KILEN WOODS STATE PARK

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Consultant's Report

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CONTACT STATION BUILDING

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Building Envelope
Domestic Water Heater
Lighting
Propane Furnace

REPAIR SHOP BUILDING

Building Envelope
Lighting
Furnace

SUMMARY OF RECOMMENDATIONS

CONTACT STATION RECOMMENDATIONS	EXISTING MMBTU USAGE	PROPOSED MMBTU USAGE	ANNUAL MMBTU SAVINGS	ANNUAL DOLLAR SAVINGS	REPLACEMENT COST	PAYBACK IN YEARS
REPLACE EXISTING LIGHTING WITH LED	3.64	1.78	1.85	$ 65.13	$ 1,400.00	21.49
REPLACE EXISTING AC TO SEER 14	2.65	0.86	1.80	$ 63.14	$ 3,000.00	47.52
TOTALS	**6.29**	**2.64**	**3.65**	**$ 128.27**	**$ 4,400.00**	**34.30**
SAVINGS PERCENTAGE IN MMBTU	**58%**					

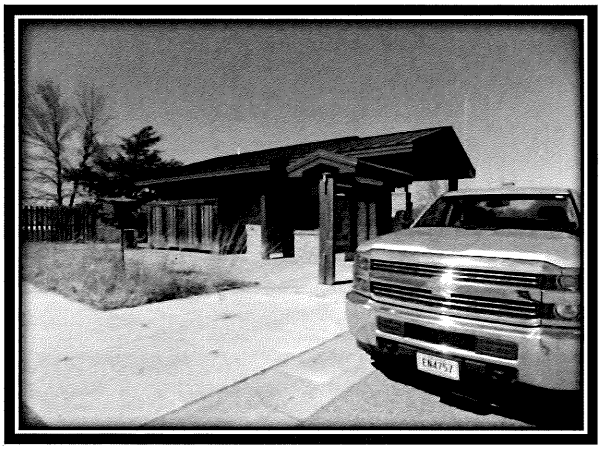
The lighting hours are very limited and provide a long payback. The lights would last 25 to 30 years with the small amount of use they receive.

The air conditioning upgrade would be if unit needed replacement. The payback is not good at this time.

REPAIR SHOP RECOMMENDATIONS	EXISTING MMBTU USAGE	PROPOSED MMBTU USAGE	ANNUAL MMBTU SAVINGS	ANNUAL DOLLAR SAVINGS	REPLACEMENT COST	PAYBACK IN YEARS
REPLACE EXISTING LIGHTING WITH LED	5.11	3.02	2.09	$ 73.56	$ 1,600.00	21.75
TOTALS	**5.11**	**3.02**	**2.09**	**$ 73.56**	**$ 1,600.00**	**21.75**
SAVINGS PERCENTAGE IN MMBTU	**41%**					

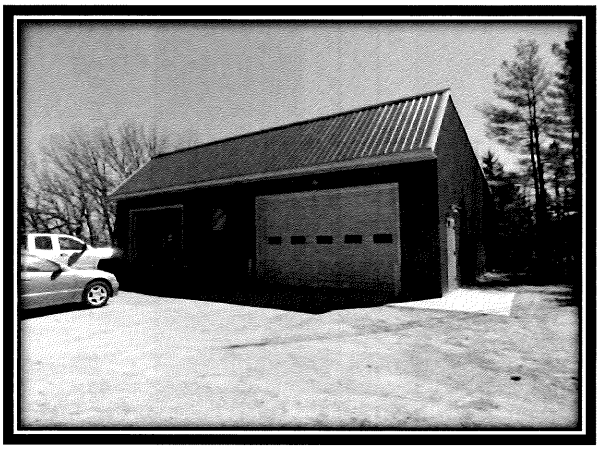
LED lighting would make sense if the shop lights would be used more hours. The advantage of the LED is that they light up instantly in the cold.

