FACILITY CONDITION ASSESSMENT & NETZERO ENERGY AUDIT

prepared for

School Administrative Unit 70
41 Lebanon Street, Suite 2
Hanover, New Hampshire
Jamie Teague

Bernice A. Ray School
26 Reservoir Road
Hanover, New Hampshire 03755

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DATE OF REPORT:
January 27, 2023

ON SITE DATE:
December 19-20, 2022

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1. Executive Summary

Property Overview and Assessment Details

General Information	
Property Type	School
Main Address	26 Reservoir Road, Hanover, New Hampshire 03755
Site Developed	1970 Renovated 1994 and 2014
Site Area	35.00 acres (estimated)
Parking Spaces	127 total spaces all in open lots; five of which are accessible
Building Area	81,252 SF
Number of Stories	One above grade with one below-grade basement level
Outside Occupants / Leased Spaces	None
Date(s) of Visit	December 19-20, 2022
Management Point of Contact	School Administrative Unit 70, Anthony Daigle, Director of Facilities 603.643.3810 phone anthonydaigle@hanovernorwichschools.org email
On-site Point of Contact (POC)	same as above
Assessment and Report Prepared By	Carl Alejandro
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AssetCalc Link	Full dataset for this assessment can be found at: https://www.assetcalc.net/

Significant/Systemic Findings and Deficiencies

Historical Summary

The Bernice A. Ray School was originally constructed in 1970. In 1994, the music room, library, gymnasium, and extra classrooms were constructed. Additional renovations occurred in 2014-2015 which included parking lot improvements, more classrooms, three new restrooms, an upgraded building automation system, and other interior finish replacements.

Architectural

According to the point of contact, the roof was replaced eight years ago. Roof leaks have occurred in the past and are repaired as they occur. The leaks commonly occur where rainwater gets stuck on the transitions from sloped roofing to flat roofing. In the past year though, there has only been one leak. The exterior walls were painted within the past year and are in excellent condition. Concrete cracking was observed on the sides of the foundation. Repair of the damaged areas is recommended. There have been no reported issues of building settlement, but due to the age of the building, routine maintenance checks on the foundation are recommended. There do not appear to be significant issues with window leaks.

The interior finishes are replaced on an as needed basis. The hallway and kitchen flooring was replaced in 2014-2015.The point of contact noted that the flooring in the supply closets between classrooms is original to the 1970's and contains signs of asbestos. Asbestos abatement has been implemented annually with the most recent work occurring in April 2022. A few isolated areas of interior wall cracking were observed that will require repair during the reserve term. Typical lifecycle replacements for exterior and interior finish replacements are budgeted and anticipated.

Mechanical, Electrical, Plumbing and Fire (MEPF)

The heating and cooling system consists of a central boiler system and several rooftop packaged units. Multiple HVAC components were replaced during the 2014-2015 renovation including the installation of a new building automated system. Hydronic radiators are original to construction and are recommended for typical lifecycle replacements.

The electrical wiring and equipment vary in age throughout the building. Electrical improvements occurred in 2015 including the installation of a new switchboard and a few LED lighting upgrades.

Hot water is supplied by a central gas water heater and a supplemental smaller electric water heater near the gym. The central water heater was replaced in 2019. Typical commercial plumbing fixtures are utilized in the restrooms. Plumbing blockages have occurred three times in the past year but have since been repaired. The piping is reportedly original.

Fire suppression consists of a sprinkler system that serves the entire building. The fire alarm panel is located in the office.

Site

The parking lot was redone in 2015 and has only minor areas of asphalt cracking. There were some also some modular buildings that were removed in 2015 after more classroom space was constructed. Isolated cracking was observed on the outdoor basketball court. Repair is recommended to prevent potential trip hazards. The playground areas appear to be in overall fair condition. Site lighting appears to be adequate for the facility's needs.

Recommended Additional Studies

No additional studies recommended at this time.

Facility Condition Index (FCI)

One of the major goals of the FCA is to calculate each building's Facility Condition Index (FCI), which provides a theoretical objective indication of a building's overall condition. By definition, the FCI is defined as the ratio of the cost of current needs divided by current replacement value (CRV) of the facility. The chart below presents the industry standard ranges and cut-off points.

FCI Ranges and Description	
0 – 5%	In new or well-maintained condition, with little or no visual evidence of wear or deficiencies.
5 – 10%	Subjected to wear but is still in a serviceable and functioning condition.
10 – 30%	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.
30% and above	Has reached the end of its useful or serviceable life. Renewal is now necessary.

The deficiencies and lifecycle needs identified in this assessment provide the basis for a portfolio-wide capital improvement funding strategy. In addition to the current FCI, extended FCI's have been developed to provide owners the intelligence needed to plan and budget for the "keep-up costs" for their facilities. As such the 3-year, 5-year, and 10-year FCI's are calculated by dividing the anticipated needs of those respective time periods by current replacement value. As a final point, the FCI's ultimately provide more value when used to relatively compare facilities across a portfolio instead of being over-analyzed and scrutinized as stand-alone values. The table below summarizes the individual findings for this FCA:

FCI Analysis | Bernice A. Ray School(1970)

Replacement Value	*Total SF*	*Cost/SF*
$ 34,938,400	*81,252*	*$ 430*

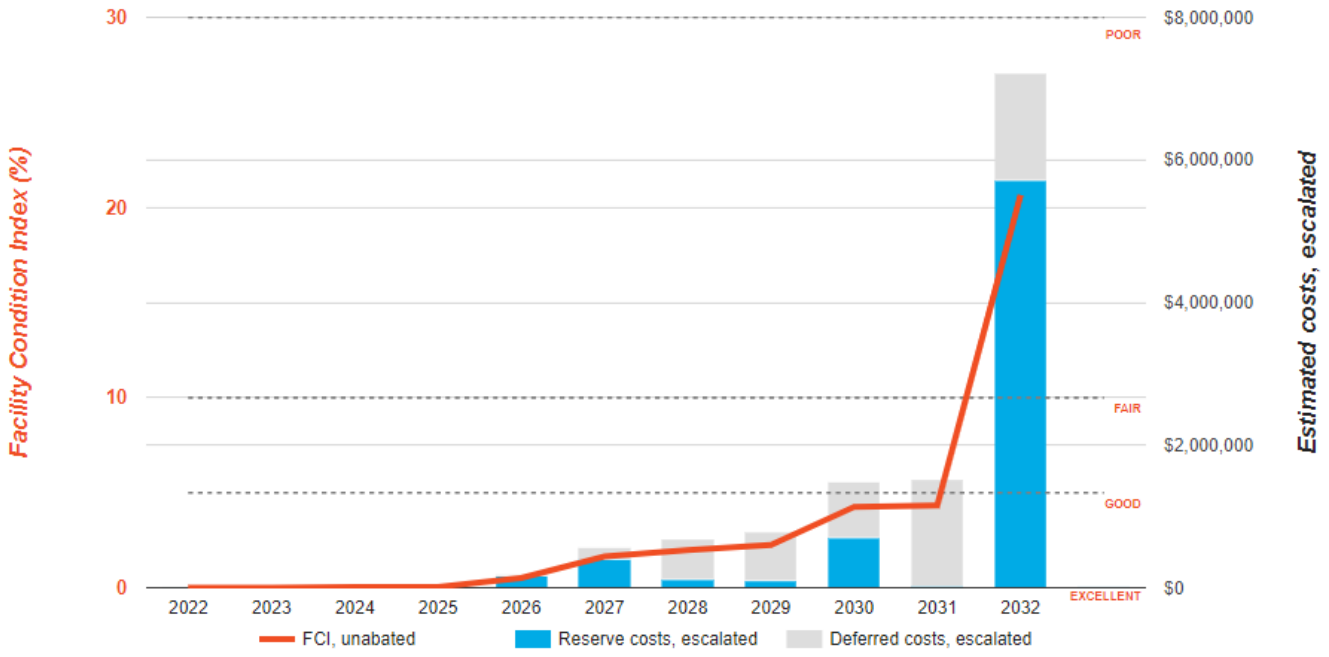
	Est Reserve Cost	FCI
Current	$ 900	**0.0 %**
3-Year	$ 14,000	0.0 %
5-Year	$ 575,700	1.6 %
10-Year	$ 7,219,400	20.7 %

The vertical bars below represent the year-by-year needs identified for the site. The orange line in the graph below forecasts what would happen to the FCI (left Y axis) over time, assuming zero capital expenditures over the next ten years. The dollar amounts allocated for each year (blue bars) are associated with the values along the right Y axis.

Needs by Year with Unaddressed FCI Over Time

FCI Analysis: Bernice A. Ray School

Replacement Value: $34,939,000 Inflation Rate: 3.0% Average Needs per Year: $656,400



Immediate Needs

Facility/Building	Total Items	Total Cost
Bernice A. Ray School	2	$900
Total	**2**	**$900**

Bernice A. Ray School

ID	Location	Location Description	UF Code	Description	Condition	Plan Type	Cost
4714410	Bernice A. Ray School	Mechanical room	C1010	Interior Wall, Concrete, Repair	Poor	Performance/Integrity	$800
4714361	Bernice A. Ray School	Special Ed Area	C1010	Interior Wall, Gypsum Board/Plaster, Repair	Poor	Performance/Integrity	$100
Total (2 items)							**$900**

Key Findings

Foundation System in Poor condition.

Concrete or CMU Walls w/out Footings
Bernice A. Ray School Building exterior

Uniformat Code: A1010
Recommendation: **Concrete or CMU Walls w/out Footings in 2024**

Priority Score: **90.8**

Plan Type: Performance/Integrity

Cost Estimate: $2,400

**$$**$$

Cracking on concrete foundation. Repair is recommended. - AssetCALC ID: 4714434

Interior Wall in Poor condition.

Gypsum Board/Plaster
Bernice A. Ray School Special Ed Area

Uniformat Code: C1010
Recommendation: **Repair in 2022**

Priority Score: **84.9**

Plan Type: Performance/Integrity

Cost Estimate: $100

**$$**$$

Special Ed area cracking on interior walls. - AssetCALC ID: 4714361

Interior Wall in Poor condition.

Concrete
Bernice A. Ray School Mechanical room

Uniformat Code: C1010
Recommendation: **Repair in 2022**

Priority Score: **84.9**

Plan Type: Performance/Integrity

Cost Estimate: $800

**$$**$$

Concrete cracking in mechanical room. Repair is recommended. - AssetCALC ID: 4714410

Athletic Surfaces & Courts in Poor condition.

Basketball/General, Asphalt Pavement
Bernice A. Ray School Site

Uniformat Code: G2050
Recommendation: **Seal & Stripe in 2024**

Priority Score: **82.8**

Plan Type: Performance/Integrity

Cost Estimate: $100

**$$**$$

Isolated cracking on basketball court - AssetCALC ID: 4714357

Flooring in Poor condition.

Vinyl Tile (VCT), w/ Asbestos Abatement
Bernice A. Ray School Classroom Supply Closets

Uniformat Code: C2030
Recommendation: **Replace in 2024**

Priority Score: **81.8**

Plan Type: Performance/Integrity

Cost Estimate: $10,000

**$$$**$

Classrooms have shared supply closet that have asbestos. 1970s original flooring. 10000-20000 a year for asbestos abatement. - AssetCALC ID: 4714399

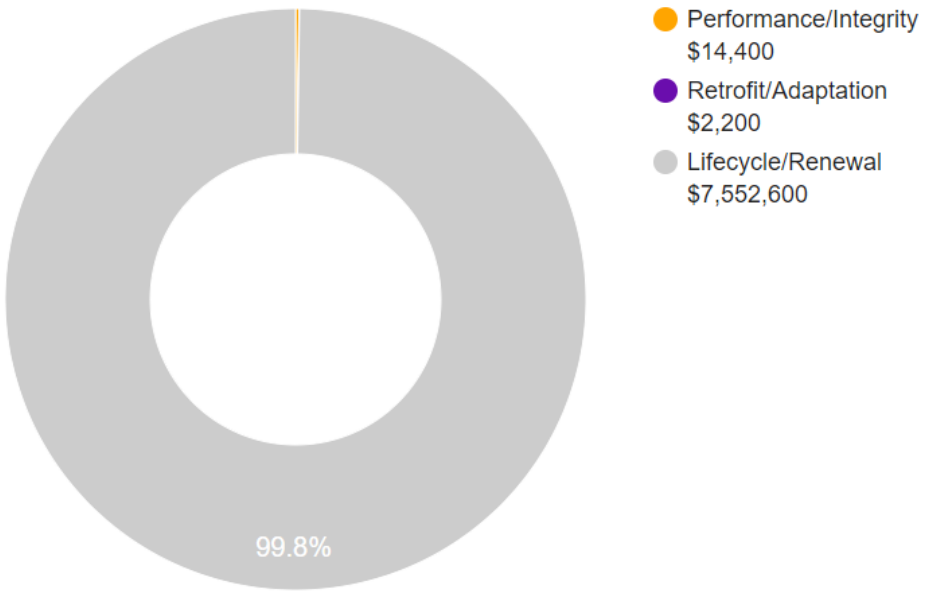
Plan Types

Each line item in the cost database is assigned a Plan Type, which is the primary reason or rationale for the recommended replacement, repair, or other corrective action. This is the "why" part of the equation. A cost or line item may commonly have more than one applicable Plan Type; however, only one Plan Type will be assigned based on the "best" fit, typically the one with the greatest significance.

Plan Type Descriptions

Safety	An observed or reported unsafe condition that if left unaddressed could result in injury; a system or component that presents potential liability risk.
Performance/Integrity	Component or system has failed, is almost failing, performs unreliably, does not perform as intended, and/or poses risk to overall system stability.
Accessibility	Does not meet ADA, UFAS, and/or other handicap accessibility requirements.
Environmental	Improvements to air or water quality, including removal of hazardous materials from the building or site.
Retrofit/Adaptation	Components, systems, or spaces recommended for upgrades in in order to meet current standards, facility usage, or client/occupant needs.
Lifecycle/Renewal	Any component or system that is not currently deficient or problematic but for which future replacement or repair is anticipated and budgeted.

Plan Type Distribution (by Cost)



10-YEAR TOTAL: $7,569,200

2. Building and Site Information

Systems Summary

System	*Description*	*Condition*
Structure	Steel frame and masonry walls with concrete-topped metal decks over concrete foundation slab	Good
Façade	Primary Wall Finish: Painted wood siding Windows: Aluminum	Good
Roof	Primary: Flat construction with single-ply TPO/PVC membrane Secondary: Sloped construction with asphalt shingles	Poor
Interiors	Walls: Painted gypsum board and CMU Floors: Carpet, VCT, ceramic tile, wood Ceilings: ACT, wood	Fair
Elevators	Wheelchair lifts serving multi-purpose room Dumbwaiter serving kitchen and maintenance area	Fair
Plumbing	Distribution: Copper supply and cast iron waste & venting Hot Water: Propane and fuel oil boilers, electric and gas water heaters with integral tanks Fixtures: Toilets, urinals, and sinks in restrooms	Fair
HVAC	Central System: Boilers and air handlers feeding hydronic baseboard radiators and unit ventilators Non-Central System: Packaged units, ductless split-systems	Fair
Fire Suppression	Wet-pipe sprinkler system on mechanical areas and fire extinguishers and kitchen hood system	Fair

Systems Summary

Electrical	Source & Distribution: Main switchboard with copper wiring Interior Lighting: LED, linear fluorescent, CFL Emergency Power: None	Fair
Fire Alarm	Alarm panel with smoke detectors, heat detectors, alarms, strobes, pull stations, back-up emergency lights, and exit signs	Fair
Equipment/Special	Commercial kitchen equipment	Fair
Site Pavement	Asphalt lots with limited areas of concrete aprons and pavement and adjacent concrete sidewalks and curbs	Fair
Site Development	Building-mounted signage; wooden fencing Playgrounds and basketball courts Limited park benches and picnic tables	Fair
Landscaping and Topography	Significant landscaping features including lawns and trees Irrigation not present Low to moderate site slopes throughout	Fair
Utilities	Municipal water, on-site wells Local utility-provided electric, propane gas, and fuel oil tanks	Fair
Site Lighting	Pole-mounted: LED Building-mounted: LED	Fair
Ancillary Structures	Storage sheds, Colonial House	Fair
Accessibility	Presently it does not appear an accessibility study is needed for this property.	
Key Issues and Findings	Exterior concrete cracking, cracking on outdoor basketball court, asbestos in supply closets, and interior wall cracking	

System Expenditure Forecast

System	Immediate	Short Term (1-2 yr)	Near Term (3-5 yr)	Med Term (6-10 yr)	Long Term (11-20 yr)	TOTAL
Structure	-	$2,546	-	-	-	$2,546
Facade	-	-	-	$92,730	$314,342	$407,072
Roofing	-	-	-	-	$1,417,529	$1,417,529
Interiors	$837	$10,609	$482,837	$306,677	$1,379,896	$2,180,856
Conveying	-	-	-	$43,336	-	$43,336
Plumbing	-	-	-	$1,552,560	$259,926	$1,812,486
HVAC	-	-	$19,939	$554,717	$1,554,726	$2,129,382
Fire Protection	-	-	$3,477	$4,300	$132,345	$140,122
Electrical	-	-	-	$3,057,485	$585,502	$3,642,987
Fire Alarm & Electronic Systems	-	-	-	$758,298	-	$758,298
Equipment & Furnishings	-	-	$55,407	$179,484	$104,208	$339,099
Special Construction & Demo	-	-	-	$94,074	$42,709	$136,783
Site Development	-	$17,117	$18,548	$141,249	$241,615	$418,529
Site Utilities	-	-	-	$172,767	$212,804	$385,571
Site Pavement	-	-	-	-	$476,681	$476,681
Other (H0001)	-	-	-	-	-	-
TOTALS (3%	**$900**	**$30,300**	**$580,300**	**$6,957,700**	**$6,722,300**	**$14,291,500**

3. Property Space Use and Observed Areas

Areas Observed

The interior spaces were observed in order to gain a clear understanding of the property's overall condition. Other areas accessed included the site within the property boundaries and the exterior of the property.

Key Spaces Not Observed

Areas of note that were either inaccessible or not observed for other reasons are listed here:

- Roof; safety concerns due to icy conditions on roof

4. ADA Accessibility

Generally, Title II of the Americans with Disabilities Act (ADA) prohibits discrimination by entities to access and use of "areas of public accommodations" and "public facilities" on the basis of disability. Regardless of their age, these areas and facilities must be maintained and operated to comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

A public entity (i.e. city governments) shall operate each service, program, or activity so that the service, program, or activity, when viewed in its entirety, is readily accessible to and usable by individuals with disabilities.

However, this does not:

1. Necessarily require a public entity to make each of its existing facilities accessible to and usable by individuals with disabilities;
2. Require a public entity to take any action that would threaten or destroy the historic significance of an historic property; or
3. Require a public entity to take any action that it can demonstrate would result in a fundamental alteration in the nature of a service, program, or activity or in undue financial and administrative burdens. In those circumstances where personnel of the public entity believe that the proposed action would fundamentally alter the service, program, or activity or would result in undue financial and administrative burdens, a public entity has the burden of proving that compliance with 35.150(a) of this part would result in such alteration or burdens. The decision that compliance would result in such alteration or burdens must be made by the head of a public entity or his or her designee after considering all resources available for use in the funding and operation of the service, program, or activity, and must be accompanied by a written statement of the reasons for reaching that conclusion. If an action would result in such an alteration or such burdens, a public entity shall take any other action that would not result in such an alteration or such burdens but would nevertheless ensure that individuals with disabilities receive the benefits or services provided by the public entity.

Removal of barriers to accessibility should be addressed from a liability standpoint in order to comply with federal law, but the barriers may or may not be building code violations. The Americans with Disabilities Act Accessibility Guidelines are part of the ADA federal civil rights law pertaining to the disabled and are not a construction code. State and local jurisdictions have adopted the ADA Guidelines or have adopted other standards for accessibility as part of their construction codes.

During the FCA, Bureau Veritas performed a limited high-level accessibility review of the facility non-specific to any local regulations or codes. The scope of the visual observation was limited to the same areas observed while performing the FCA and the categories set forth in the tables that are included in the appendix. It is understood by the Client that the limited observations described herein do not comprise a full ADA Compliance Survey, and that such a survey is beyond the scope of this particular assessment. A full measured ADA survey would be required to identify any and all specific potential accessibility issues. Additional clarifications of this limited survey:

- This survey was visual in nature and actual measurements were not taken to verify compliance
- Only a representative sample of areas was observed
- Two overview photos were taken for each subsection regardless of perceived compliance or non-compliance
- Itemized costs for individual non-compliant items are not included in the dataset
- For any "none" boxes checked or reference to "no issues" identified, that alone does not guarantee full compliance

The facility was originally constructed in 1970. The facility was substantially renovated in 2014-2015 and some accessibility improvements appear to have been implemented at that time.

During the interview process with the client representatives, no complaints or pending litigation associated with potential accessibility issues was reported.

A prior accessibility survey was performed during the 2014-2015 renovation. From BV's perspective and limited analysis of the documents provided in conjunction with our own site visit, it appears that the recommendations from that study have been fully addressed. A line item by line item comparison between the prior study and BV's recent observations are beyond the scope of this assessment. Reference the appendix for specific data, photos, and tables or checklists associated with this limited accessibility survey.

5. Purpose and Scope

Purpose

Bureau Veritas was retained by the client to render an opinion as to the Property's current general physical condition on the day of the site visit.

Based on the observations, interviews and document review outlined below, this report identifies significant deferred maintenance issues, existing deficiencies, and material code violations of record, which affect the Property's use. Opinions are rendered as to its structural integrity, building system condition and the Property's overall condition. The report also notes building systems or components that have realized or exceeded their typical expected useful lives.

The physical condition of building systems and related components are typically defined as being in one of five condition ratings. For the purposes of this report, the following definitions are used:

Condition Ratings	
Excellent	New or very close to new; component or system typically has been installed within the past year, sound and performing its function. Eventual repair or replacement will be required when the component or system either reaches the end of its useful life or fails in service.
Good	Satisfactory as-is. Component or system is sound and performing its function, typically within the first third of its lifecycle. However, it may show minor signs of normal wear and tear. Repair or replacement will be required when the component or system either reaches the end of its useful life or fails in service.
Fair	Showing signs of wear and use but still satisfactory as-is, typically near the median of its estimated useful life. Component or system is performing adequately at this time but may exhibit some signs of wear, deferred maintenance, or evidence of previous repairs. Repair or replacement will be required due to the component or system's condition and/or its estimated remaining useful life.
Poor	Component or system is significantly aged, flawed, functioning intermittently or unreliably; displays obvious signs of deferred maintenance; shows evidence of previous repair or workmanship not in compliance with commonly accepted standards; has become obsolete; or exhibits an inherent deficiency. The present condition could contribute to or cause the deterioration of contiguous elements or systems. Either full component replacement is needed or repairs are required to restore to good condition, prevent premature failure, and/or prolong useful life.
Failed	Component or system has ceased functioning or performing as intended. Replacement, repair, or other significant corrective action is recommended or required.
Not Applicable	Assigning a condition does not apply or make logical sense, most commonly due to the item in question not being present.

Scope

The standard scope of the Facility Condition Assessment includes the following:

- Visit the Property to evaluate the general condition of the building and site improvements, review available construction documents in order to familiarize ourselves with, and be able to comment on, the in-place construction systems, life safety, mechanical, electrical, and plumbing systems, and the general built environment.
- Identify those components that are exhibiting deferred maintenance issues and provide cost estimates for Immediate Costs and Replacement Reserves based on observed conditions, maintenance history and industry standard useful life estimates. This will include the review of documented capital improvements completed within the last five-year period and work currently contracted for, if applicable.
- Provide a full description of the Property with descriptions of in-place systems and commentary on observed conditions.
- Provide a high-level categorical general statement regarding the subject Property's compliance to Title III of the Americans with Disabilities Act. This will not constitute a full ADA survey, but will help identify exposure to issues and the need for further review.
- Obtain background and historical information about the facility from a building engineer, property manager, maintenance staff, or other knowledgeable source. The preferred methodology is to have the client representative or building occupant complete a Pre-Survey Questionnaire (PSQ) in advance of the site visit. Common alternatives include a verbal interview just prior to or during the walk-through portion of the assessment.
- Review maintenance records and procedures with the in-place maintenance personnel.
- Observe a representative sample of the interior spaces/units, including vacant spaces/units, to gain a clear understanding of the property's overall condition. Other areas to be observed include the exterior of the property, the roofs, interior common areas, and the significant mechanical, electrical and elevator equipment rooms.
- Provide recommendations for additional studies, if required, with related budgetary information.
- Provide an Executive Summary at the beginning of this report, which highlights key findings and includes a Facility Condition Index as a basis for comparing the relative conditions of the buildings within the portfolio.

6. Opinions of Probable Costs

Cost estimates are attached throughout this report, with the Replacement Reserves in the appendix.

These estimates are based on Invoice or Bid Document/s provided either by the Owner/facility and construction costs developed by construction resources such as *R.S. Means, CBRE Whitestone,* and *Marshall & Swift,* Bureau Veritas's experience with past costs for similar properties, city cost indexes, and assumptions regarding future economic conditions.

Opinions of probable costs should only be construed as preliminary, order of magnitude budgets. Actual costs most probably will vary from the consultant's opinions of probable costs depending on such matters as type and design of suggested remedy, quality of materials and installation, manufacturer and type of equipment or system selected, field conditions, whether a physical deficiency is repaired or replaced in whole, phasing or bundling of the work (if applicable), quality of contractor, quality of project management exercised, market conditions, use of subcontractors, and whether competitive pricing is solicited, etc. Certain opinions of probable costs cannot be developed within the scope of this guide without further study. Opinions of probable cost for further study should be included in the FCA.

Definitions

Immediate Needs

Immediate Needs are line items that require immediate action as a result of: (1) material existing or potential unsafe conditions, (2) failed or imminent failure of mission critical building systems or components, or (3) conditions that, if not addressed, have the potential to result in, or contribute to, critical element or system failure within one year or will most probably result in a significant escalation of its remedial cost.

For database and reporting purposes the line items with RUL=0, and commonly associated with *Safety* or *Performance/Integrity* Plan Types, are considered Immediate Needs.

Replacement Reserves

Cost line items traditionally called Replacement Reserves (equivalently referred to as Lifecycle/Renewals) are for recurring probable renewals or expenditures, which are not classified as operation or maintenance expenses. The replacement reserves should be budgeted for in advance on an annual basis. Replacement Reserves are reasonably predictable both in terms of frequency and cost. However, Replacement Reserves may also include components or systems that have an indeterminable life but, nonetheless, have a potential for failure within an estimated time period.

Replacement Reserves generally exclude systems or components that are estimated to expire after the reserve term and are not considered material to the structural and mechanical integrity of the subject property. Furthermore, systems and components that are not deemed to have a material effect on the use of the Property are also excluded. Costs that are caused by acts of God, accidents, or other occurrences that are typically covered by insurance, rather than reserved for, are also excluded.

Replacement costs are solicited from ownership/property management, Bureau Veritas's discussions with service companies, manufacturers' representatives, and previous experience in preparing such schedules for other similar facilities. Costs for work performed by the ownership's or property management's maintenance staff are also considered.

Bureau Veritas's reserve methodology involves identification and quantification of those systems or components requiring capital reserve funds within the assessment period. The assessment period is defined as the effective age plus the reserve term. Additional information concerning system's or component's respective replacement costs (in today's dollars), typical expected useful lives, and remaining useful lives were estimated so that a funding schedule could be prepared. The Replacement Reserves Schedule presupposes that all required remedial work has been performed or that monies for remediation have been budgeted for items defined as Immediate Needs.

For the purposes of 'bucketizing' the System Expenditure Forecasts in this report, the Replacement Reserves have been subdivided and grouped as follows: Short Term (years 1-3), Near Term (years 4-5), Medium Term (years 6-10), and Long Term (years 11-20).

Key Findings

In an effort to highlight the most significant cost items and not be overwhelmed by the Replacement Reserves report in its totality, a subsection of Key Findings is included within the Executive Summary section of this report. Key Findings typically include repairs or replacements of deficient items within the first five-year window, as well as the most significant high-dollar line items that fall anywhere within the ten-year term. Note that while there is some subjectivity associated with identifying the Key Findings, the Immediate Needs are always included as a subset.

