DATE POSTED: MARBLEHEAD TOWN CLERK
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2024 DEC -2 PM 2:11

MEETING NOTICE

POSTED IN ACCORDANCE WITH THE PROVISIONS OF MGL 30A § 20 Act relative to extending certain COVID-19 measures adopted during the state of emergency

Marblehead School Committee – Facilities Subcommittee

Name of Board or Committee

Zoom Conference join via the web link or Dial in
https://marbleheadschools-org.zoom.us/j/99975493631?pwd=Y0pHWVM2YitBZXN0U2ZyTk1OMzh4dz09
Meeting ID: 999 7549 3631
Password: 873255
Dial in Phone #1 646 931 3860

Thursday	December	5th	2024	9:00 AM
Day of Week	Month	Date	Year	Time

Agenda or Topics to be discussed listed below (That the chair reasonably anticipates will be discussed)

I. Initial Business
   a. Call to Order
   b. Public Comment

II. Facilities Update
   a. District wide
   b. Marblehead Highschool Roof
   c. Marblehead Highschool Green House Project

III. Capital Projects Update and Planning

IV. School Owned Properties

V. Closing Business
   a. New Business- Subcommittee Announcements and Requests

THIS AGENDA IS SUBJECT TO CHANGE

Chairperson: Sarah Fox
Posted by: Sarah Fox
Date: 12/2/2024

RAYMOND DESIGN ASSOCIATES
ARCHITECTURE & PLANNING

MARBLEHEAD HIGH SCHOOL

Roofing Replacement Feasibility Study

Presented by

Raymond Design Associates, Inc.

For

Marblehead Public Schools

November 1, 2024

Mechanical, Electrical & Plumbing Engineers:

GGD Consulting Engineers, Inc.
375 Faunce Corner Road, Suite D
North Dartmouth, MA 02747
508.998.5700

Professional Cost Estimator:

PM&C
20 Downer Street
Hingham, MA 02043
781.740.8007

Moisture Testing Consultant:

IR Analyzers, Inc.
65 Lyman Drive
Town, MA 00000
800.879.1964

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RAYMOND DESIGN ASSOCIATES
ARCHITECTURE & PLANNING

EXECUTIVE SUMMARY

Raymond Design Associates, Inc. (RDA) is pleased to present this Roofing Replacement Feasibility Study to Marblehead Public Schools (MPS) for the Marblehead High School, located in Marblehead, Massachusetts. MPS engaged RDA to assess existing conditions, recommend repairs and replacement of existing systems, and propose a "menu" of scope options with varying estimated construction costs. We understand the primary focus of this Feasibility Study is replacement of existing membrane and asphalt shingle roofing in order to preserve and protect the Marblehead High School building.

RDA engaged GGD Consulting Engineers, Inc. (GGD) to evaluate the condition of existing rooftop HVAC equipment in order to better understand what effect the equipment might have on roofing replacement work, and to inform MPS of any immediate functional concerns related to rooftop equipment. RDA understands that mechanical equipment upgrades were not originally intended to be part of this roofing replacement project, but rooftop units are often interlinked with the roofing system due to curb flashings and penetrations. Verification of their condition is a matter of due diligence as they relate to roofing work, and also provides MPS with critical information for future capital improvement planning.

Generally, existing roofing systems and HVAC rooftop equipment have reached the end of their useful life spans. Replacement of roofing and rooftop HVAC equipment is recommended. We understand the current construction budget and funding allocation for this project will not support roofing and HVAC work, so we have developed several scope Options for consideration by MPS. Our intent for this report is to inform MPS about the condition of existing roofing systems and to support a proposal to the Marblehead School Committee and/or Town of Marblehead should MPS choose to request additional funding.

RDA also engaged PM&C, Inc. for professional cost estimating services and IR Analyzers, Inc. for moisture testing. Please refer to Appendices A and B for detailed cost estimates. Approximately 5% of the total square foot area of existing rigid insulation was documented as "wet" by infrared moisture testing performed by IR Analyzers. To avoid trapped moisture within new sealed roofing, wet and damp insulation must be removed and replaced prior to installation of a new membrane. For feasibility planning, we recommend including about 10% insulation replacement to account for margin of error and unforeseen conditions. To better understand the level of saturation and extent of damaged insulation, RDA will perform sample roofing test cuts at various locations throughout all roof areas with professional contractor assistance.

Test cuts will also allow RDA to confirm as-built roofing conditions, and our Environmental Consultant to collect samples for hazardous materials testing. Based on the age of the building and available original construction details, asbestos-containing materials are not expected. However, it is best industry practice to sample and test any suspect materials, using the services of a certified industrial hygienist.

We understand the current construction budget for this project to be approximately **$4,250,000**. This budget will support **Option C** (*Partial Roof Re-cover to fit current budget*) is feasible but is less ideal due to widespread water infiltration documented by infrared testing and suspected interior leaks reported by the MPS. **Option A** (*Re-cover only, no HVAC – **$5,491,300** estimated construction cost*) is recommended, at minimum, to secure the roof envelope without duplicate soft costs and general conditions required for separate procurements. **Option A1** (*Re-cover and replace all HVAC rooftop equipment - **$11,087,779** estimated construction cost*) is highly recommended for the same reasons of economy, based on existing HVAC equipment condition described herein, to allow for full

coordination of roofing and mechanical detailing, and to prevent cutting and patching of new roofing should HVAC equipment be replaced at a later date.

RDA remains Marblehead Public School's trusted partner, in full cooperation with LeftField Project Management, in representation of this project to the MPS School Committee and Town of Marblehead. Upon approval of this Feasibility Study and phase deliverables, RDA is prepared to move forward with Design Development and Construction Documents in preparation for Spring 2025 public bidding.

EXISTING CONDITIONS

PROPERTY DESCRIPTION

Construction of Marblehead High School, located at 2 Humphrey Street in Marblehead, Massachusetts, was completed and the school opened in 2002. The property is approximately 18.6 acres and includes soccer and baseball fields, tennis courts, and a newly installed turf football field hosting the Marblehead Magicians. Surrounded by densely settled residential neighborhoods consisting of mainly one and two family homes, the school is an important community resource and well-known public investment.

The school building is generally constructed of exterior masonry walls, brick masonry façade, steel framing, and flat membrane roofing. There is one asphalt-shingled gable roof and also a seventy-foot tall tower overlooking the coastal neighborhood. The site is located less than one half mile from the closest shoreline and therefore the building is subjected to coastal environmental conditions year-round including but not limited to corrosive salt, increased humidity, and high winds.

