Out of Town News - Historic Restoration

08.01.16

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THE GALANTE ARCHITECTURE STUDIO INC

CRITICAL ISSUES	STATUS
OPERABLE WINDOWS - SLIDING WINDOWS	CONCEPTUAL APPROACH ACCEPTED CHC 08.01.2016
RATIO OF GLASS TO MASONRY	CONCEPTUAL APPROACH ACCEPTED CHC 08.01.2016
ARCHITECTURAL & GENERAL SPACE LIGHTING APPROACH	CONCEPTUAL APPROACH ACCEPTED CHC 08.01.2016
COPPER ROOFING & COPPER CORNICE	FULL REPLACEMENT OF COPPER ROOFING & CORNICE RECCOMENDED
LOWERING SLAB 6 INCHES FOR ENTRANCE ACCESSIBILTY	UNDER CONSIDERATION DEPENDANT UPON PLAZA WORK
INTERIOR FLOORING MATERIAL	CAMBRIDGE HISTORIC COMMISSION - MATCH PLAZA
ARCHED GLASS INTEGRATED SIGNAGE	UNDER CONSIDERATION
HVAC OUTDOOR UNIT LOCATION & ENCLOSURE	UNRESOLVED NEEDS EXTENSIVE STUDY
HVAC INTOOR UNITS LOCATIONS & PIPING	UNRESOLVED NEEDS EXTENSIVE STUDY
CEILING FANS	UNRESOLVED NEEDS EXTENSIVE STUDY
INTERIOR LAYOUT FLOOR PLAN	UNRESOLVED NEEDS EXTENSIVE STUDY
MILLWORK COUNTERS & STORAGE	UNRESOLVED NEEDS EXTENSIVE STUDY
AUDIO VIDEO SYSTEMS, PROGRAM & LOCATION	UNRESOLVED NEEDS EXTENSIVE STUDY
INTERIOR FINISHES	UNRESOLVED NEEDS EXTENSIVE STUDY

CONCEPTUAL DESIGN STATUS AS OF: 08.01.2016

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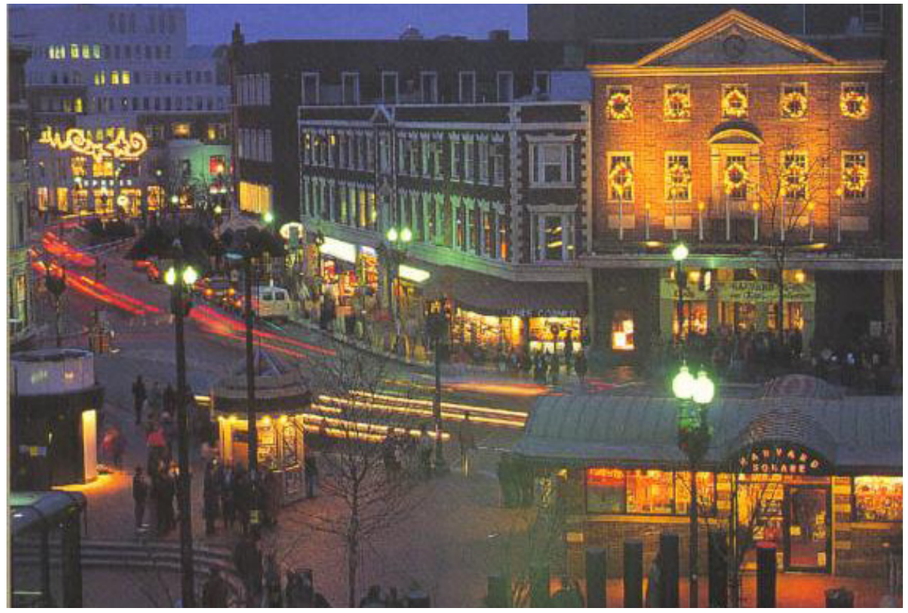
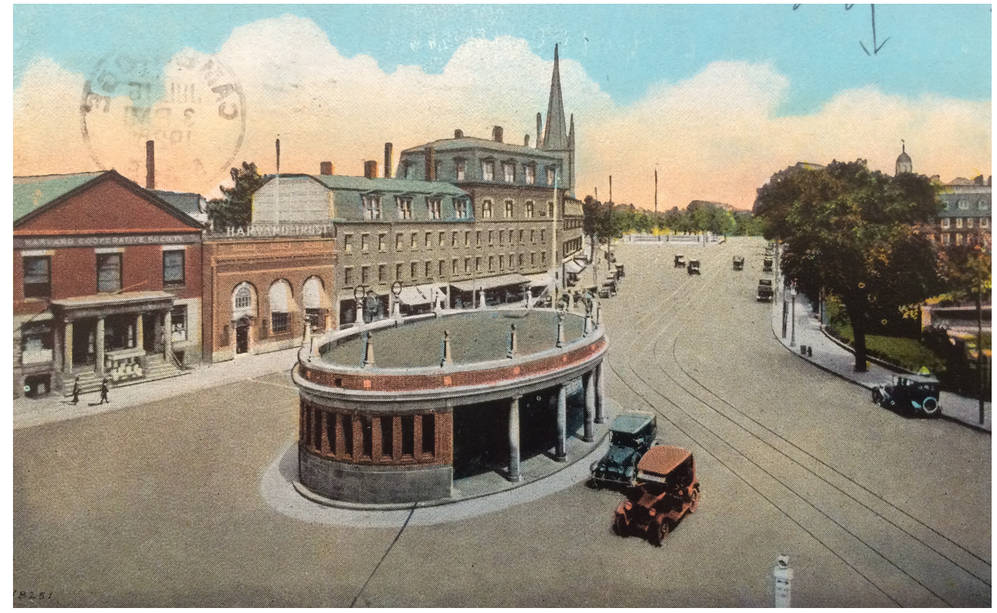


Harvard Square - **2014**



Harvard Square - **1825**

Harvard Square - **1960's**

Harvard Square - **1949**

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Brattle Street Facade - **2014**

Massachusetts Avenue Facade - **2014**

Brattle Street Facade - **1929**

Massachusetts Avenue Facade - **1950's**

Historic and Existing Conditions Images

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OUT OF TOWN NEWS - Historic Restoration

MBTA-Side Facade - **2014**

Massachusetts Avenue Facade - **2014**

MBTA-Side Facade - **1960's**

Massachusetts Avenue Facade - **1960's**

Historic and Existing Conditions Images

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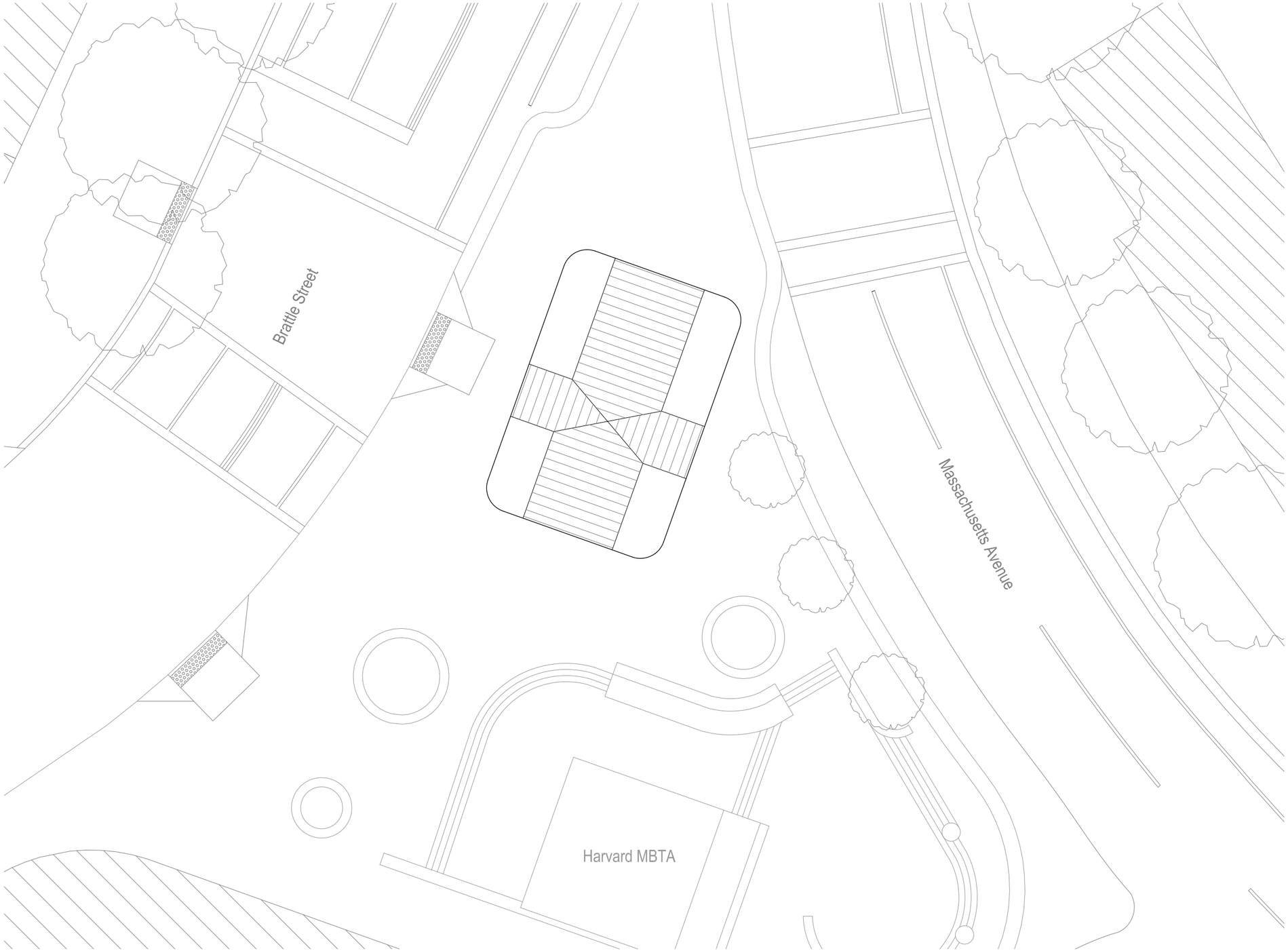
OUT OF TOWN NEWS - Historic Restoration



