



**LOW SLOPED ROOF EVALUATION
AT THE MASCONOMET REGIONAL SCHOOL
20 ENDICOTT ROAD
BOXFORD, MA 01921
GALE JN 834200**

October 3, 2018

Evaluation and Recommendations Report

Prepared For:

**Masconomet Regional School District
District Central Office
20 Endicott Road
Boxford, MA 01921**

**LOW SLOPED ROOF EVALUATION
AT THE MASCONOMET REGIONAL SCHOOL
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BACKGROUND INFORMATION

In accordance with our agreement, Gale Associates, Inc. (Gale) has performed an evaluation of the existing roof systems and associated components at the Masconomet Regional School (MRS). The intent of the evaluation is to review the existing roof system condition and associated components to provide the MRS with recommendations for roof repairs. This report includes Gale's findings of the in-place components, recommendations for repairs and recommendations for future roof replacement and associated work. It is Gales understanding that MRS intends for these repairs to extend the service life of the current roof system for approximately 5 to 10 years until funding can be obtained to replace the roof systems.

The MRS is a multi-level, multiple building school facility that serves as the Regional Middle and High School. The building reportedly consists of an original section with multiple additions added over the years. The most recent addition was the round high school building and the middle school front entrance sections. These were reportedly constructed around 2002, which is around the time the roof system was installed. It was reported that the existing building's roof system was replaced at the same time, approximately 2002. The existing roof consists of approximately 200,000 square feet of roof divided up into approximately 20 different roof sections. The existing roof assembly consist of fully-adhered, single-ply EPDM system that is around 16 years old. Based on test cuts and original plans it appears that this building has three roof deck, metal roof deck types, concrete roof deck, and cementitious wood fiber.

REVIEW OF EXISTING DOCUMENTS

To assist Gale in performing the evaluation of the MRS Building, representatives from the MRS provided Gale with the following drawings:

1. Masconomet Regional School – Designed by Architectural Resources, Volume 2, Dated October 26, 1999. The drawings provided includes a partial set of the original design drawings including; roof area plans, floor plans, elevations, and details.

INTERIOR LEAK AUDIT

On September 12, 2018, Representatives from Gale briefly reviewed the interior conditions with MRS representatives and observed several active leak locations where there was evidence of water leakage, water staining, and water residue on interior walls. Gale also reviewed areas reported by MRS representatives to have previous leaks that are not currently active. These leak locations and conditions are as follows:

1. Roof Area A, Corridor HC301 – MRS representatives reported leaks above the lockers in the hallway at this location as recently as one year ago. Minor water staining was observed on the walls (Fig. 1).



Figure 1: Water staining observed above lockers in Corridor HC301.

2. Roof Area A, Corridor HC301 – MRS representatives reported a leak in the hallway at this location as recently as one year ago. It was reported that the leak was associated with a roof drain, and repairs had been made to remedy the issue. Since repairs, the leak is reported to no longer be active.

3. Roof Area A, Classroom H363 – MRS representatives reported an active leak in this classroom along the wall shared with the barrel roof.
4. Roof Area A, Mechanical Room H331 – MRS representatives reported an active leak in this room at the doorway. The door and floor were observed with evidence of water staining, and the door appeared warped from water damage (Fig. 2).



Figure 2: Water staining observed on door and floor of Mechanical Room H331.

5. Roof Area A.2 – MRS representatives reported a previous leak at this roof. Repairs were reportedly made one year ago. Since repairs, the leak is reported to no longer be active.
6. Roof Area B, Cafeteria C106 – MRS representatives reported an active winter leak at this location. Stained roof deck was observed at the leak location (Fig. 3).



Figure 3: Stained roof deck observed in Cafeteria C106.

7. Roof Area B.1, Lobby HC109 – MRS representatives reported a previous leak at this location. Representatives reported repairs had been made, and since repairs the leak is no longer active.
8. Roof Area F.3, Corridor EC201 – MRS representatives reported a previous leak at this location approximately ten years ago. Representatives reported repairs had been made, and since repairs the leak is no longer active.
9. Roof Area C.2, Corridor EC109 – MRS representatives reported a previous leak at this location as recently as two years ago. Representatives claimed repairs had been made, and since repairs the leak is no longer active.
10. Roof Area C.3, Electric Room E103 – MRS representatives reported a previous leak at this location approximately 8 years ago. No repairs were reported, but representatives reported the leak is no longer active.
11. Roof Area E.2, Corridor EC108 – MRS representatives reported an active leak at this location. Minor staining was observed on the insulation of a roof drain leader but not on the roof deck, possibly indicating the leak is related to the leader.
12. Roof Area E.2, Corridor EC108 – MRS representatives reported an active leak along the rising wall of this corridor. Water staining was observed along the wall. Representatives reported the leak was typical with wind-driven rain (Fig. 4).



Figure 4: Water staining observed along rising wall of Corridor EC108.

INFRARED SURVEY

Representatives from Gale traveled to the referenced facility on the evenings of August 23 and 28, 2018 and September 5, 2018 to conduct a non-destructive, visual, thermographic infrared (IR) survey of the single-ply, low-sloped membrane roof assemblies on the High School and Middle School. The purpose of the (IR) survey is to locate any anomalies within the roof assemblies that may indicate potential areas of wet or otherwise damaged insulation.

Gale performed the IR survey from upper level roofs (where possible), looking down onto lower roofs and from the individual roof areas. Suspected anomalies, if detected, were documented on the attached roof plans. The intended purpose of the IR survey is to help Gale determine locations for destructive testing in the form of roof test cuts.

The roof infrared survey indicated the following representative anomalies:

- Anomalies that indicate wet insulation in the field of the roof *Refer to Figure 5 IR-1.*
- Anomalies that indicate wet insulation in the tapered insulation within drainage crickets *Refer to Figure 6 IR-2.*
- Anomalies that indicate wet insulation adjacent to drainage crickets *Refer to Figure 7 IR-3.*
- Anomalies that indicate wet insulation adjacent to rising walls *Refer to Figure 8 IR-4.*
- Anomalies that indicate wet insulation around / adjacent to rooftop equipment *Refer to Figure 9 IR-5.*

Gale utilized the information obtained from the IR survey to identify test cut locations. Refer to the following section for a summary of Gale's observations from the test cuts and visual observations.

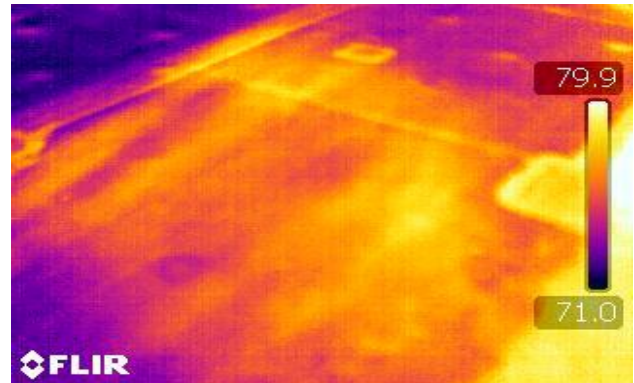


Figure 5 IR-1: Thermographic image shows an anomaly that is consistent with wet insulation in the field of the roof.

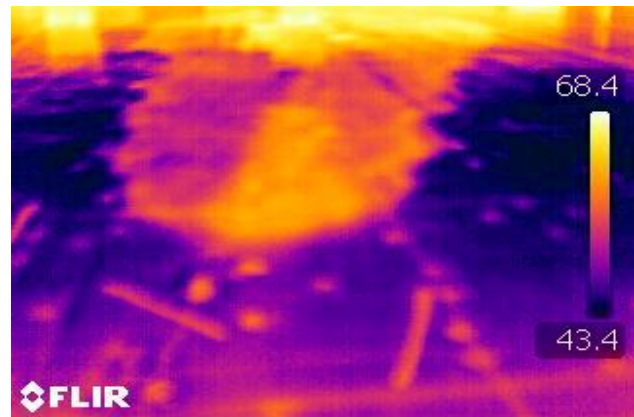


Figure 6 IR-2: Thermographic image shows an anomaly that is consistent with wet insulation within a tapered insulation drainage cricket

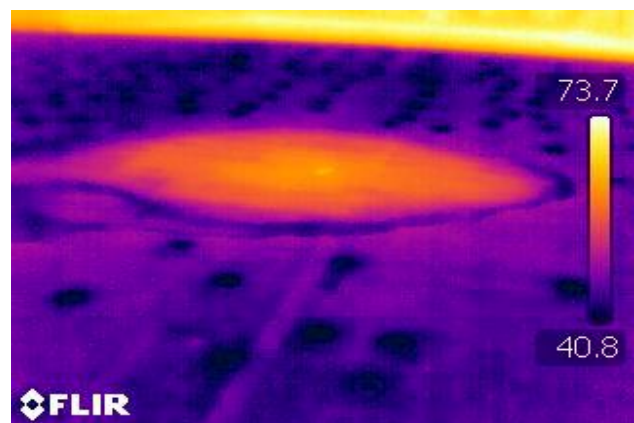


Figure 7 IR-3: Thermographic image shows an anomaly that is consistent with wet insulation adjacent to a drainage cricket.

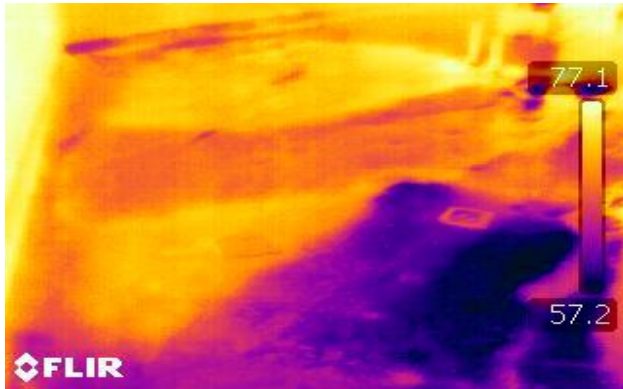


Figure 8 IR-4: Thermographic image shows an anomaly that is consistent with wet insulation at a rising wall transition.

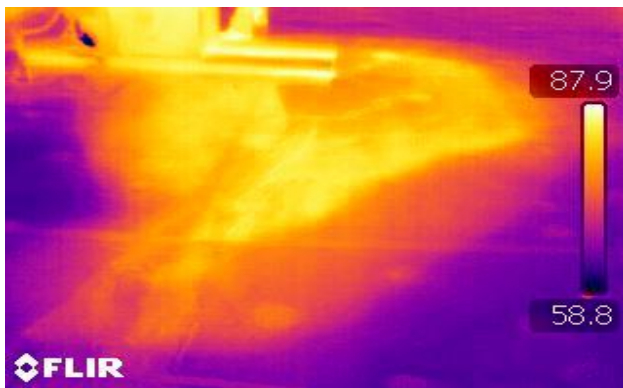


Figure 9 IR-5: Thermographic image shows an anomaly that is consistent with wet insulation around / adjacent to rooftop equipment.