ROOFING

Membrane Roofing: There are a total of nine (9) membrane roof areas totaling approximately 116,800 square feet. Areas are delineated by elevation change and most are accessible by full height exterior service doors and roof ladders (Photo 1 of Appendix F: Photo Index). According to original 2001 construction drawings, all membrane roofing is composed of single-ply TPO (thermoplastic polyolefin) membrane over 3-inch thick rigid polyiso board insulation, continuous vapor barrier between the insulation and roof deck, and corrugated steel roof deck. Lighting protection with surface wiring is installed throughout all roof areas and connected to rooftop mechanical equipment (Photo 2). Flat roof drainage consists of cast iron area drains at most roof areas (Photo 3), and scupper boxes with downspouts at Areas E and I (tower), (Photo 4). Based on the original drawings, most roof decking is flat, but decking over the Gymnasium (Roof Are D) appears to be sloped.

Marblehead Public Schools (MPS) reported recent repairs to several leaks in membrane roofing prior to the commencement of this study and have reported remaining concerns possible active leaks below Roof Area 'D' (Gymnasium). Staining and water damage to interior finishes resulting from these leaks is evident in several common areas within the school (Photo 5). From the surface, the membrane is generally clean and free of debris and large ponding areas. However, we observed signs that the membrane, walk pads, and various finishes have reached or are reaching the end of their expected life spans such as brittle membrane surfaces (Photo 6), rippling and delamination (Photo 7), apparent seam repairs (Photos 8 through 11), and limited ponding (Photo 12). Based on the number of apparent seam repairs observed, welded seams are generally compromised and susceptible to age-related failure.

Existing TPO membrane roofing is terminated at vertical masonry sidewalls by means of lead-coated copper (LCC) through-wall flashing and LCC counterflashing. Regularly spaced weep slots are visible along the brick masonry

courses above all through-wall flashing which is in line with best industry practices for masonry cavity walls (Photo 13). Roofing sealant along the top edge of most through-wall flashing is worn, faded, and appears to have reached the end of its useful life span (Photo 14). TPO flashings appear to be loosening with aging seals that may be compromised (Photo 15). LCC flashings appear to be in stable condition with exception of minor bending and dents in some areas. Flat roof fasciae are terminated with white color-coated aluminum edge metal with gravel stop profile and hemmed drip edge (Photo 16).

Infrared moisture testing performed by IR Analyzers, Inc. indicated approximately 5,500 square feet of wet rigid insulation, mainly scattered throughout Roof Areas 'A' and 'B'. Wet areas range in size from 6 square feet to 800 square feet and appear to be in locations that suggest leaks at roof drains and penetration flashings. Generally, infrared moisture testing works by using infrared imaging to mark contrasts in roof temperature which indicate where moisture is trapped within insulation below the roof membrane. Because damp/wet insulation gains and radiates heat at different rates than dry insulation, wet areas appear as "warm" compared to dry areas that appear "cool". Please refer to Infrared Thermographic Roof Moisture Analysis included in this report for detailed descriptions of infrared testing methodology and results.

Asphalt Shingle Roofing: Roof Area 'J' is located above the Library and is the only roof area with an asphalt-shingle sloped gable roof (Photo 17). There are approximately 8,430 square feet of asphalt shingle roofing, with 6:12 slope factor applied. Based on original 2001 construction documents, the roofing assembly consists of architectural fiberglass-reinforced asphalt shingles, building felt, plywood sheathing, 1-1/2 inch +/- ventilating air space, 3-inch thick nailable rigid insulation board, and vapor barrier over corrugated metal decking. There is a continuous clear air space along each eave for intake ventilation and continuous shingle-over roof vent for exhaust ventilation. Fasciae and rakes are clad in white color-coated aluminum sheet metal that matches flat roof edge metal color.

Existing asphalt shingles are faded, beginning to loose surface granules, and at 22 years old are approaching the end of an expected 25-30 year life span with coastal conditions considered. However, we did not observe damage, missing or cupped shingles, or substantial wear that would suggest the shingles are close to failure. Loss of surface granules is often a primary indicator of shingle integrity because the granules help resist UV radiation and protect the asphalt impregnated shingle body from damage, lichen growth, and moisture absorption. Once these granules wear away, water can begin to soak and pass through the shingle body, resulting in interior leaks. In contrast, the existing shingles at Marblehead High School are true to color, uniform, and do not appear to be absorbing water (Photo 18).

Intersections with vertical masonry walls are flashed with LCC through-wall flashing similar to membrane roofing termination flashing, with LCC counterflashing. Weep slots are visible along the flashing lines, including at step flashing which is in line with recommended building practices. LCC flashing appears to be in fair to good condition at asphalt shingle roofing, with some patina coming through on counterflashing (Photo 19).

Asphalt shingle roof drainage consists of continuous, white color-coated aluminum, custom-formed gutters, matching the typical edge metal at rakes and flat roof edges (Photo 20). Downspouts along the north eave are copper pipe-style (Photo 21) and downspouts along the south eave are rectangular white color-coated aluminum (Photo 22). All downspouts drain onto small splash mats adhered to TPO membrane roofing below and ultimately to cast-iron area drains within the flat roofing field. Gutters and downspouts appear to be in fair to good condition.

HEATING, VENTILATION, AND AIR CONDITIONING

While roofing is the primary focus of the Feasibility Study, RDA engaged GGD Consulting Engineers, Inc. (GGD) to evaluate the general condition of existing rooftop Heating, Ventilation, and Air Conditioning (HVAC) equipment. Roofing replacements are often an ideal time to replace, repair, and/or update rooftop equipment due to

interconnection between roof flashings and equipment curbs, wiring, penetrations, etc. HVAC work can be quite costly in relation to re-roofing costs, especially when rigging and hoisting is required to lift large units onto the roof. Generally, the existing Marblehead High School rooftop equipment consists of over forty (40) exhaust fans, twenty (20) compact condensing units, eight (8) large RTU's (roof-top unit), five (5) large HRV's (heat recovery ventilator), and one (1) medium sized MAU (make-up air unit). Please refer to Appendix E to review GGD's HVAC Report which details their professional observations and recommendations.