BUILDING ENVELOPES



Contact Station

The contact office is a 672 square foot building that was built in 2004. The office is used mostly during the summer months with the spring and fall months for startup and shut down of the park. The facility is not staffed in the winter.



Repair Shop

The repair shop is used for park maintenance equipment and staff. The shop is separated into 924 sq ft heated and 1092 sq ft unheated areas. No heating was done in 2014. When the shop is heated, it is kept at 60 degrees.

CONTACT STATION AIR FLOW

	EXISTING	PROPOSED	REDUCTION
Volume of building Cubic Feet	5376		
BLOWER DOOR @ 50pa	776	700	76
Air changes per hour @ 50	8.66	7.81	0.85
Air changes per hour natural	0.43	0.39	0.04
Reduced by	**10%**		

ENERGY PROFILE

TYPE OF FUEL	COST PER UNIT	DOLLARS PER MMBTU
Electrical Rate	0.12	35.17
Propane Gas Rate	1.65	17.19

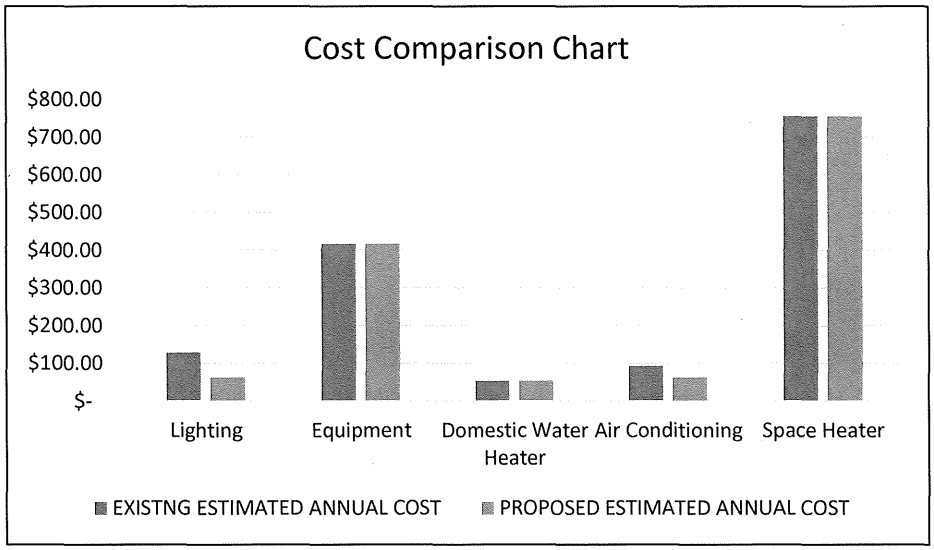
CONTACT STATION FUEL USAGE	ANNUAL MMBTU	ANNUAL PERCENT	USAGE EQUIPMENT
2013 Electrical Usage	11.37	21%	Lighting, air conditioning, office equipment, water heater, & furnace fan.
2013 Gas Usage	43.53	79%	Forced air furnace
TOTAL	**54.90**	**100%**	

REPAIR SHOP FUEL USAGE	ANNUAL MMBTU	ANNUAL PERCENT	USAGE EQUIPMENT
2013 Electrical Usage	3.65	10%	Lighting, shop equipment, furnace fan, & water heating.
2013 Gas Usage	31.25	90%	Space heating
TOTAL	**34.90**	**100%**	

Note: 2113 data was used to better illustrate annual usage.

