OUR ISLAND HOME
Existing Building Systems Evaluations

Our Island Home
Town of Nantucket
9 East Creek Road
Nantucket, MA 02554

SED Associates Corp.
132 Lincoln Street
Boston, MA 02111

April 2014

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I. EXECUTIVE SUMMARY

SED Associates Corp. was retained by the Town of Nantucket to perform an assessment of the Our Island Home (OIH) existing HVAC, plumbing and electrical systems present conditions. Its expected useful life and applicable energy conservation measures. The assessment was performed at the Client's request using methods and procedures consistent with standard industry procedures. This report is exclusively for the use and benefit of the Client. This report is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of SED.

Summary of Existing Energy Performance

Building's Annual Energy Consumption	4,459,830 kBtu
Total Annual Energy Costs	$137,859

SED has determined that the facility current heating boilers are insufficient to meet existing heating demand, see Appendix D HVAC Load Analysis.

SED has identified four Energy Conservation Measures (ECMs) for this property. The savings for each measure are calculated using standard engineering methods followed in the industry, and detailed calculations for ECM are provided in Appendix F for reference. In addition to the consideration of the interactive effects, SED has applied a 10% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs.

The following table summarizes the recommended ECMs in terms of description, investment cost, energy consumption reduction, and cost savings.

Summary of Recommended Energy Conservation Measures (ECM #3 & #4)

Total Projected ECM Initial Investment	$34,900
Estimated Annual Cost Savings	$9,919
Net Effective Payback	3.5yrs.
Estimated Annual Energy Savings	16%
Estimated Annual Cost Savings	7%

SED recommendation based upon our evaluations and analysis; and to combine the above noted ECM's with the following system replacement/upgrades:

1. Replace the existing individual fin-tube radiation self-contained thermostats.
2. Replace the existing central heat recovery unit with three (3) new DOAS-ERV.
3. Replace the existing boiler heating, domestic hot water heaters and pumps. .
4. Replace fuel oil circulation pump, OP-1.
5. Replace existing propane direct fired domestic hot water heaters.

Current Massachusetts Department of Public Health (DPH) requirement is to have air conditioning in all residence areas and will need to be incorporated into any long term plans for the facility. The existing facility has limited air conditioning mainly the general interior 'core area' that provides the facility administration/nursing support services, common sitting areas at the end of the corridor, main residence lounge, etc.

Estimated installation costs are based on SED experience on similar projects and industry standard cost estimating tools including *RS Means*. In developing the installed costs, SED also considered the area correction factors for labor rates for Nantucket, MA. Since actual installed costs may vary widely for particular installation based on labor & material rates at time of installation, SED does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein. We strongly encourage the owner to confirm these cost estimates independently. SED does not guarantee the costs savings estimated in this report. SED shall in no event be liable should the actual energy savings vary from the savings estimated herein.

II. INTRODUCTION

This study evaluated the short and long term options for the HVAC (heating, ventilation and air conditioning), plumbing and electrical systems present conditions and expected useful life systems as they relate to the occupants comfort and the building energy usage.

SED looked at both the general physical and age of the equipment in addition to the current operational status. No testing was performed services limited to observations only.

Facility Description:

Building Description
OIH was constructed in 1980 with major dining addition in 2002 having a total gross area of 20,000 sq.ft. This is a single story wood framed, slab on grade reinforced concrete floor with partial attic/mechanical space and fully accessible attic. The building is fully heated with partial air conditioning.

This is a 45-bed facility with central support areas consisting of bathing, dining, laundry, kitchen, nurse call center and related administrative areas.

Utilities
Propane Gas Supply Company is Yeats Gas/Suburban Propane
Electric Supply Company is National Grid, rate G2.
Fuel Oil Supply Company, no.2 type, Harbor Fuel Oil Corp.
Water and sewer services , Town of Nantucket's Sewer Department through its agent the Wannacomet Water Company.

Schedules
Occupancy: 24-hours per day, 365 days per year.
Equipment: Occupied mode 24-hours per day, 365 days per year.

III. OBSERVATIONS-EXISTING CONDITIONS

SED conducted site visits during November 2013 and late January 2014 to allow for the obtaining existing systems data and its visual observations while operating.

General envelope observations-

- Wood frame construction; walls 5.5" fiberglass, attic floor 10" fiberglass/blow-in insulation.
- Entry vestibules have been retrofitted with sliding doors to cut down on the outside air infiltration.
- Excessive outside air flow was observed during the site observations, mainly around the entry areas that will contribute to the 'cold temperatures' within the building. *See observed temperature under appendix A.*
- Attic vents are block-off in winter to cut down on the outside air infiltration.

Electrical-

- Service size is 800amps, 120/208-3phs. Appears to be sufficient for the current connected loads, facility personnel didn't not any issues with this system other than the need for more outlets.
- Lighting system was upgraded by National grid as part of an energy conservation program in 2011.
- Emergency generator rated at 45KW, 158amps. System typically services the heating system, limited egress lighting, sewage ejector and the kitchen freezer & cooler units. Unit fuel source is a dedicated 330 gallon oil storage tank located in the shed with gthe generator.

Plumbing- see appendix B Existing Equipment Inventory for additional information

- Building water service with meter, combined site service with the fire line 8"connecting to the town system. Splits inside the building to 3"cold water feed to the building distribution system.
- Building sanitary, 6" connected to the town system. Building system pumped from a duplex sewage ejector.
- Fixtures are of the older 2.5-3gpf units. Central bathing facilities are located in the east & west wings for use by the residence. In addition each wing has a dedicated tub/shower unit within a residence room.
- Central hot water heating units, oil fired generate 180deg,F hot water. This higher temperature required for the laundry and is reduced with mixing valve station to provide lowered tempered water to the kitchen and general fixtures.
- Bathing areas had supplemental/replacement direct fired tank less propane hot water heaters added to provide hot water and with adequate flow to meet these rooms demand. *Facility personnel noted unit were installed to meet both a demand and to address the issue of the delivery time of hot water to the bathing/shower equipment.*
- Propane storage tanks, multi-units service the kitchen cooking, laundry and the direct fired hot water heaters.
- Kitchen fixtures discharge thru dedicated grease interceptors located within the kitchen area.

HVAC- see appendix B Existing Equipment Inventory for equipment data and additional information.

The building has 100% heating coverage with limited air conditioning for the core/nursing area, residence sitting areas, a classroom and a three support spaces- medical records, computer server and dry goods storage.

- Central boiler hot water heating system, oil fired units with main circulation pumps and dedicated zone pumps.
- Heat within the individual residence rooms and spaces is by fin tube hot water radiators with self-contained thermostatic valves in each room/space.
- Common areas and entries have dedicated hot water cabinet unit heaters with built-in fans and controls.
- Heating, Ventilation and Air Conditioning systems consist of;
  General ventilation is provided by a central heat recovery unit with a supply and exhaust air fans; hot water coil and temperature controls to maintain a discharge set point. This unit provides both the supply and exhausts air throughout the residence areas of the facility with supply air into the residence bed area and exhaust out the toilet room. Unit has no air conditioning.

  The kitchen hood has a dedicated un-tempered make-up air supply fan unit with direct connection to the hood and a roof mounted exhaust fan. The dishwasher hood has a dedicated exhaust fan. The cart wash area has a dedicated exhaust fan.

  Laundry room has a dedicated wall exhaust fan and intake damper.

  Core area, entry/nurse station has dedicated air handling unit with electric coil, refrigerant coil and a spilt condenser. Unit provides heating & cooling with dehumidification for the serviced areas.

  Dining room has dedicated air handling unit with refrigerant coil and a spilt condenser.

  Limited air conditioning is by means of small dedicated split heat pump units that service the common sitting areas, classroom and the kitchen area support offices only.

- Central aboveground fuel oil storage tank, 2,000 gallon capacity installed in 2011 to replace the original underground unit. Oil provides for the building heat and domestic hot water mainly the laundry and kitchen related to dish washing.

- There is no central building energy management system. The automatic temperature controls system consist of individual dedicated control systems as follows;

  Boilers are equipment with an automatic start/stop and hot water outdoor reset controller that varies the supply water temperature based upon the outside temperature. The reset water range is 160-200deg.F. The lower temperature range is due to the cast iron boilers which require a minimum 140deg.F return water temperature.

Pump controls is limited to the boiler room main pumps which provide for outside air temperature pump start, lead-lag operation manual operation. *Zone pumps, per facility personnel, are left on year round due to the lack of automatic controls.*

Heat recovery unit, factory packaged, with built-in face & bypass control, duct thermostats to maintain the supply discharge air temperature at a fixed set point that is manually adjustable.

Kitchen hood exhaust fan is manually started/stopped with the make-up air and dishwasher hood exhaust fan interlocked to operate whenever the kitchen hood exhaust fan runs. The cart wash area fan is manually started/stopped.

Core area unit is controlled by a space mounted thermostat that cycles the electric heating coil and condensing unit compressor to maintain set point temperature, manually adjustable. The electric heat and condensing unit are interlocked to prevent simultaneous operation.

Attic mechanical room 'cooling' exhaust fan is thermostatically controlled to open a motorized intake damper and run whenever the space exceeds its set point temperature, manually adjustable. The mechanical room heating is maintained by a thermostatically controlled hot water unit heater.

Residence and dining room fin tube radiation has self-contained thermostatic valves that maintain room/space set point temperatures.

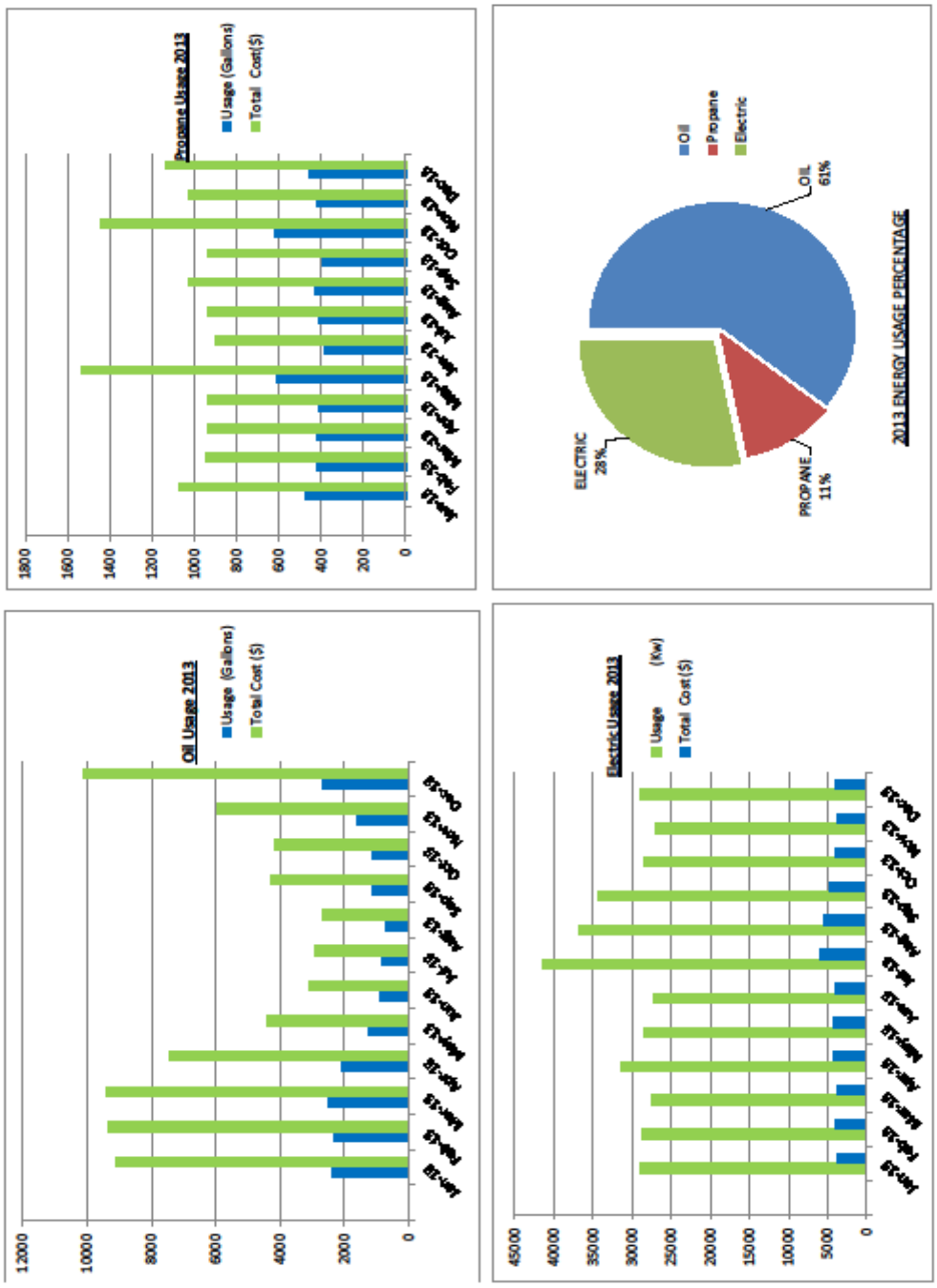
Common areas, corridors and entry's temperature is maintained by the cabinet unit's thermostat that cycles the fan.