Generally, all HVAC rooftop units and exhaust fans have reached and/or passed the end of their useful life spans. Selective equipment is not functioning properly, and substantial corrosion of interior components were documented. At least nineteen (19) compact condensers supported by membrane-wrapped sleepers must be disconnected, lifted, and then re-connected as part of a roofing replacement project in order to flash and wrap the sleepers with new membrane. These units use now defunct R-22 refrigerant. Re-charging with R-22 refrigerant is very costly because it is no longer manufactured but is still available (at the time of this study) at a premium cost. For feasibility analysis, all nineteen (19) units should be assumed to require this purge/re-charge work.

RECOMMENDATIONS

Based on observations of existing roofing conditions and review of moisture testing results, replacement of all TPO membrane roof areas with new membrane roofing is recommended at this time. Replacement of asphalt shingle roofing is also recommended, but the condition of existing shingles does not appear to be as severe as membrane roof areas. Based on findings and recommendations by GGD pertaining to rooftop HVAC equipment, replacement of all rooftop units with new equipment is recommended. Because the currently funded construction budget of approximately $4,250,000 will not support both roofing and HVAC work, we have developed a "menu" of Scope of Work Options with varying estimated construction costs.

First, roofing replacement is recommended to include overlay of existing membrane and insulation with a new membrane and cover board, as opposed to removal of the entire existing roofing system down to steel decking. This approach is referred to as roofing "Re-Cover" and is appropriate when there are no major concerns regarding thermal performance and the membrane has simply reached the end of its life span. The rigid insulation below the membrane, when dry and intact, retains insulative value for many decades and typically has a considerably longer life span than the membrane itself. Full replacement (stripping down to the deck and replacing with all new materials) will require increasing insulation thickness to meet the newest energy code requirements which are substantially more stringent than 2001 codes. New codes will likely result in raising the height of all through-wall flashings, fascia edge metals, cheek wall window sills, access door sills, roof drains, equipment curbs, and vent pipes as much as 12-inches or more. At Marblehead High School, increasing insulation to such a degree will substantially increase construction costs, and without performing extensive energy modeling, utility cost savings over time are unclear. Roofing re-cover is permitted by code and allows for re-use of existing through-wall flashings and curbs. Therefore, with an understanding of MPS' budget and reported needs, roof re-cover is recommended.

The new roofing membrane is recommended to be either EPDM (ethylene propylene diene monomer) or PVC (polyvinyl chloride) due to their availability, economy, and durability. EPDM roofing has better walkability in wet conditions, relatively simple repairability, and seam sealing technology has improved in recent years. PVC roofing uses heat-welded seams that require welded patching for repairs and is less walkable when wet, but its light color helps reduce unwanted heat gain and it does not fade over time. Membrane type can be determined during Design.

Existing wet and damp rigid insulation, as identified by infrared testing and uncovered during construction, should be replaced in kind with new dry material prior to installation of new cover board and roofing membrane. Based

on infrared moisture testing results, for planning purposes, and to account for any margin of error we have included 11,000 square feet of insulation replacement in the Feasibility Cost Estimate. This quantity can be included in future bidding documents under unit pricing to allow MPS a refund for any unused quantities.

If MPS is interested in increasing insulation value without triggering full compliance with the latest energy codes, we recommend that an additional 3-inches of new rigid board insulation be installed over the existing TPO membrane, below the new cover board and EPDM membrane. Most existing membrane roofing terminations are located 12-inches or more above the roof surface. The minimum standard is 8-inches, therefore 3" of additional roof thickness plus 1/2-inch thick cover board without demolishing existing through-wall flashing. Selective through-wall flashing repairs and curb adjustments may be required but are expected to be minor in nature.

During early planning of any major renovation to a public building, it is critical to confirm whether or not any accessibility compliance thresholds will be passed that might expand the Scope of Work. 521 CMR, the Commonwealth of Massachusetts' Architectural Access Board (MAAB) code, requires building owners to upgrade public facilities to be fully compliant with all sections of its latest edition when the cost of renovations within any three-year period exceeds 30% of the building's full and fair cash value. The full and fair cash value is determined by dividing the assessed building value (not including land assessment) by the Commonwealth of Massachusetts' assigned *Equalized Value Ratio* for the Town of Marblehead, which is .95. According to the Town of Marblehead Assessor's Database, the 2024 assessed building value is $19,133,400. Therefore, the *equalized value* is $20,140,421. This means that if renovation costs related to any and all permitted work within the present three-year period exceeds **$6,042,126**, the whole building must be brought up to full compliance. At the time of 2002 construction many accessibility requirements enforced today were in place, so major structural modifications are not expected. However, should the project budget increase beyond the 30% equalized value, a full facility 521 CMR review is recommended along with research to quantify costs of all permitted work within the last 3-year period. MPS may also request a revised town assessment to verify whether or not the current assessed value can be increased, therefore raising the 30% equalized value threshold. Lastly, the MAAB has an established variance process for relief of upgrades with costs substantially disproportionate to the level of accessibility improvement, as determined by the MAAB.

Please refer to the Scope Options Outline on the following page for detailed schematic descriptions and preliminary estimated construction costs of each proposed option. Based on GGD's findings regarding the condition of HVAC equipment, we do not recommend selective replacement of units as they are all in generally similar disrepair. Generally, Options include A (Roof Re-Cover), A1 (Roof Re-Cover with HVAC rooftop equipment replacement), B (Roof Re-Cover with 3-inches added insulation), B1 (Roof Re-Cover with 3-inches added insulation and HVAC rooftop equipment replacement), and C (Partial Roof Re-Cover to fit original construction budget).

For planning purposes, Options A and B include replacement of asphalt shingle roofing, but sloped roofing could be completed as Phase II depending on available budget. Existing shingle roofing does not appear to have failed and is separate from membrane roofing in terms of intersections and flashings. However, savings associated with eliminating sloped roofing from the Scope may be negated by increased costs associated with a second design phase, separate procurement, and separate contractor mobilization costs. It is typically more economical to avoid phasing for these reasons if funding is available to complete all roof areas.

Based on the age of the building, no hazardous materials are expected to be present within the existing roofing systems. Asbestos was prohibited from use in manufacturing in 1980, but it is sometimes still detected in newer imported materials such as mastic sealants, ceiling tiles and floor tiles. As RDA moves into Design Development and now that infrared moisture testing is complete, RDA will coordinate contractor-assisted roofing test cuts to confirm existing construction, verify (as practicable) extent of "wet" insulation detected by infrared scanning, and collect material samples for asbestos testing.

