TALCOT LAKE WILDLIFE MANAGEMENT AREA

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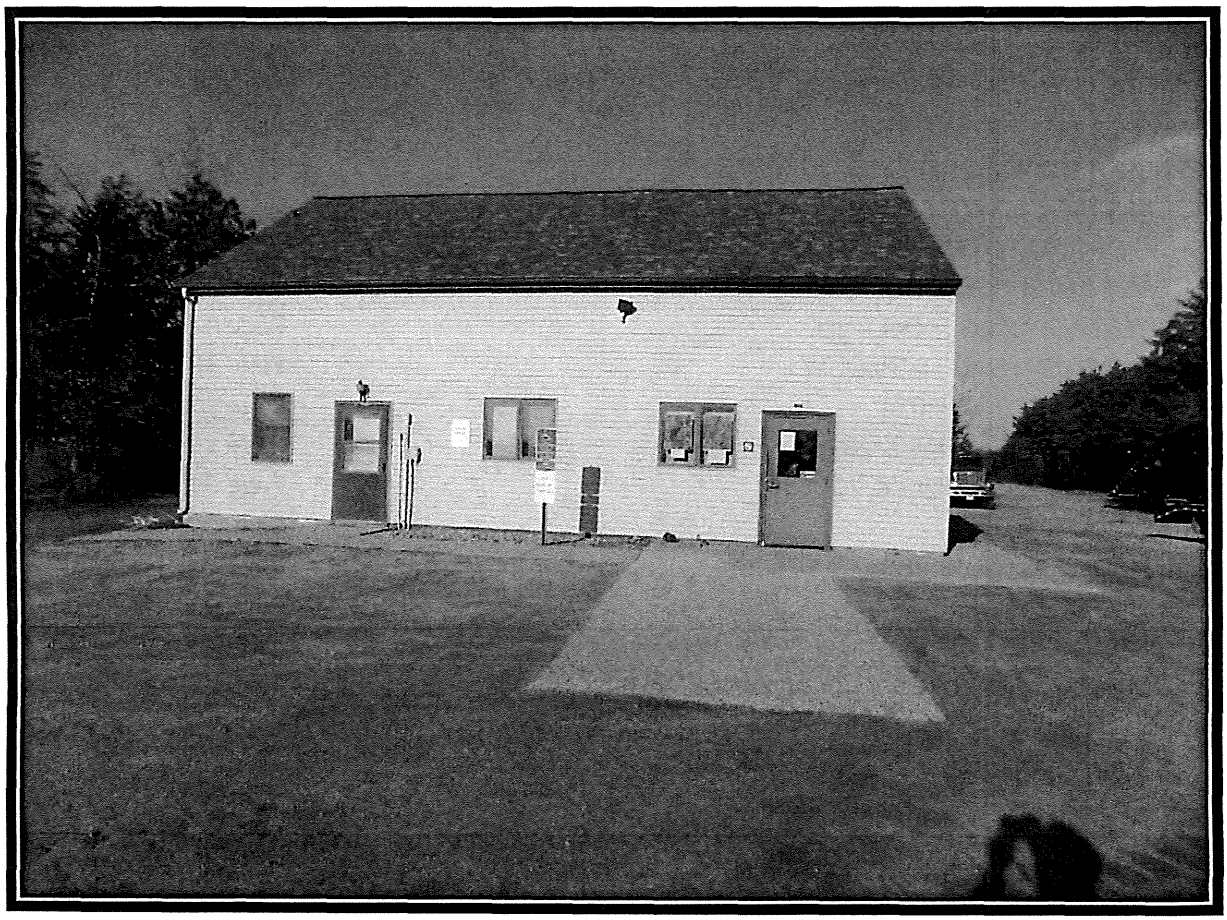

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Consultant's Report

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SYSTEMS CONSIDERED IN AUDIT

OFFICE

Air Conditioning
Building Envelope
Domestic Hot Water
Lighting
Office Equipment
Propane Furnace
Well Pump

DORMITORY

Air Conditioning
Appliances & Equipment
Building Envelope
Domestic Hot Water
Lighting
Propane Furnace