Dining room cooling air conditioning unit is controlled by a space mounted thermostat that cycles the condensing unit compressor to maintain set point temperature, manually adjustable.

Limited air conditioning is by means of small dedicated split heat pump are controlled by space/room thermostat.

Existing Building Benchmarking using Utility Data

A. The 2013 energy usage was as follows; see appendix C2013 Energy Usage Summary.



Typical benchmarks, EPA Portfolio manager and Commercial Buildings Energy Consumption Survey (CBECS, 2003 revised 2008) compare utility usage of this building to similar types. The Portfolio manager is an EPA tool that rates your building against similar buildings.

CBECS is a database of existing buildings and their characteristics and is commonly used as bases of energy use and comparison to establish energy benchmarks.

Building Information			Performance Ratings Annual				Operating Cost/Sq.Ft.			
	EPA Bldg.	Area	Existing	Energy Intensity (Kbtu/sqft)			2013	2013	2013	Total
Building Type	Type	(Sq.Ft.)	EPA Rank	Existing	Medium	Energy Star	Electric	Oil	Propane	
Nursing Home	Senior Care	20,000	17	204.3	159.4	132.3	$2.61	$3.64	$0.64	$6.89
Weather Information			Electric and Fuel Usage			Annual Energy Use Indices				
			Actual	Actual	Actual	Normalized	Normalized			
			Electric	Oil	Propane	Total Fuel	Site Total			
Year	HDD	CDD	(kBTU)	(kBTU)	(kBTU)	(kBTU)	(kBTU/sqft)			
2013	5400	116	1,261,541	2,700,835	497,454	4,169,509	208.5			
30 yr.ave.	5776	104								

Terms that is used in the table above:

- Building type; the type of building being examined.
- EPA Building Type: EPA Portfolio building type.
- Building total gross area sq.ft.
- EPA rank: EPA's portfolio manager benchmarking tool. The scale is 1 to 100, with an average building ranking of 50.
- Energy intensity kBTU/sqft: measure of the annual amount of energy used to operate this facility.
- Operating cost per sq.ft. area: 2013 base year.
- Degree & heating days are base 65deg.F; cooling days are 70deg.F.
- Heating Degree Days: an indication of how cold the year was with higher HDD indicating a colder year.
- Cooling Degree Days: an indication of how warm the year was with a higher CDD indicating a warmer year.
- Actual Electric kBTU: amount of electric used during the year, measured in in kBTU which is 1000 BTU or 1/100 of therm. Conversion of electric is 3.413 kBTU/kWh.
- Actual Fuel, Oil or Propane kBTU: amount of heating energy used during the year, fuel measured in kBTU which is 1000 BTU or 1/100 of therm.
- Normalized Total Fuel kBTU: the total energy (electric, oil, propane) used during the year and normalized to 30 year averages based on HDD.
- Normalized Site Total kBTU/sqft: 30 year average of the total heating energy use per year (kBTU) divided by the building gross square footage.
- Normalized values are used to provide a common usage bases of the year to year weather variances which are based on 30 year average weather data.

Comments on the above charts and spreadsheet,

The building annual energy usage is divided into three categories based on type; Oil at 61%, electric at 28% and propane at 11%. The oil has peak usage during the heating months from September thru late April with a drop-off to the non-heating months that is mostly attributable to the domestic hot water usage for the laundry/kitchen.

This building higher normalized energy intensity value of 208.5 kBTU/sqft as compared to the medium facility of 159.4 kBTU/sqft is a measure of its energy usage which for this existing facility is indicative of a poor envelope and poor performance of its systems.

This building would need to reduce its energy usage by 55% to receive the minimum rating of '75' Energy Star Award.

IV. EVALUATIONS

The report evaluations are separated into two general categories of equipment and energy conservation measures. These categories will have both indirect and direct effects on each other that cannot be evaluated on its own but offer potential savings and long term usage when combined.

Existing equipment evaluations see appendix B Existing Equipment Inventory for equipment data and additional information and observations.

1. Boilers (B-1, 2 & 3), cast iron type, installed 2000 (approximate) with issue to date that have included
   - Boiler units have been discontinued by manufacture with the continued availability of replacement parts from the manufacturer unknown.
   - Boiler #1combustion chamber gasket failure resulting in hot gas leakage/burn thru its cover.
   - Boiler #3 burner unit replaced and the related flue.

   Condition of the existing boilers is fair. Oil fired boilers such as this one have system cast iron section sealing issues between each boiler section as they approach the end of their useful life and in the 15 year old range. Each boiler section is connected by neoprene seals at three internal areas inside the boiler sections. These gaskets are used to connect each section to the other for water tightness. As they age and by firing # 2 oil the by-products of burning # 2 oil are sulfur and vanadium. As the boiler ages the residues land on the edges of the neoprene gaskets and as the boiler heats/cools over a period of time any moisture inside the combustion chamber mixes with the sulfur to create sulfuric acid. This acid then starts to 'eat away' at the neoprene gasket and eventually the boiler starts to leak between the sections. It can be re-gasket as observed on unit #1. If that area leaks for a long time (usually2-3 months) then the water has eroded/corroded the cast iron gasket captured seal port and then the boiler should be replaced. Current observations are that the boilers are not leaking. These opinions are from past experiences with boilers that fire # 2 oil and are over 15 + years old which your boiler is there in that range.

Comment: while the tested combustion efficiency of these units is 84-85% the overall thermal efficiency as a measure of the 'heat' delivered to meet the building load is typically around 75-80%. This is due to a combination of boiler radiation heat loss to the boiler room and the limited to opening the range of the hot water reset temperature due to the cast iron material. Replacement is recommended.

2. Boilers (B-1, 2 & 3) issue with regards to sufficient boiler heating capacity. Facility personnel noted that on winter days below 15deg.F the HRV unit is shut down to prevent cold air from being discharged into the room below its set point temperature. SED observed space temperatures ranging 68-72deg.F at an outside temperature of 16-19deg.F, see appendix A. Observed Temperatures

   Our analysis indicated the following (see appendix D HVAC Loads Analysis for additional data). Design winter outside temperature 9deg.F.

- Original calculated building load without the dining addition is 879,833 BTUH at interior temperature 70deg.F.
- Corrected calculated building load with dining addition is 1,126,403 BTUH at interior temperature 70deg.F..
- Calculated building load with dining addition is 1,218,731 BTUH at the current DPH required interior temperature of 75deg.F.

Comment This analysis indicates that the existing boiler plant capacity can only adequately heat this facility down to an outside ambient temperature between 15-20deg.F. Replacement is recommended with increased heating capacity of 1,218,731 BTUH (minimum). See Domestic Hot Water Heaters, Storage Type hereinafter for additional comments on sizing with indirect hot water heating.

3. Main Heating System Circulation & Zone Pumps (P-1 thru P-9).
   These are constant speed units that should be upgraded to newer energy efficient units with DC- Electronically Commutated Motor (ECM). These units when coupled with the proper controls allow for direct variation of the system flow which will vary due to the building/space heating loads.

Comment The useful like of these units vary from 0-9 years. The zone pumps are pipe in a secondary loop with balanced return flow that is works marginally and is a waste of energy since it uses a 2nd pump to force the water flow thru the zone.

4. Oil Circulation Pumps (OP-1 & 2). Units are fully functional at this time. OP-2 was replaced in 2014.

Comment Replacement of OP-1 has exceeded its useful service life and should be replaced.

5. Core Area AC. Unit is fully functional at this time.

Comment: This unit is the only piece of equipment that supply's fresh and tempered (heated & cooled) air to the central core area that also included the nurse's station. This unit has exceeded its useful service life and should be replaced. Replacement compressors using this refrigerant are being phased out of manufacturing and in the foreseeable future may become unavailable.

6. Dining Area AC. Unit is fully functional at this time.

Comment: This unit uses a refrigerant, R-22, that is no longer made and will become harder if not impossible to obtain as a replacement due to any system leakage. Replacement compressors using this refrigerant are being phased out of manufacturing and in the foreseeable future may become unavailable.

7. General Usage Areas Ductless Split Units (5 units) Units are fully functional at this time.

Comment: This unit uses a refrigerant, R-22, that is no longer made and will become harder if not impossible to obtain as a replacement due to any system leakage. Replacement compressors using this refrigerant are being phased out of manufacturing and in the foreseeable future may become unavailable.

8. Kitchen Ductless AC units (3 units). Units are fully functional at this time. The dry goods storage unit was replaced in 2013 and that unit uses R-410a as a refrigerant.

Comment: Two of these units use refrigerant, R-22, that is no longer made and will become harder if not impossible to obtain as a replacement due to any system leakage. Replacement compressors using this refrigerant are being phased out of manufacturing and in the foreseeable future may become unavailable.

9. Central energy recovery unit ventilator (HRV), installed 1980 with issues to date that have included the following items;.

- Unit has been discontinued by manufacture with the continued availability of replacement parts from the manufacturer unknown.
- Unit controls have been repaired over time on as needed bases.
- Dampers, face & by-pass not operational.
- Unit access for normal maintenance is limited that has resulted in limited filter replacement and no cleaning of the heat exchanger core. It was observed that the core has dust/dirt buildup of the surfaces resulting in a loss of the unit efficiency.
- Unit is shutoff when the outside temperature is below 10deg.F to prevent cold air being supplied to the residence rooms per the facility operator. This is caused in part due to the lack of sufficient heat from the boiler heating system.
- Minimum dehumidification of the fresh outside supply air provided thru the heat exchanger only. Estimate that this unit would need to have 25tons of mechanical cooling to meet an indoor temperature of 75def.F/50% humidity.

Comment: current performance issues includes the lack of heating on colder days, no air condition to dehumidify the summer supply air, service issues and unit being discontinued by the manufacture.

10. Kitchen Make-up unit. Unit is fully functional at this time.
Comment: unit has exceeded its useful service life.

11. Kitchen Exhaust Fans: Units are fully functional at this time.
Comment: units have exceeded their useful service life

12. Attic Mechanical Fan: Unit is fully functional at this time.
Comment: unit has exceeded its useful service life.

13. Laundry Area Exhaust Fan and Intake: Unit is fully functional at this time.
Comment: Units were installed within the past 5-6 years.

14. Combustion Exhaust Fan: Unit is fully functional at this time.
Comment: unit has exceeded its useful service life.

15. Residence & Dining Room thermostats: Majority of units are functional at this time.
Comment: unit has exceeded its useful service life.

16. Domestic hot water heaters, storage tank type (2 units) in the boiler room: Units are fully functional at this time.
Comment: The units are coming up on its useful service life and owner replaced these in 2007 after earlier replacement units from 2000(?) were replaced. Owner has noted issue with servicing since it requires taking both off line at the same time leaving the facility without its main source of domestic hot water. Replacement should evaluate the replacement for these units as an indirect type connected to the replacement boiler system.

    The current domestic water heating system capacity is provided from the central boiler room oil fired storage tanks with a combined recovery of 332gal/hour and the propane directed fired units with a combined recovery of 576 gal/hour. This is in compliance with current DPH guidelines, see Appendix E.

17. Domestic hot water heaters, direct fired tank less type (2 units): Units are fully functional at this time.
Comment: unit has exceeded its useful service life.

V. CONCLUSIONS and RECOMMENDATIONS

Considering the projects requirement to reduce its energy usage and that ownership is to remain unchanged, and also the unpredictable cost of future energy, those options which minimize energy consumption should be considered favorable if they occur within a reasonable timeline. To accomplish this simple payback was calculated for the analyzed option which does not consider the cost of salvage values of the individual option. Applicable energy conservation measures evaluated included;

Energy Conservation Measures (ECM):

ECM#1: Replace zone constant speed units with variable frequency drive ECM motors.

Electric Savings:	2,628KWH x 6 pumps	=15,768KWH
Cost Savings:	$368 x 6 pumps	= $2,208.00
Replacement Cost:	6 units x $350.00	= $2,100.00 (materials)
	6 units, piping and access.	= $ 700.00 (materials)
	1 man x 2 days;16 hrs x $75/hr.	= $1,200.00 (labor mech+elect)
		$4,000.00

Simple payback: $4,000/$2,208= 1.8 yrs.

ECM#2: Replace main constant speed units with variable frequency drive ECM motors. One pump is a stand-by unit.

