dressing Room, Water Office, Water Shop, Boiler Room	10 FLUOR (2) CFL, A Lamp 7W with Manual Switching		Replace with 10 LED 4W Module StdElectronic	
Installation Cost	$500	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$114
Breakeven Cost	$728	Savings-to-Investment Ratio	1.5	Simple Payback yrs	4

Rank	Location	Existing Condition		Recommendation	
12	Hall D	FLUOR (2) T12 4' F40T12 34W Energy-Saver StdElectronic with Manual Switching		Replace with FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost	$132	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$23
Breakeven Cost	$145	Savings-to-Investment Ratio	1.1	Simple Payback yrs	6

Rank	Location		Existing Condition		Recommendation	
13	Hall A, Shop Office, Main Shop, Laundry Room		6 FLUOR (4) T12 4' F40T12 34W Energy-Saver (2) Magnetic with Manual Switching		Replace with 6 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	
Installation Cost		$1,200	Estimated Life of Measure (yrs)	7	Energy Savings (/yr)	$193
Breakeven Cost		$1,234	Savings-to-Investment Ratio	1.0	Simple Payback yrs	6

A.2.2 Other Electrical Loads

There are no recommended EEMs in this category.

A.3 Building Envelope: Recommendations for change

A.3.1 Exterior Walls

There are no recommended EEMs in this category. Improving the insulation on the walls is not economical at this time. Details explaining these retrofit attempts can be found in Appendix B.

A.3.2 Foundation and/or Crawlspace

There are no recommended EEMs in this category

A.3.3 Roofing and Ceiling

There are no recommended EEMs in this category. Improving the insulation on the ceilings is not economical at this time. Details explaining these retrofit attempts can be found in Appendix B.

A.3.4 Windows

There are no recommended EEMs in this category.

A.3.5 Doors

Adding insulated blankets to the garage doors is found to be economical at this time.

Rank	Location		Size/Type, Condition		Recommendation	
6	Garage Door: 2" Metal Foam Core		Door Type: Sectional, EPS core, 2", thermal break Insulating Blanket: None Modeled R-Value: 3.4		Add R-5 insulating blanket to garage door	
Installation Cost		$1,225	Estimated Life of Measure (yrs)	15	Energy Savings (/yr)	$697
Breakeven Cost		$10,267	Savings-to-Investment Ratio	8.4	Simple Payback yrs	2

A.4 Building Heating System / Air Conditioning

A.4.1 Heating and Heat Distribution

The set of Grundfos UPS 80-160 circulation pumps can be upgraded to new variable speed Grundfos Magna pumps which will lower the energy usage in the City Shop. The oil fired water heater in this building was installed in 1982. Replacing this water heater with an indirect fired water heater from a loop off the boiler will decrease the cost to heat water because the boiler is more efficient and standby losses will be decreased by eliminating one chimney.

Rank	Location		Existing Condition		Recommendation	
11	replace UPS 80-60 with variable speed magna pumps, remove direct fired water heater an indirect fired water heater.					
Installation Cost		$11,000	Estimated Life of Measure (yrs)	20	Energy Savings (/yr)	$929
Breakeven Cost		$15,824	Savings-to-Investment Ratio	1.4	Simple Payback yrs	12

A.4.2 Air Conditioning

The City Shop is not equipped with Air Conditioning.

A.4.3 Ventilation

There are no recommended EEMs in this category.

A.4.4 Air Changes and Air Tightening

No EEMs are recommended in this area because of the difficulty of quantifying the amount of leaking air and the savings. However, by using a blower door to depressurize the building and an infra-red camera, the location of significant air leaks can be determined so they can be repaired. Several locations on the envelope in the City Shop have damage that allows heat to escape that should be repaired.

Appendix B Energy Efficiency Measures that are NOT Recommended

As indicated in other sections of the report, a number of potential EEMs were identified that were determined to be NOT cost effective by the AkWarm model. These EEMs are not currently recommended on the basis of energy savings alone because each may only save a small amount of energy, have a high capital cost, or be expensive to install. While each of these EEMs is not cost effective at this time, future changes in building use such as longer operating hours, higher energy prices, new fixtures or hardware on the market, and decreases in installation effort may make any of these EEMs cost effective in the future. These potential EEMs should be reviewed periodically to identify any changes to these factors that would warrant re-evaluation.

Although these upgrades are not currently cost effective on an energy cost basis, the fixtures, hardware, controls, or operational changes described in these EEMs should be considered when replacing an existing fixture or unit for other reasons. For example, replacing an existing window with a triple-pane window may not be cost effective based only on energy use, but if a window is going to be replaced for some other reason, then the basis for a decision is only the incremental cost of upgrading from a less efficient replacement window to a more efficient replacement window. That incremental cost difference will have a significantly shorter payback, especially since the installation costs are likely to be the same for both units.