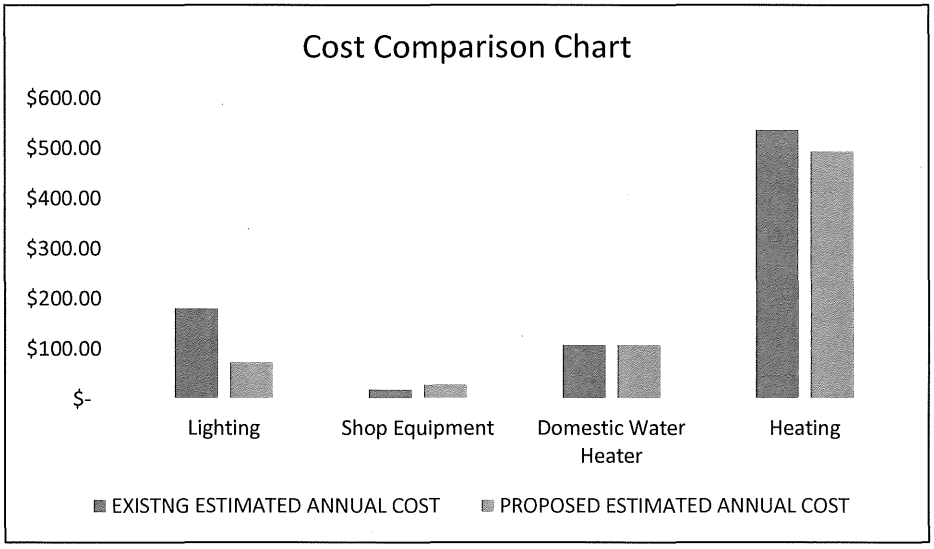
CONTACT STATION FUEL & EQUIPMENT COST COMPARISON

ENERGY USE	EXISTNG ESTIMATED ANNUAL COST	EXISTING PERCENT OF ANNUAL COST	PROPOSED ESTIMATED ANNUAL COST	PROPOSED SAVINGS OF ANNUAL COST
Lighting	$ 128.36	9%	$ 63.00	5%
Equipment	$ 418.00	29%	$ 418.00	31%
Domestic Water Heater	$ 54.00	4%	$ 54.00	4%
Air Conditioning	$ 93.60	6%	$ 63.36	5%
Space Heater	$ 756.25	52%	$ 756.25	56%
TOTAL	**$1,450.21**	**100%**	**$ 1,354.61**	**100%**



REPAIR SHOP FUEL & EQUIPMENT COST COMPARISON

ENERGY SOURCE	EXISTNG ESTIMATED ANNUAL COST	EXISTING PERCENT OF ANNUAL COST	PROPOSED ESTIMATED ANNUAL COST	PROPOSED PERCENT OF ANNUAL COST
Lighting	$ 180.38	21%	$ 73.82	10%
Shop Equipment	$ 19.20	2%	$ 28.80	4%
Domestic Water Heater	$ 108.00	13%	$ 108.00	15%
Heating	$ 537.11	64%	$ 494.14	70%
TOTAL	**$ 844.69**	**100%**	**$ 704.76**	**100%**



CONTACT STATION ENERGY SCHEDULE BY ELECTRIC USAGE

		EXISTING				PROPOSED					
SURFACE OR LOCATION	LAMP/EQUIP	QUANT	EXIST KW	HRS PER YEAR	ANNUAL TOTAL KWH EXISTING	RETRO FIT TYPE	MOTION SENSOR	TOTAL KW PROPOSED	HOURS PER YEAR PROPOSED	ANNUAL TOTAL KWH PROPOSED	ANNUAL SAVINGS PER MMBTU
Lobby and Office	4' T8 fluorescents	24	0.032	400	307.2	LED	NO	0.016	400	153.6	153.6
Lobby	65 w reflector	3	0.065	60	11.7	LED	NO	0.009	60	1.62	10.08
Lobby Track Light	30 w halogen	5	0.035	90	15.75	LED	NO	0.005	90	2.25	13.5
Exterior Light	HP sodium	3	0.07	3500	735	LED	NO	0.035	3500	367.5	367.5
Misc Office	Office equip	1	0.2	400	80	NA	NA	0.2	400	80	0
Water Heater	Domestic hot water	1	1.5	300	450	NA		1.5	300	450	0
Air Conditioner	Air Conditioner	1	2.6	300	780	SEER 14	NA	1.76	300	528	252
Furnace Fan	Motor	1	0.26	1300	338	NA	NA	0.26	1300	338	0
TOTAL			**4.762**		**2717.65**			**3.785**		**1920.97**	**796.68**