REPAIR SHOP

Building Envelope
Lighting
Propane Furnace
Shop Equipment

OFFICE SUMMARY OF RECOMMENDATIONS

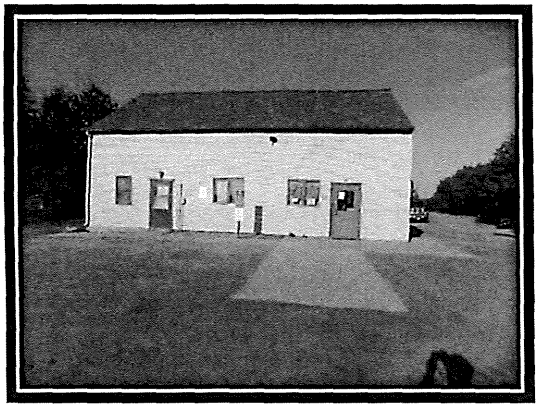
RECOMMENDATIONS	EXISTING MMBTU USAGE	PROPOSED MMBTU USAGE	MMBTU SAVINGS	FUEL OR KWH SAVINGS	DOLLAR SAVINGS	COST	PAYBACK IN YEARS
OFFICE LED	9.05	3.43	5.62	1,654	$ 198.53	$ 2,000.00	$ 10.07
BREAK ROOM LED	3.62	0.91	2.71	796	$ 95.54	$ 750.00	$ 7.85
2ND FLOOR LED	0.07	0.02	0.05	14	$ 1.63	$ 100.00	$ 61.27
FOUNDATION WALLS	9.39	2.93	6.45	67	$ 110.95	$ 1,000.00	$ 9.01
INSULATE ATTIC FLOORS	28.82	6.27	22.56	235	$ 387.73	$ 800.00	$ 2.06
INSULATE KNEEWALLS	23.45	5.41	18.03	188	$ 310.02	$ 400.00	$ 1.29
INSULATE ATTICS	6.95	2.75	4.20	44	$ 72.20	$ 1,800.00	$ 24.93
TOTALS	**81.34**	**21.72**	**59.62**	**2,998**	**$ 1,176.60**	**$ 6,850.00**	**$ 5.82**
SAVINGS PERCENTAGE	**73%**						

DORMITORY SUMMARY OF RECOMMENDATIONS							
RECOMMENDATIONS	EXISTING MMBTU USAGE	PROPOSED MMBTU USAGE	MMBTU SAVINGS	FUEL OR KWH SAVINGS	DOLLAR SAVINGS	COST	PAYBACK IN YEARS
INSTALL LED IN ALL FIXTURES	1.02	0.09	0.93	273	$ 32.76	$ 300.00	$ 9.16
FOUNDATION WALLS	26.07	7.29	18.78	196	$ 322.85	$ 3,920.00	$ 12.14
INSULATE ATTIC FLOORS	17.16	3.48	13.67	142	$ 235.01	$ 600.00	$ 2.55
INSULATE KNEEWALLS	2.68	0.52	2.16	23	$ 37.21	$ 100.00	$ 2.69
INSULATE ATTICS	5.42	0.47	4.95	52	$ 85.05	$ 480.00	$ 5.64
INSULATE PERIMETER WALLS	35.74	1.50	34.24	357	$ 588.62	$ 1,680.00	$ 2.85
TOTALS	**88.08**	**13.35**	**74.74**	**1,042**	**$ 1,301.50**	**$ 7,080.00**	**$ 5.44**
SAVINGS PERCENTAGE	**85%**						

REPAIR SHOP SUMMARY OF RECOMMENDATIONS

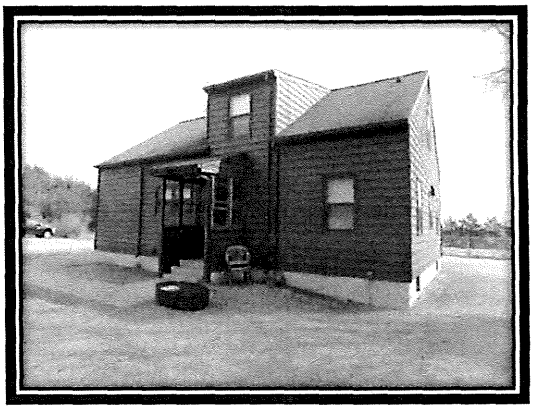
REPAIR SHOP RECOMMENDATIONS	EXISTING MMBTU USAGE	PROPOSED MMBTU USAGE	MMBTU SAVINGS	FUEL OR KWH SAVINGS	DOLLAR SAVINGS	COST	PAYBACK IN YEARS
REPLACE INTERIOR LAMPS WITH LED	4.24	0.91	3.34	979	$ 117.50	$ 1,440.00	$ 12.25
REPLACE EXTERIOR LAMPS WITH LED	1.05	0.42	0.63	185	$ 22.18	$ 300.00	$ 13.53
FIX COMPRESSOR AIR LEAKS	3.81	3.05	0.76	224	$ 26.88	$ 200.00	$ 7.44
REPAIR SHOP DOOR WEATHERSTRIPPING							
TOTALS	**9.10**	**4.38**	**4.74**	**1,388**	**$ 166.56**	**$ 1,940.00**	**$ 11.65**
SAVINGS PERCENTAGE	**52%**						

BUILDING ENVELOPE



Office

The contact station is the base location for several wildlife locations in the area. The building was constructed in 1950 and has approximately 2160 sq. ft. of usable space including the 2nd floor.



Dormitory

The dormitory, built in 1950, is the former ranger home with approximately 1680 sq. ft. of living area first and 2nd floor with a full basement. This is currently used for housing of persons for wildlife studies in the area.