SCOPE OPTIONS OUTLINE

Option A: Roof Re-Cover

Construction Cost: $5,491,304

- Perforate existing TPO per new membrane manufacturer's requirements, strip all edges and penetrations.
- Install high density cover board over existing membrane, mechanically attached.
- Fully adhere new EPDM membrane over cover board, with new membrane flashing at all edges, penetrations and base flashings.
- Base flashing/through-wall flashing repair allowance and masonry walls.
- Remove and replace roof edge fascia/edge metal.
- Extend plumbing vents per GGD's recommendations.
- Disconnect and purge ACC Rooftop Units, lift for new membrane installation; reset, re-connect, **re-charge**.
- * **ACC-1 through ACC-19 use R-22 Refrigerant = High Cost**
- New lightning protection connected to existing downleads.
- Lift and reset all exhaust fans on existing re-flashed curbs. Include 3/4" blocking to raise curbs slightly.
- Re-flash all other rooftop equipment in place.
- Remove and replace (1) 3'x5' roof hatch, and (2) 5'x8' hatches.
- Replace shingle roofing with new architectural asphalt shingles, underlayment, adhered leak barrier, and drip edge.

Option A1: Roof Re-Cover and Replace All HVAC Rooftop Units. ***(Alt. #2 in Cost Estimate)***

Construction Cost: $11,087,779

- Perforate existing TPO per new membrane manufacturer's requirements, strip all edges and penetrations.
- Install high density cover board over existing membrane, mechanically attached.
- Fully adhere new PVC membrane over cover board, with new membrane flashing at all edges, penetrations and base flashings.
- Base flashing/through-wall flashing repair allowance and masonry walls.
- Remove and replace roof edge fascia/edge metal.
- Extend plumbing vents.
- New lightning protection connected to existing downleads.
- Remove and replace (1) 3'x5' roof hatch, and (2) 5'x8' hatches.
- **Remove and replace all Rooftop HVAC equipment including exhaust fans.**
- * **Replace interior refrigerant lines associated with ACC-1 through ACC-19 due to R-22 refrigerant.** Include associated acoustic tile ceiling and GWB patching/repairs/repaint.
- * **Replace interior ACU-1 through ACU-19 (interior mini-splits using R-22).**
- Raise MAU-1 curb plus allowance for misc. curbs.
- Replace shingle roofing with new architectural asphalt shingles, underlayment, adhered leak barrier, and drip edge.

Option B: Roof Re-Cover with 3" Added Insulation

Construction Cost: $7,958,876

- Same as Option A, Except:
  - * Add blocking to raise curbs 6" at all Exhaust Fans.
  - * Extend all plumbing vent pipes.
- Edge metal/fascia detail will be higher cost than Option A due to increased thickness.

Option B1: Roof Re-Cover with 3" Added Insulation and Replace All HVAC Rooftop Units *(Alt. #2 in Cost Estimate)*

Construction Cost: $12,224,085

- Same as Option A1, with added cost for insulation.
- Edge metal/fascia detail higher cost similar to Option B.

Option C: Partial Roof Re-Cover to Fit Existing Construction Budget

Construction Cost: $4,250,000

- Same as Option A1, but limit scope areas to fit base budget. Roof Areas D and J N.I.C. (not in contract) or bid as alternates.

End of Feasibility Narrative

Please refer to Appendices A through F for supporting reports and documentation.

APPENDIX A

Feasibility Estimate

Marblehead HS

Roof Replacement

Marblehead, MA

PM&C LLC
20 Downer Ave, Suite 5
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

RDA, Inc.

October 28, 2024

PM&C

Marblehead HS
Roof Replacement
Marblehead, MA

10/28/2024

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	$/sf	Estimated Cost
OPTION A TRADE COSTS				
Roof Replacement Option A	Jul-25			$4,024,172
HazMat removals allowance budget				NIC
SUBTOTAL TRADE COSTS	Jul-25			$4,024,172
Design and Estimating Contingency		15.0%		$603,626
Escalation to Bid		4.7%		$189,136
SUBTOTAL				$4,816,934
Subcontractor Bonds				In rates
General Conditions	7.0%			$337,185
General Requirements	3.0%			$144,508
Winter Conditions				excl
Insurances - GLI/Builders Risk	1.40%			Included
Bond	0.70%			Included
Building Permit				Included
Overhead & Profit	4.0%			$192,677
TOTAL ESTIMATED CONSTRUCTION COST				**$5,491,304**

Alternates (Markedup) :

ALT1	MEP Alternate 1 - RTU Replacement @ Gym	ADD	$	**922,185**
ALT2	MEP Alternate 2 - All RTU Replacement	ADD	$	**5,596,475**

PM&C

Marblehead HS
Roof Replacement
Marblehead, MA

10/28/2024

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	$/sf	Estimated Cost
OPTION B TRADE COSTS				
Roof Replacement Option B	Jul-25			$5,832,473
HazMat removals allowance budget				NIC
SUBTOTAL TRADE COSTS	Jul-25			$5,832,473
Design and Estimating Contingency		15.0%		$874,871
Escalation to Bid		4.7%		$274,126
SUBTOTAL				$6,981,470
Subcontractor Bonds				In rates
General Conditions	7.0%			$488,703
General Requirements	3.0%			$209,444
Winter Conditions				excl
Insurances - GLI/Builders Risk	1.40%			Included
Bond	0.70%			Included
Building Permit	0.0%			Waived
Overhead & Profit	4.0%			$279,259
TOTAL ESTIMATED CONSTRUCTION COST				**$7,958,876**

Alternates (Markedup) :

ALT1	MEP Alternate 1 - RTU Replacement @ Gym	ADD	$	**922,185**
ALT2	MEP Alternate 2 - All RTU Replacement	ADD	$	**4,265,209**

PM&C

Marblehead HS
Roof Replacement
Marblehead, MA

10/28/2024

BASIS OF ESTIMATE

This cost estimate was produced from Feasibility drawings, specifications and other documentation prepared by RDA, Inc. and their design team dated 09/17/24 . Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, general contractor's profit and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be under:

Chapter 149 of the Massachusetts General Laws to roofing contractors as prime, and pre-qualified sub-contractors, open specifications for materials and manufacturers.

If a CM at risk CH149a procurement is used costs will increase from the costs presented in this report.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT INCLUDED IN THIS ESTIMATE

Items not included in this estimate are:

- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items (e.g. technology, furniture and equipment, etc.)