EXISTING CONDITIONS

Gale performed an exterior visual evaluation of the MRS roof areas. Gale's on-site evaluation was conducted in August and September of 2018 and consisted of an up-close visual evaluation of roof components and a brief review of the associated rising wall components. Below are observations of the existing conditions that were observed.

1. Isolated areas of wet and deteriorated insulation and coverboard were observed. These areas were identified by the IR scan and confirmed with test cuts.
2. Isolated areas of open, torn, or punctured membrane were observed (Fig. 10).
3. Isolated area of unadhered membrane were observed. Roof membrane appears to have become separated from the coverboard below (Fig. 11).

4. Delaminated roof membrane patches were observed throughout the roof areas. Refer to the attached plans for noted locations (Fig. 12 and 13).



Figure 10: Open area of roof membrane were observed.



Figure 11: View of unadhered membrane on Roof Area A.



Figure 12: Delaminated roof membrane patch observed on Roof Area B.2.

5. Delaminated stripping membrane was observed at isolated areas across the building (Fig. 14).
6. Failed and cracked sealant was observed at isolated pitch pockets penetrations near air conditioners and other mechanical units (Fig. 15).
7. Open sheet metal flashing seams were observed at isolated areas. Cracked solder and open seams can allow of moisture infiltration. Refer to the attached plans for locates noted (Fig. 16).
8. Low flashing heights at mechanical curbs, roof top units, and vent pipes were observed. Flashing heights varied but were well below the 8-inch industry standard for roof flashings at the locations noted (Fig. 17).
9. Area of displaced edge metal were observed on Roof Area A (Fig. 18).
10. Failed seams were observed in the two-piece parapet cap flashing (Fig. 19 and 20).
11. Bubbled stripping membrane was observed at roof edges throughout the building (Fig. 21).



Figure 14: Delaminated stripping membrane observed on Roof Area F.3.



Figure 15: Failed sealant at the pitch pockets observed.



Figure 13: Delaminated roof membrane patch observed on Roof Area A.



Figure 16: View of cracked solder and open sheet metal flashing seams at a scupper on Roof Area B.3.



Figure 17: Low flashing height observed at a vent pipe on Roof Area B.



Figure 20: Failed seams observed in two-piece parapet cap flashing on Roof Area B.2.



Figure 18: Displaced edge metal observed on Roof Area A.



Figure 21: View of bubbled stripping membrane at edge of Roof Area C.1.



Figure 19: Failed seams observed in two-piece parapet cap flashing on Roof Area B.2.



Figure 22: Scope 1 area, wet insulation and unadhered membrane was observed.

Gale noted multiple areas of wet roofing at rising wall locations across the building on different roof areas that appear to be related to throughwall flashing issues. While these areas will require major repairs to the flashing to address the moisture infiltration issues, we have identified several areas with minimal roof areas that are experiencing leaking or were documented to contain wet material. These limited areas have been identified and labeled as Scope 1 through Scope 4. Gale recommends to addressing these rising wall conditions if roofing repairs are performed at these specified areas.

12. Scope 1 is located on Roof Area A.2. Gale observed a large area of wet insulation with loose and bridging membrane. Gale did not observe failed membrane patches or punctures in this area. It appears that the leak is related to the joint of the throughwall flashing in the corner of the wall between the masonry and panel assemblies. Gale observed this corner joint to be open and has recommended throughwall flashing replacement in conjunction with full roof is repair (Fig. 22 and 23).

13. Scope 2 is located on Roof Area A near a rising wall at the stairwell location associated with an interior reported leak. No visible roof defect was observed in the field of the roof. The adjacent curtainwall has a sealant bead installed over the weeps which may direct water inwards. It is recommended to remove the curtainwall mullion snap cover and sealant and repair any observed defects and reinstall the covers. Additional leak testing to confirm water patch is path is recommended (Fig. 24).

14. Scope 3 consists of a small triangular roof area on the edge of Roof Area B.1. This entire section of roofing was observed to be wet and delaminated. Multiple defects associated with the throughwall flashing were observed. The throughwall flashing do not appear to have end dams and do not overlap allowing for water to bypass the flashing and leak into the roof system. In order to address the wet insulation, Gale recommends that the throughwall flashing repairs are performed (Fig. 25).

15. Scope 4 is located on Roof Area C.2. This area of wet roofing appears to be related deficient door flashing. Gale observed a large wet area of insulation located directly around the base of the door. The wet roofing in this area appears to be related to the door pan flashing. To address this area the pan flashing would be required (Fig. 26 and 27) to be removed and replaced.



Figure 23: Scope 1 area, throughwall flashing joint in the corner appears to be open.



Figure 24: Scope 2 area active leak on rising wall on Roof Area A



Figure 25: Scope 3 area.

During the evaluation of the roof, several additional items were observed at the rising walls that are beyond the scope of this evaluation but may impact the roof system. Long term repairs and/or roof replacement should address these deficiencies.

16. Reglet joint flashing terminations are installed on the base of the wall on the original building sections. Failed sealants were typically observed at the roof system termination on the rising wall reglet joint flashings (Fig. 28).
17. Isolated areas of failed, loose, and open reglet joints were observed at isolated locations (Fig. 29 and 30).
18. Rising walls typically appeared to have throughwall flashing installed at roofing system termination. Condition of the throughwall flashing varied, some locations appeared to be in good condition while other locations exhibited open joints and damaged throughwall flashing (Fig. 31).
19. Glass blocks rising walls were observed to be in poor condition, multiple cracked blocks were observed. Isolated blocks were observed to be partially filled with water (Fig. 32 and 33).
20. At rising brick masonry wall typical masonry defects were observed throughout, including areas of deteriorated mortar, failed expansion joint sealant, and areas of step cracking. Gale recommends that the rising walls are fully reviewed and repairs are incorporated prior to

full roof system is replaced as these defects may be contributing to the deterioration of the roof system (Fig. 34, 35, 36 and 37).

21. Masonry weeps filled with spray foam were observed on the rising wall of Roof Area B.1. (Fig. 38).



Figure 26: Scope 4 area overall view.



Figure 27: Scope 4 area close up view of the poor door pan flashing.



Figure 28: Failed sealant observed at reglet joint flashing terminations on the rising wall of Roof Area B.3.



Figure 29: Reglet joint observed pulled out of wall and open.



Figure 30: Failed sealants were typically observed at reglet joints.



Figure 31: View of throughwall flashing with open joints.



Figure 32: View of cracked glass block.



Figure 33: View of glass block filled with water.



Figure 34: View of deteriorated mortar.



Figure 37: View of step cracking.



Figure 35: View of failed expansion joint sealant.



Figure 38: View of masonry weeps filled with spray foam.



Figure 36: View of step cracking.



Figure 39: Open penetrations in RTU curbs.



Figure 40: View of frozen air conditioner lines on Roof Area A.

22. Open pipe penetrations in roof top unit (RTU) curbs were observed throughout the building. These opening can allow moisture and air infiltration into the building (Fig. 39).
23. Frozen air conditioner lines were observed at a unit on Roof Area A. Frozen lines can indicated that there is an issue with the unit. Gale notified MRS personnel prior to leaving the site. Gale recommends that MRS have a mechanical contractor review the unit (Fig. 40).
24. A door on Roof Area C.2. was observed with failed perimeter sealant. Open gaps were observed at the head of the door and exposed plywood was observed behind the door's hinges.
25. Three smoke hatches were observed on roof area E.3. with failed weatherstripping and without full perimeter sealant (Fig. 41).
26. An exposed edge of the metal panel wall cladding above the white barrel roof of the field house appears to be separating from the wall (Fig 42 and 43). The panels appear to be loose or missing closure trim which creates a potential

path for water to enter the wall system and building.



Figure 41: View of smoke hatch with failed weatherstripping and missing sealant.

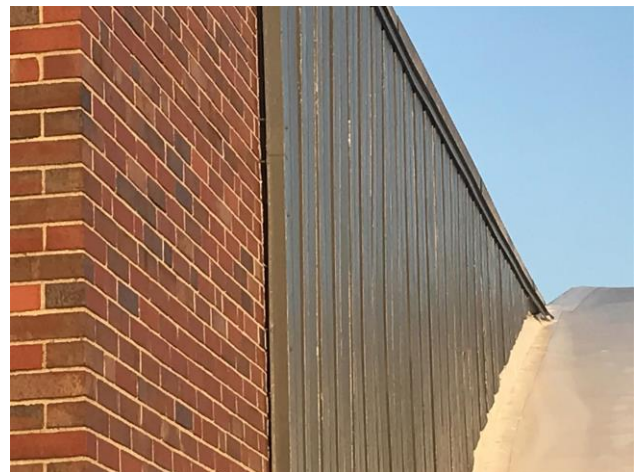


Figure 42: View of open wall panels edge on field house wall.

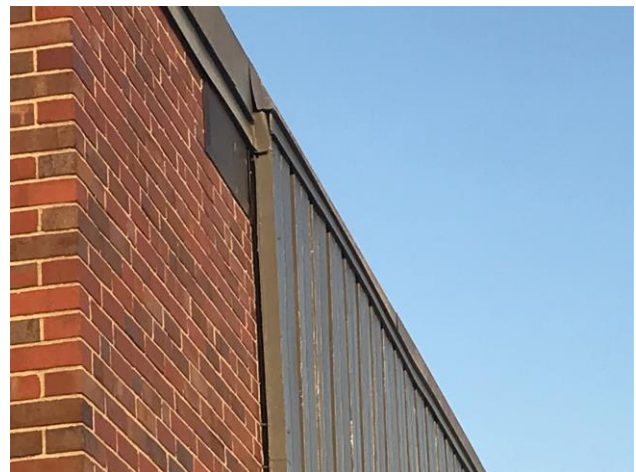


Figure 43: View of open wall panels edge on field house wall.

TEST CUTS

On September 12 and September 14, 2018, Gale representatives monitored destructive test cuts performed to the various roof assemblies. The roof test cuts were performed by Wayne Roofing, LLC, of Foxboro, Massachusetts. Roof test cuts were performed for verification of the existing roof system, and to confirm the wet insulation areas that were observed from the IR Scan. Roof test cuts were performed in the field of the roof at noted wet areas across various roof areas.

As the test cuts were limited in nature, Gale was unable to confirm every noted wet area. Select representative test cuts were performed at various areas. Please be reminded that these test cuts represent the typical construction details but are not all inclusive of the construction configurations. With respect to the overall size of the building and associated components, the openings performed represent less than one percent of the overall roof area. As such, any defects or conditions which have been exposed as a result of these limited openings, have been assumed typical throughout the building.