Repair Shop

The heated repair shop is approximately 1800 sq. ft. with a 12' ceiling and used for the maintenance of the numerous park vehicles used by the DNR.

OFFICE HEAT LOSS CALCULATION SHEET

LOCATION	SAVINGS IN HEATING MMBTUS	SAVINGS IN COOLING MMBTUS	SAVINGS IN DOLLARS HEATING	SAVINGS IN DOLLARS COOLING
FOUNDATION WALLS	5.78	0.68	$ 99.27	$ 23.89
INSULATE ATTIC FLOORS	21.07	1.48	$ 362.21	$ 52.20
INSULATE KNEEWALLS	16.85	1.19	$ 289.62	$ 41.74
INSULATE ATTICS	3.92	0.28	$ 67.45	$ 9.72
TOTALS	47.62	3.63	$ 818.55	$ 127.55

DORMITORY HEAT LOSS CALCULATION SHEET

LOCATION	SAVINGS IN HEATING MMBTUS	SAVINGS IN COOLING MMBTUS	SAVINGS IN DOLLARS HEATING	SAVINGS IN DOLLARS COOLING
FOUNDATION WALLS	16.04	1.89	$ 275.69	$ 66.33
INSULATE ATTIC FLOORS	12.54	0.88	$ 215.60	$ 31.07
INSULATE KNEEWALLS	2.04	0.12	$ 35.11	$ 4.30
INSULATE ATTICS	4.90	0.20	$ 84.22	$ 6.87
INSULATE PERIMETER WALLS	32.30	1.27	$ 555.28	$ 44.54
TOTALS	67.82	4.35	$ 1,165.91	$ 153.11

OFFICE HEAT LOSS FROM AIR FLOW

ACPH EXISTING	ACPH PROPOSED	BUILDING COEFFICIENT	HOURS PER DAY	HEATING DEGREE DAYS	COST PER UNIT OF FUEL	HEAT SYSTEM EFFICIENCY	DOLLARS PER YEAR SAVED
0.312181188	0.24484799	0.018	24	8680	1.65	0.92	$ 452.82

	EXISTING	PROPOSED	REDUCTION
Volume of building Cubic Feet	19604		
BLOWER DOOR @ 50pa	2040	1600	440
Air changes per hour @ 50	6.24	4.90	1.35
Air changes per hour natural	0.31	0.24	0.07

DORMITORY HEAT LOSS FROM AIR FLOW

ACPH EXISTING	ACPH PROPOSED	BUILDING COEFFICIENT	HOURS PER DAY	HEATING DEGREE DAYS	COST PER UNIT OF FUEL	HEAT SYSTEM EFFICIENCY	DOLLARS PER YEAR SAVED
0.304529688	0.24484799	0.018	24	8680	1.65	0.92	$401.37

	EXISTING	PROPOSED	REDUCTION
Volume of building Cubic Feet	19604		
BLOWER DOOR @ 50pa	1990	1600	390
Air changes per hour @ 50	6.09	4.90	1.19
Air changes per hour natural	0.30	0.24	0.06

ENERGY PROFILE FUEL BREAKDOWN

OFFICE	MMBTU	PERCENT	USAGE EQUIPMENT
Electrical Usage	30.27	32%	Lighting, Office Equipment, Furnace Fan, Water Heater & Air Conditioning
Gas Usage	63.29	68%	Furnace
TOTAL	**93.56**	100%	

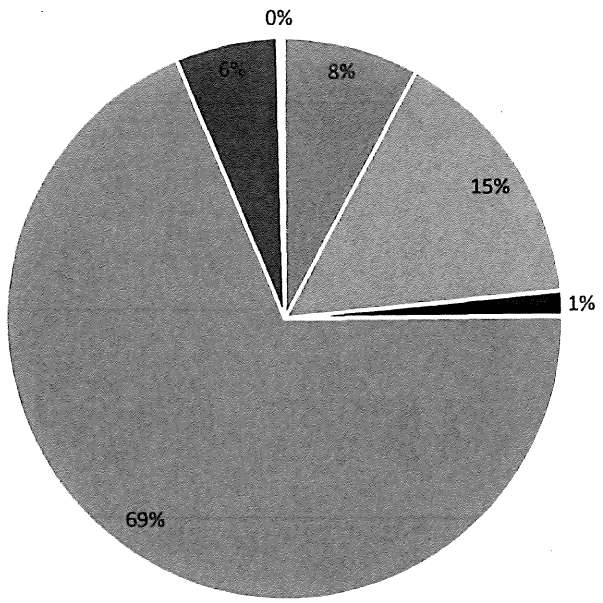
DORMITORY	MMBTU	PERCENT	USAGE EQUIPMENT
Electrical Usage	4.82	100%	Lighting, Furnace Fan & Water Heater
Gas Usage	0.00	0%	Furnace (Not Used)
TOTAL	**4.82**	**100%**	