CONSTRUCTION COST SUMMARY IN CSI FORMAT

DIVISION		*Option A Backup* Subtotal	*Option A Backup* Total	*Option B Backup* Subtotal	*Option B Backup* Total
DIV. 2 EXISTING CONDITIONS					
024100	Demolition				
028000	Facility Remediation	See summary		See summary	
DIV. 5 METALS					
051000	Structural Framing				
055000	Metal Fabrications				
DIV. 6 WOODS & PLASTICS			**$82,432**		**$103,040**
061000	Rough Carpentry	$82,432		$103,040	
DIV. 7 THERMAL & MOISTURE PROTECTION			**$3,352,842**		**$4,161,663**
075000	Roofing	$2,978,043		$3,786,864	
077000	Roof & Wall Specialties / Accessories	$124,193		$124,193	
079200	Joint Sealants	$250,606		$250,606	
DIV. 21 FIRE PROTECTION					
210000	Fire Protection				
DIV. 22 PLUMBING			**$101,750**		**$101,750**
220000	Plumbing	$101,750		$101,750	
DIV. 23 HVAC			**$324,648**		**$1,252,520**
230000	HVAC	$324,648		$1,252,520	
DIV. 26 ELECTRICAL			**$162,500**		**$213,500**
260000	Electrical	$162,500		$213,500	
SUBTOTAL DIRECT (TRADE) COST		***Option 1***	**$4,024,172**	***Option 2***	**$5,832,473**

PM&C

Marblehead HS
Roof Replacement
Marblehead, MA

28-Oct-24

CODE	DESCRIPTION	QTY	UNIT	UNIT COST	COST	SUBTOTAL COST	TOTAL COST

Option A Backup

1		***02 EXISTING CONDITIONS***						
2								
3		**024100 Demolition**						
4		Demolition w/ Div 7						
5	024100	SUBTOTAL:					$ -	
6								
7		***TOTAL, DIVISION 2 - EXISTING CONDITIONS***						
8								
9		***05 METALS***						
10								
11		**055000 Metal Fabrications**						
12		Misc. metals as req'd at roof, allowance	**116,866**	sf		NR		
13	055000	SUBTOTAL:					$ -	
14								
15		***TOTAL, DIVISION 5 - METALS***						
16								
17		***06 WOOD & PLASTICS***						
18								
19		**061000 Rough Carpentry**						
20		Rough blocking at roofing	**11,776**	lf	7.00	82,432		
21	061000	SUBTOTAL:					$ 82,432	
22								
23		***TOTAL, DIVISION 6 - WOOD & PLASTICS***						**$82,432**
24								
25		***07 THERMAL & MOISTURE PROTECTION***						
26								
27		**075000 Roofing**						
28		Roof Qty Summary				-		
29		Roof 1 Area - PVC	**116,866**	sf		-		
30		Roof 1 - Edge Perimeter	**2,944**	lf		-		
31		Roof 1 - Roof to Wall	**1,109**	lf		-		
32		Roof 2 Area - Shingle	**8,437**	sf		-		
33						-		
34		*ROOFING AND FLASHING*				-		
35		Roof 1, PVC	**116,866**	sf		-		
36		Fully adhere new PVC roof to cover board.	**116,866**	sf	16.00	1,869,856		
37		Slice existing TPO roof membrane and overlay with mechanically fastened 5/8" dens deck cover board.	**116,866**	sf	3.00	350,598		
38		Replace damaged insulation as indicated in designer infrared scan. (Assume 11,000 sf of damaged insulation, 4" thick)	**11,000**	sf	6.00	66,000		
39		Roof 2, Shingle	**8,437**	sf		-		
40		Provide new shingles over existing substrate.	**8,437**	sf	20.00	168,740		
41		Roof edge fascia & flashing assembly	**2,944**	lf	75.00	220,800		
42		Wall to roof edge flashing	**1,109**	lf	50.00	55,450		
43								
44		<u>Reflash & Re-Curb Roof Penetrations</u>						
45		Roof component, RTU	**10**	ea	1,000.00	10,000		
46		Roof component, RD	**40**	ea	150.00	6,000		
47		Roof component, heat & smoke vent	**1**	ea	125.00	125		
48		Roof component, elevator vent	**3**	ea	125.00	375		
49		Roof component, EF	**43**	ea	200.00	8,600		
50		Roof component, CU	**8**	ea	500.00	4,000		
51		Roof component, IH	**11**	ea	200.00	2,200		
52		Miscellaneous flashings @ other penetrations	**116,866**	sf	1.50	175,299		
53		Staging at tower roof	**1**	ls	40,000.00	40,000		
54	075000	SUBTOTAL:					$ 2,978,043	
55								
56		**077000 Roof & Wall Specialties / Accessories**						
57		Roof accessory, walk pads	**4,384**	sf	15.00	65,760		
58		Reinstall extg accessories after roof work, allowance	**116,866**	sf	0.50	58,433		
59	077000	SUBTOTAL:					$ 124,193	
60								
61		**079200 Joint Sealants**						
62		Joint sealants as req'd @ roof	**125,303**	sf	2.00	250,606		
63	079200	SUBTOTAL:					$ 250,606	
64								
65		***TOTAL, DIVISION 7 - THERMAL AND MOISTURE PROTECTION***						**$3,352,842**
67								