1 Site Plan

Site Plan

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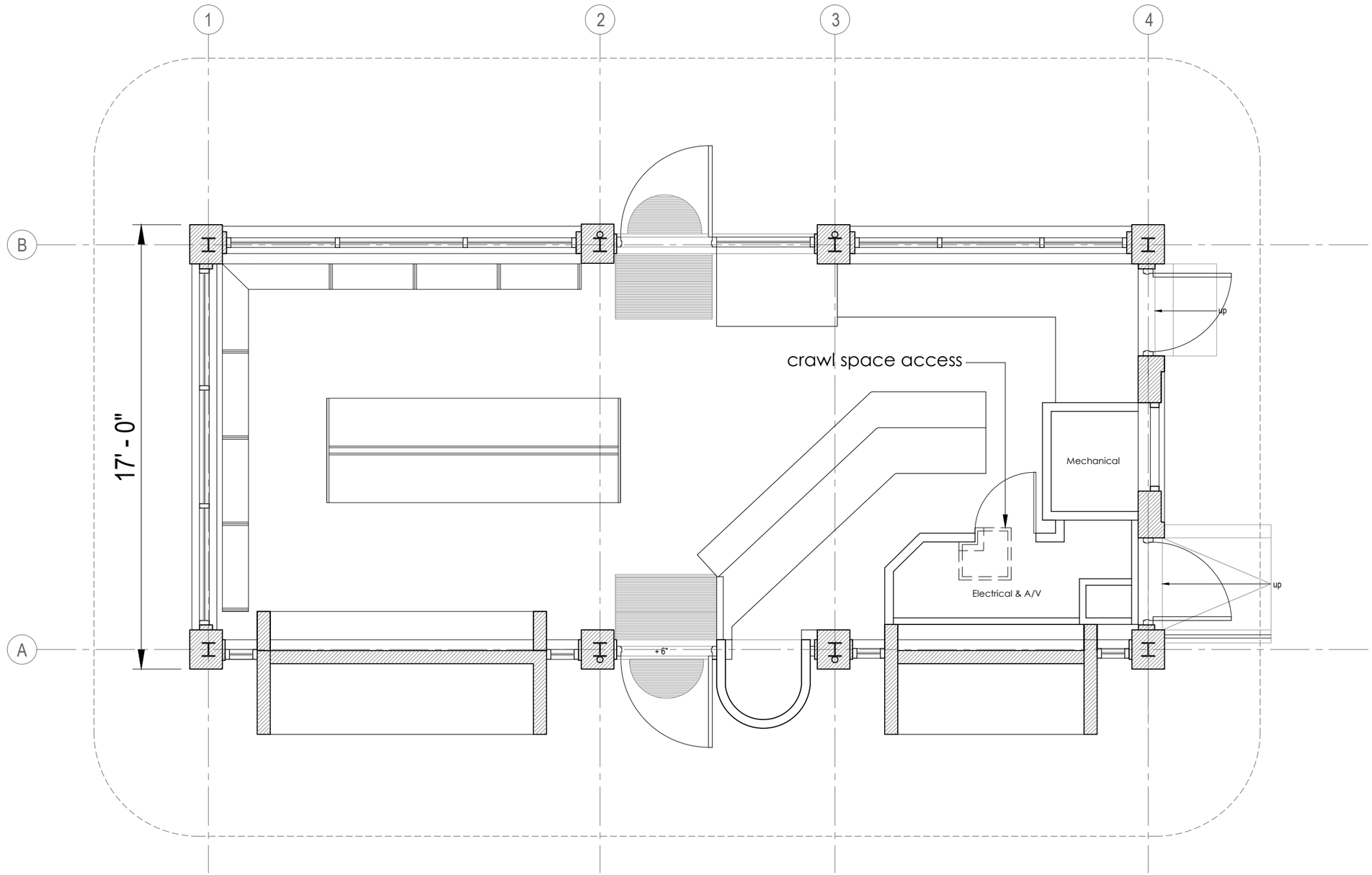
GROSS SQUARE FOOTAGE: 636 SF
NET SQUARE FOOTAGE: 514 SF



1 Floor Plan

1/2"=1'-0"

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Existing Conditions Floor Plan

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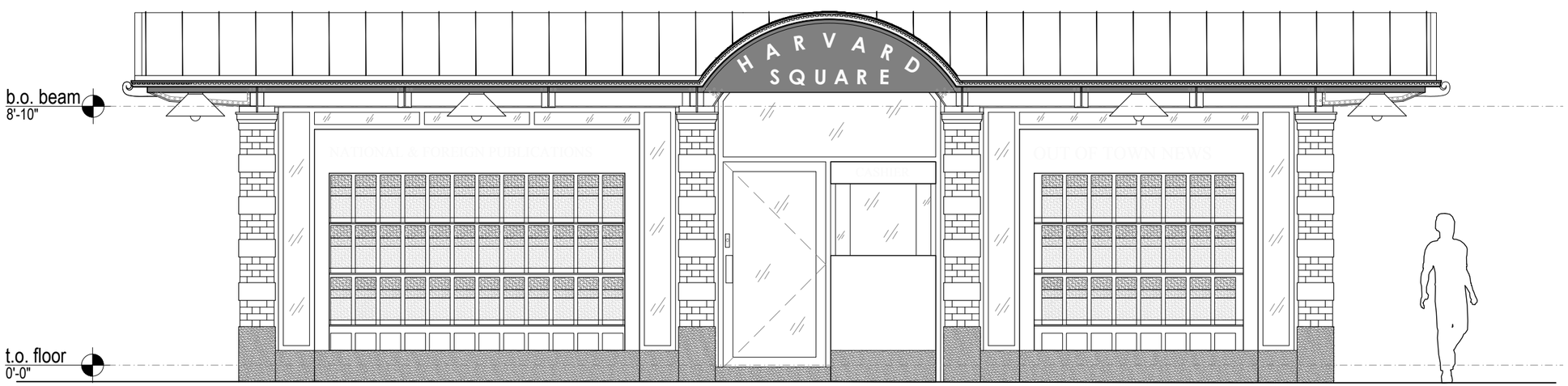
2 Elevation - Massachusetts Avenue

1/2"=1'-0"



1 Elevation - Brattle Street

1/2"=1'-0"

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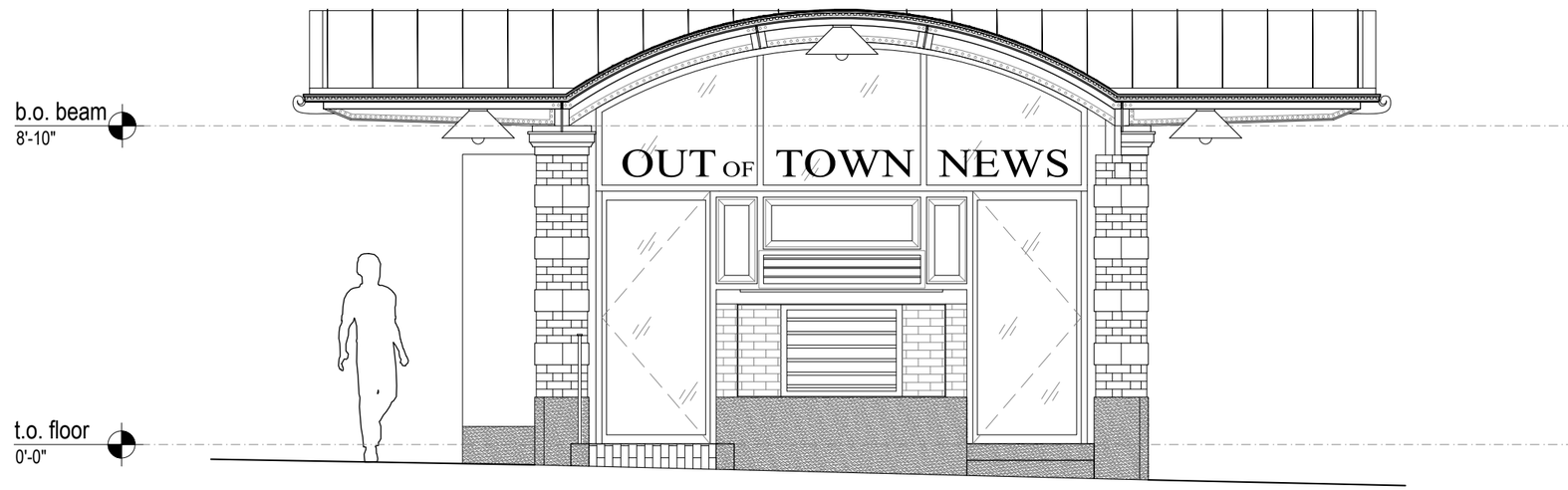
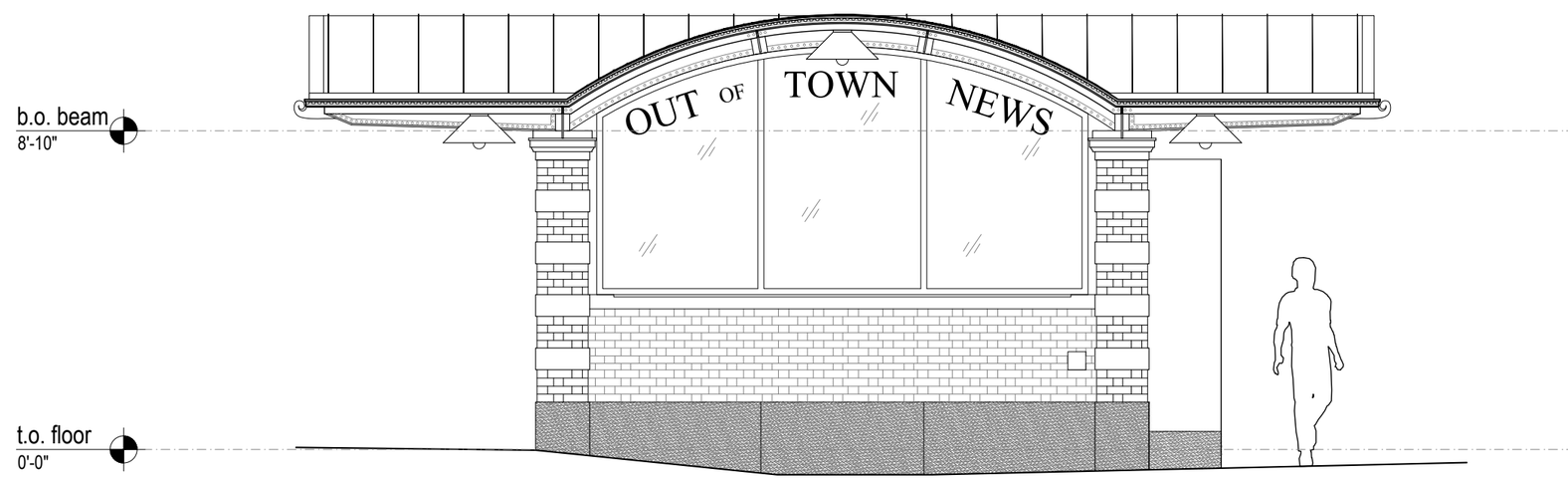
Existing Conditions Exterior Elevations

OUT OF TOWN NEWS - Historic Restoration



2 Elevation - Facing Harvard Square MBTA Station

1/2"=1'-0"



1 Elevation - Facing Harvard University

1/2"=1'-0"