REPAIR SHOP	MMBTU	PERCENT	USAGE EQUIPMENT
Electrical Usage	23.25	23%	Lighting, Furnace Fan, & Shop Equipment
Gas Usage	78.98	77%	Furnace
TOTAL	**102.23**	**100%**	

OFFICE ESTIMATED COST & PERCENT COMPARISON

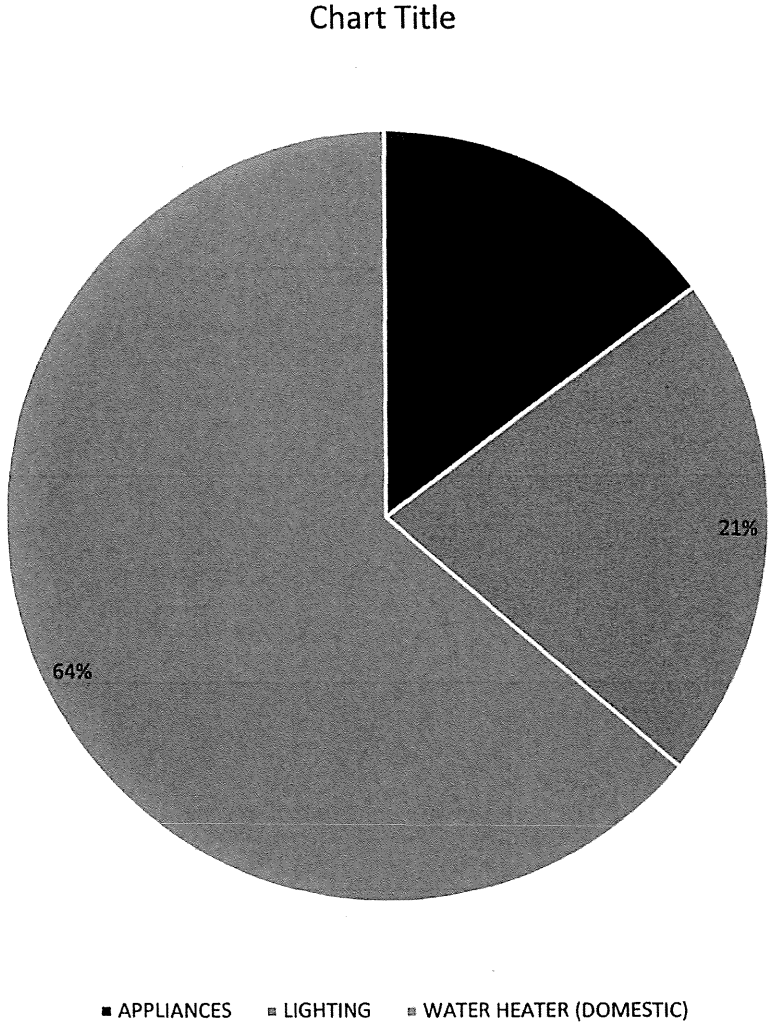
ENERGY USAGE	ESTIMATED COST	ESTIMATED COST BY PERCENT
APPLIANCES	$ 429.00	8%
OFFICE EQUIPMENT	$ 839.20	15%
FURNACE FAN	$ 78.00	1%
LIGHTING	$ 3,729.66	69%
WATER HEATER (DOMESTIC)	$ 324.00	6%
WELL PUMP	$ 20.16	0%
TOTAL	**$ 5,420.02**	**100%**

