

FACILITY CONDITION

ASSESSMENT

BURLINGTON SCHOOL DISTRICT

150 Colchester Avenue
Burlington, Vermont 05401
Marty Spaulding



FACILITY CONDITION ASSESSMENT

and

LEVEL I ENERGY AUDIT

of

BURLINGTON HIGH SCHOOL

52 Institute Road
Burlington, Vermont 05408

PREPARED BY:

EMG
222 Schilling Circle, Suite 275
Hunt Valley, Maryland 21031
www.emgcorp.com

EMG CONTACT:

Marge Bershtein, PE
Program Manager
800.733.0660, x6230
mBershtein@emgcorp.com

EMG Project #: 113231.15R-001.294
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On site Date: June 5, 2015

Immediate Repairs Report**Burlington High School****3/11/2016**

Report Section	Location Description	Cost Description	Quantity	Unit	Unit Cost	Subtotal	Deficiency Repair Estimate *
3.1 Building A through F		Fire Doors, Replace	1	EA	\$241,812.00	\$241,812	\$241,812
3.2 Interiors and Connections		ADA, Miscellaneous (Lump Sum Budgetary Allowance), Upgrade	1	EA	\$1,951,938.00	\$1,951,938	\$1,951,938
3.2 Parking and Site Grounds		ADA, Miscellaneous (Lump Sum Budgetary Allowance), Upgrade	1	EA	\$50,000.00	\$50,000	\$50,000
5.2 Courtyard connecting paths B building landing and front entrance		Asphalt paving, crack repair, large quantities	1000	LF	\$2.09	\$2,090	\$2,090
5.2 sidewalk		Concrete Pavement, Parking Lot, Replace	3200	SF	\$19.82	\$63,424	\$63,424
5.2 Student parking lots		Asphalt Pavement, Parking Lot, Mill & Overlay	45000	SF	\$3.28	\$147,600	\$147,600
6.4 F building - north elevation		Brick Veneer, Exterior, 3+ Stories, Repair	500	SF	\$53.28	\$26,640	\$26,640
6.6 Windows		Lintel, Steel, Up to 8', Replace	200	EA	\$4,105.00	\$821,000	\$821,000
6.6 Building A through F		Storefront Windows without Door(s), Metal-Framed, Replace	58200	SF	\$48.00	\$2,793,600	\$2,793,600
6.6 Building A through F Connector Corridors		Storefront Windows without Door(s), Metal-Framed, Replace	12000	SF	\$48.00	\$576,000	\$576,000
6.6 Building A through F Entrances		Storefront Windows with Door(s), Metal-Framed, Replace	2500	SF	\$55.00	\$137,500	\$137,500
6.6 Exterior entrances		Steel, Insulated, Exterior Door, Replace	25	EA	\$1,098.00	\$27,450	\$27,450
6.6 Fire stairs		Fire Doors, Replace	21	EA	\$1,536.05	\$32,257	\$32,257
6.6 Classrooms/Offices		Fire Doors, Replace	100	EA	\$950.00	\$95,000	\$95,000
6.8 Common corridors		Locker, Steel, Baked Enamel, Single to 5 Tier, 12" W x 15" D x 72" H, Replace (Per LF)	1000	LF	\$416.50	\$416,500	\$416,500
6.8 Commercial Kitchen		Freezer/Cooler w/ Desuperheater, Commercial, Walk-In, Replace	2	EA	\$45,346.71	\$90,693	\$90,693
6.8 Home economics classroom		Range/Oven, Replace	5	EA	\$5,240.00	\$26,200	\$26,200
6.8 Home economics classroom		Kitchen Cabinet, Base and Wall Section, Wood, Replace	50	LF	\$371.98	\$18,599	\$18,599
7.1 Building G		Expansion Tank, 176 to 250 GAL, Replace	2	EA	\$4,696.79	\$9,394	\$9,394
7.1 Roof		Ductless Split System, Single Zone, 2.5 to 3 Ton, Replace	2	EA	\$6,577.13	\$13,154	\$13,154

7.1 Lobby, connectors	Fan Coil Unit, Hydronic, 4,001 to 12,000 CFM, Replace	7 EA	\$23,034.63	\$161,242	\$161,242
7.1 Building A through F	Building Automation System (HVAC Controls), Upgrade	232566 SF	\$5.36	\$1,246,554	\$1,246,554
7.2 Building E	Emergency Eye Wash & Shower Station, Replace	4 EA	\$2,114.70	\$8,459	\$8,459
7.2 F building	Water Heater, Electric, Commercial, 30 to 80 GAL, Replace	1 EA	\$6,963.24	\$6,963	\$6,963
7.2 D building	Water Heater, Electric, Commercial, 30 to 80 GAL, Replace	1 EA	\$6,963.24	\$6,963	\$6,963
7.5 F Building and B Building Library	ADA, Elevator/Lift, Wheelchair Lift, Up to 8', Install	2 EA	\$23,850.00	\$47,700	\$47,700
7.6 Building F Dust Collection System	Fire Alarm System, School, Upgrade/Install	1000 SF	\$3.13	\$3,130	\$3,130
Immediate Repairs Total					\$9,021,863
* Location Factor (1.0) included in totals.					

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7.1 Building A through F	D3022 Expansion Tank, 31 to 60 GAL, Replace	25	23	2	6 EA	\$2,483.48	\$14,901	\$14,901				\$14,901
7.1 Building G	D3022 Expansion Tank, 176 to 250 GAL, Replace	25	25	0	2 EA	\$4,696.79	\$9,394	\$9,394				\$9,394
7.1 Roof	D3031 Chiller, Air-Cooled, 41 to 50 Ton, Replace	25	10	15	1 EA	\$78,186.30	\$78,186			\$78,186		\$78,186
7.1 Roof	D3031 Chiller, Air-Cooled, 21 to 30 Ton, Replace	25	10	15	1 EA	\$54,093.38	\$54,093			\$54,093		\$54,093
7.1 Roof	D3032 Condensing Unit/Heat Pump, Split System, 2.5 Ton, Replace	15	12	3	7 EA	\$3,366.36	\$23,565	\$23,565		\$23,565		\$47,129
7.1 Roof	D3032 Condensing Unit/Heat Pump, Split System, 2.5 Ton, Replace	15	5	10	1 EA	\$3,366.36	\$3,366	\$3,366				\$3,366
7.1 Roof	D3032 Ductless Split System, Single Zone, 2.5 to 3 Ton, Replace	15	15	0	2 EA	\$6,577.13	\$13,154	\$13,154			\$13,154	\$26,309
7.1 Lobby, connectors	D3041 Fan Coil Unit, Hydronic, 4,001 to 12,000 CFM, Replace	15	15	0	7 EA	\$23,034.63	\$161,242	\$161,242			\$161,242	\$322,485
7.1 Administration	D3041 Fan Coil Unit, 2 to 2.5 Ton, Replace	15	4	11	7 EA	\$2,756.89	\$19,298		\$19,298			\$19,298
7.1 Roof	D3041 Make-Up Air Unit, 6,001 to 12,000 CFM, Replace	20	16	4	2 EA	\$44,658.41	\$89,317	\$89,317				\$89,317
7.1 Buildings A,B,C,D,and part of E	D3041 Unit Ventilator, 1,251 to 1,500 CFM (approx. 4 Ton), Replace	15	14	1	40 EA	\$9,974.25	\$398,970	\$398,970		\$398,970		\$797,940
7.1 Nursing, Early Child Development	D3041 Fan Coil Unit, 2 to 2.5 Ton, Replace	15	12	3	6 EA	\$2,756.89	\$16,541	\$16,541			\$16,541	\$33,083
7.1 Industrial arts workshops	D3041 Air Handler, Interior, 15,001 to 20,000 CFM, Replace	30	11	19	3 EA	\$25,200.00	\$75,600				\$75,600	\$75,600
7.1 Roof	D3042 Exhaust Fan, Centrifugal, 801 to 2,000 CFM, Replace	15	11	4	12 EA	\$2,664.18	\$31,970	\$31,970			\$31,970	\$63,940
7.1 Roof	D3042 Exhaust Fan, Centrifugal, 8,001 to 10,000 CFM, Replace	15	6	9	6 EA	\$7,685.96	\$46,116	\$46,116				\$46,116
7.1 Industrial Arts	D3042 Exhaust Fan, Centrifugal, 3,501 to 5,000 CFM, Replace	15	11	4	2 EA	\$4,322.55	\$8,645	\$8,645				\$17,290
7.1 A Building	D3043 Replace Heat Exchanger	20	5	15	1 EA	\$5,100.00	\$5,100	\$5,100		\$5,100		\$5,100
7.1 C Building	D3043 Replace Heat Exchanger	20	1	19	1 EA	\$5,100.00	\$5,100	\$5,100			\$5,100	\$5,100
7.1 D Building	D3043 Replace Heat Exchanger	20	4	16	1 EA	\$5,100.00	\$5,100	\$5,100		\$5,100		\$5,100
7.1 Industrial arts workshops	D3044 Replace water source unit heaters with fan 43.9 MBH	30	16	14	50 EA	\$4,764.00	\$238,200	\$238,200			\$238,200	\$238,200
7.1 Building G	D3044 Circulation Pump, Heating Water, 30 to 75 HP, Replace	20	6	14	2 EA	\$17,713.00	\$35,426	\$35,426			\$35,426	\$35,426
7.1 Entrance Lobby	D3052 Package Unit, 16 to 20 Ton, Replace	15	13	2	1 EA	\$36,777.37	\$36,777	\$36,777			\$36,777	\$73,555
7.1 Roof	D3052 Air Handling Unit, Exterior, 3.5 to 5 Ton, Replace	15	6	9	2 EA	\$11,419.83	\$22,840	\$22,840				\$22,840
7.1 Building A through F	D3068 Building Automation System (HVAC Controls), Upgrade	20	20	0	232566 SF	\$5.36	\$1,246,554	\$1,246,554				\$1,246,554
7.1 Jewelry Shop	E1027 Laboratory Exhaust Hood, Variable Volume, 4 LF, Replace	25	21	4	2 EA	\$7,284.16	\$14,568	\$14,568				\$14,568
7.2 Bathrooms	D2011 Toilet, Tankless (Water Closet), Replace	20	19	1	25 EA	\$842.97	\$21,074	\$21,074				\$21,074
7.2 Restrooms	D2012 Urinal, Vitreous China, Replace	20	19	1	12 EA	\$1,193.44	\$14,321	\$14,321				\$14,321
7.2 Restrooms	D2013 Lavatory, Vitreous China, Replace	20	19	1	25 EA	\$572.66	\$14,317	\$14,317				\$14,317
7.2 Janitor closets	D2014 Service Sink, Porcelain Enamel, Cast Iron, Replace	20	19	1	8 EA	\$1,360.33	\$10,883	\$10,883				\$10,883
7.2 Building E	D2019 Emergency Eye Wash & Shower Station, Replace	15	15	0	4 EA	\$2,114.70	\$8,459	\$8,459			\$8,459	\$16,918
7.2 F building	D2023 Water Heater, Electric, Commercial, 30 to 80 GAL, Replace	15	15	0	1 EA	\$6,963.24	\$6,963	\$6,963			\$6,963	\$13,926
7.2 C Building	D2023 Water Heater, Electric, Residential, 30 to 52 GAL, Replace	15	8	7	1 EA	\$1,335.00	\$1,335	\$1,335				\$1,335
7.2 E building	D2023 Water Heater, Electric, Commercial, 30 to 80 GAL, Replace	15	1	14	1 EA	\$6,963.24	\$6,963	\$6,963		\$6,963		\$6,963
7.2 D building	D2023 Water Heater, Electric, Commercial, 30 to 80 GAL, Replace	15	15	0	1 EA	\$6,963.24	\$6,963	\$6,963			\$6,963	\$13,926
7.2 Building A and B	D2023 Water Storage Tank, 80 to 150 GAL, Replace	20	8	12	4 EA	\$2,140.56	\$8,562	\$8,562			\$8,562	\$8,562
7.2 Kitchen	D2023 Domestic Boiler, Gas, 260 to 500 MBH, Replace	22	21	1	1 EA	\$20,417.07	\$20,417	\$20,417				\$20,417
7.2 Waste and vent piping	D2031 Pipe & Fittings, Cast Iron, 3", Replace	50	47	3	5000 LF	\$41.60	\$208,000	\$208,000				\$208,000
7.2 Building A and B	D3021 Boiler, Gas, 126 to 250 MBH, Replace	25	8	17	2 EA	\$14,377.52	\$28,755	\$28,755			\$28,755	\$28,755
7.4 Building A to H	D5019 Electrical System, School, Upgrade	40	38	2	232566 SF	\$27.25	\$6,337,424	\$6,337,424				\$6,337,424
7.5 All buildings	D1011 Elevator, Hydraulic, 3000 to 4000 LB, 3 Floors, Renovate	30	18	12	4 EA	\$83,619.00	\$334,476	\$334,476			\$334,476	\$334,476
7.5 F Building and B Building Library	Z1020 ADA, Elevator/Lift, Wheelchair Lift, Up to 8', Install	0	0	0	2 EA	\$23,850.00	\$47,700	\$47,700				\$47,700
7.6 Building A through F	D4019 Sprinkler System, Full Retrofit, School (per SF), Renovate	50	48	2	232566 SF	\$6.25	\$1,453,538	\$1,453,538				\$1,453,538
7.6 All Buildings	D5037 Fire Alarm System, School, Upgrade/Install	20	18	2	232566 SF	\$3.13	\$727,932	\$727,932				\$727,932

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CERTIFICATION

Burlington School District retained EMG to perform this Facility Condition Assessment in connection with its possible acquisition of Burlington High School, 52 Institute Road, Burlington, Vermont, the "Property". It is our understanding that the primary interest of Burlington School District 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 Section 2 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 were observed (See Section 4.2 for areas observed). 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 Burlington School District for the purpose stated within Section 2. of this report. The report, or any excerpt thereof, shall not be used by any party other than Burlington School District or for any other purpose than that specifically stated in our agreement or within Section 2. of this report without the express written consent of EMG.

Any reuse or distribution of this report without such consent shall be at Burlington School District and the recipient's sole risk, without liability to EMG.

Prepared by: Mary Endsley,
Project Manager

Reviewed by:



Raj Vishwanath, FCA Reviewer for
Marge Bershtein
Program Manager
mminick@emgcorp.com

1. EXECUTIVE SUMMARY

1.1. PROPERTY INFORMATION AND GENERAL PHYSICAL CONDITION

The property information is summarized in the table below. More detailed descriptions may be found in the various sections of the report and in the Appendices.

Property Information		
Address:	52 Institute Road, Burlington, Vermont 05408	
Year constructed:	1964 – High School 2007 – Wood Chip Plant	
Current owner of property:	Burlington School District	
Management Point of Contact:	Leonard Smith, Property Services Director 802.864.8453 phone	
Property type:	Educational	
Site area:	32.43	
Gross floor area:	232,566 Square Feet	
Number of buildings:	8 Buildings	
Number of stories:	2 – 4 stories	
Parking type and number of spaces:	380 spaces in open lots	
Building construction:	Masonry bearing walls with concrete-topped metal decks.	
Interior vertical clearance:	Approximately 12 Feet	
Roof construction:	Flat roofs with built-up membrane.	
Exterior Finishes:	Brick Veneer	
Heating and/or Air-conditioning:	Common Area- Heating	Central Hotwater Boilers
	Common Area- Cooling	Split Systems
Fire and Life/Safety:	Limited fire sprinklers, hydrants, smoke detectors, alarms, extinguishers.	
Dates of visit:	June 1, 2015 through June 3, 2015	
Point of Contact (POC):	Leonard Smith	
Assessment and Report Prepared by:	Mary Endsley	

Property Information	
Reviewed by:	Raj Vishwanath Technical Report Reviewer for Marge Bershtein, PE Program Manager mbershtein@emgcorp.com 800.733.0660 x6230

Generally, the property appears to have been constructed within industry standards in force at the time of construction. The property appears to have been well maintained since it was first occupied and is in good overall condition.

According to property management personnel, the property has had a limited capital improvement expenditure program over the past three years, primarily consisting of new heating water circulation pumps. Supporting documentation was not provided in support of these claims but some of the work is evident.

Summary of Energy Audit:

EMG has conducted an Energy Audit on the Burlington High 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.

EMG has evaluated 22 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, EMG has applied a 15% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs

Summary of Financial Information for Recommended Energy Conservation Measures

Item	Estimate
Total Projected Initial ECM Investment	\$ 273,046 (In Current Dollars)
Estimated Annual Cost Savings Related to ECMs	\$107,404 (In Current Dollars)
Net Effective ECM Payback	2.54 years
Estimated Annual Energy Savings	85.15%
Estimated Annual Cost Savings	48.93%

1.2. SPECIAL ISSUES AND FOLLOW-UP RECOMMENDATIONS

As part of the FCA, a limited assessment of accessible areas of the building(s) was performed to determine the presence of mold, conditions conducive to mold growth, and/or evidence of moisture. Property personnel were interviewed concerning any known or suspected mold, elevated relative humidity, water intrusion, or mildew-like odors. Sampling is not a part of this assessment.

There are no visual indications of the presence of mold growth, conditions conducive to mold growth, or evidence of moisture in representative readily accessible areas of the property.

The following issues should be considered.

- Verify that all warranties are transferable.
- Verify that any alterations, installations, or other improvements since the project was first constructed and occupied have been properly permitted and approved by municipal agencies.
- Verify that no defective materials or equipment are used at the property.

Copies of the documents listed below should be obtained:

- All roof, equipment and system warranties/guarantees and transfers. Manufacturers often levy a warranty transfer fee and require that the equipment or system be in pristine condition in order to provide such transfers. This requirement often necessitates upgrades, repairs, or servicing.
- All available site and building construction drawings and specifications.
- All government documents such as Certificates of Occupancy, permits, zoning variances, easements, tax receipts, and other pertinent records.

1.3. OPINIONS OF PROBABLE COST

Cost estimates are attached at the front of this report (following the cover page).

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* and *Marshall & Swift*, EMG'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 of the work (if applicable), quality of contractor, quality of project management exercised, market conditions, and whether competitive pricing is solicited, etc. ASTM E2018-08 recognizes that 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 PCR.

1.3.1. Methodology

Based upon site observations, research, and judgment, along with referencing Expected Useful Life (EUL) tables from various industry sources, EMG 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. Projections of Remaining Useful Life (RUL) are based on continued use of the Property similar to the reported past use. Significant changes in tenants and/or usage may affect the service life of some systems or components.

Where quantities could not be derived from an actual take-off, lump sum costs or allowances 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.

1.3.2. Immediate Repairs and Short Term Costs

Immediate repairs are opinions of probable costs that require immediate action as a result of: (1) material existing or potential unsafe conditions, (2) material building or fire code violations, 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.

Short term costs are opinions of probable costs to remedy physical deficiencies, such as deferred maintenance, that may not warrant immediate attention, but that require repairs or replacements, which should be undertaken on a priority basis in addition to routine preventive maintenance. Opinions of probable costs may include costs for testing, exploratory probing, and further analysis should this be deemed warranted by the consultant. The performance of such additional services is beyond the FCA scope of work. Generally, the time frame for such repairs is within one to two years.

1.3.3. Replacement Reserves

Replacement Reserves are for recurring probable 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 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, EMG'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.

EMG'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 in the Immediate Repair and Short Term Cost Estimate.

2. PURPOSE AND SCOPE

2.1. PURPOSE

EMG 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 at municipal offices, 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 components is typically defined as being in one of three categories: Good, Fair, and Poor. For the purposes of this report, the following definitions are used:

- Good = Satisfactory as-is. Requires only routine maintenance during the assessment period. Repair or replacement may be required due to a system's estimated useful life.
- Fair = Satisfactory as-is. Repair or replacement is required due to current physical condition and/or estimated remaining useful life.
- Poor = Immediate repair, replacement, or significant maintenance is required.

2.2. 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, Short Term, 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 general statement of 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.
- Perform a limited assessment of accessible areas of the building(s) for the presence of mold, conditions conducive to mold growth, and/or evidence of moisture. EMG will also interview Project personnel regarding the presence of any known or suspected mold, elevated relative humidity, water intrusion, or mildew-like odors. Potentially affected areas will be photographed. Sampling will not be considered in routine assessments.
- List the current utility service providers.
- Review maintenance records and procedures with the in-place maintenance personnel.

- Observe a representative sample of the interior tenant spaces/units, including vacant spaces/units, in order 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 mechanical, electrical and elevator equipment rooms.
- Appropriate inquiries of municipal officials regarding the existence of pending unresolved building, zoning or fire code violations on file, and a determination of the current zoning category, flood plain zone, and seismic zone for the Property.
- Provide recommendations for additional studies, if required, with related budgetary information.
- Tenant responsibility for maintenance, repair or replacement of finishes, fixtures, or equipment is not addressed by this scope of services.
- Provide an Executive Summary at the beginning of this report with a Project-At-A-Glance cost estimate as a quick, user-friendly summary of the Property's condition and the assigned costs by category. These costs are tied to the report sections where reference to the issues are clearly defined and expanded.

The expanded scope of this assessment includes the following:

- Prepare a mechanical equipment inventory list.

2.3. PERSONNEL INTERVIEWED

The following personnel from the facility and government agencies were interviewed in the process of conducting the FCA:

Name and Title	Organization	Phone Number
Leonard Smith Property Services	Burlington High School	802.864.8453
Elsie Tillotson Department Secretary	Burlington Building Department	802.865.7188
Joe Keenan Assistant Fire Marshall	Burlington Fire Department	802.864.5577

The FCA was performed with the assistance of Leonard Smith, Property Services, Burlington School District, the on site Point of Contact (POC), who was cooperative and provided information that appeared to be accurate based upon subsequent site observations. The on site contact is completely knowledgeable about the subject property and answered most questions posed during the interview process. The POC's management involvement at the property has been for the past eight years.