The following measures were not found to be cost-effective:						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
14	Lighting: Main Shop	Replace with 5 FLUOR (4) T8 4' F32T8 25W Energy-Saver (2) Instant StdElectronic	$156	$1,000	0.96	6.4
15	Exterior Door: Metal 1/4 lite	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$41	$1,071	0.89	26
16	Window/Skylight: Dbl Alum Therm Brk Other	Replace existing window with U-0.22 vinyl window	$289	$5,744	0.86	20
17	Lighting: Hall A, Mezzanine, Part Room, Hall D, Break room, Men's Bathroom, Shower Room, Main Shop, Laundry Room	Replace with 29 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$451	$3,828	0.73	8.5
18	Lighting: Mezzanine Office, Tool Room, Server Room, Men's Bathroom, Main Shop	Replace with 10 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$156	$1,320	0.73	8.5

The following measures were not found to be cost-effective:						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
19	Lighting: Hall C, Main Shop	Replace with 9 FLUOR (4) T8 4' F32T8 32W Standard Instant StdElectronic	$194	$1,800	0.67	9.3
20	Exterior Door: Metal 1/2 Lite	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$28	$1,064	0.62	38
21	Window/Skylight: Double Wood/Vinyl >3/8: Other	Replace existing window with U-0.22 vinyl window	$191	$5,947	0.55	31
22	Lighting: Tool Room, Main Shop, Water Shop	Replace with 4 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$58	$800	0.45	14
23	Lighting: Hall A, Shop Office, Water Shop	Replace with 13 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$190	$2,600	0.45	14
24	Window/Skylight: Triple Vinyl Other	Replace existing window with U-0.22 vinyl window	$87	$3,955	0.38	46
25	Lighting: Hall B	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$14	$264	0.32	20
26	Lighting: Hall A, Hall C, Part Room, Hall D, Break room, Dressing Room, Men's Bathroom, Shower Room	Replace with 13 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$88	$1,716	0.32	20
27	Exterior Door: Flush Metal 2" Foam	Remove existing door and install standard pre-hung U-0.16 insulated door, including hardware.	$35	$2,666	0.31	75
28	Lighting: Plans Room, Conference, Wood Shop	Replace with 5 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$52	$1,000	0.28	19
29	Window/Skylight: Triple Vinyl South	Replace existing window with U-0.22 vinyl window	$21	$1,316	0.27	64
30	Cathedral Ceiling: House	Install R-14 rigid board insulation. No cost included for covering insulation.	$5,831	$509,435	0.27	87
31	Lighting: Claire's Office, Storage A	Replace with 8 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$42	$1,056	0.22	25
32	Lighting: Water Office, Main Water Office, Boiler Room	Replace with 10 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$52	$1,320	0.22	25

The following measures were not found to be cost-effective:						
Rank	Feature/ Location	Improvement Description	Estimated Annual Energy Savings	Estimated Installed Cost	Savings to Investment Ratio, SIR	Simple Payback (Years)
33	Lighting: Claire's Office	Replace with 4 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$30	$800	0.20	27
34	Lighting: Claire's Office	Replace with 2 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$10	$400	0.13	42
35	Above-Grade Wall: House	Install R-30 rigid foam board to exterior and cover with T1-11 siding or equivalent.	$3,385	$604,478	0.13	180
36	Lighting: Plans Room, Conference, Wood Shop	Replace with 10 FLUOR (4) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$50	$2,000	0.14	40
37	Lighting: Boiler Room	Replace with FLUOR (4) T8 4' F32T8 25W Energy-Saver (2) Instant StdElectronic	$5	$200	0.13	43
38	Lighting: Chris's Office	Replace with 2 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$5	$264	0.10	57
39	Lighting: Stair A & B, Mezzanine Office, Water Office, Water Hallway, Main Water Office, Wood Shop, Water Shop, Boiler Room	Replace with 27 FLUOR (2) T8 4' F32T8 25W Energy-Saver Instant StdElectronic	$62	$3,564	0.09	58

Appendix C Significant Equipment List

HVAC Equipment

Equipment	Manufacturer	Model No.	Fuel Type	Notes
Boiler	Weil McLain	88 Series	#2	Two redundant boilers
Wood Shop Unit Heaters	Westinghouse	134FR18T12	Electric	Two units
Main Shop Unit Heaters	AO Smith motor	206VC24J12	Electric	Four units
Circulation Pump	Grundfos	80-160	Electric	Two units
Circulation Pump	Grundfos	50-160	Electric	Two units
AHU 1	Trane	MCCA006	Electric	not in use
Combustion air fan	AO Smith motor		Electric	1/2 hp
Main Shop Unit Heaters	n/a	n/a	Electric	1/4 hp
Storage Unit Heaters	n/a	n/a	Electric	1/4 hp
AHU 2	Trane	CLCM-1M-15A	Electric	not in use
AHU 3	Trane	CLCM-1M-15A	Electric	not in use
Waste oil burner	Clean Burn	CB 525	waste	n/a
Fan motor	Marathon	n/a	Electric	2 hp
Exhaust motor	Fasco	n/a	Electric	1/3 hp
Oil pump motor	n/a	n/a	Electric	1/6 hp
Waste oil burner	Sunfire	FLA 495	waste	n/a
Fan motor	n/a	n/a	Electric	1 1/2 hp
Burner motor	n/a	n/a	Electric	1/8 hp
Water Heater	Copperglas	2.8-G-90-A-0	#2	90 gal tank
Circulation Pump	Grundfos	UP 15-42	Electric	n/a