Electric Savings: 2,366KWH
Cost Savings: $331.00

Replacement Cost: 2 x $1,500.00 = $3,000.00 (materials)
units, piping and access. = $1,200.00 (materials)
1 man x 2 days; 16 hrs x $75/hr.= $1,200.00 (labor mech + elect)
$5,400.00

Simple payback: $5,400/$331=16.3 yrs.

ECM#3: Replace main constant speed units with variable frequency drive ECM motors and eliminate the zone pumps. Elimination of the zone pumps will need to include minor piping modification once these pumps are eliminated.

Electric savings 3,137KWH x 6 pumps= 18,822KWH (see ECM#1 analysis data)
Electric Savings: 2,366KWH (see ECM#2 analysis data)
Cost Savings: (18,822KWH + 2,366KWH) x $0.14/KWH= $2,966.00

Replacement Cost: demo. 6 units x $250.00 = $1,500.00 (materials)
new 2 pumps x $1,500.00 = $3,000.00 (materials)
units, piping and access. = $1,200.00 (materials)
2 man x 2 days; 32 hrs. x $75/hr.= $2,400.00 (labor mech + elect)
$8,100.00

Simple payback: $8,100/$2,966= 2.7 yrs.

ECM#4: Replace the existing oil fired domestic hot water heaters with indirect units with heating hot water from the new boilers.

Electric Savings: 156KWH (estimated based upon existing burner's usage)
Cost Savings: $219.00
Oil Savings: 1,937 gallons
Cost Savings: $6,953.00

Replacement Cost: 2 units x $6,500.00 = $13,000.00 (materials)
2 units, piping and accessories = $ 6,000.00 (materials)
2 men x 5 days; 80 hrs. x $75/hr. = $ 6,000.00 (labor mech.)
1 man x 3 days; 24 hrs. x $75/hr. = $ 1,800.00 (labor. elect.)
$26,800.00

Simple payback: $26,800/($6,953+$219.00) = 3.7 yrs.

Recommendations:

The priority items that are listed will require action now or in the in the near future. Individual equipment and/or system replacement is recommended due to its current age or condition which will improve the facility energy performance and avoid interruption due to unscheduled component failure and assure long term usage of the facility. Several of the existing individual pieces of equipment that are not listed for action at this time while functional at this time have

exceeded their useful service life and have not been deemed as critical should be considered for additional action due to their age.

1. Room fin-tube radiators, self-contained thermostats have all exceed their service life and should be replaced. Replacement will provide for improved temperature control and space comfort.
   Replacement Cost: 41 units x $65/unit =$2,665.00 (material)
   1 man x 3 days; 24 hrs. x $75/hr. =$1,800.00 (labor)
   $4,465.00
2. Main Heating System Circulation & Zone Pumps (P-1 thru P-8) see ECM#3.

3. Oil Circulation Pumps (OP-1 & 2). Replacement of OP-1
   Replacement Cost: 1 pump unit with motor =$ 750.00 (material)
   piping and accessories =$ 250.00 (materials)
   1 man x 1 days; 8 hrs. x $75/hr. =$ 600.00 (labor)
   $1,600.00

4. Central energy recovery unit ventilator (HRV) replace in-kind due to its poor performance and current condition. Existing unit, similar capacity without air conditioning, physical size and arrangement.
   Replacement cost: $194,610 (see appendix G)

5. Central energy recovery unit ventilator (DOAS-ERV) replacement, three (3) smaller capacity units dedicated to the three residence wins with heating and air conditioning. Note, air conditioning sized for dehumidification of the outside air not intended to treat the complete occupied space.
   Replacement cost: $181,820 (see appendix G)

6. Combustion Exhaust Fan: replace if existing boilers & domestic hot water heaters remain. Fan unit not required for the new boilers and domestic hot water heaters selection.
   Replacement Cost: fan with motor =$1,800.00 (material)
   Fan draft controller =$ 400.00(material)
   Flue modification =$1,000.00 (material)
   2 man x 2 days; 16 hrs. x $75/hr. =$1,200.00 (labor)
   $4,400.00

7. Domestic hot water heaters, storage tank type (2 units): see ECM#4.
   Replacement Cost $26,800.00

8. Domestic hot water heaters, direct fired tank less type (2 units):
   Replacement Cost: 2 units =$3,500.00 (material)
   Flue modification =$ 500.00 (material)
   piping and accessories =$ 500.00 (materials)
   2 man x 2 days; 16 hrs. x $75/hr. =$1,200.00 (labor)
   $5,700.00

9. Boiler system replacement, sized to provide building heating, individual flues and indirect domestic hot water. Due to the limited existing boiler room size and the proposed boilers sizing and quantity requires that the indirect hot water heaters (2- units 119 gallon, 30-inch dia.) tanks be located in the adjoining storage room.
   - Indirect domestic hot water heaters $ 26,800.00 (see ECM#4)
   - New tempering valve with piping $ 2,500.00
   - New main pumps with ECM motors & controls $ 8,100.00 (see ECM#3)

Subtotal	$ 37,400.00
General Conditions	$ 0.00
Mobilization	$ 0.00
Coordination	$ 1,870.00
Phasing	$ 0.00
Subtotal	$ 39,270.00
Profit (15%)	$ 5,891.00
Subtotal	$ 45,161.00
Bonding (2%)	$ 903.00
Const. allowance	$ 0.00
Total	$ 46,064.00

   - Boilers and related work $153,561.00 (see appendix G)

System Total $199,625.00

Notes:
1. Boilers, cast iron units that allow low return water temperatures of 100deg.F are manufactured by Viessmann, Buderus, DeDietrich. Selection of one of these manufactures would eliminate the need for a hot water return control system that prevents boiler shock associated with low return water temperatures.
2. Indirect water heaters, Turbomax.
3. Pumps, ECM motors with built-in controls; manufacture Grundfos, Wilo.

Conclusions

Based upon the evaluation and analysis as performed for this report SED recommend the following minimum course of action for facility priority items;

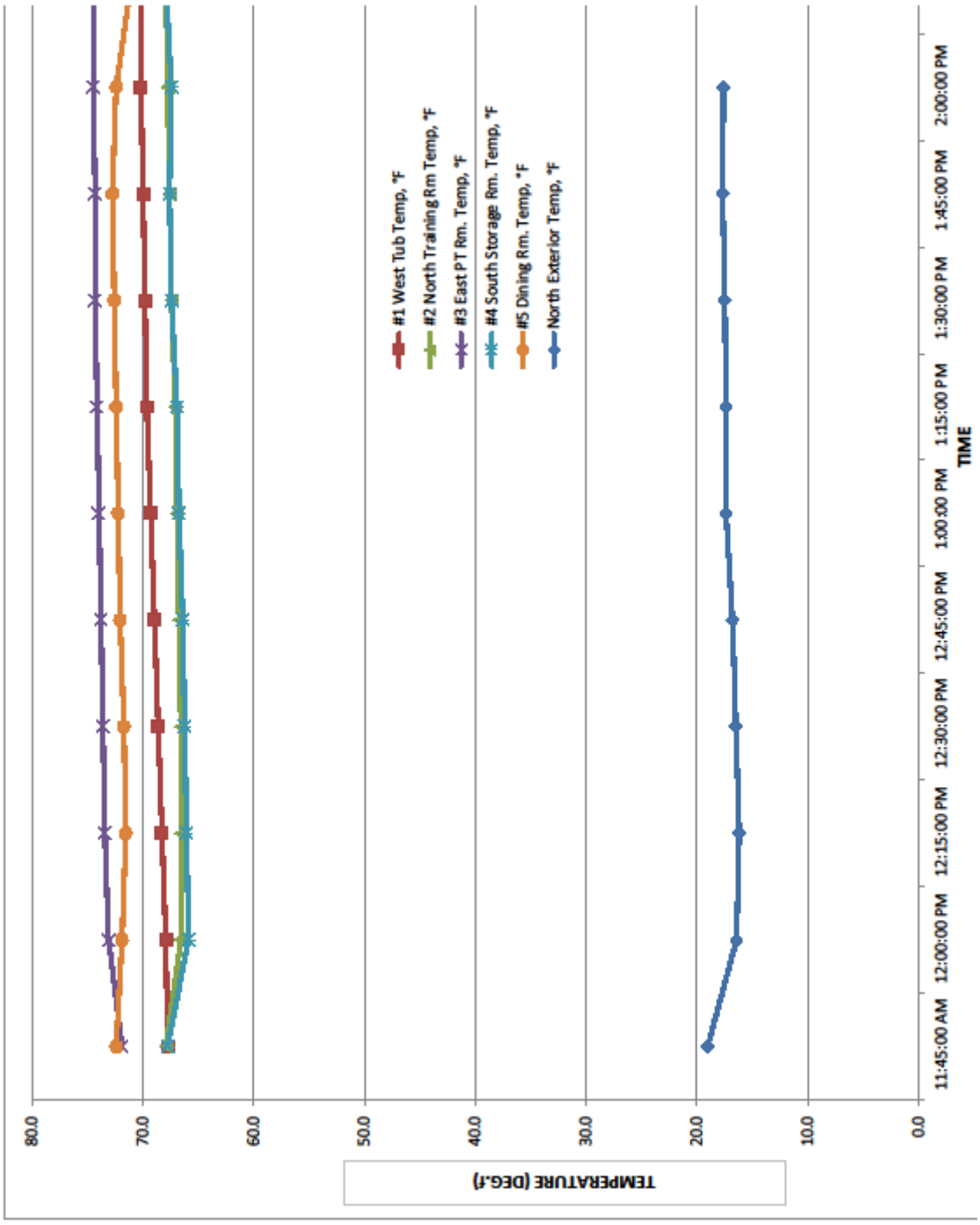
1. Replace the existing individual fin-tube radiation self-contained thermosets	$ 4,500.00.
2. Replace the existing central heat recovery unit with three(3) new DOAS-ERV	$182,000.00.
3. Replace the existing boiler heating, domestic hot water heater and pumps	$200,000.00
4. Replace fuel oil circulation pump, OP-1	$ 1,600.00
5. Replace existing propane direct fired domestic hot water heaters	$ 5,700.00
Total	$393,800.00

The remainder of the existing equipment while exceeding the projected useful service life are still fully functional and were not noted by facility as an issue for either maintenance or service. These items should be replaced on an as need bases.

APPENDICES:

A. Observed Temperatures
B. Existing Equipment Inventory
C. 2013 Energy Usage
D. HVAC Load Analysis, Summary
E. Domestic Water Storage Tank Analysis
F. Energy Conservation Measures, Analysis
G. System Budget Costs

Appendix A: Observed Temperatures(January 2014)



Appendix B: Existing Equipment Inventory

Useful service life as estimated by ASHRAE- HVAC Applications (2011)

FACILITY: OUR ISLAND HOME DATE: JAN 2014

BOILER & BURNER #1

Year Installed: 2000?	Manufacturer:Weil-Mclain	Burner, Manfacturer: Carlin
Location: boiler room	Model:WGO-8	Model:QB-300
Equipment Type: Cast Iron	Size: 231MBH	Size: 2.3 gph
Fuel: No. 2 oil		Electrical: 1/6 hp motor, 120-1ph

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			BOILER				**BURNER**
X			Is the piping insulated complete and in good condition?	X			Is the piping in good condition?
	X		Are there visual signs of leaks in water,fuel or combustion exhhaust?	X			Is the motor in good condition?
X			Are the drain and safety valves properly piped?				**ELECTRICAL**
X			Is the piping in good condition?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?				**PLUMBING**
X			Are there sufficient pressure gauges?	X			Are ther localized drains?
X			Are there sufficuent temperature sensors?	X			Is there piped make-up water?
X			Is the flue and breeching insulation in good condition?	X			Is there a backflow preventer on the make-up line?
X			Is there a combustiion air source?	X			Is there a PRV on ther make-up water line?
	X		Is the room under a negative pressure versus surrounding spaces?	X			Is the fuel piping in good condition?
X			Is there accss around equipment?				**MAINTENANCE**
X			Overall condition, clean, clutter free?		X		Is the system flow diagram mounted in room?
X			Is there proper air control devices (air seperator, expansion tank, air vents)?	X			Is the O+M located nerby or in a file?
X			Is barometric damper in good condition?	X			Is there a service contractor?
X			Are system controls operational?	X			Is recent combustion efficiency test posted or on file?

STANDRAD AND CODE ISSUES

X			Is the flue and breeching installed per code, pitch & length?			X	Is unit current energy code compliant?
X			Is the combustion air source code compliant?	X			Is emergency power a requiremnt?
X			Is boiler equipped with HI & LO water cutoffs?				
X			Is fuel cutoff device installed?				

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
11	cast iron boiler, benchmark is 25 years	**2**	controls benchmark is 16 years
1	burner, benchmark is 15 years	**4**	burner motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.