The typical roof system was determined to be adhered EPDM roof membrane, ½" layer of wood fiberboard insulation, multiple layer of polyisocyanurate insulation (Flat stock on Roof Area A, and tapered on all other roof areas), reinforced paper vapor retarder, and ½" gypsum sheathing baseboard. The insulation and coverboard were observed to be mechanically attached to the deck at all roof area.

Test cuts typically revealed wet and deteriorated roofing materials. Wet and deteriorated coverboard was observed in the majority of the test cuts, some test cuts consisted of dry deteriorated coverboard that possibly indicates a previous leak that was patched and has started to dry out. In isolated test cuts Gale observed standing water above the vapor retarder.

The test cuts confirmed that the areas noted from IR scan are in fact wet and deteriorated and will require repairs. Additionally, in isolated test cuts on Roof Areas E.1, E.2, and E.3 a layer of built up roof was

observed on the roof deck. This roof appears to be located on the original portions of the building. At this time, hazardous material testing has not been performed, but would be recommended as part of a roof replacement project.



Figure 44: View of wet roofing material.



Figure 45: View of deteriorated coverboard.

DISCUSSIONS AND RECOMMENDATIONS

While the roof system overall appears to be in fair condition, reported leaks, isolated defects and areas of wet or deteriorated roof system were observed visually and during the infrared scan. A majority of the defects observed can be repaired with minimal scope of work in order to extend the life of the existing roof system.

The majority of the areas that require repairs appear to have been caused by isolated membrane punctures or failed membrane patches. Locations of

detected wet insulation and roofing materials based upon results from the infrared scan are marked on the roof surface with marking paint in order to identify the location and extend of each defect recommended for replacement.

Please note that several wet areas were observed at rising walls and appear to be related to rising wall flashing issues such as improper throughwall flashing installation. The observed throughwall flashing defects may be the source of interior leaks as well as moisture detected in the roof system located near rising walls. It is recommended that long-term repairs or replacement include more invasive throughwall flashing replacement. This would include masonry removal and throughwall flashing replacement.

Four areas were noted to require more intrusive repairs in order to address the deficiencies. These areas tended to be similar in nature and the observed defects were found throughout the roof area. The moisture identified in the roof system at these areas appears to be caused by rising walls. Without addressing the rising walls, repairs to these areas would not be anticipated to last long. As such these four areas are recommended to include full roof replacement with repairs to the adjacent construction and throughwall flashings.

It is Gale's understanding that MRS was aware that there were isolated areas of the roof system that were wet from previous leaks. While periodic roof repairs were performed the punctures in the roof membrane appear widespread. Based on conversations with MRS, it is our understanding that MRS prefers a temporary repair to address the active water leaks and observed deterioration. As such, Gale has recommended the following short term repairs which can be performed to extend the service life of the roof for approximately five (5) years when MRS budgets for full roof replacement in approximately five years.

Gale's repair recommendations are as follows:

- I. Remove and replace areas of wet insulation down to the roof deck, replace membrane in these areas.

- II. Install batten bars on areas of unadhered membrane to re-secure. Strip in with membrane.
- III. Replace delaminated or failed membrane patches and stripping membrane.
- IV. Patch all tears and open membrane areas.
- V. Remove and replace pitch pocket sealant at mechanical penetrations.
- VI. Re-secure and repair all edge metal defects.
- VII. Strip in cracked metal and solder joints.
- VIII. Strip in failed parapet cap flashing joints and seams.
- IX. Repair/replace low vent pipe flashings and other low flashing to provide better flashing heights.
- X. Strip in bubbled stripping membrane at roof edges.
- XI. Reset and repair failed reglet joint flashings. Please note that reglet flashings have the potential to allow moisture in the brick masonry to travel down into the building and below the surface of the roof and appear like a roof leak. Gale recommends that during future roof replacement that these reglet joint be removed and replaced with throughwall flashing to provide a more watertight detail.
- XII. Remove and replace all failed sealant joint at reglet flashings.
- XIII. Remove spray foam insulation from weep and replace damaged or clogged weep baffles.
- XIV. Remove and replace Scope 1 roof area, open masonry wall and metal wall panels to repair throughwall flashing joint.
- XV. Remove and replace Scope 2 roof area, remove and repair flashings on rising wall.
- XVI. Remove and replace Scope 3 roof area, remove and raise throughwall flashings, provide 8" overlaps at steps and end dams in flashing.
- XVII. Remove and replace Scope 4 roof area. Gale recommends that the door pan flashing be repaired or replaced. If no active leaks are reported on the interior of the building at this location, the door and pan flashing could be replaced as part of the full roof replacement in the future.

Please note that Gale's evaluation was limited to a visual review of the roof system and Infrared scan to determine wet and deteriorated roof section. Further defects may be found during the roof construction. Gale recommends that MRS carry unit price items to address any additional repairs observed during construction.

COST ESTIMATE

The budget estimates presented in this report have been listed for each roof area. These estimates, which are based on current construction costs, should be considered preliminary and should not be used for sensitive budgeting. All estimating was performed using historical and market trends to establish unit pricing. These estimates have been generated by various sources and may not reflect the actual conditions at the time of construction. These budget estimates do not include additional engineering evaluation or design services, construction administration services, or permitting costs. These budget estimates also do not include soft costs associated with MRS's project management, site supervision, designer fees. The line items within the estimate include a fifteen-percent (15%) design and construction contingency, as a defined scope has not been determined, as well as to account for potential unforeseen conditions that may be encountered. The potential budget can be seen below, with a map of the roof areas.

Thank you for the opportunity to assist MRS with this project. The information provided in this report is based on the visual observations and record information provided by MRS. As such, there may be additional variations in the subsurface and/or building conditions that may be discovered during the repairs. If you have additional questions or would like to discuss the next steps in design or reroofing measures, please contact our office.

Roof Areas:	CONSTRUCTION BUDGETARY ESTIMATE			
	Material and Labor Subtotal	Bond, Insurance, Overhead, and Profit 15%	Design and Construction Contingency 15%	Total
Roof Area A	\$ 82,200.00	\$ 12,400.00	\$ 14,200.00	\$ 108,800.00
Roof Area A.1	\$ -	\$ -	\$ -	\$ -
Roof Area A.2	\$ 200.00	\$ 100.00	\$ 100.00	\$ 400.00
Roof Area B	\$ 3,100.00	\$ 500.00	\$ 600.00	\$ 4,200.00
Roof Area B.1	\$ 2,300.00	\$ 400.00	\$ 500.00	\$ 3,200.00
Roof Area B.2	\$ 300.00	\$ 100.00	\$ 100.00	\$ 500.00
Roof Area B.3	\$ 300.00	\$ 100.00	\$ 100.00	\$ 500.00
Roof Area C	\$ 2,200.00	\$ 400.00	\$ 400.00	\$ 3,000.00
Roof Area C.1	\$ 37,500.00	\$ 5,700.00	\$ 6,500.00	\$ 49,700.00
Roof Area C.2	\$ 5,200.00	\$ 800.00	\$ 900.00	\$ 6,900.00
Roof Area C.3	\$ 6,100.00	\$ 1,000.00	\$ 1,100.00	\$ 8,200.00
Roof Area D	\$ 6,700.00	\$ 1,100.00	\$ 1,200.00	\$ 9,000.00
Roof Area E.1	\$ 3,600.00	\$ 600.00	\$ 700.00	\$ 4,900.00
Roof Area E.2	\$ 3,100.00	\$ 500.00	\$ 600.00	\$ 4,200.00
Roof Area E.3	\$ -	\$ -	\$ -	\$ -
Roof Area F	\$ 4,800.00	\$ 800.00	\$ 900.00	\$ 6,500.00
Roof Area F.1	\$ 2,600.00	\$ 400.00	\$ 500.00	\$ 3,500.00
Roof Area F.2	\$ 10,100.00	\$ 1,600.00	\$ 1,800.00	\$ 13,500.00
Roof Area F.3	\$ 500.00	\$ 100.00	\$ 100.00	\$ 700.00
Roof Area F.4	\$ 2,500.00	\$ 400.00	\$ 500.00	\$ 3,400.00
TOTAL FOR ROOF AREAS:				\$ 231,100.00
Scope 1	\$ 22,500.00	\$ 3,400.00	\$ 3,900.00	\$ 29,800.00
Scope 2	\$ 4,800.00	\$ 800.00	\$ 900.00	\$ 6,500.00
Scope 3	\$ 16,500.00	\$ 2,500.00	\$ 2,900.00	\$ 21,900.00
Scope 4	\$ 4,000.00	\$ 600.00	\$ 700.00	\$ 5,300.00
TOTAL FOR ADDITIONAL SCOPES OF WORK:				\$ 63,500.00
TOTAL FOR ALL WORK:				\$ 294,600.00