Lighting

Location	Lighting Type	Bulb Type	Quantity	KWH/YR	Cost/YR
Shops	Metal Halide	400 W	47	65654	$ 11,161
Main Shop	Metal Halide	400 W	8	31290	5,319
Exterior	High Pressure Sodium	250 W	6	7356	1251
Office	Fluorescent	T12	58	6096	1,036
Mezzanine	Fluorescent	T12	18	5050	859
Office	Fluorescent	T12	54	4279	727
Office	Fluorescent	T12	52	4120	700
Main Shop	Fluorescent	T12	36	3783	643
Exterior	LED	100W	7	3565	606
Office	Fluorescent	T12	40	3169	539
Office/Shop	Fluorescent	T12	24	2522	429
Office/Shop	Fluorescent	T12	20	2102	357
Office/Shop	Fluorescent	T12	20	2102	357
Office	Fluorescent	T12	20	2102	357
Shops	Fluorescent	T12	20	2102	357
Office	LED	40 W	14	2071	352
Office	Fluorescent	T12	26	2060	350
Office	Fluorescent	T12	16	1682	286
Exterior	Metal Halide	70 W	4	1402	238
Shops	Fluorescent	T12	16	1268	216
Exterior	LED	48 W	5	1243	211
Exit	Fluorescent	14	10	1227	209
Office	Fluorescent	T12	16	1177	200
Sauna	Halogen	60 W	2	1052	179
Office	Fluorescent	T12	8	634	108
Storage/RR	Halogen	60 W	4	626	106
Hall	Fluorescent	T12	2	533	91
Boiler	Fluorescent	T12	4	317	54
Hall	Fluorescent	T12	4	317	54
Office	Fluorescent	T12	4	317	54
Break room	Incandescent	40 W	2	209	36
Shops	Fluorescent	T8	2	150	26
Bathroom	Fluorescent	CFL	4	115	20
Boiler	Fluorescent	14 W	1	37	6
Bathroom	Fluorescent	14 W	2	37	6

Energy Consumption calculated by AkWarm based on wattage, schedule, and an electricity rate of $0.17/kWh

Plug Loads

Equipment	Location	Manufacturer	KWH/YR	Cost/YR
Head bolt	Exterior	n/a	13774	$ 2,342
Telephone System	Server Room	n/a	5523	939
Sauna heater	Sauna	n/a	4686	797
Air Compressors	Shops	n/a	4592	781
Computer Towers	Offices	n/a	2922	497
Desktop Printers	Offices	n/a	1837	312
Welders	Shops	n/a	1748	297
Computer Monitors	Offices	n/a	1565	266
Space Heaters	Offices	n/a	1562	266
Washing Machine	Shops	Speed Queen	1534	261
Misc. tools	Shops	n/a	1526	259
Coffee Makers	Offices	n/a	704	120
Laptops	Offices	n/a	587	100
Hand Dryer	Bathrooms	n/a	470	80
Microwaves	Offices	n/a	459	78
Multi-use workstations	Offices	n/a	344	58
Fans	Offices	n/a	148	25
Humidifier	Offices	n/a	73	12
Electronic air purifier	Offices	n/a	52	9

Energy Consumption calculated by AkWarm based on wattage, schedule, and an electricity rate of $0.17/kWh

Appendix D Local Utility Rate Structure

The information in this section was provided directly from the local utility or gathered from the local utility's publicly available information at the time of the audit. All language used in this section was provided by the local utility and believed to be current at the time of the audit. Energy use terms, specific fees, and other specific information are subject to change. Updated rate structure information should be gathered from the utility during future discussion of rates, rate structures and utility pricing agreements.

Bethel Utilities Corporation Rate Structure for March 1, 2011 bill:

RATE TYPE		
Customer Charge		$42.93
Demand Charge		$30.02/KW
Energy Charge		$0.2925/KWH
Power Adjustment Surcharge		$0.0820/KWH
RCC		$0.000552/KWH
PCE	(minus)	$0.2874/KWH
Effective Rate (Total Less PCE)		$0.165/KWH

*****The effective rate is all of the charges totaled together and divided by the kilowatt hour used.**

Buildings owned by the city of Bethel qualify for the Power Cost Equalization program. Bethel Utilities Corporation is eligible for payment up 70 KWH per person. Due to this calculation, 100% of the KWH used by city buildings in Bethel qualifies for an adjustment.