2.4. DOCUMENTATION REVIEWED

Prior to the FCA, relevant documentation was requested that could aid in the knowledge of the subject property's physical improvements, extent and type of use, and/or assist in identifying material discrepancies between reported information and observed conditions. The review of submitted documents does not include comment on the accuracy of such documents or their preparation, methodology, or protocol. The Documentation Request Form is provided in Appendix E.

Although Appendix E provides a summary of the documents requested or obtained, the following list provides more specific details about some of the documents that were reviewed or obtained during the site visit.

- Floor plans

- Utility contact information

2.5. PRE-SURVEY QUESTIONNAIRE

A Pre-Survey Questionnaire was sent to the POC prior to the site visit. The questionnaire is included in Appendix E. Information obtained from the questionnaire has been used in preparation of this report.

2.6. WEATHER CONDITIONS

June 1, 2015: Clear, with temperatures in the 50s (°F) and light winds.

June 3, 2015: Clear, with temperatures in the 50s (°F) and light winds.

3. CODE INFORMATION AND ACCESSIBILITY

3.1. CODE INFORMATION, FLOOD ZONE AND SEISMIC ZONE

According to Elsie Tillotson of the Burlington Building Department, there are no outstanding building code violations on file. There are numerous open building permits at the property. A copy of the original Certificates of Occupancy were requested but were not available.

The property management indicated the building is being considered for a substantial renovation. As part of the substantial renovation, the building will be remodeled or reconfigured and therefore required to meet current building and fire codes. EMG was provided with a summary of findings of issues. The review summary indicated the following issues:

- Building A through F – the current window system in conjunction with lack of fire sprinkler coverage requires the installation of either a full sprinkler system or installation of egress windows. The connecting doors within the classrooms also require modification, installation, or replacement to access the window egress system.
- Building A through F – the interior doors and stairwells require modification, replacement or installation to meet current fire codes. Separation enclosures are required within building A and B. Classrooms greater than 1,000-SF require additional egress doors. There are doors swinging the wrong direction during fire safety utilization. Proper pathways are required at the protective services classroom. There is a dead end corridor occurring at the band room.

The above projects were provided with individual budgetary costs. The cost budget included soft costs for contractor fees and a discounted cost for completing the projects in unison, known as mobilization costs. The budget also provided a cost range from high to low. EMG has included the high cost budget in the Replacement Reserves Report.

Based on a review of the zoning classification information at the Burlington Planning Department, the property is located within the RCOG zoning district and appears to be a conforming use.

A message was left on the voice mail of Joe Keenan, Assistant Fire Marshal, regarding any fire code violations at Burlington High School. Significant information will be forwarded upon receipt. According to the site POC there may be some fire code violations regarding the common corridors. The building was compliant when originally constructed but new requirements have changed.

According to the Flood Insurance Rate Map, published by the Federal Emergency Management Agency (FEMA) and dated 7/18/2011, the property is located in Zone X (unshaded), defined as areas outside the 500-year flood plain with less than 0.2% annual probability of flooding. Annual Probability of Flooding of Less than one percent.

According to the 1997 Uniform Building Code Seismic Zone Map of the United States, the property is located in Seismic Zone 2A, defined as an area of low to moderate probability of damaging ground motion.

3.2. ADA ACCESSIBILITY

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

Buildings completed and occupied after January 26, 1992 are required to comply fully with the ADAAG. Existing facilities constructed prior to this date are held to the lesser standard of compliance to the extent allowed by structural feasibility and the financial resources available. As an alternative, a reasonable accommodation pertaining to the deficiency must be made.

During the FCA, a limited visual observation for ADA accessibility compliance was conducted. The scope of the visual observation was limited to those areas set forth in *EMG's Abbreviated Accessibility Checklist* provided in Appendix D of this report. It is understood by the Client that the limited observations described herein does not comprise a full ADA Compliance Survey, and that such a survey is beyond the scope of EMG's undertaking. Only a representative sample of areas was observed and, other than as shown on the Abbreviated Accessibility Checklist, actual measurements were not taken to verify compliance. At a school property, the areas considered as a public accommodation besides the site itself and parking, are the exterior accessible route, the interior accessible route up to the classrooms and the interior common areas, including the common area restrooms.

The POC indicated the building is being considered for a substantial renovation. As part of the substantial renovation, the building is intended to be remodeled or reconfigured with the intent of full accessibility compliance.

EMG was provided with a summary of findings of an interior ADA review by others. The review summary indicated the following:

- Installation of compliant ramps are required at the entrance lobby
- Reconstruction of the ramp between the lobby and building B, interior ramp between building B and D, interior ramp connection between building B and C, and install compliant closed ground level ramp walkway from building C to E
- Installation of vertical lifts and accessible pathways are required at band room, music room, aviation laboratory, maintenance break room, loading dock area, auditorium stage, auditorium seating, automotive mechanic changing room, and between building D and F
- Replace existing knob handle hardware with lever action hardware throughout the buildings
- Renovate multiple stall restrooms and shower rooms with compliant accessories and accessible stalls, convert and/or renovate single stall restrooms to compliant accessible restrooms

The above projects were provided with individual budgetary costs. The cost budget included soft costs for contractor fees as well as a discounted cost for completing the projects simultaneously, by combining mobilization costs. The budget also provided a cost range from high to low. EMG has included the high range cost budget provided by the client's ADA consultant in the Replacement Reserves Report.

The property did not appear to be accessible with Title III of the Americans with Disabilities Act. Elements as defined by the ADAAG that are not accessible as stated within the priorities of Title III, are as follows:

Parking and Site Grounds

- Adequate number of designated parking stalls and signage for cars and vans are not provided.
- Signage directing to accessible parking or accessible building entrances to the facility are not provided.
- Access aisles adjacent to parking spaces, crossing hazardous vehicle areas, from main roadways or public transportation stops to the building sidewalks and entrances are not provided.

- The playing fields are accessible only with vehicular transportation to the fields. Access aisles from main building to playing fields are not provided.

A full ADA Compliance Survey of the exterior of the property may reveal additional aspects of the property that are not in compliance.

Corrections of these conditions should be addressed from a liability standpoint, but are not necessarily code violations. The Americans with Disabilities Act Accessibility Guidelines concern civil rights issues as they pertain to the disabled and are not a construction code, although many local jurisdictions have adopted the Guidelines as such. The estimated cost of this work is included the Replacement Reserves Report.

4. EXISTING BUILDING ASSESSMENT

4.1. AREAS OBSERVED

All 232,566 square feet of the building is occupied by a single tenant, Burlington High School.

EMG observed 100 percent of the building in order to gain a clear understanding of the property's overall condition. Other areas accessed included the exterior of the property and the roof, as observed from the ground level for the 1903 original building.

All areas of the property were available for observation during the site visit.

A "down area" is a term used to describe an unoccupied space due to poor conditions such as fire damage, water damage, missing equipment, damaged floor, wall or ceiling surfaces, or other significant deficiencies. According to the site personnel, there are no unoccupied spaces in the facility. No down areas were observed during the site visit.

5. SITE IMPROVEMENTS

5.1. UTILITIES

The following table identifies the utility suppliers and the condition and adequacy of the services.

Site Utilities		
Utility	Supplier	Condition and Adequacy
Sanitary sewer	City of Burlington	Good
Storm sewer	Burlington Department of Public Works	Good
Domestic water	City of Burlington	Good
Electric service	Burlington Electric	Good
Natural gas service	Vermont Gas	Good

Observations/Comments:

- The utilities appear to be adequate for the property. There are no unique, on site utility systems such as emergency electrical generators, septic systems, water or waste water treatment plants, or propane gas tanks.
- The property has a 1000-gallon propane tank and a propane distribution system, which supplies propane gas to the field house. The propane tank is located in the vicinity of field house. The propane distribution system was installed in 2006 and appears to be in good condition and no gas leaks are evident. The system will require routine maintenance over the assessment period.

5.2. PARKING, PAVING, AND SIDEWALKS

Item	Description
Main Ingress and Egress	Institute Road
Access from	S
Additional Entrances	None
Additional Access from	None

Paving and Flatwork					
Item	Material	Last Work Done	Good	Fair	Poor
Entrance Driveway Apron	Asphalt	2006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Parking Lot	Asphalt	2006	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Drive Aisles	Asphalt	2006	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service Aisles	Asphalt	2006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Item		Last Work Done	Good	Fair	Poor
Sidewalks		2006	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Curbs	Cast in Place Concrete	2006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
trian Ramps	Cast in Place Concrete	2006	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Parking Count				
Open Lot	Carport	Private Garage	Subterranean Garage	Freestanding Parking Structure
380	0	0	0	0
Number of ADA Compliant Spaces			8	
Number of ADA Compliant Spaces for Vans			0	
Total Parking Spaces			380	
Parking Ratio (Spaces/Apartments)			0	
Method of obtaining parking count			Physical count	

Exterior Stairs					
Location	Material	Handrails	Good	Fair	Poor
Service area – A building	Concrete stairs	Metal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Entrance to B Building	Concrete stairs	Metal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Entrance to F Building	Concrete stairs	Metal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Action/Comments:

- The property does not have a dedicated paving repair and maintenance contractor. On site personnel maintain the paving and flatwork or a contractor is retained when required.
- The concrete pavement is in good condition at the main parking area and service drives surrounding the High School building. There are no significant signs of cracks or surface deterioration. Repair of minor cracks will be required during the assessment period as part of the property management's routine maintenance program.
- The asphalt pavement is in good condition. However, the surface seal coating is worn and pavement markings are difficult to identify. Crack sealing, seal coating, and re-striping of the asphalt paving will be required over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The parking area at the student parking lots are in poor condition. In order to maximize the pavement life, pothole patching, crack sealing, seal coating, and re-striping of the asphalt paving will be required during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

- In addition to the pavement repairs noted above, seal coating, and re-striping of the asphalt pavement will be required over the assessment period to maximize the pavement life. The estimated cost of this work is included in the Replacement Reserves Report.
- The concrete sidewalks, curbs, and gutters are in fair condition. Isolated areas of settlement, cracking and spalling concrete curbs and sidewalks occur along the front entrance path, the student parking lots and the sidewalks surrounding the buildings. The damaged areas of concrete curbs and sidewalks will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The asphalt paths throughout the courtyards are in fair condition. There are isolated areas of failure and deterioration, such as localized depressions near the connector entrances. The damaged areas of paving must be cut and patched in order to maintain the integrity of the overall pavement system. The estimated cost of this work is included in the Replacement Reserves Report.
- The concrete curbs, gutters, and sidewalks throughout the property are in good condition. Routine cleaning and maintenance will be required during the assessment period.

5.3. DRAINAGE SYSTEMS AND EROSION CONTROL

Drainage System and Erosion Control				
System	Exists At Site	Good	Fair	Poor
Surface Flow	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Detention Pond	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lagoons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ponds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Underground Piping	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
French Drains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Municipal System	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dry Well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- There is no evidence of storm water runoff from adjacent properties. The storm water system appears to provide adequate runoff capacity. There is no evidence of major ponding or erosion.
- No repair costs are recommended. Routine maintenance is recommended over the evaluation period.

5.4. TOPOGRAPHY AND LANDSCAPING

Item	Description
Site Topography	Slopes gently down from the north side of the property to the south property line.

Item	Description						
Landscaping	Trees	Grass	Flower Beds	Planters	Drought Tolerant Plants	Decorative Stone	None
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	Automatic Underground		Drip		Hand Watering		None
	<input checked="" type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Retaining Walls				
Type	Location	Good	Fair	Poor
Stone Masonry	Memorial walk at fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reinforced Concrete	Stairs and courtyards	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- The topography and adjacent uses do not appear to present conditions detrimental to the property.
- The landscape material is in fair condition. There are isolated areas of overgrown and neglected landscape areas and planters in the courtyards, front yard and side yards. New landscape material must be installed at the affected areas. The estimated cost of this work is included in the Replacement Reserves Report.
- The underground irrigation system is located at the baseball field only and appears to be in good working order. Replacement of sprinkler heads and minor repairs will be required during the assessment period. This work is considered to be routine maintenance.

5.5. GENERAL SITE IMPROVEMENTS

Property Signage	
Property Signage	Monument Sign
Street Address Displayed?	NA

Site and Building Lighting					
Site Lighting	None	Pole-mounted	Bollard Lights	Ground Mounted	Parking Lot Pole Type
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Building Lighting	None		Wall-mounted		Recessed Soffit
	<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>

Site Fencing				
Type	Location	Good	Fair	Poor
Chain link with metal posts	Football and track field	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chain link with metal posts	Perimeter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Site Fencing				
Type	Location	Good	Fair	Poor
Chain link with metal posts	Along Institute and North Road	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Refuse Disposal						
Refuse Disposal	Common Area Dumpsters					
Dumpster Locations	Mounting	Enclosure	Contracted?	Good	Fair	Poor
Loading dock	Asphalt Paving	None	Yes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H building parking area	Asphalt Paving	None	Yes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other Site Amenities					
	Description	Location	Good	Fair	Poor
Playground Equipment	Plastic	Rear of F Building	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tennis Courts	None	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basketball Court	None	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swimming Pool	None	NA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Baseball field	Grass	Playing Fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Football Field and Track	Turf	Playing Fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The football field is surrounded by a chain link fence.

The playing field complex was completed in 2006. New high intensity lighting and seating was installed. A new turf field and track was installed.

Observations/Comments:

- No repair costs are recommended. Routine maintenance is recommended over the evaluation period.
- The property and tenant identification signs are in good condition. Routine maintenance will be required during the assessment period.
- The exterior site and building light fixtures are in good condition. Routine maintenance will be required during the assessment period.
- The playground equipment is in good condition. It is associated with the Early Childhood education center at F building. Routine maintenance will be required during the assessment period.
- The fields and track are well maintained and in good condition. Routine maintenance will be required during the assessment period.

6. BUILDING ARCHITECTURAL AND STRUCTURAL SYSTEMS

6.1. FOUNDATIONS

Building Superstructure				
Item	Description	Good	Fair	Poor
Floor	Concrete Slab on grade	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Footings	Concrete perimeter footings	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Basement and Crawl Space	None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- The foundations and footings could not be directly observed during the site visit. There is no evidence of movement that would indicate excessive settlement.

6.2. SUPERSTRUCTURE

Building Superstructure				
Item	Description	Good	Fair	Poor
Framing	Steel Columns	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper Floors	Concrete topped steel desks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roof Structure	Open web steel joists	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roof Sheathing	Steel Decks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- The superstructure is exposed in some locations, which allows for limited observation. Walls and floors appear to be plumb, level, and stable. There are no significant signs of deflection or movement.

6.3. ROOFING

Primary Roof			
Type	Flat	Finish	Rubber membrane with stone ballast
Maintenance	In-house Staff	Roof Age	
Flashing	Membrane	Warranties	

Primary Roof			
Parapet and Copings	None	Roof Drains	Internal drains
Fascia	Metal Panel	Insulation	Rigid Board
Soffits	None	Skylights	Yes
Attics		Ponding	Yes
Ventilation Source-1		Leaks Observed	No
Ventilation Source-2		Roof Condition	Good

The primary roof is observed at A, B, C, D, E and F Buildings.

Secondary Roof			
Type	Gable Roof	Finish	Asphalt shingles
Maintenance	In-house Staff	Roof Age	
Flashing	Membrane	Warranties	
Parapet and Copings	None	Roof Drains	Edge drainage to ground
Fascia	None	Insulation	Fiberglass batts
Soffits	Concealed Soffits	Skylights	No
Attics	Wood joists with plywood sheathing	Ponding	No
Ventilation Source-1	Soffit Vents	Leaks Observed	No
Ventilation Source-2	Gable end vents	Roof Condition	Good

The secondary roof is observed at H Building.

Observations/Comments:

- The property does not have a dedicated roof repair and maintenance contractor. On site personnel maintain the roofs or a contractor is retained when required. age and warranty statement
- The primary roof finishes vary in age but most of the primary roof and connector roofs were replaced within the last 10 years. Information regarding roof warranties or bonds were requested but are not available.
- The roof membranes are in good condition and will require routine maintenance during the assessment period.
- The primary roof is in good condition. Based on their estimated Remaining Useful Life (RUL), the roof membrane will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves Cost Estimate (Table 2)
- The asphalt roof at H building is in good condition. Based on their estimated Remaining Useful Life (RUL), the asphalt roof membrane will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- There is no evidence of active roof leaks.

- There is no evidence of roof deck or insulation deterioration. The roof substrate and insulation should be inspected during any future roof repair or replacement work.
- There is no evidence of fire retardant treated plywood (FRT).
- The roof flashings are in good condition and will require routine maintenance during the assessment period.
- The parapet walls and copings are in good condition and will require routine maintenance during the assessment period.
- Roof drainage appears to be adequate. Clearing and minor repair of drain system components should be performed regularly as part of the property management's routine maintenance program.
- The roof vents are in good condition and will require routine maintenance during the assessment period.
- The skylights are in good condition and will require routine maintenance during the assessment period.

6.4. EXTERIOR WALLS

Building Exterior Walls				
	Type	Good	Fair	Poor
Primary Finish	Brick Veneer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Accented With	Metal Panels	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Soffits	None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Building sealants (caulking) are located between dissimilar materials, at joints, and around window and door openings.

Observations/Comments:

- The sealant is flexible, smooth, and in good condition and will require routine maintenance during the assessment period.
- Some area of the brick masonry veneer is in fair condition. There are significant areas of spalling and broken bricks at the north elevation of F Building. The affected areas of brick masonry must be repaired. The estimated cost of this work is included in the Replacement Reserves Report.
- Most of the brick masonry veneer is in good condition. There is no evidence of cracking or efflorescence. Based on the estimated Remaining Useful Life (RUL), the mortar joints must be cleaned and re-pointed over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The metal siding is in fair condition. There are significant areas of rusted, dented and damaged siding at A Building and throughout the campus. The damaged siding must be repaired and replaced as part of the window upgrade over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

6.5. EXTERIOR AND INTERIOR STAIRS

Building Exterior and Interior Stairs							
Type	Description	Riser	Handrail	Balusters	Good	Fair	Poor
Building Exterior Stairs	Concrete stairs	Close	Metal	Metal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Building Interior Stairs	Steel Framed With Vinyl treads	Close	Metal	Metal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- The interior stairs, balusters, and handrails are in good condition and will require routine maintenance during the assessment period.
- The concrete stairs are in fair condition. There are isolated areas of spalled concrete surfaces at the stairs near the service area and the entrances of B and F buildings. The damaged portions of the stairs must be repaired. Based on its condition the stairs will require repairs over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

6.6. EXTERIOR WINDOWS AND DOORS

Building Windows						
Window Framing	Glazing	Location	Window Screen	Good	Fair	Poor
Hopper Units	Double Pane	Classrooms	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Aluminum-framed units with fixed panes	Double Pane	Administration	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Building Doors				
	Door Type	Good	Fair	Poor
Main building Entrance Door	Solid Core metal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Service Door Type-1	Hollow Metal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Service Door Type-2	Metal Door With Vision Glass	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Overhead Door	Manual	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Observations/Comments:

- The storefront window system is in fair to poor condition. The storefront system includes exterior doors, fixed window panes, operable hopper units, metal fascia panels, and insulated aluminum infill panels. The windows, frames, and panels are original to the date of construction for each of the buildings. Approximately 20 percent of the glazing and frames have been replaced since the time of construction. The replacement window system elements are mismatched in color and design. The system has numerous areas of impact damage along the ground floor, rusted fascia panels, broken seals in the vision panels, and inoperable hopper units. The perimeter window sealant is dry, broken and damaged. There were numerous areas of apparent water infiltration through the storefront evidenced in the classrooms. The storefront window system requires replacement. Based upon the age, condition, and mismatched color/design of the 20 percent of the system that has been replaced, replacement of the system is recommended. Replacement of the storefront system includes windows, doors at classrooms and entrances. The estimated cost of this work is included in the Replacement Reserves Report.
- The steel lintels and base connections at the storefront system are deteriorated and corroded. The steel will require replacement in conjunction with the storefront replacement. The estimated cost of this work is included in the Replacement Reserves Report.

- The storefront at the connectors is in poor condition. The connector storefront has steel supports at the upper level corridors. The decks are constructed of steel and concrete. The connector framing, windows, metal, roofing, and concrete will require repair and/or replacement. In addition, budgetary costs for replacement of the connectors are included in Section 3.2 of this report for installation of accessibility compliant ramps. The estimated cost of this work is included in the Replacement Reserves Report.
- The exterior doors are in fair condition. There are a select rusted and damaged doors and door frames. The damaged doors must be replaced. Based on the estimated Remaining Useful Life (RUL) and their condition, most of the doors will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- A total of 13 overhead doors are located at the loading dock, H Building and the industrial arts classrooms including wood shop, aviation, auto repair, and auto body repair. The overhead doors are coiling metal doors and are equipped with mechanical openers
- The overhead doors are in fair condition. There are a few rusted and deteriorated doors. Based on the estimated Remaining Useful Life (RUL) and their condition, some of the doors will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The classroom, corridor and stair doors are in fair condition. Many are from the original construction. Based on the estimated Remaining Useful Life (RUL), the interior doors will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

6.7. PATIO, TERRACE, AND BALCONY

Not applicable. There are no patios, terraces, or balconies.

6.8. COMMON AREAS, ENTRANCES, AND CORRIDORS

The lobby contains benches and a main staircase to the central administrative offices and Auditorium.

The class rooms, common areas and administrative spaces are accessed from corridors on each floor.

Common area restrooms located off the common corridors on the first floor and second floors of Buildings A, C, D and F. There are a total of ten common area restrooms.

The following table identifies the interior common areas and generally describes the finishes in each common area.