COMPARISON CHART



DORMITORY ESTIMATED COST & PERCENT COMPARISON

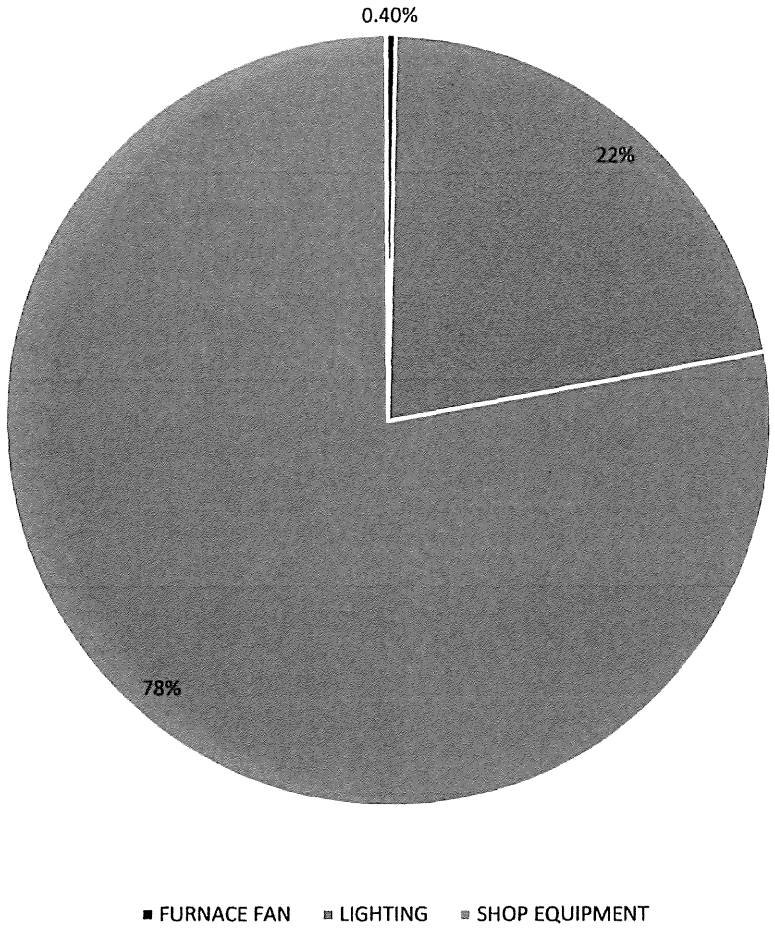
ENERGY USAGE	ESTIMATED COST	ESTIMATED COST BY PERCENT
APPLIANCES	$ 25.20	15%
LIGHTING	$ 36.00	21%
WATER HEATER (DOMESTIC)	$ 108.00	64%
TOTAL	**$ 169.20**	**100%**



REPAIR SHOP ESTIMATED COST & PERCENT COMPARISON

ENERGY USAGE	ESTIMATED COST	ESTIMATED COST BY PERCENT
FURNACE FAN	$ 23.40	0.40%
LIGHTING	$ 1,284.96	22%
SHOP EQUIPMENT	$ 4,603.46	78%
TOTAL	**$ 5,911.82**	**100%**

COMPARISON CHART



OFFICE ENERGY USAGE SCHEDULE

		EXISTING						PROPOSED			
LOCATION	LAMP / EQUIPMENT	QUANT	EXIST KW	HRS PER YEAR	ANNUAL TOTAL KWH EXISTING	RETRO FIT TYPE	MOTION SENSOR	TOTAL KWH PROPOSED	HOURS PER YEAR PROPOSED	ANNUAL TOTAL KWH PROPOSED	ANNUAL SAVINGS KWH
OFFICE	4'- T8	40	0.03	2,080	2,662	LED	YES	0.01	1,800	1,008	1,654
BREAK ROOM	4'-T8	16	0.03	2,080	1,065	LED	YES	0.01	1,200	269	796
2ND FLOOR	2'-T8	8	0.02	100	19	LED	YES	0.01	50	6	14
BREAK ROOM	REFRIGERATOR	1	0.33	1,200	390	NA	NA	0.33	1,200	390	0
BREAK ROOM	FREEZER	1	0.33	1,000	325	NA	NA	0.33	1,000	325	0
OFFICE	COMPUTER	2	0.20	2,080	832	NA	NA	0.20	2,080	832	0
OFFICE	COPIER	1	0.30	200	60	NA	NA	0.30	200	60	0
MECHNICAL RM	FURNACE FAN	1	0.33	2,000	650	NA	NA	0.33	2,000	650	0
MECHNICAL RM	WATERHEATER	1	4.50	600	2,700	NA	NA	4.50	600	2,700	0
WELL	WELL PUMP	1	0.56	300	168	NA	NA	0.56	300	168	0
TOTAL			**6.62**		**8,872**			**6.58**		**6,407**	**2,464**

DORMITORY ENERGY USAGE SCHEDULE

EXISTING						PROPOSED					
LOCATION	LAMP / EQUIPMENT	QUANT	EXIST KW	HRS PER YEAR	ANNUAL TOTAL KWH EXISTING	RETRO FIT TYPE	MOTION SENSOR	TOTAL KWH PROPOSED	HOURS PER YEAR PROPOSED	ANNUAL TOTAL KWH PROPOSED	ANNUAL SAVINGS KWH
HOUSE	60 W INCAN	10	0.06	500	300	LED	YES	0.01	300	27	273
HOUSE	REFRIGERATOR	1	0.35	600	210	NA	NA	0.35	600	210	0
HOUSE	MISC EQUIP	1	0.04	100	4	NA	NA	0.04	100	4	0
HOUSE	WATERHEATER	1	4.50	200	900	NA	NA	4.50	200	900	0
TOTAL			**4.95**		**1,414**			**4.89**		**1,141**	**273**