COMMENTS:

1. Boiler has had section seal failure with burn thru, patched.
2. System controller: Tekmar 254, 4 stages boiler, outside water reset & system start
3. Unit model discontinued by manufactuer, replacemnt unit not compatable.

BOILER SIDE PANEL BURN THRU

BURNER

FACILITY: OUR ISLAND HOME DATE: JAN 2014

BOILER & BURNER #2

Year Installed: 2000?	Manufacturer:Weil-Mclain	Burner, Manfacturer: Carlin
Location: boiler room	Model:WGO-8	Model:QB-300
Equipment Type: Cast Iron	Size: 231MBH	Size: 2.3 gph
Fuel: No. 2 oil		Electrical: 1/6 hp motor, 120-1ph

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			BOILER				**BURNER**
X			Is the piping insulated complete and in good condition?	X			Is the piping in good condition?
	X		Are there visual signs of leaks in water,fuel or combustion exhhaust?	X			Is the motor in good condition?
X			Are the drain and safety valves properly piped?				**ELECTRICAL**
X			Is the piping in good condition?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?				**PLUMBING**
X			Are there sufficient pressure gauges?	X			Are ther localized drains?
X			Are there sufficuent temperature sensors?	X			Is there piped make-up water?
X			Is the flue and breeching insulation in good condition?	X			Is there a backflow preventer on the make-up line?
X			Is there a combustiion air source?	X			Is there a PRV on ther make-up water line?
	X		Is the room under a negative pressure versus surrounding spaces?	X			Is the fuel piping in good condition?
X			Is there accss around equipment?				**MAINTENANCE**
X			Overall condition, clean, clutter free?		X		Is the system flow diagram mounted in room?
X			Is there proper air control devices (air seperator, expansion tank, air vents)?	X			Is the O+M located nerby or in a file?
X			Is barometric damper in good condition?	X			Is there a service contractor?
X			Are system controls operational?	X			Is recent combustion efficiency test posted or on file?

STANDRAD AND CODE ISSUES

X			Is the flue and breeching installed per code, pitch & length?			X	Is unit current energy code compliant?
X			Is the combustion air source code compliant?	X			Is emergency power a requiremnt?
X			Is boiler equipped with HI & LO water cutoffs?				
X			Is fuel cutoff device installed?				

END OF EQUIPMENT USEFUL SERVICE LIFE

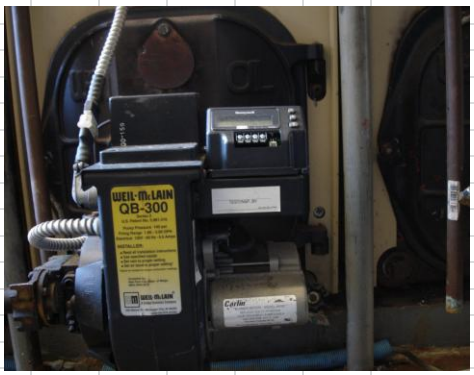
Useful Life		Useful Life	
11	cast iron boiler, benchmark is 25 years	**2**	controls benchmark is 16 years
1	burner, benchmark is 15 years	**4**	burner motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.

COMMENTS:

1. System controller: Tekmar 254, 4 stages boiler, outside water reset & system start
2. Unit model discontinued by manufactuer, replacemnt unit not compatable.



BURNER

HEATING BOILER SYSTEM CONTROLLER

FACILITY: OUR ISLAND HOME DATE: JAN 2014

BOILER & BURNER #3

Year Installed: 2000?	Manufacturer:Weil-Mclain	Burner, Manfacturer: Becket
Location: boiler room	Model:WGO-8	Model: AFG
Equipment Type: Cast Iron	Size: 231MBH	Size: 2.3 gph
Fuel: No. 2 oil		Electrical: 1/6 hp motor, 120-1ph

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			BOILER				**BURNER**
X			Is the piping insulated complete and in good condition?	X			Is the piping in good condition?
	X		Are there visual signs of leaks in water,fuel or combustion exhhaust?	X			Is the motor in good condition?
X			Are the drain and safety valves properly piped?				**ELECTRICAL**
X			Is the piping in good condition?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?				**PLUMBING**
X			Are there sufficient pressure gauges?	X			Are ther localized drains?
X			Are there sufficuent temperature sensors?	X			Is there piped make-up water?
X			Is the flue and breeching insulation in good condition?	X			Is there a backflow preventer on the make-up line?
X			Is there a combustiion air source?	X			Is there a PRV on ther make-up water line?
	X		Is the room under a negative pressure versus surrounding spaces?	X			Is the fuel piping in good condition?
X			Is there accss around equipment?				**MAINTENANCE**
X			Overall condition, clean, clutter free?		X		Is the system flow diagram mounted in room?
X			Is there proper air control devices (air seperator, expansion tank, air vents)?	X			Is the O+M located nerby or in a file?
X			Is barometric damper in good condition?	X			Is there a service contractor?
X			Are system controls operational?	X			Is recent combustion efficiency test posted or on file?

STANDRAD AND CODE ISSUES

X			Is the flue and breeching installed per code, pitch & length?			X	Is unit current energy code compliant?
X			Is the combustion air source code compliant?	X			Is emergency power a requiremnt?
X			Is boiler equipped with HI & LO water cutoffs?				
X			Is fuel cutoff device installed?				

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
11	cast iron boiler, benchmark is 25 years	**2**	controls benchmark is 16 years
1	burner, benchmark is 15 years	**4**	burner motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.

COMMENTS:

1. System controller: Tekmar 254, 4 stages boiler, outside water reset & system start
2. Burner refurrbished & flue replaced on the unit 01/24/2014
3. Unit model discontinued by manufactuer, replacemnt unit not compatable.

BOILER NEW FLUE

BURNER REFURBISHED

FACILITY: OUR ISLAND HOME DATE: JAN 2014

COMBUSTION AIR EXHAUST FAN

Year Installed: 2000? Manufacturer: Whitty Co. Inc. (obsolete)

Location: boiler room Tag/Model/Capacity

Type: single fan, constant volumn. Electrical: 1/2 hp, 12-1ph, 1728 RPM

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			AIR HANDLING UNIT				**ATC**
X			Is the flue insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the flue in good condition?				
X			Unit in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are automatic dampers in good condition & operating?	X			Is ther a localized disconnect?
X			Overall condition, clean, clutter free, no vibration or noise?		X		Does the unit have a VSD?
	X		Are system controls operational?				**PLUMBING**
				X			Are ther localized drains?
							MAINTENANCE
					X		Is the system flow diagram mounted in room?
					X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

COMMENTS:

1. Manufacture out of bussiness, obsolete.
2. Exterior surface corrison
3. Draft fan controller not working, fan runs 24/7.

DRAFT FAN

DRAFT FAN CONTROLLER

COMBUSTION AIR INTAKE

FACILITY: OUR ISLAND HOME DATE: JAN 2014

OIL PUMPS: OP-1 & OP-2

Year Installed: Varies | Manufacturer:Suntec
Location: boiler room | Model: JP6A
Casing: Cast Iron | Size: 24 GPH @ 100PSIG
Impeller: Steel (rotary) | Electrical: 1/3 hp motor, 120-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
		X	Is the piping insulated complete and in good condition?		X		Does the system have automatic controls?
X			Is there sufficient pump head pressure?				
X			Is the piping in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?		X		Does the pump have a VSD?
X			Are there sufficient pressure gauges?				**PLUMBING**
		X	Are there sufficuent temerature sensors, thermometers?	X			Are ther localized drains?
X			Overall condition, clean, clutter free?				**MAINTENANCE**
	X		Is there any excess pump vibration?		X		Is the system flow diagram mounted in room?
		X	Are system controls operational?		X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
X			Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	OP-1 pump, pipe-mounted benchmark is 20 years.	**20**	OP-2 pump, pipe-mounted benchmark is 20 years.

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.

COMMENTS:

1. OP-1, original unit.
2. OP-2, unit replaced 2014.
3. Pumps are manually operated, year round running.

OP-1 & 2

OIL FILTERING SYSTEM-STORAGE TANK

FACILITY: OUR ISLAND HOME DATE: JAN 2014

MAIN HOT WATER CIRCULATION PUMPS : P-7 & P-8(STAND-BY)

Year Installed: 2005?	Manufacturer:TACO
Location: boiler room	Model: 1615
Casing: Cast Iron	Size: 32GPM @ 32FT.HD
Impeller: Cast Bronze	Electrical: 1/2 hp motor, 120-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
X			Is the piping insulated complete and in good condition?		X		Does the system have automatic controls?
X			Is there sufficient pump head pressure?				
X			Is the piping in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?		X		Does the pump have a VSD?
X			Are there sufficient pressure gauges?				**PLUMBING**
	X		Are there sufficuent temerature sensors, thermometers?	X			Are ther localized drains?
X			Overall condition, clean, clutter free?				**MAINTENANCE**
	X		Is there any excess pump vibration?		X		Is the system flow diagram mounted in room?
	X		Are system controls operational?		X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
X			Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

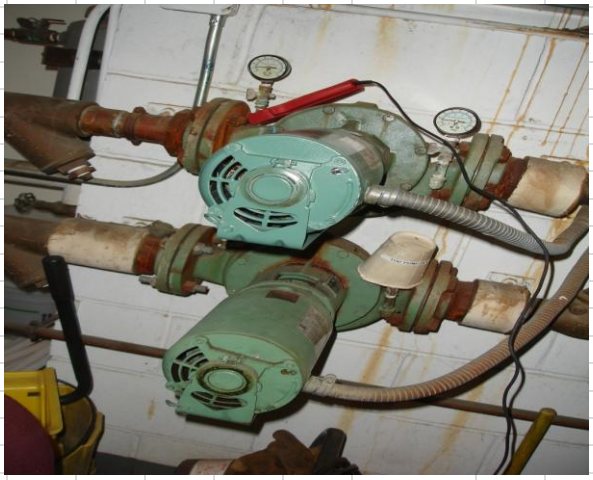
Useful Life		Useful Life	
1	pump, pipe-mounted benchmark is 10 years.	**2**	controls benchmark is 16 years

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.
X			Consider replacemnt with ECM units with autoadapt controls

COMMENTS:

1. Automatic controls part of the boiler system Tekmar controller, start-stop only
2. Manual selection of pump sequencing, next up designated by cup.
3. Pump P-1(top) motor replaced 2009?
4. Pressure gauge missing P-2(bottom)



PUMPS

FACILITY: OUR ISLAND HOME DATE: JAN 2014

3 TON DUCTLESS SPLIT AC- TYPICAL FOR THREE UNITS

Year Installed: 2003	Manufacturer: Carrier
Location: common area; north, east & west end-of-corridors	Model: 40QAB036 (INDOOR), 38HDC030(OUTDOOR)
Type: single zone ductless AC unit with remote condenser	Size: not applicable
Cooling: 3 ton, refrigerant R-22	Capacity: 840CFM @ 0.25inWC. (INDOOR)
Heating: none	Electrical: indoor fan 1/6 hp motor, 208-1ph (1725RPM)
	Electrical: oudoor condenser 1/8 hp motor, 208-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			DUCTLESS AC				**ATC**
	X		Is the piping insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping in good condition?				
X			Are the valves in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Indood unit in good condition?	X			Is ther a localized disconnect?
		X	Are automatic dampers in good condition & operating?		X		Does the unit have a VSD?
X			Outdoor unit in good condition?				**PLUMBING**
X			Refrigeration systems & associated controls in good condition?	X			Are ther localized drains?
		X	Energy revovery installed & operating?				**MAINTENANCE**
X			Overall condition, clean, clutter free, no vibration or npoise?		X		Is the system flow diagram mounted in room?
		X	Are there valve tags?		X		Is the O+M located nerby or in a file?
X			Are system controls operational?		X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
9	indoor unit motor benchmark is 20 years.	**9**	outdoor unit compressor benchmark is 20 years

ENERGY CONSERVCATION MEASURES

COMMENTS:

1. Refrigeration is R-22 no longer manufactured, replacemnt refrigerents not compatable.
2. Exterior insulation splitting apart.