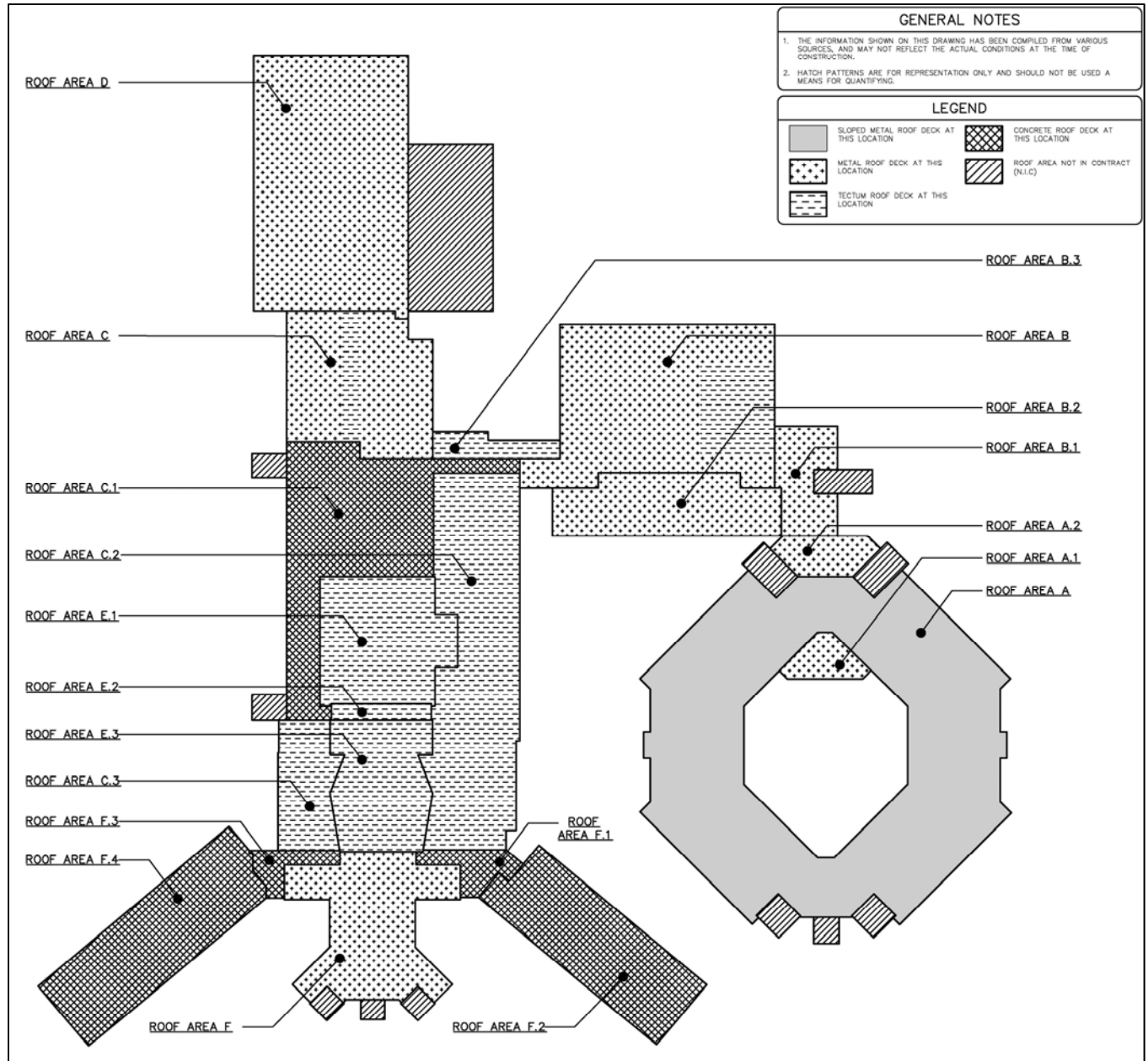


Figure 47: Roof area key plan.

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APPENDIX A

REDUCED DRAWINGS

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LIMITED ROOF REPAIRS AT MASCONOMET REGIONAL SCHOOL

20 ENDICOTT ROAD
BOXFORD, MA 01921

D

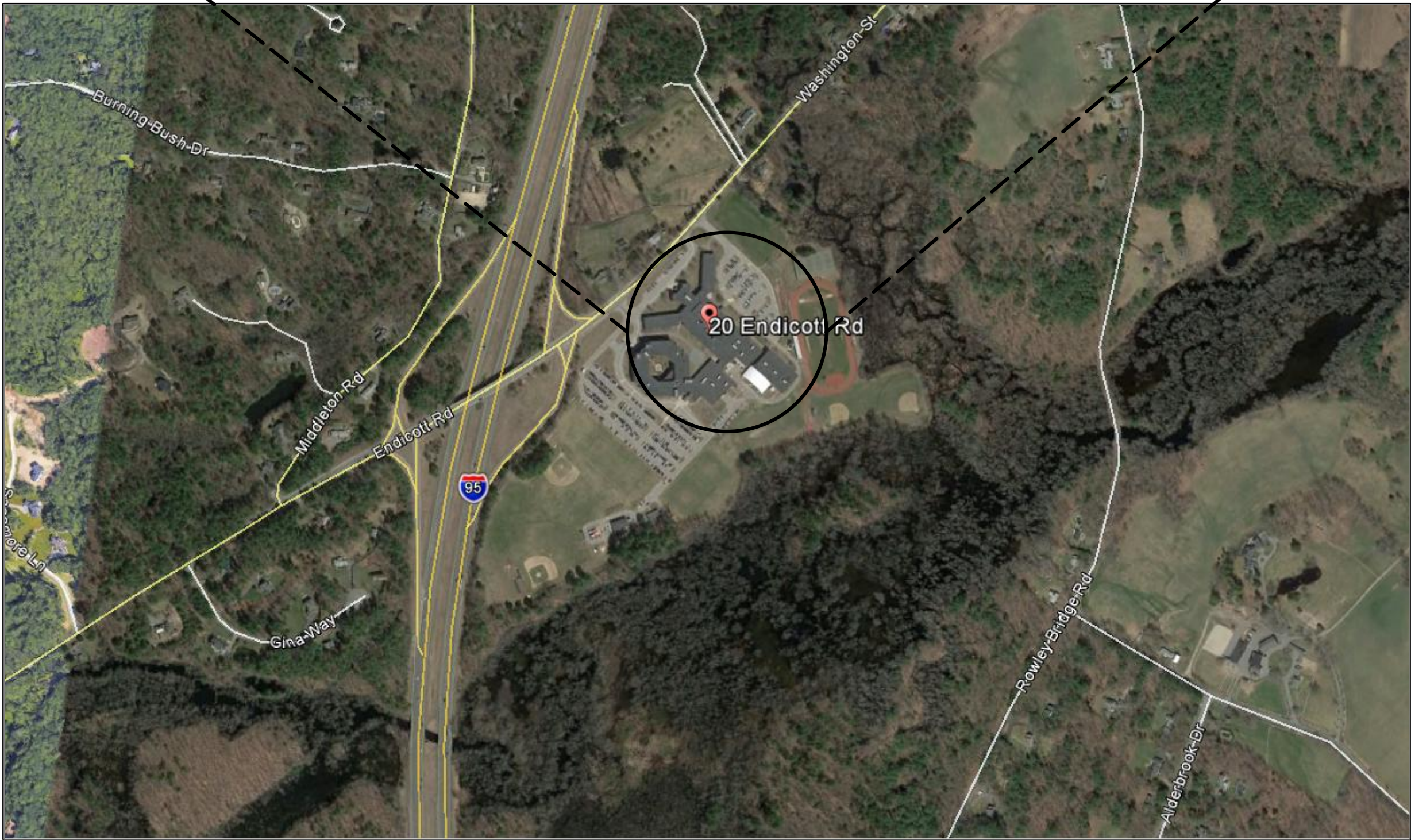
PREPARED FOR
MASCONOMET REGIONAL SCHOOL DISTRICT
DISTRICT CENTER OFFICE BUILDING
20 ENDICOTT ROAD
BOXFORD, MASSACHUSETTS 01921

C

DRAWING NO	TITLE
G100	COVER SHEET
G101	OVERALL ROOF PLAN AND EXISTING ROOF CROSS SECTIONS
A101	PARTIAL ROOF AREA PLAN
A102	PARTIAL ROOF AREA PLAN
A103	PARTIAL ROOF AREA PLAN
A104	PARTIAL ROOF AREA PLAN



SITE MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE



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EVALUATION

PROJECT	OWNER
LIMITED ROOF REPAIRS AT THE MASCONOMET REGIONAL SCHOOL 20 ENDICOTT ROAD BOXFORD, MA 01921	MASCONOMET REGIONAL SCHOOL DISTRICT DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD BOXFORD, MASSACHUSETTS 01921

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	834200		
CADD FILE	834200 G100		
DESIGNED BY	JMZ		
DRAWN BY	DJK/RFF/CGK		
CHECKED BY	BHN		
DATE	10/03/18		
DRAWING SCALE	NOT TO SCALE		

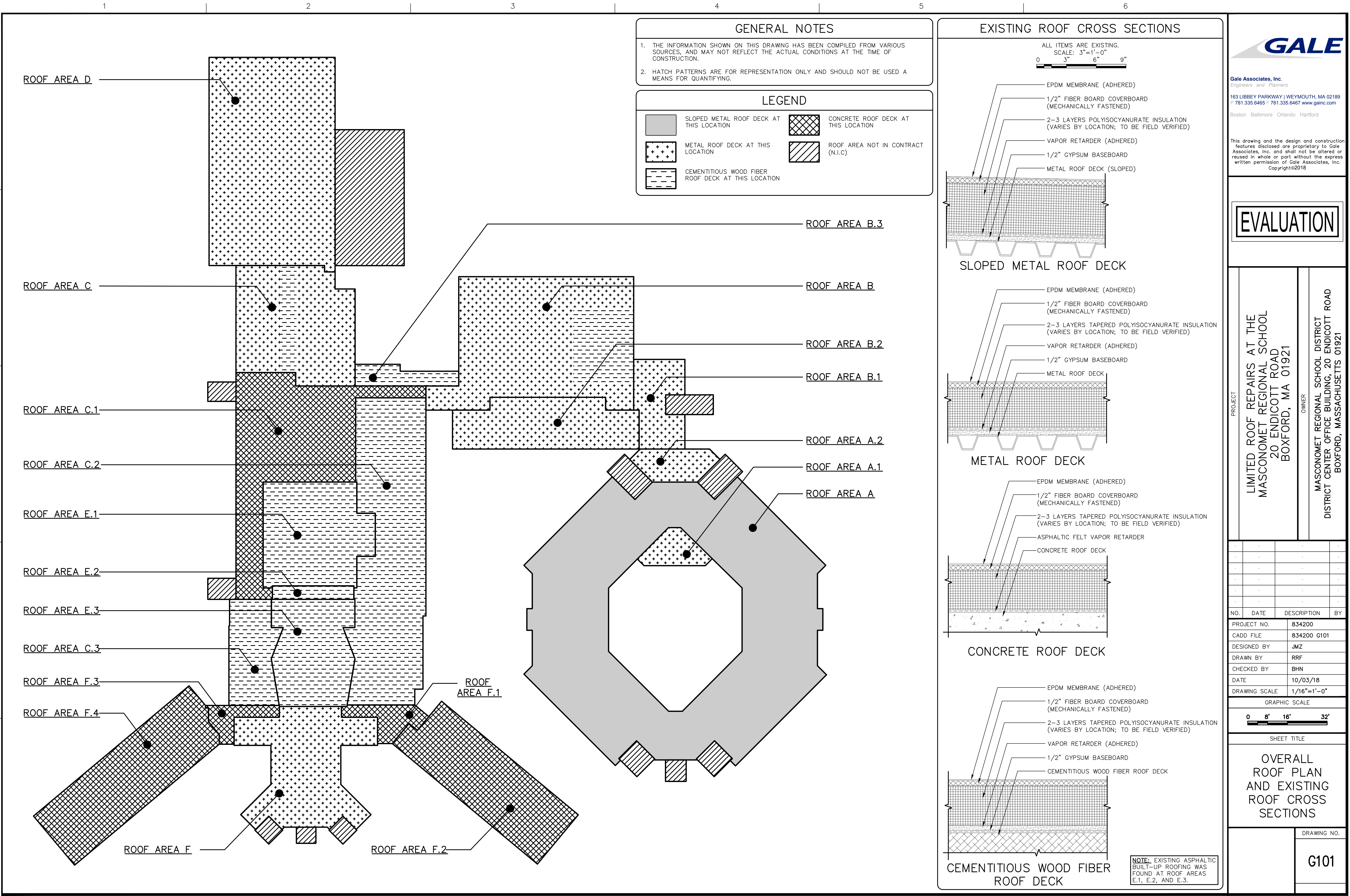
GRAPHIC SCALE

SHEET TITLE

COVER SHEET

DRAWING NO.