Exceedingly Aged

A fairly common scenario encountered during the assessment process, and a frequent source of debate, occurs when classifying and describing "very old" systems or components that are still functioning adequately and do not appear nor were reported to be in any way deficient. To help provide some additional intelligence on these items, such components will be tagged in the database as Exceedingly Aged. This designation will be reserved for mechanical or electrical systems or components that have aged well beyond their industry standard lifecycles, typically at least 15 years beyond and/or twice their Estimated Useful Life (EUL). In tandem with this designation, these items will be assigned a Remaining Useful Life (RUL) not less than two years but not greater than 1/3 of their standard EUL. As such the recommended replacement time for these components will reside outside the typical Short Term window but will not be pushed 'irresponsibly' (too far) into the future.

Methodology

Based upon site observations, research, and judgment, along with referencing Expected Useful Life (EUL) tables from various industry sources, Bureau Veritas opines as to when a system or component will most probably necessitate replacement. Accurate historical replacement records, if provided, are typically the best source of information. Exposure to the elements, initial quality and installation, extent of use, the quality and amount of preventive maintenance exercised, etc., are all factors that impact the effective age of a system or component. As a result, a system or component may have an effective age that is greater or less than its actual chronological age. The Remaining Useful Life (RUL) of a component or system equals the EUL less its *effective age*, whether explicitly or implicitly stated. Projections of Remaining Useful Life (RUL) are based primarily on age and condition with the presumption of continued use and maintenance of the Property similar to the observed and reported past use and maintenance practices, in conjunction with the professional judgment of Bureau Veritas's assessors. Significant changes in occupants and/or usage may affect the service life of some systems or components.

Where quantities could not be or were not derived from an actual construction document take-off or facility walk-through, and/or where systemic costs are more applicable or provide more intrinsic value, budgetary square foot and gross square foot costs are used. Estimated costs are based on professional judgment and the probable or actual extent of the observed defect, inclusive of the cost to design, procure, construct and manage the corrections.

7. Net Zero Energy Audit

The purpose of this Net Zero Energy Audit is to provide Bernice A. Ray School with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for both renewable and non-renewable Energy Conservation Measures to reduce the carbon emissions from building operations to net zero. This is achieved through the following steps:

1. Benchmark the building using EPA -portfolio manager tool to understand the existing carbon foot print.
2. Identify ways to reduce and optimize energy use in building through retrofits and energy efficient replacments.
3. Electrification – replace all fossil fuel consuming HVAC and DWH systems with high efficiency electric equivanelts
4. Onsite generation- perform feasibility study on installing solar PV systems on building roof and carports to offset electric use at the site
5. Procure the balance of electricity from renewable source such as “Solar Farms” or “Wind Farms”.

This audit will focus on the first four steps of the process, terminating with performing a “Gap- Analysis” to project the carbon footprint of the building post implementation of all non-renewable and renewable energy + water saving measures at the building.

Historical Energy and Water Performance Metrics + EPA Benchmarking

- Establishing the energy baseline begins with an analysis of the utility cost and consumption of the facility. Utilizing the historical energy data and local weather information, we evaluate the existing utility consumption and assign it to the various end-uses throughout the buildings.
- On developing a baseline, Bureau Veritas uses the Portfolio Manager tool developed by the Federal Environmental Protection Agency to track relative energy uses of buildings by property type.

Energy and Water Use Optimization Audit

The energy audit consisted of an onsite visual assessment to determine current conditions, itemize the energy consuming equipment (i.e. Boilers, Make-Up Air Units, DWH equipment); review lighting systems both exterior and interior; and review efficiency of all such equipment. The study also included interviews and consultation with operational and maintenance personnel. The energy audit process includes the following:

- Interviewing staff and review plans and past upgrades
- Performing an energy audit for each use type
- Performing a preliminary evaluation of the utility system
- Analyzing findings, utilizing ECM cost-benefit worksheets
- Making preliminary recommendations for system energy improvements and measures
- Estimating initial cost and changes in operating and maintenance costs based on implementation of energy efficiency measures.
- Ranking recommended cost measures, based on the criticality of the project and the largest payback.

Electrification

This includes identifying all fossil fuel burning HVAC and DWH systems and identifying optimal energy efficient electric alternatives to offset any Scope -II emissions from building operations.

Onsite Generation

This includes conducting feasibility study for onsite energy generation through renewable energy sources such as roof top solar PV to offset the electric use at the building.

8. Historical Energy and Water Performance Metrics

Utility Data Tabulation Methodology

The baseline utility consumption data for the proper has been developed by aggregating the consumption from one electric meter, one water meter, and delivery data for propane and fuel oil.

Data Limitation:
No assumptions were made in tabulation of the utility data for the purposes of the audit.

Utilities Metering at Glance	
Number of electric meters observed	One
Number of gas meters observed	Zero
Number of domestic water meter observed	One

Average Utility Rates				
Electricity	Natural Gas	Propane	No.2 Oil	Water & Sewer
Average Rate	Average Rate	Average Rate	Average Rate	Blended Rate
$0.16/kWh	N/A	$1.59/Gal ;	$2.38/Gal	$20.64/kgal

Electricity

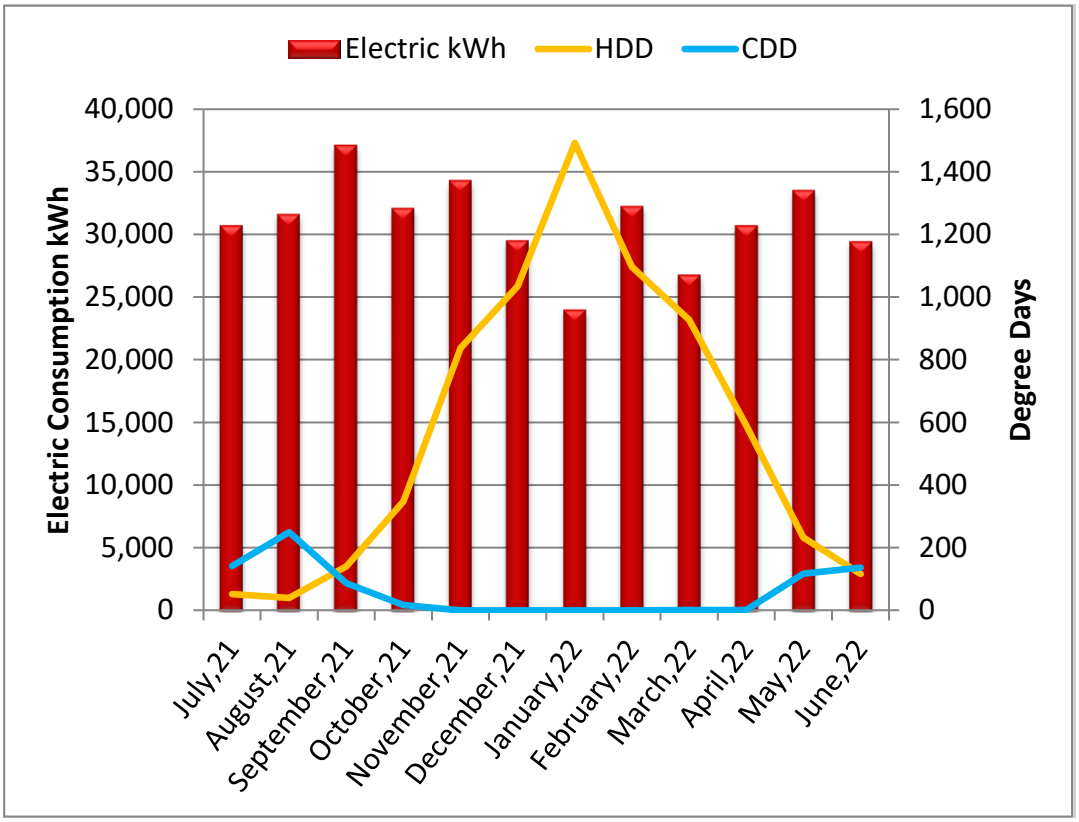
Liberty Utilities provides the electrical service to the facility.

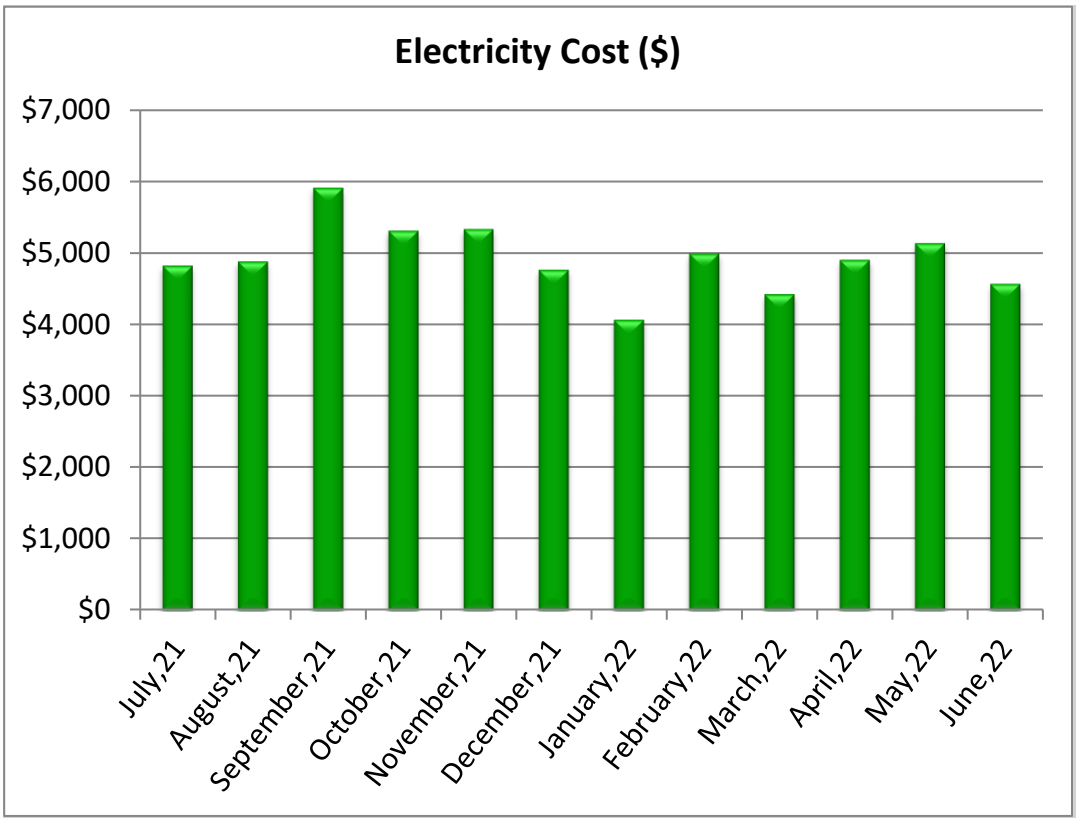
The consumption pattern for the period under consideration varies seasonally. The seasonal variation in the consumption is primarily attributed to the cooling loads, while the static base load primarily consists of lighting, appliances, and domestic water heating.

"Heating degree days", or "HDD", are a measure of how much (in degrees), and for how long (in days), outside air temperature was lower than a specific "base temperature" (in this case 65F). They are widely used in the energy industry for calculations relating to the effect of outside air temperature on building energy consumption.

"Cooling degree days", or "CDD", are a measure of how much (in degrees), and for how long (in days), outside air temperature was higher than a specific base temperature. They are used for calculations relating to the energy consumption required to cool buildings.

Electricity Consumption & Cost Data			
Billing Month	Consumption (kWh)	Unit Cost (per kWh)	Total Cost
July,21	30,720	$0.16	$4,822
August,21	31,600	$0.15	$4,883
September,21	37,120	$0.16	$5,913
October,21	32,080	$0.17	$5,312
November,21	34,320	$0.16	$5,336
December,21	29,520	$0.16	$4,765
January,22	24,000	$0.17	$4,065
February,22	32,240	$0.15	$4,994
March,22	26,800	$0.17	$4,426
April,22	30,720	$0.16	$4,902
May,22	33,520	$0.15	$5,138
June,22	29,440	$0.16	$4,568
TOTAL/AVERAGE	**372,080**	**$0.16**	**$59,125**


Electric kWh
HDD
CDD
Electric Consumption kWh
Degree Days
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1,600
1,400
1,200
1,000
800
600
400
200
0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22


Electricity Cost ($)
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22

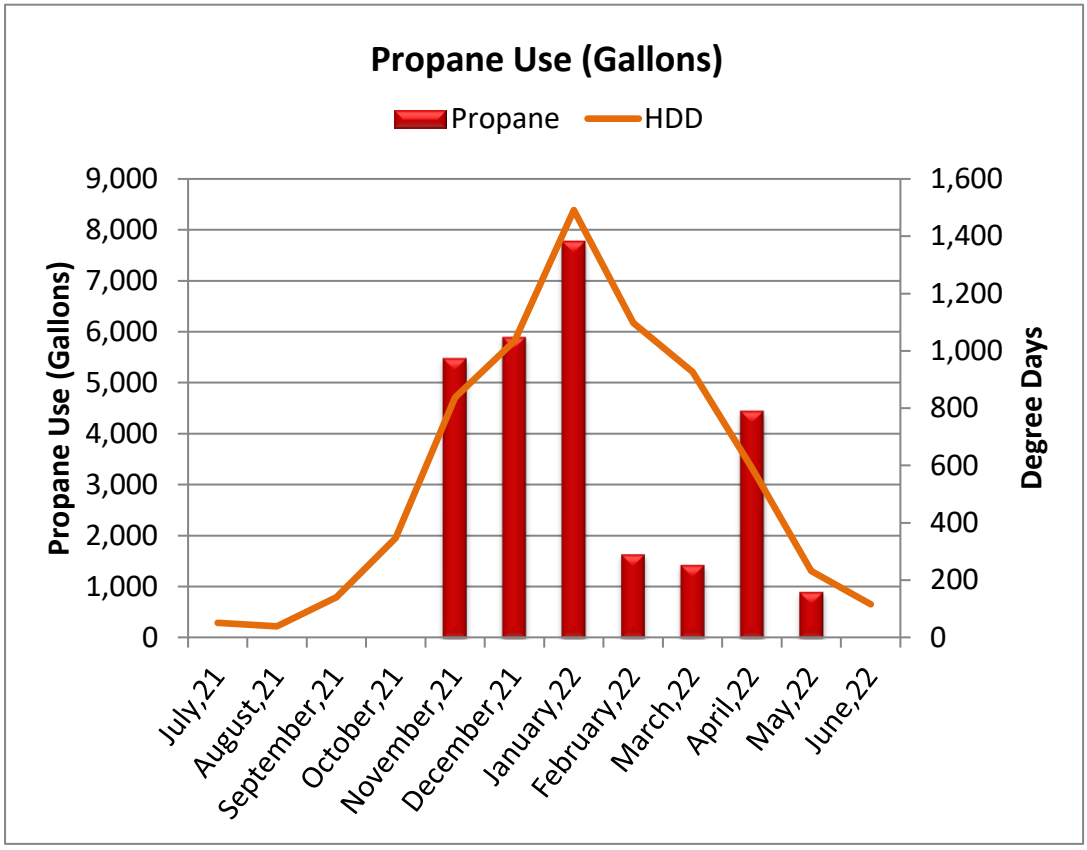
Propane & Fuel Oil

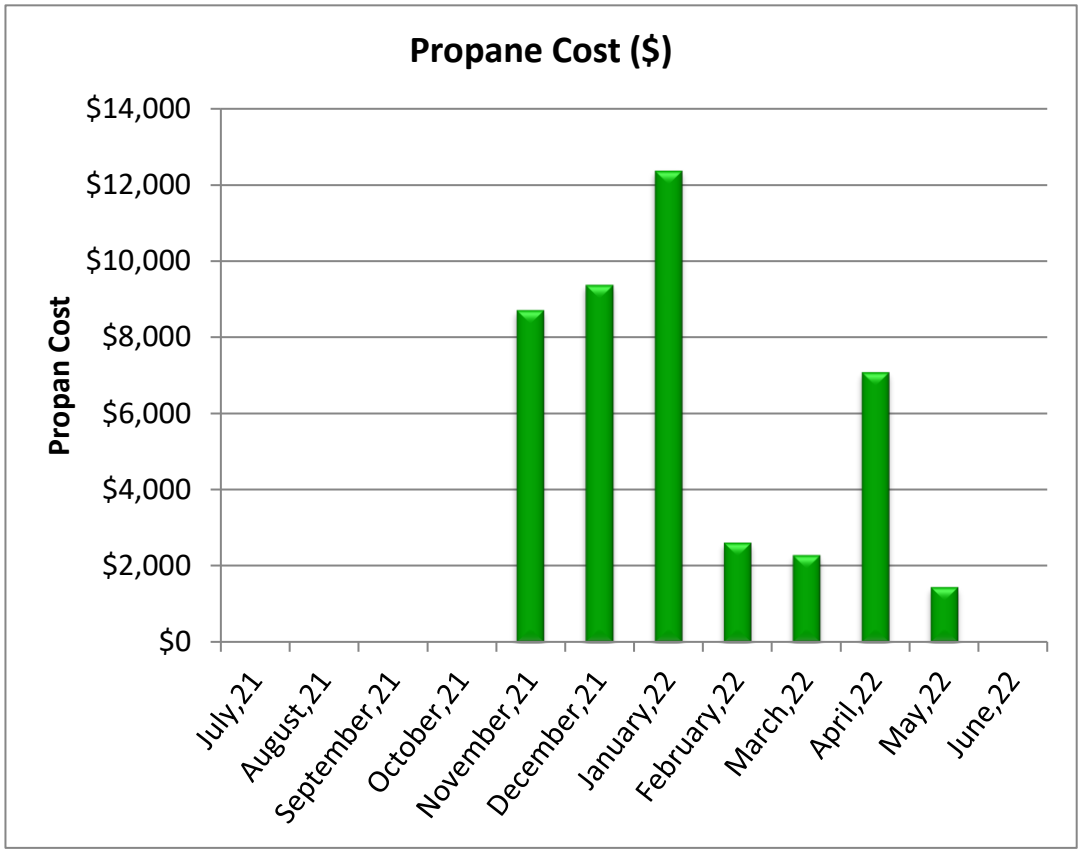
Dead River provides the propane and fuel oil to the facility. The deliveries are made on an as-needed basis. The underground storage tanks are located on-site and have a total rated capacity of 10,000 gallons for propane and 1,000 gallons for fuel oil.

The primary use of the propane and fuel oil is for space heating, domestic water heating, and cooking. The consumption pattern for the period under consideration varies seasonally. The seasonal variation in the consumption is primarily attributed to the heating loads, while the static base load primarily consists of domestic water heating and cooking.

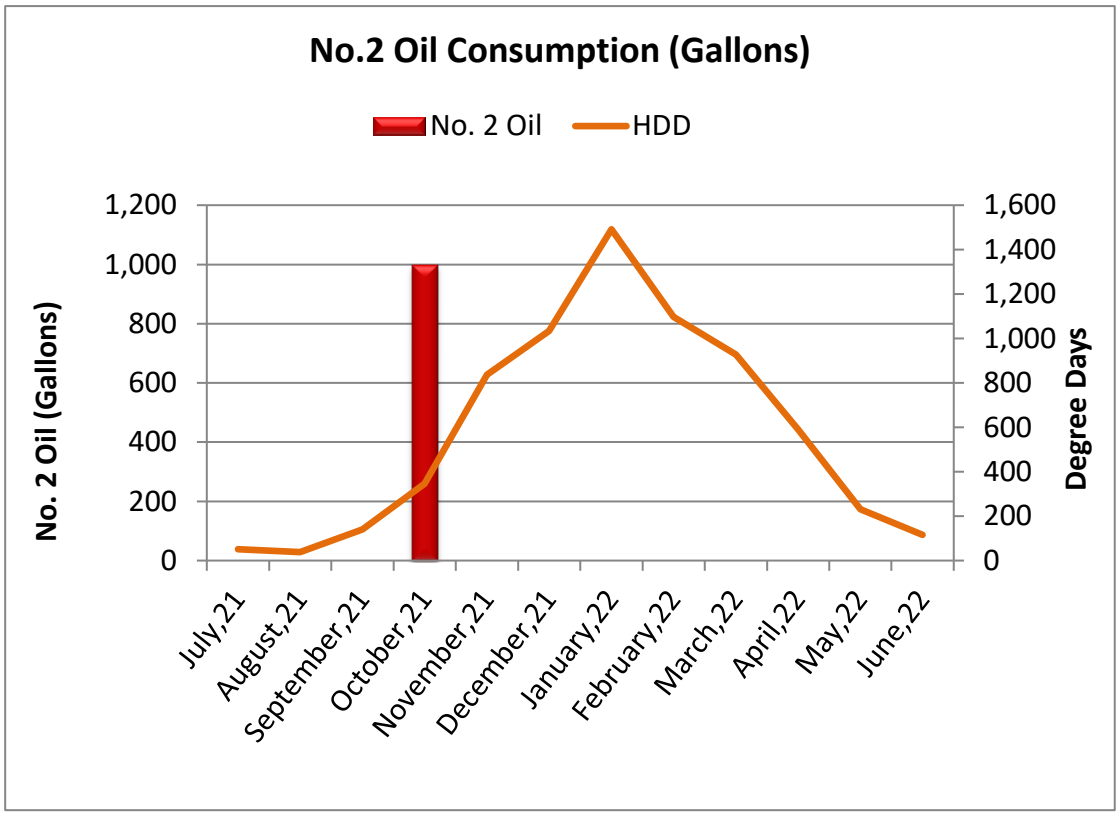
"Heating degree days", or "HDD", are a measure of how much (in degrees), and for how long (in days), outside air temperature was lower than a specific "base temperature" (in this case 65F). They are widely used in the energy industry for calculations relating to the effect of outside air temperature on building energy consumption.

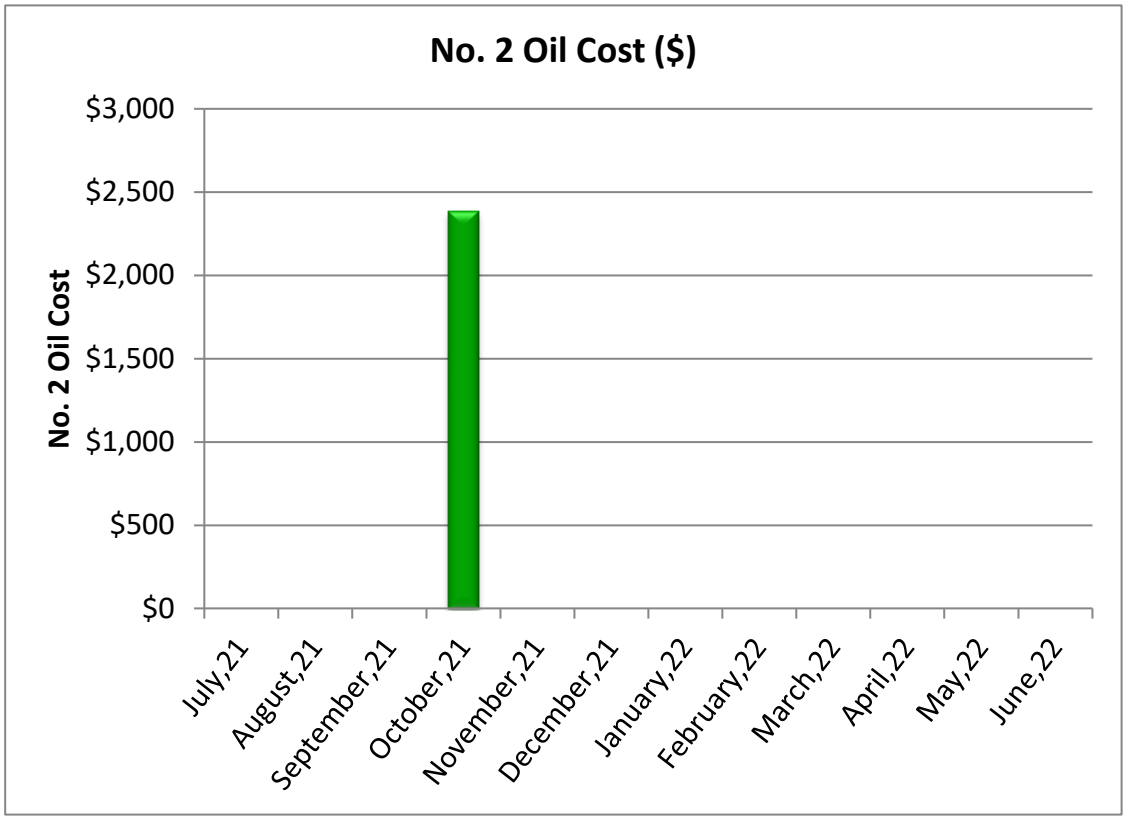
Propane Consumption & Cost Data			
Delivery Month	Delivery (gallons)	Unit Cost (per gallon)	Total Cost
July,21	0	0	$0
August,21	0	0	$0
September,21	0	0	$0
October,21	0	0	$0
November,21	5,484	1.59	$8,719
December,21	5,898	1.59	$9,378
January,22	7,783	1.59	$12,374
February,22	1,647	1.59	$2,618
March,22	1,440	1.59	$2,289
April,22	4,459	1.59	$7,089
May,22	911	1.59	$1,449
June,22	0	0	$0
Total	**27,621**	**1.59**	**$43,917**


Propane Use (Gallons)
Propane
HDD
Propane Use (Gallons)
Degree Days
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1,600
1,400
1,200
1,000
800
600
400
200
0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22


Propane Cost ($)
Propan Cost
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22

Fuel Oil Consumption & Cost Data			
Delivery Month	Delivery (gallons)	Unit Cost (per gallon)	Total Cost
July,21	0	0	$0
August,21	0	0	$0
September,21	0	0	$0
October,21	1,000	$2.38	$2,384
November,21	0	0	$0
December,21	0	0	$0
January,22	0	0	$0
February,22	0	0	$0
March,22	0	0	$0
April,22	0	0	$0
May,22	0	0	$0
June,22	0	0	$0
Total	**1,000**	**$2.38**	**$2,384**


No.2 Oil Consumption (Gallons)
No. 2 Oil
HDD
No. 2 Oil (Gallons)
Degree Days
1,200
1,000
800
600
400
200
0
1,600
1,400
1,200
1,000
800
600
400
200
0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22


No. 2 Oil Cost ($)
No. 2 Oil Cost
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
July,21
August,21
September,21
October,21
November,21
December,21
January,22
February,22
March,22
April,22
May,22
June,22

Water and Sewer

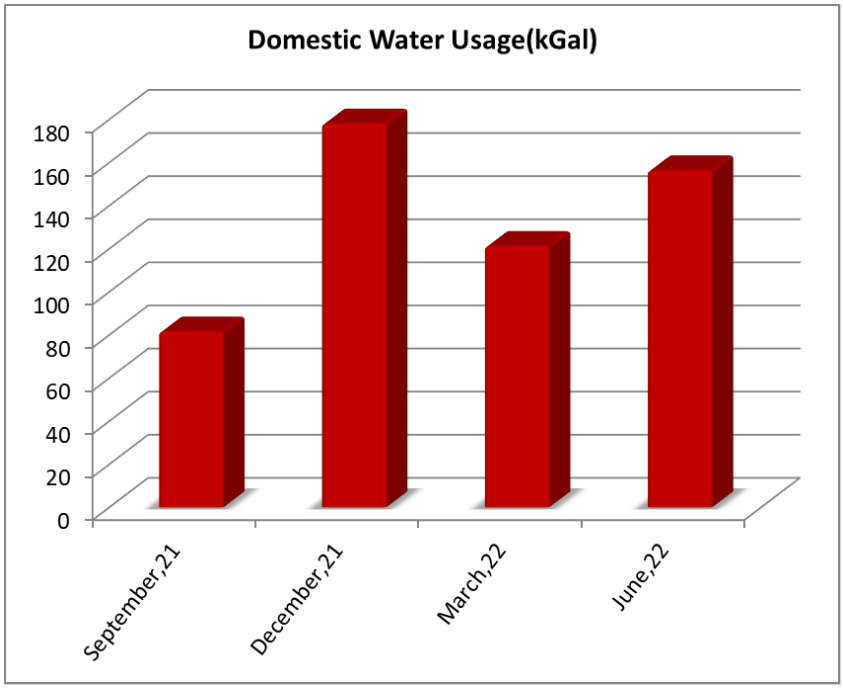
The Town of Hanover satisfies the water and sewer requirements of the facility. The billing for the water and sewer is quarterly.