REPAIR SHOP ENERGY USAGE SCHEDULE

		EXISTING				PROPOSED					
LOCATION	LAMP / EQUIPMENT	QUANT	EXIST KW	HRS PER YEAR	ANNUAL TOTAL KWH EXISTING	RETRO FIT TYPE	MOTION SENSOR	TOTAL KWH PROPOSED	HOURS PER YEAR PROPOSED	ANNUAL TOTAL KWH PROPOSED	ANNUAL SAVINGS KWH
SHOP	8'-T12	24	0.07	800	1,248	LED	YES	0.03	400	269	979
SHOP	HID SODIUM	2	0.07	2,200	308	LED	NO	0.03	2,200	123	185
SHOP	WELDER	1	4.00	20	80	NA	NA	4.00	20	80	0
SHOP	COMPRESSOR	1	5.60	200	1,120	REPAIR LEAKS	NA	5.60	160	896	224
SHOP	FURNACE FAN	1	0.33	600	195	NA	NA	0.33	600	195	0
GRAIN DRYING	RAIN DRYING FA	2	2.24	700	3,136	NA	NA	2.24	700	3,136	0
GRAIN DRYING	4'-T8	16	0.03	400	205	NA	NA	0.03	400	205	0
GRAIN DRYING	EXHAUST	1	0.75	700	522	NA	NA	0.75	700	522	0
TOTAL			**13.08**		**6,814**			**13.00**		**5,426**	**1,388**

OFFICE USAGE DATA 2013 & 2014

2013	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,493	0	0	$ -	130	$ 168.70
February	1,325	0	0	$ -	127	$ 165.45
March	1,240	0	0	$ -	80	$ 105.17
April	842	1	0	$ -	50	$ 65.83
May	291	36	0	$ -	46	$ 66.99
June	55	147	0	$ -	33	$ 62.73
July	20	253	0	$ -	34	$ 64.82
August	9	212	0	$ -	34	$ 64.82
September	83	130	0	$ -	33	$ 62.73
October	540	7	0	$ -	34	$ 64.82
November	990	0	0	$ -	33	$ 62.73
December	1,649	0	0	$ -	24	$ 42.16
2013 TOTALS	**8,537**	**786**	**0**	**$ -**	**659**	**$ 996.95**

2014	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,624	0	0	$ -	14	$ 17.98
February	1,480	0	0	$ -	13	$ 16.24
March	1,153	0	0	$ -	14	$ 17.98
April	652	0	0	$ -	14	$ 17.40
May	277	70	0	$ -	14	$ 17.98
June	22	133	0	$ -	14	$ 17.40
July	26	153	0	$ -	14	$ 17.98
August	9	173	0	$ -	14	$ 17.98
September	154	59	0	$ -	14	$ 17.40
October	470	0	0	$ -	14	$ 17.98
November	1,218	0	0	$ -	5	$ 6.96
December	1,262	0	0	$ -	0	$ -
2014 TOTALS	**8,347**	**588**	**0**	**$ -**	**143**	**$ 183.30**

DORMITORY USAGE DATA 2013 & 2014

2013	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,493	0	517	$ 62.04	0	$ -
February	1,325	0	403	$ 48.36	0	$ -
March	1,240	0	980	$ 117.60	0	$ -
April	842	1	1,320	$ 158.40	0	$ -
May	291	36	930	$ 111.60	0	$ -
June	55	147	810	$ 97.20	0	$ -
July	20	253	1,190	$ 142.80	0	$ -
August	9	212	1,213	$ 145.56	0	$ -
September	83	130	1,241	$ 148.92	0	$ -
October	540	7	3,676	$ 441.12	0	$ -
November	990	0	0	$ -	0	$ -
December	1,649	0	1,120	$ 134.40	0	$ -
2013 TOTALS	**8,537**	**786**	**13,400**	**$ 1,608.00**	**0**	**$ -**

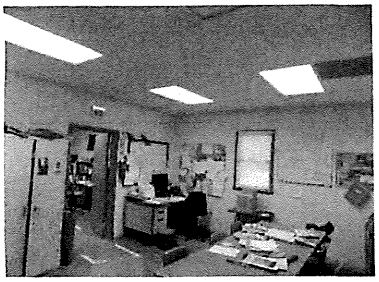
2014	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,624	0	1,050	$ 126.00	0	$ -
February	1,480	0	740	$ 88.80	0	$ -
March	1,153	0	1,010	$ 121.20	0	$ -
April	652	0	900	$ 108.00	0	$ -
May	277	70	920	$ 110.40	0	$ -
June	22	133	750	$ 90.00	0	$ -
July	26	153	1,030	$ 123.60	0	$ -
August	9	173	830	$ 99.60	0	$ -
September	154	59	4,520	$ 542.40	0	$ -
October	470	0	1,660	$ 199.20	0	$ -
November	1,218	0	660	$ 79.20	0	$ -
December	1,262	0	970	$ 116.40	0	$ -
2014 TOTALS	**8,347**	**588**	**15,040**	**$ 1,804.80**	**0**	**$ -**