CONTACT STATION ENERGY SCHEDULE BY GAS USAGE

		EXISTING				PROPOSED					
SURFACE OR LOCATION	EQUIPMENT	QUANT	EXIST MMBTU PER HOUR	HRS PER YEAR	ANNUAL TOTAL MMBTU EXISTING	RETRO FIT TYPE	MOTION SENSOR	PROPOSED MMBTU PER HOUR	HOURS PER YEAR PROPOSED	ANNUAL TOTAL MMBTU PROPOSED	ANNUAL SAVINGS PER MMBTU
Contact Station	Furnace 92% efficient	1	0.044	1000	44	NONE	NA	0.044	1000	44	0
TOTAL			**0.044**		**44**			**0.044**		**44**	**0**

REPAIR SHOP ENERGY SCHEDULE BY ELECTRICAL USAGE

			EXISTING					PROPOSED			
SURFACE OR LOCATION	LAMP/EQUIP	QUANT	EXISTING KW	HOURS PER YEAR EXISTING	ANNUAL TOTAL KWH EXISTING	RETRO FIT TYPE	MOTION SENSOR	PROPOSED KWH	HOURS PER YEAR PROPOSED	ANNUAL TOTAL KWH PROPOSED	ANNUAL SAVINGS PER KWH
Lighting Heated	8' T8	12	0.064	1000	768	LED	YES	0.034	800	326.4	441.6
Lighting Heated	4' T8	4	0.032	1000	128	LED	YES	0.016	800	51.2	76.8
Lighting Unheated	8'T8	12	0.064	400	307.2	LED	YES	0.034	200	81.6	225.6
Exterior Light	HP Sodium	2	0.05	3000	300	LED	NO	0.026	3000	156	144
Domestic Water heater	10 gallon	1	1.5	600	900	10 GALLON	NA	1.5	600	900	0
Shop Equipment	misc	1	0.4	400	160	NONE	NA	0.4	400	160	0
Furnace Fan		1	0.32	250	80	NONE	NA	0.32	250	80	0
TOTAL			**2.43**		**2643.2**			**2.33**		**1755.2**	**888**

REPAIR SHOP ENERGY SCHEDULE BY GAS USAGE

			EXISTING					PROPOSED			
SURFACE OR LOCATION	EQUIPMENT	QUANT	EXISTING MMBTU	HOURS PER YEAR EXISTING	ANNUAL TOTAL MMBTU EXISTING	RETRO FIT TYPE	SETBACK THERMO-STAT	PROPOSED MMBTU	HOURS PER YEAR PROPOSED	ANNUAL TOTAL MMBTU PROPOSED	ANNUAL SAVINGS PER MMBTU
REPAIR SHOP	Furnace	1	0.125	250	31.25	NONE	YES	0.125	230	28.75	2.5
TOTAL			**0.125**		**31.25**			**0.125**		**28.75**	**2.5**

CONTACT STATION USAGE DATA 2013 & 2014

2013	HDD (MN6137)	CDD (MN6137)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE GAS COST
January	1,458	0	214.52	$ 31.28	38.52	$ 51.62
February	1,184	0	169.29	$ 26.22	34.79	$ 46.62
March	1,160	0	187.81	$ 28.44	40.54	$ 52.77
April	718	1	149.57	$ 25.01	39.23	$ 51.07
May	271	42	237.53	$ 33.25	40.54	$ 52.77
June	55	160	312.47	$ 41.58	38.70	$ 56.39
July	21	274	522.37	$ 63.07	37.26	$ 85.77
August	14	229	458.97	$ 53.19	37.26	$ 85.77
September	80	142	408.00	$ 48.44	36.06	$ 83.00
October	490	2	269.16	$ 32.05	37.26	$ 85.77
November	995	0	192.34	$ 19.35	36.06	$ 83.00
December	1,610	0	209.17	$ 6.94	37.26	$ 85.77
2013 TOTALS	**8,056**	**850**	**3,331.18**	**$ 408.81**	**453.48**	**$ 820.31**