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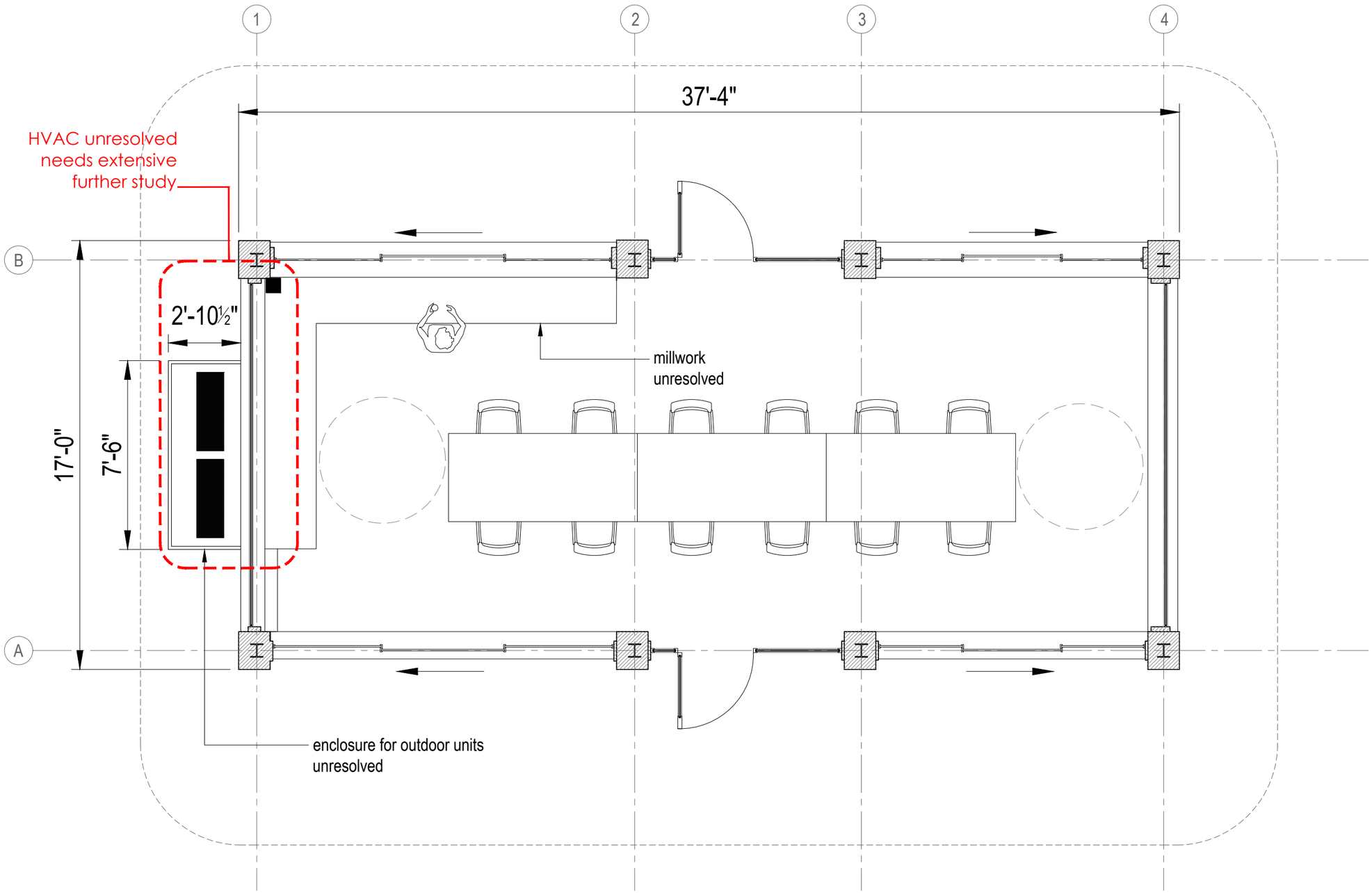
Existing Conditions Exterior Elevations

OUT OF TOWN NEWS - Historic Restoration



Proposed Floor Plan

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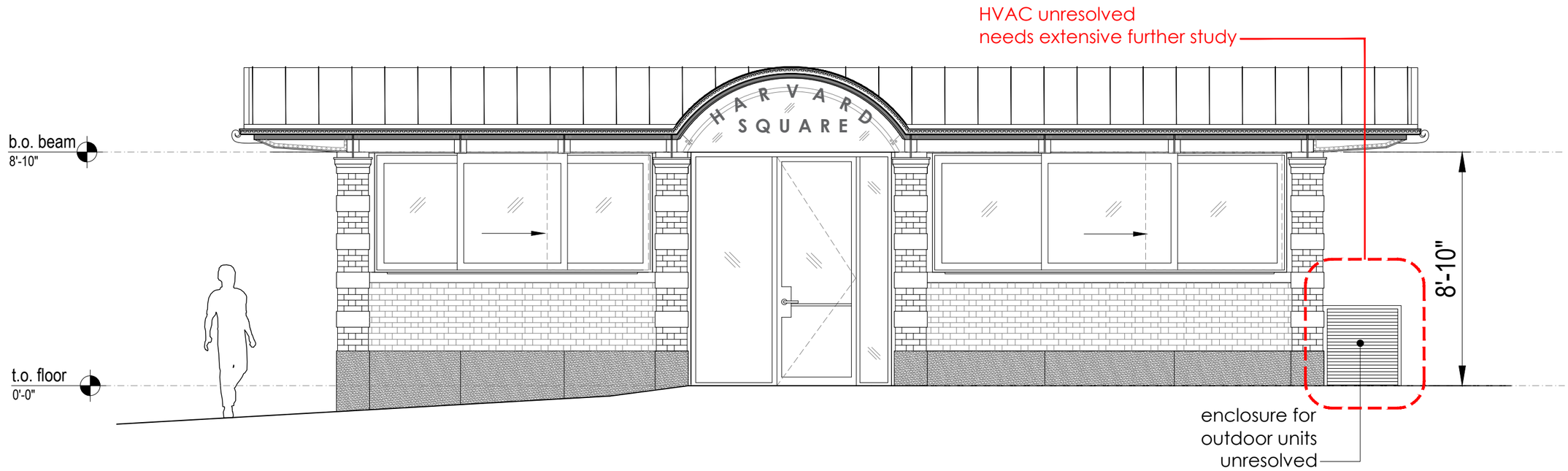
OUT OF TOWN NEWS - Historic Restoration



2 Elevation - Massachusetts Avenue

Scale: 1/2"=1'-0"

1 Elevation - Brattle Street

1/2"=1'-0"

Proposed Exterior Elevations

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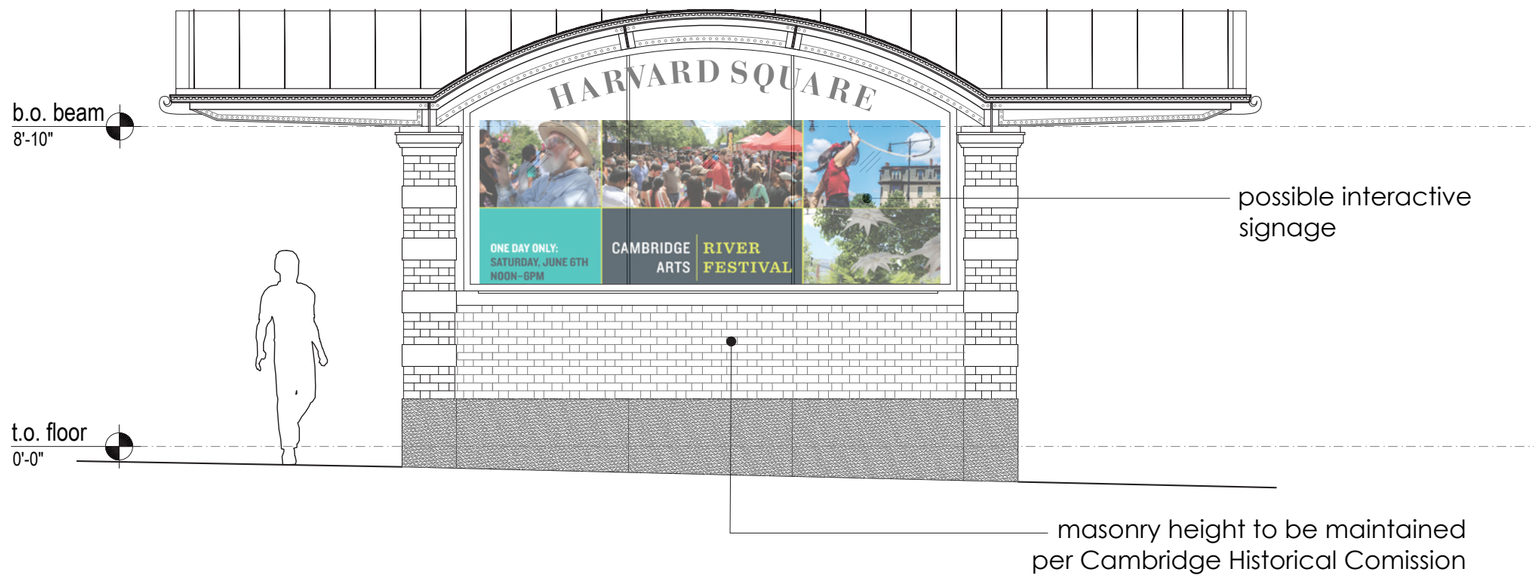
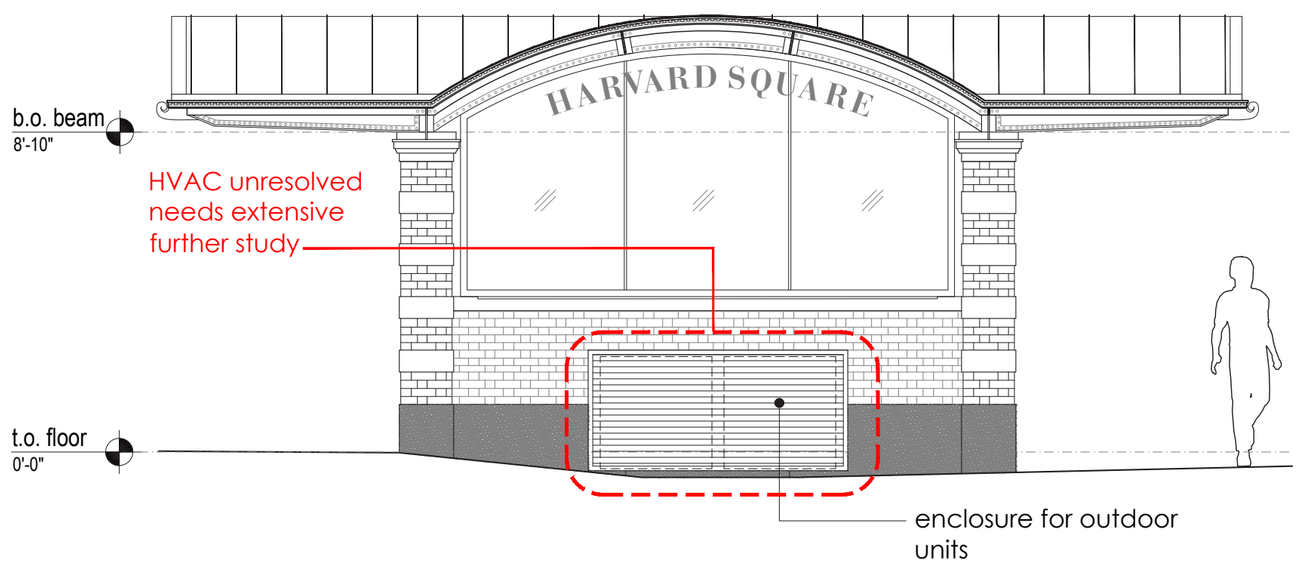


2 Elevation - Facing Harvard Square MBTA Station

1/2"=1'-0"



1 Elevation - Facing Harvard University

1/2"=1'-0"