Common Area	Floors	Walls	Ceilings
Lobby	Vinyl Tile	Painted CMU	Suspended T-bar (Acoustic)
Auditorium	Carpet	Painted CMU	Painted drywall
Gymnasium	Polished concrete	Painted CMU	Exposed
Corridor	Vinyl Tile	Painted CMU	Suspended T-bar (Acoustic)
Cafeteria	Vinyl Tile	Painted CMU	Suspended T-bar (Acoustic)
Common Area Restrooms	Ceramic Tile	Ceramic Tile	Painted drywall

The lockers are located in the corridors of each building. The lockers are constructed of painted metal with numerical combination locks. The lockers are vertical to one another or stacked three to four in height.

The building has two commercial kitchens. There is one kitchen servicing the student lunch program and a kitchen for the culinary arts program. There is a variety of commercial kitchen appliances, fixtures, and equipment. The equipment is owned and maintained by the district.

The kitchen includes the following major appliances, fixtures, and equipment:

Appliance	Comment
Refrigerators	Walk-in and Up-right
Freezers	Walk-in
Ranges	Gas
Ovens	Gas
Griddles / Grills	Gas
Fryers	Yes
Hood	Exhaust ducted to exterior
Dishwasher	Owned
Microwave	Yes
Ice Machines	Yes
Steam tables	Yes
Work tables	Stainless steel
Shelving	Stainless steel

Observations/Comments:

- The kitchen appliances appear to be in good condition. Based on their estimated Remaining Useful Life (RUL), the walk-in refrigerator and freezer will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The vinyl tile flooring in the classrooms and corridors is in fair condition. Based on the condition and estimated Remaining Useful Life (RUL), the vinyl flooring will require replacement during the assessment period. The vinyl flooring throughout the building has been installed over the original flooring and sub-flooring. There are sub-layers of reported ACM floor tiles. Reportedly, approximately 30 percent of the building has exposed potential ACM floor tiles and ACM mastic on the subflooring. Removal and replacement of the current vinyl flooring is required in conjunction with ACM abatement and subflooring repairs. The estimated cost of this work is included in the Replacement Reserves Report.
- The lockers are in poor condition. There were numerous impact damaged lockers, lockers leaning and not aligned. Approximately 10 percent of the lockers were considered to be non-functioning units. The lockers require replacement early during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The stair vinyl flooring is in fair condition. The flooring is worn and there is select damage throughout the stair landings. The flooring requires replacement early during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- Some of the common areas were last renovated approximately four years ago including the auditorium, cafeteria, and student restrooms in a building and F building.
- It appears that the interior finishes in the common areas including the gymnasium and common corridors have not been renovated within the last 15 years.

- The ceiling tiles are in fair condition. Based on the estimated Remaining Useful Life (RUL), the ceiling tiles will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The painted walls are in good condition. Based on the estimated Remaining Useful Life (RUL), the walls will require painting over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The hardwood flooring in gymnasium is in fair condition. Based on the estimated Remaining Useful Life (RUL), the gymnasium flooring will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The work stations at the Home Economics classrooms are original cabinets with replacement appliances. Based on the estimated Remaining Useful Life (RUL), the work stations will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- There are ten common area restrooms, which are located within each building and at the locker rooms. The common area restrooms have ceramic-tile floors and wainscots and painted drywall-finished walls and ceilings. The restrooms have commercial-grade fixtures including water closets and lavatories.
- The common area restrooms at A and F Buildings have been recently renovated. Based on the condition and estimated Remaining Useful Life (RUL), the remaining restrooms will require renovation over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The loading dock equipment is in good condition and will require routine maintenance during the assessment period.

7. BUILDING MECHANICAL AND PLUMBING SYSTEMS

See the Mechanical Equipment List in the Appendices for the quantity, manufacturer's name, model number, capacity and year of manufacturer of the major mechanical equipment, if available.

7.1. BUILDING HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

Building Central Heating System	
Primary Heating System Type	Central Hotwater Boilers
Quantity	4
Heating Fuel	Natural Gas and Wood Biomass
Heating System Input Capacity (MBH)	Three, 6,000-MBH for gas boiler and one, 2,500-MBH biomass boiler
Manufactured Rated Efficiency	80% (approximately)
Location of Equipment	G Building
Space Served by System	All
Age	28 year old gas boilers and 9 year old biomass boiler
Heating Plant Condition	Fair

Building Cooling Systems	
Primary Cooling System Type	Packaged units, split systems
Quantity	See equipment schedule
Refrigerant	R-22, R-410a
Cooling System Capacity (Tons)	Approximately 150 tons combined
Cooling Tower Size	NA
Manufactured Rated Efficiency	10.0 EER (Approximately)
Location of Equipment	Roof top, mechanical rooms
Space Served by System	Assembly areas, offices
Age	8-10 years
Cooling System Condition	Good to fair

Distribution Systems	
Hot Water Distribution System	Two pipe system
Hot Water Circulation Pump Size and Quantity	2 (40 HP) in boiler plant also 8 smaller (1-2 HP) circulation pumps at buildings
Chilled Water Circulation Pump Size and Quantity	NA
Air Distribution System	Unit Ventilators, Constant and variable volume Air Handlers
Air Handling Unit Locations	Mezzanine space and ceiling hung at industrial arts workshops. Wall hung

Distribution Systems	
Air Handling Units- Serving	Cafeteria/Auditorium/Workshops/Offices
Location Fan Coil Unit	Ceiling-mounted/Unit Ventilators/Unit heaters
Spaces Served by Fan Coil Unit	Classrooms, Various
Common Area Temperature Control	BMS, Local thermostats
Building Ventilation	Fresh Air Intake at Unit Ventilators and Air Handlers, Roof Exhaust Fans
Ventilation System Condition	Fair

The heating and cooling systems are controlled primarily by local thermostats. The large air handler systems have pneumatic controls.

The industrial arts workshops are heated by hot water unit heaters, which are suspended from the ceiling. The units are individually controlled by integral thermostats. There are gas-fired make up air units for the shop spaces.

Heating in the classrooms is provided by unit ventilators with hot water heating coils and outside air ventilation.

Heating and cooling for the auditorium, cafeteria and the culinary arts kitchen is provided by large capacity split air handling units equipped with hot water heating and direct expansion cooling coils. The air handling units are located in the mezzanine. The condensing/chillers units are located on the roof.

Natural ventilation is provided by operable windows. Mechanical ventilation is provided in each bathroom by ceiling exhaust fans, via unit ventilators and via corridor exhaust air systems utilizing plenum ceilings and rooftop exhaust fans. There are local exhaust systems at the shop areas.

Heating and cooling for the administrative spaces, the computer classrooms, the nursing and the child care programs is provided by unit ventilators and split system air-conditioners.

Corridors, restrooms and other areas have hot water baseboard radiators. The building connectors are heated by fan coil units.

There are gas-fired makeup air units and exhaust hoods for the kitchens.

Observations/Comments:

- The property does not have a dedicated HVAC repair and maintenance contractor. On site personnel maintain the HVAC equipment or a contractor is retained when required.
- The HVAC equipment varies in age.
- The pneumatic HVAC controls are in poor condition. The controls are obsolete and require replacement. The estimated cost of this work is included in the Replacement Reserves Report.
- The HVAC climate control in the auditorium lobby is in poor condition. The POC indicated that the lobby is not adequately heated likely due to the removal of electric heating elements and it is not cooled. It is recommended a dedicated rooftop unit be installed to provide adequate climate control to the lobby and the adjacent corridors, which includes the reception area for the building and visitor restrooms. The estimated cost of this work is included in the Replacement Reserves Report.
- The hot water pumping systems appears to be in good condition. Based on the estimated Remaining Useful Life (RUL), pump replacements will be required over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The heating water piping on the roof has deteriorating insulation, supports, and couplings which will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

- The unit ventilators appear to be in good to fair condition. The units have been replaced in F Building and parts of the E Building. Based on their estimated Remaining Useful Life (RUL), the unit ventilators in the rest of the buildings will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The ceiling hung unit heaters appear to be in fair condition. Based on their estimated Remaining Useful Life (RUL), the unit heaters will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The baseboard radiators are in good condition and will require routine maintenance during the assessment period.
- The large air handlers and their condensing units appear to be in fair condition. Based on the estimated Remaining Useful Life (RUL), the large air handlers will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The wood chip boiler was installed new in 2006. The wood boiler appears to be in good condition and will require routine maintenance during the assessment period.
- The natural gas boilers were installed around 1987 and are in fair to poor condition with reported burner operation problems as well as difficulty obtaining parts. Based on this information, their condition, and the estimated Remaining Useful Life (RUL) the boilers will require replacement early in the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The boiler and heat exchanger expansion tanks are in good to poor condition. The boiler tanks are not functioning properly requiring replacement. The remainder of the tanks will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The mechanical ventilation systems and equipment appear to be in fair condition. Fan replacements will be required during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The corridor ceiling plenum ventilation systems will require conversion upon a substantial upgrade to the HVAC systems. A cost for conversion to heat recovery ventilators is included in the Replacement Reserves Cost Estimate (Table 2).
- The make-up air units for the kitchens are in good condition. Based on their estimated Remaining Useful Life they will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- It was reported that the connector corridors are not warm enough and that the main lobby does not heat well. Additional heating will be required in the main lobby and the connector fan coil units should be upsized when they are replaced.

7.2. BUILDING PLUMBING AND DOMESTIC HOT WATER

Building Plumbing System				
Type	Description	Good	Fair	Poor
Water Supply Piping	Copper	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste/Sewer Piping	Cast Iron Pipe	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vent Piping	Cast Iron Pipe	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Water Meter Location	Vault in street			

Domestic Water Heaters	
Fuel	Natural Gas, Electricity

Domestic Water Heaters	
Water Heater Volume	80 -120 gal
Input Capacity	Varies
Supplementary Storage Tanks?	Yes
Storage Tank Volume	120 gal
Quantity of Storage Tanks	4
Water Heater Condition:	Good to fair
Domestic Hot Water Circulation Pump/s (HP)	Fractional
Pressure and Flow of Hot Water	Adequate
Domestic Water Booster Pumps (hp)	NA
Pressure and Flow of City Water	Adequate

Common Area Plumbing Fixtures	
Water Closets	Commercial
Water Closets Rating	Varies
Common Area Faucet, GPM	Varies

Domestic hot water is provided by the heating boiler system during the heating season. There are heat exchangers in place in Buildings A through E to heat the Domestic water from the boiler loop.

In buildings A and B, two gas-fired hot water boilers feeding 4 120-gallon storage tanks are used in the non-heating months. The kitchen has a gas-fired boiler for off season water heating.

There are electric tank heaters for Buildings C, D, E and F.

The domestic water piping is copper. The waste and vent piping is cast iron.

Observations/Comments:

- The heat exchangers appear to be in good to fair condition. Based on their estimated Remaining Useful Life (RUL), the heat exchangers in A, C and D Building will require replacement during the assessment period. The cost of this work is included in the Replacement Reserves.
- The gas boilers and storage tanks for building A and B were installed in 2008 and are in good condition. Based on their estimated Remaining Useful Life (RUL), the water heaters and storage tanks will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The kitchen hot water boiler is in fair condition and reportedly is hard to get parts for. Based on its estimated Remaining Useful Life (RUL), the water heating boiler will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The electric heater for Building F is over 15 years old and will require replacement during the assessment period. The heaters for Buildings C, E, and F. Vary in age. Based on their expected remaining useful life (RUL) they will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.

- Most of the waste and vent piping is original and the maintenance staff reports that the systems are nearing or at the end of their lives, requiring frequent repairs. These piping systems will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The Emergency showers in Building E will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The accessories and fixtures in the common area restrooms are in good to fair condition and will require routine maintenance and replacement of the oldest fixtures at buildings B, C, D, and E during the assessment period.

7.3. BUILDING GAS DISTRIBUTION

Gas service is supplied from the gas main on the adjacent public street. There are three gas meters and regulators located along the exterior walls of the buildings. The gas distribution piping within the buildings is malleable steel (black iron).

Observations/Comments:

- The pressure and quantity of gas appear to be adequate.
- The gas meters and regulators appear to be in good condition and will require routine maintenance during the assessment period.
- Only limited observation of the gas distribution piping can be made due to hidden conditions. The gas piping appears to be in good condition.

7.4. BUILDING ELECTRICAL

Building Electrical Systems			
Electrical lines run	Underground	Transformers	Pad-mounted
Service size (Amps)	1800 Amps	Volts	277/480 Volt, three-phase
Meter and panel location	2 Exterior Electric meters. 2 Electrical Rooms	Branch wiring	Copper
Conduit	Metallic	Circuit Breaker Panels	Located throughout the buildings
Number of Buildings	Multiple	Building Intercom System	Yes

Observations/Comments:

- The on site electrical systems up to the site transformers are owned and maintained by the respective utility Burlington Electric.
- The electrical service and capacity appear to be adequate for the property's demands.

- The interior switchgear, breaker panels' peripheral wiring, and receptacles appear to be in fair condition. The electrical system has had only as required replacement since building construction. The system's current configuration provides adequate power to the building; however, there are obsolete panels, transformers, and switchgear within the building. The branch wiring is generally original with the exception of isolated locations, including but not limited to, the auditorium, kitchen, and office upgrades. The current number and location of the receptacles within the classrooms is not adequately configured for electronic instructional equipment. Based upon the observed conditions, an electrical modernization of the system is required during the assessment period. The estimated cost to perform this work is included in the Replacement Reserves Report.

7.5. BUILDING ELEVATORS AND CONVEYING SYSTEMS

	Elevator-1	Elevator-2	Elevator-3	Elevator-4
Building Name	A Building	B Building	E Building	F Building
Elevator Category	Passenger	Passenger	Passenger	Passenger
Elevator Type	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Elevator Capacity	2100 Lbs	2000 Lbs	2100 Lbs	2800 Lbs
Elevator Manufacturer	Dover	Thyssen-Krupp	Dover	Dover
Equipment Location	At base	At base	At base	At base
Elevator Safety Stop	Electronic	Electronic	Electronic	Electronic
Elevator Emergency Communication	Yes	Yes	Yes	Yes
Elevator Cab Floor	Vinyl-tiled	Vinyl-tiled	Vinyl-tiled	Vinyl-tiled
Elevator Cab Wall	Plastic-laminated wood	Plastic-laminated wood	Plastic-laminated wood	Plastic-laminated wood
Elevator Cabin Lighting	F42T8	F42T8	F42T8	F42T8

Observations/Comments:

- The elevators are serviced on a routine basis. The elevator machinery and controls were upgraded in 1997.
- The elevators appear to provide adequate service. Based on its estimated Remaining Useful Life (RUL), the elevator equipment will require replacement during the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The elevators are inspected on an annual basis by the municipality, and a certificate of inspection is displayed in the elevator cabs. The emergency communication equipment in the elevators appears to be functional and will require routine maintenance during the assessment period.
- There are two wheel chair lifts located at F Building connector and the library. According to the site POC the lift at F Building has problems with the controls. The wheel chair lifts were installed in 1997. Based on their estimated Remaining Useful Life (RUL), the wheel chair lifts will require replacement during the assessment period.

- The finishes in the elevator cabs appear to be in good condition. Based on their estimated Remaining Useful Life (RUL), some of the cab finishes will require replacement during the assessment period.

7.6. FIRE PROTECTION AND SECURITY SYSTEMS

Item	Description					
Type	Wet (Partial)					
Fire Alarm System	None	<input type="checkbox"/>	Battery Operated Smoke Detectors	<input checked="" type="checkbox"/>	Strobe Light Alarms	<input checked="" type="checkbox"/>
	Central Alarm Panel	<input checked="" type="checkbox"/>	Hard-wired Smoke Detectors	<input checked="" type="checkbox"/>	Illuminated EXIT Signs	<input checked="" type="checkbox"/>
	Battery backup Light Fixtures	<input checked="" type="checkbox"/>	Hard-wired Smoke Detectors/ with battery Backup	<input checked="" type="checkbox"/>	Annunciator Panels	<input checked="" type="checkbox"/>
Sprinkler System	None	<input type="checkbox"/>	Standpipes	<input checked="" type="checkbox"/>	Flow Switches	<input checked="" type="checkbox"/>
	Pull Station	<input checked="" type="checkbox"/>	Fire Pumps	<input type="checkbox"/>	Siamese Connections	<input checked="" type="checkbox"/>
	Alarm horns	<input checked="" type="checkbox"/>	Backflow Preventer	<input checked="" type="checkbox"/>	Hose Cabinets	<input checked="" type="checkbox"/>
Central Alarm Panel System	Location of Alarm Panel			Age of Alarm panel		
	Main office			1		
Fire Extinguishers	Last Service Date			Estimated Quantity		
	3/18/15			96		
Hydrant Location	Institute Road					
Siamese Location	A Building					
Special Systems	Kitchen Suppression System		<input checked="" type="checkbox"/>	Computer Rm. Suppression System		<input type="checkbox"/>

Part of the school is protected by a limited wet sprinkler system. Sprinkler heads are located in the auditorium and the spray room at the auto body work shop.

Interior fire exit stairwells are accessed from the common area corridors. There are twelve fire stairs located throughout the property. The walls of the fire stairwells are finished with exposed masonry. The stairs discharge at the ground floor, directly to the exterior of the building and to the main entrance lobby.

Observations/Comments:

- Information regarding the fire sprinkler inspection contractor was requested but was not provided by the POC.
- Information regarding the fire alarm inspection contractor was requested but was not provided by the POC
- Information regarding fire department inspection information is included in Section 3.1.
- The central alarm panel appears in fair condition and serviced regularly by a qualified fire equipment contractor. Based on inspection documents displayed by the panel, the central alarm panel has been inspected within the last year.

- The central alarm panel appears to be approximately one year old. Based on the estimated Remaining Useful Life (RUL), the alarm panel will require replacement over the assessment period. The estimated cost of this work is included in the Replacement Reserves Report.
- The fire sprinklers appear in good condition and inspected by a qualified contractor on a routine basis. The fire sprinklers will require routine maintenance during the assessment period.
- The building does not have sprinkler coverage with the exception of the kitchen and boiler room. The POC indicated the building is being considered for a substantial renovation. As part of the substantial renovation, the building will be remodeled or reconfigured and therefore required to meet current building codes. Installation of a full sprinkler system is anticipated with the renovation. In addition, the peripheral fire protection equipment varies in age to the date of construction. Although the fire panel was recently renovated, the fire protection equipment will also require modernization in conjunction with the installation of a new sprinkler system. The estimated cost for these two items is included in the Replacement Reserves Report.
- The fire extinguishers are serviced annually and in good condition. The fire extinguishers were serviced and inspected within the last year.
- The pull stations and alarm horns appear to be in good condition and will require routine maintenance during the assessment period.
- Smoke detector replacement is considered to be routine maintenance.
- Exit sign and emergency light replacement is considered to be routine maintenance.
- The dry chemical extinguishing systems appear in good condition serviced regularly by a qualified fire equipment contractor.
- The dust collection system in Building F is reported to need fire suppression and alarm additions. The estimated cost of this work is included in the Replacement Reserves Report.
- The exit stairwells appear to be constructed in accordance with applicable codes in force at the time of construction.
- The stairwell doors and door hardware are fire-rated. Components bearing certification labels are displayed on the doors.

8. TENANT SPACES

8.1. INTERIOR FINISHES

Not applicable; see Section 6.8 for descriptions and comments regarding the interior finishes.

8.2. COMMERCIAL KITCHEN EQUIPMENT

Not applicable; see Section 6.8 for descriptions and comments regarding the kitchen equipment.

8.3. HVAC

Not applicable; see Section 7.2. for descriptions and comments regarding the building HVAC systems.

8.4. PLUMBING

Not applicable; see Section 7.2 for descriptions and comments regarding the building plumbing systems.

8.5. ELECTRICAL

Not applicable; see Section 7.4 for descriptions and comments regarding the building electrical systems.

9. OTHER STRUCTURES

A maintenance building and field house are located near the new football field. The maintenance building is a pre-manufactured wood structure set on a concrete slab. The field house is a masonry structure with flat roof.

Observations/Comments:

- The maintenance building and field house were constructed in 2006 and are in good condition. They will require routine maintenance during the assessment period.

10. ENERGY AUDIT - PURPOSE AND SCOPE

The purpose of this Energy Audit is to provide Burlington High School with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, as well as support performance contracting, justify a municipal bond-funded improvement program, or as a basis for replacement of equipment or systems

The energy audit consisted of an on site 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 following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

The following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

Energy and Water Using Equipment

- EMG has surveyed the tenant spaces, common areas, offices, maintenance facilities and mechanical rooms to document utility-related equipment, including heating systems, cooling systems, air handling systems and lighting systems.

Building Envelope

- EMG has reviewed the characteristics and conditions of the building envelope, checking insulation values and conditions. This review also includes an inspection of the condition of walls, windows, doors, roof areas, insulation and special use areas.

Recommendations for Energy Savings Opportunities

- Based on the information gathered during the on site assessment, the utility rates, as well as recent consumption data and engineering analysis, EMG has identified opportunities to save energy and provide probable construction costs, projected energy/utility savings and provide a simple payback analysis.

Analysis of Energy Consumption

- Based on the information gathered during the on site assessment, EMG has conducted an analysis of the energy usage of all equipment, and identified which equipment is using the most energy and what equipment upgrades may be necessary. As a result, equipment upgrades or replacements are identified that may provide a reasonable return on the investment and improve maintenance reliability.

Energy Audit Process

- 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

11. ENERGY CONSERVATION MEASURES

EMG has identified 22 Energy Conservation Measures (ECMs) for this property. Please see the following pages for a list of the ECMs.