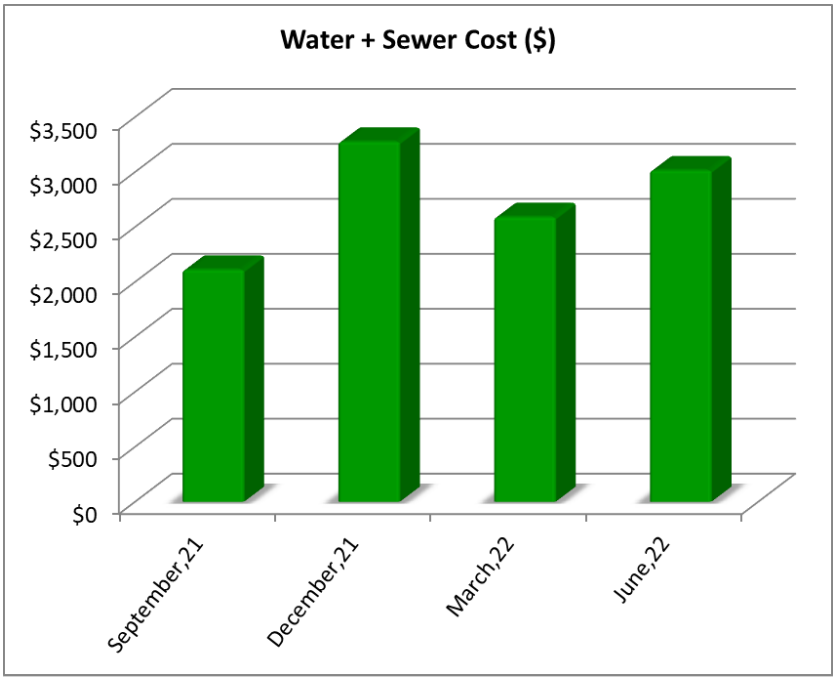
Based on the 2021-2022 water and sewer usage and costs provided, the average blended price paid during the year was $20.64 per kilogallon. The total annual consumption for the 12-month period analyzed is 537 kilogallons for a total cost of $11,086.

Usage across the 9-month school session varies over a modest range, with reduced consumption during the summer months when school is not in session.

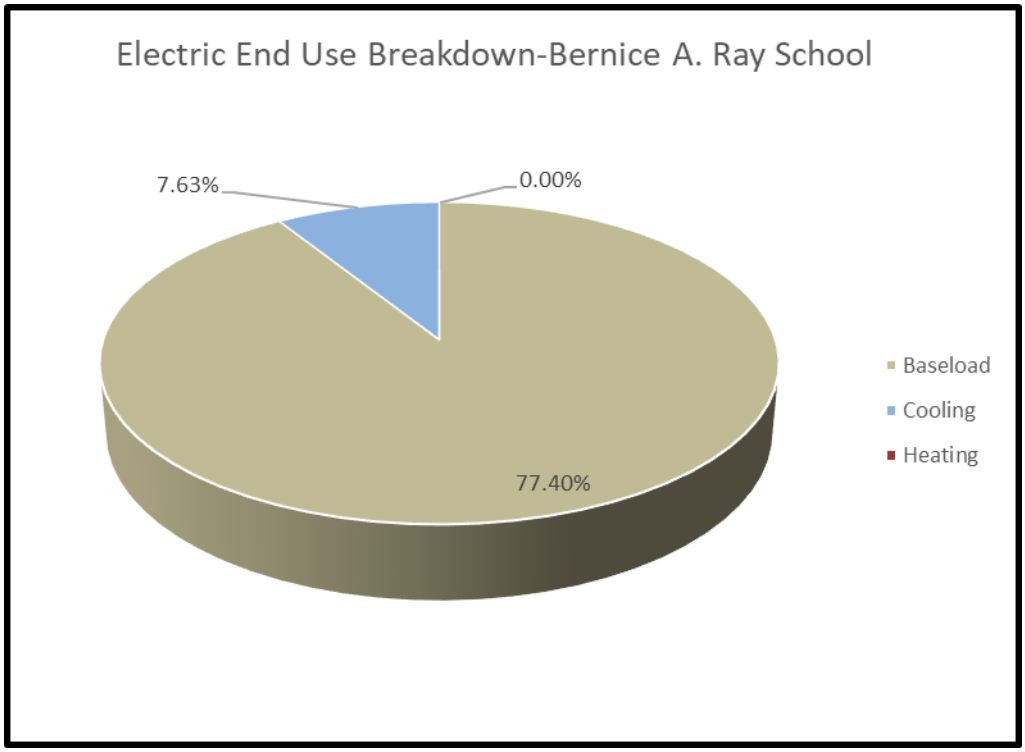
Note: Landscape irrigation is a separate bill and is not included in these amounts, as it does not affect building water and sewer usage.

Water & Sewer Consumption & Cost Data			
Billing Month	Consumption (kGal)	Unit Cost (per kGal)	Total Cost
August,21	82	$25.90	$2,112
November,21	178	$18.41	$3,277
February,22	121	$21.38	$2,591
May,22	156	$19.87	$3,106
TOTAL/AVERAGE	**537**	**$20.64**	**$11,086**


Domestic Water Usage(kGal)
180
160
140
120
100
80
60
40
20
0
September,21
December,21
March,22
June,22


Water + Sewer Cost ($)
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
September,21
December,21
March,22
June,22

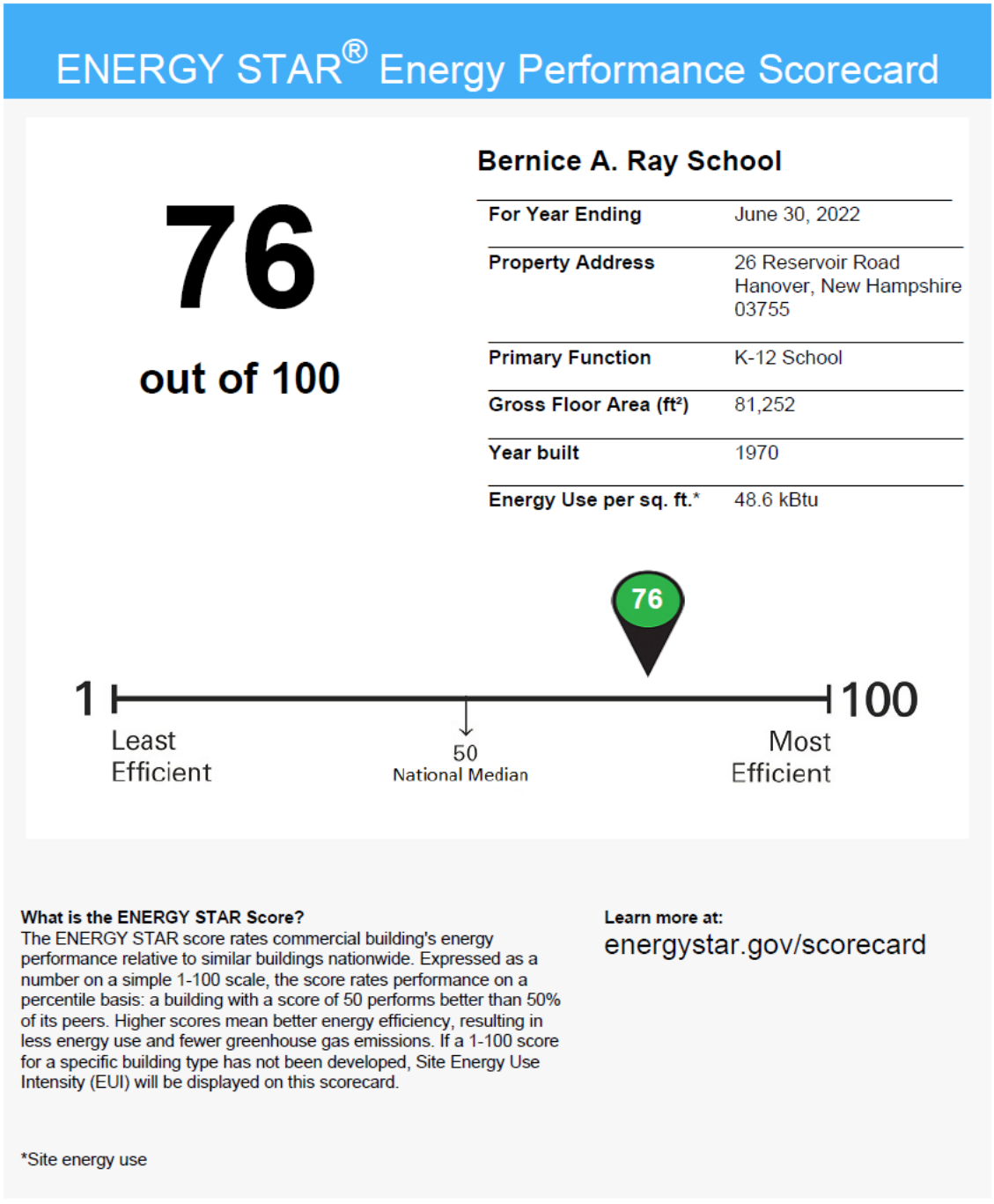
End Use Energy Distribution



Energy Star Portfolio Manager Facility Summary

Bureau Veritas uses the Portfolio Manager tool developed by the Federal Environmental Protection Agency to track relative energy uses of buildings by property type. This tool allows the input of a facility's historic utility data to be compared with normalized data of a large database of its peer facilities.

Based on this analysis, the Bernice A. Ray School is performing above the national average level.



ENERGY STAR® Energy Performance Scorecard

76

out of 100

Bernice A. Ray School

For Year Ending	June 30, 2022
Property Address	26 Reservoir Road Hanover, New Hampshire 03755
Primary Function	K-12 School
Gross Floor Area (ft²)	81,252
Year built	1970
Energy Use per sq. ft.*	48.6 kBtu

What is the ENERGY STAR Score?
The ENERGY STAR score rates commercial building's energy performance relative to similar buildings nationwide. Expressed as a number on a simple 1-100 scale, the score rates performance on a percentile basis: a building with a score of 50 performs better than 50% of its peers. Higher scores mean better energy efficiency, resulting in less energy use and fewer greenhouse gas emissions. If a 1-100 score for a specific building type has not been developed, Site Energy Use Intensity (EUI) will be displayed on this scorecard.

Learn more at:
energystar.gov/scorecard

*Site energy use

EPA United States Environmental Protection Agency

Date Generated: January 05, 2023

9. Energy Conservation Measures

Bureau Veritas has conducted an Energy Audit on Bernice A. Ray School. The study included a review of the building's construction features, historical energy and water consumption and costs, review of the building envelope, HVAC equipment, heat distribution systems, lighting, and the building's operational and maintenance practices.

Bureau Veritas has evaluated three 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 H for reference. A 10% discount in energy savings was applied to account for the interactive effects amongst the ECMs. In addition to the consideration of the interactive effects, Bureau Veritas has applied a 15% 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.

Recommended Non-Renewable Energy Conservation Measures: Financial Impact	
Total Projected Initial ECM Investment	$109,943 (In Current Dollars)
Estimated Annual Cost Savings Related to ECMs	$17,106 (In Current Dollars)
Net Effective ECM Payback	6.43 Years
Estimated Annual Energy Savings	5.4%
Estimated Annual Utility Cost Savings *(excluding water)*	8.7%
Estimated Annual Water Cost Savings	16.6%

Solar Rooftop Photovoltaic Analysis	
Estimated number of panels	984
Estimated kW Rating	310.0 kW
Potential Annual kWh Produced	372,220.0 kW
% of Current Electricity Load	100.0%
Investment Cost	$1,508,647
Estimated Energy Cost Savings	$59,147
Payback without Incentives	25.51 Years
Payback with All Incentives	18.88 Years

Key Metrics to Benchmark the Subject Property's Energy Usage Profile

- Building Site Energy Use Intensity - The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.
- Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.
- Building Cost Intensity - This metric is the sum of all energy use costs in dollars per unit of gross building area.
- Greenhouse Gas Emissions - Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

Energy Usage Profile	
Site Energy Use Intensity	
Current Site Energy Use Intensity (EUI)	48.4 kBTU/SF
Post ECM Site Energy Use Intensity (EUI)	45.8 kBTU/SF
Source Energy Use Intensity (EUI)	
Current Source Energy Use Intensity (EUI)	85.3 kBTU/SF
Post ECM Source Energy Use Intensity (EUI)	77.3 kBTU/SF
Building Cost Intensity (BCI)	
Current Building Cost Intensity	$1.30/SF
Post ECM Building Cost Intensity	$1.18/SF
Greenhouse Gas Emissions Reduction ***(from recommended ECM's)***	
Current Annual CO2e Emissions from Building Operation	257.57 $MtCO_2$/Yr
Total Annual CO2 Emissions Reduced	14.7 MtCO2e/Yr
Estimated Annual Thermal Energy Reduction	214.5 MMBTU
Total Cars off the Road (Equivalent)*	3
Total Acres of Pine Trees Planted (Equivalent)*	3

Energy Conservation Measures Screening:

Bureau Veritas screens ECMs using two financial methodologies. ECMs which are considered financially viable must meet both criteria.

1. Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates. ECMs with a payback period greater than the Expected Useful Life (EUL) of the project are not typically recommended, as the cost of the project will not be recovered during the lifespan of the equipment. These ECMs are recommended for implementation during future system replacement. At that time, replacement may be evaluated based on the premium cost of installing energy efficient equipment.

$$Simple\ Payback = \frac{Initial\ Cost}{Annual\ Savings}$$

2. Savings-to-Investment Ratio (SIR) – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value over the estimated useful life (EUL) of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy efficiency recommendations should be based on a calculated SIR, with larger SIRs receiving a higher priority. A project is typically only recommended if SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

$$SIR = \frac{Present\ Value\ (Annual\ Savings, i\%, EUL)}{Initial\ Cost}$$

Bureau Veritas has identified three Energy Conservation Measures (ECM) for this property.

List of Recommended Energy Conservation Measures For Bernice A. Ray School

		Description of ECM	Location	Labor Cost	Material Cost	Projected Initial Investment	Utility Company Incentive	Net Projected Initial Investment	Estimated Annual Energy & Water Savings					Total Energy Savings	Total Green House Gas Savings	Estimated Utility Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	Life Cycle Savings	Expected Useful Life (EUL)
						(a)	(b)	C=(a-b)	Propane	No.2 Oil	Electricity	Demand Reduction	Water									
				($)	($)	($)	($)	($)	(Gallons)	(Gallons)	(kWh)	(KW)	(kGal)	(Mmbtu)	($MtCO_2$/Yr)	($)	($)	($)	(Yrs.)		($)	(Yrs.)
1	Title:	Install Low Flow Faucet Aerators	Location: Classrooms, offices	$424	$536	$960	$0	$960	0	0	0	0	65	29	1.56	$0	$0	$645	1.49	5.74	$4,544	10.00
	Attribute:	Replace 34x 2.2GPM rated kitchen aerators with 1.5GPM WaterSense certified aerators Replace 33x 1.5GPM rated bathroom aerators with 0.5GPM WaterSense certified aerators																				
2	Title:	Retrofit Flush Tank Toilets to Dual Flush	Location: Restrooms	$3,111	$792	$3,903	$0	$3,903	0	0	0	0	146	0	0.00	$0	$0	$1,464	2.67	5.58	$17,882	20.00
	Attribute:	Retrofit 33x 1.6GPF toilets to dual-flush																				
3	Title:	Upgrade Building Lighting to LED and Install Automatic Lighting Controls	Location: Building Interior and Exterior - Bernice A. Ray School	$84,169	$6,572	$90,740	$0	$90,740	0	0	61,229	42	0	209	14.49	$9,730	$6,658	$16,387	5.54	2.16	$104,889	15.00
	Attribute:	Replace CFL (39x) ;Incan/H/MR (23x) ;Linear Fluorescent (567x) ;																				
Totals for No/Low Cost Items				**$424**	**$536**	**$960**	**$0**	**$960**	**0**	**0**	**0**	**0**	**0**	**65**	**1.56**	**$0**	**$0**	**$645**	**1.49**			
Total For Capital Cost				**$87,279**	**$7,364**	**$94,643**	**$0**	**$94,643**	**0**	**0**	**61,229**	**42**	**42**	**146**	**14.49**	**$9,730**	**$6,658**	**$17,852**	**5.30**			
		Interactive Savings Discount @ 10%							0	0	-6,123	-4	-4	-21	-1.60	-$973	-$666	-$1,850				
		Total Contingency Expenses @ 15%				$14,340		$14,340														
Total for Improvements						**$109,943**	**$0**	**$109,943**	**0**	**0**	**55,107**	**38**	**38**	**190**	**14.44**	**$8,757**	**$5,992**	**$16,647**	**6.60**			

10. Electrification

This analysis investigates replacing HVAC and other fossil fuel consuming systems within the building with efficient electric alternatives. These improvements can be considered as green replacements to traditional “like and in kind” replacements as done as part of the life cycle replacement These replacements are recommended under Capital improvements and not as energy improvements as the cost savings are not significant enough to offset the initial investment.
To take advantage of the saving by transferring the improvements to electrical usage an increase in electrical demand for your present system will be required. This will require ensuring that the electrical equipment is of adequate size to handle the increased load. There are several things to consider before making an upgrade to the electrical equipment.

1. First determine if the service you presently have will require an increase in size. This can be done by reviewing your current electrical usage to see if the additional load will be more than you present system can accommodate. By getting a copy of the last year’s usage from the utility company a comparison can be made to determine if your system can handle the additional load.
2. Updating you present equipment may be required, based on the age and condition of your present equipment. If your system is at the end of its useful life or parts are not available, then a change to the entire system may be required. Things to consider beside the cost of a new system include the cost of shutdown of your present system during the changeover and remodeling to replace present systems.
3. We recommend building another service alongside your present system to handle the increase from the changes being recommended. According to the National Electrical Code under the “Rule of Six” you are allowed to have 6 separate electrical services, or six different main disconnects on your building. This rule allows you to build an additional electrical system to handle the increased load only.

Any changes made to your electrical system should be evaluated by an Electrical Engineer to ensure that the new system will meet the new load requirements and for compliance with all electrical codes. The cost for that study has been included in this evaluation.

Note: The facility is heated by one 500 MBH boiler, installed in 2014, one 1,000 MBH boiler, installed in 2014, one 2,670 MBH boiler, installed in 2014, and a propane water heater, installed in 2019. Several rooftop package units are also present; these run on propane and provide minimal pre-heating of spaces, but reportedly the original design intent was to install energy recovery ventilators rather than package units. The following two tables list the existing fossil fuel-fired equipment and a proposed road map toward eliminative fossil fuel use by replacing these units. Bureau Veritas proposes the electrification replacements be scheduled so that the equipment with the longer remaining useful life is changed out last.

Fossil Fuel Burning Systems

	Asset Description	Input Capacity (MBH)	Quantity	EUL	RUL	Fuel
1	Water Heater, 119 GAL	200	1	20	17	Popane
2	Boiler, HVAC, 2670 MBH	2670	1	20	22	No. 2 Oil
3	Boiler, HVAC, 1000 MBH	1000	1	20	22	Propane
4	Boiler, HVAC, 500 MBH	500	1	30	22	Propane
5	Packaged Unit, 12.5 Ton	200	1	20	12	Propane
6	Packaged Unit, 12.5 Ton	200	1	20	12	Propane
7	Packaged Unit, 12.5 Ton	200	1	20	12	Propane
8	Packaged Unit, 17.5 Ton	320	1	20	12	Propane
9	Packaged Unit, 20 Ton	320	1	20	12	Propane
10	Packaged Unit, 4 Ton	100	1	20	12	Propane
11	Packaged Unit, 4 Ton	100	1	20	12	Propane
	Totals	5,810				

Net-Zero Project Schedule																								
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	Action	Attributes	Initial Investment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total
1	Implement All Non- Renewable Measures		$109,943		$109,943																			$109,943
2	Install Solar PV System	310 kW	$1,508,647			$301,729		$301,729		$301,729		$301,729		$301,729											$1,508,647
3	Energy Recovery Ventilator, 1,875 CFM, Replace	Administration / B Wing	$25,000													$25,000									$25,000
4	Energy Recovery Ventilator, 3,000 CFM, Replace	K-1, Life Skills Library / D Wing	$40,000													$40,000									$40,000
5	Energy Recovery Ventilator, 2,625 CFM, Replace	5th Grade Pod / E Wing	$40,000														$40,000								$40,000
6	Energy Recovery Unit, 1,875 CFM, Replace	Multi Purpose Room Partial 3rd Grade Pod / F Wing	$25,000														$25,000								$25,000
7	Energy Recovery Ventilator, 1,875 CFM, Replace	2nd Grade Pod / C Wing	$25,000														$25,000								$25,000
8	Energy Recovery Ventilator, 600 CFM, Replace	Art Room	$9,000															$9,000							$9,000
9	Energy Recovery Ventilator, 600 CFM, Replace	Kitchen	$9,000															$9,000							$9,000
10	Install Electric Water Heater	130 GAL in place of existing Propane WH at end of its life	$18,500																		$18,500				$18,500
11	Upgrade Electrical System	120/208V, 1200A	$109,785																			$109,785			$109,785
12	Install Variable Refrigerant Flow (VRF) Heat Pump System	Install first portion as 2 smaller boilers are removed	$1,218,780																				$487,512	$731,268	$1,218,780
13	Boiler, Propane, Decommission	500 MBH	$7,000																				$7,000		$7,000
14	Boiler, Propane, Decommission	1,000 MBH	$10,000																				$10,000		$10,000
15	Boiler, Dual Fuel, Decommission	2,670 MBH	$20,000																					$20,000	$20,000
16	HVAC System, Hydronic Piping, 2-Pipe, Decommission/Remove		$40,626																					$40,626	$40,626
17	Storage Tank, 1000 GAL, Site Fuel, Underground, Abandon/Decommission		$5,000																					$5,000	$5,000
18	Storage Tank, 10000 GAL, Site Fuel, Underground, Abandon/Decommission	Existing tank due for replaement in 2030, will need interim replacement	$15,000																					$15,000	$15,000
	Totals		**$3,236,281**	$0	$109,943	$301,729	$0	$301,729	$0	$301,729	$0	$301,729	$0	$301,729	$0	$65,000	$90,000	$18,000	$0	$0	$18,500	$109,785	$504,512	$811,894	$3,236,281
	Escalated at 3% Inflation			$0	$112,253	$311,840	$0	$316,655	$0	$319,868	$0	$322,289	$0	$324,235	$0	$70,199	$97,415	$19,523	$0	$0	$20,176	$119,924	$551,953	$889,541	$3,475,871

Analysis:

The schedule above assumes replacing the fossil fuel-fired equipment as it reaches the end of its nominal lifespan. If eliminating fossil fuel usage is a greater priority, this can be moved to an earlier year. The large 10,000 gallon underground fuel tank reaches the end of its expected lifespan in 2030, and will need replacement if still in use.
We recommend replacing the rooftop units with energy recovery ventilators as they reach the end of their life. This is reportedly per the original system design. ERV's will not consume fossil fuel.
Note that the cost of the non-fuel equipment shown in this table is offsets costs in the existing Replacement Reserves table for replacing fuel fired equipment with same.

1. Implement recommended energy conservation measures.
2. Install PV system, costs distributed to reduce yearly budget impact.
3-9. Replace rooftop package units with energy recovery ventilators.
10. Replace gas water heater with electric as the gas unit reaches its replacement year.
11. Upgrade the electrical system to accommodate the VRF system.
12. Install VRF system. Installation is broken up into 2 years, so that the smaller boilers can be removed in the first year and the larger boiler in the second year.
13-15. Decommission boilers.
16. Decommission hydronic piping from the old heating system.
17-18. Remove or properly abandon underground storage tanks.

11. Onsite Renewable Energy Generation

A photovoltaic array is a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells. The cells convert solar energy into direct current electricity via the photovoltaic effect. The power that one module can produce is seldom enough to meet requirements of a home or a business, so the modules are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can plug into the existing infrastructure to power lights, motors, and other loads. The modules in a PV array are usually first connected in series to obtain the desired voltage; the individual strings are then connected in parallel to allow the system to produce more current. Solar arrays are typically measured by the peak electrical power they produce, in watts, kilowatts, or even megawatts.

When determining if a site is suitable for a solar application, two basic considerations must be evaluated:

- At minimum, the sun should shine upon the solar collectors from 9 AM to 3 PM. If less, the application may still be worthwhile, but the benefit will be less.
- The array should face south and be free of any shading from buildings, trees, rooftop equipment, etc. If the array is not facing directly south, there will be a penalty in transfer efficiency, reducing the overall efficiency of the system.

Solar Feasibility	
Does the property have a south, east, or west facing roof or available land of more than 250 square feet per required Solar Array Panel?	Yes
Is the area free from any shading such as trees, buildings, equipment etc throughout the whole day	Yes
Can the panels be mounted at an incline of roughly 25-45 degrees? (equal to latitude of property)	Yes
Is the property in an area with acceptable average monthly sunlight levels?	Yes
Has the roofing been replaced within the past 3-5 years?	No
Is the roof structure sufficient to hold solar panels?	Yes
Is the property located in a state eligible for net metering?	Yes

A solar feasibility analysis of the site has resulted in the building containing a more than sufficient amount of roof area for solar electricity generation. The analysis through the use of National Renewable Energy Laboratory's solar photovoltaic software assisted in calculating the potential electricity generated from the allocated land and roof area set for solar photovoltaic installment. The allocated roof area was determined by looking at the roof and surrounding areas at a bird's eye view. Also detailed in the report are incentives and rebates that can potentially bring down the installation cost of the ECMs and result in a higher return on investment and quicker payback period.

The approach taken in the solar photovoltaic (PV) roof analysis begins with surveying the roof and determining areas on the roof where solar PV panels can potentially be installed.

1) Conducting a preliminary sizing of solar PV panels on the roofs and on the ground and its potential electricity production for its first year of installment using the National Renewable Energy Laboratory (NREL) PV WATTS Software.
2) Calculate energy and cost savings for the site as a sole proprietor of the system capable of collecting state, local, and federal tax credits and incentives and interconnecting and selling the renewable energy electrical production to the building.

Bureau Veritas has done a preliminary study on the rooftop solar photovoltaic application at the site.

Solar Rooftop Photovoltaic Analysis	
Estimated number of panels	984
Estimated kW Rating	310.0 kW
Potential Annual kWh Produced	372,220.0 kW
Percent of Current Electricity Load	100.0%
Investment Cost	$1,508,647
Estimated Energy Cost Savings	$59,147
Payback without Incentives	25.51 Years
Payback with All Incentives	18.88 Years

A photovoltaic array is a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells. The cells convert solar energy into direct current. Modules of cells are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can connect to existing AC infrastructure to power lights, motors, and other loads.