Proposed Exterior Elevations

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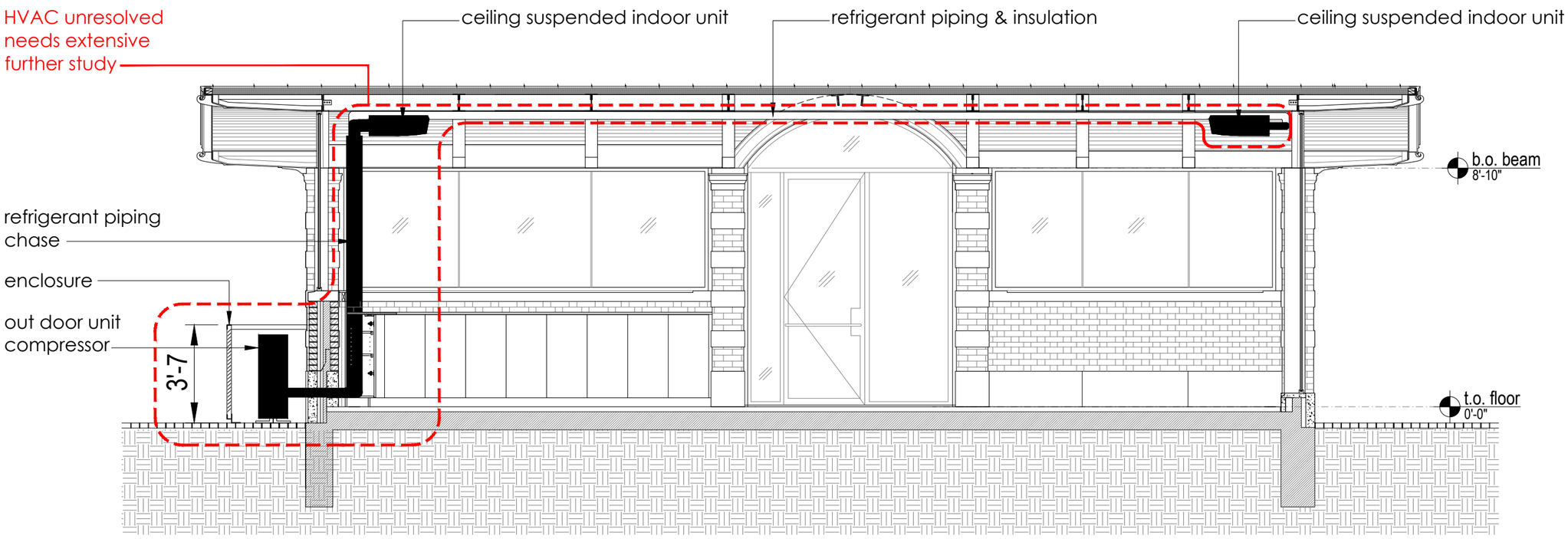
OUT OF TOWN NEWS - Historic Restoration



2 Building Section - Ceiling Suspended Heat Pump
Unacceptable to Design Team & Comittee

Scale: 1/2"=1'-0"

Proposed Building Section - Conceptual HVAC Test Fit

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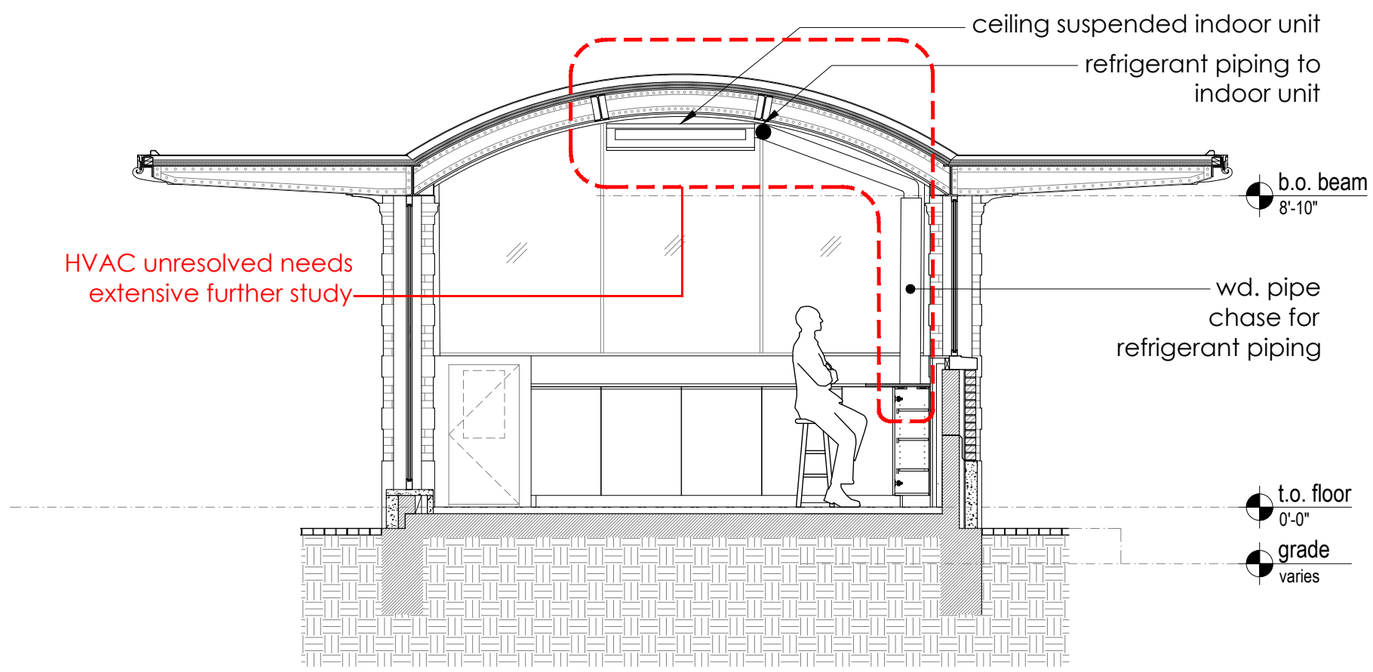

1 Building Section - Vertical Packaged Unit
Unacceptable to Design Team & Comittee

1/2"=1'-0"

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THE GALANTE ARCHITECTURE STUDIO INC

P-SERIES

PCA-A30KA6 & PUZ-A30NHA6 (-BS)
30,000 BTU/H CEILING-SUSPENDED HEAT-PUMP SYSTEM

MITSUBISHI ELECTRIC

Job Name:	
System Reference:	Date:

Indoor Unit: PCA-A30KA6

Outdoor Unit: PUZ-A30NHA6 (-BS)

UNIT OPTION:

- □ Standard Model.....PUZ-A30NHA6
- □ Seacoast (BS) Model.....PUZ-A30NHA6-BS

ACCESSORIES:

Indoor Unit

- □ Condensate Pump (BlueDiamond X87-711/721; 115/230V)
- □ Condensate Pump (Sauermann SI30-115/230; 115/230V)
- □ High-Efficiency Filter (PAC-SH89KF-E)
- □ iSee Sensor (PAC-SH91MK-E)
- □ Disconnect Switch (TAZ-MS303)

Outdoor Unit

- □ Wind Baffle (WB-PA2)*

*Allows operation to 0º F (-18º C).

- □ Air Outlet Guide (PAC-SG59SG-E)
- □ Mounting Base (QSMS1201)
- □ Wall Bracket (QSWB2000M-1)

Controls

- □ Wireless Controller (MHK1)
- □ Advanced Wired Controller (PAR-31MAA)
- □ Simple Wired Controller (PAC-YT53CRAU)
- □ M-NET Adapter (PAC-SF83MA-E)
- □ Temperature Sensor (PAC-SE41TS)

SPECIFICATIONS:

Rated Conditions (Capacity / Input)*		
Cooling	Btu/h / W	30,000 / 3,760
Heating at 47º F	Btu/h / W	32,000 / 3,210
Heating at 17º F	Btu/h / W	23,000 / 2,940

* Rating Conditions per AHRI Standard:
Cooling | Indoor: 80º F (27º C)DB / 67º F (19º C)WB; Outdoor: 95º F (35º C)DB / 75º F (24º C)WB
Heating at 47ºF | Indoor: 70º F (21º C)DB / 60º F (16º C)WB; Outdoor: 47º F (8º C)DB / 43º F (6º C)WB
Heating at 17º F | Indoor: 70º F (21º C)DB / 60º F (16º C)WB; Outdoor: 17º F (-8º C)DB / 15º F (-9º C)WB

Capacity Range		
Cooling	Btu/h	12,000 - 30,000
Heating at 47º F	Btu/h	12,000 - 34,000

Operating Range	
Cooling	0º F** to 115º F (-18º C to 46º C) DB
Heating	12º F to 70º F (-11º C to 21º C) DB

** The minimum temperature will be 23º F (-5º C) DB if optional wind baffle accessory is not installed.

AHRI Efficiency Ratings	
EER	8.0
SEER	14.5
HSPF	9.2
COP at 47º F	2.92
COP at 17º F	2.29

Electrical Power Requirements	208 / 230V, 1-Phase, 60 Hz

Minimum Circuit Ampacity (MCA)		
Indoor / Outdoor	A	1 / 25

Indoor Unit		
Blower Motor (ECM)	F.L.A.	0.54
Blower Motor Output	W	95
SHF / Moisture Removal		0.69 / 8.3 pt./h

Outdoor Unit		
Compressor		DC INVERTER-driven Twin Rotary
Fan Motor (ECM)	F.L.A.	0.75
MOCP	A	40

Airflow Rate (Low-M1-M2-Hi)			
Indoor (Cooling)	DRY	CFM	565-600-635-705
	WET		530-565-600-670
Outdoor	DRY		1,940

Sound Pressure Level			
Indoor (Low-M1-M2-Hi)		dB(A)	35-37-39-41
Outdoor	Cooling		48
	Heating		50

External Dimensions		
Indoor (H x W x D)	In.(mm)	9-1/16 x 50-3/8 x 26-3/4 (230 x 1,280 x 680)
Outdoor (H x W x D)		37-1/8 x 37-3/8 x 13 + 1-3/16 (943 x 950 x 330 + 30)

Net Weight		
Indoor	Lbs.(kg)	71 (32)
Outdoor		165 (75)

External Finish	
Indoor	Munsel No. 6.4Y 8.9/0.4
Outdoor	Munsell No. 3Y 7.8 / 1.1

Refrigerant	R410A ; 6lbs., 10oz.

Refrigerant Piping (Flared)		
Liquid (High Pressure)	In.(mm)	3/8 (9.52)
Gas (Low Pressure)		5/8 (15.88)
Maximim Total Refrigerant Pipe Length	Ft. (m)	165 (50)
Maximum Vertical Separation	Ft. (m)	100 (30)

Specifications are subject to change without notice.