THERMOSTAT

INDOOR CONDENSER

OUTDOOR CONDENSER

FACILITY: OUR ISLAND HOME DATE: JAN 2014

5 TON DUCTLESS SPLIT AC- TYPICAL FOR TWO UNITS

Year Installed: 2003	Manufacturer: Carrier
Location: north training room & nurse station sitting area.	Model: 40QAB060 (INDOOR), 38HDC060(OUTDOOR)
Type: single zone ductless AC unit with remote condenser	Size: not applicable
Cooling: 5 ton, refrigerant R-22	Capacity: 850CFM @ 0.25inWC. (INDOOR)
Heating: none	Electrical: indoor fan 1/4 hp motor, 208-1ph (1725RPM)
	Electrical: oudoor condenser 1/8 hp motor, 208-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			DUCTLESS AC				**ATC**
	X		Is the piping insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping in good condition?				
X			Are the valves in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Indood unit in good condition?	X			Is ther a localized disconnect?
		X	Are automatic dampers in good condition & operating?		X		Does the unit have a VSD?
X			Outdoor unit in good condition?				**PLUMBING**
X			Refrigeration systems & associated controls in good condition?	X			Are ther localized drains?
		X	Energy revovery installed & operating?				**MAINTENANCE**
X			Overall condition, clean, clutter free, no vibration or npoise?		X		Is the system flow diagram mounted in room?
		X	Are there valve tags?		X		Is the O+M located nerby or in a file?
X			Are system controls operational?		X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
9	indoor unit motor benchmark is 20 years.	**9**	outdoor unit compressor benchmark is 20 years

ENERGY CONSERVCATION MEASURES

COMMENTS:

1. Refrigeration is R-22 no longer manufactured, replacemnt refrigerents not compatable.
2. Exterior insulation splitting apart.

THERMOSTAT

INDOOR CONDENSER

OUTDOOR CONDENSER

FACILITY: OUR ISLAND HOME DATE: JAN 2014

CORE AREA AC

Year Installed: 1980(indoor), unknown (outdoor)	Manufacturer: Carrier (indoor unit) Bryant (outdoor unit)
Location: attic mechanical room	Model: 40AS-036
Type: single zone, constant volumn with remote condenser	Size: unknown
Cooling: 3 ton, refrigerant R-22	Capacity: 1300CFM @ 0.60inWC. (INDOOR)
Heating: 3.6 KW, electric (208-3ph)	Electrical: indoor fan 1/3 hp motor, 120-1ph (1725RPM)
	Electrical: oudoor condenser 1/3 hp motor, 120-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			AIR HANDLING UNIT				**ATC**
X			Is the piping & ductwork insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping & ductwork in good condition?				
X			Are the valves in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Indood unit in good condition?	X			Is ther a localized disconnect?
X			Are automatic dampers in good condition & operating?		X		Does the unit have a VSD?
X			Outdoor unit in good condition?				**PLUMBING**
X			Refrigeration systems & associated controls in good condition?	X			Are ther localized drains?
		X	Energy revovery installed & operating?				**MAINTENANCE**
X			Overall condition, clean, clutter free, no vibration or npoise?		X		Is the system flow diagram mounted in room?
		X	Are there valve tags?		X		Is the O+M located nerby or in a file?
X			Are system controls operational?		X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

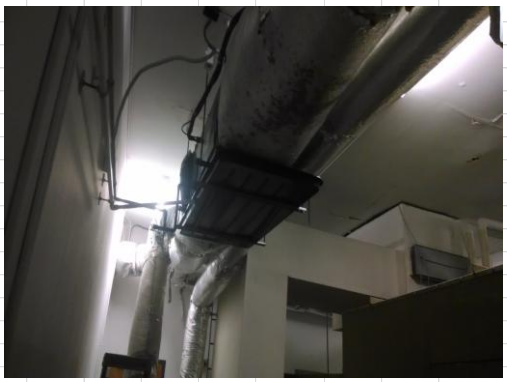
Useful Life		Useful Life	
0	indoor unit motor benchmark is 20 years.	**??**	outdoor unit compressor benchmark is 20 years

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.	X			Consider retrofitting with central VRZ ductless system.

COMMENTS:

1. Unit model discontinued by manufactuer, replacemnt unit not compatable.
2. Refrigeration is R-22 no longer manufactured, replacemnt refrigerents not compatable.



INDOOR FAN COILN UNIT

OUTDOOR CONDENSER

UNIT SPACE THERMOSTAT

FACILITY: OUR ISLAND HOME DATE: JAN 2014

KITCHEN AREA DUCTLESS SPLIT AC- TYPICAL FOR THREE UNITS

Year Installed: 2006,2012	Manufacturer: Friedrich(Dry Goods), Heat Controller (Computer Server, Medical Records)
Location: kitchen area	Model: Friedrich MR09CIH (OUTDOOR), Heat Controller A-HMC09AS(OUTDOOR)
Type: single zone ductless AC unit with remote condenser	Size: not applicable
Cooling: 9000 BTUH, refrigerant R-22	Capacity: VARIES
Cooling: 9000 BTUH, refrigerant R-410a Dry Goods.	Electrical: VARIES
Heating: none	Electrical: oudoor condenser 1/6 hp motor, 120-1ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			DUCTLESS AC				**ATC**
	X		Is the piping insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping in good condition?				
X			Are the valves in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Indood unit in good condition?	X			Is ther a localized disconnect?
		X	Are automatic dampers in good condition & operating?		X		Does the unit have a VSD?
X	X		Outdoor unit in good condition?				**PLUMBING**
X			Refrigeration systems & associated controls in good condition?	X			Are ther localized drains?
		X	Energy revovery installed & operating?				**MAINTENANCE**
X			Overall condition, clean, clutter free, no vibration or npoise?		X		Is the system flow diagram mounted in room?
		X	Are there valve tags?		X		Is the O+M located nerby or in a file?
X			Are system controls operational?		X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
7	outdoor unit compressor benchmark is 15 years	**12**	outdoor unit compressor benchmark is 15 years

ENERGY CONSERVCATION MEASURES

COMMENTS:

1. Refrigeration is R-22 no longer manufactured, replacemnt refrigerents not compatable.
2. Exterior insulation splitting apart.
3. Medical records unit has exterior corrision.

MEDICAL RECORDS (2006?) COMPUTER SERVER (2006?) DRY GOODS (2013)

OUTDOOR CONDENSERS

FACILITY: OUR ISLAND HOME DATE: JAN 2014

HEAT RECOVERY VENTILATOR(AIR-TO-AIR)

Year Installed: 1980	Manufacturer: Des Champs (now Munters)
Location: attic mechanical room	Model: PV10 with ten(10) Series 74-1000-68A6C Z-Duct Heat Recovery modules.
Type: Plate type air-to-air HX, constant volumn.	Recovery: 535,488 BTUH (winter)
Cooling: None	Capacity: 11,855 CFM @ 0.60inWC. (INDOOR)
Heating: recovery with supplemental hot water coil	Electrical: supply fan 15 hp motor, 208-3ph (1725RPM)
Heating Coil: 644,174 BTUH	Electrical: exhaust fan 5 hp motor, 208-3ph (1725RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA					
			HRV				**ATC**				
	X		Is the piping & ductwork insulated complete and in good condition?	X			Does the system have automatic controls?				
	X		Is the piping & ductwork in good condition?								
X			Are the valves in good condition?				**ELECTRICAL**				
X			Is there accss around equipment?		X		Is the motor high efficiency?				
	X		Unit in good condition?	X			Is ther a localized disconnect?				
	X		Are automatic dampers in good condition & operating?		X		Does the unit have a VSD?				
X			Energy revovery installed & operating?				**PLUMBING**				
X			Overall condition, clean, clutter free, no vibration or noise?	X			Are ther localized drains?				
		X	Are there valve tags?				**MAINTENANCE**				
X			Are system controls operational?		X		Is the system flow diagram mounted in room?				
					X		Is the O+M located nerby or in a file?				
					X		Is there a service contractor?				

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			replacemnt with new energy recovery unit				

COMMENTS:

1. Unit model discontinued by manufactuer, replacemnt unit not compatable.
2. Unit controls have been updated, dampers not working, coils and HX dirty, etc,

HRV UNIT

PIPING

INSIDE AT HX

FACILITY: OUR ISLAND HOME DATE: JAN 2014

ZONE WATER CIRCULATION PUMPS : P-1 North,P-2 West,P-3 Stand-by,P-4 East ,P-5 South & P-6 HRV.

Year Installed: Varies	Manufacturer:TACO
Location: attic mechanical room	Model: 112
Casing: Cast Iron	Size: 7GPM @ 10FT.HD (Typical)
Impeller: Cast Bronze	Electrical: 1/3 hp motor, 120-1ph (3450RPM) (Typic

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
X			Is the piping insulated complete and in good condition?		X		Does the system have automatic controls?
X			Is there sufficient pump head pressure?				
X			Is the piping in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?		X		Does the pump have a VSD?
X			Are there sufficient pressure gauges?				**PLUMBING**
	X		Are there sufficuent temerature sensors, thermometers?	X			Are ther localized drains?
X			Overall condition, clean, clutter free?				**MAINTENANCE**
	X		Is there any excess pump vibration?		X		Is the system flow diagram mounted in room?
	X		Are system controls operational?		X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
X			Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
3	P-1, pump, pipe-mounted benchmark is 10 years.	**9**	P-4, pump, pipe-mounted benchmark is 10 years.
0	P-2, pump, pipe-mounted benchmark is 10 years.	**9**	P-5, pump, pipe-mounted benchmark is 10 years.
2	P-3, pump, pipe-mounted benchmark is 10 years.	**1**	P-6, pump, pipe-mounted benchmark is 10 years.

ENERGY CONSERVCATION MEASURES

X			Replace with new higher efficiency units.
X			Consider replacemnt with ECM units with autoadapt contro

COMMENTS:

1. P-1: Pump bearing & motor replaced 2007.
2. P-2: Pump bearing & motor replaceed 2003.
3. P-3: Pump replaced 2004, motor replaced 2006.
4. P-4 & P-5: Unit replaced 2013.
5. P-6: Pump replaced 2005, motor replaced 2008.
6. Manual year round operation 24/7.

P-1

P-2

P-3

P-4

P-5

P-6

FACILITY: OUR ISLAND HOME DATE: JAN 2014

ZONE WATER CIRCULATION PUMPS : P-9 Dining Room.

Year Installed: 2003	Manufacturer:TACO
Location: storage closet outside of dining room.	Model: 008
Casing: Cast Iron	Size: 6GPM @ 13FT.HD
Impeller: Cast Bronze	Electrical: 1/25 hp motor, 120-1ph (3450RPM)

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
X			Is the piping insulated complete and in good condition?		X		Does the system have automatic controls?
X			Is there sufficient pump head pressure?				
X			Is the piping in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?		X		Does the pump have a VSD?
	X		Are there sufficient pressure gauges?				**PLUMBING**
	X		Are there sufficuent temerature sensors, thermometers?	X			Are ther localized drains?
X			Overall condition, clean, clutter free?				**MAINTENANCE**
	X		Is there any excess pump vibration?		X		Is the system flow diagram mounted in room?
	X		Are system controls operational?		X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
X			Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	pump, pipe-mounted benchmark is 10 years.		

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with new higher efficiency units.
X			Consider replacemnt with ECM units with autoadapt controls

COMMENTS:

1. Located in closet ceiling outside of dining room.
2. Manual year round operation, continous.

P-9

FACILITY: OUR ISLAND HOME DATE: JAN 2014

RESIDENCE ROOM RADIATOR & THERMOSTAT (TYPICAL)

Year Installed: 1980 Manufacturer: Vulcan?

Location: residence rm. and common spaces Model: FS?

Size: 600BTUH per foot (active length)

Electrical: none

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
X			Is the piping insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping in good condition?				
X			Unit covers in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
X			Overall condition, clean, clutter free?		X		Does the pump have a VSD?
X			Are system controls operational?				**PLUMBING**
				X			Are ther localized drains?
							MAINTENANCE
					X		Is the system flow diagram mounted in room?
					X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
		X	Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	radiator, benchmark is 25 years.	**0**	self-contained thermostat, benchmark is 10 years.

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace self-contained thermostatic valves

COMMENTS:

SELF-CONTAINED THERMOSTAIC VALVE

SELF-CONTAINED THERMOSTAIC SPACE SENSOR

FACILITY: OUR ISLAND HOME DATE: JAN 2014

DINING ROOM RADIATOR & THERMOSTAT (TYPICAL)

Year Installed: 2003 Manufacturer: Slant-Fin?

Location: dining room Model: Mulkti/Pak 80?

Size: 840BTUH per foot (active length)

Electrical: none

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			PUMP				**ATC**
X			Is the piping insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the piping in good condition?				
X			Unit covers in good condition?				**ELECTRICAL**
X			Is there accss around equipment?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
X			Overall condition, clean, clutter free?		X		Does the pump have a VSD?
		X	Are system controls operational?				**PLUMBING**
				X			Are ther localized drains?
							MAINTENANCE
					X		Is the system flow diagram mounted in room?
					X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
		X	Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
12	radiator, benchmark is 25 years.	**0**	self-contained thermostat, benchmark is 10 years.