List of Recommended Energy Conservation Measures For Burlington High School													
ECM #	Description of ECM	ECM Evaluation	ECM Category	Net Project Initial Investment	Estimated Annual Energy Savings	Estimated Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	ECM Category-Payback Based	Life Cycle Savings	Expected Useful Life (EUL)
					Electricity								
					kWh	\$	\$	\$	Years			\$	Years
1	Replace Existing Air Conditioners with Energy Star Air Conditioners	Evaluated	HVAC- Core ECM	\$70,365	-22,857	-\$3,657	-\$183	-\$3,840	-18.32	-0.65	Payback ≤ 12 Yrs	-\$116,207	15.00
2	Install Low Flow Shower Heads	Evaluated	Plumbing- Core ECM	\$979	0	\$15,236	\$0	\$15,236	0.06	132.79	Payback ≤ 12 Yrs	\$128,986	10.00
3	Reduce HVAC Hours of Operation	Evaluated	Controls- Core ECM	\$2,780	65,400	\$15,164	\$0	\$15,164	0.18	65.12	Payback ≤ 12 Yrs	\$178,248	15.00
4	Install Low Flow Restroom Flush Tank Toilets	Evaluated	Plumbing- Core ECM	\$17,213	0	\$34,020	\$0	\$34,020	0.51	29.40	Payback ≤ 12 Yrs	\$488,919	20.00
5	Control External Air Leakage In Commercial Buildings	Evaluated	Envelope- Core ECM	\$7,613	5,577	\$10,770	\$323	\$11,093	0.69	12.43	Payback ≤ 12 Yrs	\$87,010	10.00
6	Replace Existing Freezers With High Efficiency Freezers	Evaluated	Appliance- Core ECM	\$897	5,927	\$948	\$0	\$948	0.95	12.62	Payback ≤ 12 Yrs	\$10,424	15.00
7	Install Energy Savers on Vending, Snack Machines	Evaluated	Controls- Core ECM	\$2,109	13,433	\$2,149	\$0	\$2,149	0.98	8.70	Payback ≤ 12 Yrs	\$16,226	10.00
8	Install Outside Air Temperature Reset Controls For Hot Water Boilers	Evaluated	Controls- Core ECM	\$5,200	0	\$5,174	\$0	\$5,174	1.00	8.49	Payback ≤ 12 Yrs	\$38,939	10.00
9	Replace Existing Motors With High Efficiency Motors	Evaluated	Motors- Core ECM	\$8,666	14,567	\$2,331	\$117	\$2,447	3.54	3.37	Payback ≤ 12 Yrs	\$20,550	15.00
10	Re-Commission The Building & Its Control Systems	Evaluated	Controls- Core ECM	\$74,019	63,000	\$15,254	\$0	\$15,254	4.85	2.46	Payback ≤ 12 Yrs	\$108,087	15.00
11	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)	Evaluated	Appliance- Core ECM	\$1,945	2,462	\$394	\$0	\$394	4.94	2.42	Payback ≤ 12 Yrs	\$2,757	15.00
12	Replace External Windows	Evaluated	Envelope- Core ECM	\$43,762	0	\$8,581	\$86	\$8,667	5.05	3.88	Payback ≤ 12 Yrs	\$126,106	30.00
13	Install Low Flow Faucet Aerators	Evaluated	Plumbing- Core ECM	\$20,206	0	\$3,709	\$0	\$3,709	5.45	1.57	Payback ≤ 12 Yrs	\$11,432	10.00
14	Add Reflective Coating To Exterior Windows	Evaluated	Envelope- Core ECM	\$7,559	601	\$1,019	\$51	\$1,070	7.07	1.69	Payback ≤ 12 Yrs	\$5,209	15.00
15	Install Variable Frequency Drives (VFD)	Evaluated	Controls- Core ECM	\$31,860	20,748	\$3,320	\$0	\$3,320	9.60	1.24	Payback ≤ 12 Yrs	\$7,770	15.00
16	Replace Existing Heat Pumps With Energy Efficient Heat Pumps	Evaluated	HVAC- Core ECM	\$44,988	17,283	\$2,765	\$0	\$2,765	16.27	0.91	12 ≥ Payback ≤ 20 Yrs	-\$3,849	20.00
17	Upgrade Insulation	Evaluated	Envelope- Core ECM	\$12,625	0	\$693	\$0	\$693	18.22	1.41	12 ≥ Payback ≤ 20 Yrs	\$5,205	50.00
18	Install Building Energy Management System and Replace Terminal Units	Evaluated	Controls- Core ECM	\$863,307	42,000	\$10,170	\$508	\$10,678	80.85	0.15	Payback > 20 Yrs	-\$735,833	15.00
19	Install Reflective Insulation Between Radiators And External Wall	Evaluated	Envelope- Core ECM	\$2,843	0	\$0	\$0	\$0	-	0.00	Payback > 20 Yrs	-\$2,843	10.00
22	Install Timers On Exhaust Fans	Evaluated	Controls- Core ECM	\$498	0	\$0	\$0	\$0	-	0.00	Payback > 20 Yrs	-\$498	15.00
39	Bilevel and Tandem Linear Fluorescent Lighting ECM	Evaluated	Lighting- Core ECM	\$0	0	\$0	\$0	\$0	-	0.00	Payback > 20 Yrs	\$0	15.00
41	Install Low Flow Tankless Restroom Fixtures	Evaluated	Plumbing- Core ECM	\$1,927	0	\$0	\$0	\$0	-	0.00	Payback > 20 Yrs	-\$1,927	15.00
Totals For Evaluated ECM's With Payback ≤12 Yrs				\$295,171	168,858	\$114,411	\$394	\$114,805	2.57				
Totals For Evaluated ECM's With 12 > Payback ≤20 Yrs				\$57,613	17,283	\$3,458	\$0	\$3,458	16.66				
Totals For Evaluated ECM's With Payback > 20 Yrs				\$868,576	42,000	\$10,170	\$508	\$10,678	81.34				
Total For ALL Evaluated ECM'S				\$1,221,361	228,141	\$128,039	\$902	\$128,941	9.47				
Totals For Recommended ECM's (SIR ≥1)				\$237,431	191,715	\$118,762	\$576	\$119,338	1.99				
	Interactive Savings Discount @ 10%				-19,172	-\$11,876	-\$58	-\$11,934					
	Total Contingency Expenses @ 15%			\$35,615									
Total for Improvements				\$273,046	172,544	\$106,885	\$519	\$107,404	2.54				

12. UTILITY ANALYSIS

Establishing the energy baseline begins with an analysis of the utility cost and consumption of the building. 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. The Historical Data Analysis breaks down utilities by consumption, cost and annual profile.

This data is analyzed, using standard engineering assumptions and practices. The analysis serves the following functions:

- Allows our engineers to benchmark the energy and water consumption of the facilities against consumption of efficient buildings of similar construction, use and occupancy.
- Generates the historical and current unit costs for energy and water
- Provides an indication of how well changes in energy consumption correlate to changes in weather.
- Reveals potential opportunities for energy consumption and/or cost reduction. For example, the analysis may indicate that there is excessive, simultaneous heating and cooling, which may mean that there is an opportunity to improve the control of the heating and cooling systems.

By performing this analysis and leveraging our experience, our engineers prioritize buildings and pinpoint systems for additional investigation during the site visit, thereby maximizing the benefit of their time spent on site and minimizing time and effort by the customer's personnel. Based upon the utility information provided about the Burlington School District, Champlain Elementary School, the following energy rates are utilized in determining existing and proposed energy costs.

Note: No gas and water utility data was received by EMG from the Burlington School District (BSD) at the time of report compilation. As a result of this, EMG has estimated the approximate water rate, taking into consideration the published tariff rates, surcharges, and service charges per meter. EMG will update the report on receipt of the actual data from the BSD.

Utility Rates used for Cost Analysis

Electricity	Natural Gas	Water / Sewer
\$0.16/kWh	\$1.12/therm	\$ 10.5/kGal

12.1. ELECTRICITY

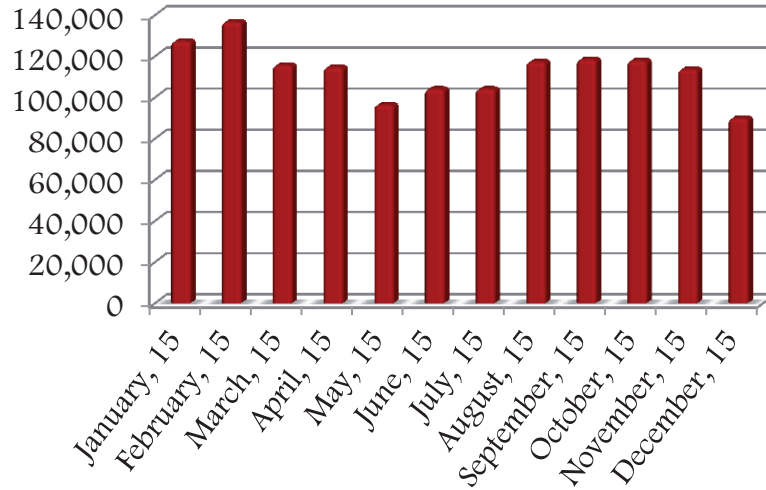
Burlington Electricity satisfies the electricity requirements of the facility. The property is master metered.

The electricity is paid for by the school district. The consumption pattern for the period under consideration varies seasonally. The seasonal variation in the consumption is attributed to cooling loads, while the base load primarily consists of lighting.

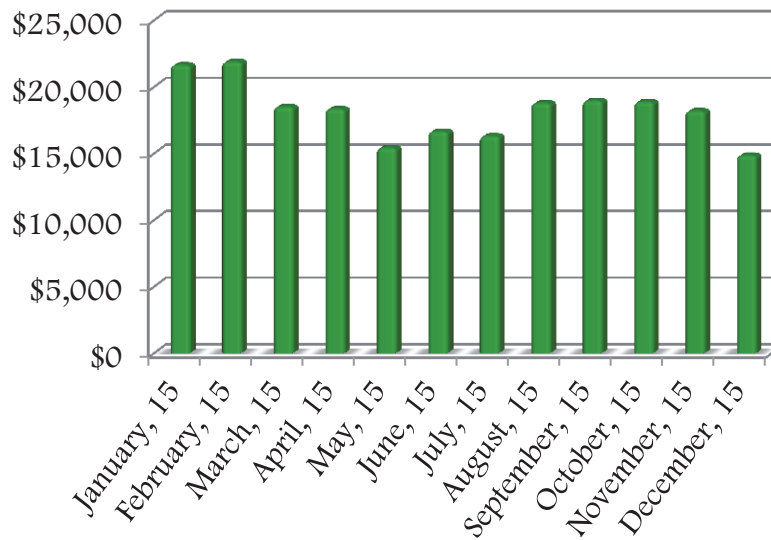
Based on the 2015 electric usage and costs, the average price paid during the year was \$0.18 per kWh. The total annual electricity consumption for the 12-month period analyzed is 1,242,012kWh for a total cost of \$218,445.60.

Billing Month	Monthly Electricity Usage (kWh)	Monthly Electricity Cost
January, 15	12739.0	\$21,644.23
February, 15	136803.0	\$21,888.48
March, 15	115638.7	\$18,502.19
April, 15	114615.0	\$18,338.40
May, 15	96416.5	\$15,426.64
June, 15	104119.5	\$16,659.12
July, 15	104120.0	\$16,310.25
August, 15	117376.6	\$18,780.26
September, 15	118531.9	\$18,965.10
October, 15	117967.8	\$18,874.85
November, 15	113713.5	\$18,194.16
December, 15	89970.0	\$14,861.92
Annual Electricity Usage and Cost:	1,242,012	\$218,445.60

Electricity Use (kWh)



Electricity Cost (\$)



12.2. NATURAL GAS

Vermont Gas satisfies the natural gas requirements of the facility are satisfied by. The gas to the property is direct metered. Based on the data provided by the POC, there is one gas meter at the facility.

The primary use of natural gas is for space heating. The consumption pattern for the period under consideration varies seasonally. Based on the information provided by the site manager, the heating season starts from October and continues till May end

Note: No gas utility data was received by EMG from the BSD at the time of report compilation. As a result of this, EMG has estimated the approximate fuel rate, taking into consideration the published tariff rates, surcharges, and service charges per meter. EMG will update the report on receipt of the actual data from the BSD.

12.3. PROPANE OR FUEL OIL

Not applicable. There is no propane or fuel oil at the property.

12.4. WATER AND SEWER

The City of Burlington satisfies the Water and Sewer requirements of the facility.

There is one water meter at the site. Water usage data was not provided to EMG.

EMG utilized a \$10.5/kGal rate for the purposes of calculations.

13. RECOMMENDED OPERATIONS AND 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. These actions will ensure that the energy conservation measures identified in this report will remain effective. The following general recommendations should be continued or implemented.

Building Envelope

1. Ensure that the building envelope has proper caulking and weather stripping.
2. Patch holes in the building envelope with foam insulation and fire rated caulk around combustion vents
3. Inspect building vents semiannually for bird infestation
4. Inspect windows monthly for damaged panes and failed thermal seals
5. Repair and adjust automatic door closing mechanisms as needed. (Remove, if not-applicable)

Heating and Cooling

1. All preventive maintenance should be performed on all boilers, which would include cleaning of burners and heat exchanger tubes.
2. Ensure that the combustion vents exhaust outside the conditioned space and the vent dampers are functional.
3. Ensure the duct work in unconditioned space is un-compromised and well insulated.
4. Duct cleaning is recommended every 10 years. This should include sealing of ducts using products similar to 'aero-seal'.
5. Ensure that the air dampers are operating correctly.
6. Return vents should remain un-obstructed and be located centrally.
7. Temperature settings reduced in unoccupied areas and set points seasonally adjusted.
8. Evaporator coils and condenser coils should be regularly cleaned to improve heat transfer.
9. Refrigerant pipes should be insulated with a minimum of ¾" thick Elastomeric Rubber Pipe Insulation.
10. Ensure refrigerant pressure is maintained in the condensers.
11. Change air filters on return vents seasonally. Use only filters with 'Minimum Efficiency Rating Value' (MERV) of 8.

Central Domestic Hot Water

1. Never place gas-fired water heaters adjacent to return vents so as to prevent flame roll outs.
2. Ensure the circulation system is on timer to reduce the losses through re-circulation.
3. Ensure all hot water pipes are insulated with fiberglass insulation at all times.

4. Replacement water heater should have Energy Factor (EF) > 0.9.
5. Tank-type water heaters flushed monthly.

Lighting

1. Utilize bi-level lighting controls in stairwells and hallways.
2. Use energy efficient replacement lamps (28W T-8 and CFLs).
3. Clean lighting fixture reflective surfaces and translucent covers.
4. Ensure that timers and/or photocells are operating correctly on exterior lighting.
5. Use occupancy sensors for offices and other rooms with infrequent occupancy.

Existing Equipment and Replacements

1. Ensure that refrigerator and freezer doors close and seal correctly.
2. Ensure kitchen and bathroom exhaust outside the building and the internal damper operates properly.
3. Ensure that bathroom vents exhaust out.
4. Office/ computer equipment either in the "sleep" or "off" mode when not used.

14. APPENDICES

APPENDIX A: Photographic Record

APPENDIX B: Site Plans

APPENDIX C: Supporting Documentation

APPENDIX D: EMG Abbreviated Accessibility Checklist

APPENDIX E: Pre Survey Questionnaire and Documentation Request Checklist

APPENDIX F: Terminology

APPENDIX G: Resumes for Report Reviewer and Field Observer

APPENDIX A:
PHOTOGRAPHIC RECORD

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #1:	Front entrance to High School
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Photo #2:	A building rear elevation
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Photo #3:	A building front elevation
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Photo #4:	A building side elevation
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Photo #5:	Accessible entrance at B building
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Photo #6:	Maintenance building at playing fields
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EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #7: Field house



Photo #8: Maintenance sheds opposite loading dock



Photo #9: F building front elevation



Photo #10: B building side elevation



Photo #11: G building front elevation



Photo #12: View of connector between D and E buildings

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #13: Front elevation H building



Photo #14: Greenhouse at D building



Photo #15: E building rear elevation



Photo #16: Connector between D and B buildings



Photo #17: Connector between D and A buildings



Photo #18: Front elevation at D building

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #19: Side elevation D building



Photo #20: Playground equipment at F building



Photo #21: Student parking lot



Photo #22: Student Parking lot



Photo #23: Exterior stairs at F building



Photo #24: Side road and parking behind F building

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #25: F building parking area



Photo #26: Memorial walk and retaining wall



Photo #27: Loading dock at A building



Photo #28: Bleachers and press box



Photo #29: Baseball field



Photo #30: Loading dock at F building

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #31: Roof at F building



Photo #32: Lower roof at A building



Photo #33: Fire alarm panel



Photo #34: Heat exchanger at mezzanine



Photo #35: Hot water storage tanks



Photo #36: Two of three water pumps

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #37: Air handler at building trade workshop



Photo #38: Hot water radiator



Photo #39: Roof top condensing units at F building



Photo #40: Unit ventilator at art room



Photo #41: Hot water heater for commercial kitchen



Photo #42: Condensing unit outside automotive shop

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #43: Wood chip boiler at H building



Photo #44: Conveyor belt for wood chips



Photo #45: Fire sprinkler riser at H building



Photo #46: Mini split system for computer lab at F building



Photo #47: Mini split system interior fan



Photo #48: Main electrical panel in electrical room

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #49: Connector between B and A buildings