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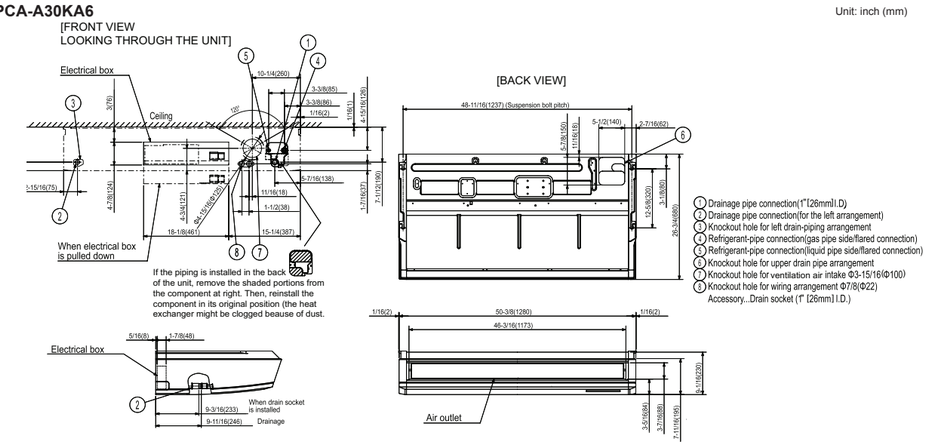
DIMENSIONS: PCA-A30KA6 & PUZ-A30NHA6 (-BS)

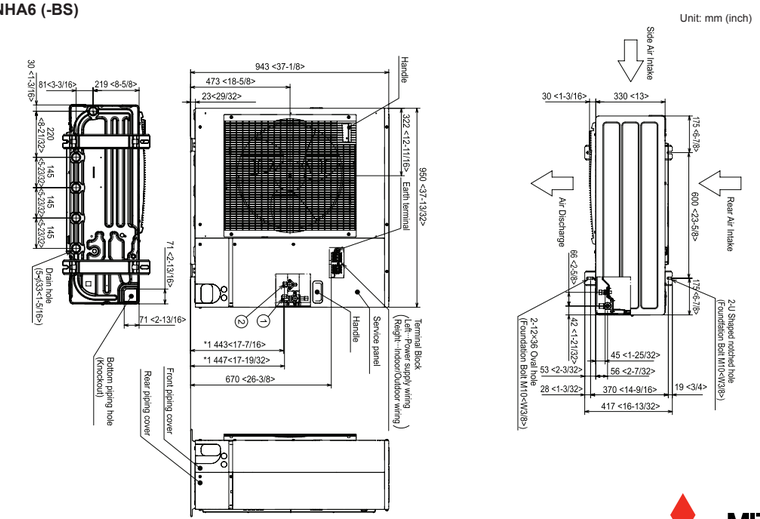
PCA-A30KA6

Unit: inch (mm)



PUZ-A30NHA6 (-BS)

Unit: mm (inch)



NOTES:
SEACOAST PROTECTION

- External Outer Panel: Phosphate coating + Acrylic-Enamel coating
- Fan Motor Support: Epoxy resin coating (at edge face)
- Separator Assembly ; Valve Bed: Epoxy resin coating (at edge face)
- Screws (used outer side): Zinc nickel coating 5μm + Polyvinylidene chloride coating

"Blue Fin" treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants..

MITSUBISHI ELECTRIC
COOLING & HEATING

1340 Satellite Boulevard. Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

AHRI CERTIFIED www.ahrinet.org Unitary Small HP AHRI Standard 210/240

Intertek

FORM# PCA-A30KA6 - PUZ-A30NHA6 (-BS) - 201507
Specifications are subject to change without notice.

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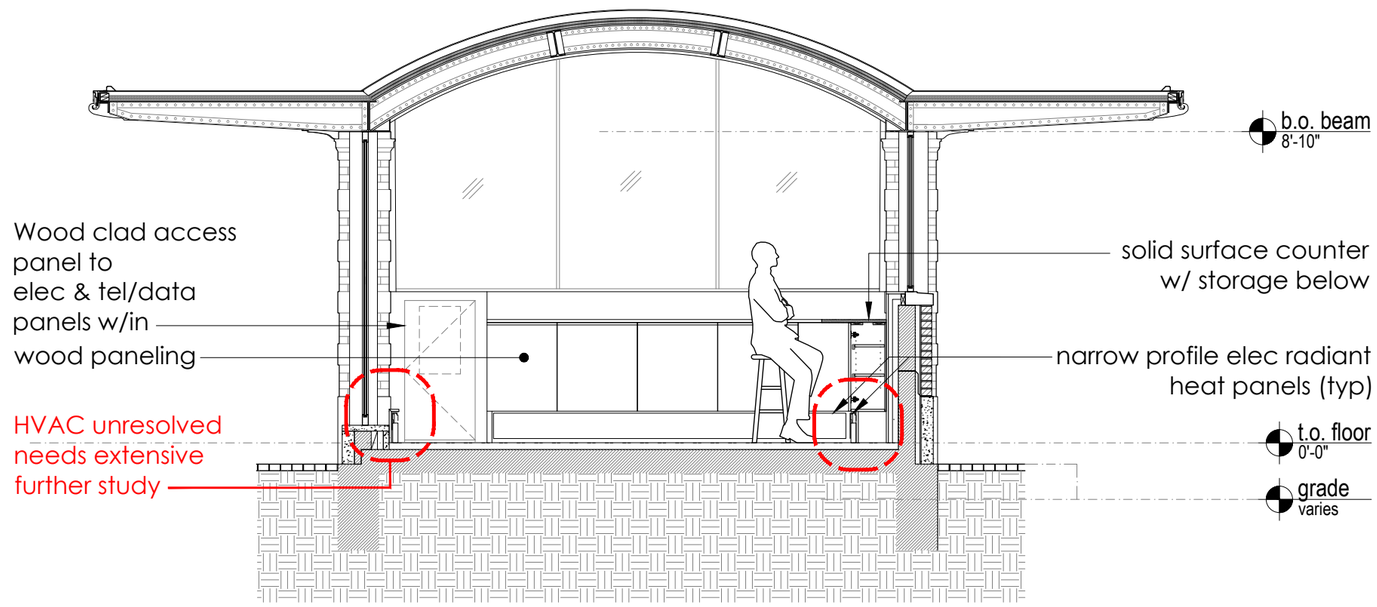
OUT OF TOWN NEWS - Historic Restoration



1 Building Section - Radiant Heating

1/2"=1'-0"

Proposed Building Section - Conceptual Radiant Heating Test Fit

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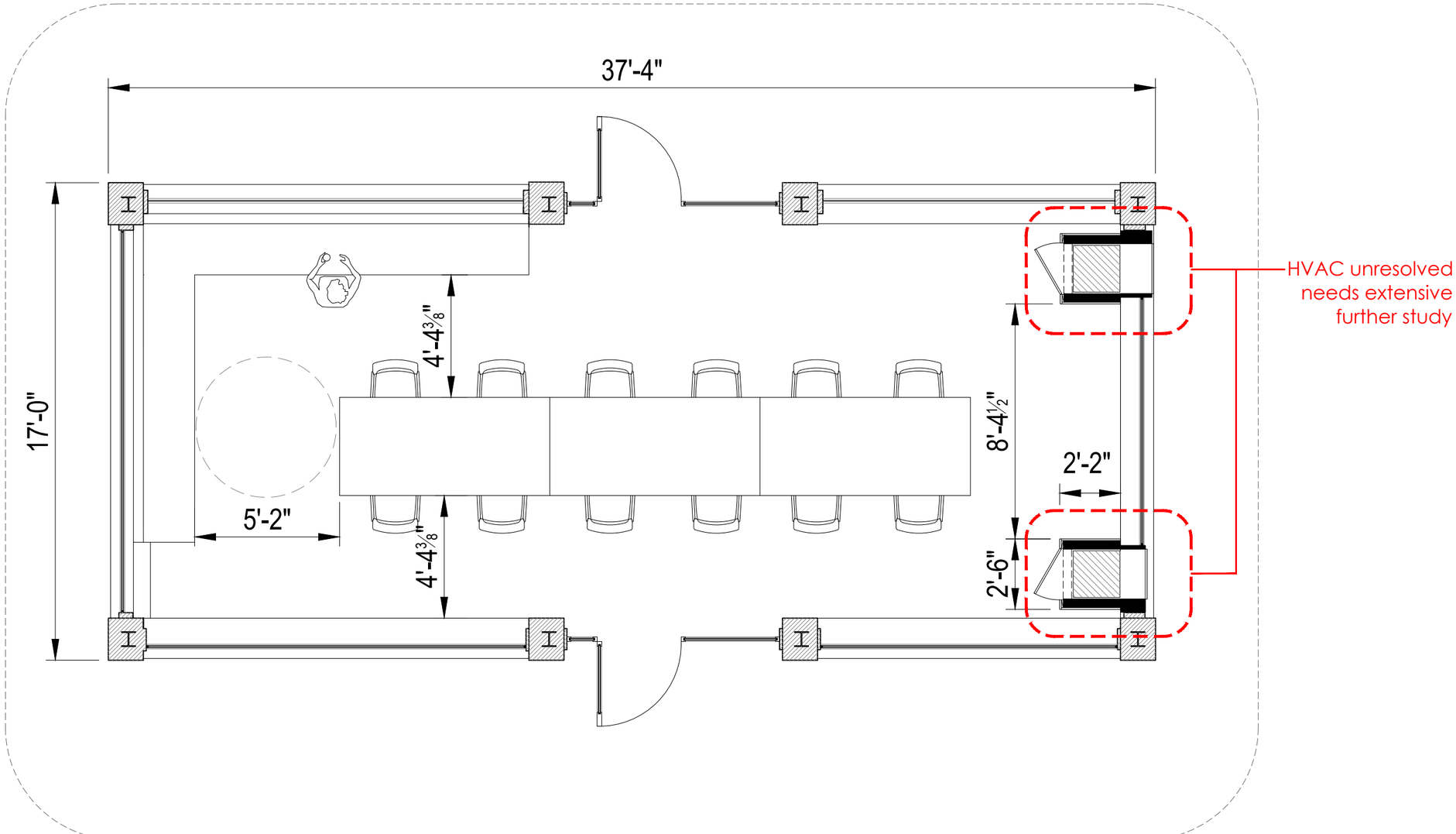
OUT OF TOWN NEWS - Historic Restoration



1 Floor Plan - Vertical Package Units
Unacceptable to Design Team & Comittee

1/2"=1'-0"