Customer Charge

A flat fee that covers costs for meter reading, billing and customer service.

Utility Charge (kWh charge)

This charge is multiplied by the number of kilowatt-hours (kWh) used in a monthly billing period. It covers the costs to maintain power plants and substations, interest on loans as well as wires, power poles and transformers.

Fuel and Purchased Power

This charge is based on a combination of forecasted and actual power costs. The monthly charge allows Golden Valley to pass on increases and decreases in fuel and energy purchases to our members. It is calculated quarterly and multiplied by the kilowatt-hours used each month.

Regulatory Charge

This charge of .000492 per kWh is set by the Regulatory Commission of Alaska (RCA). Since November 1, 1992, the Regulatory Commission of Alaska has been funded by a Regulatory Charge to the utilities it regulates rather than through the State general fund. The charge, labeled "Regulatory Cost Charge." on your bill, is set by the RCA, and applies to all retail kilowatt-hours sold by regulated electric utilities in Alaska.

Appendix E Analysis Methodology

Data collected was processed using AkWarm energy use software to estimate current energy consumption by end usage and calculate energy savings for each of the proposed energy efficiency measures (EEMs). In addition, separate analysis may have been conducted to evaluate EEMs that AkWarm cannot effectively model to evaluate potential reductions in annual energy consumption. Analyses were conducted under the direct supervision of a Certified Energy Auditor, Certified Energy Manager, or a Professional Engineer.

EEMs are evaluated based on building use, maintenance and processes, local climate conditions, building construction type, function, operational schedule and existing conditions. Energy savings are calculated based on industry standard methods and engineering estimations. Each model created in AkWarm is carefully compared to existing utility usage obtained from utility bills. The AkWarm analysis provides a number of tools for assessing the cost effectiveness of various improvement options. The primary assessment value used in this audit report is the Savings/Investment Ratio (SIR). The SIR is a method of cost analysis that compares the total cost savings through reduced energy consumption to the total cost of a project over its assumed lifespan, including both the construction cost and ongoing maintenance and operating costs. Other measurement methods include Simple Payback, which is defined as the length of time it takes for the savings to equal the total installed cost and Breakeven Cost, which is defined as the highest cost that would yield a Savings/Investment Ratio of one.

EEMs are recommended by AkWarm in order of cost-effectiveness. AkWarm first calculates individual SIRs for each EEM, and then ranks the EEMs by SIR, with higher SIRs at the top of the list. An individual EEM must have a SIR greater than or equal to one in order to be recommended by AkWarm. Next AkWarm modifies the building model to include the installation of the first EEM and then re-simulates the energy use. Then the remaining EEMs are re-evaluated and ranked again. AkWarm goes through this iterative process until all suggested EEMs have been evaluated.

Under this iterative review process, the savings for each recommended EEM is calculated based on the implementation of the other, more cost effective EEMs first. Therefore, the implementation of one EEM affects the savings of other EEMs that are recommended later. The savings from any one individual EEM may be relatively higher if the individual EEM is implemented without the other recommended EEMs. For example, implementing a reduced operating schedule for inefficient lighting may result in relatively higher savings than implementing the same reduced operating schedule for newly installed lighting that is more efficient. If multiple EEMs are recommended, AkWarm calculates a combined savings.

Inclusion of recommendations for energy savings outside the capability of AkWarm will impact the actual savings from the AkWarm projections. This will almost certainly result in lower energy savings and monetary savings from AkWarm recommendations. The reality is that only so much energy is consumed in a building. Energy savings from one EEM reduces the amount of energy that can be saved from additional EEMs. For example, installation of a lower wattage light bulb does not save energy or money if the bulb is never turned on because of a schedule or operational change at the facility.

Appendix F Audit Limitations

The results of this audit are dependent on the input data provided and can only act as an approximation. In some instances, several EEMs or installation methods may achieve the identified potential savings. Actual savings will depend on the EEM selected, the price of energy, and the final installation and implementation methodology. Competent tradesmen and professional engineers may be required to design, install, or otherwise implement some of the recommended EEMs. This document is an energy use audit report and is not intended as a final design document, operation, and maintenance manual, or to take the place of any document provided by a manufacturer or installer of any device described in this report.

Cost savings are calculated based on estimated initial costs for each EEM. Estimated costs include labor and equipment for the full up-front investment required to implement the EEM. The listed installation costs within the report are conceptual budgetary estimates and should not be used as design estimates. The estimated costs are derived from Means Cost Data, industry publications, local contractors and equipment suppliers, and the professional judgment of the CEA writing the report and based on the conditions at the time of the audit.

Cost and energy savings are approximations and are not guaranteed.