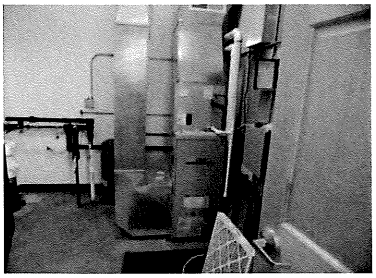
2014	HDD (MN6137)	CDD (MN6137)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE GAS COST
January	1,625	0	268.17	$ 40.76	22.84	$ 52.57
February	1,544	0	158.02	$ 27.30	0.00	$ -
March	1,120	0	130.37	$ 26.69	0.00	$ -
April	575	0	123.44	$ 24.51	0.00	$ -
May	244	62	182.08	$ 29.05	0.00	$ -
June	26	139	258.15	$ 36.99	0.00	$ -
July	29	121	366.65	$ 50.95	0.00	$ -
August	3	170	356.77	$ 46.58	0.00	$ -
September	161	46	246.34	$ 11.23	0.00	$ -
October	463	0	212.30	$ (99.41)	0.00	$ -
November	1,154	0	135.74	$ (70.83)	0.00	$ -
December	1,212	0	111.85	$ (46.30)	0.00	$ -
2014 TOTALS	**8,156**	**538**	**2,549.89**	**$ 77.53**	**22.84**	**$ 52.57**

REPAIR SHOP USAGE DATA 2013 & 2014

2013	HDD (MN6137)	CDD (MN6137)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE GAS COST
January	1,458	0	24.13	$ 14.22	17.30	$ 22.42
February	1,184	0	22.68	$ 13.29	15.63	$ 20.25
March	1,160	0	42.72	$ 16.76	17.30	$ 22.42
April	718	1	121.66	$ 22.73	16.74	$ 21.70
May	271	42	191.71	$ 28.73	17.30	$ 22.42
June	55	160	127.73	$ 23.86	19.97	$ 31.92
July	21	274	145.92	$ 26.52	37.29	$ 85.77
August	14	229	125.98	$ 23.37	37.29	$ 85.77
September	80	142	130.25	$ 24.04	36.09	$ 83.00
October	490	2	77.35	$ 19.98	37.29	$ 85.77
November	995	0	36.50	$ 15.33	36.09	$ 83.00
December	1,610	0	21.83	$ 13.85	37.29	$ 85.77
2013 TOTALS	**8,056**	**850**	**1,068.46**	**$ 242.67**	**325.56**	**$650.20**

2014	HDD (MN6137)	CDD (MN6137)	KWH USAGE	ENERGY COST	PROPANE GALLON USAGE	PROPANE GAS COST
January	1,625	0	14.18	$ 14.63	22.85	$ 52.57
February	1,544	0	11.88	$ 12.89	0.00	$ -
March	1,120	0	15.67	$ 15.47	0.00	$ -
April	575	0	40.94	$ 16.22	0.00	$ -
May	244	62	143.63	$ 25.40	0.00	$ -
June	26	139	121.27	$ 23.46	0.00	$ -
July	29	121	141.52	$ 27.91	0.00	$ -
August	3	170	120.03	$ 23.87	0.00	$ -
September	161	46	107.55	$ 22.67	0.00	$ -
October	463	0	73.93	$ 21.05	0.00	$ -
November	1,154	0	31.54	$ 15.83	0.00	$ -
December	1,212	0	65.05	$ 17.84	0.00	$ -
2014 TOTALS	**8,156**	**538**	**887**	**$ 237.24**	**22.85**	**$ 52.57**