G100



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EVALUATION

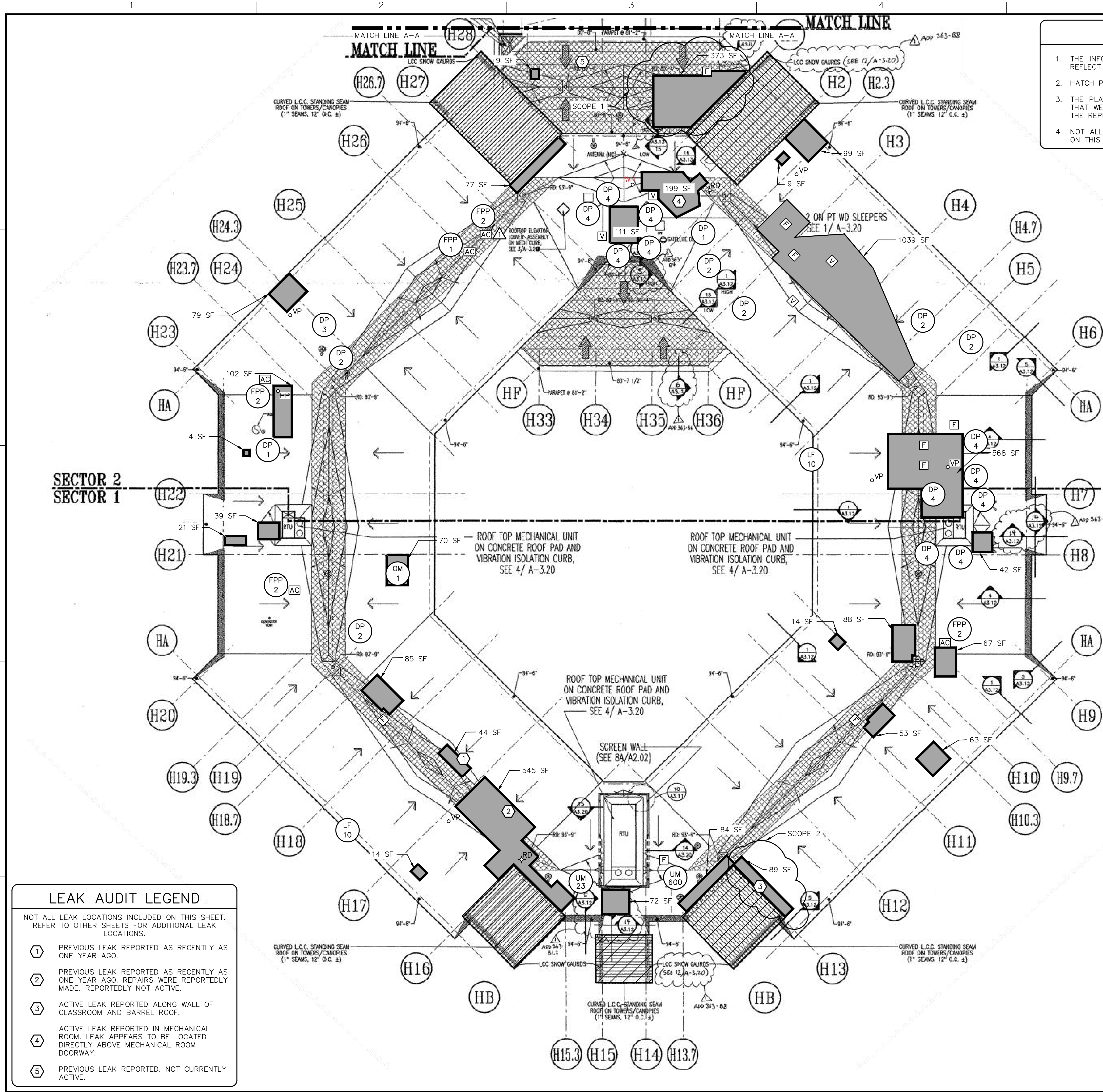
PROJECT	LIMITED ROOF REPAIRS AT THE MASCONOMET REGIONAL SCHOOL DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD BOXFORD, MA 01921	
	OWNER MASCONOMET REGIONAL SCHOOL DISTRICT DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD BOXFORD, MASSACHUSETTS 01921	

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	834200
CADD FILE	834200 G101
DESIGNED BY	JMZ
DRAWN BY	RRF
CHECKED BY	BHN
DATE	10/03/18
DRAWING SCALE	1/16"=1'-0"

GRAPHIC SCALE	
0 8' 16' 32'	
SHEET TITLE	

OVERALL ROOF PLAN AND EXISTING ROOF CROSS SECTIONS	
DRAWING NO.	G101



- GENERAL NOTES
1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
 2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED A MEANS FOR QUANTIFYING.
 3. THE PLANS SHOWN ON THIS DRAWING ARE SCANNED REPRODUCTIONS OF THE ORIGINAL DESIGN DOCUMENTS THAT WERE PROVIDED BY THE OWNER. THE ACTUAL CONFIGURATIONS MAY VARY FROM THOSE SHOWN. DUE TO THE REPRODUCTION, THE SCALE MAY BE SLIGHTLY SKEWED.
 4. NOT ALL ROOF TOP EQUIPMENT IS SHOWN ON THIS PLAN. ROOF TOP EQUIPMENT AND PENETRATIONS SHOWN ON THIS PLAN INCLUDE ITEMS THAT WERE OBSERVED IN AND DIRECTLY ADJACENT TO ROOF DEFECTS.

LEGEND

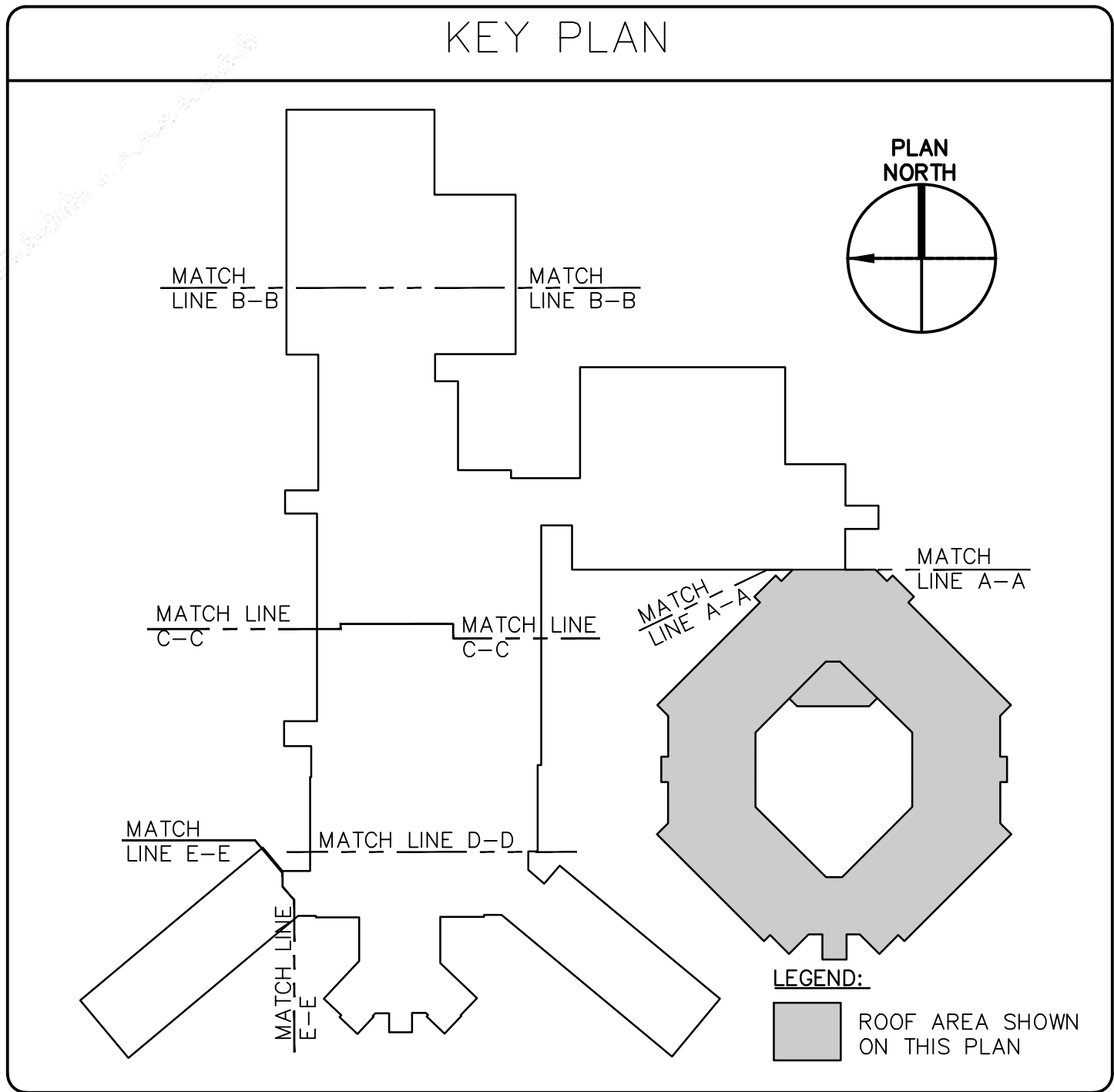
- MATCH LINE
- NOT IN CONTRACT (N.I.C.)
- NOTED AREAS OF WET INSULATION TO BE REMOVED AND REPLACED. NUMBER INDICATED IS SQUARE FEET OF WET INSULATION AREA
- NOTED AREAS WITH ADDITIONAL SCOPE OF WORK REQUIRED. SEE REPORT FOR MORE INFORMATION.
- VENT
- AIR CONDITIONER UNIT
- FAN
- HOT PIPE
- VENT PIPE
- ROOF DRAIN
- WEATHERHEAD

ROOFING DEFECT LEGEND

- OM # OPEN/TORN/SLICED/PUNCTURED MEMBRANE; # INDICATES LINEAR FEET
- UM # UNADHERED MEMBRANE/FLASHING; # INDICATES SQUARE FEET
- FPP # FAILED PITCH POCKETS; # INDICATES UNITS
- LF # LOOSE/DETACHED FASCIA METAL; # INDICATES LINEAR FEET
- DP # DELAMINATED MEMBRANE PATCH; # INDICATES UNIT

SHEET NOTES

- ICE OBSERVED ON AIR CONDITIONER UNIT. UNIT SHOULD BE RE-INSULATED



LEAK AUDIT LEGEND

NOT ALL LEAK LOCATIONS INCLUDED ON THIS SHEET. REFER TO OTHER SHEETS FOR ADDITIONAL LEAK LOCATIONS.