Additional significant energy savings can usually be found with more detailed auditing techniques that include actual measurements of electrical use, temperatures in the building and HVAC ductwork, intake and exhaust temperatures, motor runtime and scheduling, and infrared, air leakage to name just a few. Implementation of these techniques is the difference between a Level III Energy Audit and the Level II Audit that has been conducted.

Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

Appendix G References

Although not all documents listed below are specifically referenced in this report, each contains information and insights considered valuable to most buildings.

Alaska Department of Education and Early Development; Education Support Services/Facilities. (1999). *Alaska School Facilities Preventative Maintenance Handbook.* Juneau, AK: Alaska Department of Education and Early Development.

Alaska Housing Finance Corportation. (2010). *Retrofit Energy Assessment for Loans.* AHFC.

ASHRAE. (1997). *1997 ASHRAE Handbook: Fundamentals.* Atlanta, GA: ASHRAE.

ASHRAE. (2007). *ASHRAE Standard 105-2007 Expressing and Comparing Building Energy Performance.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2007). *ASHRAE Standard 90.1-2007 Energy Standards for buildings Except Low-Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.1-2010 Ventilaton for Acceptable Indoor Air Quality.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE. (2010). *ASHRAE Standard 62.2-2010 Ventilation and Acceptable Indoor Air Quality in Low Rise Residential Buildings.* Retrieved from ASHRAE: www.ashrae.org

ASHRAE RP-669 and SP-56. (2004). *Procedures for Commercial Building Energy Audits.* Atlanta, GA: ASHRAE.

Coad, W. J. (1982). *Energy Engineering and Management for Building Systems.* Scarborough, Ontario, Canada: Van Nostrand Reinhold Company.

Daley, D. T. (2008). *The Little Black Book of Reliability Management.* New York, NY: Industrial Press, Inc.

Federal Energy Management Program. (2004, March 3). *Demand Controlled Ventilation Using CO2 Sensors.* Retrieved 2011, from US DOE Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/femp/pdfs/fta_co2.pdf

Federal Energy Management Program. (2006, April 26). *Low-Energy Building Design Guidelines.* Retrieved 2011, from Department of Energy; Federal Energy Management Program: http://www.eren.doe.gov/femp/

Institute, E. a. (2004). *Variable Speed Pumping: A Guide to Successful Applications.* Oxford, UK: Elsevier Advanced Technology.

International Code Council. (2009). *International Energy Conservation Code.* Country Club Hills, IL: International Code Council, Inc.

Leach, M., Lobato, C., Hirsch, A., Pless, S., & Torcellini, P. (2010, September). *Technical Support Document: Strategies for 50% Energy Savings in Large Office Buildings.* Retrieved 2011, from National Renewable Energy Laboratory: http://www.nrel.gov/docs/fy10osti/49213.pdf

Thumann, P.E., C.E.M., A., Younger, C.E.M., W. J., & Niehus, P.E., C.E.M., T. (2010). *Handbook of Energy Audits Eighth Edition.* Lilburn, GA: The Fairmont Press, Inc.

U.S. Energy Information Administration. (2006). *Commercial Building Energy Consumption Survey (CBECS).* Retrieved 2011, from Energy Information Administration: http://www.eia.gov/emeu/cbecs/

Appendix H Typical Energy Use and Cost – Fairbanks and Anchorage

This report provides data on typical energy costs and use on selected building in Fairbanks and Anchorage, Alaska for comparative purposes only. The values provided by the US Energy Information Administration CBECS study included a broader range of building types for the Continental U.S. are not necessarily good comparatives for buildings and conditions in Alaska. An assortment of values from CBECS may be found in Appendix I.

The Alaska data described in this report came from a benchmarking study NORTECH and other Technical Services Providers (TSPs) completed on publicly owned buildings in Alaska under contract with AHFC. This study acquired actual utility data for municipal buildings and schools in Alaska for the two recent full years. The utility data included costs and quantities including fuel oil, electricity, propane, wood, steam, and all other energy source usage. This resulted in a database of approximately 900 buildings. During the course of the benchmarking study, the comparisons made to the CBECS data appeared to be inappropriate for various reasons. Therefore, this energy use audit report references the average energy use and energy cost of Anchorage and Fairbanks buildings as described below.

The Alaska benchmarking data was evaluated in order to find valid comparison data. Buildings with major energy use information missing were eliminated from the data pool. After detailed scrutiny of the data, the most complete information was provided to NORTECH by the Fairbanks North Star Borough School District (FNSBSD) and the Anchorage School District (ASD). The data sets from these two sources included both the actual educational facilities as well as the district administrative buildings and these are grouped together in this report as Fairbanks and Anchorage schools. These two sources of information, being the most complete and reasonable in-state information, have been used to identify an average annual energy usage for Fairbanks and for Anchorage in order to provide a comparison for other facilities in Alaska.