Photo #50: Library

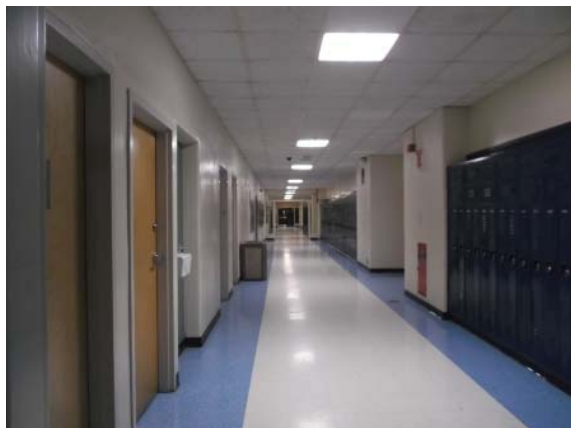


Photo #51: Common corridor

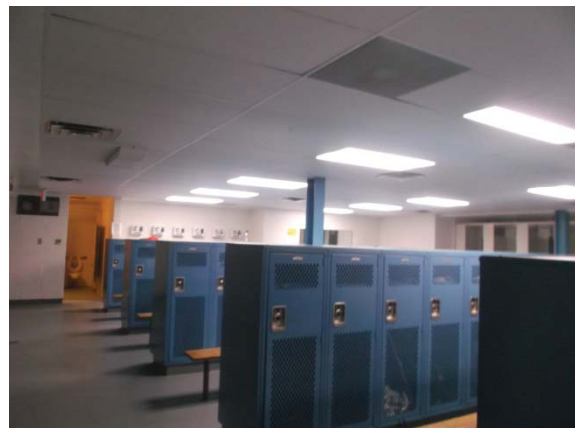


Photo #52: Girls locker room



Photo #53: Lavatory at main rest room



Photo #54: Commercial kitchen

EMG PHOTOGRAPHIC RECORD

Project No.: 113231.15R-001.294

Project Name: Burlington High School



Photo #55: Home economic work station



Photo #56: Biology Lab



Photo #57: Classroom

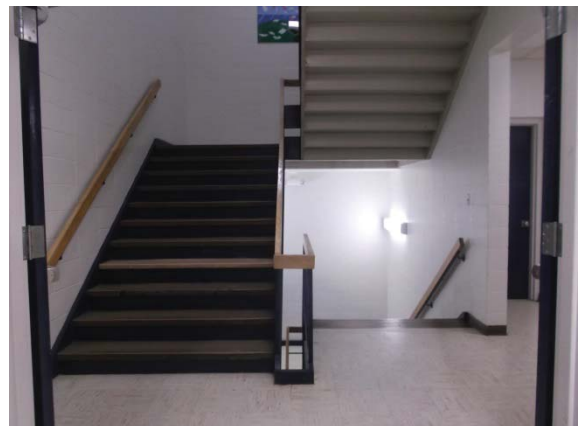


Photo #58: Fire stair at A building



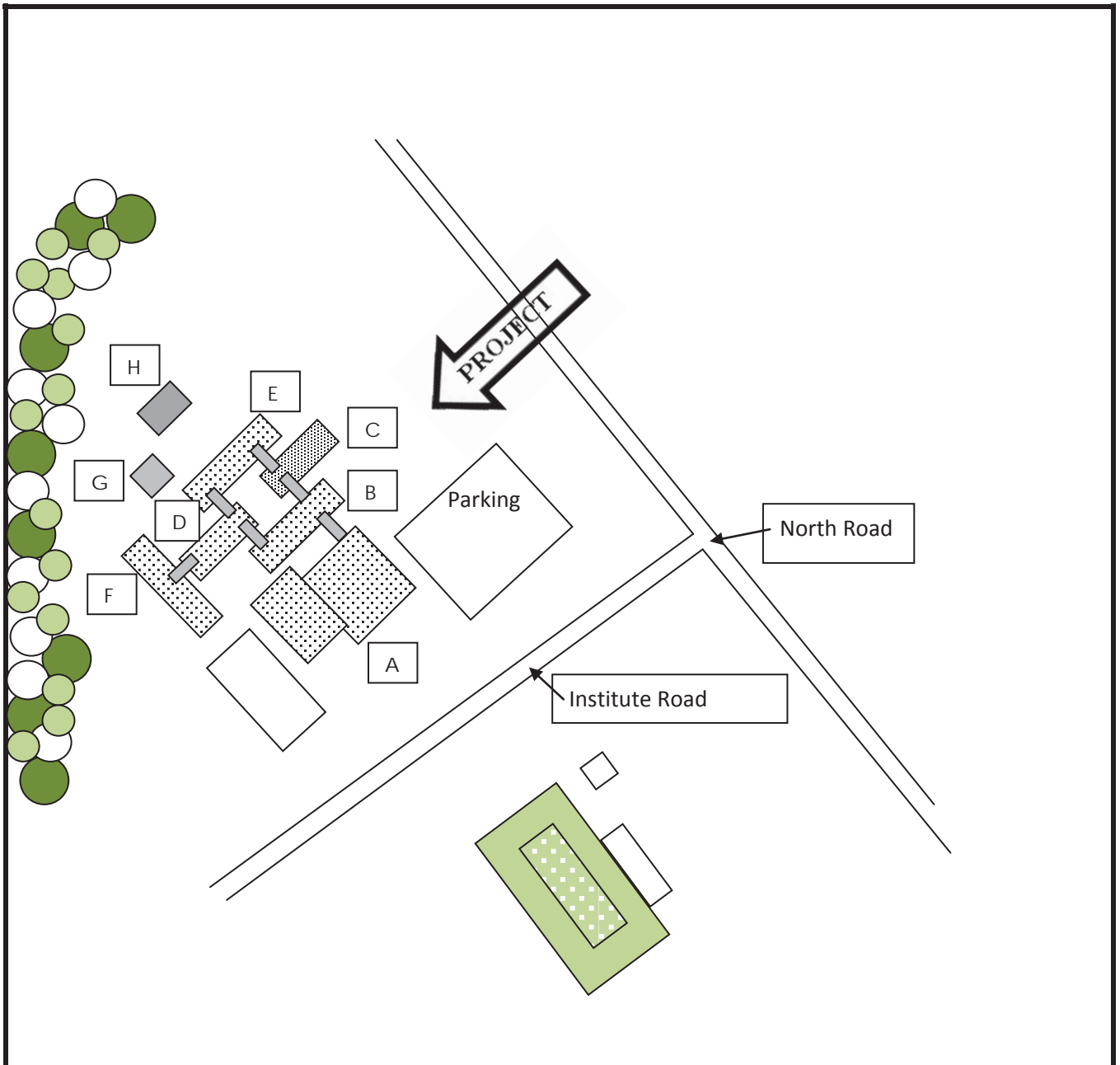
Photo #59: Chair lift at library





Photo #60: Chair lift at F building

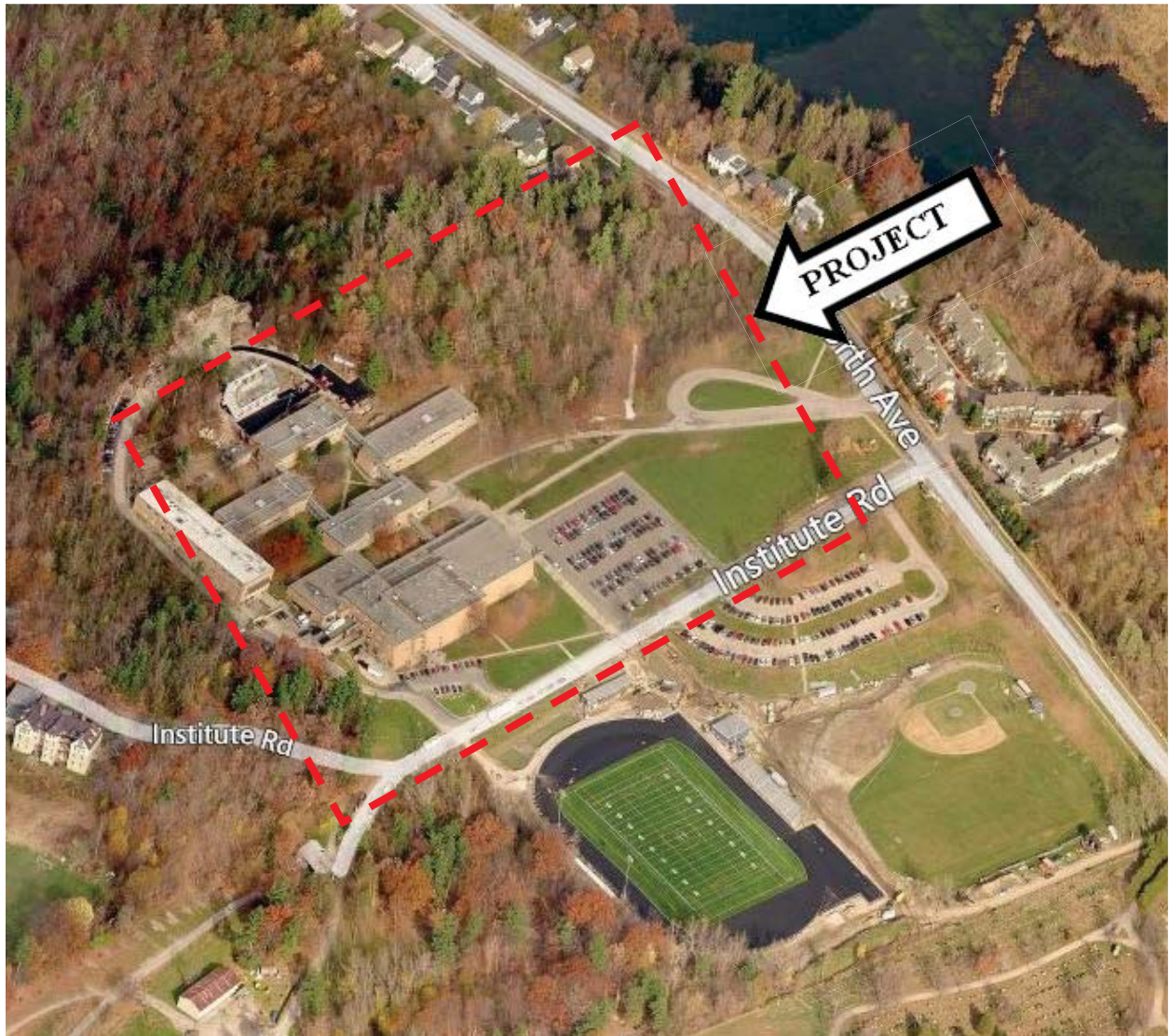
APPENDIX B:
SITE PLANS

Site Plan



	<p>Source: Google Maps</p>	<p>Project Number: 113231.15R-001.294</p>
	<p>Not drawn to scale. The north arrow indicator is an approximation of 0° North.</p>	<p>Project Name: Burlington High School</p> <p>On-Site Date: June 1-3, 2015</p>

Site Plan



EMG

Source:

Bing Maps

Project Number:

113231.15R-001.294

Project Name:

Burlington High School



Not drawn to scale. The north arrow indicator is an approximation of 0° North.

On-Site Date:

June 1-3, 2015

APPENDIX C:
SUPPORTING DOCUMENTATION

Equipment Inventory Report
3/11/2016

ID	Location	Description	Manufacturer	Model	Details	Internal Facility	Dude Id	Quantity	Unit	Replacement Year	Total Cost
335184	Burlington High School	D1011 - Elevator, Hydraulic, 3000 to 4000 LB, 3 Floors, Renovate; Lifespan: 30	Dover	EP9520	FH8040			4	EA	2028	\$334,476
389249	Burlington High School	D2012 - Urinal, Vitreous China, Replace; Lifespan: 20						12	EA	2017	\$14,321
389253	Burlington High School	D2014 - Service Sink, Porcelain Enamel, Cast Iron, Replace; Lifespan: 20						8	EA	2017	\$10,883
388848	Burlington High School	D2019 - Emergency Eye Wash & Shower Station, Replace; Lifespan: 15	Haws					4	EA	2016	\$8,459
388902	Burlington High School	D2021 - Pipe & Fittings, Steel, 3", Replace; Lifespan: 30						2800	LF	2017	\$127,232
388859	Burlington High School	D2023 - Water Heater, Electric, Commercial, 30 to 80 GAL, Replace; Lifespan: 15	Bradford White					1	EA	2016	\$6,963
335222	Burlington High School	D2023 - Water Heater, Electric, Residential, 30 to 52 GAL, Replace; Lifespan: 15	Bradford White					1	EA	2023	\$1,335
388861	Burlington High School	D2023 - Water Heater, Electric, Commercial, 30 to 80 GAL, Replace; Lifespan: 15	A O Smith	DRE 80 100				1	EA	2030	\$6,963
388901	Burlington High School	D2023 - Circulator Pump, 2 HP, Replace; Lifespan: 15	Taco					9	EA	2025	\$53,509
388856	Burlington High School	D2023 - Water Heater, Electric, Commercial, 30 to 80 GAL, Replace; Lifespan: 15	Bradford White					1	EA	2016	\$6,963
388776	Burlington High School	D2023 - Water Storage Tank, 80 to 150 GAL, Replace; Lifespan: 20	Triangle Tube		120			4	EA	2028	\$8,562
388781	Burlington High School	D2023 - Domestic Boiler, Gas, 260 to 500 MBH, Replace; Lifespan: 22	De Dietrich	C-230				1	EA	2017	\$20,417
388843	Burlington High School	D2031 - Pipe & Fittings, Cast Iron, 3", Replace; Lifespan: 50						5000	LF	2019	\$208,000
388900	Burlington High School	D3021 - Boiler, Dual Fuel, 2,001 to 20,000 MBH, Replace; Lifespan: 30	Hurst		FB 1660-60-4			1	EA	2024	\$953,869
388774	Burlington High School	D3021 - Boiler, Gas, 126 to 250 MBH, Replace; Lifespan: 25	Rinnai	R53				2	EA	2033	\$28,755
412389	Burlington High School	D3021 - Boiler, Gas, 4,201 to 10,000 MBH, Replace; Lifespan: 25	Bryan	RV600-W-FDG				3	EA	2018	\$998,603
412400	Burlington High School	D3022 - Expansion Tank, 31 to 60 GAL, Replace; Lifespan: 25						6	EA	2018	\$14,901
412399	Burlington High School	D3022 - Expansion Tank, 176 to 250 GAL, Replace; Lifespan: 25	Taco	Not Accessible				2	EA	2016	\$9,394
388944	Burlington High School	D3031 - Chiller, Air-Cooled, 41 to 50 Ton, Replace; Lifespan: 25	Aaon					1	EA	2031	\$78,186
388947	Burlington High School	D3031 - Chiller, Air-Cooled, 21 to 30 Ton, Replace; Lifespan: 25	Aaon					1	EA	2031	\$54,093
389213	Burlington High School	D3032 - Condensing Unit/Heat Pump, Split System, 2.5 Ton, Replace; Lifespan: 15	Carrier					7	EA	2019	\$23,565
389219	Burlington High School	D3032 - Condensing Unit/Heat Pump, Split System, 2.5 Ton, Replace; Lifespan: 15	Lennox					1	EA	2026	\$3,366
389223	Burlington High School	D3032 - Ductless Split System, Single Zone, 2.5 to 3 Ton, Replace; Lifespan: 15	Fujitsu					2	EA	2016	\$13,154
388943	Burlington High School	D3041 - Air Handler, Interior, 20,001 to 25,000 CFM, Replace; Lifespan: 30	Aaon					1	EA	2036	\$64,707
388923	Burlington High School	D3041 - Fan Coil Unit, Hydronic, 4,001 to 12,000 CFM, Replace; Lifespan: 15						7	EA	2016	\$161,242
389220	Burlington High School	D3041 - Fan Coil Unit, 2 to 2.5 Ton, Replace; Lifespan: 15	Lennox					7	EA	2027	\$19,298
389266	Burlington High School	D3041 - Air Handler, Variable Volume w/ Exhaust Recovery Wheel, 20,000 CFM, Replace; Lifespan: 30						4	EA	2045	\$475,401
389216	Burlington High School	D3041 - Make-Up Air Unit, 6,001 to 12,000 CFM, Replace; Lifespan: 20	Carrier					2	EA	2020	\$89,317
388939	Burlington High School	D3041 - Unit Ventilator, 1,251 to 1,500 CFM (approx. 4 Ton), Replace; Lifespan: 15	AAF					40	EA	2017	\$398,970
412394	Burlington High School	D3041 - Air Handler, Interior, 10,001 to 15,000 CFM, Replace; Lifespan: 30						1	EA	2036	\$41,979
389215	Burlington High School	D3041 - Fan Coil Unit, 2 to 2.5 Ton, Replace; Lifespan: 15	Carrier					6	EA	2019	\$16,541
335218	Burlington High School	D3041 - Air Handler, Interior, 15,001 to 20,000 CFM, Replace; Lifespan: 30	Nesbitt	25083-AO-14-HC				3	EA	2035	\$75,600
389258	Burlington High School	D3042 - Exhaust Fan, Centrifugal, 801 to 2,000 CFM, Replace; Lifespan: 15	Various					12	EA	2020	\$31,970
389226	Burlington High School	D3042 - Exhaust Fan, Centrifugal, 8,001 to 10,000 CFM, Replace; Lifespan: 15	Twin City					6	EA	2025	\$46,116
389228	Burlington High School	D3042 - Exhaust Fan, Centrifugal, 3,501 to 5,000 CFM, Replace; Lifespan: 15	NV					2	EA	2020	\$8,645

Flood Map



FEMA's National Flood Hazard Layer (Official)
Page 1 of 2

FEMA's National Flood Hazard Layer (Official)

Data from Flood Insurance Rate Maps (FIRMs) where available digitally. Try <http://bit.ly/1bPpUjq> (Unofficial) if this map is down



DigitalGlobe, GeoEye, Microsoft, VCGI, USDA FSA, CNES/AirbuD

	Source: FEMA Map Number: 50007C0251D Dated: 7/18/2011	Project Number: 113231.15R-001.294
		Project Name: Burlington High School
	Not drawn to scale. The north arrow indicator is an approximation of 0° North.	On-Site Date: June 1 – 3, 2015

RECORD OF COMMUNICATION

Date: June 1, 2015
Recorded by: Mary Endsley
Project Name: Burlington High School
Project Number: 113231.15R-001.294

Communication with: Leonard Smith
of:
Phone: 802.864.8453

Communication via:

- ☐ Telephone Conversation
- ☒ Discussions During Site Inspection
- ☐ Office Visitation/Meeting

Re:

Outstanding violations, Certificate of Occupancy, and other record information.

Summary of Communication:

See Section 2.5 for information regarding the Point of Contact

RECORD OF COMMUNICATION

Date: June 3, 2015
Recorded by: Mary Endsley
Project Name: Burlington High School
Project Number: 113231.15R-001.294

Communication with: Elsie Tillotson
of: Burlington Building Department
Phone: 802.865.7188

Communication via:

Telephone Conversation
Discussions During Site Inspection
✓ Office Visitation/Meeting

Re:

Outstanding violations, Certificate of Occupancy, and other record information.

Summary of Communication:

According to Elsie Tillotson of the Burlington Building Department, there are no outstanding building code violations on file. There are numerous open building permits at the property. A copy of the original Certificates of Occupancy were requested but were not available.

RECORD OF COMMUNICATION

Date: June 3, 2015
Recorded by: Mary Endsley
Project Name: Burlington High School
Project Number: 113231.15R-001.294

Communication with: Joe Keenan
of: Burlington Fire Department
Phone:

Communication via:

✓ Telephone Conversation
Discussions During Site Inspection
Office Visitation/Meeting

Re:

Outstanding fire code violations and inspection history

Summary of Communication:

A message was left with Joe Keenan – Assistant Fire Marshall regarding any fire code violations at Burlington High School. Significant information will be forwarded upon receipt.

Glossary of Terms and Acronyms-Energy Audit

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) Investment 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 thousand 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 thousand 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 (CO₂). 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).

UIC		Add Reflective Coating To Exterior Windows	
EAE1		Details: Reflective coating to window systems	
ENTER EXISTING CONDITIONS			
Total Sq.Ft window area:	750 sq.ft	Select The Existing Window Type:	Metal Frame & Double Glazing (Select)
Approximate number of windows:	75	Existing U-value of window: (1/R)	0.87 Btu/ ft ² .°F-h
ASHRAE Climatic Zone	Zone-6	New U-value with Double pane Low E window: (1/R)	0.42 Btu/ ft ² .°F-h
Select Type of Heating Fuel	Natural Gas (Select)	Is the Property Cooled ?	Yes (Select)
WINTER		SUMMER	
Net heating plant & distribution system efficiency:	75.00 %	Cooling Plant Efficiency (EER):	10.00 EER
Annual Heating Degree Days (HDD):	7,626	Annual Cooling Degree Days (CDD):	742
Heat loss through Existing Window/ Yr :	119,423 kBtu/Yr	Energy Loss Through Existing Single Pane Window/Yr	11,620 kBtu/Yr
Estimated Heat Loss With New Windows:	57,653 kBtu/Yr	Estimated Energy Loss With New Windows:	5,610 kBtu/Yr
Annual Heat Loss Reduction:	61,771 kBtu/Yr	Annual Energy Loss Reduction:	6,010 kBtu/Yr
Estimated Total Annual Input Heating Energy Savings	824 Therms	Annual Cooling Fuel Savings During Summer Season	601 Kwh
ENERGY & COST ANALYSIS			
Insert Cost of Heating Fuel:	\$1.12 \$/Therm	Annual Heating Cost Savings:	\$922.44 \$
Insert Cost of Cooling Fuel:	\$0.16 \$/kWh	Annual Cooling Cost Savings:	\$96.16 \$
Estimated Annual O&M Savings	\$51 \$	Total Annual Cost Savings From Heating & Cooling:	\$1,019 \$
Total Annual cost savings:	\$1,070 \$	Cost For Up-grading Windows	\$7,125
Cost of window upgrade:	\$7,559	Total project cost:	\$7,125
Simple payback:	7.07 years	Type of Recommendation	Capital Cost ECM Recommendation

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ECM DESCRIPTION:

When the existing windows are not justified for complete replacement retrofit due to financial, functional, historical building restrictions or aesthetic reasons, higher performance low-emissivity (low E) and reflective coating films can improve the performance of the windows for a lower cost and reduce the desired heating or cooling load. Low-emissivity (Low-E) coatings on glazing or glass control the heat transfer through a double paned or higher glazing window. A Low-E coating is a microscopically thin, virtually invisible, metallic oxide layer deposited directly on one or more panes of glass. Different types of Low-E coatings have been designed to allow for high solar gain, moderate solar gain, or low solar gain. A high solar gain coating is applied to reduce heat conduction and intended for cold climates. To keep the heat inside, the Low-E coating should be applied to the inside pane of glass. A low solar gain coating is used for hot climates and designed to reduce solar heat gain by blocking admission of the infrared portion of the sunlight spectrum. To keep the sun's heat out, the Low-E coating should be applied to the outside pane of glass. Tinted and reflective films can also be used on single paned and multi-paned windows to reduce solar heat gain to reduce the cooling load for hotter climates.

Summary:

Initial Investment:	\$7,559	Simple Payback Period:	7.07 Yrs
Annual Energy Cost Savings:	\$1,070		

UIC		Replace External Windows	
EAEZ		Details: Replace window systems	
ENTER EXISTING CONDITIONS			
Existing and Proposed Window Properties		Existing & Proposed Air Leakage Through Windows	
Total Sq.Ft window area:	750 sq.ft	Insert Existing Estimated Air Change Rate/Hr (ACH 1):	0.60
Approximate number of windows:	75	<small>(Existing Air Changes Per Hour, 1.5 is very leaky and 0.35 ideal)</small>	
Total existing window area:	750 Sq.Ft	Insert Proposed Estimated Air Change Rate/Hr (ACH 2):	0.35
Select The Existing Window Type	Metal Frame & Single Glazing <small>(Select)</small>	Estimated Space Volume Under Consideration	696,000.00 Cu. Ft
Existing U-value of window: (1/R)	1.31 Btu/ ft²·°F·h		
ASHRAE Climatic Zone	Zone-6	Is the Property Cooled ?	No <small>(Select)</small>
New U-value with Double pane Low E window: (1/R)	0.31 Btu/ ft²·°F·h		
<small>AHRAE 90.1 Recommended Value</small>			
WINTER		SUMMER	
Select Type of Heating Fuel	Natural Gas <small>(Select)</small>	Select Type of Cooling Fuel:	Electric <small>(Default)</small>
Net heating plant & distribution system efficiency:	75.00 %	Cooling Plant Efficiency (EER):	10.00 EER
Annual Heating Hours:	7,626 HDD	Annual Cooling Hours:	742 CDD
Estimated Total Annual Input Heating Energy Savings By Replacing Windows	18.30 Therms	Annual Total Input Cooling Fuel Savings During Summer Season By Replacing Windows	1,336 kWh
Estimated Total Annual Input Heating Energy Savings Achieved By Controlling Air Leakage Through Windows	7,643 Therms	Estimated Total Annual Input Cooling Energy Savings Achieved By Controlling Air Leakage Through Windows	0 kWh
Estimated Total Input Heating Fuel Savings From Replacing Windows	7,661 Therms	Estimated Total Input Cooling Fuel Savings From Replacing Windows	0 kWh
ENERGY & COST ANALYSIS			
Insert Cost of Heating Fuel:	\$1.12 \$/Therm	Annual Heating Cost Savings:	\$8,580.75 \$\$
Insert Cost of Cooling Fuel:	\$0.16 \$/kWh	Annual Cooling Cost Savings:	\$0.00 \$\$
Total Annual Cost Savings	\$8,667	Total Annual Cost Savings From Heating & Cooling:	\$8,581 \$\$
Cost of window upgrade:	\$43,762	Estimated Annual O&M Savings	\$86 \$
Simple payback:	5.05 Yrs	Type of Recommendation	Capital Cost ECM Recommendation

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ECM DESCRIPTION:

Windows play a major role in the energy use and comfort of an interior space. In the winter, heat in a room is lost when cold outside air infiltrates around the edges of windows. Heat also can be lost by conduction directly through the pane, even if the window fits tightly. Windows with insulated panes, such as those filled with Argon address this issue, while proper caulking and sealant address the infiltration issue. The cold drafts and the chilly windowpane make the room uncomfortable. Windows also can help to heat a room by letting the sun's rays enter. While this solar radiation is beneficial in the winter, it can be a major source of discomfort in hot, summer climates. Energy Star rated windows with Low-E glazing are designed to keep the solar heat gain minimized during the summer months. Choosing a replacement window that fits properly has the desired U-value, and proper glazing characteristics is critical to energy conservation through window upgrades.