- 1 PREVIOUS LEAK REPORTED AS RECENTLY AS ONE YEAR AGO.
- 2 PREVIOUS LEAK REPORTED AS RECENTLY AS ONE YEAR AGO. REPAIRS WERE REPORTEDLY MADE. REPORTEDLY NOT ACTIVE.
- 3 ACTIVE LEAK REPORTED ALONG WALL OF CLASSROOM AND BARREL ROOF.
- 4 ACTIVE LEAK REPORTED IN MECHANICAL ROOM. LEAK APPEARS TO BE LOCATED DIRECTLY ABOVE MECHANICAL ROOM DOORWAY.
- 5 PREVIOUS LEAK REPORTED. NOT CURRENTLY ACTIVE.

GALE

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Engineers and Planners
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Boston Baltimore Orlando Hartford

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EVALUATION

PROJECT: LIMITED ROOF REPAIRS AT THE MASCONOMET REGIONAL SCHOOL DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD BOXFORD, MA 01921

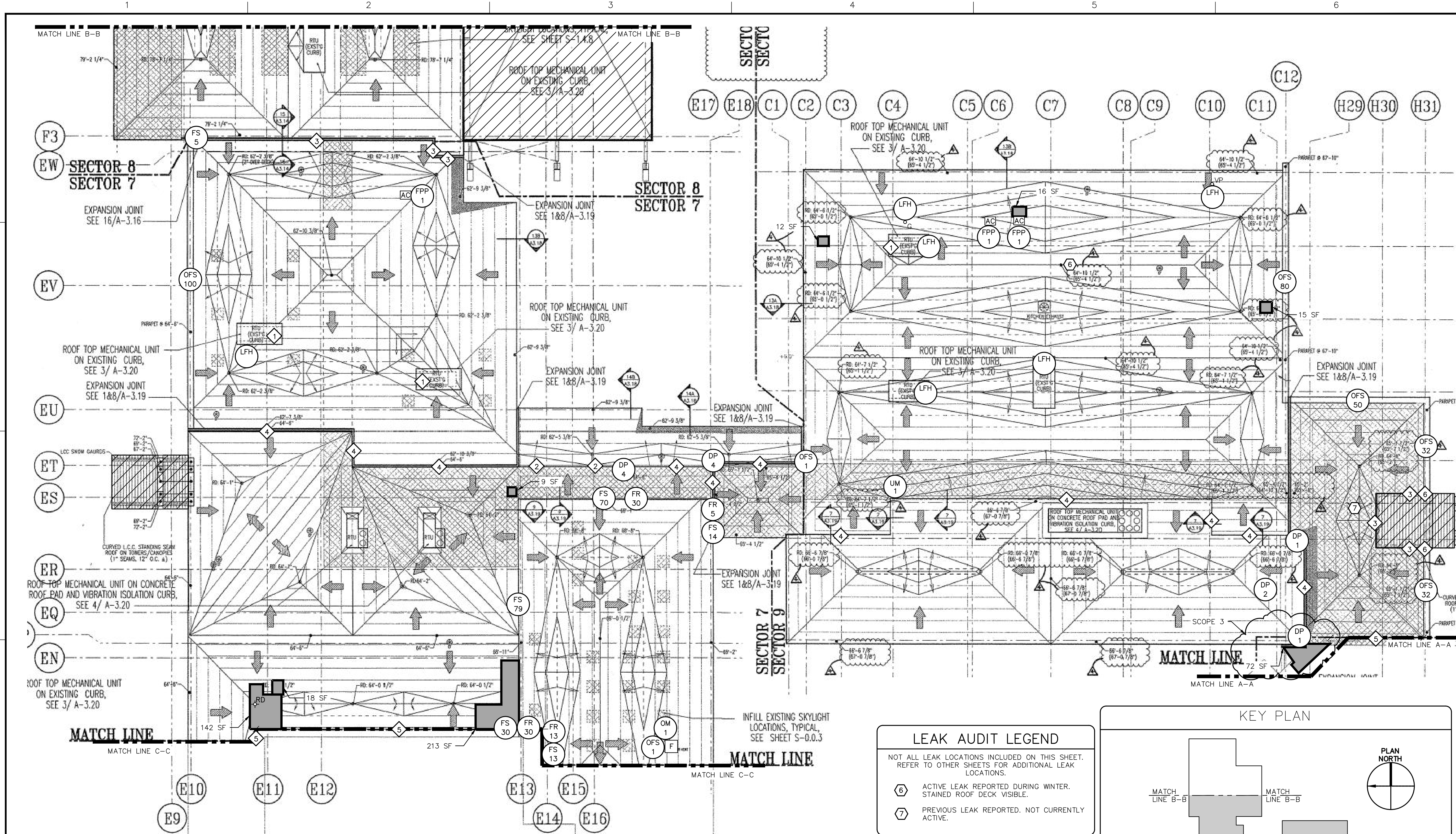
OWNER: MASCONOMET REGIONAL SCHOOL DISTRICT

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	834200		
CADD FILE	834200 A100s		
DESIGNED BY	JMZ		
DRAWN BY	DJK/CGK		
CHECKED BY	BHN		
DATE	10/03/18		
DRAWING SCALE	1/16"=1'-0"		

GRAPHIC SCALE
0 8' 16' 32'

SHEET TITLE
PARTIAL ROOF AREA PLAN

DRAWING NO.
A101



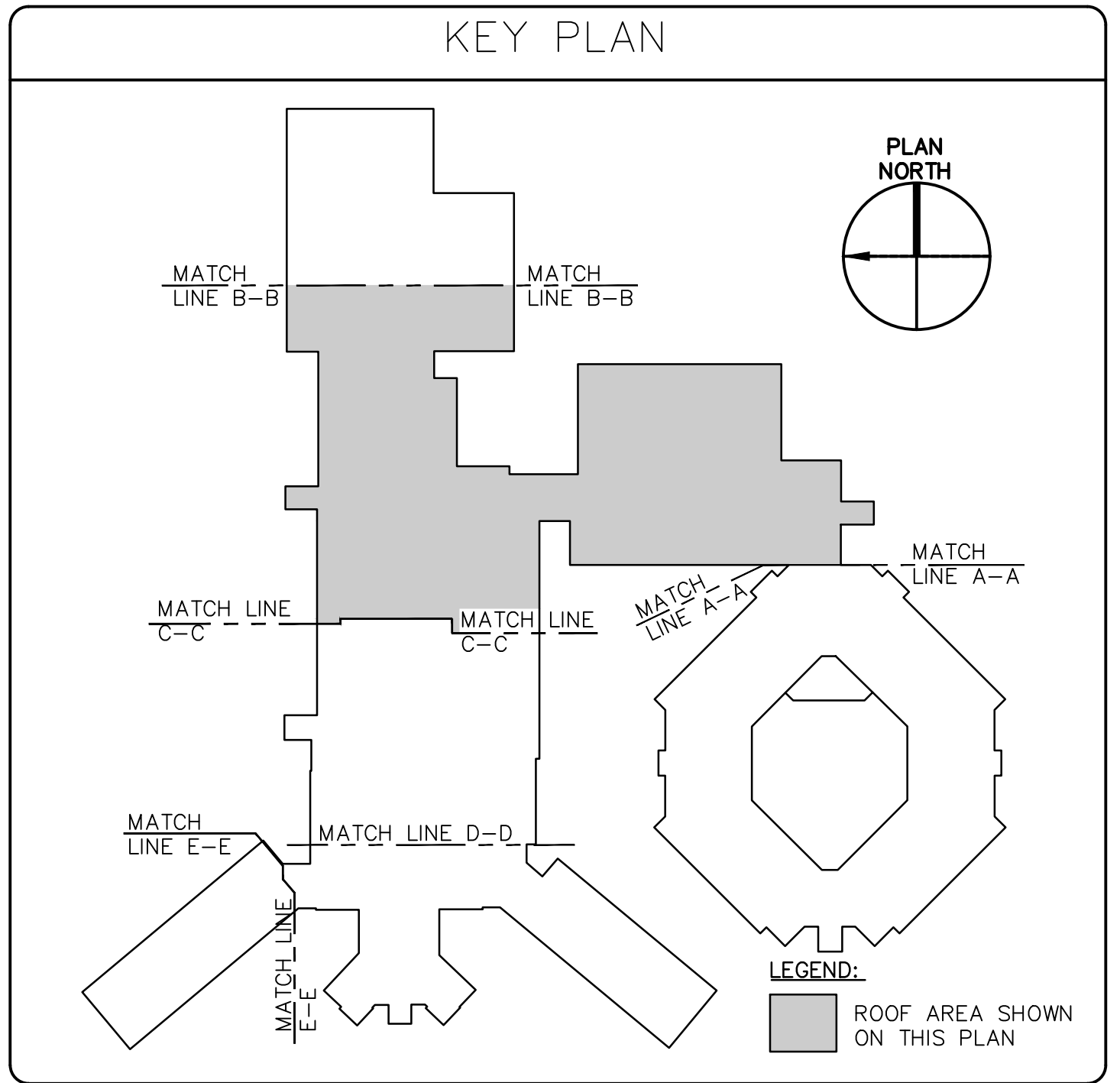
SHEET NOTES	
1	OPEN PENETRATIONS AND ELECTRIC OBSERVED AT MECHANICAL UNITS.
2	CRACKED SOLDER OBSERVED AT METAL JOINTS.
3	THROUGH WALL FLASHING OBSERVED WITH OPEN JOINTS.
4	BUBBLED STRIPPING MEMBRANE AT ROOF EDGE; TYPICAL.
5	GLASS BLOCK RISING WALLS WITH THROUGH WALL FLASHING OBSERVED.
6	MASONRY WEEPS OBSERVED FILLED WITH SPRAY FOAM.

ROOFING DEFECT LEGEND	
OM #	OPEN/TORN/SLICED/PUNCTURED MEMBRANE; # INDICATES LINEAR FEET
UM #	UNADHERED MEMBRANE/FLASHING; # INDICATES SQUARE FEET
FPP #	FAILED PITCH POCKETS; # INDICATES UNITS
DP #	DELAMINATED MEMBRANE PATCH; # INDICATES UNITS
OFS #	OPEN METAL FLASHING SEAM; # INDICATES LINEAR FEET
FS #	FAILED SEALANT; # INDICATES LINEAR FEET
FR #	FAILED REGLET FLASHING; # INDICATES LINEAR FEET
LFH #	LOW FLASHING HEIGHT; # INDICATES INCHES FROM ROOF

LEGEND	
	MATCH LINE
	NOT IN CONTRACT (N.I.C.)
	NOTED AREAS OF WET INSULATION TO BE REMOVED AND REPLACED. NUMBER INDICATED IS SQUARE FEET OF WET INSULATION AREA
	NOTED AREAS WITH ADDITIONAL SCOPE OF WORK REQUIRED. SEE REPORT FOR MORE INFORMATION.
AC	AIR CONDITIONER UNIT
F	FAN
VP	VENT PIPE
RD	ROOF DRAIN
G	GAS PIPE

GENERAL NOTES	
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4.	NOT ALL ROOF TOP EQUIPMENT IS SHOWN ON THIS PLAN. ROOF TOP EQUIPMENT AND PENETRATIONS SHOWN ON THIS PLAN INCLUDE ITEMS THAT WERE OBSERVED IN AND DIRECTLY ADJACENT TO ROOF DEFECTS.