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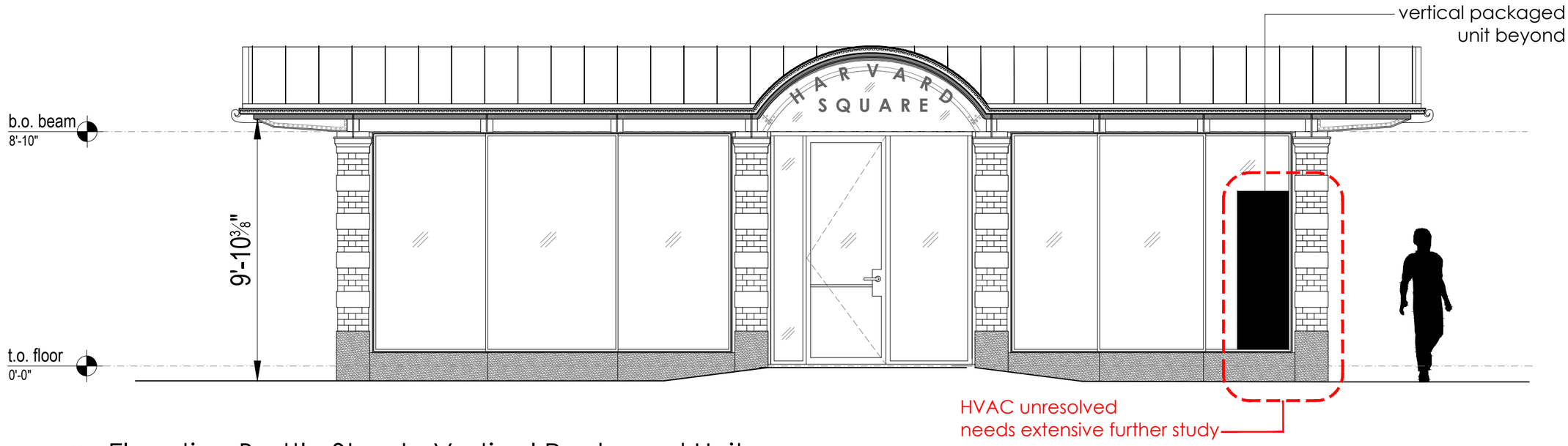
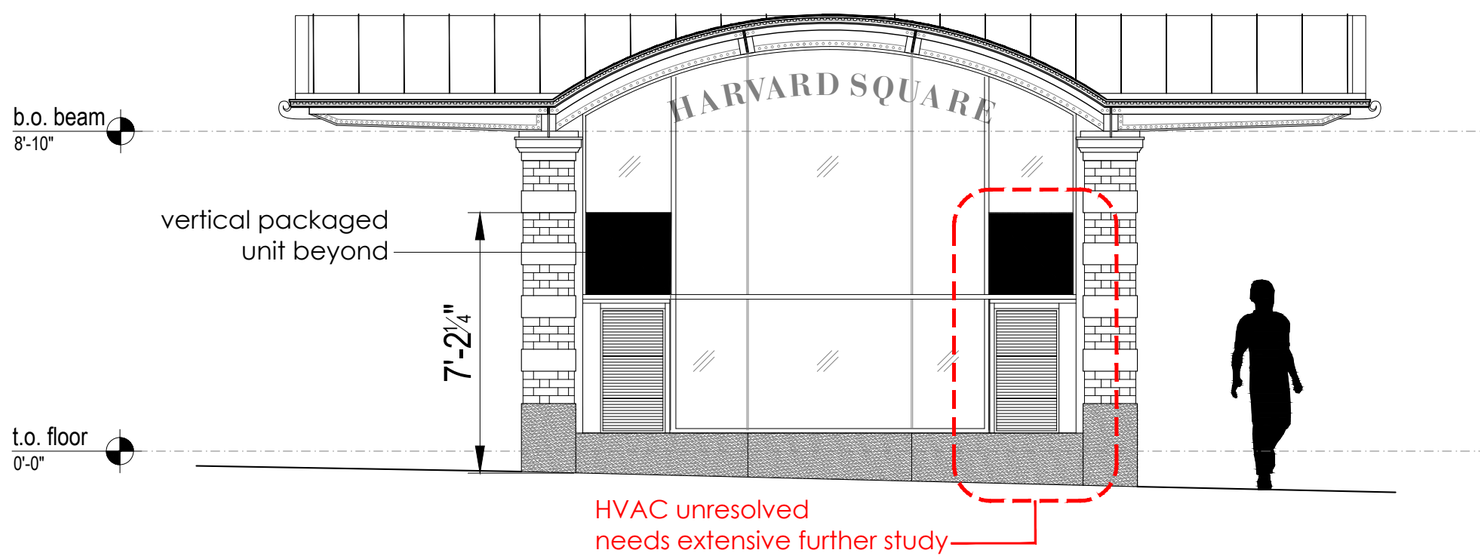
Proposed Floor Plan - Vertical Package Unit - Conceptual HVAC Test Fit

OUT OF TOWN NEWS - Historic Restoration



2 Elevation Brattle Street - Vertical Packaged Unit
Unacceptable to Design Team & Comittee

Scale: 1/2"=1'-0"



1 Elevation Facing Harvard Square - MBTA Station
Unacceptable to Design Team & Comittee

1/2"=1'-0"

Proposed Exterior Elevations - Vertical Package Unit - Conceptual HVAC Test Fit

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OUT OF TOWN NEWS - Historic Restoration

1 Building Section - Vertical Packaged Unit
Unacceptable to Design Team & Comittee

1/2"=1'-0"

Proposed Building Section - Vertical Package Unit - Vertical Package Unit - Conceptual HVAC Test Fit

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OUT OF TOWN NEWS - Historic Restoration

2 Building Section - Horizontal Packaged Unit
Unacceptable to Design Team & Comittee

Scale: 1/2"=1'-0"

Proposed Building Section - Vertical Package Unit - Conceptual HVAC Test Fit

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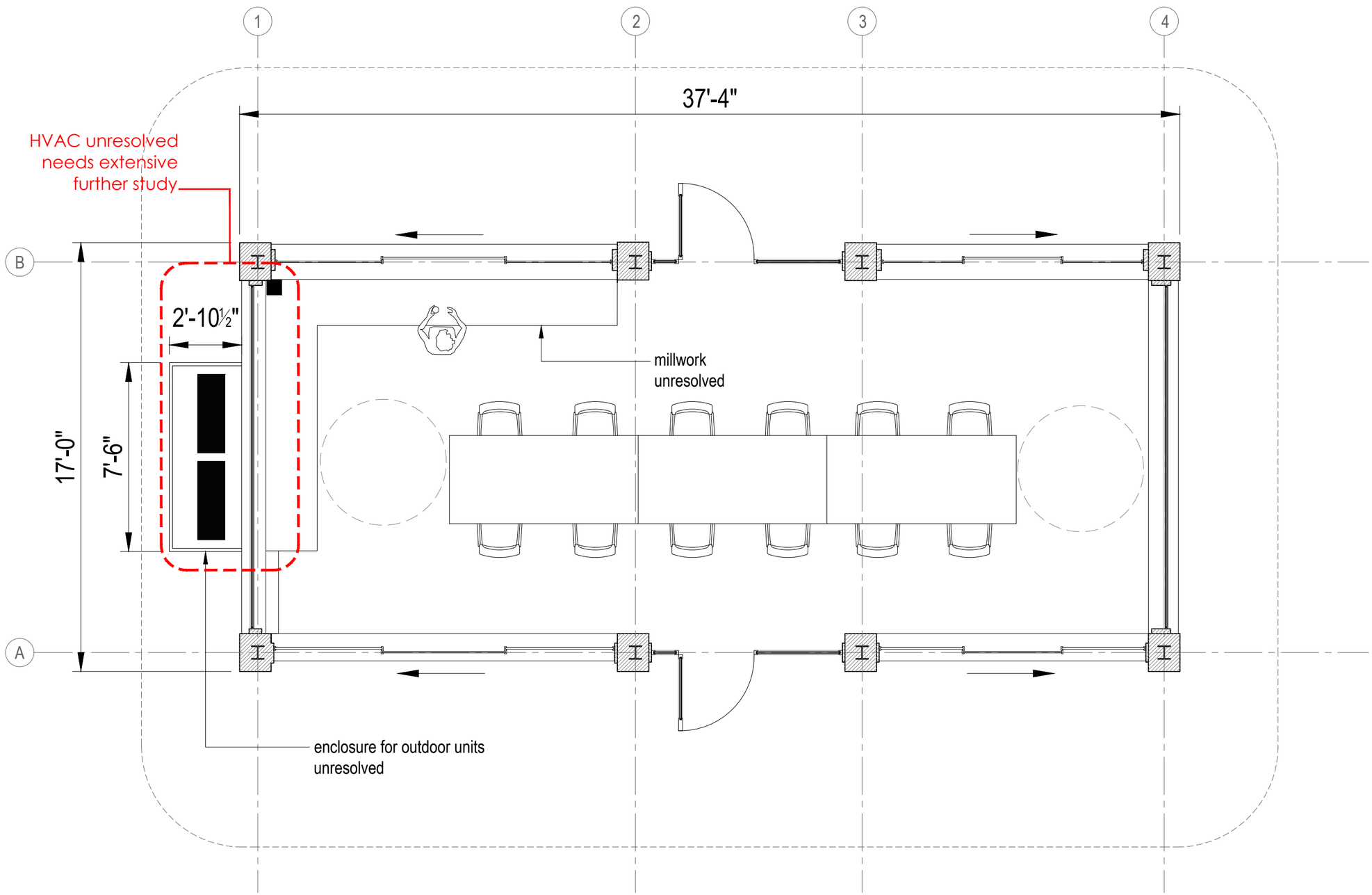
OUT OF TOWN NEWS - Historic Restoration



Proposed Floor Plan

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OUT OF TOWN NEWS - Historic Restoration

masonry height to be maintained
per CHC

Rendering Brattle Street - Conceptual Rendering As Of 08.01.2016

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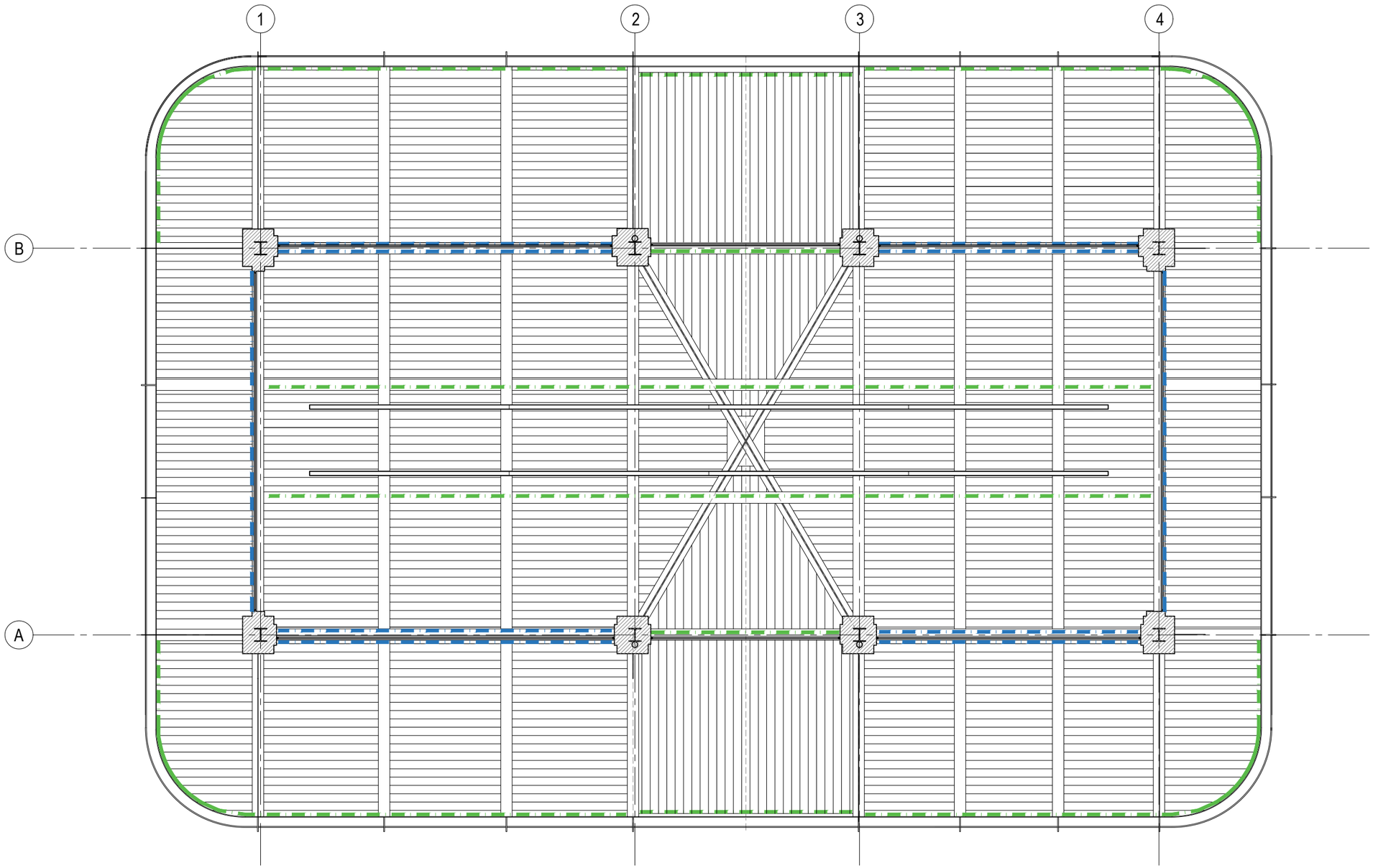
OUT OF TOWN NEWS - Historic Restoration