PM&C

Marblehead HS
Roof Replacement
Marblehead, MA

28-Oct-24

Option A Backup

	CODE	DESCRIPTION	QTY	UNIT	UNIT COST	COST	SUBTOTAL COST	TOTAL COST
68		***22 PLUMBING***						
69								
70		**220000 Plumbing**						
71		Extend roofing drains; modify piping	**40**	loc	2,000.00	80,000		
72		Extend vent piping	**29**	loc	750.00	21,750		
73	220000	SUBTOTAL					$ 101,750	
74								
75		***TOTAL, DIVISION 22***						**$101,750**
76								
77		***23 HVAC***						
78								
79		**230000 HVAC**						
80		HVAC Equipment						
81		Remove & reset existing exhaust fans & fresh air intakes						
82		Remove & reset existing roof mounted exhaust fans, EF-1 through EF-45	**43**	ea	1,150.00	49,450		
83		Remove & reset existing roof mounted fresh air intakes IH-1 through IH-11	**11**	ea	800.00	8,800		
84		Automatic Temperature Controls						
85		Automatic temperature controls DDC				Assume no work required		
86		Balancing						
87		System testing & balancing, pre-conditions	**1**	ls	4,200.00	4,200		
88		Miscellaneous						
89		Disconnect + purge ACC RTU's + reconnect, re-charge using R-22 Refrigerant; ACC-1 to ACC-19	**19**	loc	12,500.00	237,500		
90		Coordination & Supervision	**1**	ls	5,000.00	5,000		
91		Equipment start-up and inspection	**1**	ls	2,400.00	2,400		
92		Rigging & equipment rental	**1**	ls	10,000.00	10,000		
93		Vibration & seismic restraints	**1**	ls	2,500.00	2,500		
94		Permits & Fees	**1**	ls	4,797.75	4,798		
95	230000	SUBTOTAL					$ 324,648	
96								
97		***TOTAL, DIVISION 23***						**$324,648**
98								
99		***26 ELECTRICAL***						
100								
101								
102		**260000 Electrical**						
103		**Gear & Distribution**						
104		Disconnect electrical and reconnect (including extension if needed) to Roof top equipment	**54**	ea	1,500.00	81,000		
105								
106		**Lighting & Power**						
107		No items in this section				-		
108								
109		**Communication & Security Systems**						
110		No items in this section				-		
111								
112		**Other Electrical Systems**						
113		Lightning Protection System connected to existing downleads	**1**	ls	70,000.00	70,000		
114		Fees & Permits & coordination and management	**1**	ls	11,500.00	11,500		
115	260000	SUBTOTAL					$ 162,500	
116								
117		***TOTAL, DIVISION 26***						**$162,500**

CODE	DESCRIPTION	QTY	UNIT	UNIT COST	COST	SUBTOTAL COST	TOTAL COST

Option B Backup

1		***02 EXISTING CONDITIONS***						
2								
3		**024100 Demolition**						
4		Demolition w/ Div 7						
5	024100	SUBTOTAL:					$ -	
6								
7		***TOTAL, DIVISION 2 - EXISTING CONDITIONS***						
8								
9		***05 METALS***						
10								
11		**055000 Metal Fabrications**						
12		Misc. metals as req'd at roof, allowance	**116,866**	sf		NR		
13	055000	SUBTOTAL:					$ -	
14								
15		***TOTAL, DIVISION 5 - METALS***						
16								
17		***06 WOOD & PLASTICS***						
18								
19		**061000 Rough Carpentry**						
20		Rough blocking at roofing	**14,720**	lf	7.00	103,040		
21	061000	SUBTOTAL:					$ 103,040	
22								
23		***TOTAL, DIVISION 6 - WOOD & PLASTICS***						**$103,040**
24								
25		***07 THERMAL & MOISTURE PROTECTION***						
26								
27		**075000 Roofing**						
28		Roof Qty Summary				-		
29		Roof 1 Area - PVC	**116,866**	sf		-		
30		Roof 1 - Edge Perimeter	**2,944**	lf		-		
31		Roof 1 - Roof to Wall Edge	**1,109**	lf		-		
32		Roof 2 Area - Shingle	**8,437**	sf		-		
33						-		
34		*ROOFING AND FLASHING*				-		
35		Roof 1, PVC	**116,866**	sf	-	-		
36		Fully adhere new PVC roof to cover board.	**116,866**	sf	16.00	1,869,856		
37		Slice existing TPO roof membrane and overlay with mechanically fastened 5/8" dens deck cover board.	**116,866**	sf	4.00	467,464		
38		Replace damaged insulation as indicated in designer infrared scan. (Assume 11,000 sf of damaged insulation, 4" thick)	**11,000**	sf	9.00	99,000		
39		Roof 2, Shingle	**8,437**	sf	-	-		
40		Provide new shingles over existing substrate.	**8,437**	sf	20.00	168,740		
41		Provide New 3" layer of insulation over entire roof surface (including shingled area)	**125,303**	sf	5.00	626,515		
42		Roof edge fascia & flashing assembly	**2,944**	lf	85.00	250,240		
43		Wall to roof edge flashing	**1,109**	lf	50.00	55,450		
44								
45		<u>Reflash & Re-Curb Roof Penetrations</u>						
46		Roof component, RTU	**13**	ea	1,000.00	13,000		
47		Roof component, RD	**40**	ea	150.00	6,000		
48		Roof component, heat & smoke vent	**1**	ea	125.00	125		
49		Roof component, elevator vent	**3**	ea	125.00	375		
50		Roof component, EF	**43**	ea	200.00	8,600		
51		Roof component, CU	**8**	ea	500.00	4,000		
52		Roof component, IH	**11**	ea	200.00	2,200		
53		Miscellaneous flashings @ other penetrations	**116,866**	sf	1.50	175,299		
54		Staging at tower roof	**1**	ls	40,000.00	40,000		
55	075000	SUBTOTAL:					$ 3,786,864	
56								
57		**077000 Roof & Wall Specialties / Accessories**						
58		Roof accessory, walk pads	**4,384**	sf	15.00	65,760		
59		Reinstall extg accessories after roof work, allowance	**116,866**	sf	0.50	58,433		
60	077000	SUBTOTAL:					$ 124,193	
61								
62		**079200 Joint Sealants**						
63		Joint sealants as req'd @ roof	**125,303**	sf	2.00	250,606		
64	079200	SUBTOTAL:					$ 250,606	
65								
66								
67		***TOTAL, DIVISION 7 - THERMAL AND MOISTURE PROTECTION***						**$4,161,663**