12. Net Zero Gap Analysis

Net Zero Energy Analysis for Renewable and Non-Renewable Evaluated Measures

Net Zero Energy Analysis					
		No. 2 Oil	Propane	Electric	MMBTU
--		(Lbs)	(Gal)	(kWh)	(MMBtu)
(a)	Existing Net Annual Energy Consumption	1,000	27,621	372,080	3,935
(b)	Projected First Year, Annual Energy Savings from Non-Renewable Energy Measures	0	289	55,107	214
(c) = (a)-(b)	Projected Annual Consumption Post Non-Renewable Energy Measures	**1,000**	**27,332**	**316,973**	**3,721**
(d)	Projected Energy Consumption Post Electrification and Fossil Fuel Conversion	--	--	1,090,523	3,721
(e)	Projected First Year, Annual Energy Savings from Renewable Energy Measures	--	--	372,220	1270.01
(f) = (d)-(e)	Projected Energy Consumption Post Renewable + Non-Renewable Energy Implementation + Electrification	--	--	718,303	2,451

Net Zero Financial Analysis	
Total Projected Initial Investment for Recommended Non-Renewable Measures	$109,943 (in current dollars)
Total Projected Initial Investment for Electrification	$3,236,281
Total Projected Initial Investment for Recommended Renewable Measures	$1,508,647
Total project initial investment	$4,854,871

13. Recommended Operations & Maintenance Plan

The quality of the maintenance and the operation of the facility's energy systems have a direct effect on its overall energy efficiency. Energy-efficiency needs to be a consideration when implementing facility modifications, equipment replacements, and general corrective actions. The following is a list of activities that should be performed as part of the routine maintenance program for the property.

Building Envelope

- ✓ Ensure that the building envelope has proper caulking and weather stripping.
- ✓ Patch holes in the building envelope with foam insulation and fire rated caulk around combustion vents
- ✓ Inspect building vents semiannually for bird infestation
- ✓ Inspect windows monthly for damaged panes and failed thermal seals
- ✓ Repair and adjust automatic door closing mechanisms as needed.

Heating and Cooling

- ✗ Pilots lights on furnaces and boilers be turned off in summer
- ✓ All preventive maintenance should be performed on all furnaces and boilers, which would include cleaning of burners and heat exchanger tubes.
- ✓ Ensure that the combustion vents exhaust outside the conditioned space and the vent dampers are functional
- ✓ Ensure that the control valves are functioning properly before start of every season
- ✓ Ensure steam traps are functional before start of each heating season
- ✓ Ensure use of chemical treatment for boiler make up water
- ✓ Ensure boiler outside temperature re-set is set to 55F
- ✗ Ensure use of chemical treatment for cooling tower water to prevent corrosion
- ✓ Ensure the duct work in unconditioned space is un-compromised and well insulated
- ✓ Duct cleaning is recommended every 10 years. This should include sealing of ducts using products similar to 'aero-seal'
- ✓ Ensure use of economizer mode is functional and used
- ✓ Ensure that the outside air dampers actuators are operating correctly
- ✓ Ensure air coils in the AHU and FCA's are pressure washed annually
- ✓ Return vents should remain un-obstructed and be located centrally
- ✓ Temperature settings reduced in unoccupied areas and set points seasonally adjusted.
- ✓ Evaporator coils and condenser coils should be regularly cleaned to improve heat transfer
- ✓ Refrigerant pipes should be insulated with a minimum of ¾" thick Elastomeric Rubber Pipe Insulation
- ✓ Ensure refrigerant pressure is maintained in the condensers
- ✓ Change air filters on return vents seasonally. Use only filters with 'Minimum Efficiency Rating Value'(MERV) of 8

Central Domestic Hot Water Heater

- ✓ Never place gas fired water heaters adjacent to return vents so as to prevent flame roll outs
- ✓ Ensure the circulation system is on timer to reduce the losses through re-circulation
- ✓ Ensure all hot water pipes are insulated with fiberglass insulation at all times
- ✓ Replacement water heater should have Energy Factor (EF)>0.9
- ✓ Tank-type water heaters flushed monthly

Lighting Improvements

- ✓ Utilize bi-level lighting controls in stairwells and hallways.
- ✓ Use LED replacement lamps
- ✓ Clean lighting fixture reflective surfaces and translucent covers.
- ✓ Ensure that timers and/or photocells are operating correctly on exterior lighting
- ✓ Use occupancy sensors for offices and other rooms with infrequent occupancy

Existing Equipment and Replacements

- ✓ Ensure that refrigerator and freezer doors close and seal correctly
- ✓ Ensure kitchen and bathroom exhaust outside the building and the internal damper operates properly
- ✓ Ensure that bathroom vents exhaust out
- ✓ Office/ computer equipment either in the “sleep” or “off” mode when not used

Key

x	Maintenance Measure is Not Applicable For the Given Facility
✓	Maintenance Measure is Applicable For the Given Facility

14. Certification

School Administrative Unit 70 (the Client) retained Bureau Veritas to perform this Facility Condition Assessment in connection with its continued operation of Bernice A. Ray School, 26 Reservoir Road, Hanover, New Hampshire 03755, the "Property". It is our understanding that the primary interest of the Client is to locate and evaluate materials and building system defects that might significantly affect the value of the property and to determine if the present Property has conditions that will have a significant impact on its continued operations.

The conclusions and recommendations presented in this report are based on the brief review of the plans and records made available to our Project Manager during the site visit, interviews of available property management personnel and maintenance contractors familiar with the Property, appropriate inquiry of municipal authorities, our Project Manager's walk-through observations during the site visit, and our experience with similar properties.

No testing, exploratory probing, dismantling or operating of equipment or in-depth studies were performed unless specifically required under the *Purpose and Scope* section of this report. This assessment did not include engineering calculations to determine the adequacy of the Property's original design or existing systems. Although walk-through observations were performed, not all areas may have been observed (see Section 1 for specific details). There may be defects in the Property, which were in areas not observed or readily accessible, may not have been visible, or were not disclosed by management personnel when questioned. The report describes property conditions at the time that the observations and research were conducted.

This report has been prepared on behalf of and exclusively for the use of the Client for the purpose stated within the *Purpose and Scope* section of this report. The report, or any excerpt thereof, shall not be used by any party other than the Client or for any other purpose than that specifically stated in our agreement or within the *Purpose and Scope* section of this report without the express written consent of Bureau Veritas.

Any reuse or distribution of this report without such consent shall be at the Client and the recipient's sole risk, without liability to Bureau Veritas.

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15. Appendices

Appendix A: Photographic Record
Appendix B: Site and Floor Plans
Appendix C: Pre-Survey Questionnaire
Appendix D: Accessibility Review & Photos
Appendix E: Component Condition Report
Appendix F: Replacement Reserves
Appendix G: Equipment Inventory List
Appendix H: Lighting System Schedule
Appendix I: Energy Conservation Measures Calculation
Appendix J: Solar Photovoltaic Feasibility Study
Appendix K: Energy Audit Glossary of Terms

Appendix A:
Photographic Record

Appendix B:
Site and Floor Plans

Appendix C:
Pre-Survey Questionnaire

CLIENT DELIVERY, PLEASE INSERT

PRE-SURVEY QUESTIONNAIRE

Appendix D:
Accessibility Review & Photos

CLIENT DELIVERY, PLEASE INSERT
ADA CHECKLISTS/MATRICES AS UPLOADED TO P: DRIVE

Appendix E:
Component Condition Report

CLIENT DELIVERY, PLEASE INSERT

COMPONENT CONDITION REPORT

Appendix F:
Replacement Reserves

CLIENT DELIVERY, PLEASE INSERT
REPLACEMENT RESERVES

Appendix G:
Equipment Inventory List

Appendix H:
Lighting System Schedule

CLIENT DELIVERY, PLEASE INSERT

LIGHTING SYSTEM SCHEDULE

Appendix I:
Energy Conservation Measures Calculation

CLIENT DELIVERY, PLEASE INSERT
ECM WORKSHEETS HERE

Appendix J:
Solar Photovoltaic Feasibility Study

CLIENT DELIVERY, PLEASE INSERT SOLAR APPENDIX

Appendix K:
Energy Audit Glossary of Terms

Glossary of Terms and Acronyms

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR - The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost - The sum of the present values of (a) **I**nvestment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs: (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity - The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity - This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions - Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

15. Appendices

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Appendix A:
Photographic Record

Photographic Overview

1 - FRONT ELEVATION

2 - LEFT ELEVATION

3 - REAR ELEVATION

4 - RIGHT ELEVATION

5 - CLASSROOM

6 - CLASSROOM 2

Photographic Overview

7 - MUSIC ROOM

8 - ART ROOM

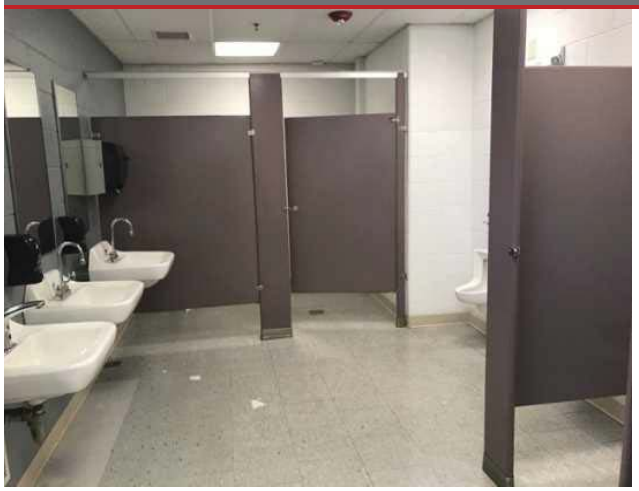
9 - LIBRARY

10 - GYMNASIUM

11 - OFFICE

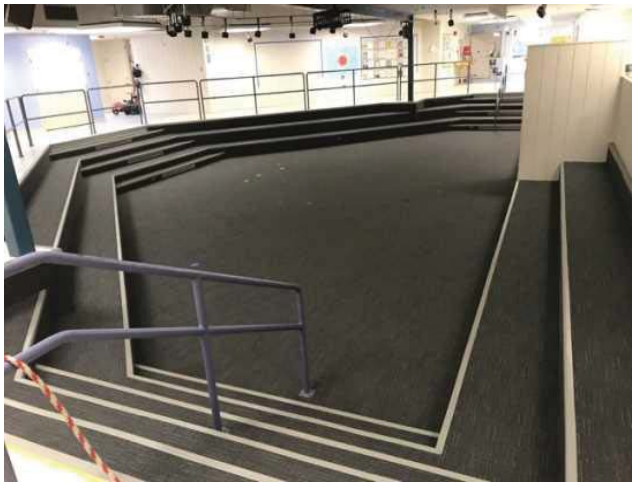
12 - NURSE'S OFFICE

Photographic Overview



13 - RESTROOM

14 - CAFE



15 - MULTI-PURPOSE ROOM

16 - MECHANICAL ROOM

17 - ROOFTOP PACKAGED UNIT

18 - BOILER

Photographic Overview

19 - UNIT HEATER

20 - DISTRIBUTION PUMP

21 - SWITCHBOARD

22 - DISTRIBUTION PANEL

23 - WHEELCHAIR LIFT

24 - WATER HEATER

Photographic Overview

25 - FIRE ALARM PANEL

26 - PARKING LOT

27 - COLONIAL BUILDING

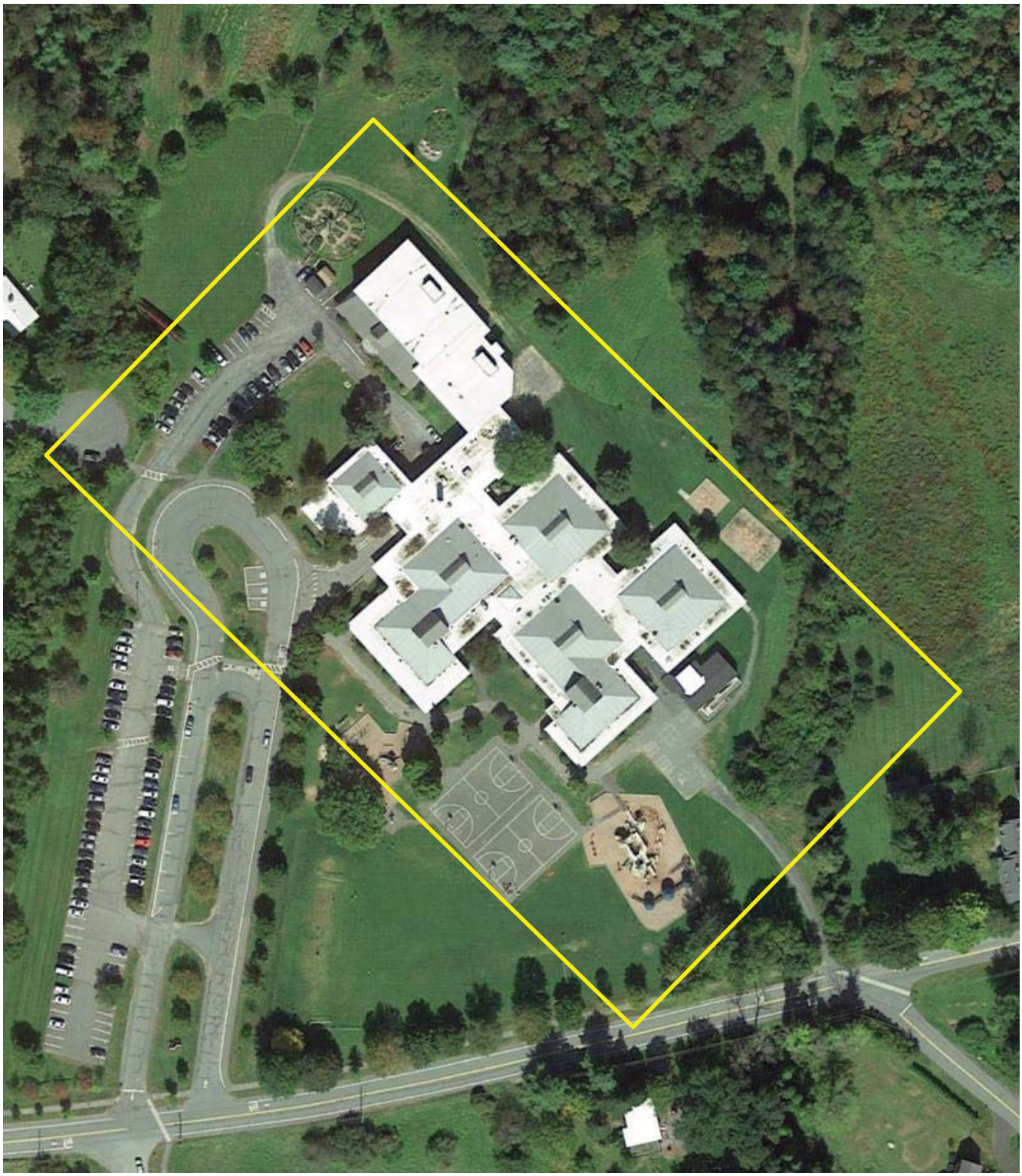
28 - STORAGE SHED

29 - PLAYGROUND

30 - POLE LIGHT

Appendix B:
Site Plan

Site Plan



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School
Source	**On-Site Date**
Google	December 19-20, 2022

BUREAU VERITAS

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Appendix C:
Pre-Survey Questionnaire

Energy & FCA Audit
Pre-Survey Questionnaire

This questionnaire must be completed by the property owner, the owner's designated representative, or someone knowledgeable about the subject property. During the site visit, BV's Field Observer may ask for details associated with selected questions. This questionnaire will be utilized as an exhibit in BV's final report.

Name of Institution:	SAU-70 Hanover School District		
Name of Building:	Bernice A. Ray School	Building #:	1
Name of person completing questionnaire:	Tony Daigle		
Length of Association with the Property:	Six Years	Phone Number:	603-643-3810

Site Information				
Year of Construction?	1930 / 1994 / 2014			
No. of Stories?	Floors 1			
Total Site Area?	Acres 35			
Total Building Area?	Sqft 81,252			
Parking	Open Parking	Enclosed Parking	Partly Enclosed Parking	Is parking Heated?
Parking Area?	22,500 sqft	0 Sqft	0 Sqft	Yes / No
Area Heated (%)	100 %			
Area Cooled (%)	36 % | Cooling Equipment Redundancy? N // N+1 // N+2 // >2N			
Total Conditioned Area (%)	48 %			
Primary Heating System?	Propane Hot Water			
Secondary Heating System?	#2 Oil Hot Water			
If Oil Used for Heating- Tank Capacity	10,000 Gallons	1 No. of Tanks		
Primary Cooling System & Capacity?	RTU's +/- 54 Ton			
Do Any HVAC Systems Use R-11, R-12 or R-22 Refrigerants?	R410A			

	Elec.	Natural Gas	Propane	No.2 Oil	Dist. Steam
Primary Heating Fuel?	☐	☐	☒	☐	☐
Secondary Heating Fuel?	☐	☐	☐	☒	☐
Domestic Water Heater Fuel?	☐	☐	☒	☐	

Building Occupancy/Schedule		
Facility Occupancy (avg. people ea. day)	550	
After Hours Facility Occupancy (avg. people /day)	12	
Standard Staff Work Timing	7:30 AM/PM - 4:00 AM/PM	
Maintenance Staff Hours	6:00 AM/PM - 11:00 AM/PM	
Number of Computers at Site	TBD - Tech Dept.	
Day	Hours open to Public	Hours open to Staff
Monday	7:30 AM/PM - 5:00 AM/PM	7:00 AM/PM - 3:00 AM/PM
Tuesday	: AM/PM - 5:00 AM/PM	: AM/PM - : AM/PM
Wednesday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Thursday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Friday	7:30 AM/PM - 5:00 AM/PM	: AM/PM - : AM/PM
Saturday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Sunday	: AM/PM - : AM/PM	7:00 AM/PM - 8:00 AM/PM
Number of Months the Facility Operates in a Year?	Months	

Energy & FCA Audit
Pre-Survey Questionnaire

Estimated Percentage of Male Staff and Guests	%

Inspections	Date of Last Inspection	List of Any Outstanding Repairs Required
1. Elevators	08/12/2022	Chair Lift
2. HVAC Mechanical, Electric, Plumbing?	09/19/2022	HVAC only
3. Life-Safety/Fire?	08/2022	
4. Roofs?	2018/19	

Key Questions	Response
Major Capital Improvements in Last 3 yrs.	
Planned Capital Expenditure for Next Year?	Main Entrance / Reception Redesign
Age of the Roof?	8 Years
What bldg. Systems Are Responsibilities of Tenants? (HVAC/Roof/Interior/Exterior/Paving)	N/A

Unk = Unknown, NA = Not Applicable	Yes	No	NA	Unk	Comments
1. Are the plumbing fixtures Low Flow *(Below 2.0GPM, .6GPF)*	☒	☐	☐	☐	
2. Are there any vacant buildings or significant building areas?	☐	☒	☐	☐	
3. Do tenants pay for utilities at leased properties?	☐	☒	☐	☐	
4. Does the owner pay for exterior site lighting electricity?	☒	☐	☐	☐	
5. Any Issues with exterior Lighting?	☐	☒	☐	☐	

Preventive Maintenance of Mechanical System		
Systems	**Annual Professional Maintenance**	**Seldom or Never Maintained**
Tenant Space Heating Systems (*Furnace/Boilers/Heat pumps*)	☒	☐
Tenant Space Cooling Systems (*Condensers/Window AC*)	☒	☐
Domestic Water Heaters	☒	☐
Air Quality – Air Handling Unit - Air Filter Rating (MERV):	MERV- 11 and 14	
Air Quality – Annual Frequency of Filter Check	Choose an item. Every 4 Months	

Utility Metering		
	Qty	Comments?
# of Elevators Chair Lift / Dump waiter	2	Hydraulic/Traction
# of Electric Meters	1	
# of Nat. Gas Meters	N/A	
# of Water Meters	1	
# of Backup Generator	N/A	Generator Fuel?
Does facility have 3rd party power Procurement agreement?	Yes	
% of Green energy procured (Electric)		__%
% of Green energy procured (Natural Gas)		__%
Facility generates part of energy through onsite renewable?		

Energy & FCA Audit
Pre-Survey Questionnaire

Facility has onsite battery storage system?	No	
Mechanical system sub-metered (boiler make-up water /humidifier)?	No	
Makeup water for cooling tower metered Separately (if applicable)?	N/A	
Irrigation system metered separately (if applicable)?	N/A	

Building Appliances		
	Value	Additional Comments?
Percentage of Energy Star Certified Refrigerators	%	
Percentage of Refrigerators older than 8 years	25 %	8 Years
Cooking Range Type (Electric/Gas/Propane)	Propane	
Laundry System (Leased/Owned)	owned	
No. of Washers	1	
No. of Dryers	1	

Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any *Yes* responses. (**NA** indicates "*Not Applicable*", **Unk** indicates "*Unknown*")

	QUESTION	Y	N	Unk	NA	COMMENTS
	ZONING, BUILDING DESIGN & LIFE SAFETY ISSUES					
1	Are there any unresolved building, fire, or zoning code issues?		X			
2	Is there any pending litigation concerning the property?		X			
3	Are there any other significant issues/hazards with the property?		X			UST ?
4	Are there any unresolved construction defects at the property?		X			
5	Has any part of the property ever contained visible suspect mold growth?		X			
6	Is there a mold Operations and Maintenance Plan?	X				Plan: Dry, clean, wet areas within 48 hours.
7	Are there any recalled fire sprinkler heads (Star, GEM, Central, and Omega)?		X			
8	Have there been indoor air quality or mold related complaints from tenants?	X				We have had the space inspected and tested. Found no action needed levels of mold.
	GENERAL SITE					
9	Are there any problems with erosion, storm water drainage or areas of paving that do not drain?		X			

Energy & FCA Audit
Pre-Survey Questionnaire

10	Are there any problems with the landscape irrigation systems?				X	
BUILDING STRUCTURE						
11	Are there any problems with foundations or structures?		X			
12	Is there any water infiltration in basements or crawl spaces?		X			
13	Has a termite/wood boring insect inspection been performed within the last year?		X			
BUILDING ENVELOPE						
Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any *Yes* responses. (**NA** indicates "*Not Applicable*", **Unk** indicates *"Unknown"*)						
QUESTION		Y	N	Unk	NA	**COMMENTS**
14	Are there any wall, or window leaks?		X			
15	Are there any roof leaks?	X				There have been leaks. We repair as needed.
16	Is the roofing covered by a warranty or bond?	X				
17	Are there any poorly insulated areas?			X		
18	Is Fire Retardant Treated (FRT) plywood used?			X		
19	Is exterior insulation and finish system (EIFS) or a synthetic stucco finish used?		X			
BUILDING HVAC AND ELECTRICAL						
20	Are there any leaks or pressure problems with natural gas service?				X	
21	Does any part of the electrical system use aluminum wiring?		X			
22	Do Commercial units have less than 200-Amp service?	X				
23	Are there any problems with the utilities, such as inadequate capacities?		X			
ADA						
25	Has the management previously completed an ADA review?	X				Renovation 2014/15

Energy & FCA Audit
Pre-Survey Questionnaire

26	Have any ADA improvements been made to the property?	X				Renovation 2014
27	Does a Barrier Removal Plan exist for the property?		X			
28	Has the Barrier Removal Plan been approved by an arms-length third party?		X			

Mark the column corresponding to the appropriate response. Please provide additional details in the Comments column, or backup documentation for any *Yes* responses. (**NA** indicates *"Not Applicable"*, *Unk* indicates *"Unknown"*)

	QUESTION	Y	N	Unk	NA	COMMENTS
29	Has building ownership or management received any ADA related complaints?		X			
30	Does elevator equipment require upgrades to meet ADA standards?		X			
	PLUMBING					
31	Is the property served by private water well?		X			
32	Is the property served by a private septic system or other waste treatment systems?		X			
33	Is polybutylene piping used?		X			
34	Are there any plumbing leaks or water pressure problems?		X			

Issues or Concerns That BV Should Know About?	
1.	
2.	
3.	

Items Provided to BV Auditors	Yes	No	N/A	Additional Comments?
Access to All Mechanical Spaces	☒	☐	☐	
Access to Roof/Attic Space	☒	☐	☐	
Access to Building As-Built Drawings	☒	☐	☐	
Site plan with bldg., roads, parking and other features	☒	☐	☐	
Access to last 12/24 Months Common Area Utility Data	☒	☐	☐	
Contact Details of Mech, Elevator, Roof, Fire Contractors:	☒	☐	☐	
Previous reports pertaining to the physical condition of property.	☒	☐	☐	
ADA survey and status of improvements implemented.	☐	☐	☒	

Energy & FCA Audit
Pre-Survey Questionnaire

Current / pending litigation related to property condition.			X	
Any brochures or marketing information.	☐	☐	☒	
Appraisal, either current or previously prepared.	☒	☐	☐	Insurance appraisal
Summary of Projects executed in last 5 years	☒	☐	☐	

Tony Ruiz

Signature of person Interviewed or completing form

Date 9/22/2022

Appendix D:
Accessibility Review and Photos

Visual Survey - 2010 ADA Standards for Accessible Design

Property Name: Bernice A. Ray School

BV Project Number: 158531.22R000 - 001.379

Facility History & Interview

	Question	Yes	No	Unk	Comments
1	Has an accessibility study been previously performed? If so, when?	X			2014-2015
2	Have any ADA improvements been made to the property since original construction? Describe.	X			
3	Has building management reported any accessibility-based complaints or litigation?		X		

Bernice A. Ray School: Accessibility Issues

Category	Major Issues (ADA study recommended)	Moderate Issues (ADA study recommended)	Minor Issues	None*
Parking				X
Exterior Accessible Route				X
Building Entrances				X
Interior Accessible Route				X
Elevators				X
Public Restrooms			No pipe wrapping	
Kitchens/Kitchenettes				X
Playgrounds & Swimming Pools				X
Other				X

**be cognizant that if the "None" box is checked that does not guarantee full compliance; this study is limited in nature*

Bernice A. Ray School: Photographic Overview

OVERVIEW OF ACCESSIBLE PARKING AREA

CLOSE-UP OF STALL

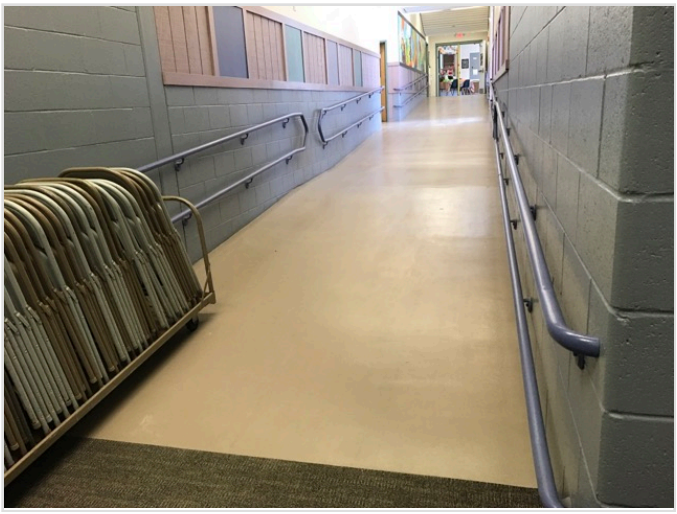
ACCESSIBLE RAMP

CURB CUT

ACCESSIBLE ENTRANCE

DOOR HARDWARE

Bernice A. Ray School: Photographic Overview



ACCESSIBLE INTERIOR RAMP

DOOR HARDWARE

TOILET STALL OVERVIEW

SINK, FAUCET HANDLES AND ACCESSORIES

OVERVIEW OF PLAYGROUND

ACCESSIBLE ROUTE TO PLAYGROUND

Appendix E:
Component Condition Report

UF L3 Code	Location	Condition	Asset/Component/Repair	Quantity	RUL	ID
Structure						
A1010	Building exterior	Poor	Foundation System, Concrete or CMU Walls w/out Footings, Concrete or CMU Walls w/out Footings	100 SF	2	4714434
Facade						
B2010	Building Exterior	Fair	Exterior Walls, Glass Block	20 SF	20	4714368
B2010	Building exterior	Excellent	Exterior Walls, any painted surface, Prep & Paint	23,000 SF	10	4808745
B2020	Building Exterior	Fair	Window, Aluminum Double-Glazed, 16-25 SF	65	15	4714347
B2020	Building Exterior	Fair	Window, Aluminum Double-Glazed, up to 15 SF	18	15	4714455
B2050	Building Exterior	Fair	Exterior Door, Aluminum-Framed & Glazed, Standard Swing	12	15	4714408
B2050	Building Exterior	Fair	Exterior Door, Wood, Solid-Core Decorative High-End w/ Glazing	4	13	4714459
B2050	Building Exterior	Fair	Exterior Door, Steel, Standard	34	20	4714367
Roofing						
B3010	Roof	Fair	Roofing, Single-Ply Membrane, TPO/PVC	50,745 SF	12	4714415
B3010	Roof	Fair	Roofing, Asphalt Shingle, 20-Year Standard	33,500 SF	12	4714349
B3060	Roof	Fair	Roof Skylight, per unit, up to 20 SF	3	15	4714494
Interiors						
C1010	Mechanical room	Poor	Interior Wall, Concrete, Repair	25 SF	0	4714410
C1010	Special Ed Area	Poor	Interior Wall, Gypsum Board/Plaster, Repair	25 SF	0	4714361
C1030	4th grade addition	Fair	Interior Door, Wood, Solid-Core Decorative High-End w/ Glazing	7	20	4714411
C1030	Throughout building	Fair	Interior Door, Wood, Solid-Core	67	20	4714470
C1030	Throughout building	Good	Interior Door, Aluminum-Framed & Glazed, Standard Swing	2	32	4714484
C1070	Throughout building	Fair	Suspended Ceilings, Acoustical Tile (ACT)	65,500 SF	13	4714421
C1070	4th grade addition	Good	Suspended Ceilings, Acoustical Tile (ACT)	3,000 SF	17	4714508
C2010	Throughout building	Fair	Wall Finishes, any surface, Prep & Paint	90,000 SF	5	4714454
C2010	Throughout building	Fair	Wall Finishes, Wood Paneling, Refinish	1,500 SF	5	4714463
C2010	4th grade addition	Good	Wall Finishes, any surface, Prep & Paint	10,000 SF	8	4714496
C2030	Hallways	Fair	Flooring, Vinyl Tile (VCT)	15,000 SF	7	4714483
C2030	Throughout building	Fair	Flooring, Carpet, Commercial Standard	17,316 SF	5	4714371
C2030	Throughout building	Fair	Flooring, Vinyl Tile (VCT)	30,000 SF	4	4807303
C2030	Throughout building	Excellent	Flooring, Carpet, Commercial Standard	4,434 SF	10	4714373
C2030	Gymnasium	Good	Flooring, Maple Sports Floor	7,000 SF	8	4714414
C2030	Classroom Supply Closets	Poor	Flooring, Vinyl Tile (VCT), w/ Asbestos Abatement	1,250 SF	2	4714399
C2030	Restrooms	Fair	Flooring, Ceramic Tile	3,000 SF	20	4714489
C2050	Throughout building	Fair	Ceiling Finishes, Wood Paneling	1,500 SF	12	4714413
Conveying						
D1010	MPR	Fair	Vertical Lift, Wheelchair, 5' Rise, Renovate	1	9	4714460
D1010	Maintenance Shop	Fair	Dumbwaiter, Electric, up to 5 Stories, Renovate	1	8	4714446
Plumbing						
D2010	Throughout building	Fair	Shower, Fiberglass	2	12	4714337