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace self-contained thermostatic valves

COMMENTS:

RADITOR

SELF-CONTAINED THERMOSTAIC SPACE SENSOR

FACILITY: OUR ISLAND HOME DATE: JAN 2014

LAUNDRY AREA FANS & HOODS

Year Installed: 1980? & 2010 Manufacturer: unknown

Location: exterior wall Tag/Model/Capacity/Electrical

Type: single fan, constant volumn. unkonown

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA					
			AIR HANDLING UNIT				**ATC**				
X			Is the ductwork insulated complete and in good condition?	X			Does the system have automatic controls?				
X			Is the ductwork in good condition?								
X			Is there accss around equipment?				**ELECTRICAL**				
X			Unit in good condition?		X		Is the motor high efficiency?				
X			Are automatic dampers in good condition & operating?	X			Is ther a localized disconnect?				
X			Overall condition, clean, clutter free, no vibration or noise?		X		Does the unit have a VSD?				
X			Are system controls operational?				**PLUMBING**				
				X			Are ther localized drains?				
							MAINTENANCE				
					X		Is the system flow diagram mounted in room?				
					X		Is the O+M located nerby or in a file?				
					X		Is there a service contractor?				

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
22	fan unit benchmark is 25 years.	**15**	motor benchmark is 18 years
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

COMMENTS:

1. Intake and exhaust hoods added recently, past year, to comply with DPH requirements.

LAUNDRY ROOM EXTERIOR WALL- FANS, INTAKE & EXHAUST HOODS

FACILITY: OUR ISLAND HOME DATE: JAN 2014

KITCHEN MAKE UP AIR UNITHEAT RECOVERY VENTILATOR(AIR-TO-AIR)

Year Installed: 1980	Manufacturer: McQuay (now Dakin)
Location: attic mechanical room	Model: LYF106cv
Type: single fan, constant volumn.	Capacity: 2310 CFM @ 1.75inWC.
Cooling: None	Electrical: supply fan 1.5 hp motor, 208-3ph (1725RPM)
Heating: None	

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA	AIR HANDLING UNIT
X			Is the ductwork insulated complete and in good condition?
X			Is the ductwork in good condition?
X			Is there accss around equipment?
	X		Unit in good condition?
X			Are automatic dampers in good condition & operating?
X			Overall condition, clean, clutter free, no vibration or noise?
X			Are system controls operational?

Y	N	NA	ATC
X			Does the system have automatic controls?
			ELECTRICAL
	X		Is the motor high efficiency?
			Is ther a localized disconnect?
	X		Does the unit have a VSD?
			PLUMBING
X			Are ther localized drains?
			MAINTENANCE
	X		Is the system flow diagram mounted in room?
	X		Is the O+M located nerby or in a file?
	X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			replacemnt with new make-up air unit with VFD				

COMMENTS:

1. Unit model discontinued by manufactuer, replacemnt unit not compatable.
2. Unit controls have been updated, dampers not working, coils and HX dirty, etc,

MAKE UP AIR UNIT

FACILITY: OUR ISLAND HOME DATE: JAN 2014

KITCHEN AREA EXHAUST FANS

Year Installed: 1980 Manufacturer: Loren Cook

Location: attic Tag/Model/Capacity/Electrical

Type: single fan, constant volumn. EF-1 Cooking Hood, unknown,3800CFM@1.00inWC, 1.5hp(208-3ph).

EF-2 Dishwasher Hood, L2, 600CFM@0.75inWC, 1/4hp(120-1ph).

EF-3 Washdown Area, CVD, 200CFM@0..375inWC, 1/12hp(120-1ph).

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			AIR HANDLING UNIT				**ATC**
X			Is the ductwork insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the ductwork in good condition?				
X			Is there accss around equipment?				**ELECTRICAL**
X			Unit in good condition?		X		Is the motor high efficiency?
X			Are automatic dampers in good condition & operating?	X			Is ther a localized disconnect?
X			Overall condition, clean, clutter free, no vibration or noise?		X		Does the unit have a VSD?
X			Are system controls operational?				**PLUMBING**
				X			Are ther localized drains?
							MAINTENANCE
					X		Is the system flow diagram mounted in room?
					X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			replacemnt with new unit with ECM motor.				

COMMENTS:

1. Unit model discontinued by manufactuer, replacemnt unit not compatable.

EF-2 & EF-3

FACILITY: OUR ISLAND HOME DATE: JAN 2014

DOMESTIC WATER HEATERS (DWH-3&4)

Year Installed: 2006	Manufacturer: Noritz	Burner, Manfacturer: Noritz
Location: bathing rooms	Model:N-084M-DV	Model: NA
Equipment Type: Direct	Size: not applicable	Firing Rate: 236,000 BTUH
Fuel: Propane	Capacity: flow 4.8gpm at 80deg.F rise	Electrical: 1amp, 120-1ph

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			TANK				**BURNER**
X			Is the piping insulated complete and in good condition?	X			Is the piping in good condition?
X			Are there visual signs of leaks in water,fuel or combustion exhhaust?	X			Is the motor in good condition?
X			Are the drain and safety valves properly piped?				**ELECTRICAL**
X			Is the piping in good condition?			X	Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?				**PLUMBING**
	X		Are there sufficient pressure gauges?	X			Are ther localized drains?
	X		Are there sufficuent temperature sensors?	X			Is there piped make-up water?
X			Is the flue and breeching insulation in good condition?			X	Is there a backflow preventer on the make-up line
X			Is there a combustiion air source?			X	Is there a PRV on ther make-up water line?
	X		Is the room under a negative pressure versus surrounding spaces?	X			Is the fuel piping in good condition?
	X		Is there accss around equipment?				**MAINTENANCE**
X			Overall condition, clean, clutter free?		X		Is the system flow diagram mounted in room?
X			Is there proper air control devices (air seperator, expansion tank, air v			X	Is the O+M located nerby or in a file?
		X	Is barometric damper in good condition?			X	Is there a service contractor?
X			Are system controls operational?			X	Is recent combustion efficiency test posted or on

STANDRAD AND CODE ISSUES

X			Is the flue and breeching installed per code, pitch & length?			X	Is unit current energy code compliant?
X			Is the combustion air source code compliant?	X			Is emergency power a requiremnt?
		X	Is boiler equipped with HI & LO water cutoffs?				
		X	Is fuel cutoff device installed?				

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
2	heat exchanger, benchmark is 10 years		

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace.		

COMMENTS:

1. Unit model discontinued by manufactuer, replacemnt unit not compatable.

DWH-3: OTPT BATH

WEST BATHING

DWH-3:DATA

FACILITY: OUR ISLAND HOME DATE: JAN 2014

DOMESTIC WATER HEATERS (DWH-1 &2)

Year Installed: 2007	Manufacturer: BOCK	Burner, Manfacturer: Carlin
Location: boiler room	Model:73E	Model: Elite, EZ-2
Equipment Type: storage	Size: 67 gallon	Firing Rate: 1.75 gph
Fuel: No. 2 oil	Capacity: recovery 258 gph at 90deg.F rise	Electrical: 1/6 hp motor, 120-1ph

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			TANK				**BURNER**
X			Is the piping insulated complete and in good condition?	X			Is the piping in good condition?
X			Are there visual signs of leaks in water,fuel or combustion exhhaust?	X			Is the motor in good condition?
X			Are the drain and safety valves properly piped?				**ELECTRICAL**
	X		Is the piping in good condition?		X		Is the motor high efficiency?
X			Are the valves in good condition?	X			Is ther a localized disconnect?
	X		Are there valve tags?				**PLUMBING**
	X		Are there sufficient pressure gauges?	X			Are ther localized drains?
	X		Are there sufficuent temperature sensors?	X			Is there piped make-up water?
X			Is the flue and breeching insulation in good condition?			X	Is there a backflow preventer on the make-up line?
X			Is there a combustiion air source?			X	Is there a PRV on ther make-up water line?
	X		Is the room under a negative pressure versus surrounding spaces?	X			Is the fuel piping in good condition?
	X		Is there accss around equipment?				**MAINTENANCE**
X			Overall condition, clean, clutter free?		X		Is the system flow diagram mounted in room?
X			Is there proper air control devices (air seperator, expansion tank, air vents)?			X	Is the O+M located nerby or in a file?
	X		Is barometric damper in good condition?			X	Is there a service contractor?
X			Are system controls operational?			X	Is recent combustion efficiency test posted or on file?

STANDRAD AND CODE ISSUES

X			Is the flue and breeching installed per code, pitch & length?			X	Is unit current energy code compliant?
X			Is the combustion air source code compliant?	X			Is emergency power a requiremnt?
		X	Is boiler equipped with HI & LO water cutoffs?				
		X	Is fuel cutoff device installed?				

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
3	storage tank, benchmark is 10 years	**11**	burner motor benchmark is 18 years
8	burner, benchmark is 15 years		

ENERGY CONSERVCATION MEASURES

X			End of useful life, replace with indirect type storage tank.

COMMENTS:

1. Nearby piping has external service corrision.
2. Poor combustion process as noted by backdraft damper soot.
3. DWH-2, burner controller replaced, date unknown.
4. Common flue vent requires shudown both units to service.

DWH-1

DWH-2

DWH PIPING

DWH COMBUSTION BACK DRAFT DAMPER

FACILITY: OUR ISLAND HOME DATE: JAN 2014

ATTIC MECHANICAL ROOM EXHAUST FAN

Year Installed: 1980 Manufacturer: Barry Blower

Location: attic Tag/Model/Capacity/Electrical

Type: single fan, constant volumn. EF-1 Attc Mechanical Room, BVB182,3000CFM@1.00inWC, 1hp(208-3ph).

EXISTING CONDITIONS AND DEFICIENCIES

Y	N	NA		Y	N	NA	
			AIR HANDLING UNIT				**ATC**
X			Is the ductwork insulated complete and in good condition?	X			Does the system have automatic controls?
X			Is the ductwork in good condition?				
X			Is there accss around equipment?				**ELECTRICAL**
X			Unit in good condition?		X		Is the motor high efficiency?
X			Are automatic dampers in good condition & operating?	X			Is ther a localized disconnect?
X			Overall condition, clean, clutter free, no vibration or noise?		X		Does the unit have a VSD?
							PLUMBING
				X			Are ther localized drains?
							MAINTENANCE
					X		Is the system flow diagram mounted in room?
					X		Is the O+M located nerby or in a file?
					X		Is there a service contractor?

STANDRAD AND CODE ISSUES

		X	Current code compliant?
	X		Is emergency power a requiremnt?
		X	Is unit current energy code compliant?

END OF EQUIPMENT USEFUL SERVICE LIFE

Useful Life		Useful Life	
0	fan unit benchmark is 25 years.	**0**	motor benchmark is 18 years

ENERGY CONSERVCATION MEASURES

X			replacemnt with new unit with ECM motor.				

COMMENTS:

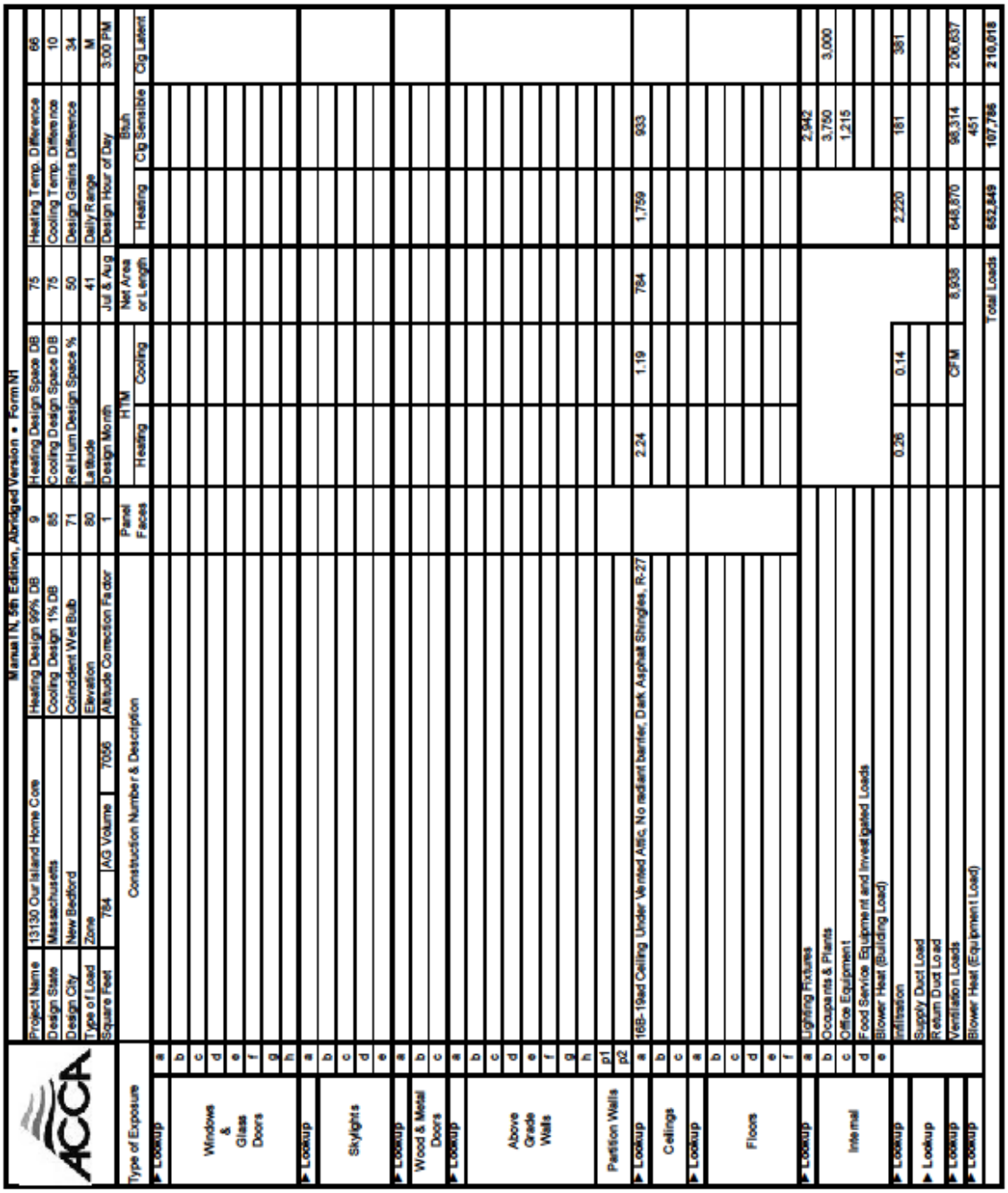
1. Unit model discontinued by manufactuer, replacemnt unit not compatable.