LED flexible tape lighting

Asymmetrical linear grazing light fixture

Linear direct / indirect pendant light fixture



Proposed Reflected Ceiling Plan

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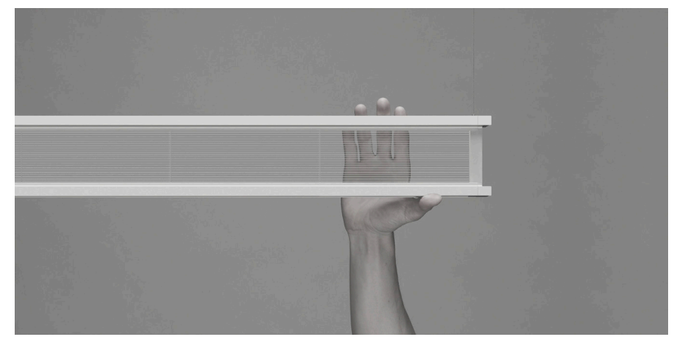
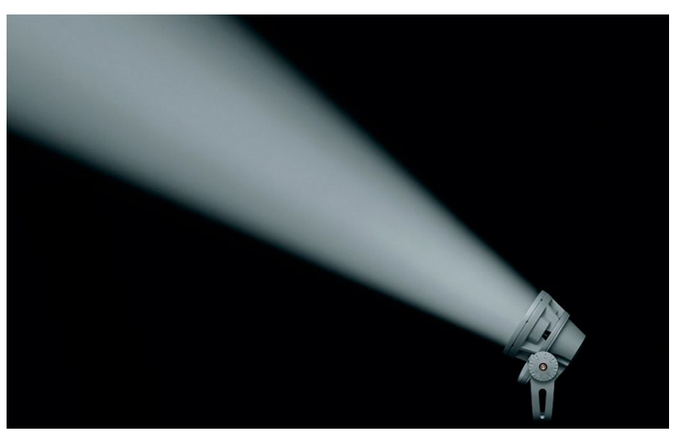
Column grazing accent



Direct / Indirect linear pendant

Assymetrical grazing ceiling fixture



Ceiling wash accent

LED flexible tape lighting

Integrated Building Signage - Conceptual Signage for Transparency

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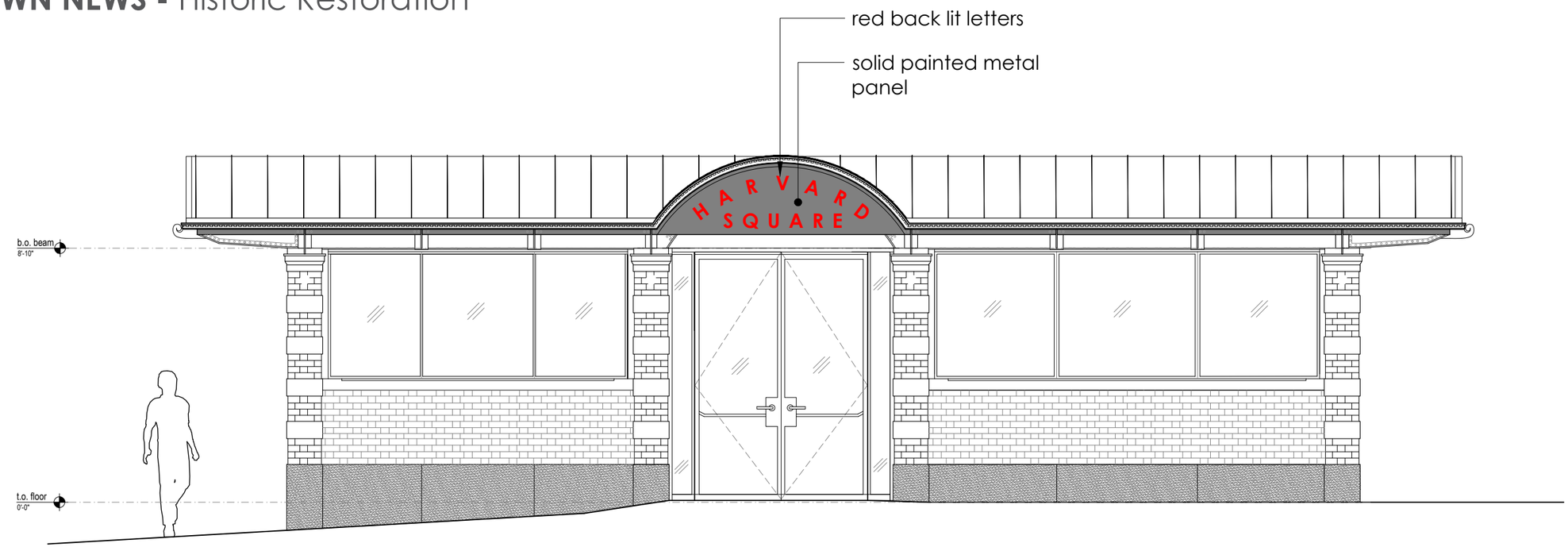
OUT OF TOWN NEWS - Historic Restoration



1 Elevation - Massachusetts Avenue

Scale: 1/2"=1'-0"

Integrated SIgnage - Conceptual Signage Based on History

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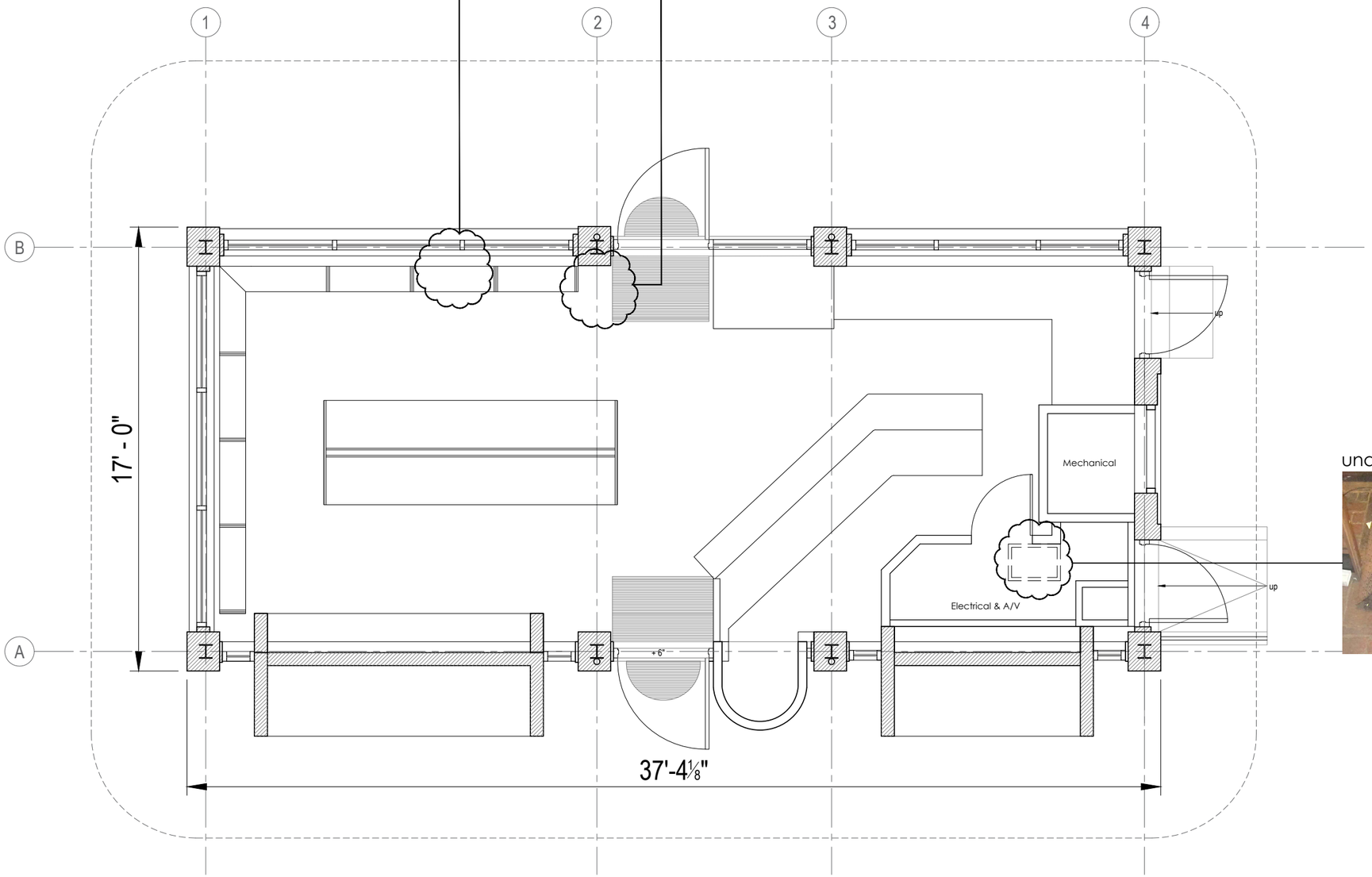
OUT OF TOWN NEWS - Historic Restoration