CODE	DESCRIPTION	QTY	UNIT	UNIT COST	COST	SUBTOTAL COST	TOTAL COST

Option B Backup

		22 PLUMBING						
	220000	**Plumbing**						
		Extend roofing drains; modify piping	**40**	loc	2,000.00	80,000		
		Extend vent piping	**29**	loc	750.00	21,750		
220000		SUBTOTAL					$ 101,750	
		TOTAL, DIVISION 22						**$101,750**
		23 HVAC						
	230000	**HVAC**						
		HVAC Equipment						
		Remove & reset existing RTU's, exhaust fans & fresh air intakes						
		Remove & reset existing RTU's & HRV rooftop units on new curb	**13**	ea	11,200.00	145,600		
		Remove & reset existing roof mounted MUA Unit	**1**	ea	8,000.00	8,000		
		Remove & reset existing roof mounted exhaust fans, EF-1 through EF-45	**43**	ea	1,150.00	49,450		
		Remove & reset existing roof mounted fresh air intakes IH-1 through IH-11	**11**	ea	800.00	8,800		
		Add ACC Unit including replacement of refrigerant piping	**20**	ea	40,000.00	800,000		
		Automatic Temperature Controls						
		Automatic temperature controls DDC	**1**	ls	70,000.00	70,000		
		Pre-Construction Testing + Balancing	**1**	ls	20,000.00	20,000		
		System testing & balancing, pre-conditions	**1**	ls	37,600.00	37,600		
		Miscellaneous						
		Replace ceilings	**993**	sf	20.00	19,860		
		Coordination & Supervision	**1**	ls	10,000.00	10,000		
		Equipment start-up and inspection	**1**	ls	7,200.00	7,200		
		Rigging & equipment rental	**1**	ls	54,000.00	54,000		
		Vibration & seismic restraints	**1**	ls	3,500.00	3,500		
		Permits & Fees	**1**	ls	18,510.15	18,510		
230000		SUBTOTAL					$ 1,252,520	
		TOTAL, DIVISION 23						**$1,252,520**
		26 ELECTRICAL						
	260000	**Electrical**						
		Gear & Distribution						
		Disconnect electrical and reconnect (including extension if needed) to Roof top equipment	**88**	ea	1,500.00	132,000		
		Lighting & Power						
		No items in this section				-		
		Communication & Security Systems						
		No items in this section				-		
		Other Electrical Systems						
		Lightning Protection System connected to existing downleads	**1**	ls	70,000.00	70,000		
		Fees & Permits & coordination and management	**1**	ls	11,500.00	11,500		
260000		SUBTOTAL					$ 213,500	
		TOTAL, DIVISION 26						**$213,500**

CODE	DESCRIPTION	QTY	UNIT	UNIT COST	COST	SUBTOTAL COST	TOTAL COST
MEP Alternates							
	ALT1 REPLACE (2) RTU @ GYM						
	051000 Structural Framing						
	Additional Structural Reinforcing to be carried 1 bay in each direction around replaced units.	2	ea	40,000.00	80,000		
	Allowance for roofing + ceiling work	2	ea	30,000.00	60,000		
051000	SUBTOTAL:					$ 140,000	
	230000 HVAC						
	HVAC Equipment						
	Replace (2) RTU on Gymnasium, & include 36" new curbs						
	Replace (2) RTU on Gymnasium, 18,000 cfm ea, based on existing schedule page M0.4	18,000	cfm	26.00	468,000		
	Automatic Temperature Controls						
	Automatic temperature controls DDC	2	ea	19,200.00	38,400		
	Balancing						
	System testing & balancing, pre-conditions	1	ls	2,800.00	2,800		
	Miscellaneous						
	Coordination & Supervision	1	ls	5,000.00	5,000		
	Equipment start-up and inspection	1	ls	2,400.00	2,400		
	Rigging & equipment rental	1	ls	8,500.00	8,500		
	Permits & Fees	1	ls	9,976.50	9,977		
230000	SUBTOTAL					$ 535,077	
	260000 Electrical						
	Gear & Distribution						
	Disconnect electrical and reconnect (including extension if needed) to Roof top equipment	2	ea	1,500.00	3,000		
260000	SUBTOTAL					$ 3,000	
	TOTAL, ALTERNATE 1						**$678,077**
	ALT2 REPLACE ALL RTUs						
	051000 Structural Framing						
	Additional Structural Reinforcing to be carried 1 bay in each direction around replaced units.	12	ea	40,000.00	480,000		
	Allowance for roofing + ceiling work	12	ea	30,000.00	360,000		
051000	SUBTOTAL:					$ 840,000	
	230000 HVAC						
	HVAC Equipment						
	Replace All RTU's on roof and include 36" new curbs						
	Replace (2) RTU on Gymnasium, 18,000 cfm ea, based on existing schedule page M0.4	18,000	cfm	26.00	468,000		
	Replace RTU 1, serving Admin	5,770	cfm	26.00	150,020		
	Replace RTU 2, serving Library	12,290	cfm	26.00	319,540		
	Replace RTU 3, serving Auditorium	6,445	cfm	26.00	167,570		
	Replace RTU 4, serving Auditorium	11,350	cfm	26.00	295,100		
	Replace HRV units HRV-1, through HRV-5	48,620	cfm	22.00	1,069,640		
	Replace MAU-1, Kitchen Make-up air unit	4,680	cfm	18.00	84,240		
	Add ACC Unit including replacement of refrigerant piping	20	ea	40,000.00	800,000		
	Automatic Temperature Controls						
	Automatic temperature controls DDC	12	ea	16,000.00	192,000		
	Balancing						
	System testing & balancing, pre-conditions	1	ls	14,000.00	14,000		
	Miscellaneous						
	Replace ceilings	993	sf	20.00	19,860		
	Coordination & Supervision	1	ls	35,000.00	35,000		
	Equipment start-up and inspection	1	ls	14,400.00	14,400		
	Rigging & equipment rental	1	ls	59,500.00	59,500		
	Permits & Fees	1	ls	55,333.05	55,333		
230000	SUBTOTAL					$ 3,744,203	
	260000 Electrical						
	Gear & Distribution						
	Disconnect electrical and reconnect (including extension if needed) to Roof top equipment	12	ea	1,500.00	18,000		
260000	SUBTOTAL					$ 18,000	
	TOTAL, ALTERNATE 2						**$4,602,203**