Several factors may limit the comparison of a specific facility to these regional indicators. In Fairbanks, the FNSBSD generally uses number two fuel oil for heating needs and electricity is provided by Golden Valley Electric Association (GVEA). GVEA produces electricity from a coal fired generation plant with additional oil generation upon demand. A few of the FNSBSD buildings in this selection utilize district steam and hot water. The FNSBSD has recently (the last ten years) invested significantly in envelope and other efficiency upgrades to reduce their operating costs. Therefore a reader should be aware that this selection of Fairbanks buildings has energy use at or below average for the entire Alaska benchmarking database.

Heating in Anchorage is through natural gas from the nearby natural gas fields. Electricity is also provided using natural gas. As the source is nearby and the infrastructure for delivery is in place, energy costs are relatively low in the area. As a result, the ASD buildings have lower energy costs, but higher energy use, than the average for the entire benchmarking database.

These special circumstances should be considered when comparing the typical annual energy use for particular buildings.

Appendix I Typical Energy Use and Cost – Continental U.S.

Released: Dec 2006

Next CBECS will be conducted in 2007

Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003

	All Buildings*			Sum of Major Fuel Consumption			
	Number of Buildings (thousand)	Floor space (million square feet)	Floor space per Building (thousand square feet)	Total (trillion BTU)	per Building (million BTU)	per Square Foot (thousand BTU)	per Worker (million BTU)
All Buildings*	4,645	64,783	13.9	5,820	1,253	89.8	79.9
Building Floor space (Square Feet)							
1,001 to 5,000	2,552	6,789	2.7	672	263	98.9	67.6
5,001 to 10,000	889	6,585	7.4	516	580	78.3	68.7
10,001 to 25,000	738	11,535	15.6	776	1,052	67.3	72.0
25,001 to 50,000	241	8,668	35.9	673	2,790	77.6	75 8
50,001 to 100,000	129	9,057	70.4	759	5,901	83.8	90.0
100,001 to 200,000	65	9,064	138.8	934	14,300	103.0	80.3
200,001 to 500,000	25	7,176	289.0	725	29,189	101.0	105.3
Over 500,000	7	5,908	896.1	766	116,216	129.7	87.6
Principal Building Activity							
Education	386	9,874	25.6	820	2,125	83.1	65.7
Food Sales	226	1,255	5.6	251	1,110	199.7	175.2
Food Service	297	1,654	5.6	427	1,436	258.3	136.5
Health Care	129	3,163	24.6	594	4,612	187.7	94.0
Inpatient	8	1,905	241.4	475	60,152	249.2	127.7
Outpatient	121	1,258	10.4	119	985	94.6	45.8
Lodging	142	5,096	35.8	510	3,578	100.0	207.5
Retail (Other Than Mall)	443	4,317	9.7	319	720	73.9	92.1
Office	824	12,208	14.8	1,134	1,376	92.9	40.3
Public Assembly	277	3,939	14.2	370	1,338	93.9	154.5
Public Order and Safety	71	1,090	15.5	126	1,791	115.8	93.7
Religious Worship	370	3,754	10.1	163	440	43.5	95.6
Service	622	4,050	6.5	312	501	77.0	85.0
Warehouse and Storage	597	10,078	16.9	456	764	45.2	104.3
Other	79	1,738	21.9	286	3,600	164.4	157.1
Vacant	182	2,567	14.1	54	294	20.9	832.1

This report references the Commercial Buildings Energy Consumption Survey (CBECS), published by the U.S. Energy Information Administration in 2006. Initially this report was expected to compare the annual energy consumption of the building to average national energy usage as documented below. However, a direct comparison between one specific building and the groups of buildings outlined below yielded confusing results. Instead, this report uses a comparative analysis on Fairbanks and Anchorage data as described in Appendix F. An abbreviated excerpt from CBECS on commercial buildings in the Continental U.S. is below.

Appendix J List of Conversion Factors and Energy Units

1 British Thermal Unit	is the energy required to raise one pound of water one degree F°
1 Watt	is approximately 3.412 BTU/hr
1 horsepower	is approximately 2,544 BTU/hr
1 horsepower	is approximately 746 Watts
1 "ton of cooling"	is approximately 12,000 BTU/hr, the amount of power required to melt one short ton of ice in 24 hours