UF L3 Code	Location	Condition	Asset/Component/Repair	Quantity	RUL	ID
D2010	Throughout building	Fair	Sink/Lavatory, Vanity Top, Stainless Steel	34	15	4714398
D2010	Kitchen	Fair	Sink/Lavatory, Commercial Kitchen, 1-Bowl	3	15	4714355
D2010	Utility closet	Fair	Sink/Lavatory, Service Sink, Floor	5	10	4714503
D2010	Kitchen	Fair	Sink/Lavatory, Commercial Kitchen, 3-Bowl	1	15	4714339
D2010	Restrooms	Fair	Toilet, Commercial Water Closet	33	15	4714490
D2010	Kitchen	Fair	Sink/Lavatory, Vanity Top, Stainless Steel	3	15	4714387
D2010	4th grade addition	Good	Toilet, Commercial Water Closet	3	22	4714445
D2010	Mechanical room	Good	Water Heater, Gas, Commercial (200 MBH)	1	17	4714426
D2010	4th grade addition	Good	Sink/Lavatory, Vanity Top, Stainless Steel	3	22	4714341
D2010	Mechanical room	Fair	Backflow Preventer, Domestic Water	1	15	4714379
D2010	Near Gym	Fair	Water Heater, Electric, Residential	1	8	4714404
D2010	Restrooms	Fair	Urinal, Standard	8	15	4714354
D2010	4th grade addition	Good	Urinal, Standard	1	22	4714450
D2010	Throughout building	Fair	Drinking Fountain, Wall-Mounted, Bi-Level	8	8	4714422
D2010	4th grade addition	Good	Sink/Lavatory, Vanity Top, Solid Surface or Vitreous China	4	22	4714424
D2010	Throughout building	Fair	Plumbing System, Supply & Sanitary, High Density (excludes fixtures)	81,252 SF	10	4714427
D2010	Restrooms	Fair	Sink/Lavatory, Vanity Top, Enameled Steel	33	15	4714442
D2020	Maintenance Shop	Fair	Supplemental Components, Grease Trap/Interceptor, Undercounter	1	10	4714343
HVAC						
D3020	Throughout building	Fair	Radiator, Hydronic, Baseboard (per LF)	50 LF	15	4714471
D3020	Maintenance Shop	Fair	Unit Heater, Hydronic	1	10	4714488
D3020	Mechanical room	Good	Boiler, Gas, HVAC, 1000 MBH	1	22	4714456
D3020	Gymnasium	Fair	Unit Heater, Hydronic	1	10	4714491
D3020	Maintenance Shop	Fair	Unit Heater, Hydronic	1	10	4714482
D3020	Mechanical room	Good	Boiler Supplemental Components, Expansion Tank	1	32	4714439
D3020	Mechanical room	Good	Boiler Supplemental Components, Expansion Tank	1	32	4714353
D3020	Throughout building	Fair	Radiator, Hydronic, Baseboard (per LF)	100 LF	5	4714436
D3020	Mechanical room	Fair	Boiler, Dual Fuel, HVAC, 2670 MBH	1	22	4714480
D3020	Mechanical room	Fair	Boiler, Gas, HVAC, 500 MBH	1	22	4714385
D3020	Ramp	Fair	Cabinet Heater, Electric, 3 to 4 LF	1	17	4807637
D3030	Classrooms	Fair	Unit Ventilator, approx/nominal 2 Ton	16	15	4714479
D3030	Office	Fair	Air Conditioner, Window/Thru-Wall	1	5	4714495
D3030	Server Room	Fair	Split System Ductless, Single Zone	1	7	4714348
D3030	3rd Grade Common	Fair	Unit Ventilator, approx/nominal 2 Ton, 300 to 750 CFM	1	12	4807636
D3050	5th Grade Pod / E Wing	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH	1	12	4807629
D3050	Mechanical room	Fair	Pump, Distribution, HVAC Heating Water	1	16	4714468
D3050	Mechanical room	Fair	Pump, Distribution, HVAC Heating Water	1	16	4714358
D3050	Multi Purpose Room Partial 3rd Grade Pod / F Wing	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	1	12	4807628
D3050	Music Room	Fair	Air Handler, Exterior AHU, 15001 to 20000 CFM	1	12	4807631

UF L3 Code	Location	Condition	Asset/Component/Repair	Quantity	RUL	ID
D3050	Administration / B Wing	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	1	12	4807304
D3050	Throughout building	Fair	HVAC System, Hydronic Piping, 2-Pipe	81,252 SF	10	4714447
D3050	K-1, Life Skills Library / D Wing	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH	1	12	4807305
D3050	Cafe	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, Cooling Only	1	12	4807633
D3050	Art Room	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, 100 MBH	1	12	4807630
D3050	2nd Grade Pod / C Wing	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	1	12	4807627
D3050	Kitchen	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, 100 MBH	1	12	4807634
D3050	Computer Lab	Fair	Packaged Unit, RTU, Pad or Roof-Mounted, 6 to 7.5 TON, Electric Heat	1	12	4807635
D3050	Throughout building	Fair	HVAC System, Ductwork, High Density	81,252 SF	15	4714458
D3050	Gym	Fair	Air Handler, Exterior AHU, 15001 to 20000 CFM	1	12	4807632
Fire Protection						
D4010	Kitchen	Fair	Fire Suppression System, Commercial Kitchen, per LF of Hood	8 LF	10	4714417
D4010	Throughout building	Fair	Fire Suppression System, Existing Sprinkler Heads, by SF	81,252 SF	13	4714438
D4030	Throughout building	Fair	Fire Extinguisher, Wet Chemical/CO2	10	5	4714363
Electrical						
D5020	Throughout building	Fair	Electrical System, Full System Renovation/Upgrade, High Density/Complexity	81,252 SF	10	4714392
D5020	Electrical room	Good	Switchboard, 120/208 V	1	32	4714462
D5040	Throughout building	Fair	Interior Lighting System, Full Upgrade, High Density & Standard Fixtures	81,252 SF	12	4714429
D5040	Building exterior	Fair	Standard Fixture w/ Lamp, any type, w/ LED Replacement	8	12	4714346
D5040	Building exterior	Fair	Standard Fixture w/ Lamp, any type, w/ LED Replacement	12	12	4714509
Fire Alarm & Electronic Systems						
D7030	Throughout building	Fair	Security/Surveillance System, Full System Installation, High Density, Install	81,252 SF	8	4714501
D7050	Office	Fair	Fire Alarm Panel, Fully Addressable	1	8	4714487
D7050	Throughout building	Fair	Fire Alarm System, Full System Upgrade, Standard Addressable, Upgrade/Install	81,252 SF	10	4714344
Equipment & Furnishings						
E1030	Kitchen	Fair	Foodservice Equipment, Range/Oven, 6-Burner	1	8	4714390
E1030	Kitchen	Fair	Foodservice Equipment, Convection Oven, Single	1	5	4714350
E1030	Kitchen	Fair	Foodservice Equipment, Freezer, 2-Door Reach-In	1	8	4714469
E1030	Art Room	Fair	Foodservice Equipment, Exhaust Hood, 8 to 10 LF	1	8	4714441
E1030	Kitchen	Fair	Foodservice Equipment, Freezer, Chest	1	5	4714352
E1030	Kitchen	Fair	Foodservice Equipment, Coffee Machine	1	5	4714376
E1030	Kitchen	Fair	Foodservice Equipment, Freezer, 3-Door Reach-In	1	8	4714500
E1030	Kitchen	Fair	Foodservice Equipment, Refrigerator, 3-Door Reach-In	1	8	4714431
E1030	Kitchen	Fair	Foodservice Equipment, Heat Lamps, Food Warming Fixture	1	5	4714364
E1030	Kitchen	Fair	Foodservice Equipment, Freezer, Chest	1	5	4714409
E1030	Kitchen	Fair	Foodservice Equipment, Refrigerator, 2-Door Reach-In	1	8	4714384
E1030	Kitchen	Fair	Foodservice Equipment, Prep Table Refrigerated, Salad/Sandwich	1	5	4714428
E1030	Kitchen	Fair	Foodservice Equipment, Dishwasher Commercial	1	5	4714382
E1030	Kitchen	Fair	Foodservice Equipment, Exhaust Hood, 8 to 10 LF	1	8	4714418

UF L3 Code	Location	Condition	Asset/Component/Repair	Quantity	RUL	ID
E1030	Kitchen	Fair	Foodservice Equipment, Food Warmer, Proofing Cabinet on Wheels	1	8	4714369
E1030	Kitchen	Fair	Foodservice Equipment, Convection Oven, Single	1	5	4714449
E1030	Kitchen	Fair	Foodservice Equipment, Griddle	1	8	4714381
E1030	Kitchen	Fair	Foodservice Equipment, Refrigerator, 2-Door Reach-In	1	8	4714492
E1040	Throughout building	Fair	Healthcare Equipment, Defibrillator (AED), Cabinet-Mounted	2	5	4714386
E2010	Site	Fair	Bleachers, Fixed Steel Frame, Aluminum Benches (per Seat)	60	13	4714443
E2010	Throughout building	Fair	Casework, Cabinetry, Hardwood Standard	320 LF	6	4714351
E2010	4th grade addition	Good	Casework, Cabinetry, Hardwood Standard	40 LF	12	4714423
Special Construction & Demo						
F1020	Site	Fair	Ancillary Building, Wood-Framed or CMU, Standard	700 SF	10	4714444
F1020	Site	Fair	Ancillary Building, Wood-Framed or CMU, Basic/Minimal	50 SF	13	4714464
F1020	Site	Fair	Ancillary Building, Wood-Framed or CMU, Basic/Minimal	375 SF	18	4714481
Pedestrian Plazas & Walkways						
G2020	Site	Fair	Parking Lots, Pavement, Asphalt, Mill & Overlay	80,000 SF	18	4714433
Athletic, Recreational & Playfield Areas						
G2050	Site	Fair	Play Structure, Multipurpose, Large	1	10	4714474
G2050	Site	Fair	Play Structure, Multipurpose, Medium	1	10	4714388
G2050	Site	Fair	Playfield Surfaces, Chips Wood, 3" Depth	16,000 SF	2	4714394
G2050	Site	Fair	Play Structure, Multipurpose, Small	1	10	4714336
G2050	Gymnasium	Fair	Sports Apparatus, Basketball, Backboard/Rim/Pole	6	13	4714338
G2050	Site	Poor	Athletic Surfaces & Courts, Basketball/General, Asphalt Pavement, Seal & Stripe	300 SF	2	4714357
G2050	Site	Fair	Play Structure, Swing Set, 4 Seats	2	10	4714362
G2050	Site	Fair	Sports Apparatus, Basketball, Backboard/Rim/Pole	4	13	4714389
Sitework						
G2060	Site	Fair	Picnic Table, Wood/Composite/Fiberglass	7	10	4714405
G2060	Site	Fair	Picnic Table, Metal Powder-Coated	3	10	4714502
G2060	Site	Fair	Park Bench, Wood/Composite/Fiberglass	20	10	4714430
G2060	Site	Fair	Bike Rack, Fixed 6-10 Bikes	2	10	4714498
G4050	Site	Fair	Pole Light Fixture w/ Lamps, any type 20' High, w/ LED Replacement, Replace/Install	18	10	4714507
Utilities						
G3060	Site	Fair	Storage Tank, Site Fuel, Underground, Replace/Install	5	18	4714391
G3060	Site	Fair	Storage Tank, Site Fuel, Underground, Replace/Install	1	8	4714375
Other (H0001)						
H0000				0	0	4714340

Appendix F:
Replacement Reserves

Replacement Reserves Report

Bernice A. Ray School

1/27/2023

Location	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Total Escalated Estimate
Bernice A. Ray School	$838	$0	$30,273	$0	$168,826	$411,392	$114,629	$96,711	$798,772	$22,181	$5,925,401	$22,148	$2,616,785	$631,161	$24,201	$1,820,067	$21,824	$93,774	$753,327	$263,026	$476,010	**$14,291,345**
Grand Total	**$838**	**$0**	**$30,273**	**$0**	**$168,826**	**$411,392**	**$114,629**	**$96,711**	**$798,772**	**$22,181**	**$5,925,401**	**$22,148**	**$2,616,785**	**$631,161**	**$24,201**	**$1,820,067**	**$21,824**	**$93,774**	**$753,327**	**$263,026**	**$476,010**	**$14,291,345**

Uniformat Code	Location Description	ID	Cost Description	Lifespan (EUL)	EAge	RUL	Quantity	Unit	Unit Cost *	Subtotal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Deficiency Repair Estimate
A1010	Building exterior	4714434	Foundation System, Concrete or CMU Walls w/out Footings, Concrete or CMU Walls w/out Footings	75	73	2	100	SF	$24.00	$2,400			$2,400																			**$2,400**
B2010	Building exterior	4808745	Exterior Walls, any painted surface, Prep & Paint	10	0	10	23000	SF	$3.00	$69,000											$69,000										$69,000	**$138,000**
B2010	Building Exterior	4714368	Exterior Walls, Glass Block, Replace	40	20	20	20	SF	$50.00	$1,000																					$1,000	**$1,000**
B2020	Building Exterior	4714347	Window, Aluminum Double-Glazed, 16-25 SF, Replace	30	15	15	65	EA	$950.00	$61,750																$61,750						**$61,750**
B2020	Building Exterior	4714455	Window, Aluminum Double-Glazed, up to 15 SF, Replace	30	15	15	18	EA	$650.00	$11,700																$11,700						**$11,700**
B2050	Building Exterior	4714459	Exterior Door, Wood, Solid-Core Decorative High-End w/ Glazing, Replace	25	12	13	4	EA	$2,100.00	$8,400														$8,400								**$8,400**
B2050	Building Exterior	4714408	Exterior Door, Aluminum-Framed & Glazed, Standard Swing, Replace	30	15	15	12	EA	$1,300.00	$15,600																$15,600						**$15,600**
B2050	Building Exterior	4714367	Exterior Door, Steel, Standard, Replace	40	20	20	34	EA	$600.00	$20,400																					$20,400	**$20,400**
B3010	Roof	4714349	Roofing, Asphalt Shingle, 20-Year Standard, Replace	20	8	12	33500	SF	$3.80	$127,300													$127,300									**$127,300**
B3010	Roof	4714415	Roofing, Single-Ply Membrane, TPO/PVC, Replace	20	8	12	50745	SF	$17.00	$862,665													$862,665									**$862,665**
B3060	Roof	4714494	Roof Skylight, per unit, up to 20 SF, Replace	30	15	15	3	EA	$1,300.00	$3,900																$3,900						**$3,900**
C1010	Mechanical room	4714410	Interior Wall, Concrete, Repair	0	0	0	25	SF	$30.00	$750	$750																					**$750**
C1010	Special Ed Area	4714361	Interior Wall, Gypsum Board/Plaster, Repair	0	0	0	25	SF	$3.50	$88	$88																					**$88**
C1030	4th grade addition	4714411	Interior Door, Wood, Solid-Core Decorative High-End w/ Glazing, Replace	40	20	20	7	EA	$2,100.00	$14,700																					$14,700	**$14,700**
C1030	Throughout building	4714470	Interior Door, Wood, Solid-Core, Replace	40	20	20	67	EA	$700.00	$46,900																					$46,900	**$46,900**
C1070	Throughout building	4714421	Suspended Ceilings, Acoustical Tile (ACT), Replace	25	12	13	65500	SF	$3.50	$229,250														$229,250								**$229,250**
C1070	4th grade addition	4714508	Suspended Ceilings, Acoustical Tile (ACT), Replace	25	8	17	3000	SF	$3.50	$10,500																		$10,500				**$10,500**
C2010	Throughout building	4714463	Wall Finishes, Wood Paneling, Refinish	10	5	5	1500	SF	$4.00	$6,000						$6,000										$6,000						**$12,000**
C2010	Throughout building	4714454	Wall Finishes, any surface, Prep & Paint	10	5	5	90000	SF	$1.50	$135,000						$135,000										$135,000						**$270,000**
C2010	4th grade addition	4714496	Wall Finishes, any surface, Prep & Paint	10	2	8	10000	SF	$1.50	$15,000									$15,000										$15,000			**$30,000**
C2030	Restrooms	4714489	Flooring, Ceramic Tile, Replace	40	20	20	3000	SF	$18.00	$54,000																					$54,000	**$54,000**
C2030	Classroom Supply Closets	4714399	Flooring, Vinyl Tile (VCT), w/ Asbestos Abatement, Replace	15	13	2	1250	SF	$8.00	$10,000			$10,000															$10,000				**$20,000**
C2030	Throughout building	4807303	Flooring, Vinyl Tile (VCT), Replace	15	11	4	30000	SF	$5.00	$150,000					$150,000															$150,000		**$300,000**
C2030	Hallways	4714483	Flooring, Vinyl Tile (VCT), Replace	15	8	7	15000	SF	$5.00	$75,000								$75,000														**$75,000**
C2030	Throughout building	4714371	Flooring, Carpet, Commercial Standard, Replace	10	5	5	17316	SF	$7.50	$129,870						$129,870										$129,870						**$259,740**
C2030	Throughout building	4714373	Flooring, Carpet, Commercial Standard, Replace	10	0	10	4434	SF	$7.50	$33,255											$33,255										$33,255	**$66,510**
C2030	Gymnasium	4714414	Flooring, Maple Sports Floor, Replace	30	22	8	7000	SF	$17.00	$119,000									$119,000													**$119,000**
C2050	Throughout building	4714413	Ceiling Finishes, Wood Paneling, Replace	30	18	12	1500	SF	$14.00	$21,000													$21,000									**$21,000**
D1010	MPR	4714460	Vertical Lift, Wheelchair, 5' Rise, Renovate	25	16	9	1	EA	$17,000.00	$17,000										$17,000												**$17,000**
D1010	Maintenance Shop	4714446	Dumbwaiter, Electric, up to 5 Stories, Renovate	25	17	8	1	EA	$16,700.00	$16,700									$16,700													**$16,700**
D2010	Near Gym	4714404	Water Heater, Electric, Residential, Replace	15	7	8	1	EA	$650.00	$650									$650													**$650**
D2010	Mechanical room	4714426	Water Heater, Gas, Commercial (200 MBH), Replace	20	3	17	1	EA	$16,600.00	$16,600																		$16,600				**$16,600**
D2010	Throughout building	4714427	Plumbing System, Supply & Sanitary, High Density (excludes fixtures), Replace	40	30	10	81252	SF	$14.00	$1,137,528											$1,137,528											**$1,137,528**
D2010	Mechanical room	4714379	Backflow Preventer, Domestic Water, Replace	30	15	15	1	EA	$6,600.00	$6,600																$6,600						**$6,600**
D2010	Throughout building	4714422	Drinking Fountain, Wall-Mounted, Bi-Level, Replace	15	7	8	8	EA	$1,500.00	$12,000									$12,000													**$12,000**
D2010	Utility closet	4714503	Sink/Lavatory, Service Sink, Floor, Replace	35	25	10	5	EA	$800.00	$4,000											$4,000											**$4,000**
D2010	Throughout building	4714337	Shower, Fiberglass, Replace	20	8	12	2	EA	$1,600.00	$3,200													$3,200									**$3,200**
D2010	Throughout building	4714398	Sink/Lavatory, Vanity Top, Stainless Steel, Replace	30	15	15	34	EA	$1,200.00	$40,800																$40,800						**$40,800**
D2010	Kitchen	4714355	Sink/Lavatory, Commercial Kitchen, 1-Bowl, Replace	30	15	15	3	EA	$1,600.00	$4,800																$4,800						**$4,800**
D2010	Kitchen	4714339	Sink/Lavatory, Commercial Kitchen, 3-Bowl, Replace	30	15	15	1	EA	$2,500.00	$2,500																$2,500						**$2,500**
D2010	Restrooms	4714490	Toilet, Commercial Water Closet, Replace	30	15	15	33	EA	$1,300.00	$42,900																$42,900						**$42,900**
D2010	Kitchen	4714387	Sink/Lavatory, Vanity Top, Stainless Steel, Replace	30	15	15	3	EA	$1,200.00	$3,600																$3,600						**$3,600**
D2010	Restrooms	4714354	Urinal, Standard, Replace	30	15	15	8	EA	$1,100.00	$8,800																$8,800						**$8,800**
D2010	Restrooms	4714442	Sink/Lavatory, Vanity Top, Enameled Steel, Replace	30	15	15	33	EA	$1,100.00	$36,300																$36,300						**$36,300**
D2020	Maintenance Shop	4714343	Supplemental Components, Grease Trap/Interceptor, Undercounter, Replace	20	10	10	1	EA	$1,800.00	$1,800											$1,800											**$1,800**
D3020	Throughout building	4714436	Radiator, Hydronic, Baseboard (per LF), Replace	30	25	5	100	LF	$150.00	$15,000						$15,000																**$15,000**
D3020	Maintenance Shop	4714488	Unit Heater, Hydronic, Replace	20	10	10	1	EA	$1,100.00	$1,100											$1,100											**$1,100**
D3020	Gymnasium	4714491	Unit Heater, Hydronic, Replace	20	10	10	1	EA	$1,100.00	$1,100											$1,100											**$1,100**
D3020	Maintenance Shop	4714482	Unit Heater, Hydronic, Replace	20	10	10	1	EA	$1,100.00	$1,100											$1,100											**$1,100**
D3020	Throughout building	4714471	Radiator, Hydronic, Baseboard (per LF), Replace	30	15	15	50	LF	$150.00	$7,500																$7,500						**$7,500**
D3020	Ramp	4807637	Cabinet Heater, Electric, 3 to 4 LF, Replace	25	8	17	1	EA	$3,500.00	$3,500																		$3,500				**$3,500**
D3030	Office	4714495	Air Conditioner, Window/Thru-Wall, Replace	10	5	5	1	EA	$2,200.00	$2,200						$2,200										$2,200						**$4,400**
D3030	Server Room	4714348	Split System Ductless, Single Zone, Replace	15	8	7	1	EA	$3,500.00	$3,500								$3,500														**$3,500**
D3030	3rd Grade Common	4807636	Unit Ventilator, approx/nominal 2 Ton, 300 to 750 CFM, Replace	20	8	12	1	EA	$7,400.00	$7,400													$7,400									**$7,400**