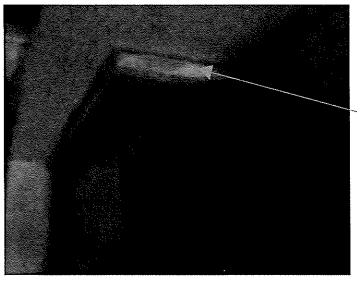
CONTACT STATION PHOTOGRAPHS



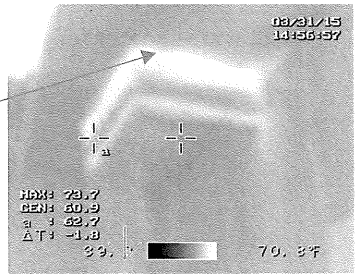
Existing furnace is an 11 year old 92% efficient furnace. The supply air runs through the attic.

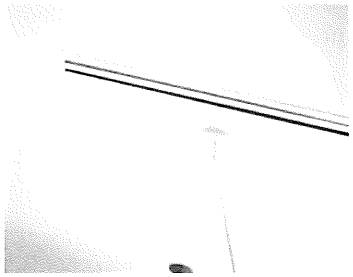
Air conditioner is also 11 years old SEER 10 unit.

Lobby view looking east.

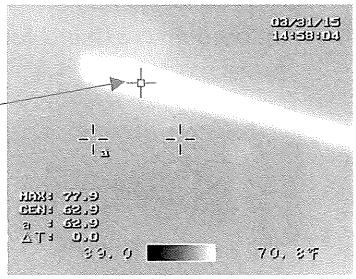


There is an air bypass around the heat duct into the attic. Another possibility is the ductwork in attic is leaking.

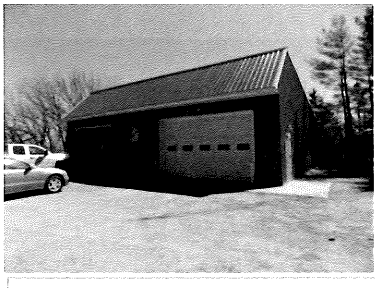




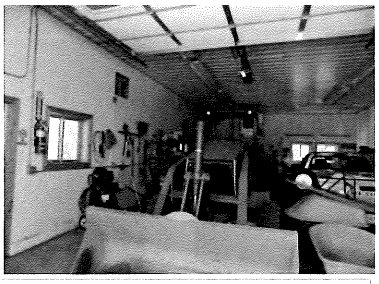
This appears to show attic duct work leakage.



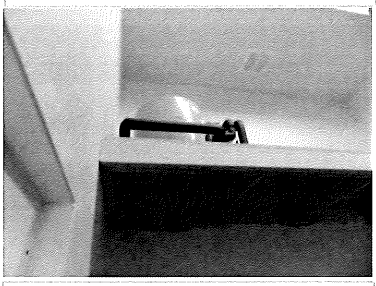
REPAIR SHOP PHOTOGRAPHS



Elevation view of shop.

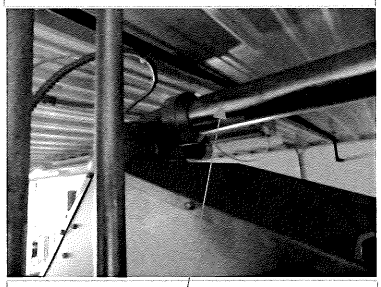


Interior view of heated area



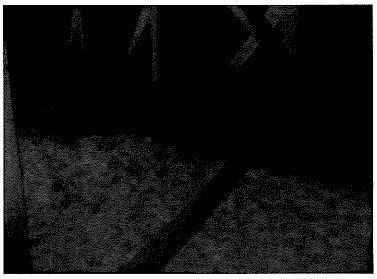
Hot water heater for shop.

Hanging furnace for shop.



Induced draft exhaust for furnace.

Typical 8' light fixtures in shop.



Attic is blown with 16" fiberglass insulation.

View of the unheated area of the shop.