Summary:

Initial Investment:	\$43,762	Simple Payback	5.05 Yrs
Annual Energy Cost Savings:	\$8,667		

UIC	Upgrade Insulation			
EAE3B	Details:			
ENTER EXISTING CONDITION				
Property Zone	Surface Under Consideration	Min. R-Value		
Zone-6	Ceiling/Attic	R-49		
Source: 2009 IECC For Residential Bldgs		Not Specified		
Enter Total Surface Area Under Consideration:		17,000 Sq.Ft	Proposed Net Effective R-Value: (Sq.Ft deg F/btu)	49
ENTER CLIMATIC & SYSTEM DATA				
Annual Cooling Degree Days (CDD):		742	Estimated Annual Cooling Plant Efficiency (EER):	5.00 EER
Annual Heating Degree Days (HDD):		7,626	Estimated Annual Heating Plant Efficiency: %	65.00 %
WINTER			SUMMER	
Select Type of Heating Fuel	Natural Gas (Select)	Is the Property Cooled ? No (Select)		
Annual Conduction Losses From Existing Insulation	103,714 kBtu	Annual Conduction Losses From Existing Insulation	10,091 kBtu	
Annual Conduction Losses From Proposed Insulation	63,498 kBtu	Annual Conduction Losses From Proposed Insulation	6,178 kBtu	
Savings In Conduction Losses After Adding Insulation	40,215 kBtu	Savings In Conduction Losses After Adding Insulation	0 kBtu	
Estimated Total Annual Input Heating Energy Savings	619 Therms	Estimated Total Annual Input Cooling Energy Savings	0 kWh	
Cost of Heating Fuel/Unit:	\$1.12 \$/Therm	Cost of Electricity/Unit	\$0.16 \$/kWh	
Annual Heating Cost Savings	692.943613 \$\$	Annual Cooling Cost Savings	\$0 \$\$	
COST ANALYSIS				
Estimated O&M Savings	\$0.00 \$\$	Estimated Cost To Add Insulation/Sqft	\$0.70	
Total Estimated Annual Cost Savings	\$693 \$\$	Estimated Total Installation Cost	\$12,625 \$\$	
Simple Pay Back Period	18.22 Years	Type of Recommendation	Capital Cost ECM Recommendation	

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UIC		Control External Air Leakage In Commercial Buildings	
EAE4A		Details:	
ENTER EXISTING CONDITION			
Insert Existing Estimated Air Change Rate/Hr (ACH 1): <small>(Existing Air Changes Per Hour, 3 is very leaky and 0.35 ideal)</small>	0.60	Cubic Feet/Min (CFM 1):	6,960
Insert Proposed Estimated Air Change Rate/Hr (ACH 2):	0.35	Cubic Feet/Min (CFM 2):	4,060
Estimated Space Volume Under Consideration	696,000	Cu.Ft	
WINTER		SUMMER	
Select Type of Heating Fuel	Natural Gas (Select)	Is The Building Cooled?	Yes
Estimated Annual Heating Plant Efficiency	65.00 %	Estimated Annual Cooling Plant Efficiency	10.00 EER
Annual Heating Degree Days(HDD):	7,626	Annual Cooling Degree Days(CDD):	742
Estimated Total Annual Input Heating Energy Savings	8,819 Therms	Estimated Total Annual Input Cooling Energy Savings	5,577 kWh
Cost/Unit of Heating Fuel:	\$1.12 \$/Therm	Cost/Unit For Electricity	\$0.16 \$\$
Estimated Annual Heating Cost Savings	\$9,877 \$\$	Estimated Annual Cooling Cost Savings	\$892 \$\$
Cost Analysis			
Install Flush Mounted, Vinyl Door Sweeps ?	No	Total Length of Door Sweeps to Be Installed: <small>(3.5' Standard Width Door)</small>	375 LF
Install Window Air Conditioner Covers For Winter:	No	Number of Air Conditioner Covers To Be Installed: <small>(Covers would meet HUD Chapter-12 Energy Conservation Compliance Section 329C)</small>	8
Estimated Annual O&M Savings	\$323	Estimated Length of Joints To Be Re-Caulked: <small>(Includes Demolition and Re-Caulking)</small>	2600 LF
Total Estimated Annual Cost Savings	\$11,093	Total Cost For Controlling Air Leakage	\$7,613
Simple Pay Back Period	0.69 Yrs	Type of Recommendation	Capital Cost ECM Recommendation

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ECM DESCRIPTION:

One of the most commonly used methods for reducing air leakage through building structures is caulking and weather stripping. Particularly effective measures include caulking cracks around windows and door frames and weather stripping around windows and doors. Weather-stripping and caulking of doors and windows, helps in thermally isolating of the building with the outside atmosphere. This prevents the infiltration of external un-conditioned air along with moisture and humidity into the conditioned space at the same time, prevents the conditioned air from escaping out. A precisely thermally isolated building directly affects the cooling and heating load on the facilities HVAC system as it has to put in less effort in maintaining the desired temperature inside the facility. As per ASHRAE a well insulated and ventilated building can save up to 10% of the energy costs. In order to ensure proper thermal isolation of the property, EMG recommends ensuring that the weather-stripping and caulking of all external doors and windows remains intact. It is also recommended that door sweeps be installed under all the doors opening into conditioned space. Any visible cracks between the window frame and wall should be plugged by caulking. In case of building with window airconditioners, EMG recommends use of interior/exterior window airconditioner covers so as to prevent cold air drafts into the conditioned space during the winter so as to save on heating costs.

SUMMARY:

Initial Investment:	\$7,613	Simple Pay Back Period:	0.69 Yrs
Annual Energy Cost Savings:	\$11,093		

UIC	Replace Existing Motors With High Efficiency Motors			
EAM1	Details:			
	Hot water pumps boiler room	Insert Location here	Insert Location here	Insert Location here
Enter The Number of Existing Motors	3			
Enter Horse Power of Existing Motor:	20 hp			
Enter Existing Annual Hours of Operation:	2,500 Hrs		0 Hrs	0 Hrs
Enter Existing Name Plate Efficiency:	75.0%			
Type of Current Supplied	Three Phase			
Enter The Number of Proposed Motors	3		0	0
Enter Horse Power of Proposed Motor:	20 hp			
Enter Proposed Annual Hours of Operation:	2,500 Hrs	0 Hrs	0 Hrs	0 Hrs
No. of Poles of the Proposed Motor:	4 Pole (1800 RPM)			
Select Type of Motor:	Totally Enclosed Fan Cooled			
Efficiency of Proposed Motor :	93.6%	0.0%	0.0%	0.0%
Estimated annual cost savings:	\$2,447 \$	\$0 \$	\$0 \$	\$0 \$
Estimated cost to replace <i>one</i> motor: (Material And Installation Cost)	\$2,723 \$	\$0 \$	\$0 \$	\$0 \$
Total Replacement Cost	\$8,666 \$	\$0 \$	\$0 \$	\$0 \$
Simple Payback:	3.54 Yrs	#DIV/0! Yrs	#DIV/0! Yrs	#DIV/0! Yrs
Total Initial Investment: \$8,666 Total Annual Cost Savings: \$2,447 Simple Payback: 3.54 Yrs Type of Recommendation: Capital Cost ECM Recommendation				

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ECM DESCRIPTION:

High-efficiency motors will perform the same function as standard motors, but will improve efficiency by reducing losses in the conversion of electrical to mechanical energy. For example, magnetic losses are reduced by using thinner, higher quality steel lamination in the stator and rotor core. The air gap between rotor and stator is minimized by manufacturing to higher tolerances. More copper is used in the stator windings to reduce resistive losses. On motors with fans, smaller and more efficient fans are used.

The best applications are generally those in which the motor operates at least eight hours or more per day (NCEL 1983a). In some cases, the savings in electrical energy consumption justifies immediate replacement. However, high-efficiency motors are not cost-effective when their premium cost cannot be recovered during the normal life of the motor because of limited hours of operation.

Summary:

Initial Investment: \$8,666 Energy Cost Savings: ##### Simple Payback: 3.54 Yrs

UIC		Reduce HVAC Hours of Operation	
EAC3		Details:	
No of Programmable Thermostats To Be Installed :		36	Qty.
Select Type of Programmable Thermostat Recommended: <small>(Selection Based on Type of Property)</small>		Thermostatic Radiator Valve <small>(Select)</small>	
Heating Load Calculation		Cooling Load Calculation	
Select Type of Heating Fuel		Natural Gas <small>(Select)</small>	
Estimated Current Annual Energy Consumption For Winter Heating		30,800 Therms	
	Weekdays Weekends		
Day Time Set Back Hours	9.00 4.00		
Night Time Set Back Hours	8.00 8.00		
Hours Without Set Back	7.00 12.00		
Typical Indoor Temp	72.00 °F		
Temp Set Point With Set Back During Day Time	65.00 °F		
Temp Set Point With Set Back During Night Time	65.00 °F		
Average Heating Set Point	67.46 °F		
Savings Per Degree Set Back For Heating Season <small>(Industry Standard, 2004)</small>	3%		
Estimated Annual Heating Energy Consumption	3,080,000 kBtu		
Estimated New Annual Heating Energy Consumption	2,660,350 kBtu		
Estimated Annual Heating Energy Savings	4,196 Therms		
Select Type of Cooling Fuel		Electric <small>(Default)</small>	
Estimated Current Annual Energy Consumption For Summer Cooling		420,000 kWh	
	Weekdays Weekends		
Day Time Set Back Hours	9.00 4.00		
Night Time Set Back Hours	8.00 8.00		
Hours Without Set Back	7.00 12.00		
Typical Indoor Temp	74.00 °F		
Temp Set Point With Set Back During Day Time	78.00 °F		
Temp Set Point With Set Back During Night Time	78.00 °F		
Average Cooling Set Point	76.60 °F		
Savings Per Degree Set Back For Cooling Season <small>(Industry Standard, 2004)</small>	6%		
Estimated Annual Cooling Energy Consumption	1,433,040 kBtu		
Estimated New Annual Cooling Energy Consumption	1,209,895 kbtu		
Estimated Annual Cooling Energy Savings	65,400 kWh		
Cost Analysis			
Average Annual Cost of Heating Fuel:	\$1.12 \$/Therm	Estimated Installation Cost Per Thermostats:	\$73 \$\$ <small>(Includes Material, Labor & Installation Costs)</small>
Average Annual Cost of Electricity:	\$0.16 \$/kWh		\$2,780 \$\$
Estimated Annual Heating Cost Savings:	\$4,700 \$\$	Total Estimated Cost For All Programmable Thermostats	
Estimated Annual Cooling Cost Savings:	\$10,464 \$\$	Total Estimated Cost Savings From All Programmable Thermostats	\$15,164
		Estimated Simple Pay Back Period	0.18 Yrs
Type of Recommendation	Capital Cost ECM Recommendation		

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ECM DESCRIPTION:

A Thermostatic Radiator Valve (TRV) is a self regulating control device for hot water heating and steam (also known as air vent valves) systems consisting of hot water baseboard heaters/ radiators. A TRV consists of two parts: a valve that opens or closes to control the hot water flow and a sensor that controls the opening of the valve. The sensor contains an actuator with a sensing substance, which adjusts the valve opening based on the temperature in the room and via a physical connection between the actuator-spindle and the valve-spindle/cone. TRVs control the temperature in the room based on an individually set temperature. TRVs also come in different motorized and electronic actuator design and can also work together with outdoor temperature controls, supply flow temperature controls, pressure controls and time set-back devices. TRVs help to control the flow of hot water/steam in the heating system that is used throughout the spaces. By controlling the fluid flow in response to the actual heating demand, energy costs can be reduced by limiting the amount of steam or hot water being un-necessarily being produced. TRVs help to improve temperature control in individual spaces by relating the desired space temperature to the flow required in the radiator unit. This efficient control method reduces overheating of the space and modulates the demand for steam. The result is better distribution of hot water/steam throughout the building, which reduces energy consumption related to space heating.

SUMMARY

Initial Investment:	\$2,780	Simple Payback Period:	0.18 Yrs
Annual Energy Cost Savings:	\$15,164		

UIC	Install Variable Frequency Drives (VFD)						
EAC4	Details:						
Cost/kWh:					\$0.16		
Existing Motor							
No. of Motors:	4	Are Motors To be Replaced?			Yes		
Individual Motor HP:	20	HP	No. of Motors To be Replaced?			4	
Existing Motor Effi:	75.00%	Cost of New Motor (Includes Installation)			\$2,723		
Proposed Motor Effi:	93.60%	Cost For All New Motors:			\$10,891		
Load Factor:	85%	No. of VFD To Be Installed:			4		
Existing Motor Power:	16.91	kW	Cost Per VFD (Excluding Installation):			\$2,550	
Proposed Motor Power:	13.55	kW	Estimated Labor cost/VFD:			\$1,685	
Hrs of Operation/Yr:	2080.00	Hrs					
% Load	% hours	Hours	VFD Factor	Full Load kW	Fraction of full load power (kW) with VFD	kW Reduction with VFD	kWh Savings with VFD
0%	0%	-	-	16.91	0.00	16.91	-
10%	1%	21	0.03	16.91	0.41	16.50	343
20%	2%	42	0.07	16.91	0.95	15.96	664
30%	2%	42	0.13	16.91	1.76	15.15	630
40%	5%	104	0.21	16.91	2.85	14.06	1,463
50%	15%	312	0.30	16.91	4.06	12.84	4,008
60%	20%	416	0.41	16.91	5.56	11.35	4,723
70%	25%	520	0.54	16.91	7.32	9.59	4,988
80%	15%	312	0.68	16.91	9.21	7.70	2,401
90%	10%	208	0.83	16.91	11.25	5.66	1,178
100%	5%	104	1.00	16.91	13.55	3.36	349
Total		2,080					20,748
Total Installation Cost:		\$31,860		Number of Valves To Be		4	
Average kW Reduction:		13.64		Converted From 3 Way to 2		(\$550/Valve)	
Annual kWh Savings Per Motor:		20,748 kWh		Select Type Of Motor Configuration			
		Motors Run In Lead Lag Configuration					
Total Savings From All Motors:		20,748 kWh					
Estimated annual cost savings:		\$3,320 \$\$					
Simple Payback:		9.60 years					
Type of Recommendation		Capital Cost ECM Recommendation					

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ECM DESCRIPTION

Variable frequency drives (VFD) have the ability to control the frequency and voltage to a motor. The speed of an AC motor depends on frequency and number of poles built into the motor. The number of poles cannot be changed once the motor is manufactured, so the only other way to change the speed is to vary the frequency. The frequency of AC power from a utility cannot be changed. Therefore, the only way to change the frequency of an AC circuit is to 'manufacture' your own AC power.

A VFD does of this by first changing the incoming AC power to DC. This is why changing two of the phases on the line side of a VFD does not change the rotation of the motor. Next, the VFD changes the DC power back into AC, but now the frequency can be easily controlled, as can voltage. This is one way a single phase power source can supply a 3 phase motor. The rate of change in frequency can also be controlled, so a VFD certainly can act as a soft-start.

SUMMARY:

Initial Investment: \$31,860
Energy Cost Savings: \$3,320

Simple Payback: 9.60

UIC	Install Outside Air Temperature Reset Controls For Hot Water Boilers	
EACS	Details:	
Select Type of Heating Fuel	<input type="text" value="Natural Gas"/>	(Select)
Select The Number of Outside Air Temperature Controls To Be Installed:	<input type="text" value="6"/>	
Estimate Actual Heating Fuel Used Annually	<input type="text" value="30,800"/>	Therms
Total Estimated Energy Savings By Use of OA Temperature Reset Control:	<input type="text" value="15%"/>	
Estimated New Heating Fuel Consumption With Improved System Efficiency:	<input type="text" value="26,180"/>	Therms
Estimated Annual Heating Fuel Savings:	<input type="text" value="4,620"/>	Therms
Cost Per Unit of Heating Fuel:	<input type="text" value="\$1.12"/>	\$/Therm
Estimated Annual Cost Savings:	<input type="text" value="\$5,174"/>	
Installed cost of a OA Reset controller:	<input type="text" value="\$5,200"/>	
Simple Payback:	<input type="text" value="1.00"/>	years
Type of Recommendation	<input type="text" value="Capital Cost ECM Recommendation"/>	

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ECM DESCRIPTION:

HVAC equipment is usually sized to meet conditions at the design peak load. Hot water temperature set points are also chosen to meet the design load. However, during most hours of operation, the equipment operates at part-load. Use of design set points on water loops at part-load results in unnecessary thermal losses and equipment inefficiencies. Resetting the set point reduces energy consumption by matching hot water supply set points to the actual equipment load.

Reset of supply water temperature may be based on the outside air temperature or on the hot water demand. Except for buildings with dominant internal loads, the space load generally may be considered to be a function of the outdoor temperature. For example, as the outside air temperature rises, hot water temperature is adjusted downward. Alternatively, a more accurate method is to reset the water temperature based on instrumentation readings. Such an instrument is known as an outside air temperature reset control. The sensor shall modulate the supply water temperature based on the outside temperature, thus resulting in considerable energy savings, without manual intervention.

SUMMARY:

Initial Investment	\$5,200	Simple Payback:	1.00
Energy Cost Savings:	\$5,174		

UIC	Install Energy Savers on Vending, Snack Machines	
EAC8	Details:	
No. of Vending Machines:	<input type="text" value="6"/>	Qty
No. of Beverage Cooling Machines:	<input type="text" value="4"/>	Qty
No. of Snack Machines	<input type="text" value="2"/>	Qty
Vending Machines (Cold Beverage Vending Machines)		
Estimated Annual kWh Consumption of Vending Machine:	<input type="text" value="3,500"/>	kWh
Estimated Annual kWh of Vending Machine With VendMiser:	<input type="text" value="1,890"/>	kWh
Total annual kWh savings:	<input type="text" value="1,610"/>	kWh
Total Annual kWh Savings for All Vending Machines:	<input type="text" value="9,660"/>	kWh
Beverage Cooling Machines		
Estimated Annual kWh Consumption of Beverage Cooling Machine:	<input type="text" value="2,300"/>	kWh
Estimated Annual kWh of Cooling Machine With CoolerMiser:	<input type="text" value="1,610"/>	kWh
Total Annual kWh savings:	<input type="text" value="690"/>	kWh
Total Annual kWh Savings For All Cooling Machines:	<input type="text" value="2,760"/>	kWh
Snack Vending Machines		
Estimated Annual kWh Consumption of Individual Snack Machine:	<input type="text" value="874"/>	kWh
Estimated Annual kWh of Individual Snack Machines With VendMiser:	<input type="text" value="367"/>	kWh
Total Annual kWh savings:	<input type="text" value="507"/>	kWh
Total Annual kWh Savings For All Snack Vending Machines:	<input type="text" value="1,013"/>	kWh
Cost Analysis		
Total estimated annual kWh savings with Energy Misers:	<input type="text" value="13,433"/>	kWh
Cost/kWh:	<input type="text" value="\$0.16"/>	\$/kWh
Estimated Cost of Vendmiser/ Vending Machine:	<input type="text" value="\$200"/>	
Estimated Cost of Coolermiser/ Beverage Cooling Machine:	<input type="text" value="\$190"/>	
Estimated Cost of Vendmiser/ Snack Machine:	<input type="text" value="\$70"/>	
Estimated total installed cost of all VendMisers:	<input type="text" value="\$2,109"/>	
Estimated Total Annual Electricity Savings Using Vending Misers:	<input type="text" value="\$2,149"/>	
Simple Payback:	<input type="text" value="0.98"/>	years
Type of Recommendation	<input type="text" value="Capital Cost ECM Recommendation"/>	

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ECM DESCRIPTION:

Vending machines are usually designed to operate all day round irrespective of the occupancy level in the office. This means that the vending machines operate for more than 12 hours a day when not required in case of commercial establishments.

EMG recommends installing vend misers on the vending machines, which will automatically reduce the run time of these machines during weekends and unoccupied hours. There are two types of vend misers; one has a timer in it, which is programmed to turn off or tune down the vending machines after the office hours and bring it back up an hour before the office opens. The other is a motion sensor based system that tunes down the machines upon detecting no-occupancy for a pre-programmed duration of time. In the case of vending machines storing chilled products, the vend miser does not turn off the machine entirely, but reduces the operating time of the compressor, such that the machine maintains the products at a minimum tolerable temperature

Summary:

Initial Investment:	\$2,109	Simple Payback:	0.98
Energy Cost Savings:	\$2,149		

UIC	Re-Commission The Building & Its Control Systems	
EAC10	Details:	
Enter the Total Area of The Facility	232,566	SqFt
Select the Type of Heating Fuel:	Natural Gas	(Select)
Estimated Annual Heating Fuel Consumption:	30,800	Therms
Is the Property Cooled?	Yes	(Select)
Estimated Annual Electrical Energy Consumed For Cooling:	420,000	kWh
Estimated Energy Savings From Re-Commissioning on Building Systems:	15%	(Select)
Estimated Heating Energy Saving Post Re-Commissioning:	4,620	Therms
Estimated Cooling Energy Saving Post Re-Commissioning:	63,000	kWh
Average Heating Fuel Rate Paid By The Property:	\$1.12	\$/Therm
Average Electrical Rate Paid By The Property:	\$0.16	\$/kWh
Annual Energy Cost Savings:	\$15,254	\$
Estimated Cost For Re-Commissioning The Facility: (LBNL 2009 Report on Building Commissioning)	\$74,019	\$
Simple Payback Period:	4.85	Yrs
Type of Recommendation	Capital Cost ECM Recommendation	

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ECM DESCRIPTION

The goal of commissioning of a facility is to ensure that the equipments in the facility are performing as per the desired standards or as per design standards. The role of commissioning in existing buildings is to identify the almost inevitable "drift" from where things should be and puts the things back on track. Based on the LBNL 2009 Report on Building Commissioning the average re-commissioning of existing buildings yielded atleast 16% of energy savings across the facility. This average has been developed based on over 643 buildings that were commissioned across United States in different climatic zones.