ATTIC MECHANICAL ROO

Appendix C: 2013 Energy Usage

Month	OIL			PROPANE			ELECTRICITY					
	Usage (Gallons)	Total Cost ($)	Unit Cost ($/gallon)	Usage (Gallons)	Total Cost($)	Unit Cost $/gallon	Demand (Kw)	Usage (Kw)	NGRID Cost($)	Supplier Cost ($)	Total Cost ($)	Unit Cost ($/kwh)
Jan-13	2,360	9,118.78	3.8632	479.00	1,075.36	2.2450	61.6	28,960	1,888.33	1,966.38	3,854.71	0.13310
Feb-13	2,321	9,313.60	4.0136	421.30	947.93	2.2500	60.8	28,720	1,926.88	1,950.09	3,876.97	0.13499
Mar-13	2,498	9,368.87	3.7508	416.50	940.88	2.2590	61.6	27,600	1,984.47	1,874.04	3,858.51	0.13980
Apr-13	2,088	7,419.47	3.5534	409.10	940.48	2.2989	60.8	31,360	2,195.42	2,129.34	4,324.76	0.13791
May-13	1,251	4,401.29	3.5182	606.50	1,535.32	2.5314	56.0	28,400	2,204.89	1,928.36	4,133.25	0.14554
Jun-13	875	3,083.05	3.5219	385.90	896.83	2.3240	72.0	27,280	2,229.39	1,852.31	4,081.70	0.14962
Jul-13	812	2,911.36	3.5863	410.10	934.14	2.2778	81.6	41,520	3,216.58	2,819.21	6,035.79	0.14537
Aug-13	735	2,700.87	3.6747	429.00	1,025.26	2.3899	80.8	36,720	2,898.45	2,493.29	5,391.74	0.14683
Sep-13	1,152	4,270.40	3.7086	389.00	939.76	2.4158	76.8	34,320	2,495.55	2,330.33	4,825.88	0.14061
Oct-13	1,125	4,140.36	3.6790	616.10	1,441.78	2.3402	68.0	28,480	2,098.34	1,933.79	4,032.13	0.14158
Nov-13	1,607	5,926.08	3.6888	425.40	1,029.13	2.4192	58.4	27,120	1,966.81	1,841.45	3,802.26	0.14020
Dec-13	2,651	10,099.42	3.8102	458.70	1,134.97	2.4743	58.4	29,040	2,073.64	1,971.82	4,045.46	0.13931
12 MONTH	19,474	72,753.55	3.7360	5,446.60	12,841.84	2.3578	66.4	369,520	27,178.75	25,090.41	52,263.16	0.14144

Appendix D: HVAC Load Analysis



ACCA — Manual N, 5th Edition, Abridged Version • Form N1

	Project Name	13130 Our Island Home Core	Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference	66
	Design State	Massachusetts	Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference	10
	Design City	New Bedford	Coincident Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference	34
	Type of Load	Zone	Elevation	80	Latitude	41	Daily Range	M
	Square Feet	784 | AG Volume | 7056	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day	3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a								
Windows & Glass Doors	b								
	c								
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a								
Wood & Metal Doors	b								
	c								
▶ Lookup	a								
Above Grade Walls	b								
	c								
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	16B-19ad Ceiling Under Vented Attic, No radiant barrier, Dark Asphalt Shingles, R-27		2.24	1.19	784	1,759	933	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f								
▶ Lookup	a	Lighting Fixtures						2,942	
Internal	b	Occupants & Plants						3,750	3,000
	c	Office Equipment						1,215	
	d	Food Service Equipment and Investigated Loads							
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		0.26	0.14		2,220	181	381
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads				CFM 8,908	646,870	98,314	206,637
▶ Lookup		Blower Heat (Equipment Load)						451	
						Total Loads	652,849	107,786	210,618

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Project Name	13130 Our Island Home Dining			Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference	66
Design State	Massachusetts			Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference	10
Design City	New Bedford			Coincident Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference	34
Type of Load	Zone			Elevation	80	Latitude	41	Daily Range	M
Square Feet	1768	AG Volume	15912	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day	3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a	1c-cuf-c Double pane, fixed sash, insulated fiberglass	North	36.96	24.12	111.0	4,104	2,678	
Windows & Glass Doors	b	1c-cuf-c Double pane, fixed sash, insulated fiberglass	South	36.96	62.18	111.0	4,104	6,904	
	c	1c-cuf-c Double pane, fixed sash, insulated fiberglass	East	36.96	49.42	45.6	1,685	2,253	
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a	11J Metal, Fiberglass Core	East	39.60	12.60	56.0	2,218	706	
Wood & Metal Doors	b								
	c								
▶ Lookup	a	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	East	6.01	2.00	306	1,838	613	
Above Grade Walls	b	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	South	6.01	1.18	468	2,811	554	
	c	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	North	6.01	0.36	468	2,811	170	
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	17B-10w R-13 roof decking, dead air space, R-19 ceiling		1.45	0.55	1,768	2,567	972	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f	22A-ph Slab on Grade, No Edge Insulation, Light Wet Soil		77.88		138	10,747		
▶ Lookup	a	Lighting Fixtures						6,635	
Internal	b	Occupants & Plants						13,200	13,200
	c	Office Equipment						2,740	
	d	Food Service Equipment and Investigated Loads							
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		0.23	0.12		4,428	350	736
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads			CFM	350	25,410	3,850	8,092
▶ Lookup		Blower Heat (Equipment Load)						2,833	
						Total Loads	62,723	44,458	22,028

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Project Name	13130 Our Island Home East			Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference	66
Design State	Massachusetts			Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference	10
Design City	New Bedford			Coincident Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference	34
Type of Load	Zone			Elevation	80	Latitude	41	Daily Range	M
Square Feet	4116	AG Volume	37044	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day	3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a	1c-cuf-c Double pane, fixed sash, Wood or wood clad	North	36.96	24.12	84.0	3,105	2,026	
Windows & Glass Doors	b	1c-cuf-c Double pane, fixed sash, Wood or wood clad	South	36.96	62.18	126.0	4,657	7,834	
	c	1c-cuf-c Double pane, fixed sash, Wood or wood clad	East	36.96	49.42	21.0	776	1,038	
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a	11J Metal, Fiberglass Core	South	39.60	12.60	21.0	832	265	
Wood & Metal Doors	b								
	c								
▶ Lookup	a	12E-2am Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	West	6.01	0.64	661	3,970	421	
Above Grade Walls	b	12E-2am Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	East	6.01	2.00	661	3,970	1,323	
	c	12E-2am Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	North	6.01	0.36	504	3,027	183	
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	16B-19ad Ceiling Under Vented Attic, No radiant barrier, Dark Asphalt Shingles, R-19		2.24	1.19	4,116	9,236	4,898	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f	22A-ph Slab on Grade, No Edge Insulation, Light Wet Soil		77.88		200	15,576		
▶ Lookup	a	Lighting Fixtures						15,451	
Internal	b	Occupants & Plants						5,500	4,400
	c	Office Equipment						6,380	
	d	Food Service Equipment and Investigated Loads							
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		1.68	0.85		75,220	5,778	12,145
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads			CFM				
▶ Lookup		Blower Heat (Equipment Load)						2,555	
						Total Loads	120,369	53,652	16,545

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Project Name	13130 Our Island Home North		Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference		66
Design State	Massachusetts		Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference		10
Design City	New Bedford		Coinddent Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference		34
Type of Load	Zone		Elevation	80	Latitude	41	Daily Range		M
Square Feet	4032	AG Volume 36288	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day		3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a	1c-cuf-c Double pane, fixed sash, Wood or wood clad	East	36.96	49.42	84.0	3,105	4,151	
Windows & Glass Doors	b	1c-cuf-c Double pane, fixed sash, Wood or wood clad	West	36.96	66.04	126.0	4,657	8,321	
	c	1c-cuf-c Double pane, fixed sash, Wood or wood clad	North	36.96	24.12	21.0	776	506	
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a	11J Metal, Fiberglass Core	East	39.60	12.60	21.0	832	265	
Wood & Metal Doors	b								
	c								
▶ Lookup	a	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	West	6.01	0.64	648	3,892	413	
Above Grade Walls	b	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	East	6.01	2.00	648	3,892	1,297	
	c	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	North	6.01	0.36	468	2,811	170	
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	16B-19ad Ceiling Under Vented Attic, No radiant barrier, Dark Asphalt Shingles, R-19		2.24	1.19	4,032	9,048	4,798	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f	22A-ph Slab on Grade, No Edge Insulation, Light Wet Soil		77.88		200	15,576		
▶ Lookup	a	Lighting Fixtures						15,137	
Internal	b	Occupants & Plants						4,750	3,800
	c	Office Equipment						6,250	
	d	Food Service Equipment and Investigated Loads							
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		1.70	0.86		74,479	5,720	12,023
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads			CFM				
▶ Lookup		Blower Heat (Equipment Load)						2,589	
						Total Loads	119,067	54,367	15,823

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Project Name	131300 Our Island Home South		Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference	66
Design State	Massachusetts		Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference	10
Design City	New Bedford		Coinddent Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference	34
Type of Load	Zone		Elevation	80	Latitude	41	Daily Range	M
Square Feet	4032	AG Volume 36288	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day	3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a	1c-cuf-c Double pane, fixed sash, Wood or wood clad	East	36.96	49.42	126.0	4,657	6,227	
Windows & Glass Doors	b	1c-cuf-c Double pane, fixed sash, Wood or wood clad	West	36.96	66.04	105.0	3,881	6,934	
	c								
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a	11J Metal, Fiberglass Core	West	39.60	12.60	21.0	832	265	
Wood & Metal Doors	b								
	c								
▶ Lookup	a	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	West	6.01	0.64	648	3,892	413	
Above Grade Walls	b	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	East	6.01	2.00	648	3,892	1,297	
	c	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	South	6.01	1.18	468	2,811	554	
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	16B-19ad Ceiling Under Vented Attic, No radiant barrier, Dark Asphalt Shingles, R-19		2.24	1.19	4,032	9,048	4,798	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f	22A-ph Slab on Grade, No Edge Insulation, Light Wet Soil		77.88		200	15,576		
▶ Lookup	a	Lighting Fixtures						15,137	
Internal	b	Occupants & Plants						4,750	3,800
	c	Office Equipment						6,250	
	d	Food Service Equipment and Investigated Loads						3,835	1,105
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		1.70	0.86		74,479	5,720	12,023
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads			CFM				
▶ Lookup		Blower Heat (Equipment Load)						2,809	
						Total Loads	119,067	58,988	16,928

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Project Name	13130 Our Island Home West		Heating Design 99% DB	9	Heating Design Space DB	75	Heating Temp. Difference		66
Design State	Massachusetts		Cooling Design 1% DB	85	Cooling Design Space DB	75	Cooling Temp. Difference		10
Design City	New Bedford		Coincident Wet Bulb	71	Rel Hum Design Space %	50	Design Grains Difference		34
Type of Load	Zone		Elevation	80	Latitude	41	Daily Range		M
Square Feet	4032	AG Volume 36288	Altitude Correction Factor	1	Design Month	Jul & Aug	Design Hour of Day		3:00 PM