REPAIR SHOP USAGE DATA 2013 & 2014

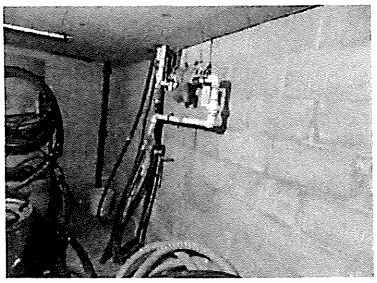
2013	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,493	0	0	$ -	115	$ 149.07
February	1,325	0	0	$ -	112	$ 145.60
March	1,240	0	0	$ -	69	$ 90.50
April	842	1	0	$ -	42	$ 55.00
May	291	36	0	$ -	37	$ 53.05
June	55	147	0	$ -	23	$ 43.64
July	20	253	0	$ -	24	$ 45.09
August	9	212	0	$ -	24	$ 45.09
September	83	130	0	$ -	23	$ 43.64
October	540	7	0	$ -	24	$ 45.09
November	990	0	0	$ -	23	$ 43.64
December	1,649	0	0	$ -	105	$ 269.73
2013 TOTALS	**8,537**	**786**	**0**	**$ -**	**619**	**$1,029.13**

2014	HDD (MN6131)	CDD (MN6131)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE COST
January	1,624	0	0	$ -	191	$ 509.35
February	1,480	0	0	$ -	156	$ 261.19
March	1,153	0	0	$ -	133	$ 181.24
April	652	0	0	$ -	13	$ 16.48
May	277	70	0	$ -	13	$ 17.03
June	22	133	0	$ -	13	$ 16.48
July	26	153	0	$ -	13	$ 17.03
August	9	173	0	$ -	13	$ 17.03
September	154	59	0	$ -	13	$ 16.48
October	470	0	0	$ -	13	$ 17.03
November	1,218	0	0	$ -	95	$ 74.09
December	1,262	0	0	$ -	155	$ 116.25
2014 TOTALS	**8,347**	**588**	**0**	**$ -**	**823**	**$ 1,259.69**

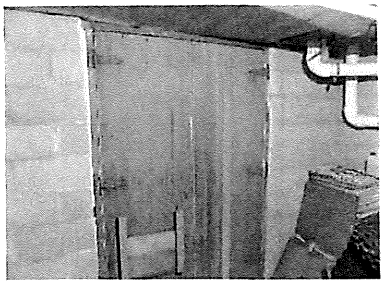
OFFICE PHOTOGRAPHS



Replace existing lighting with Linear LED lamps in the office.

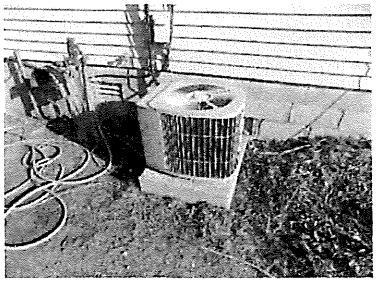


Insulate the walls with 1 1/2" thermax caulked air tight in the basement which is the southwest corner.

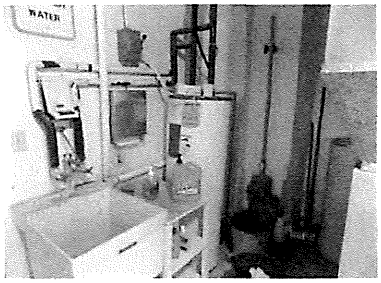


The entry door to base could be insulated and weather stripped & weather tight to exterior.

The duct work to existing high efficiency furnace could be caulked or metal taped at the seams.

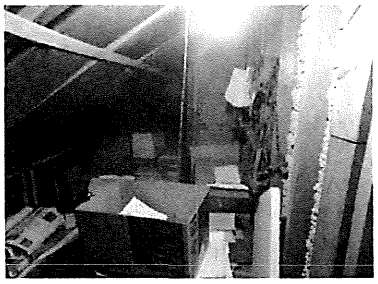


Seer 10 air conditioner for the office.



Insulate the hot water lines to electric domestic hot water heater.

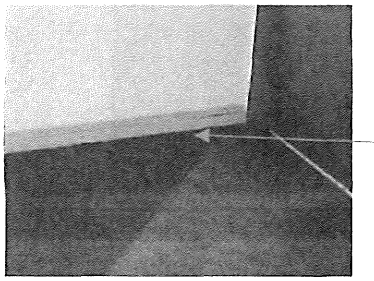
Knee wall located in the north attic storage area could be insulated to R-19 as well as dense packing the floors



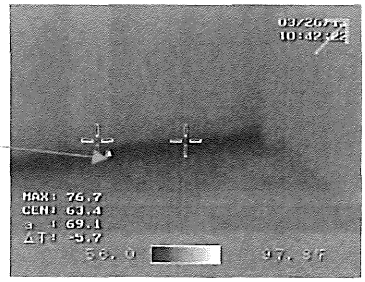
Side attics on the west knee walls need insulation as well as the floor below. Be sure to block under the knee walls.