RDA

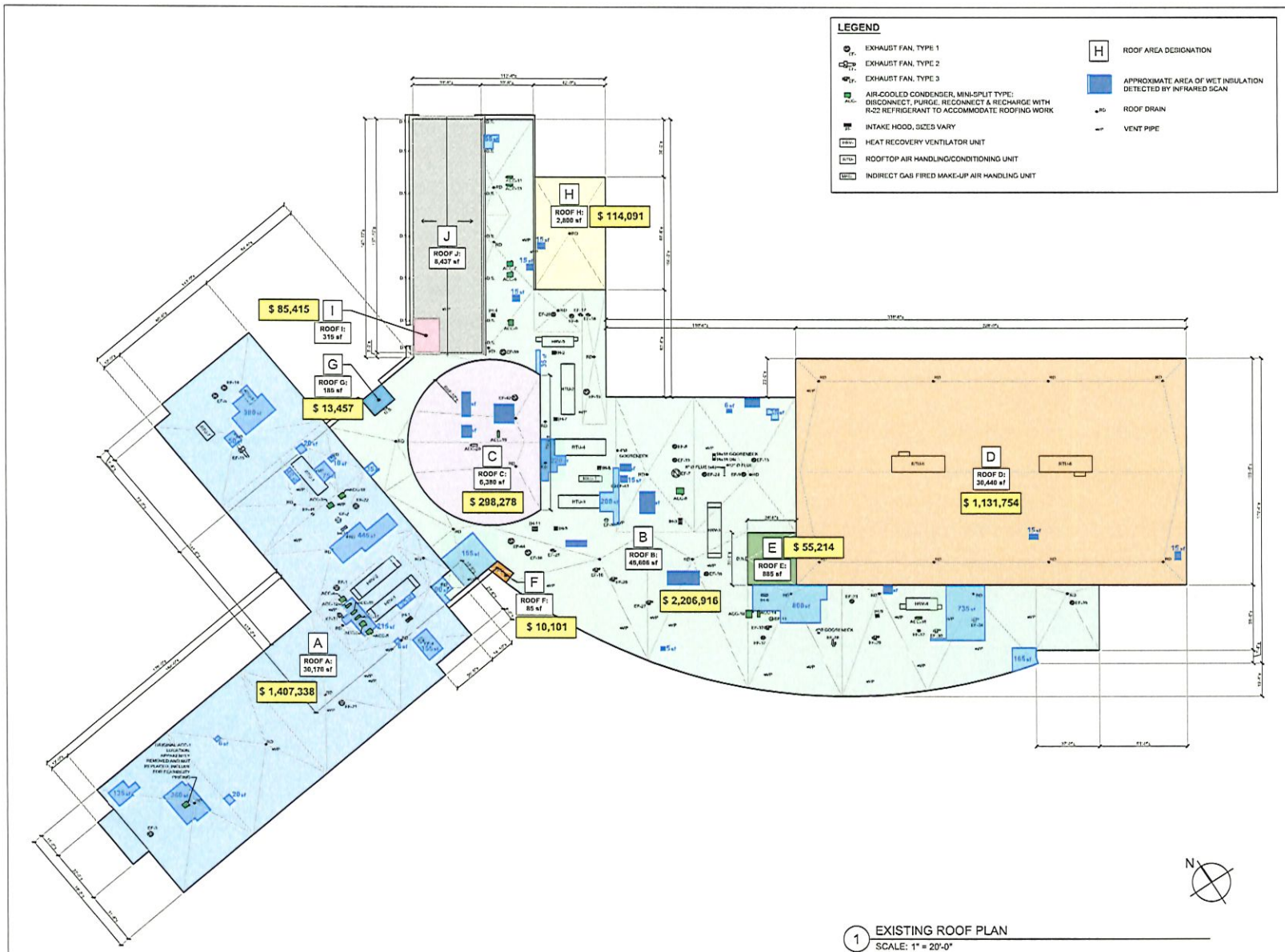
APPENDIX B

PRICING OPTION C

Feasibility Construction Cost Estimate Summary

Scope Option C: Partial roof re-cover to fit within current construction budget of **$4,250,000**. Option C does not include HVAC upgrades.

Roof Area	Estimated Construction Cost	Running Cost Total by Roof Area
ROOF AREA 'A'	$ 1,407,338	$ 1,407,338
ROOF AREA 'B'	$ 2,206,916	$ 3,614,254
ROOF AREA 'C'	$ 298,278	$ 3,912,532
ROOF AREA 'E'	$ 55,214	$ 3,967,746
ROOF AREA 'F'	$ 10,101	$ 3,977,846
ROOF AREA 'G'	$ 13,457	$ 3,991,304
ROOF AREA 'H'	$ 114,091	$ 4,105,395
ROOF AREA 'I'	$ 85,415	$ 4,190,810
ROOF AREA 'D' (Gym)	$ 1,131,754	
ROOF AREA 'J' (Asphalt Shingle)	$ 168,740	Total with Roof Areas 'D' & 'J' NOT included in Scope:
ESTIMATED CONSTRUCTION COST TOTAL:	$ 5,491,304	$ 4,190,810
CONSTRUCTION BUDGET:	$ 4,250,000	$ 4,250,000
BALANCE:	$ (1,241,304)	$ 59,190



1 EXISTING ROOF PLAN
SCALE: 1" = 20'-0"

APPENDIX C

RDA
Raymond Design Associates, Inc.
Architects & Planners
60 Ledgewood Place
Rockland, MA 02370

MARBLEHEAD HIGH SCHOOL
ROOFING REPLACEMENT
2 HUMPHREY STREET, MARBLEHEAD, MA 01945

EXISTING CONDITIONS ROOF PLAN

Revisions

No.	Date	Description

Project No. MARBLE2401
Drawing Scale 1" = 20'-0"
Submission FEASIBILITY STUDY
Date OCTOBER 31, 2024

A1.0

Tasks

Wed, December 4, 2024

- ○ Brown Stairs Painting
- ○ Greenhouse Electric / Water / Heat
- ○ Plow Truck Maintenance - Ready for winter?
- ○ Brown Fence along Parking Lot Needed
- ○ Evasive Plants at Brown School
- ○ Vets / MHS Mechanical Estimates to replace aging equipment
- ○ Brown Wood Paneling in Cafe
- ○ Business Office Kitchen Sink Replacement
- ○ MHS Fire Doors
- ○ MHS Boiler Replacement
- ○ Veterans D-Wing Roof Replacement - bid with alt/add for 2 rooftop units at same time
- ○ Field House HVAC Replacement
- ○ Village Fire Panel Upgrade - waiting on an antenna
- ○ Glover HVAC / LG Replacement - going out to bid week of 10/28/24
- ○ Brown OPM Visit
- ○ Brown Windows
- ○ MHS Roof Project

Completed

- ✓ ~~MHS Mold Issue~~
- ✓ ~~Ramp on Widger Road entrance~~

Printed with Microsoft To Do

Tasks

Wed, December 4, 2024

- ~~Vets Beam Replacement~~
- ~~Brown Lighting Issues~~
- ~~Distribute and stock all female restrooms with feminine hygiene products~~
- ~~Get estimate to demolish Coffin School~~
- ~~Piper Field Lights Replacement~~
- ~~Glover Boiler Issue~~ Overdue, Fri, October 11
- ~~Central Office Mini-Splits~~
- ~~Piper Field Turf Replacement~~
- ~~Brown Irrigation Issue~~
- ~~Brown Generator Wires Melted~~
- ~~Facilities List~~
- ~~Vets standpipe~~
- ~~Facilities~~