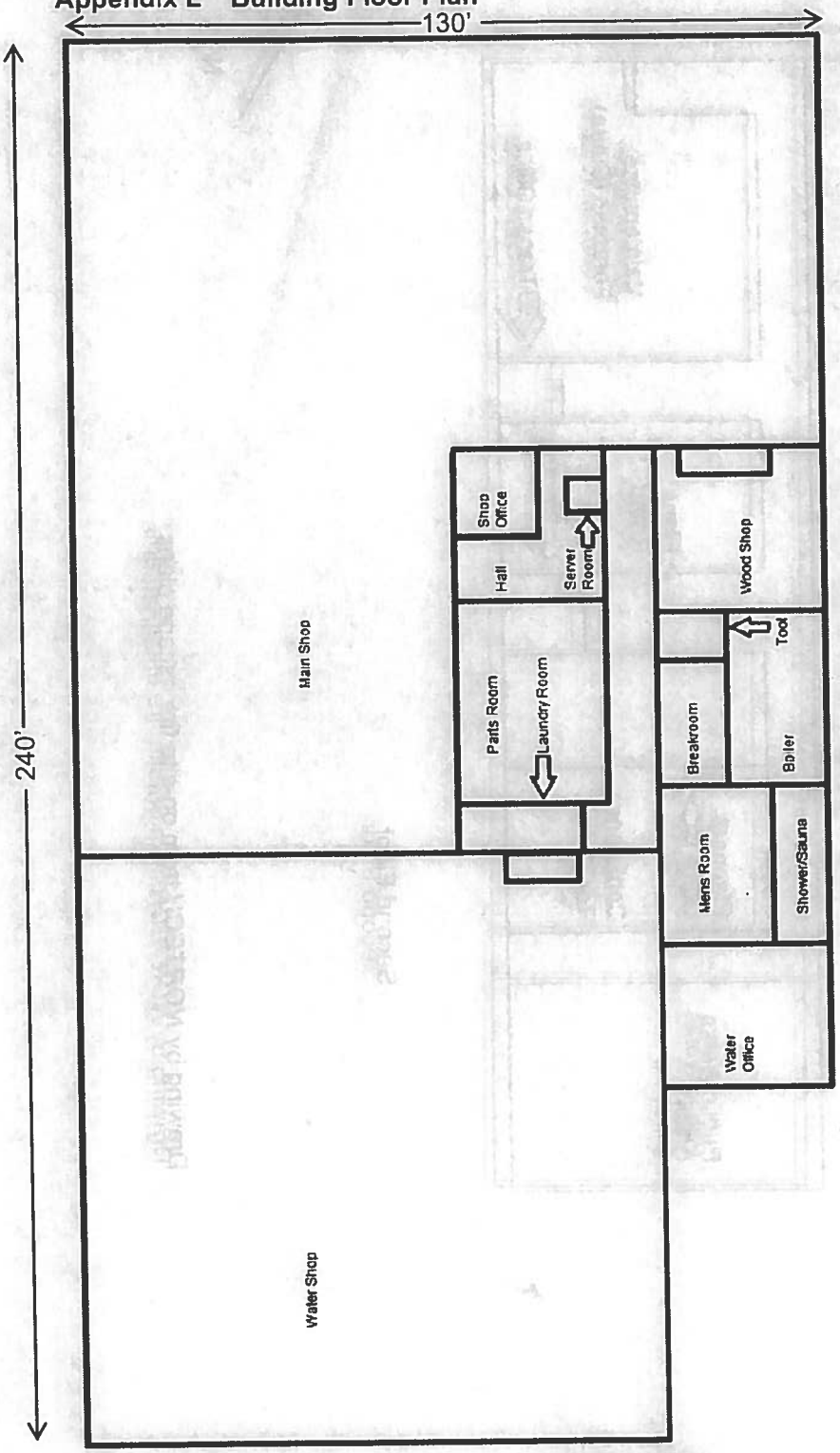
1 Therm	= 100,000 BTU
1 KBTU	= 1,000 BTU
1 KWH	= 3413 BTU
1 KW	= 3413 BTU/Hr
1 Boiler HP	= 33,400 BTU/Hr
1 Pound Steam	= approximately 1000 BTU
1 CCF of natural gas	= approximately 1 Therm
1 inch H2O	= 250 Pascal (Pa) = 0.443 pounds/square inch (psi)
1 atmosphere (atm)	= 10,1000 Pascal (Pa)

BTU	British Thermal Unit
CCF	100 Cubic Feet
CFM	Cubic Feet per Minute
GPM	Gallons per minute
HP	Horsepower
Hz	Hertz
kg	Kilogram (1,000 grams)
kV	Kilovolt (1,000 volts)
kVA	Kilovolt-Amp
kVAR	Kilovolt-Amp Reactive
KW	Kilowatt (1,000 watts)
KWH	Kilowatt Hour
V	Volt
W	Watt