Type of Exposure		Construction Number & Description	Panel Faces	HTM Heating	HTM Cooling	Net Area or Length	Btuh Heating	Btuh Clg Sensible	Btuh Clg Latent
▶ Lookup	a	1c-cuf-c Double pane, fixed sash, Wood or wood clad	North	36.96	24.12	84.0	3,105	2,026	
Windows & Glass Doors	b	1c-cuf-c Double pane, fixed sash, Wood or wood clad	South	36.96	62.18	126.0	4,657	7,834	
	c	1c-cuf-c Double pane, fixed sash, Wood or wood clad	East	36.96	49.42	21.0	776	1,038	
	d								
	e								
	f								
	g								
	h								
▶ Lookup	a								
Skylights	b								
	c								
	d								
	e								
▶ Lookup	a	11J Metal, Fiberglass Core	South	39.60	12.60	21.0	832	265	
Wood & Metal Doors	b								
	c								
▶ Lookup	a	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	West	6.01	0.64	661	3,970	421	
Above Grade Walls	b	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	East	6.01	2.00	661	3,970	1,323	
	c	12E-2sm Frame wall, Metal studs, R-19 cavity, R-2 Board, wood sheathing, siding	North	6.01	0.36	504	3,027	183	
	d								
	e								
	f								
	g								
	h								
Partition Walls	p1								
	p2								
▶ Lookup	a	16B-19ad Ceiling Under Vented Attic, No radiant barrier, Dark Asphalt Shingles, R-19		2.24	1.19	4,116	9,236	4,898	
Ceilings	b								
	c								
▶ Lookup	a								
Floors	b								
	c								
	d								
	e								
	f	22A-ph Slab on Grade, No Edge Insulation, Light Wet Soil		77.88		200	15,576		
▶ Lookup	a	Lighting Fixtures						15,451	
Internal	b	Occupants & Plants						5,500	4,400
	c	Office Equipment						6,380	
	d	Food Service Equipment and Investigated Loads							
	e	Blower Heat (Building Load)							
▶ Lookup		Infiltration		2.27	1.17		99,507	7,783	16,357
▶ Lookup		Supply Duct Load							
		Return Duct Load							
▶ Lookup		Ventilation Loads			CFM				
▶ Lookup		Blower Heat (Equipment Load)						2,655	
						Total Loads	144,656	55,757	20,757

Our Island Home Heating & Cooling Summation: Exterior Ambient Design Temperatures; 9deg.F(WN) & 85db/71wb (SM) ASHARE weater data.

	Calculated Loading (indoor 70/75)				Calculated Loading (indoor 75/75)			
Area	Heating	Cooling (BTUH)			Heating	Cooling (BTUH)		
Tag	(BTUH)	Sensible	Latent		(BTUH)	Sensible	Latent	
Core-Nursing Area	608,391	107,786	210,018	w/vent.	652,849	107,786	210,018	w/vent
East	111,250	53,652	16,545		120,369	53,652	16,545	
North	110,047	54,367	15,823		119,067	54,367	15,823	
South	110,047	58,988	16,928		119,067	58,988	16,928	
West	133,697	55,757	20,757		144,656	55,757	20,757	
Original 1979 Bldg. Total	1,068,432	330,550	280,071		1,156,008	330,550	280,071	
Dining, 2002 Addition	57,971	44,458	22,028		62,723	44,458	22,028	
Final, Required	1,126,403	375,008	302,099	56.4 tons	1,218,731	375,008	302,099	56.4 tons

Original Design 1979 calc.	879,833	0	0	
as noted on plans				

	Installed Equipment			
	Heating		Cooling, Total	
	(BTUH)	% Provided	(BTUH)	
Core-Nursing Area	656,170	108.7%	36,000	3 tons, including ventilation
East	57,400	51.6%	36,000	3 tons
North	83,400	75.8%	180,000	15tons; 3units
South	40,100	36.4%	0	
West	67,400	50.4%	36,000	3 tons
Original 1979 Bldg. Total	904,470	84.7%	288,000	
Dining, 2002 Addition	73,920	127.5%	81,600	6.8 tons, including ventilation
Final, Required	978,390	86.9%	369,600	38.8 tons

Original Design 1979 calc.	908,500	103.3%	0	Selected boiler capacity 1979'

Domestic Hot Water Sizing - Attachment #13130

ASHRAE - HVAC Applications (2011) Chap.50 Service Water Heating
System providing 180deg.F water to the the laundry & kitchen with mixing valve for nursing beds/general at 130deg.F.

Existing System:

	Selected	Adjusted
Qty	2	
Manuf	BOCK, oil fired	
Model	73E	
Recovery, each	258 gph @ 90deg.F rise	166 gph@140deg.F rise
Input, each	242,000 Btuh	242,000 Btuh

Dept.of Public Health(DPH) Current Guidelines Domestic Water Sizing (105 CMR 151.720)

	Recovery Rate Gal/hr/bed	No. of Beds	Gallons Required	Temperature Adjusted Gallons Required
Patient Area	6.5	45	293	211
Food Prep(Kitchen)	4	45	180	180
Laundry	4.5	45	203	203
		Total	676	594

C. Selection Based Required Recovery

Total Recovery, gph	594
Boiler (BTUH) @85% eff.	821,816

Cold Water Temp.Rise, 180-40= 100deg.F

Combined Building & Domestic Boiler Sizing: Based on Fig.27
SED Design Load at 70 deg.F indoor temperature: 1,126,403 BTUH
SED Design Load at 75 deg.F indoor temperature: 1,218,731 BTUH

Added Boiler Load: Domestic

Water Temp.Rise	Bldg Load (MBH)	DWH Load(MBH)	RATIO	FACTOR	Domestic Load(BTUH)
1. CW 140deg.F rise	1127	822	0.73	0.65	534
2. CW 140deg.F rise	1219	822	0.67	0.60	493

Boiler Size with Indierct Domestic Load
Option #1: 1,661 BTUH
Option #2: 1,712 BTUH

Appendix F: Energy Conservation Measures (ECM): Analysis

- ECM#1: Replace zone constant speed units with variable frequency drive ECM motors.
- ECM#2: Replace main constant speed units with variable frequency drive ECM motors.
- ECM#3: Replace main constant speed units with variable frequency drive ECM motors and delete the zone circulation pumps.
- ECM#4: Replace existing oil fired domestic water heaters with indirect units using the boiler water for heating.

Energy Conservation Measure #1

VSD Calculator for Pumps P1- P6

Inputs

Nameplate Horsepower	0.33	hp	Annual Operating Hours	7248	
Nameplate Efficiency	85	%	Type of Flow Control	Bypass, Recirculation Valve	
Motor Load at Pump Design GPM	80	%	Cost of Electricity	0.14	$/kWh

Duty Cycle: Low Pump Loading

Percent of Capacity (cfm)		Percent of Time at this Capacity	
23	%	22	%
38	%	21.3	%
53	%	22	%
68	%	20.3	%
83	%	10	%
98	%	3.7	%
100	%	0.5	%
100	%	0.2	%
100	%	0	%
100	%	0	%

Outputs

Energy and Cost savings		
Current Annual Energy use	3,137	kWh/yr
VSD Annual Energy Use	509	kWh/yr
Annual Energy Savings	2,628	kWh/yr
Annual Cost Savings	368	$/yr

Energy Conservation Measure #2

VSD Calculator for Pumps P7 & P8

Inputs

Nameplate Horsepower	0.50	hp	Annual Operating Hours	7248
Nameplate Efficiency	85	%	Type of Flow Control	Bypass, Recirculation Valve
Motor Load at Pump Design GPM	80	%	Cost of Electricity	0.14 $/kWh

Duty Cycle: Low Pump Loading

Percent of Capacity (cfm)		Percent of Time at this Capacity	
23	%	22	%
38	%	21.3	%
53	%	22	%
68	%	20.3	%
83	%	10	%
98	%	3.7	%
100	%	0.5	%
100	%	0.2	%
100	%	0	%
100	%	0	%

Outputs

Energy and Cost savings

Current Annual Energy use	3,137	kWh/yr
VSD Annual Energy Use	771	kWh/yr
Annual Energy Savings	2,366	kWh/yr
Annual Cost Savings	331	$/yr

Energy Conservation Measure #4

Energy Usage 2013: Assuming summer months is for the domestic usage which includes the kitchen, laundry and general sins/lavatories; excluding the showers which have dedicated propane hot water heaters.

Month	Usage (Gallons)	Total Cost ($)	Unit Cost ($/gallon)
Jun-13	875	3,083.05	3.5219
Jul-13	812	2,911.36	3.5863
Aug-13	735	2,700.87	3.6747
	2,422	8,695.28	3.5898
Average	807	$2,898.43	3.5898

US Dept. of Energy (DOE) estimates energy savings for indirect hot water heaters of 15-25% as compared to a standard hot water storage tank.

Estimated average monthly usage 807 gallons x 12 months = 9,684 gallons.
Estimated Savings; 9,684 gallons x 0.20= 1,937 gallons

Appendix G: System Budget Costs

#1: Boiler oil fired unit with indirect domestic hot water selected for increased building load rated at 1,712,000BTUH.			
	Demolition existing boiler & horizontal. flue	$4,500	
	Demolition hazardous material	$0	By others
	Demolition piping, limited	$3,500	boiler room disconnects, only
	Demolition oil piping	$1,500	from filter to boiler
	New Boilers Hot water, oil fired with burner (qty 3) & controls	$55,000	material & labor
	Piping and accessories	$8,500	new and modify existing connections
	Oil piping and accessories	$1,500	connect into existing
	New flues run in existing chimney (qty 3)	$6,000	assuming existing vertical chimneys adequate
	Electrical	$4,000	existing modification & new
	Rigging	$3,500	new boilers
	Insulation, boiler room piping	$5,000	
	Closeout (as builts, O+M, etc.)	$1,500	
	Subtotal	$94,500	
	General Conditions(10%)	$ 9,450	Mechanical contractor as GC
	Mobilization(5%)	$ 4,725	
	Coordination(5%)	$ 4,725	
	Phasing (5%)	$ 4,725	allowance working and maintaining active domestic hot water system
	Subtotal	$118,125	
	Profit (15%)	$ 17,719	
	Subtotal	$135.,844	
	Bonding(2%)	$ 2,717	
	Const. allowance	$ 15,000	pending final design
	Total	$153,561	

#2: Heat Recovery Ventilator (HRV) replacement in-kind.			
	Demolition existing units	$10,000	Unit located in attic, to be removed and disposed.
	Demolition hazardous material	$0	By others
	Modification to attic ductwork distribution, limited	$7,500	new and modify existing connections
	ERV' to match existing	$85,000	With heating only.
	Piping and accessories	$9,500	new and modify existing connections
	Electrical	$ 3,600	new and modify existing connections
	Rigging	$6,500	new units, in attic
	Insulation, new ductwork & piping	$4,000	
	Closeout (as builts, O+M, etc.)	$1,500	
	Subtotal	$127,600	
	General Conditions(10%)	$ 12,760	Mechanical contractor as GC
	Mobilization(5%)	$ 6,380	
	Coordination(5%)	$ 6,380	
	Phasing (5%)	$ 6,380	allowance working and maintaining active ventilation system
	Subtotal	$146,740	
	Profit (15%)	$ 29,348	
	Subtotal	$176,088	
	Bonding(2%)	$ 3,522	
	Const. allowance	$ 15,000	pending final design
	Total	$194,610	

#3: Heat Recovery Ventilator (HRV) replacement with three smaller units having limited air conditioning for dehumification.			
	Demolition existing units	$ 2,500	Unit located in attic, to be abandoned in place. Disconnect piping, electrical & ductwork as required
	Demolition hazardous material	$ 0	By others
	Modification to attic ductwork distribution, limited	$ 5,000	Related to the installation of new dedicated ERV's.
	ERV'w with limited dehumidifying cooling capacity (Qty. 3)	$ 75,000	material attic mounted, 3 tons cooling & 15MBH heating
	Piping and accessories	$ 10,500	new and modify existing connections
	Electrical	$ 8,500	existing modification & new
	Rigging	$ 5,500	new units, in attic
	Insulation, new ductwork & piping	$ 5,000	
	Closeout (as builts, O+M, etc.)	$ 1,500	
	Subtotal	$113,500	
	General Conditions(10%)	$ 11,350	Mechanical contractor as GC
	Mobilization(5%)	$ 5,675	
	Coordination(5%)	$ 5,675	
	Phasing (5%)	$ 5,675	allowance working and maintaining active ventilation system
	Subtotal	$141,875	
	Profit (15%)	$ 21,282	
	Subtotal	$163,157	
	Bonding(2%)	$ 3,663	
	Const. allowance	$ 15,000	pending final design
	Total	$181,820	