Replacement Reserves Report

Bernice A. Ray School

1/27/2023

Uniformat Code	Location Description	ID	Cost Description	Lifespan (EUL)	Age	RUL	Quantity	Unit	Unit Cost *	Subtotal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Deficiency Repair Estimate
D3030	Classrooms	4714479	Unit Ventilator, approx/nominal 2 Ton, Replace	20	5	15	16	EA	$7,400.00	$118,400																$118,400						**$118,400**
D3050	Throughout building	4714447	HVAC System, Hydronic Piping, 2-Pipe, Replace	40	30	10	81252	SF	$5.00	$406,260											$406,260											**$406,260**
D3050	Mechanical room	4714468	Pump, Distribution, HVAC Heating Water, Replace	25	9	16	1	EA	$6,800.00	$6,800																	$6,800					**$6,800**
D3050	Mechanical room	4714358	Pump, Distribution, HVAC Heating Water, Replace	25	9	16	1	EA	$6,800.00	$6,800																	$6,800					**$6,800**
D3050	5th Grade Pod / E Wing	4807629	Packaged Unit, RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH, Replace	20	8	12	1	EA	$40,000.00	$40,000													$40,000									**$40,000**
D3050	Multi Purpose Room Partial 3rd Grade Pod / F Wing	4807628	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH, Replace	20	8	12	1	EA	$25,000.00	$25,000													$25,000									**$25,000**
D3050	Music Room	4807631	Air Handler, Exterior AHU, 15001 to 20000 CFM, Replace	20	8	12	1	EA	$97,000.00	$97,000													$97,000									**$97,000**
D3050	Administration / B Wing	4807304	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH, Replace	20	8	12	1	EA	$25,000.00	$25,000													$25,000									**$25,000**
D3050	K-1, Life Skills Library / D Wing	4807305	Packaged Unit, RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH, Replace	20	8	12	1	EA	$40,000.00	$40,000													$40,000									**$40,000**
D3050	Cafe	4807633	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, Cooling Only, Replace	20	8	12	1	EA	$9,000.00	$9,000													$9,000									**$9,000**
D3050	Art Room	4807630	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, 100 MBH, Replace	20	8	12	1	EA	$9,000.00	$9,000													$9,000									**$9,000**
D3050	2nd Grade Pod / C Wing	4807627	Packaged Unit, RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH, Replace	20	8	12	1	EA	$25,000.00	$25,000													$25,000									**$25,000**
D3050	Kitchen	4807634	Packaged Unit, RTU, Pad or Roof-Mounted, 4 TON, 100 MBH, Replace	20	8	12	1	EA	$9,000.00	$9,000													$9,000									**$9,000**
D3050	Computer Lab	4807635	Packaged Unit, RTU, Pad or Roof-Mounted, 6 to 7.5 TON, Electric Heat, Replace	20	8	12	1	EA	$15,000.00	$15,000													$15,000									**$15,000**
D3050	Gym	4807632	Air Handler, Exterior AHU, 15001 to 20000 CFM, Replace	20	8	12	1	EA	$97,000.00	$97,000													$97,000									**$97,000**
D3050	Throughout building	4714458	HVAC System, Ductwork, High Density, Replace	30	15	15	81252	SF	$6.00	$487,512																$487,512						**$487,512**
D4010	Throughout building	4714438	Fire Suppression System, Existing Sprinkler Heads, by SF, Replace	25	12	13	81252	SF	$1.07	$86,940														$86,940								**$86,940**
D4010	Kitchen	4714417	Fire Suppression System, Commercial Kitchen, per LF of Hood, Replace	20	10	10	8	LF	$400.00	$3,200											$3,200											**$3,200**
D4030	Throughout building	4714363	Fire Extinguisher, Wet Chemical/CO2, Replace	10	5	5	10	EA	$300.00	$3,000						$3,000										$3,000						**$6,000**
D5020	Throughout building	4714392	Electrical System, Full System Renovation/Upgrade, High Density/Complexity, Replace	40	30	10	81252	SF	$28.00	$2,275,056											$2,275,056											**$2,275,056**
D5040	Throughout building	4714429	Interior Lighting System, Full Upgrade, High Density & Standard Fixtures, Replace	20	8	12	81252	SF	$5.00	$406,260													$406,260									**$406,260**
D5040	Building exterior	4714346	Standard Fixture w/ Lamp, any type, w/ LED Replacement, Replace	20	8	12	8	EA	$220.00	$1,760													$1,760									**$1,760**
D5040	Building exterior	4714509	Standard Fixture w/ Lamp, any type, w/ LED Replacement, Replace	20	8	12	12	EA	$220.00	$2,640													$2,640									**$2,640**
D7030	Throughout building	4714501	Security/Surveillance System, Full System Installation, High Density, Install	15	7	8	81252	SF	$4.00	$325,008									$325,008													**$325,008**
D7050	Office	4714487	Fire Alarm Panel, Fully Addressable, Replace	15	7	8	1	EA	$15,000.00	$15,000									$15,000													**$15,000**
D7050	Throughout building	4714344	Fire Alarm System, Full System Upgrade, Standard Addressable, Upgrade/Install	20	10	10	81252	SF	$3.00	$243,756											$243,756											**$243,756**
E1030	Kitchen	4714350	Foodservice Equipment, Convection Oven, Single, Replace	10	5	5	1	EA	$5,600.00	$5,600						$5,600										$5,600						**$11,200**
E1030	Kitchen	4714352	Foodservice Equipment, Freezer, Chest, Replace	15	10	5	1	EA	$1,800.00	$1,800						$1,800														$1,800		**$3,600**
E1030	Kitchen	4714376	Foodservice Equipment, Coffee Machine, Replace	10	5	5	1	EA	$2,000.00	$2,000						$2,000										$2,000						**$4,000**
E1030	Kitchen	4714364	Foodservice Equipment, Heat Lamps, Food Warming Fixture, Replace	10	5	5	1	EA	$1,800.00	$1,800						$1,800										$1,800						**$3,600**
E1030	Kitchen	4714409	Foodservice Equipment, Freezer, Chest, Replace	15	10	5	1	EA	$1,800.00	$1,800						$1,800														$1,800		**$3,600**
E1030	Kitchen	4714428	Foodservice Equipment, Prep Table Refrigerated, Salad/Sandwich, Replace	15	10	5	1	EA	$4,700.00	$4,700						$4,700														$4,700		**$9,400**
E1030	Kitchen	4714382	Foodservice Equipment, Dishwasher Commercial, Replace	10	5	5	1	EA	$21,500.00	$21,500						$21,500										$21,500						**$43,000**
E1030	Kitchen	4714449	Foodservice Equipment, Convection Oven, Single, Replace	10	5	5	1	EA	$5,600.00	$5,600						$5,600										$5,600						**$11,200**
E1030	Kitchen	4714390	Foodservice Equipment, Range/Oven, 6-Burner, Replace	15	7	8	1	EA	$6,000.00	$6,000									$6,000													**$6,000**
E1030	Kitchen	4714469	Foodservice Equipment, Freezer, 2-Door Reach-In, Replace	15	7	8	1	EA	$5,100.00	$5,100									$5,100													**$5,100**
E1030	Art Room	4714441	Foodservice Equipment, Exhaust Hood, 8 to 10 LF, Replace	15	7	8	1	EA	$4,500.00	$4,500									$4,500													**$4,500**
E1030	Kitchen	4714500	Foodservice Equipment, Freezer, 3-Door Reach-In, Replace	15	7	8	1	EA	$6,800.00	$6,800									$6,800													**$6,800**
E1030	Kitchen	4714431	Foodservice Equipment, Refrigerator, 3-Door Reach-In, Replace	15	7	8	1	EA	$6,400.00	$6,400									$6,400													**$6,400**
E1030	Kitchen	4714384	Foodservice Equipment, Refrigerator, 2-Door Reach-In, Replace	15	7	8	1	EA	$4,600.00	$4,600									$4,600													**$4,600**
E1030	Kitchen	4714418	Foodservice Equipment, Exhaust Hood, 8 to 10 LF, Replace	15	7	8	1	EA	$4,500.00	$4,500									$4,500													**$4,500**
E1030	Kitchen	4714369	Foodservice Equipment, Food Warmer, Proofing Cabinet on Wheels, Replace	15	7	8	1	EA	$1,700.00	$1,700									$1,700													**$1,700**
E1030	Kitchen	4714381	Foodservice Equipment, Griddle, Replace	15	7	8	1	EA	$7,000.00	$7,000									$7,000													**$7,000**
E1030	Kitchen	4714492	Foodservice Equipment, Refrigerator, 2-Door Reach-In, Replace	15	7	8	1	EA	$4,600.00	$4,600									$4,600													**$4,600**
E1040	Throughout building	4714386	Healthcare Equipment, Defibrillator (AED), Cabinet-Mounted, Replace	10	5	5	2	EA	$1,500.00	$3,000						$3,000										$3,000						**$6,000**
E2010	Throughout building	4714351	Casework, Cabinetry, Hardwood Standard, Replace	20	14	6	320	LF	$300.00	$96,000							$96,000															**$96,000**
E2010	4th grade addition	4714423	Casework, Cabinetry, Hardwood Standard, Replace	20	8	12	40	LF	$300.00	$12,000													$12,000									**$12,000**
E2010	Site	4714443	Bleachers, Fixed Steel Frame, Aluminum Benches (per Seat), Replace	25	12	13	60	EA	$120.00	$7,200														$7,200								**$7,200**
F1020	Site	4714444	Ancillary Building, Wood-Framed or CMU, Standard, Replace	35	25	10	700	SF	$100.00	$70,000											$70,000											**$70,000**
F1020	Site	4714464	Ancillary Building, Wood-Framed or CMU, Basic/Minimal, Replace	35	22	13	50	SF	$60.00	$3,000														$3,000								**$3,000**
F1020	Site	4714481	Ancillary Building, Wood-Framed or CMU, Basic/Minimal, Replace	35	17	18	375	SF	$60.00	$22,500																			$22,500			**$22,500**
G2020	Site	4714433	Parking Lots, Pavement, Asphalt, Mill & Overlay	25	7	18	80000	SF	$3.50	$280,000																			$280,000			**$280,000**
G2050	Site	4714357	Athletic Surfaces & Courts, Basketball/General, Asphalt Pavement, Seal & Stripe	5	3	2	300	SF	$0.45	$135			$135					$135						$135									**$540**
G2050	Gymnasium	4714338	Sports Apparatus, Basketball, Backboard/Rim/Pole, Replace	25	12	13	6	EA	$9,500.00	$57,000														$57,000								**$57,000**
G2050	Site	4714389	Sports Apparatus, Basketball, Backboard/Rim/Pole, Replace	25	12	13	4	EA	$9,500.00	$38,000														$38,000								**$38,000**
G2050	Site	4714394	Playfield Surfaces, Chips Wood, 3" Depth, Replace	3	1	2	16000	SF	$1.00	$16,000			$16,000			$16,000			$16,000			$16,000			$16,000		$16,000				$16,000		**$112,000**
G2050	Site	4714474	Play Structure, Multipurpose, Large, Replace	20	10	10	1	EA	$35,000.00	$35,000											$35,000											**$35,000**
G2050	Site	4714388	Play Structure, Multipurpose, Medium, Replace	20	10	10	1	EA	$20,000.00	$20,000											$20,000											**$20,000**
G2050	Site	4714336	Play Structure, Multipurpose, Small, Replace	20	10	10	1	EA	$10,000.00	$10,000											$10,000											**$10,000**

Replacement Reserves Report

Bernice A. Ray School

1/27/2023

Uniformat Code	Location Description	ID	Cost Description	Lifespan (EUL)	Age	RUL	Quantity	Unit	Unit Cost *	Subtotal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	Deficiency Repair Estimate
G2050	Site	4714362	Play Structure, Swing Set, 4 Seats, Replace	20	10	10	2	EA	$2,500.00	$5,000											$5,000											**$5,000**
G2060	Site	4714405	Picnic Table, Wood/Composite/Fiberglass, Replace	20	10	10	7	EA	$600.00	$4,200											$4,200											**$4,200**
G2060	Site	4714502	Picnic Table, Metal Powder-Coated, Replace	20	10	10	3	EA	$700.00	$2,100											$2,100											**$2,100**
G2060	Site	4714430	Park Bench, Wood/Composite/Fiberglass, Replace	20	10	10	20	EA	$600.00	$12,000											$12,000											**$12,000**
G2060	Site	4714498	Bike Rack, Fixed 6-10 Bikes, Replace	20	10	10	2	EA	$800.00	$1,600											$1,600											**$1,600**
G3060	Site	4714375	Storage Tank, Site Fuel, Underground, Replace/Install	25	17	8	1	EA	$60,000.00	$60,000									$60,000													**$60,000**
G3060	Site	4714391	Storage Tank, Site Fuel, Underground, Replace/Install	25	7	18	5	EA	$25,000.00	$125,000																			$125,000			**$125,000**
G4050	Site	4714507	Pole Light Fixture w/ Lamps, any type 20' High, w/ LED Replacement, Replace/Install	20	10	10	18	EA	$4,000.00	$72,000											$72,000											**$72,000**
Totals, Unescalated											**$838**	**$0**	**$28,535**	**$0**	**$150,000**	**$354,870**	**$96,000**	**$78,635**	**$630,558**	**$17,000**	**$4,409,055**	**$16,000**	**$1,835,360**	**$429,790**	**$16,000**	**$1,168,232**	**$13,600**	**$56,735**	**$442,500**	**$150,000**	**$263,555**	**$10,157,262**
Totals, Escalated (3.0% inflation, compounded annually)											**$838**	**$0**	**$30,273**	**$0**	**$168,826**	**$411,392**	**$114,629**	**$96,711**	**$798,772**	**$22,181**	**$5,925,401**	**$22,148**	**$2,616,785**	**$631,161**	**$24,201**	**$1,820,067**	**$21,824**	**$93,774**	**$753,327**	**$263,026**	**$476,010**	**$14,291,345**

Appendix G:
Equipment Inventory List

D10 Conveying

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714460	D1010	**Vertical Lift**	Wheelchair, 5' Rise		Renovate	Bernice A. Ray School	MPR	Concord	No tag/plate found	241225-2P	2007			$17,000	2031
2	4714446	D1010	**Dumbwaiter**	Electric, up to 5 Stories		Renovate	Bernice A. Ray School	Maintenance Shop				1989			$16,700	2030

D20 Plumbing

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714404	D2010	**Water Heater**	Electric, Residential	19.9 GAL	Replace	Bernice A. Ray School	Near Gym	Rheem	PR0E20 1 RU P0U	0081615038	2016			$650	2030
2	4714426	D2010	**Water Heater**	Gas, Commercial (200 MBH)	119 GAL	Replace	Bernice A. Ray School	Mechanical room	HTP	PH199-119	081319E1036793	2019			$16,600	2039
3	4714379	D2010	**Backflow Preventer**	Domestic Water	4 IN	Replace	Bernice A. Ray School	Mechanical room							$6,600	2037
4	4714422	D2010	**Drinking Fountain**	Wall-Mounted, Bi-Level		Replace	Bernice A. Ray School	Throughout building						8	$12,000	2030
5	4714355	D2010	**Sink/Lavatory**	Commercial Kitchen, 1-Bowl		Replace	Bernice A. Ray School	Kitchen						3	$4,800	2037
6	4714339	D2010	**Sink/Lavatory**	Commercial Kitchen, 3-Bowl		Replace	Bernice A. Ray School	Kitchen							$2,500	2037
7	4714503	D2010	**Sink/Lavatory**	Service Sink, Floor		Replace	Bernice A. Ray School	Utility closet						5	$4,000	2032
8	4714442	D2010	**Sink/Lavatory**	Vanity Top, Enameled Steel		Replace	Bernice A. Ray School	Restrooms						33	$36,300	2037
9	4714424	D2010	**Sink/Lavatory**	Vanity Top, Solid Surface or Vitreous China		Replace	Bernice A. Ray School	4th grade addition				2015		4	$4,400	2044
10	4714398	D2010	**Sink/Lavatory**	Vanity Top, Stainless Steel		Replace	Bernice A. Ray School	Throughout building						34	$40,800	2037
11	4714387	D2010	**Sink/Lavatory**	Vanity Top, Stainless Steel		Replace	Bernice A. Ray School	Kitchen						3	$3,600	2037
12	4714341	D2010	**Sink/Lavatory**	Vanity Top, Stainless Steel		Replace	Bernice A. Ray School	4th grade addition				2015		3	$3,600	2044
13	4714490	D2010	**Toilet**	Commercial Water Closet		Replace	Bernice A. Ray School	Restrooms						33	$42,900	2037
14	4714445	D2010	**Toilet**	Commercial Water Closet		Replace	Bernice A. Ray School	4th grade addition				2015		3	$3,900	2044
15	4714354	D2010	**Urinal**	Standard		Replace	Bernice A. Ray School	Restrooms						8	$8,800	2037
16	4714450	D2010	**Urinal**	Standard		Replace	Bernice A. Ray School	4th grade addition				2015			$1,100	2044
17	4714343	D2020	**Supplemental Components**	Grease Trap/Interceptor, Undercounter		Replace	Bernice A. Ray School	Maintenance Shop	Thermaco	EA.35909ACG-1	No tag/plate found				$1,800	2032

D30 HVAC

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714480	D3020	**Boiler**	Dual Fuel, HVAC, 2670 MBH	2670 MBH	Replace	Bernice A. Ray School	Mechanical room	Buderus	GE615/10	2530-004-000011-63130072	2014			$60,000	2044
2	4714456	D3020	**Boiler**	Gas, HVAC, 1000 MBH	1000 MBH	Replace	Bernice A. Ray School	Mechanical room	HTP	M0DC0N 1000	082714B1203713	2014			$33,800	2044
3	4714385	D3020	**Boiler**	Gas, HVAC, 500 MBH	500 MBH	Replace	Bernice A. Ray School	Mechanical room	HTP	M0DC0N500	082614B1203616	2014			$20,000	2044
4	4807637	D3020	**Cabinet Heater**	Electric, 3 to 4 LF	No tag/plate found	Replace	Bernice A. Ray School	Ramp	No tag/plate found	No tag/plate found	No tag/plate found	2014			$3,500	2039
5	4714471	D3020	**Radiator**	Hydronic, Baseboard (per LF)		Replace	Bernice A. Ray School	Throughout building	No tag/plate found	No tag/plate found	No tag/plate found			50	$7,500	2037
6	4714436	D3020	**Radiator**	Hydronic, Baseboard (per LF)		Replace	Bernice A. Ray School	Throughout building	No tag/plate found	No tag/plate found	No tag/plate found	1970		100	$15,000	2027
7	4714488	D3020	**Unit Heater**	Hydronic	No tag/plate found MBH	Replace	Bernice A. Ray School	Maintenance Shop	Trane	Inaccessible	Inaccessible				$1,100	2032
8	4714491	D3020	**Unit Heater**	Hydronic	No tag/plate found MBH	Replace	Bernice A. Ray School	Gymnasium	Inaccessible	Inaccessible	Inaccessible				$1,100	2032
9	4714482	D3020	**Unit Heater**	Hydronic	No tag/plate found MBH	Replace	Bernice A. Ray School	Maintenance Shop	Trane	Inaccessible	Inaccessible				$1,100	2032
10	4714439	D3020	**Boiler Supplemental Components**	Expansion Tank	125 GAL	Replace	Bernice A. Ray School	Mechanical room	Taco	CBX600-125	386083	2014			$4,400	2054

11	4714353	D3020	**Boiler Supplemental Components**	Expansion Tank	125 GAL	Replace	Bernice A. Ray School	Mechanical room	Taco	CBX600-125	386876	2014			$4,400	2054
12	4714495	D3030	**Air Conditioner**	Window/Thru-Wall	1 TON	Replace	Bernice A. Ray School	Office	Comfortaire	No tag/plate found	No tag/plate found				$2,200	2027
13	4714348	D3030	**Split System Ductless**	Single Zone	1 TON	Replace	Bernice A. Ray School	Server Room	Mitsubishi	PUY-A12NHA4	46u09272c	2015			$3,500	2029
14	4807636	D3030	**Unit Ventilator**	approx/nominal 2 Ton, 300 to 750 CFM	No tag/plate found	Replace	Bernice A. Ray School	3rd Grade Common	No tag/plate found	No tag/plate found	No tag/plate found	2014			$7,400	2034
15	4714479	D3030	**Unit Ventilator**	approx/nominal 2 Ton	No tag/plate found CFM	Replace	Bernice A. Ray School	Classrooms	AAF	AV	No tag/plate found			16	$118,400	2037
16	4714468	D3050	**Pump**	Distribution, HVAC Heating Water	10 HP	Replace	Bernice A. Ray School	Mechanical room	Baldor Reliance	EM3313T-8	F1407025551	2014			$6,800	2038
17	4714358	D3050	**Pump**	Distribution, HVAC Heating Water	10 HP	Replace	Bernice A. Ray School	Mechanical room	Baldor Reliance	EM3313T-8	F1406195634	2014			$6,800	2038
18	4807631	D3050	**Air Handler**	Exterior AHU, 15001 to 20000 CFM	20000 CFM	Replace	Bernice A. Ray School	Music Room	McQuay	RBS802BB	No tag/plate found	2014			$97,000	2034
19	4807632	D3050	**Air Handler**	Exterior AHU, 15001 to 20000 CFM	20000 CFM	Replace	Bernice A. Ray School	Gym	McQuay	RBS802BY	No tag/plate found	2014			$97,000	2034
20	4807628	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	12.5 Ton	Replace	Bernice A. Ray School	Multi Purpose Room Partial 3rd Grade Pod / F Wing	York	ZF150N20U2BAA6A	No tag/plate found	2014			$25,000	2034
21	4807304	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	12.5 Ton	Replace	Bernice A. Ray School	Administration / B Wing	York	ZF150N20U2BAA6A	N1F4775879	2014			$25,000	2034
22	4807627	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 11 to 12.5 TON, 200 MBH	12.5 Ton	Replace	Bernice A. Ray School	2nd Grade Pod / C Wing	York	ZF150N20U2BAA6A	No tag/plate found	2014			$25,000	2034
23	4807629	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH	17.5 Ton	Replace	Bernice A. Ray School	5th Grade Pod / E Wing	York	ZF210N32J2BAA1B	No tag/plate found	2014			$40,000	2034
24	4807305	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 16 to 20 TON, 320 MBH	20 Ton	Replace	Bernice A. Ray School	K-1, Life Skills Library / D Wing	York	ZF240N3252BAA2A	No tag/plate found	2014			$40,000	2034
25	4807630	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 4 TON, 100 MBH	4 Ton	Replace	Bernice A. Ray School	Art Room	York	F048N10B2BAA2A	No tag/plate found	2014			$9,000	2034
26	4807634	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 4 TON, 100 MBH	4 Ton	Replace	Bernice A. Ray School	Kitchen	York	ZF048N10B2BAA2A	No tag/plate found	2014			$9,000	2034
27	4807633	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 4 TON, Cooling Only	4 Ton	Replace	Bernice A. Ray School	Cafe	York	ZF048C00P2AAA1A	No tag/plate found	2014			$9,000	2034
28	4807635	D3050	**Packaged Unit**	RTU, Pad or Roof-Mounted, 6 to 7.5 TON, Electric Heat	7 Ton	Replace	Bernice A. Ray School	Computer Lab	York	D3CE868A25EBB	No tag/plate found	2014			$15,000	2034

D40 Fire Protection

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714417	D4010	**Fire Suppression System**	Commercial Kitchen, per LF of Hood		Replace	Bernice A. Ray School	Kitchen	Range Guard	No tag/plate found	No tag/plate found			8	$3,200	2032
2	4714363	D4030	**Fire Extinguisher**	Wet Chemical/CO2		Replace	Bernice A. Ray School	Throughout building						10	$3,000	2027

D50 Electrical

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714462	D5020	**Switchboard**	120/208 V	1600 AMP	Replace	Bernice A. Ray School	Electrical room	Eaton	No tag/plate found	No tag/plate found	2015			$80,000	2054
2	4714346	D5040	**Standard Fixture w/ Lamp**	any type, w/ LED Replacement		Replace	Bernice A. Ray School	Building exterior				2015		8	$1,760	2034
3	4714509	D5040	**Standard Fixture w/ Lamp**	any type, w/ LED Replacement		Replace	Bernice A. Ray School	Building exterior				2015		12	$2,640	2034

D70 Electronic Safety & Security

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714487	D7050	**Fire Alarm Panel**	Fully Addressable		Replace	Bernice A. Ray School	Office	Honeywell	No tag/plate found	No tag/plate found				$15,000	2030

E10 Equipment

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714376	E1030	**Foodservice Equipment**	Coffee Machine		Replace	Bernice A. Ray School	Kitchen	Curtis	No tag/plate found	No tag/plate found				$2,000	2027

2	4714350	E1030	**Foodservice Equipment**	Convection Oven, Single		Replace	Bernice A. Ray School	Kitchen	Turbofan	Illegible	Illegible			$5,600	2027
3	4714449	E1030	**Foodservice Equipment**	Convection Oven, Single		Replace	Bernice A. Ray School	Kitchen	Turbofan	Illegible	Illegible			$5,600	2027
4	4714382	E1030	**Foodservice Equipment**	Dishwasher Commercial		Replace	Bernice A. Ray School	Kitchen	Hobart	No tag/plate found	No tag/plate found			$21,500	2027
5	4714441	E1030	**Foodservice Equipment**	Exhaust Hood, 8 to 10 LF		Replace	Bernice A. Ray School	Art Room	No tag/plate found	No tag/plate found	No tag/plate found			$4,500	2030
6	4714418	E1030	**Foodservice Equipment**	Exhaust Hood, 8 to 10 LF		Replace	Bernice A. Ray School	Kitchen	Greenheck	Illegible	Illegible			$4,500	2030
7	4714369	E1030	**Foodservice Equipment**	Food Warmer, Proofing Cabinet on Wheels		Replace	Bernice A. Ray School	Kitchen	Metro	No tag/plate found	No tag/plate found			$1,700	2030
8	4714469	E1030	**Foodservice Equipment**	Freezer, 2-Door Reach-In		Replace	Bernice A. Ray School	Kitchen	Turbo Air	M3F47-2-N	No tag/plate found			$5,100	2030
9	4714500	E1030	**Foodservice Equipment**	Freezer, 3-Door Reach-In		Replace	Bernice A. Ray School	Kitchen	Turbo Air	M3F72-3-N	H2KSF71D6061			$6,800	2030
10	4714352	E1030	**Foodservice Equipment**	Freezer, Chest		Replace	Bernice A. Ray School	Kitchen	Powers Equipment Co	No tag/plate found	No tag/plate found			$1,800	2027
11	4714409	E1030	**Foodservice Equipment**	Freezer, Chest		Replace	Bernice A. Ray School	Kitchen	Powers Equipment Co	780	D168643			$1,800	2027
12	4714381	E1030	**Foodservice Equipment**	Griddle		Replace	Bernice A. Ray School	Kitchen	Avantco	No tag/plate found	No tag/plate found			$7,000	2030
13	4714364	E1030	**Foodservice Equipment**	Heat Lamps, Food Warming Fixture		Replace	Bernice A. Ray School	Kitchen	Duke Manufacturing	E303-25PG	12 F 95			$1,800	2027
14	4714428	E1030	**Foodservice Equipment**	Prep Table Refrigerated, Salad/Sandwich		Replace	Bernice A. Ray School	Kitchen	Duke	No tag/plate found	No tag/plate found			$4,700	2027
15	4714390	E1030	**Foodservice Equipment**	Range/Oven, 6-Burner		Replace	Bernice A. Ray School	Kitchen	Southbend	No tag/plate found	No tag/plate found			$6,000	2030
16	4714384	E1030	**Foodservice Equipment**	Refrigerator, 2-Door Reach-In		Replace	Bernice A. Ray School	Kitchen	True Manufacturing Co	T-49	1-2144659			$4,600	2030
17	4714492	E1030	**Foodservice Equipment**	Refrigerator, 2-Door Reach-In		Replace	Bernice A. Ray School	Kitchen	True Manufacturing Co	T-49	8040297			$4,600	2030
18	4714431	E1030	**Foodservice Equipment**	Refrigerator, 3-Door Reach-In		Replace	Bernice A. Ray School	Kitchen	True Manufacturing Co	T-72	11357324			$6,400	2030
19	4714386	E1040	**Healthcare Equipment**	Defibrillator (AED), Cabinet-Mounted		Replace	Bernice A. Ray School	Throughout building					2	$3,000	2027

G30 Liquid & Gas Site Utilities

Index	ID	UFCode	Component Description	Attributes	Capacity	Action	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty	Cost	Replacement Yr
1	4714391	G3060	**Storage Tank**	Site Fuel, Underground	1000 GAL	Replace/Install	Bernice A. Ray School	Site	No tag/plate found	No tag/plate found	No tag/plate found	2015		5	$125,000	2040
2	4714375	G3060	**Storage Tank**	Site Fuel, Underground	10000 GAL	Replace/Install	Bernice A. Ray School	Site	No tag/plate found	No tag/plate found	No tag/plate found	1998			$60,000	2030