Thus EMG strongly recommends re-commissioning of all existing buildings in order to ensure that all the sensors, equipments and control systems are working as per the design conditions.

SUMMARY:

Initial Investment:	\$74,019	Simple Payback:	4.85	Years
Energy Cost Savings:	\$15,254			

UIC	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)			
EEA1	Details:			
Number of Refrigerators To Be Replaced		Qty		3
Details of Existing Refrigerator:		1990-1992 Top Freezer 7.5-16.4 CuFt -1202.5 kWh		
Estimated Annual Energy Consumption By The Existing Refrigerator:		1,203 kWh/Year		
Proposed New Refrigerator:		2010 -2012 Top Freezer 16.0-19.5 CuFt-382 kWh/Yr		
Estimated Proposed Annual Energy Consumption of The New Refrigerator:		382 kWh/Year		
Annual Kwh Savings Per Unit (Kwh/year)		821 kWh		
Total Annual Kwh Savings (Kwh/year)		2,462 kWh		
Current Electrical Tariff (\$/Kwh)		\$0.16 \$/kWh		
Annual Cost Savings From All Refrigerators (\$\$)		\$394 \$\$		
Total Installation Cost Including, Eco Friendly Disposal Of Existing Refrigerator (\$\$)				
No. of Units		3	Disposal Tax	\$50
Unit Cost		\$561	Total Cost	\$1,945
Simple Return on Investment		4.94 Yrs		
Note- Average Life of a Refrigerator is 15 Years				
Type of Recommendation		Capital Cost ECM Recommendation		

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ECM DESCRIPTION:

One of the highest 'silent' energy consuming devices in any home/office is the refrigerator, which runs all year long. Having a low energy consuming refrigerator thus results in a considerable reduction in the annual energy costs. On an average a useful life of any refrigerator is approximately 19 years and hence EMG recommends replacing the current refrigerator at the end of its useful life with a new energy star certified low energy consuming refrigerator.

EMG strongly recommends replacing the existing older non energy star refrigerators with new energy efficient Energy Star Certified refrigerators of the appropriate type.

The expected useful life of new refrigerators is approximately 15 years.

Summary:

Initial Investment:	\$1,945	Simple Payback:	4.94	Yrs
Annual Cost Savings:	\$394			

UIC	Replace Existing Freezers With High Efficiency Freezers			
EAA2	Details:			
Number of Freezers To Be Replaced	2			Qty
Details of Existing Freezers:	1980 & Older Upright Freezer 21.5-24.4 CuFt 3267.5 kWh/Yr			
Estimated Annual Energy Consumption of The Existing Freezer:	3,268			kWh/Yr
Proposed New Freezers	2010 -2012 Chest Freezer 10-13.9 CuFt 304 kWh/Yr			
Estimated Annual Energy Consumption of The Proposed Freezer:	304			kWh/Yr
Annual Kwh Savings Per Unit (Kwh/year)	2,964			kWh
Total Annual Kwh Savings (Kwh/year)	5,927			kWh
Current Electrical Tariff (\$/kwh)	\$0.16			\$/kWh
Annual Cost Savings From All Freezers (\$\$)	\$948			\$\$
Total Installation Cost Including, Eco Friendly Disposal Of Existing Freezers (\$\$)				
2	\$50.00	\$373	\$897	\$\$
No. of Units	Disposal Tax	Unit Cost	Total Cost	
Simple Return on Investment			0.95	Yrs
Note- Average Life of a Freezer is 15 Years				
Type of Recommendation		No/Low Cost ECM Recommendation		

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UIC	Install Low Flow Shower Heads	
EAP1	Details:	
Total Number of Shower Heads To Be Replaced	20	
No. of Shower Days/Year	150	
No. of Residents	1,000	
Estimated Time Per Shower	8.10	Mins
GPM of Existing Shower Head	2.5 GPM	
GPM of Proposed Shower Head *	(Select) 1.75	GPM
<small>*(Federal Law Requires all new shower heads to have a max flow rate of 2.5 GPM)</small>		
Water & Energy Savings Calculations		
Property Location in United States	North Central Localities	
Select Type of Water Heater Fuel	(Select) Natural Gas	
Average Hot Water Discharge Temperature	110.00	°F
Annual Water Savings	911	kGal
<small>(Assuming 1 shower/day/person for 365 days a year)</small>		
Energy Factor of Domesitc Hot Water Heater:	0.90	EF
Equivalent Heating Fuel Energy savings:	506,048	kBtu
Cost Savings Calculations		
Equivalent Heating Fuel Savings Natural Gas	5,060	Therms
Water Tariff (\$/1000 Gal)	\$10.50	\$/kGal
Annual Cost Savings In Form of Water	\$9,568	\$\$
Annual Energy Savings From Water Heater	\$5,668	\$\$
Estimated Total Annual Cost Savings	\$15,236	\$\$
Estimated Installation Costs		
Estimated Total Installation Cost	\$979	\$\$
Simple Payback Period	0.06	Years
Type of Recommendation	No/Low Cost ECM Recommendation	

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ECM EXPLANATION:

By reducing the flow of water coming off the shower heads, savings can be generated in the form of reduced water and sewer costs. Additional savings can be realized via reduction in the demand for hot water. Currently Federal law requires all new shower heads to have a maximum flow rate of 2.5 GPM.

EMG recommends replacing the existing shower heads with new low flow shower heads 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:	\$979	Simple Payback:	0.06
Annual Cost Savings:	\$15,236		

UIC	Install Low Flow Faucet Aerators			
EAP2	Details:			
Property Type:	<input type="text" value="Commercial"/>	Estimated No. of Operational Weeks	<input type="text" value="36"/>	
No. of Occupants	<input type="text" value="1,500"/>	Number of Occupied Days/Week (Max 7)	<input type="text" value="5"/>	
KITCHEN FAUCETS		BATHROOM FAUCETS		
Do You Want To Replace Kitchen Faucets Aerators	<input type="text" value="No"/> (Select)	Do You Want To Replace Bathroom Faucets Aerators	<input type="text" value="Yes"/> (Select)	
Total Number of Faucet Aerators To Be Replaced	<input type="text" value=""/>	Total Number of Faucet Aerators To Be Replaced	<input type="text" value="120"/>	
Total Number of Faucets To Be Replaced:	<input type="text" value="0"/>	Total Number of Faucets To Be Replaced:	<input type="text" value="120"/>	
GPM of Existing Faucet Aerators	<input type="text" value="2.2"/> GPM	GPM of Existing Faucet Aerators	<input type="text" value="3.2"/> GPM	
GPM of Proposed Faucet Aerator	<input type="text" value="1"/> GPM	GPM of Proposed Faucet Aerator	<input type="text" value="1.5"/> GPM	
Estimated Number of Uses Per Day	<input type="text" value="4"/>	Estimated Number of Uses Per Day	<input type="text" value="6"/>	
Estimated Time Per Faucet Use	<input type="text" value="0.16"/> Mins	Estimated Time Per Faucet Use	<input type="text" value="0.16"/> Mins	
Annual Water Savings From Kitchen Faucets	<input type="text" value="0.00"/> kGal	Annual Water Savings From Bathroom Faucets	<input type="text" value="264.38"/> kGal	
WATER & ENERGY SAVING CALCULATION		COST SAVING CALCULATION		
Select Type of Water Heater Fuel:	<input type="text" value="Natural Gas"/> (Select)	Property Location in United States	<input type="text" value="Southern Localities"/>	
Energy Factor of Domestic Hot Water Heater:	<input type="text" value="0.90"/> EF	Heating Fuel Tariff	<input type="text" value="\$1.12"/> \$/Therm	
Hot Water Discharge Temperature at Faucet	<input type="text" value="110.00"/> °F	Water Tariff (\$/1000 Gal)	<input type="text" value="\$10.50"/> \$/kGal	
Equivalent Heating Fuel Savings: <small>Savings Discounted by 15% to Account For Cold Water Use</small>	<input type="text" value="833"/> Therms	Annual Cost Savings In Form of Water	<input type="text" value="\$2,776"/> \$	
Annual Water Savings	<input type="text" value="264.38"/> kGal	Annual Energy Savings From Water Heater	<input type="text" value="\$933"/> \$	
COST BENEFIT ANALYSIS				
Estimated Total Annual Cost Savings	<input type="text" value="\$3,709"/> \$\$	Estimated Total Installation Cost	<input type="text" value="\$20,206"/> \$\$	
Simple Payback Period	<input type="text" value="5.45"/> Years	Type of Recommendation	<input type="text" value="Capital Cost ECM Recommendation"/>	

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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.

EMG 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:	\$20,206	Estimated Annual Cost Savings:	\$3,709	Simple Payback Period (Yrs):	5.45
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UIC	Install Low Flow Restroom Flush Tank Toilets	
EAP3	Details:	
EXISTING CONDITION		
Total Occupants:	<input type="text" value="1500"/>	
Number of Water Closets To Be Replaced	<input type="text" value="25"/>	
Number of Occupied Days Per Week (Max 7)	<input type="text" value="5"/>	
Number of Occupied Weeks/Year (Max 52)	<input type="text" value="36"/>	
Estimated Restroom Usage/Individual/Day	<input type="text" value="5"/>	(Select)
<small>5.05 flushes/person/day@American Water Works Association (AWWA)</small>		
PROPOSED RETROFIT/REPLACEMENT		
Water Closets With External Flush Tanks		
Existing Gallons Per Flush Ratings For Water Closet Flushes	<input type="text" value="3.20"/>	GPF
GPF of Proposed New Low Flow Water Closet Fixture*	<input type="text" value="0.8"/>	GPF
<small>*(Federal Law Requires All Flushes Not To Exceed 1.6 GPF)</small>		
Water & Cost Saving Calculations		
Water Savings By The Use of Low Flow Water Closet Flush Valves/Day	<input type="text" value="18000.00"/>	gal
Total Annual Water Savings in gallons	<input type="text" value="3240.00"/>	kgal
Cost Savings Calculations		
Enter Water Tariff Rate (\$/1000Gal)	<input type="text" value="\$10.50"/>	\$\$
Estimated Cost Savings From Water	<input type="text" value="\$34,020"/>	\$\$
Estimated Cost of Retrofit		
Estimated Total Cost For Retrofit**	<input type="text" value="\$17,213"/>	\$\$
<small>**\$549/WC replacement</small>		
Simple Pay Back Period	<input type="text" value="0.51"/>	Yrs
Type of Recommendation	<input type="text" value="Capital Cost ECM Recommendation"/>	

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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 EMG 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 quieter as compared to the pressure assisted technology retrofitted toilets.

Summary:

Initial Investment:	\$17,213		
	Simple Payback:	0.51	Years
Annual Cost Savings:	\$34,020		

APPENDIX D:
EMG ABBREVIATED ACCESSIBILITY CHECKLIST

Property Name: Burlington High School

Date: June 1-3, 2015

Project Number: 113231.15R-001.294

EMG Abbreviated Accessibility Checklist					
	Building History	Yes	No	N/A	Comments
1.	Has the management previously completed an ADA review?		✓		
2.	Have any ADA improvements been made to the property?	✓			
3.	Does a Barrier Removal Plan exist for the property?	✓			
4.	Has the Barrier Removal Plan been reviewed/approved by an arms-length third party such as an engineering firm, architectural firm, building department, other agencies, etc.?	✓			
5.	Has building ownership or management received any ADA related complaints that have not been resolved?		✓		
6.	Is any litigation pending related to ADA issues?		✓		
	Parking	Yes	No	N/A	Comments
1.	Are there sufficient parking spaces with respect to the total number of reported spaces?	✓			
2.	Are there sufficient van-accessible parking spaces available (96" wide/ 96" aisle for van)?		✓		Add
3.	Are accessible spaces marked with the International Symbol of Accessibility? Are there signs reading "Van Accessible" at van spaces?	✓			
4.	Is there at least one accessible route provided within the boundary of the site from public transportation stops, accessible parking spaces, passenger loading zones, if provided, and public streets and sidewalks?	✓			
5.	Do curbs on the accessible route have depressed, ramped curb cuts at drives, paths, and drop-offs?	✓			
6.	Does signage exist directing you to accessible parking and an accessible building entrance?	✓			

EMG Abbreviated Accessibility Checklist					
	Ramps	Yes	No	N/A	Comments
1.	If there is a ramp from parking to an accessible building entrance, does it meet slope requirements? (1:12)	✓			
2.	Are ramps longer than 6 ft complete with railings on both sides?	✓			
3.	Is the width between railings at least 36 inches?	✓			
4.	Is there a level landing for every 30 ft horizontal length of ramp, at the top and at the bottom of ramps and switchbacks?	✓			
	Entrances/Exits	Yes	No	N/A	Comments
1.	Is the main accessible entrance doorway at least 32 inches wide?	✓			
2.	If the main entrance is inaccessible, are there alternate accessible entrances?	✓			
3.	Can the alternate accessible entrance be used independently?				
4.	Is the door hardware easy to operate (lever/push type hardware, no twisting required, and not higher than 48 inches above the floor)?	✓			Automatic openers are not installed at the entrance at the end of building connectors. Add intercom/ door control
5.	Are main entry doors other than revolving door available?			✓	
6.	If there are two main doors in series, is the minimum space between the doors 48 inches plus the width of any door swinging into the space?	✓			
	Paths of Travel	Yes	No	N/A	Comments
1.	Is the main path of travel free of obstruction and wide enough for a wheelchair (at least 36 inches wide)?	✓			
2.	Does a visual scan of the main path reveal any obstacles (phones, fountains, etc.) that protrude more than 4 inches into walkways or corridors?	✓			
3.	Are floor surfaces firm, stable, and slip resistant (carpets wheelchair friendly)?	✓			
4.	Is at least one wheelchair-accessible public telephone available?			✓	
5.	Are wheelchair-accessible facilities (toilet rooms, exits, etc.) identified with signage?	✓			

EMG Abbreviated Accessibility Checklist					
	Paths of Travel (cont.)	Yes	No	N/A	Comments
6.	Is there a path of travel that does not require the use of stairs?	✓			
7.	If audible fire alarms are present, are visual alarms (strobe light alarms) also installed in all common areas?	✓			
	Elevators	Yes	No	N/A	Comments
1.	Do the call buttons have visual signals to indicate when a call is registered and answered?	✓			
2.	Are there visual and audible signals inside cars indicating floor change?	✓			
3.	Are there standard raised and Braille marking on both jambs of each host way entrance?	✓			
4.	Do elevator doors have a reopening device that will stop and reopen a car door if an object or a person obstructs the door?	✓			
5.	Do elevator lobbies have visual and audible indicators of car arrival?	✓			
6.	Does the elevator interior provide sufficient wheelchair turning area (51" x 68")?	✓			
7.	Are elevator controls low enough to be reached from a wheelchair (48 inches front approach/54 inches side approach)?	✓			
8.	Are elevator control buttons designated by Braille and by raised standard alphabet characters (mounted to the left of the button)?	✓			
9.	If a two-way emergency communication system is provided within the elevator cab, is it usable without voice communication?	✓			
	Restrooms	Yes	No	N/A	Comments
1.	Are common area public restrooms located on an accessible route?	✓			
2.	Are pull handles push/pull or lever type?	✓			lever
3.	Are there audible and visual fire alarm devices in the toilet rooms?	✓			
4.	Are corridor access doors wheelchair-accessible (at least 32 inches wide)?	✓			
5.	Are public restrooms large enough to accommodate a wheelchair turnaround (60" turning diameter)?	✓			

EMG Abbreviated Accessibility Checklist					
	Restrooms (cont.)	Yes	No	N/A	Comments
6.	In unisex toilet rooms, are there safety alarms with pull cords?		✓		
7.	Are stall doors wheelchair accessible (at least 32" wide)?	✓			
8.	Are grab bars provided in toilet stalls?	✓			
9.	Are sinks provided with clearance for a wheelchair to roll under (29" clearance)?	✓			
10.	Are sink handles operable with one hand without grasping, pinching or twisting?	✓			
11.	Are exposed pipes under sink sufficiently insulated against contact?	✓			There is only one sink that has insulated pipes
12.	Are soap dispensers, towel, etc. reachable (48" from floor for frontal approach, 54" for side approach)?	✓			
13.	Is the base of the mirror no more than 40" from the floor?	✓			

APPENDIX E:
PRE SURVEY QUESTIONNAIRE AND
DOCUMENTATION REQUEST CHECKLIST

PROPERTY CONDITION ASSESSMENT : PRE-SURVEY QUESTIONNAIRE

This questionnaire must be completed by the property owner, the owner's designated representative, or someone knowledgeable about the subject property. **The completed form must be presented to EMG's Field Observer on the day of the site visit.** If the form is not completed, EMG's Project Manager will require **additional time** during the on-site visit with such a knowledgeable person in order to complete the questionnaire. During the site visit, EMG's Field Observer may ask for details associated with selected questions. This questionnaire will be utilized as an exhibit in EMG's final Property Condition Report.

Name of person completing questionnaire: Len Smith

Association with property: BHS SC Institute

Length of association with property: 8 yrs

Date Completed: _____

Phone Number: _____

Property Name: _____

EMG Project Number: _____

Directions: Please answer all questions to the best of your knowledge and in good faith. Please provide additional details in the Comments column, or backup documentation for any Yes responses.

INSPECTIONS		DATE LAST INSPECTED	LIST ANY OUTSTANDING REPAIRS REQUIRED
1	Elevators	3/2015	
2	HVAC, Mechanical, Electric, Plumbing	boiler 2/2015	
3	Life-Safety/Fire	3/2014	2015 Test Inspect is 75% done.
4	Roofs		

QUESTION		RESPONSE
5	List any major capital improvement within the last three years.	
6	List any major capital expenditures planned for the next year.	G bld > Heat loss pumps E bld
7	What is the age of the roof(s)?	
8	What building systems (HVAC, roof, interior/exterior finishes, paving, etc.) are the responsibilities of the tenant to maintain and replace?	All

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	RESPONSE				COMMENTS
	Y	N	Unk	NA	

9	Are there any unresolved building, fire, or zoning code issues?					FPE
10	Are there any "down" or unusable units?		N			
11	Are there any problems with erosion, stormwater drainage or areas of paving that do not drain?					
12	Is the property served by a private water well?		N			
13	Is the property served by a private septic system or other waste treatment systems?		N			
14	Are there any problems with foundations or structures?	Y				Brcks F
15	Is there any water infiltration in basements or crawl spaces?	Y				Sprinkler Room A bld
16	Are there any wall, or window leaks?					window D 1st FIR by connect. to B.
17	Are there any roof leaks?	Y				F bld 3rd FIR
18	Is the roofing covered by a warranty or bond?					B-A B-D 3yrs old connect
19	Are there any poorly insulated areas?	Y				Throughout
20	Is Fire Retardant Treated (FRT) plywood used?			✓		Now
21	Is exterior insulation and finish system (EIFS) or a synthetic stucco finish used?	Y	N			Entrances
22	Are there any problems with the utilities, such as inadequate capacities?	Y				FPE panels Capacity issue
23	Are there any problems with the landscape irrigation systems?		N			Baseball field
24	Has a termite/wood boring insect inspection been performed within the last year?	Y				D106-108, E bld-310
25	Do any of the HVAC systems use R-11, 12, or 22 refrigerants?	Y				22 only A 2-B 1-c F 2 walkins
26	Has any part of the property ever contained visible suspect mold growth?	Y				2 yrs ago F bld wood/Building trades
27	Is there a mold Operations and Maintenance Plan?					
28	Have there been indoor air quality or mold related complaints from tenants?	Y				They have been resolved

29	Is polybutylene piping used?		N			Is polybutylene piping used?
30	Are there any plumbing leaks or water pressure problems?					
31	Are there any leaks or pressure problems with natural gas service?		N			
32	Does any part of the electrical system use aluminum wiring?		N			Some copper clad
33	Do Residential units have a less than 60-Amp service?					N/A
34	Do Commercial units have less than 200-Amp service?		N			
35	Are there any recalled fire sprinkler heads (Star, GEM, Central, Omega)?		N			
36	Is there any pending litigation concerning the property?			/		
37	Has the management previously completed an ADA review?	Y				
38	Have any ADA improvements been made to the property?	Y				Egress Abld for caryn.
39	Does a Barrier Removal Plan exist for the property?					
40	Has the Barrier Removal Plan been approved by an arms-length third party?					
41	Has building ownership or management received any ADA related complaints?	Y				Chair 1.1 PT F bld
42	Does elevator equipment require upgrades to meet ADA standards?	Y				
43	Are there any problems with exterior lighting?		N			New Fall 2014
44	Are there any other significant issues/hazards with the property?					2nd F/B 2 A building water pipe insulation concrete steps Building A to B Deck.
45	Are there any unresolved construction defects at the property?					

Energy 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. If the form is not completed, EMG's Project Manager will require **additional time** during the on-site visit with such a knowledgeable person in order to complete the questionnaire. During the site visit, EMG's Field Observer may ask for details associated with selected questions. This questionnaire will be utilized as an exhibit in EMG's final report.