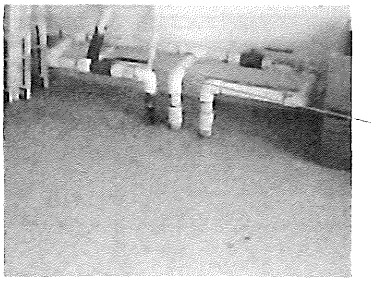
The entire attic above the 2nd floor could be insulated with 10" blown cellulose fiber. Seal all attic bypasses

OFFICE INFRARED PHOTOGRAPHS

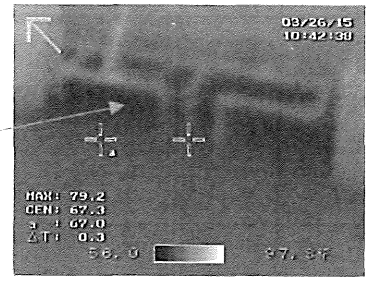


Exterior perimeter seals should be caulked where they meet concrete slab.

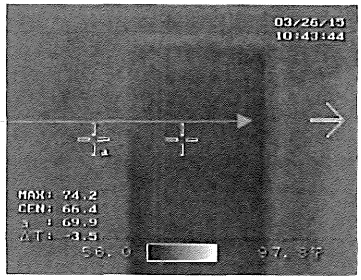


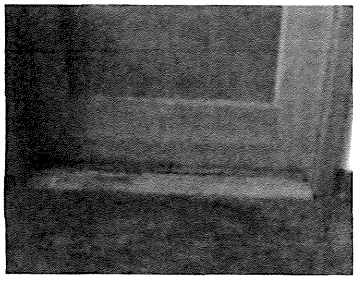


Leakage from seals by water inlet lines.

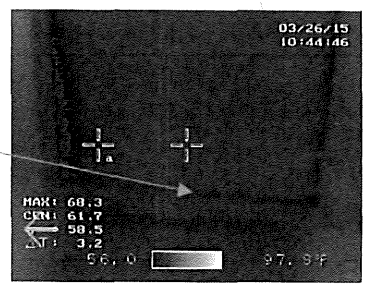


Attic access door needs to be insulated and weather-stripped. The frames should be caulked airtight.



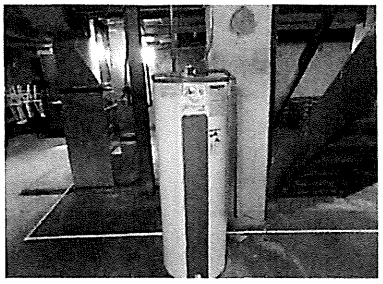


Door sweeps should also be installed on the attic access doors. A bump up threshold could be installed as an alternate.

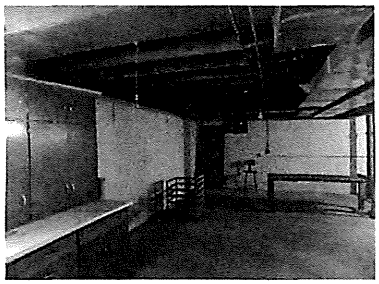


DORMITORY PHOTOGRAPHS

Tape the seems, if possible, on this high efficiency furnace located in the dormitory. It was installed in 2010.



The dormitory electric water heater is located in the basement. Hot water lines could be insulated.

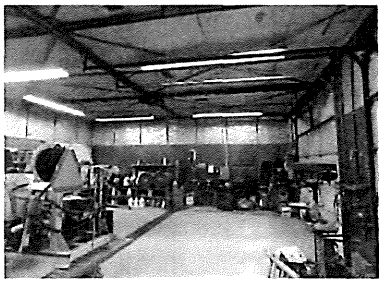


Insulate dormitory basement perimeter walls with 1 1/2" thermax caulked airtight to the foundation walls.

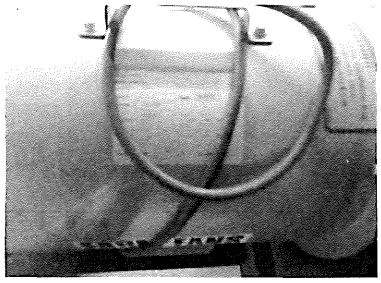
Second floor side attic could have doors reinsulated with thermax insulation. Repair knee wall and slant insulation in these areas.

REPAIR SHOP PHOTOGRAPHS

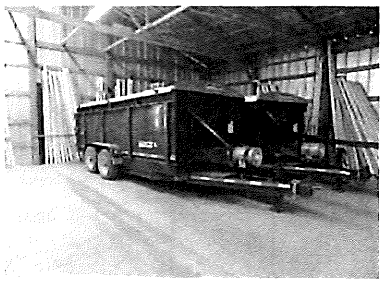
The repair shop lighting can be replaced with linear LED lamps. Motion sensors could also be installed.



This is the repair shop interior view.



The blower fan motor used to dry seed in the fall.



The portable seed drying trailers.