Appendix H:
Lighting System Schedule

Lighting Schedule - Existing

									Lamp Details				Fixture Details						Existing Consumption	
Line No.	Building Name	Interior/ Exterior	Floor	Space Type	Room No.	Additional Area Description	Control Quantity	Existing Control	Technology	Sub-Technology	Lamp Type	Total Lamps	Fixture Type	Linear Fluorescent Fixture Lens	Fixture Mounting	Fixture Quantity	24x7 Fixture Count	Fixture Height	Annual Hours	Existing Annual kWh
1	Bernice A. Ray School	Interior	1	Classroom	Office		4	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	42	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	21	No	≥ 9	3,120	4,193
2	Bernice A. Ray School	Interior	1	Classroom	Office		4	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	84	Troffer - Surface Mounted Indirect 2'x4	Prism	Surface Mount	21	No	≥ 9	3,120	8,387
3	Bernice A. Ray School	Interior	1	Classroom	Office		4	Wall-Mounted Sensor	LED	-	-	10	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	10	No	≥ 9	3,120	-
4	Bernice A. Ray School	Interior	1	Classroom	Office		4	Wall-Mounted Sensor	Linear Fluorescent	T8 U	U 32W T8	6	Troffer - Surface Mounted Indirect 2'x2	Clear Acrylic	Surface Mount	3	No	≥ 9	3,120	599
5	Bernice A. Ray School	Interior	1	Restroom - Private	Office restroom		2	Wall-Mounted Sensor	LED	-	-	2	Troffer - Recessed Indirect 2'x2'	Clear Acrylic	Recessed	2	No	≥ 9	2,080	-
6	Bernice A. Ray School	Interior	1	Restroom - Private	Office restroom		2	Wall-Mounted Sensor	LED	-	-	2	Vanity Indirect	Clear Acrylic		2	No	≥ 9	2,080	-
7	Bernice A. Ray School	Interior	1	Classroom	704		2	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	36	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	12	No	≥ 9	3,120	3,594
8	Bernice A. Ray School	Interior	1	Classroom	704		2	Wall-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	1	Vanity Indirect	Clear Acrylic		1	No	≥ 9	3,120	53
9	Bernice A. Ray School	Interior	1	Nurse	702		3	Wall-Mounted Sensor	LED	-	-	7	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	7	No	≥ 9	3,120	-
10	Bernice A. Ray School	Interior	1	Nurse	702		3	Wall-Mounted Sensor	LED	-	-	1	Troffer - Recessed Indirect 2'x2'	Clear Acrylic	Recessed	1	No	≥ 9	3,120	-
11	Bernice A. Ray School	Interior	1	Nurse	702		3	Wall-Mounted Sensor	LED	-	-	1	Can - Recessed Vertical 6"	Clear Acrylic	Recessed	1	No	≥ 9	3,120	-
12	Bernice A. Ray School	Interior	1	Mechanical Room	Mechanical Room		1	Light Switch	CFL	CFL - Screw-in	CFL26	25	Pendant Direct	None		25	No	10-15	1,040	676
13	Bernice A. Ray School	Interior	1	Electrical Room	Electrical Room		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	Troffer - Surface Mounted Direct 1'x4'	None	Surface Mount	2	No	≥ 9	520	67
14	Bernice A. Ray School	Interior	1	Maintenance Shop	Maintenance shop		2	Light Switch	Linear Fluorescent	T8	4' 32W T8	44	Troffer - Surface Mounted Direct 1'x4'	None	Surface Mount	22	No	≥ 9	4,368	6,150
15	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	38	Troffer - Suspended Indirect 2'x4'	Perforated Metal	Suspended	19	No	10-15	3,120	3,794
16	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	160	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	80	No	≥ 9	3,120	15,974
17	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		1	Light Switch	CFL	CFL - 4 Pin	CFL18	24	Can - Recessed Horizontal 6"	None	Recessed	12	No	≥ 9	3,120	1,348
18	Bernice A. Ray School	Interior	1	Restroom - Male	Rstroom		1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	12	Troffer - Recessed Indirect 2'x2'	Prism	Recessed	6	No	≥ 9	4,368	891
19	Bernice A. Ray School	Interior	1	Restroom - Female	Restroom		1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	8	Troffer - Recessed Indirect 2'x2'	Prism	Recessed	4	No	≥ 9	4,368	594
20	Bernice A. Ray School	Interior	1	Music Room	Music		1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	126	Troffer - Suspended Indirect 2'x4'	Perforated Metal	Suspended	63	No	10-15	3,120	12,580
21	Bernice A. Ray School	Interior	1	Music Room	Music		1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	4	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	2	No	≥ 9	3,120	399
22	Bernice A. Ray School	Interior	1	Classroom	Art Room		1	Light Switch	LED	-	-	20	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	20	No	≥ 9	3,120	-
24	Bernice A. Ray School	Interior	1	Classroom	Art Room		1	Light Switch	LED	-	-	2	Can - Surface Mounted	Clear Acrylic	Surface Mount	1	No	≥ 9	3,120	-
25	Bernice A. Ray School	Interior	1	Classroom	105		4	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	80	Troffer - Suspended Indirect 2'x4'	None	Suspended	40	No	≥ 9	3,120	7,987
26	Bernice A. Ray School	Interior	1	Classroom	105		4	Wall-Mounted Sensor	LED	-	-	40	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	40	No	≥ 9	3,120	-
27	Bernice A. Ray School	Interior	1	Classroom	105		4	Wall-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	8	Troffer - Recessed Indirect 2'x2'	Prism	Recessed	4	No	≥ 9	3,120	424
28	Bernice A. Ray School	Interior	1	Classroom	108		1	Wall-Mounted Sensor	LED	-	-	11	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	11	No	≥ 9	3,120	-
29	Bernice A. Ray School	Interior	1	Office- Support Staf	Classroom offices		3	Wall-Mounted Sensor	LED	-	-	3	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	3	No	≥ 9	3,120	-
30	Bernice A. Ray School	Interior	1	Classroom	111		3	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	60	Troffer - Suspended Indirect 2'x4'	None	Suspended	30	No	≥ 9	3,120	5,990
31	Bernice A. Ray School	Interior	1	Classroom	111		3	Wall-Mounted Sensor	LED	-	-	30	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	30	No	≥ 9	3,120	-
32	Bernice A. Ray School	Interior	1	Classroom	111		3	Wall-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	3	Troffer - Recessed Indirect 2'x2'	Prism	Recessed	3	No	≥ 9	3,120	159
33	Bernice A. Ray School	Interior	1	Classroom	211		10	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	200	Troffer - Suspended Indirect 2'x4'	None	Suspended	100	No	≥ 9	3,120	19,968
34	Bernice A. Ray School	Interior	1	Classroom	211		10	Wall-Mounted Sensor	LED	-	-	50	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	50	No	≥ 9	3,120	-
35	Bernice A. Ray School	Interior	1	Restroom - Male	Restroom	2nd grade	4	Ceiling-Mounted Sensor	Linear Fluorescent	T8	2' 17W T8	16	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	8	No	≥ 9	4,368	1,188
36	Bernice A. Ray School	Interior	1	Restroom - Private	Restroom		1	Ceiling-Mounted Sensor	LED	-	-	1	Troffer - Recessed Indirect 2'x2'	Clear Acrylic	Recessed	1	No	≥ 9	2,080	-
37	Bernice A. Ray School	Interior	1	Classroom	Adaptive PE		1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	16	Troffer - Suspended Indirect 2'x4'	None	Suspended	8	No	≥ 9	3,120	1,597
38	Bernice A. Ray School	Interior	1	Classroom	306		8	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	64	Troffer - Suspended Indirect 2'x4'	None	Suspended	32	No	≥ 9	3,120	6,390
39	Bernice A. Ray School	Interior	1	Classroom	306		8	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	72	Troffer - Recessed Indirect 1'x4'	Perforated Metal	Recessed	36	No	≥ 9	3,120	7,188
40	Bernice A. Ray School	Interior	1	Classroom	306		8	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	8	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	4	No	≥ 9	3,120	799
41	Bernice A. Ray School	Interior	1	Office- Support Staf	Classroom offices		3	Wall-Mounted Sensor	LED	-	-	6	Troffer - Recessed Indirect 2'x4'	Clear Acrylic	Recessed	6	No	≥ 9	3,120	-
42	Bernice A. Ray School	Interior	1	Fitness/Gym	Gym		2	Wall-Mounted Sensor	LED	-	-	15	Industrial Surface Mount 4'	None	Surface Mount	15	No	15-20	4,368	-
43	Bernice A. Ray School	Interior	1	Storage	Gym storage		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	Troffer - Suspended Indirect 2'x4'	None	Suspended	6	No	≥ 9	2,080	799
44	Bernice A. Ray School	Interior	1	Fitness/Gym	Gym		2	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	6	Troffer - Recessed Indirect 2'x4'	Prism	Recessed	2	No	≥ 9	4,368	839
45	Bernice A. Ray School	Interior	1	Fitness/Gym	Gym		2	Light Switch	CFL	CFL - 4 Pin	CFL18	4	Can - Recessed Horizontal 6"	None	Recessed	2	No	≥ 9	4,368	314
46	Bernice A. Ray School	Interior	1	Classroom	Special Ed		1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	6	Troffer - Suspended Indirect 2'x4'			3	No	≥ 9	3,120	599
47	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	92	Troffer - Surface Mounted Indirect 2'x4'			23	No	≥ 9	3,120	9,185
48	Bernice A. Ray School	Interior	1	Circulation-Hallway	MPR		1	Light Switch	Incan/H/MR	Incan	I100-Flood	23	Track Lighting			23	No	≥ 9	3,120	7,176
49	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		1	Light Switch	Linear Fluorescent	T8	4' 32W T8	10	Troffer - Surface Mounted Indirect 2'x4'			5	No	≥ 9	3,120	998
50	Bernice A. Ray School	Interior	1	Kitchen	Kitchen		1	Wall-Mounted Sensor	Linear Fluorescent	T8	8' 54W T8	8	Troffer - Surface Mounted Indirect 1'x4'			4	No	≥ 9	3,120	1,348
52	Bernice A. Ray School	Interior	1	Kitchen	Kitchen		1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	6	Strip 4'			3	No	≥ 9	3,120	599
53	Bernice A. Ray School	Interior	1	Kitchen	Kitchen		1	Wall-Mounted Sensor	LED	-	-	4	Troffer - Recessed Indirect 2'x4'			4	No	≥ 9	3,120	-

Lighting Solutions - Proposed

									Fixture Details						Existing Consumption				Proposed- Post Retrofit				
Line No.	Building Name	Interior/ Exterior	Floor	Space Type	Room No.	Additional Area Description	Existing Control	Control Quantity	Technology	Sub-Technology	Lamp- Fixture	Fixture Quantity	Total Lamps	Fixture Height	Annual Hours	Existing Annual kWh	KW Reduction	ECM	Recommended Sensor	LED Lamp Retrofit	Annual Hours of Operation	Proposed Annual kWh	Annual Savings From LED Retrofit
																							kWh
1	Bernice A. Ray School	Interior	1	Classroom	Office		Wall-Mounted Sensor	4	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	21	42	≥ 9	3,120	4,193	1.34	ECM	Retain Existing Controls	4' 17W LED T8	3,120	2,228	1,966
2	Bernice A. Ray School	Interior	1	Classroom	Office		Wall-Mounted Sensor	4	Linear Fluorescent	T8	4' 32W T8; Troffer - Surface Mounted Indirect 2'x	21	84	≥ 9	3,120	8,387	2.69	ECM	Retain Existing Controls	4' 17W LED T8	3,120	4,455	3,931
4	Bernice A. Ray School	Interior	1	Classroom	Office		Wall-Mounted Sensor	4	Linear Fluorescent	T8 U	U 32W T8; Troffer - Surface Mounted Indirect 2'x	3	6	≥ 9	3,120	599	0.19	ECM	Retain Existing Controls	U 16W LED T8	3,120	300	300
7	Bernice A. Ray School	Interior	1	Classroom	704		Wall-Mounted Sensor	2	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	12	36	≥ 9	3,120	3,594	1.15	ECM	Retain Existing Controls	4' 17W LED T8	3,120	1,909	1,685
8	Bernice A. Ray School	Interior	1	Classroom	704		Wall-Mounted Sensor	2	Linear Fluorescent	T8	2' 17W T8; Vanity Indirect	1	1	≥ 9	3,120	53	0.02	ECM	Retain Existing Controls	2' 8W LED T8	3,120	25	28
12	Bernice A. Ray School	Interior	1	Mechanical Room	Mechanical Room		Light Switch	1	CFL	CFL - Screw-in	CFL - Screw-in - CFL26	25	25	10-15	1,040	676	0.65	ECM	Retain Existing Controls	16W LED A19	1,040	416	260
13	Bernice A. Ray School	Interior	1	Electrical Room	Electrical Room		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Surface Mounted Direct 1'x4	2	4	≥ 9	520	67	0.13	ECM	Retain Existing Controls	4' 17W LED T8	520	35	31
14	Bernice A. Ray School	Interior	1	Maintenance Shop	Maintenance shop		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; Troffer - Surface Mounted Direct 1'x4	22	44	≥ 9	4,368	6,150	1.41	ECM	Retain Existing Controls	4' 17W LED T8	4,368	3,267	2,883
15	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	19	38	10-15	3,120	3,794	1.22	ECM	Ceiling Mounted	4' 17W LED T8	3,120	2,016	1,778
16	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	80	160	≥ 9	3,120	15,974	5.12	ECM	Ceiling Mounted	4' 17W LED T8	3,120	8,486	7,488
17	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		Light Switch	1	CFL	CFL - 4 Pin	CFL - 4 Pin - CFL18	12	24	≥ 9	3,120	1,348	0.43	ECM	Ceiling Mounted	4 Pin-LED8	3,120	599	749
18	Bernice A. Ray School	Interior	1	Restroom - Male	Rstroom		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	2' 17W T8; Troffer - Recessed Indirect 2'x2'	6	12	≥ 9	4,368	891	0.20	ECM	Retain Existing Controls	2' 8W LED T8	4,368	419	472
19	Bernice A. Ray School	Interior	1	Restroom - Female	Restroom		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	2' 17W T8; Troffer - Recessed Indirect 2'x2'	4	8	≥ 9	4,368	594	0.14	ECM	Retain Existing Controls	2' 8W LED T8	4,368	280	314
20	Bernice A. Ray School	Interior	1	Music Room	Music		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	63	126	10-15	3,120	12,580	4.03	ECM	Retain Existing Controls	4' 17W LED T8	3,120	6,683	5,897
21	Bernice A. Ray School	Interior	1	Music Room	Music		Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	2	4	≥ 9	3,120	399	0.13	ECM	Retain Existing Controls	4' 17W LED T8	3,120	212	187
25	Bernice A. Ray School	Interior	1	Classroom	105		Wall-Mounted Sensor	4	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	40	80	≥ 9	3,120	7,987	2.56	ECM	Retain Existing Controls	4' 17W LED T8	3,120	4,243	3,744
27	Bernice A. Ray School	Interior	1	Classroom	105		Wall-Mounted Sensor	4	Linear Fluorescent	T8	2' 17W T8; Troffer - Recessed Indirect 2'x2'	4	8	≥ 9	3,120	424	0.14	ECM	Retain Existing Controls	2' 8W LED T8	3,120	200	225
30	Bernice A. Ray School	Interior	1	Classroom	111		Wall-Mounted Sensor	3	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	30	60	≥ 9	3,120	5,990	1.92	ECM	Retain Existing Controls	4' 17W LED T8	3,120	3,182	2,808
32	Bernice A. Ray School	Interior	1	Classroom	111		Wall-Mounted Sensor	3	Linear Fluorescent	T8	2' 17W T8; Troffer - Recessed Indirect 2'x2'	3	3	≥ 9	3,120	159	0.05	ECM	Retain Existing Controls	2' 8W LED T8	3,120	75	84
33	Bernice A. Ray School	Interior	1	Classroom	211		Wall-Mounted Sensor	10	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	100	200	≥ 9	3,120	19,968	6.40	ECM	Retain Existing Controls	4' 17W LED T8	3,120	10,608	9,360
35	Bernice A. Ray School	Interior	1	Restroom - Male	Restroom	2nd grade	Ceiling-Mounted Sensor	4	Linear Fluorescent	T8	2' 17W T8; Troffer - Recessed Indirect 2'x4'	8	16	≥ 9	4,368	1,188	0.27	ECM	Retain Existing Controls	2' 8W LED T8	4,368	559	629
37	Bernice A. Ray School	Interior	1	Classroom	Adaptive PE		Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	8	16	≥ 9	3,120	1,597	0.51	ECM	Retain Existing Controls	4' 17W LED T8	3,120	849	749
38	Bernice A. Ray School	Interior	1	Classroom	306		Wall-Mounted Sensor	8	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	32	64	≥ 9	3,120	6,390	2.05	ECM	Retain Existing Controls	4' 17W LED T8	3,120	3,395	2,995
39	Bernice A. Ray School	Interior	1	Classroom	306		Wall-Mounted Sensor	8	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 1'x4'	36	72	≥ 9	3,120	7,188	2.30	ECM	Retain Existing Controls	4' 17W LED T8	3,120	3,819	3,370
40	Bernice A. Ray School	Interior	1	Classroom	306		Wall-Mounted Sensor	8	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	4	8	≥ 9	3,120	799	0.26	ECM	Retain Existing Controls	4' 17W LED T8	3,120	424	374
43	Bernice A. Ray School	Interior	1	Storage	Gym storage		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	6	12	≥ 9	2,080	799	0.38	ECM	Wall Mounted	4' 17W LED T8	2,080	424	374
44	Bernice A. Ray School	Interior	1	Fitness/Gym	Gym		Wall-Mounted Sensor	2	Linear Fluorescent	T8	4' 32W T8; Troffer - Recessed Indirect 2'x4'	2	6	≥ 9	4,368	839	0.19	ECM	Retain Existing Controls	4' 17W LED T8	4,368	446	393
45	Bernice A. Ray School	Interior	1	Fitness/Gym	Gym		Light Switch	2	CFL	CFL - 4 Pin	CFL - 4 Pin - CFL18	2	4	≥ 9	4,368	314	0.07	ECM	Retain Existing Controls	4 Pin-LED8	4,368	140	175
46	Bernice A. Ray School	Interior	1	Classroom	Special Ed		Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Suspended Indirect 2'x4'	3	6	≥ 9	3,120	599	0.19	ECM	Retain Existing Controls	4' 17W LED T8	3,120	318	281
47	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Surface Mounted Indirect 2'x	23	92	≥ 9	3,120	9,185	2.94	ECM	Ceiling Mounted	4' 17W LED T8	3,120	4,880	4,306
48	Bernice A. Ray School	Interior	1	Circulation-Hallway	MPR		Light Switch	1	Incan/H/MR	Incan	I100-Flood; Track Lighting	23	23	≥ 9	3,120	7,176	2.30	ECM	Retain Existing Controls	16W LED A19	3,120	4,880	2,296
49	Bernice A. Ray School	Interior	1	Circulation-Hallway	Hallway		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Troffer - Surface Mounted Indirect 2'x	5	10	≥ 9	3,120	998	0.32	ECM	Ceiling Mounted	4' 17W LED T8	3,120	530	468
50	Bernice A. Ray School	Interior	1	Kitchen	Kitchen		Wall-Mounted Sensor	1	Linear Fluorescent	T8	8' 54W T8; Troffer - Surface Mounted Indirect 1'x	4	8	≥ 9	3,120	1,348	0.43	ECM	Retain Existing Controls	8' 40W LED T8	3,120	998	349
52	Bernice A. Ray School	Interior	1	Kitchen	Kitchen		Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; Strip 4'	3	6	≥ 9	3,120	599	0.19	ECM	Retain Existing Controls	4' 17W LED T8	3,120	318	281

Appendix I:
Energy Conservation Measures Calculation

UIC	Install Low Flow Faucet Aerators
EAP2-b	**Location**: Classrooms, offices
Attributes:	Replace 34x 2.2GPM rated kitchen aerators with 1.5GPM WaterSense certified aerators Replace 33x 1.5GPM rated bathroom aerators with 0.5GPM WaterSense certified aerator

Property Type:	Commercial	Estimated No. of Operational Weeks	52
		Number of Occupied Days/Week (Max 7)	5

KITCHEN FAUCETS			BATHROOM FAUCETS		
Number of Occupants Affected By Retrofit	550		Number of Occupants Affected by Retrofit	550	
Do You Want To Replace Kitchen Faucets Aerators	Yes	*(Select)*	Do You Want To Replace Bathroom Faucets Aerators	Yes	*(Select)*
Total Number of Faucet Aerators To Be Replaced	34		Total Number of Faucet Aerators To Be Replaced	33	
Total Number of Faucets To Be Replaced:	0		Total Number of Faucets To Be Replaced:	0	
GPM of Existing Faucet Aerators	2.2	GPM	GPM of Existing Faucet Aerators	1.5	GPM
GPM of Proposed Faucet Aerator	1.5	GPM	GPM of Proposed Faucet Aerator	0.5	GPM
Estimated Number of Uses Per Day	1		Estimated Number of Uses Per Day	4	

Annual Water Savings From Installing Low Flow Aerators: 64.52 kGal

WATER & ENERGY SAVING CALCULATION			COST SAVING CALCULATION		
Select Type of Water Heater Fuel:	Propane	(Select)	Property Location in United States	Northern Localities	
Energy Factor of Domestic Hot Water Heater:	0.95	EF	Heating Fuel Tariff	$1.59	$/Gal
Hot Water Discharge Temperature at Faucet	101.00	°F	Water Tariff ($/1000 Gal)	$10.00	$/kGal
Equivalent Heating Fuel Savings:	321	Gallons	Annual Cost Savings In Form of Water	$645	$
Savings Discounted by 15% to Account For Cold Water Use					
Annual Water Savings	64.52	kGal	Annual Energy Savings From Water Heater	$510	$

COST BENEFIT ANALYSIS					
Estimated Material Cost	$536		Estiamted Labor Cost	$424	
Estimated Total Annual Cost Savings	$1,156	$$	Estimated Total Installation Cost	$960	$$
Simple Payback Period	0.83	Years	*Type of Recommendation*	No/Low Cost ECM Recommendation	

ECM EXPLANATION:

By reducing the flow of water coming from the restroom faucets, aerators can generate energy savings at low cost and with easy installation. The savings generated would be in the form of reduced water and sewer costs and at the same time aerators would save energy by reducing the demand for hot water. The average faucet has a flow rate of about 2 to 4 GPM. Adding a screw-in faucet aerator reduces the flow to 0.5 to 1.5 GPM in the bathroom and 2.2 GPM in the kitchen. In addition to saving energy and water, the "foamier" water that comes from faucet aerators wets objects better than water from a faucet with no aerator, which tends to bounce off the object rather than thoroughly wetting it.

BV recommends replacing the proposed faucet aerators with new low flow aerators as mentioned above. The proposed ECM shall also result in an annual energy saving in form of reduction in water heating bills.

Summary:

Initial Investment: $960 Estimated Annual Cost Savings: $1,156 Simple Payback Period (Yrs): 0.83

UIC	Retrofit Flush Tank Toilets to Dual Flush
EAP3	Location: Restrooms
Attribute:	Retrofit 33x 1.6GPF toilets to dual-flush

EXISTING CONDITION

Total Occupants:	550	
Number of Water Closets To Be Replaced	33	
Number of Occupied Days Per Week (Max 7)	5	
Number of Occupied Weeks/Year (Max 52)	52	
Estimated Restroom Usage/Individual/Day	4	(Select)

5.05 flushes/person/day@American Water Works Association (AWWA)

PROPOSED RETROFIT/REPLACEMENT

Existing Gallons Per Flush Ratings For Water Closet Flushes		1.60	GPF
Replace or Retrofit Toilets With Dual Flush Toilets		Retrofit	
Replace			
Proposed Toilet	-		
GPF of Proposed New Low Flow Water Closet Fixture*		-	GPF
Retrofit			
Dual Flush - Retrofit Setup Valve for Flush Tank Toilet	*Solid Waste (20%)*	1.60	GPF
**(Federal Law Requires All Flushes Not To Exceed 1.6 GPF)*	*Liquid Waste (80%)*	1.28	GPF

Water & Cost Saving Calculations

Water Savings By The Use of Low Flow Water Closet Flush Valves/Day			563.20	gal
Total Annual Water Savings in gallons			146.43	kgal
Cost Savings Calculations				
Enter Water Tariff Rate ($/1000Gal)			$10.00	$
Estimated Cost Savings From Water			$1,464	$
Estimated Cost of Retrofit				
Estimated Total Cost For Retrofit	*Material*	$792	Total $3,903	$
	Labor	$3,111		
Simple Pay Back Period			2.67	Yrs
Type of Recommendation	Capital Cost ECM Recommendation			

ECM EXPLANATION:

The highest water utilization at any home/office occurs in the restrooms. It is estimated that on an average a normal human being uses the restroom at least four times a day. Keeping with the global water conservation objectives, federal law prohibits use of any new water closet flushes over 1.6 GPF.

Existing toilets can be retrofitted with pressure-assisted flush technology to reduce the flush rate to 1.0 GPF or less. Though water efficient these toilets make considerable amount of noise as this involves release of pressurized air during the course of flushing. Thus making them unpopular among residential properties.

Thus BV recommends replacing the existing high flow toilets with new low flow 1.28GPF rated flush tank toilets, which are comparatively more water efficient at the same time considerably quiter as compared to the pressure assisted technology retrofitted toilets.

Summary:

Initial Investment: $3,903

Simple Payback: 2.67 Years

Annual Cost Savings: $1,464

UIC	**Upgrade Building Lighting to LED and Install Automatic Lighting Controls**
EAL10	**Location: Building Interior and Exterior - Bernice A. Ray School**
Attributes:	**Replace CFL (39x) ;Incan/H/MR (23x) ;Linear Fluorescent (567x) ;**

	No. of ECMs	No. of Fixtures	No. of Lamps	KWh Saved	Energy Cost Saving	O & M Savings
Upgrade Lighting to LED	34	629	1,308	61,229	$9,796.72	$6,657.67

Existing Technology	**Sub-Technology**	No. of ECMs	No. of Fixtures	No. of Lamps	KWh Saved	Energy Cost Saving	O & M Savings
CFL	CFL - 2 Pin	0	0	0	0	$0	$0
CFL	CFL - 4 Pin	2	14	14	924	$148	$378
CFL	CFL - Screw-in	1	25	25	260	$42	$94
Circiline	T9	0	0	0	0	$0	$0
Incan/H/MR	H	0	0	0	0	$0	$0
Incan/H/MR	Incan	1	23	23	2,296	$367	$1,034
Incan/H/MR	MR	0	0	0	0	$0	$0
HID	HPS	0	0	0	0	$0	$0
HID	MH	0	0	0	0	$0	$0
HID	MV	0	0	0	0	$0	$0
HID	QL	0	0	0	0	$0	$0
Linear Fluorescent	T8	29	564	564	57,450	$9,192	$5,115
Linear Fluorescent	T12	0	0	0	0	$0	$0
Linear Fluorescent	T8 U	1	3	3	300	$48	$37
Linear Fluorescent	T12 U	0	0	0	0	$0	$0
Linear Fluorescent	T5	0	0	0	0	$0	$0
Linear Fluorescent	T6	0	0	0	0	$0	$0
Linear Fluorescent	T10	0	0	0	0	$0	$0

Proposed Controls	**No. of Controls**		**No. of Controls**
Photo Sensor	0	Ceiling Mounted	5
Wall Mounted	1		

Initial Investment		**Equipment Rentals**	
Material Cost	$6,571.92	Scissor Lift 26' - Interior Spaces	$7,565.00
Labor Cost	$76,603.56	Bucket Truck - Exterior Spaces	$0.00
Local Electric Rate:	$0.16 $/kWh	Estimated Annual Energy Savings:	61,229
		Estimated Demand Savings:	42
Hourly Labor Rate For Electrician:	$72.05	Estimated Annual Energy Cost Savings:	$9,797
Budgeted Initial Investment:	$90,740	Estimated Annual O&M Cost Savings:	$6,658
Estimated Return on Investment:	5.51 Years	Estimated Annual Cost Savings:	$16,454
(Including O&M Savings)			

Appendix J:
Solar Photovoltaic Feasibility Study

UIC	Install Fixed Tilt Solar Photovoltaic System
EAR1	Location: Bernice A. Ray School
Attributes:	Install fixed tilt 310KW Solar Photovoltaic System consisting of 144.1kW Rooftop Fixed Array PV System; 165.9kW Ground Mounted Array PV System

Select State: New Hampshire **Electric Rate** $0.16 $/KWH Annual Electric Consumption: 372,080 KWh

Roof No.	Description	Location of the Array	DC System Size Per Roof	PV System Sizing For All Roofs	Estimated Number of 315 Watt PV Panels:	Total Estimated Annual Electricity Generated/ Roof	Total Estimated Electricity Generated (All Roofs)	Total Cost Savings	Installation Cost:	Simple Pay Back Period without Incentives	One Time Potential Utility or State Incentives	One Time Potential Federal Incentives	Annual Potential Incentives and Rebates		Simple Pay Back Period with All Incentives
			kW	kW		kWh	kWh			Yrs		Federal Tax Credit	Federal REPI Incentive	Solar Renewable Certificates (SRECS)- ($/MWH)	Years
												26%	$0.00	Varies by State	
1	Rooftop Fixed Array	1	50	50	158	59,914	59,914	$9,521	$233,087	24.5	$0	$60,603	$0	$0	18.1
2	Rooftop Fixed Array	1	35	35	112	42,390	42,390	$6,736	$164,889	24.5	$0	$42,871	$0	$0	18.1
3	Rooftop Fixed Array	1	12	12	39	14,656	14,656	$2,329	$56,987	24.5	$0	$14,817	$0	$0	18.1
4	Rooftop Fixed Array	1	13	13	42	15,977	15,977	$2,539	$62,125	24.5	$0	$16,153	$0	$0	18.1
5	Rooftop Fixed Array	1	19	19	60	22,701	22,701	$3,607	$88,284	24.5	$0	$22,954	$0	$0	18.1
6	Rooftop Fixed Array	1	15	15	46	17,419	17,419	$2,768	$67,731	24.5	$0	$17,610	$0	$0	18.1
7	Ground Mounted Array	1	103	103	326	123,405	123,405	$19,609	$517,744	26.4	$0	$134,614	$0	$0	19.5
8	Ground Mounted Array	1	63	63	200	75,758	75,758	$12,038	$317,798	26.4	$0	$82,628	$0	$0	19.5
9				0	0		0	$0	$0		$0	$0	$0	$0	
10				0	0		0	$0	$0		$0	$0	$0	$0	
		8		**310**	**984**	**372,220.0**	**372,220**	**$59,147**	**$1,508,647**	**25.51**	**$0**	**$392,248**	**$0**	**$0**	**18.88**