Name of Institution:	Burlington High School / Burlington School District	
Name of Building:		Building #:

Unk = Unknown, NA = Not Applicable	Yes	No	NA	Unk	Comments
1. Are the plumbing fixtures Low Flow (Below 2.0GPM, 1.6GPF)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Are there any vacant buildings or significant building areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Do tenants pay for utilities at leased properties?					no tenants
4. Does the owner pay for exterior site lighting electricity?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	district

Site Information					
Primary Heating System & Fuel?	Wood chip boiler.				
Secondary Heating System & Fuel?	(3) natural gas boiler / (1) hot water for kitchen				
If Oil Used For Heating Tank Capacity	Gallons	No. of Tanks			
Primary Cooling System & Capacity?	Multiple Roof Top - Administrative Office / Server Room / Auditorium / Cafeteria				
Year of Construction?	1964 → through 1969				
No. of Stories?	4 (A)	Floor	(3) F / 2 stories		
Total Site Area?	Acres				
Total Building Area?	Sqft				
Area Heated (%)	100	%			
Area Cooled (%)	20	% or less			
Total Conditioned Area (%)	%				
	Elec.	Natural Gas	Propane	No.2 Oil	Dist. Steam
Primary Heating Fuel? Wood chip	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secondary Heating Fuel?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Domestic Water Heater Fuel?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Building Occupancy/Schedule		
Facility Occupancy (avg. people ea. day)	M - F 2000 plus students + Facility (200 est)	
After Hours Facility Occupancy (avg. people ea. day)	events (1000 plus)	
Standard Building Occupancy Timing	6: (AM/PM) - 11: (AM/PM)	
Maintenance Staff Hours	: AM/PM - : AM/PM	
	Hours open to Public	Hours open to Staff
Monday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Tuesday	: AM/PM - : 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	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Saturday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Sunday	: AM/PM - : AM/PM	: AM/PM - : AM/PM
Number of Months the Facility Operates in a Year?	10 Months - 12 month - Summer school / Recreation	
Estimated Percentage of Male Staff and Guests (%)	?	



Energy Audit Pre-Survey Questionnaire

Building Structure						
		Y/N		Y/N		Y/N
Roof Type:	Pitched?		Flat	X	Both	
Attic Insulation:	Batt		Cellulose		Fiberglass	
Window Frame:	Wooden		Vinyl		Metal	
Window Glazing:	Single		Double		Triple	
Structure	Wooden		Metal		Conc.	

Rebber w/ some ballast / some emulsion
no attic spaces / rigid insulation
metal
double
masonry

→ Remodeled in early 90's

Building Lighting			
Type of Linear Fluorescent Lamps? (T8/T12)	T8	Exterior Lighting Control (Timer/Photocell)	Photocell
Type of Common Lamps? (Incand/CFLs)		Exterior Light Timing	Hr
Lighting Sensors? (Y/N)	H	EXIT Lights (Incand/Fluor/LED)	LEDs

Preventive Maintenance of Mechanical System		
Systems	Annual Professional Maintenance	Seldom or Never Maintained
Tenant Space Heating Systems (Furnace/Boilers/Heat pumps)	<input checked="" type="checkbox"/> Staff -	<input type="checkbox"/>
Tenant Space Cooling Systems (Condensers/Window AC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Domestic Water Heaters	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Other Systems			
	Qty	Selection	Additional Comments?
# of Elevators	4	Hydraulic/Traction	2 CHAIR LIFTS - stairs / 1 hand
# of Electric Meters	2500 kWh	Master/Sub	1200 AMP
# of Nat. Gas Meters	2 (?)	Resi/Commercial/Indust.	
# of Water Meters	1 water		
# of Backup Generator	no	Generator Fuel?	

boiler
no / kitchen

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

Items Provided to EMG Auditors				
	Yes	No	N/A	Additional Comments?
Access to All Mechanical Spaces				
Access to Roof/Attic Space				
Access to Building As-Built Drawings		X		
Access to last 12/24 Months Utility Data				
Access to last 12/24 Month Water & Sewer Bills				

no emergency generation

= window
= daylight sensors
= no BAS

Rain: 45°F

APPENDIX F:
TERMINOLOGY

The following are definitions of terms utilized in this report.

TERMINOLOGY	
Actual Knowledge	Information or observations known first hand by EMG.
ADA	The Americans with Disabilities Act
Ancillary Structures	Structures that are not the primary improvements of the Property but which may have been constructed to provide support uses.
Appropriate Inquiry	A requests for information from appropriate entity conducted by a Freedom of Information Letter (FOIL), verbal request, or by written request made either by fax, electronic mail, or mail. A good-faith one time effort conducted to obtain the information in light of the time constraints to deliver the FCA.
ASTM	American Society for Testing and Materials
Base Building	That portion of the building (common area) and its systems that are not typically subject to improvements to suit tenant requirements.
Baseline	A minimum scope level of observation, inquiry, research, documentation review, and cost estimating for conducting a Facility Condition Assessment as normally conducted by EMG.
BOMA	Building Owners and Managers Association
Building	Referring to the primary building or buildings on the Property, which are within the scope of the FCA as defined under Section 2.
Building Codes	A compilation of rules adopted by the municipal, county and/or state governments having jurisdiction over the Property that govern the property's design and/or construction of buildings.
Building Department Records	Information concerning the Property's compliance with applicable Building, Fire and Zoning Codes that is readily available for use by EMG within the time frame required for production of the Property Condition Assessment.
Building Systems	Interacting or interdependent components that comprise a building such as structural, roofing, side wall, plumbing, HVAC, water, sanitary sewer and electrical systems.
BUR	Built Up Roof
Client	The entity identified on the cover of this document as the Client.
Commercial Real Estate	Real property used for industrial, retail, office, agricultural, other commercial, medical, or educational purposes, and property used for residential purposes that has more than four (4) residential dwelling units.
Commercial Real Estate Transaction	The transfer of either a mortgage, lease, or deed; the re-financing of a commercial property by an existing mortgagee; or the transferring of an equity interest in commercial property.
Component	A piece of equipment or element in its entirety that is part of a system.
Consultant	The entity or individual that prepares the Facility Condition Assessment and that is responsible for the observance of, and reporting on the physical condition of Commercial Property.
Dangerous or Adverse Conditions	Situations which may pose a threat or possible injury to the Project Manager, or those situations which may require the use of special protective clothing, safety equipment, access equipment, or any precautionary measures.
Deferred Maintenance	Deficiencies that result from postponed maintenance, or repairs that have been put off until a later time and that require repair or replacement to an acceptable condition relative to the age of the system or property.
Dismantle	To take apart; disassemble; tear down any component, device or piece of equipment that is bolted, screwed, secured, or fastened by other means.

TERMINOLOGY	
DWV	Drainage Waste Ventilation
EIFS	Exterior Insulation and Finish System
EMS	Energy Management System
Engineering	Analysis or design work requiring extensive formal education, preparation and experience in the use of mathematics, chemistry, physics, and the engineering sciences as provided by a Professional Engineer licensed to practice engineering by any state of the 50 states.
Expected Useful Life (EUL)	The average amount of time in years that a system or component is estimated to function when installed new.
FEMA	Federal Emergency Management Agency
FFHA	Federal Fair Housing Act
Fire Department Records	Information generated or acquired by the Fire Department having jurisdiction over the Property, and that is readily available to EMG within the time frame required for production of the FCA.
FIRM	Flood Insurance Rate Maps
FM	Factory Mutual
FOIA	U.S. Freedom of Information Act (5 USC 552 et seq.)
FOIL	Freedom of Information Letter
FRT	Fire Retardant Treated
Guide	A series of options or instructions that do not recommend a specific course of action.
His	Referring to either a male or female Project Manager, or individuals interviewed by the Project Manager.
HVAC	Heating, Ventilating and Air-conditioning
IAQ	Indoor Air Quality
Immediate Repairs	Physical deficiencies that require immediate action as a result of: (i) existing or potentially material unsafe conditions, (ii) significant negative conditions impacting tenancy/marketability, (iii) material building code violations, or (iv) poor or deteriorated condition of critical element or system, or (v) a condition that if left "as is", with an extensive delay in addressing same, has the potential to result in or contribute to critical element or system failure within one (1) year.
Interviews	Interrogatory with those knowledgeable about the Property.
Material	Having significant importance or great consequence to the asset's intended use or physical condition.
MEP	Mechanical, Electrical, and Plumbing
NFPA	National Fire Protection Association
Observations	The results of the Project Manager's Walk-through Survey.
Observe	The act of conducting a visual, unaided survey of items, systems or conditions that are readily accessible and easily visible on a given day as a result of the Project Manager's walk-through.
Obvious	That which is plain or evident; a condition that is readily accessible and can be easily seen by the Project Manager as a result of his Walk-through without the removal of materials, moving of chattel, or the aid of any instrument, device, or equipment.
Owner	The entity holding the deed to the Property that is the subject of the FCA.
FCA	Facility Condition Assessment, the Purpose and Scope of which is defined in Section 2. of this report.

TERMINOLOGY	
Physical Deficiency	<p>Patent, conspicuous defects, or significant deferred maintenance of the Property's material systems, components, or equipment as observed during the Project Manager's Walk-through Survey.</p> <p>Material systems, components, or equipment that are approaching, have realized, or have exceeded their typical Expected Useful Life (EUL); or, that have exceeded their useful life result of abuse, excessive wear and tear, exposure to the elements, or lack of proper or adequate maintenance.</p> <p>This definition specifically excludes deficiencies that may be remedied with routine maintenance, miscellaneous repairs, normal operating maintenance, and conditions that do not present a material deficiency to the Property.</p>
PML	Probable Maximum Loss
Practically Reviewable	Information that is practically reviewable means that the information is provided by the source in a manner and form that, upon examination, yields information relevant to the property without the need for extraordinary analysis of irrelevant data.
Practice	A definitive procedure for performing one or more specific operations or functions that does not produce a test result.
Primary Improvements	The site and building improvements that are of fundamental importance with respect to the Property.
Project Manager	The individual Professional Engineer or Registered Architect having a general, well rounded knowledge of all pertinent site and building systems and components that conducts the on site visit and walk-through observation.
Property	The site and building improvements, which are specifically within the scope of the FCA to be prepared in accordance with the agreement between the Client and EMG.
Readily Accessible	Those areas of the Property that are promptly made available for observation by the Project Manager without the removal of materials or chattel, or the aid of any instrument, device, or equipment at the time of the Walk-through Survey.
Reasonably Ascertainable	Information that is publicly available, provided to EMG's offices from either its source or an information research/retrieval concern, practically reviewable, and available at a nominal cost for either retrieval, reproduction or forwarding.
Recreational Facilities	Spas, saunas, steam baths, swimming pools, tennis courts, playground equipment, and other exercise, entertainment, or athletic facilities.
Remaining Useful Life (RUL)	<p>The consultant's professional opinion of the number of years before a system or component will require replacement or reconditioning. The estimate is based upon observation, available maintenance records, and accepted EUL's for similar items or systems.</p> <p>Inclement weather, exposure to the elements, demand on the system, quality of installation, extent of use, and the degree and quality of preventive maintenance exercised are all factors that could impact the RUL of a system or component. As a result, a system or component may have an effective age greater or less than its actual age. The RUL may be greater or less than its Expected Useful Life (EUL) less actual age.</p>
Replacement Costs	Costs to replace the system or component "in kind" based on Invoices or Bid Documents provided by the current owner or the client, construction costs developed by construction resources such as <i>Means</i> and <i>Dodge</i> , EMG's experience with past costs for similar properties, or the current owner's historical incurred costs.
Replacement Reserves	Major recurring probable expenditures, which are neither commonly classified as an operation or maintenance expense. Replacement Reserves are reasonably predictable both in terms of frequency and cost. However, they may also include components or systems that have an indeterminable life but nonetheless have a potential liability for failure within the reserve term.

TERMINOLOGY	
RTU	Rooftop Unit
RUL	Remaining Useful Life (See definition)
Short Term Repair Costs	Opinions of Costs to remedy Physical Deficiencies, such as deferred maintenance, that may not warrant immediate attention, but requiring repairs or replacements that should be undertaken on a priority basis, taking precedence over routine preventive maintenance work within a zero to one year time frame. Included are such Physical Deficiencies resulting from improper design, faulty installation and/or substandard quality of original system or materials. Components or systems that have realized or exceeded their Expected Useful Life (EUL) that may require replacement to be implemented within zero to one-year time frame are also included.
Shut-Down	Equipment or systems that are not operating at the time of the Project Manager's Walk-through Survey. Equipment or systems may be considered shutdown if it is not in operation as a result of seasonal temperatures.
Significant	Important, material, and/or serious.
Site Visit	The visit to the property by EMG's Project Manager including walk-through visual observations of the Property, interviews of available project personnel and tenants (if appropriate), review of available documents and interviews of available municipal personnel at municipal offices, all in accordance with the agreement for the Facility Condition Assessment.
Specialty Consultants	Practitioners in the fields of engineering, architecture; or, building system mechanics, specialized service personnel or other specialized individuals that have experience in the maintenance and repair of a particular building component, equipment, or system that have acquired detailed, specialized knowledge in the design, assessment, operation, repair, or installation of the particular component, equipment, or system.
Structural Component	A component of the building, which supports non-variable forces or weights (dead loads) and variable forces or weights (live loads).
Suggested Remedy	A preliminary opinion as to a course of action to remedy or repair a physical deficiency. There may be alternate methods that may be more commensurate with the Client's requirements. Further investigation might make other schemes more appropriate or the suggested remedy unworkable. The suggested remedy may be to conduct further research or testing, or to employee Specialty Consultants to gain a better understanding of the cause, extent of a deficiency (whether observed or highly probable), and the appropriate remedy.
Survey	Observations as the result of a walk-through scan or reconnaissance to obtain information by EMG of the Property's readily accessible and easily visible components or systems.
System	A combination of interacting or interdependent components assembled to carry out one or more functions.
Technically Exhaustive	The use of measurements, instruments, testing, calculations, exploratory probing or discover, and/or other means to discover and/or troubleshoot Physical Deficiencies, develop scientific or Engineering findings, conclusions, and recommendations. Such efforts are not part of this report unless specifically called for under Section 2.2.
Term	Reserve Term: The number of years that Replacement Reserves are projected for as specified in the Replacement Reserves Cost Estimate.
Timely Access	Entry provided to the Project Manager at the time of his site visit.
UST	Underground Storage Tank

TERMINOLOGY

Walk-through Survey

The Project Manager's site visit of the Property consisting of his visual reconnaissance and scan of readily accessible and easily visible components and systems. This definition connotes that such a survey should not be considered in depth, and is to be conducted without the aid of special protective clothing, exploratory probing, removal of materials, testing, or the use of special equipment such as ladders, scaffolding, binoculars, moisture meters, air flow meters, or metering/testing equipment or devices of any kind. It is literally the Project Manager's walk of the Property and observations.

**APPENDIX G:
RESUMES FOR REPORT REVIEWER AND FIELD
OBSERVER**

MARGARET H. MITNICK, P.E., LEED AP*Program Manager**Education*

- B.S., Civil Engineering, University of Rhode Island, 1985
- B.A., Biology - Ecology concentration, University of Pennsylvania, 1978

Project Experience

- Archdiocese of Baltimore – Baltimore, MD.
Program Manager and Technical Report Reviewer for FCA with AssetCALC™ at multiple parishes in the Baltimore Area. The assessments included structural, mechanical, and electrical systems and components of buildings and infrastructure. Her dedication to accuracy and detail of all reports, support documents and cost estimates insured the finalization of the projects within the contract time frame with minimal revision requirements from the draft submissions to finalization.
- Hampton Redevelopment and Housing Authority - Hampton, VA.
Program Manager and Technical Report Reviewer for GPNA and HUD Rental Assistance Demonstration program conversion of multi-family properties managed by housing authority.
- Ypsilanti Housing Authority - Ypsilanti, MI.
Program Manager and Technical Report Reviewer for GPNA and Energy Audit with AssetCALC™ and HUD Rental Assistance Demonstration program conversion of multi-family properties managed by the housing authority.
- Capital Region Education Council - Hartford, CT.
Facility Condition Assessments for several portfolios of K-12 schools
- State of Vermont – Montpelier, VT
Program Manager and Technical Report Reviewer for Facility Condition Assessment and Energy Audit on the state-owned building inventory approximately 3,590,000 gross square feet in approximately 285 buildings.
- Anne Arundel Community College – Arnold, MD
Program Manager and Technical Report Reviewer for Facility Condition Assessment with AssetCALC™ of 28 facilities occupying approximately 905,064 square feet.
- Mental Health Association in Tulsa – Tulsa, OK
Program Manager and Technical Report Reviewer for Facility Condition Assessment with AssetCALC™, mechanical inventory and major movables inventory of 23 sites.
- ☐ Suffolk Redevelopment and Housing Authority – Suffolk, VA
Program Manager and Technical Report Reviewer for GPNA and Energy Audit with AssetCALC™ and HUD Rental Assistance Demonstration program conversion of multi-family properties managed by the housing authority.

Industry Tenure

- A/E: 1985
- EMG: 2013

Professional Registrations

- Professional Engineer:
DC/MD/VA
- U.S. Green Building
Council, LEED
Accredited Professional

*Professional Memberships
and Associations*

- American Society of Civil
Engineers
- International Concrete
Repair Institute
 - President, Baltimore-
Washington, D.C.
Chapter, 2002
 - Board of Directors,
2005-2006
 - 2012 ICRI BWC
Outstanding Project
Award – 3rd Place
- Project Management
Institute
 - PMP, 2013

Regional Location

Baltimore, Maryland

RAJ VISHWANATH

Project Manager

Education

- BS, Civil and Environmental Engineering 1987
- MS, Environmental Science and Engineering 1991

Key Project Experience

- **Westinghouse Electric Company, Nuclear Division World HQ Build – to – suit Project, Cranberry Township, Pennsylvania:**
As owners representative for the largest build to suit project in US history (approximately One Million Square Feet of tenant space and over \$200 Million in cost) Mr. Vishwanath played a very key role from selection of the General Contractor to conducting OAE team meetings along with the developer Trammell Crow Company. The project lasted approximately 3 years and was completed in mid 2012. WEC moved into the newly built office which housed a mock nuclear reactor in the basement level in August 2010.
- **Fifth Third Bank Building, Charlotte, North Carolina –** Mr. Raj Vishwanath conducted a facility condition audit environmental assessments and property condition assessments that included a five day site visit with narrative reports and construction document review for a 30-story office tower in North Carolina which was owned at the time by Bank of America. Sun Trust Bank of Charlotte, NC provided funding for the project.
- **Social Security Administration Buildings, Dallas, Texas** Mr. Raj Vishwanath conducted several property condition and environmental assessments for SSA offices in the Dallas / Fort Worth Metroplex for various private owners.
- **LEED Certification –** Mr. Raj Vishwanath has performed over 30 LEED and ENERGY Star Certification projects for various clients nation wide in 2012 alone. LEED projects include Commercial Office, Retail, Hospitality and Multi Family Housing. Mr. Vishwanath has successfully certified to LEED PLATINUM Coca Cola's Headquarters, KeyBank Headquarters and landmark buildings such as the Key Tower in Cleveland, Ohio, and Market Square on Pennsylvania Avenue in Washington DC.
- **Innisfree Hotels inc-** Raj Vishwanath conducted several property condition and environmental assessments for various hotel properties for Innisfree Hospitality in Pensacola, Florida, and Orange Beach Alabama in 2011 and 2012.

Industry Tenure

- A/E: 1995
- EMG: 2011

Related Experience

- Educational Facility Condition Assessment reports
- Assisted Living Portfolios
- Hospitality Portfolios
- Retail Portfolios
- Facility Condition
- LEED and Energy Star
- Construction Management
- BIM and Clash Detection in Construction trades
- Fire and Life Safety Systems
- Mechanical, Electrical and Plumbing Specialized Assessments
- Structural Assessments Concrete and Steel Structures and Wood Framed Structures
- Energy Auditing and Conservation

Industry Experience

- Government Facilities
- Office
- Industrial
- Housing/Multi-family
- K-12
- Higher Education
- Hospitality
- Healthcare
- Retail/Wholesale

Active Licenses/Registration

- California REA

Regional Location

- Dallas, Texas

MARY ENDSLEY RA

Project Manager

Education

- Bachelor of Architecture
New York Institute of Technology, Old Westbury 1990

Project Experience

- **Ramaland Data Center, Orangeburg, New York** – As a Project Manager, Ms. Endsley performed a Property Conditions Assessment (PCA) for this Warehouse/Manufacturing property that was in the process of being converted to a critical mission data center.
- **200 Forest Street, Marlborough, Massachusetts** – Ms. Endsley served as the Project Manager on the Property Conditions Assessment survey of Office/Biomedical Engineering Facility. The client found her observations critical to their final business decision.
- **Tornillo-Guadalupe Land Port of Entry (LPOE), Tornillo, Texas** – Ms. Endsley served as the Contract Administrator/Claims Manager for the owner on the new construction of the LPOE. The project consisted of 117 acres and the budget for construction was \$56 Million. The client (GSA) relied on the findings of Ms. Endsley's team in order to protect the government's position related to time and cost impacts during negotiations with the contractor.
- **Pease Federal Office Building, Portsmouth, New Hampshire** – Ms. Endsley served as the Project Manager on the Pre-Construction services including Design Review and Budget Reconciliation for the net zero office building for the GSA. The client found her observations critical to their final business decision.
- **Dana Farber Cancer Care Center, South Weymouth, Massachusetts** – Ms. Endsley served as the Project Manager on the Pre-construction Plan and Cost review and the Construction Monitoring for the new construction of the cancer care building. The client used her observations to approve the funding of the construction and the progress payments.

Industry Tenure

- A/E: 1997
- EMG: 2014

Related Experience

- Educational Facility
Condition Assessment reports
- Assisted Living Portfolios
- Hospitality Portfolios
- Retail Portfolios
- Architectural Design

Industry Experience

- Government Facilities
- Office
- Net Zero Facilities
- Industrial
- Housing/Multi-family
- Hospitality
- Healthcare
- Retail/Wholesale

Active Licenses/Registration

- New York Registered Architect, NCARB Certified, 2003

Special Skills & Training

- LEED AP
- Massachusetts MCPPO Certified
- Claims Management
- Change Order Processing
- Contract Administration

Regional Location

- Boston, Massachusetts
- New England
- New York, New York