Appendix K List of Acronyms, Abbreviations, and Definitions

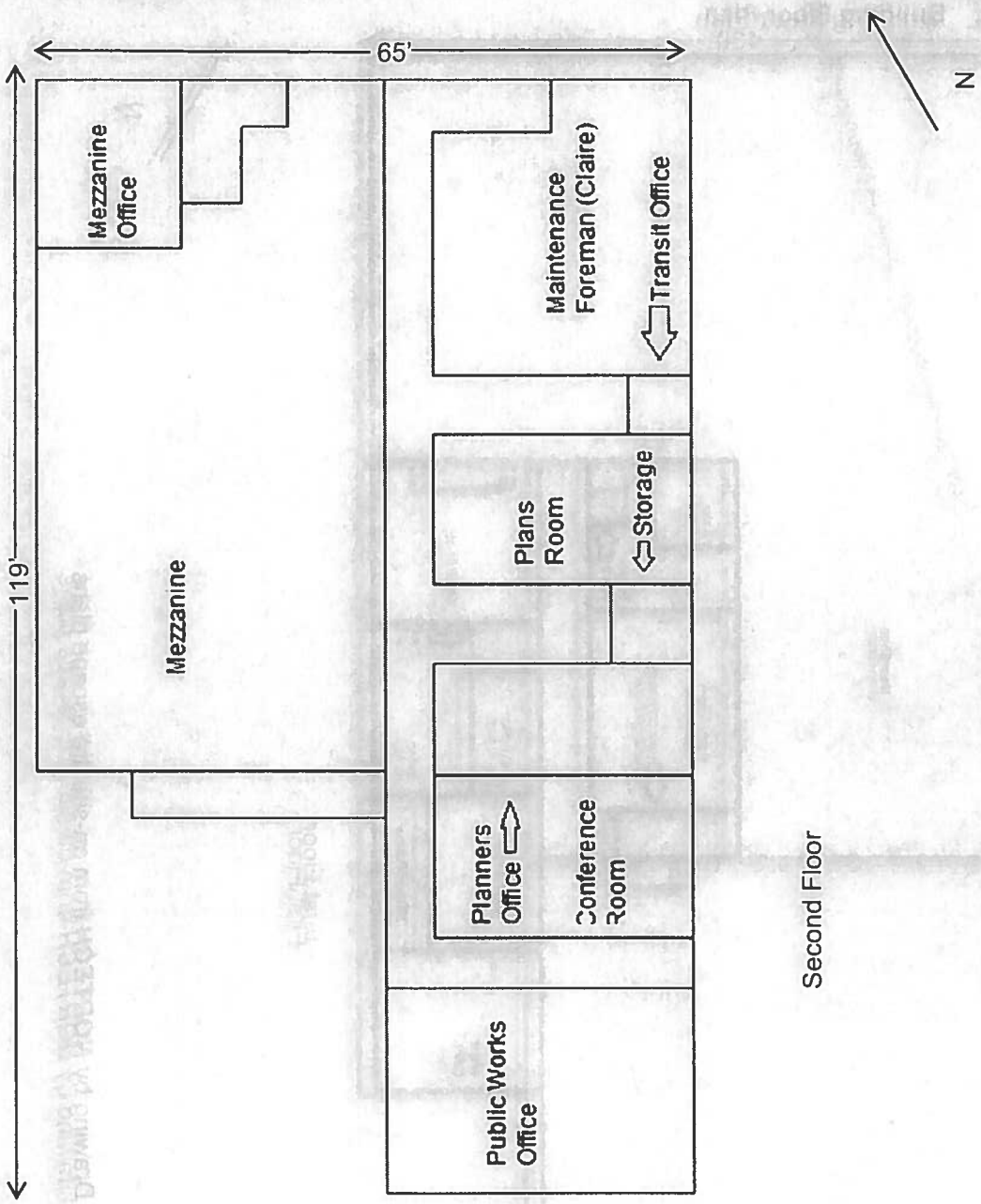
ACH	Air Changes per Hour
AFUE	Annual Fuel Utilization Efficiency
Air Economizer	A duct, damper, and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling.
Ambient Temperature	Average temperature of the surrounding air
Ballast	A device used with an electric discharge lamp to cause the lamp to start and operate under the proper circuit conditions of voltage, current, electrode heat, etc.
CO_2	Carbon Dioxide
CUI	Cost Utilization Index
CDD	Cooling Degree Days
DDC	Direct Digital Control
EEM	Energy Efficiency Measure
EER	Energy Efficient Ratio
EUI	Energy Utilization Index
FLUOR	Fluorescent
Grade	The finished ground level adjoining a building at the exterior walls
HDD	Heating Degree Days
HVAC	Heating, Ventilation, and Air-Conditioning
INCAN	Incandescent
NPV	Net Present Value
R-value	Thermal resistance measured in BTU/Hr-SF-°F (Higher value means better insulation)
SCFM	Standard Cubic Feet per Minute
Savings to Investment Ratio (SIR)	Savings over the life of the EEM divided by Investment capital cost. Savings includes the total discounted dollar savings considered over the life of the improvement. Investment in the SIR calculation includes the labor and materials required to install the measure.
Set Point	Target temperature that a control system operates the heating and cooling system
Simple payback	A cost analysis method whereby the investment cost of an EEM is divided by the first year's savings of the EEM to give the number of years required to recover the cost of the investment.

Appendix L Building Floor Plan



First Floor

Drawing by ***NORTECH*** from on-site fire escape plans



Second Floor

Drawing by ***NORTECH*** from on-site fire escape plans