LEAK AUDIT LEGEND	
NOT ALL LEAK LOCATIONS INCLUDED ON THIS SHEET. REFER TO OTHER SHEETS FOR ADDITIONAL LEAK LOCATIONS.	
6	ACTIVE LEAK REPORTED DURING WINTER. STAINED ROOF DECK VISIBLE.
7	PREVIOUS LEAK REPORTED. NOT CURRENTLY ACTIVE.



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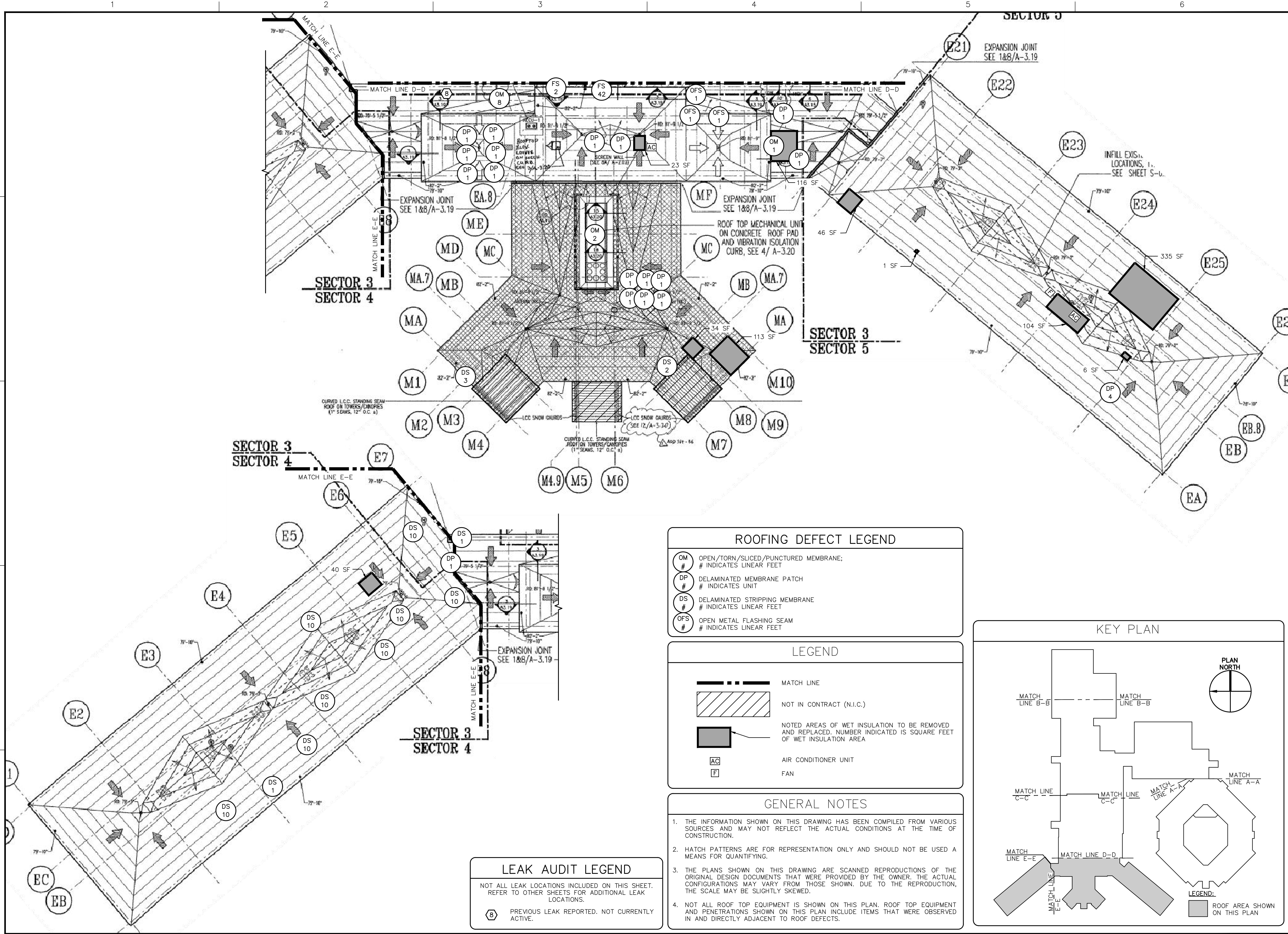
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EVALUATION

PROJECT
LIMITED ROOF REPAIRS AT THE
MASCONOMET REGIONAL SCHOOL
20 ENDICOTT ROAD
BOXFORD, MA 01921

OWNER
MASCONOMET REGIONAL SCHOOL DISTRICT
DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD
BOXFORD, MASSACHUSETTS 01921

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	834200		
CADD FILE	834200 A100s		
DESIGNED BY	JMZ		
DRAWN BY	DJK/CGK		
CHECKED BY	BHN		
DATE	10/03/18		
DRAWING SCALE	1/16"=1'-0"		
GRAPHIC SCALE			
SHEET TITLE			
PARTIAL ROOF AREA PLAN			
DRAWING NO.			
A102			



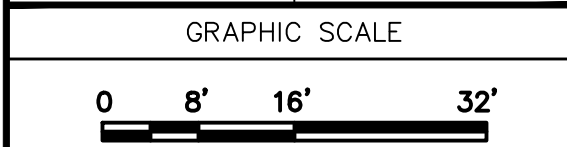
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EVALUATION

PROJECT
LIMITED ROOF REPAIRS AT THE
MASCONOMET REGIONAL SCHOOL
20 ENDICOTT ROAD
BOXFORD, MA 01921
OWNER
MASCONOMET REGIONAL SCHOOL DISTRICT
DISTRICT CENTER OFFICE BUILDING, 20 ENDICOTT ROAD
BOXFORD, MASSACHUSETTS 01921

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	834200		
CADD FILE	834200 A100s		
DESIGNED BY	JMZ		
DRAWN BY	DJK/CGK		
CHECKED BY	BHN		
DATE	10/03/18		
DRAWING SCALE	1/16"=1'-0"		



SHEET TITLE

PARTIAL ROOF AREA PLAN

DRAWING NO.
A103

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED AS MEANS FOR QUANTIFYING.
3. THE PLANS SHOWN ON THIS DRAWING ARE SCANNED REPRODUCTIONS OF THE ORIGINAL DESIGN DOCUMENTS. THEY WERE PROVIDED BY THE OWNER. THE ACTUAL CONFIGURATIONS MAY VARY FROM THOSE SHOWN. DUE TO THE REPRODUCTION, THE SCALE MAY BE SLIGHTLY SKEWED.
4. NOT ALL ROOF TOP EQUIPMENT IS SHOWN ON THIS PLAN. ROOF TOP EQUIPMENT AND PENETRATIONS SHOWN ON THIS PLAN INCLUDE ITEMS THAT WERE OBSERVED IN AND DIRECTLY ADJACENT TO ROOF DECKS.

MATCH LINE

NOT IN CONTRACT (N.I.C.)