Solar Rooftop Photovoltaic Analysis		
Total Number of Roofs	8	
Estimated Number of Panels	984	
Estimated KW Rating	310	kW
Potential Annual KWh Produced	372,220	kWh
% of Current Electricity Load	100.0%	

Financial Analysis		
Investment Cost	$1,508,647	
Estimated Energy Cost Savings	$59,147	
Potential Rebates	$392,248	
Potential Annual Incentives	$0	
Payback without Incentives	25.5	years
Incentive Payback but without SRECS	18.9	years
Payback with All Incentives	18.9	years

Solar PV Layout – Roof 1

Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at https://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

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The energy output range is based on analysis of 30 years of historical weather data, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

17,419 kWh/Year*

System output may range from 16,609 to 18,189 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.80	1,073
February	3.82	1,310
March	4.84	1,781
April	4.99	1,651
May	5.77	1,911
June	5.90	1,869
July	5.67	1,841
August	5.62	1,831
September	4.67	1,505
October	3.05	1,054
November	2.45	866
December	1.90	725
Annual	4.29	17,417

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	14.5 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

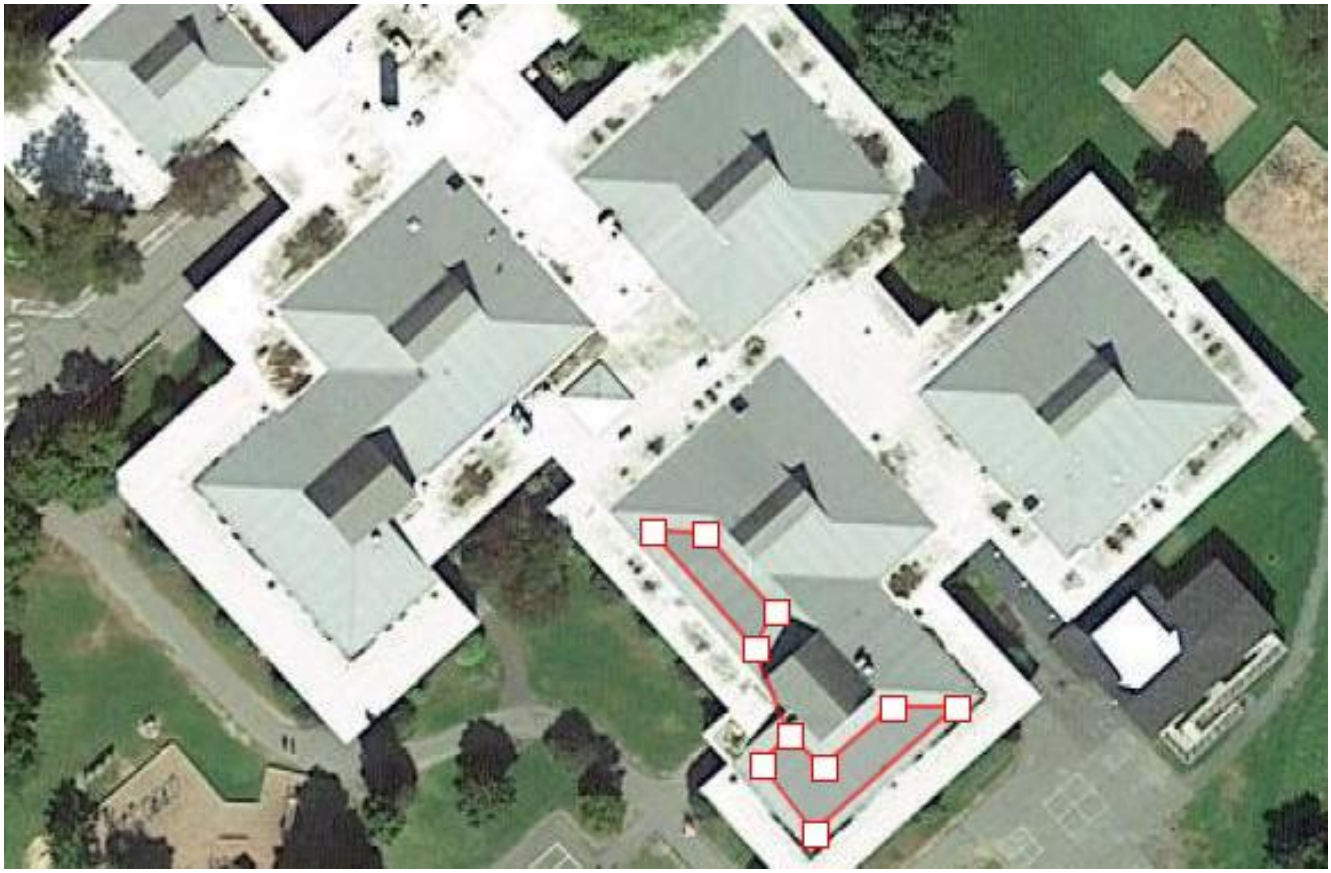
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Roof 2



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

N

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

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The energy output range is based on analysis of 30 years of historical weather data, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

22,701 kWh/Year*

System output may range from 21,645 to 23,704 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.80	1,398
February	3.81	1,706
March	4.84	2,320
April	4.99	2,152
May	5.77	2,490
June	5.90	2,436
July	5.67	2,400
August	5.62	2,387
September	4.67	1,962
October	3.05	1,374
November	2.45	1,129
December	1.90	945
Annual	**4.29**	**22,699**

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	18.9 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

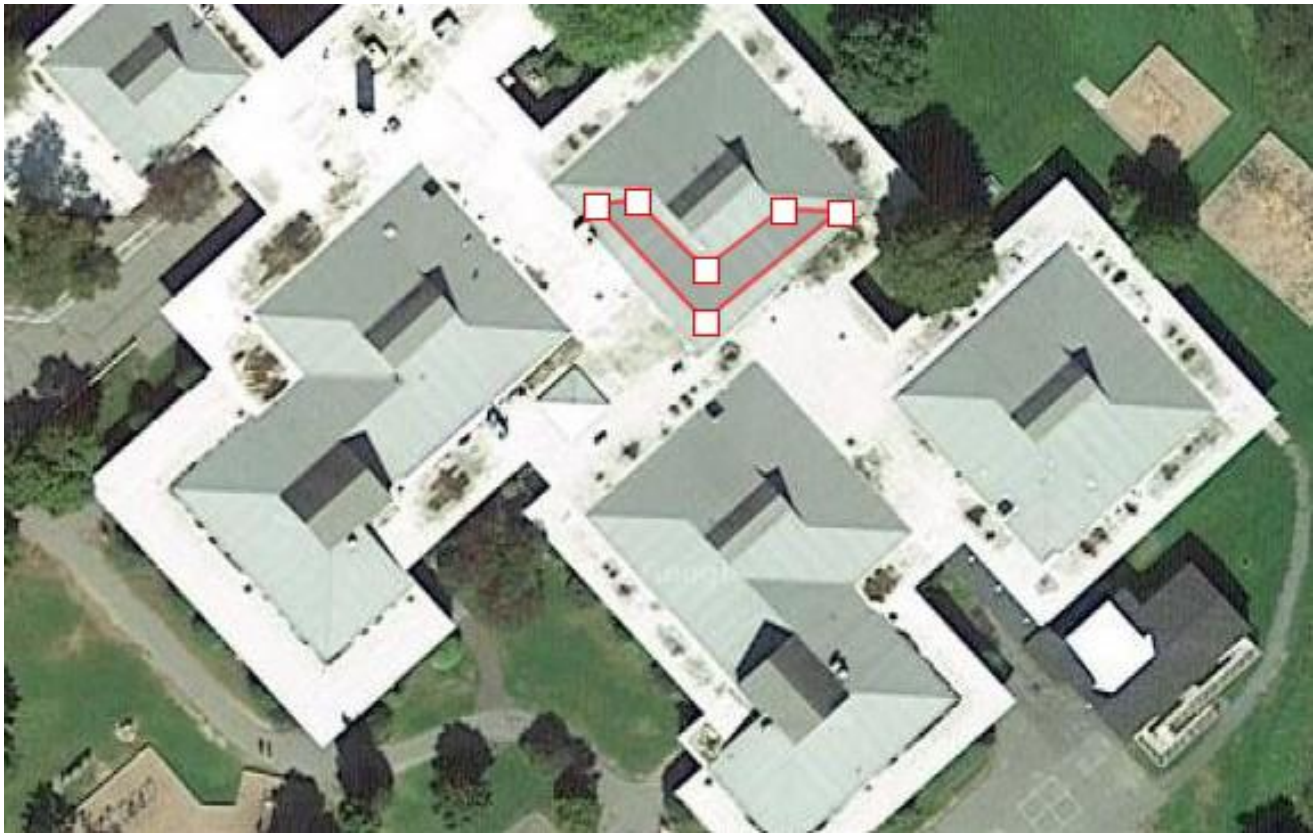
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Roof 3



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

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RESULTS

15,977 kWh/Year*

System output may range from 15,234 to 16,683 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.80	984
February	3.82	1,201
March	4.84	1,633
April	4.99	1,515
May	5.77	1,753
June	5.90	1,715
July	5.67	1,689
August	5.62	1,680
September	4.67	1,381
October	3.05	967
November	2.45	795
December	1.90	665
Annual	4.29	15,978

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	13.3 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

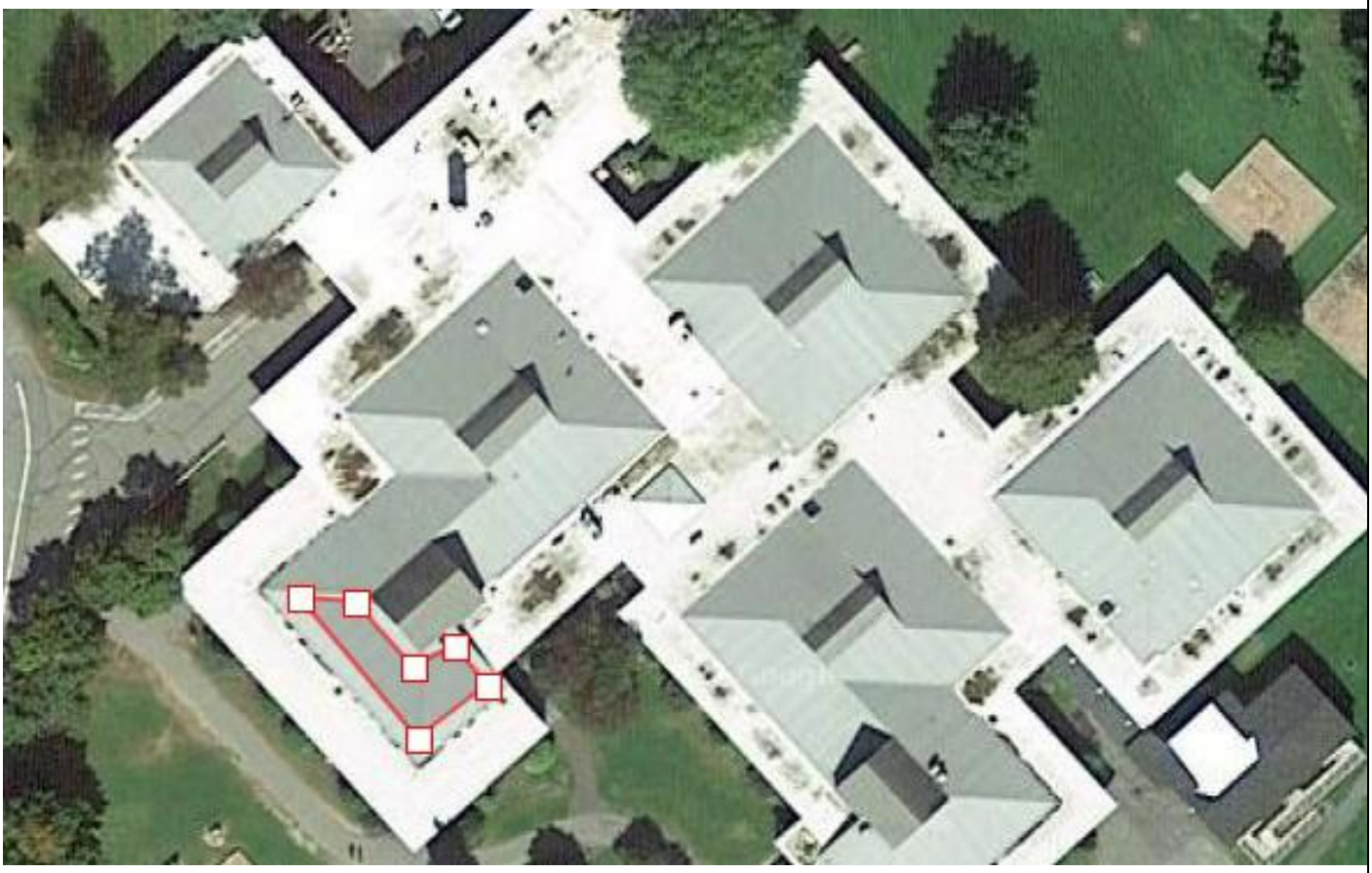
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Roof 4



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

N

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The energy output range is based on analysis of 30 years of historical weather data, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

14,656 kWh/Year*

System output may range from 13,974 to 15,304 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.80	903
February	3.82	1,102
March	4.84	1,498
April	4.99	1,389
May	5.77	1,608
June	5.90	1,573
July	5.67	1,549
August	5.62	1,541
September	4.67	1,267
October	3.05	887
November	2.45	729
December	1.90	610
Annual	4.29	14,656

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	12.2 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

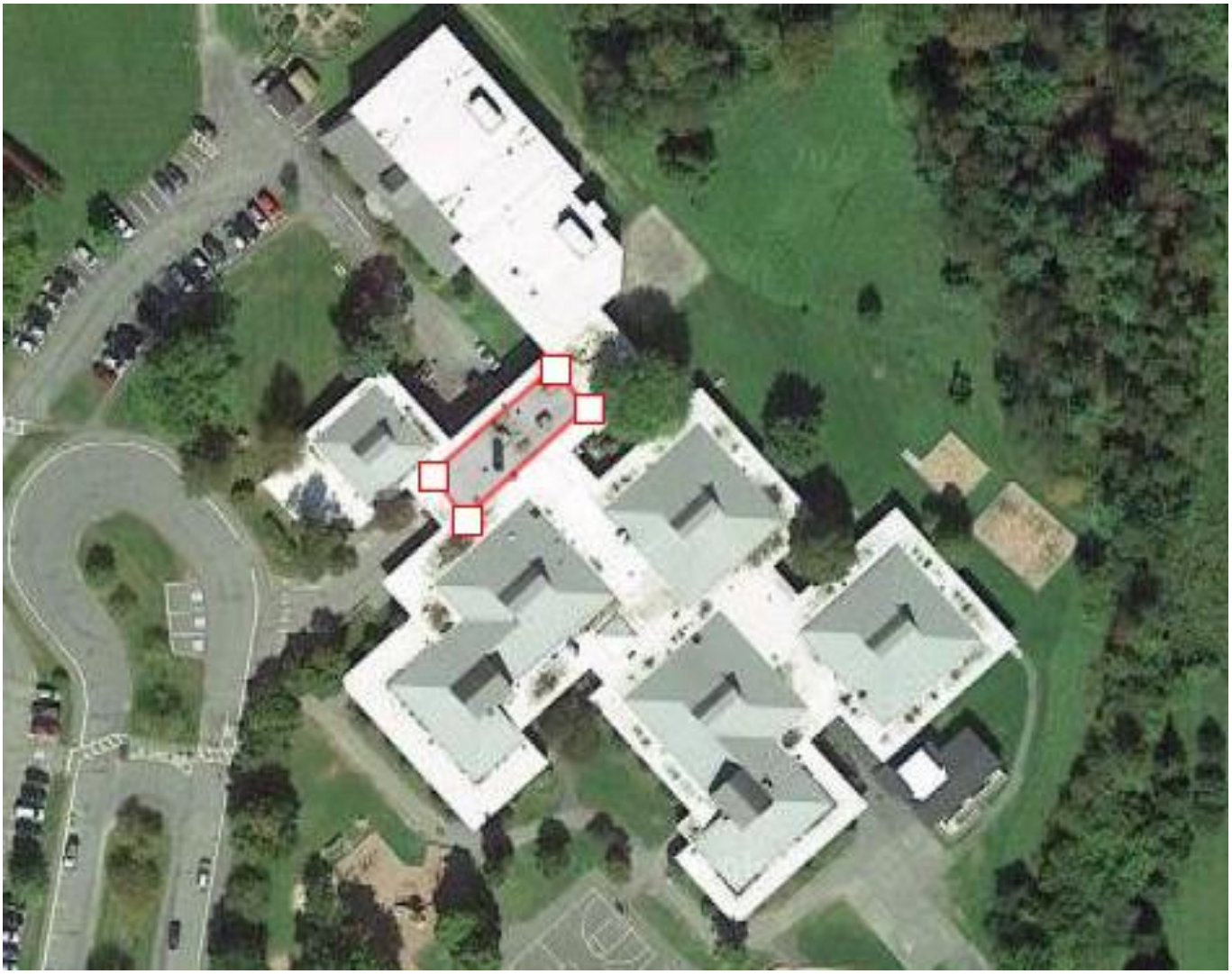
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Roof 5



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

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RESULTS

42,390 kWh/Year*

System output may range from 40,419 to 44,264 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.79	2,610
February	3.81	3,186
March	4.84	4,332
April	4.99	4,020
May	5.77	4,651
June	5.90	4,550
July	5.67	4,482
August	5.62	4,458
September	4.67	3,665
October	3.05	2,565
November	2.45	2,109
December	1.90	1,764
Annual	4.29	42,392

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	35.3 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

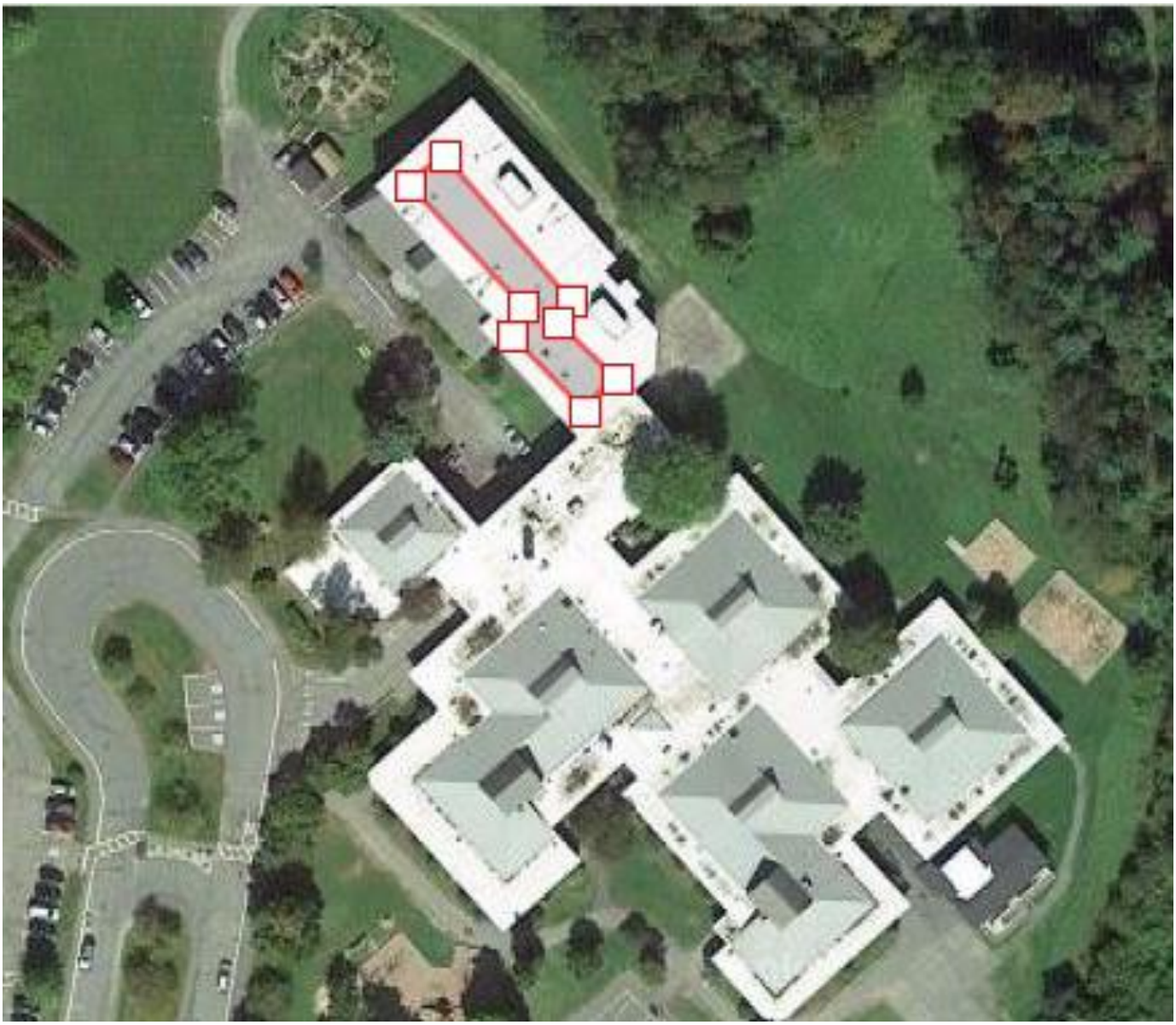
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Roof 6



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

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RESULTS

59,914 kWh/Year*

System output may range from 57,128 to 62,562 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	2.79	3,689
February	3.81	4,502
March	4.84	6,122
April	4.98	5,682
May	5.77	6,574
June	5.90	6,432
July	5.67	6,335
August	5.62	6,301
September	4.67	5,180
October	3.05	3,626
November	2.45	2,981
December	1.90	2,491
Annual	**4.29**	**59,915**

Location and Station Identification

Requested Location	26 Reservoir Road, Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	49.9 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%

Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Site 1

Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

NREL

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RESULTS

123,405 kWh/Year*

System output may range from 117,667 to 128,660 kWh per year near this location.

Month	Solar Radiation (kWh / m² / day)	AC Energy (kWh)
January	2.79	7,596
February	3.81	9,271
March	4.83	12,608
April	4.98	11,705
May	5.77	13,543
June	5.90	13,249
July	5.67	13,050
August	5.61	12,980
September	4.67	10,671
October	3.05	7,470
November	2.45	6,138
December	1.90	5,126
Annual	4.29	123,407

Location and Station Identification

Requested Location	26 Reservoir Road Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

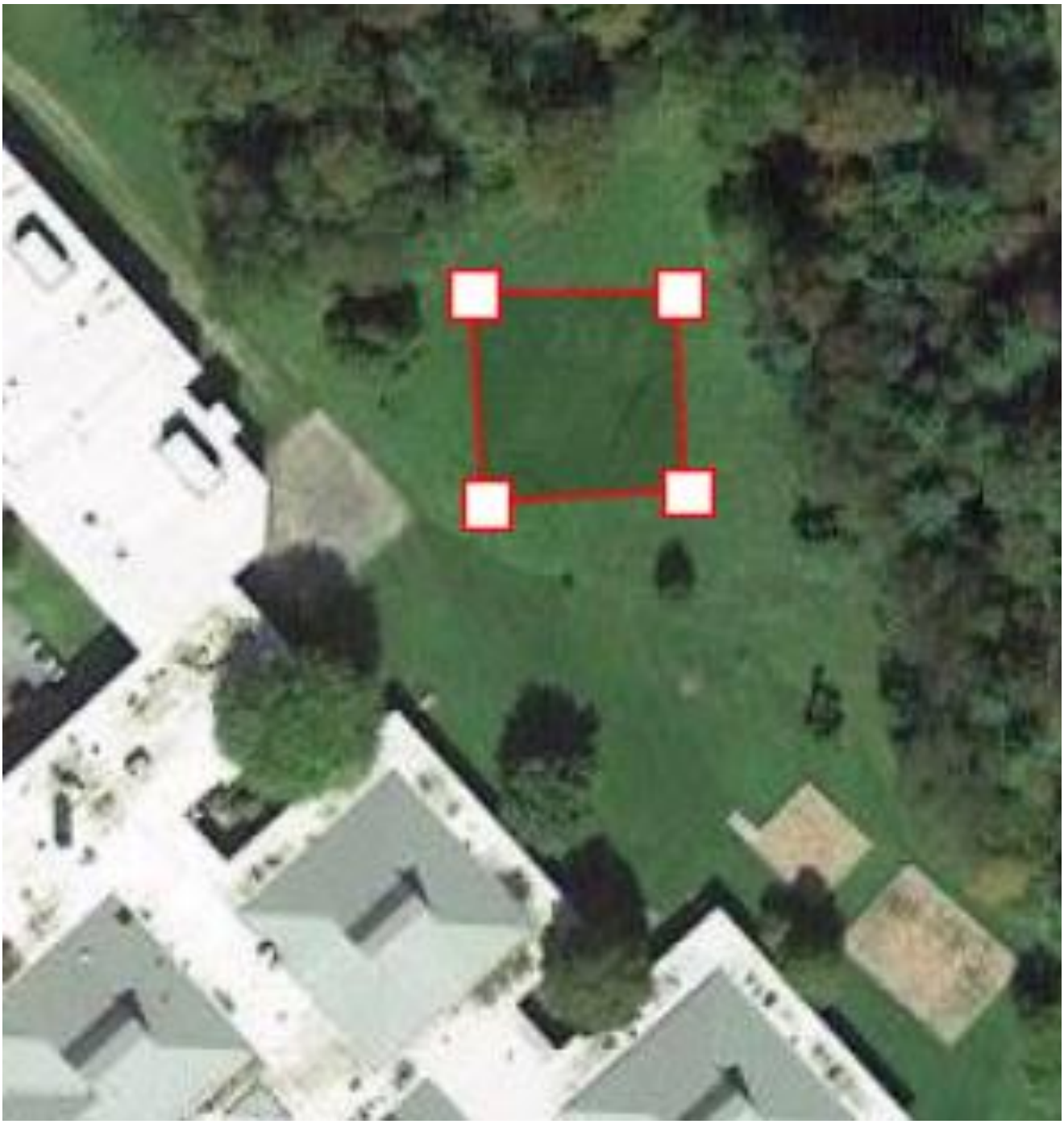
DC System Size	102.8 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Solar PV Layout – Site 2



Project Number	Project Name
158531.22R000-001.379	Bernice A. Ray School School Administrative Unit 70
Source	**On-Site Date**
PVWatts	December 19-20, 2022

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RESULTS

75,758 kWh/Year*

System output may range from 72,236 to 79,107 kWh per year near this location.

Month	Solar Radiation (kWh / m² / day)	AC Energy (kWh)
January	2.79	4,664
February	3.81	5,692
March	4.84	7,740
April	4.98	7,185
May	5.77	8,313
June	5.90	8,133
July	5.67	8,010
August	5.62	7,967
September	4.67	6,550
October	3.05	4,586
November	2.45	3,769
December	1.90	3,149
Annual	4.29	75,758

Location and Station Identification

Requested Location	26 Reservoir Road Hanover, New Hampshire
Weather Data Source	Lat, Lng: 43.73, -72.26 0.8 mi
Latitude	43.73° N
Longitude	72.26° W

PV System Specifications

DC System Size	63.1 kW
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08%
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics

DC Capacity Factor	13.7%

Appendix K:
Energy Audit Glossary of Terms

Glossary of Terms and Acronyms

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR - The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost - The sum of the present values of (a) **I**nvestment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs: (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity - The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity - This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions - Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).