NOTED AREAS OF WET INSULATION TO BE REMOVED AND REPLACED. NUMBER INDICATED IS SQUARE FEET OF WET INSULATION AREA

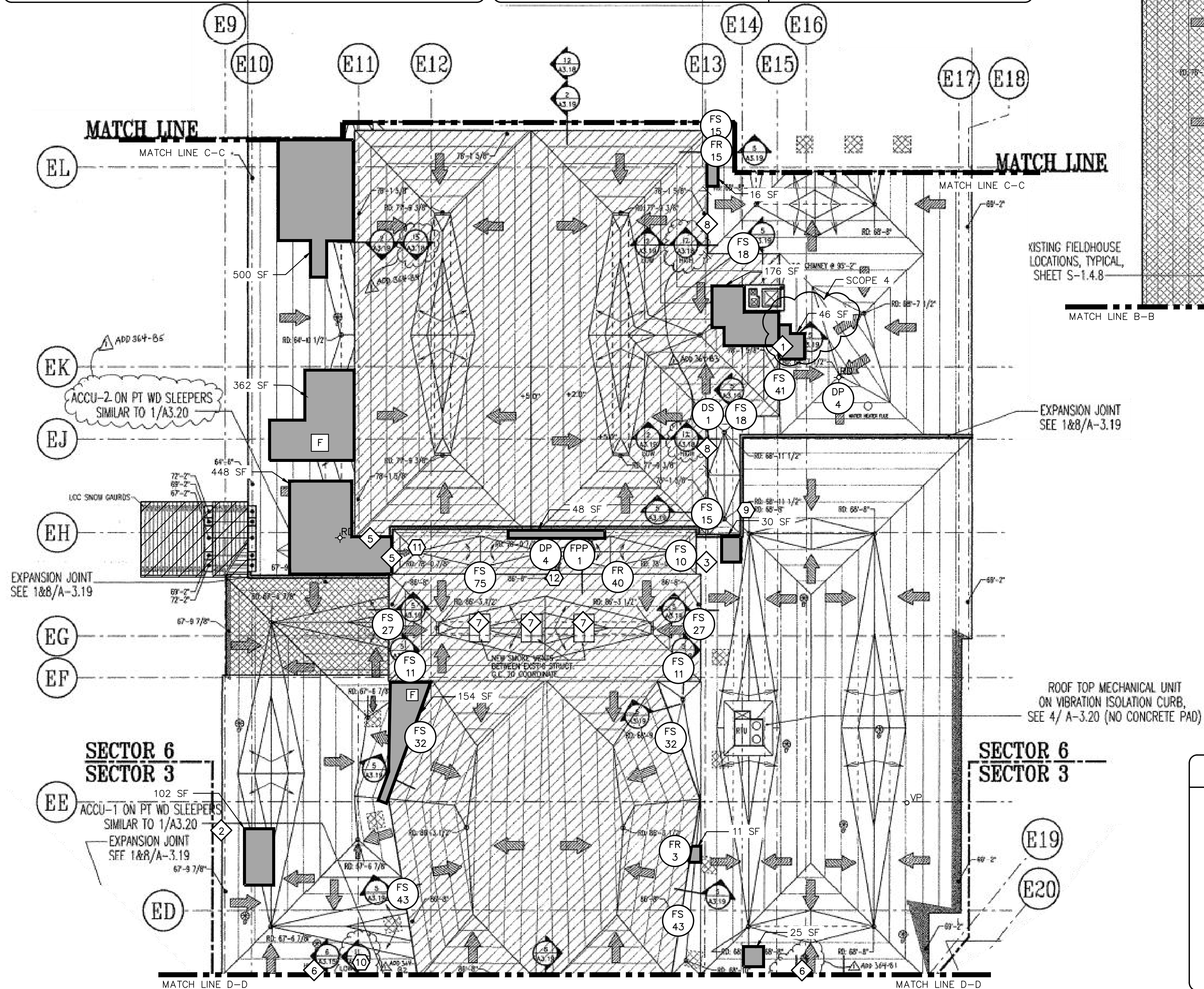
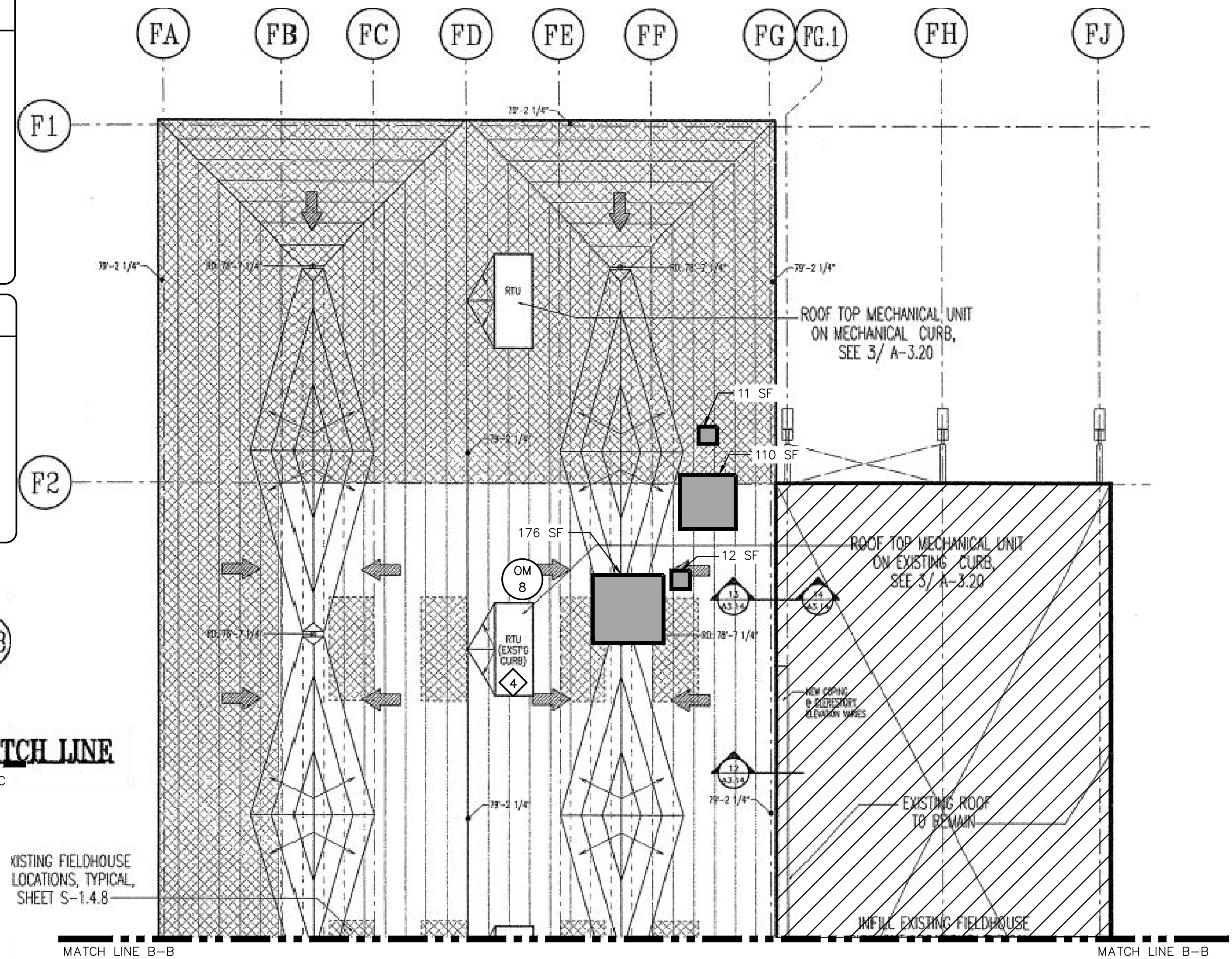
NOTED AREAS WITH ADDITIONAL SCOPE OF WORK REQUIRED. SEE REPORT FOR MORE INFORMATION.

F
VP
VENT PIPE

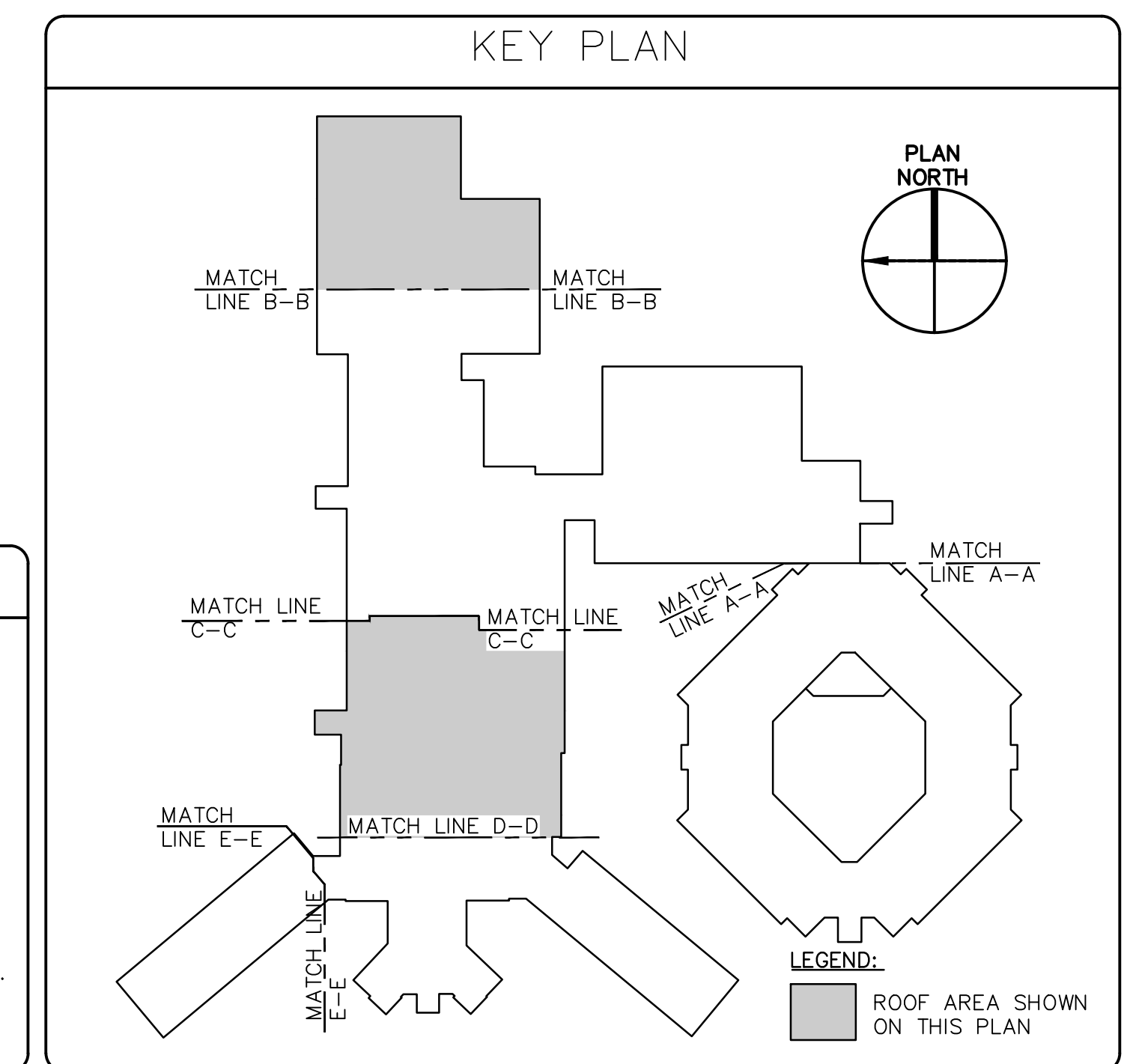
RD
ROOF DRAIN

1	DOOR SILL HAS MULTIPLE GAPS IN SILL FLASHING AND ROOFING MEMBRANE.
2	BUBBLED STRIPPING MEMBRANE AT ROOF EDGE; TYPICAL.
3	DOOR HAS 18 LF OF FAILED PERIMETER SEALANT. OPEN GAPS WERE OBSERVED AT THE HEAD OF THE DOOR AND EXPOSED PLYWOOD WAS OBSERVED BEHIND THE DOOR HINGES.
4	SEAL ALL OPEN PENETRATIONS AT MECHANICAL UNITS.
5	THROUGH WALL FLASHING OBSERVED WITH OPEN JOINTS.
6	THROUGH WALL FLASHING OBSERVED IN GOOD CONDITION WITH COUNTERFLASHING AND WEEPS AT 2 FT± O.C.
7	SMOKE HATCHES OBSERVED WITH FAILED WEATHERSTRIPPING AND WITHOUT FULL SEALNT.
8	GLASS BLOCK RISING WALLS WITH THROUGH WALL FLASHING OBSERVED.

OM #	OPEN/TORN/SLICED/PUNCTURED MEMBRANE; # INDICATES LINEAR FEET	FS #	FAILED SEALANT; # INDICATES LINEAR FEET
FPP #	FAILED PITCH POCKETS; # INDICATES UNITS	FR #	FAILED REGET FLASHING; # INDICATES LINEAR FEET
DP #	DELAMINATED MEMBRANE PATCH # INDICATES UNIT		
DS #	DELAMINATED STRIPPING MEMBRANE # INDICATES LINEAR FEET		



NOT ALL LEAK LOCATIONS INCLUDED ON THIS SHEET. REFER TO OTHER SHEETS FOR ADDITIONAL LEAK LOCATIONS.	
9	PREVIOUS LEAK REPORTED. NOT CURRENTLY ACTIVE.
10	PREVIOUS LEAK REPORTED. NOT CURRENTLY ACTIVE.
11	ACTIVE LEAK REPORTED. LEAK IS POTENTIALLY RELATED TO ROOF DRAIN LEADER.
12	ACTIVE LEAK REPORTED ALONG RISING WALL STAINING VISIBLE ALONG LENGTH OF WALL. LEAK TYPICALLY REPORTED WITH WIND-DRIVEN RAIN.



A104