Exploratory Demo @ shelving

CMU backup walls

Test pit interior concrete topping slab



underslab access panel

Exploratory Demolition - Interior

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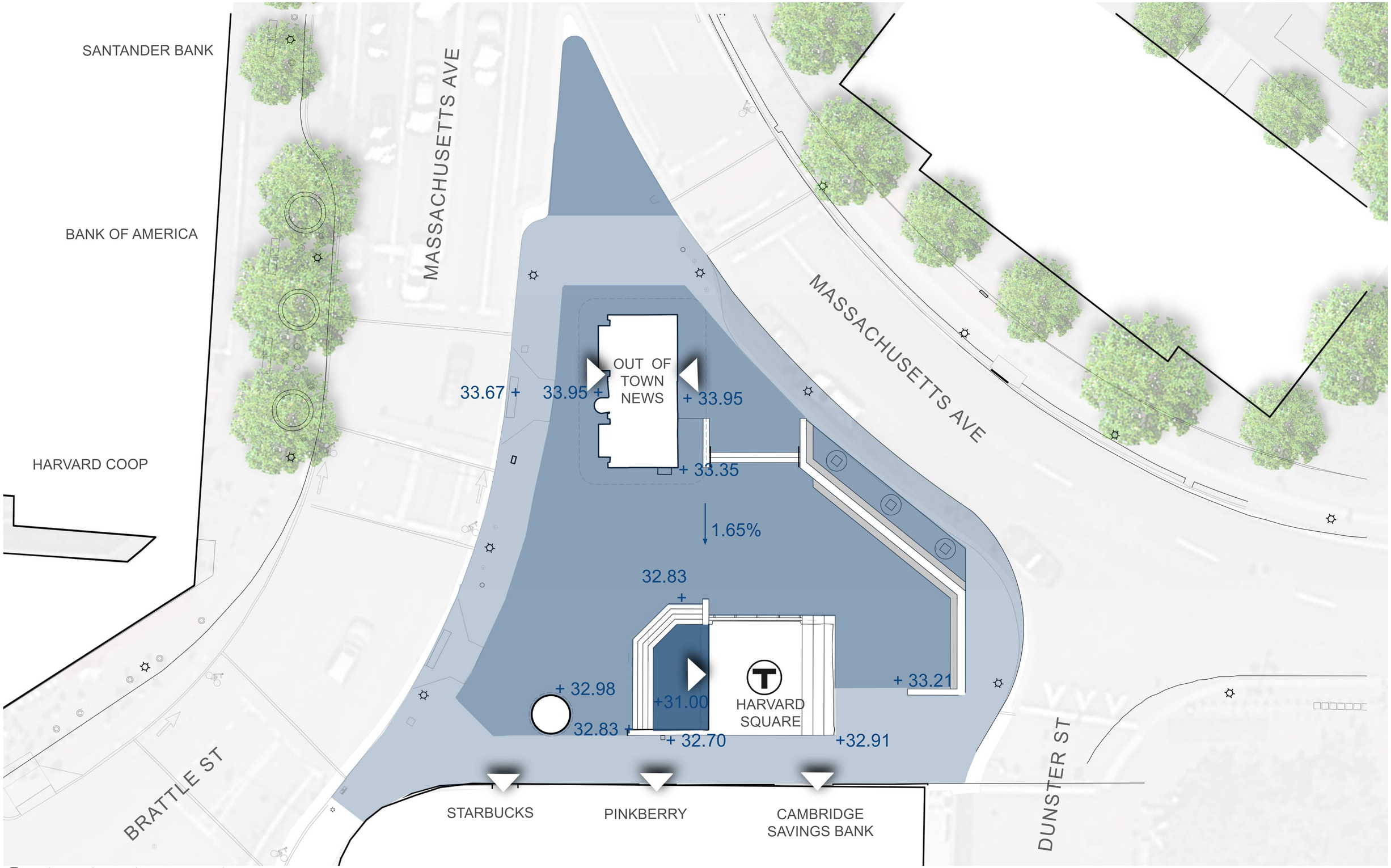
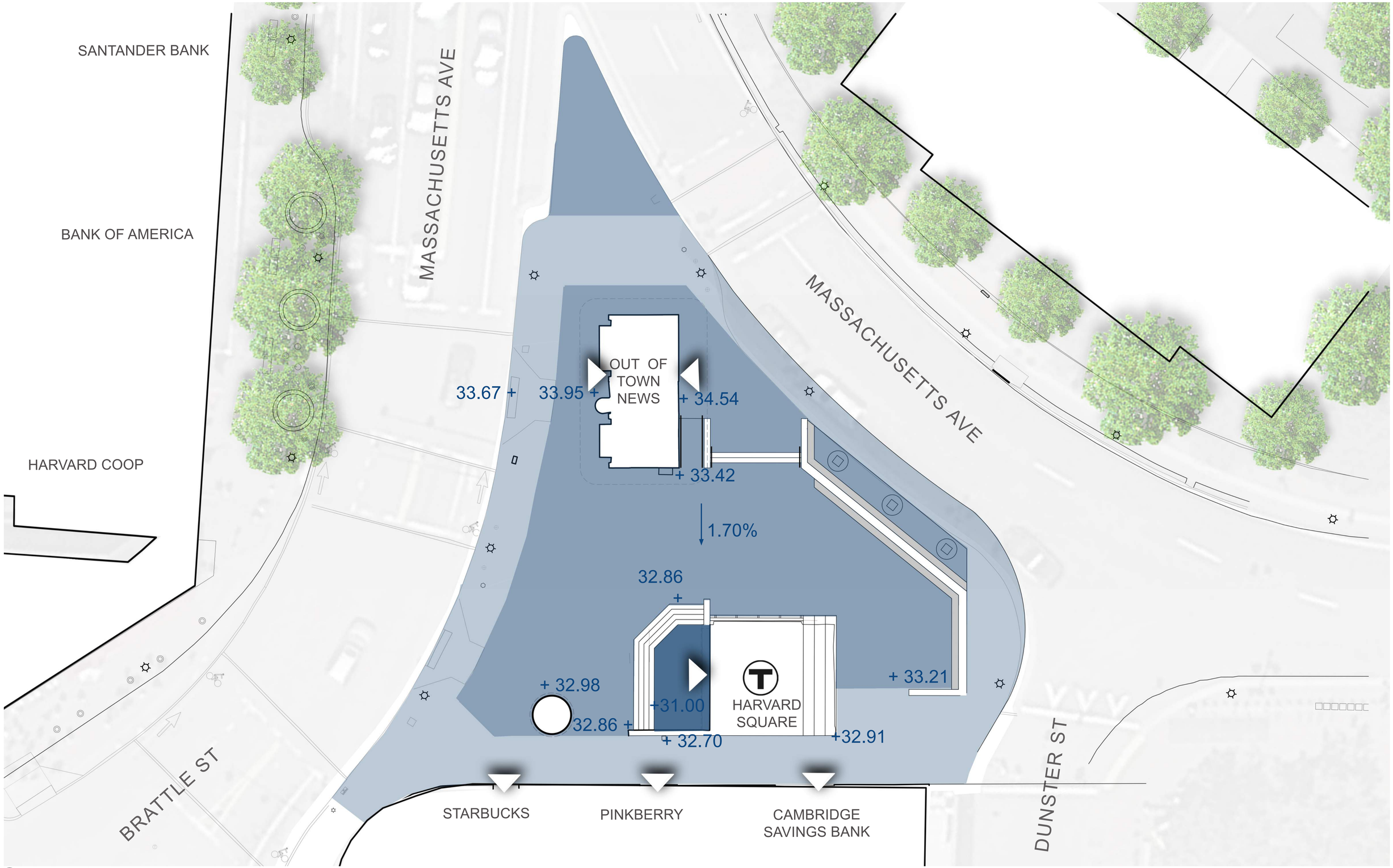


0 10 20 40 SCALE: 1" = 10' - 0"

PROPOSED ELEVATION DIAGRAM - OOTN 6" LOWER

HARVARD SQUARE - CAMBRIDGE, MASSACHUSETTS
AUGUST 01, 2016

HALVORSON DESIGN PARTNERSHIP

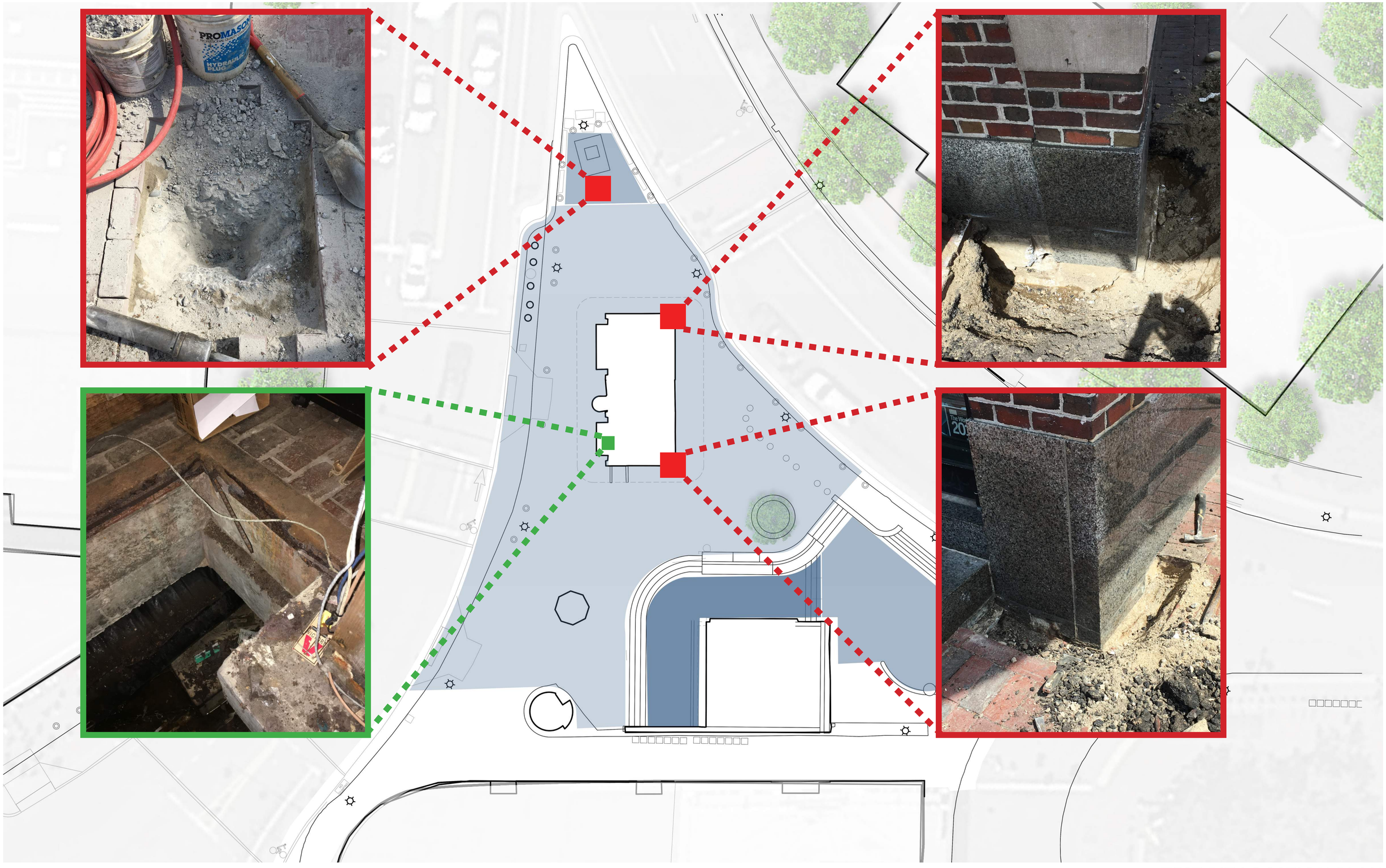


0 10 20 40 SCALE: 1" = 10' - 0"

PROPOSED ELEVATION DIAGRAM - OOTN AT EXISTING GRADE

HARVARD SQUARE - CAMBRIDGE, MASSACHUSETTS
AUGUST 01, 2016

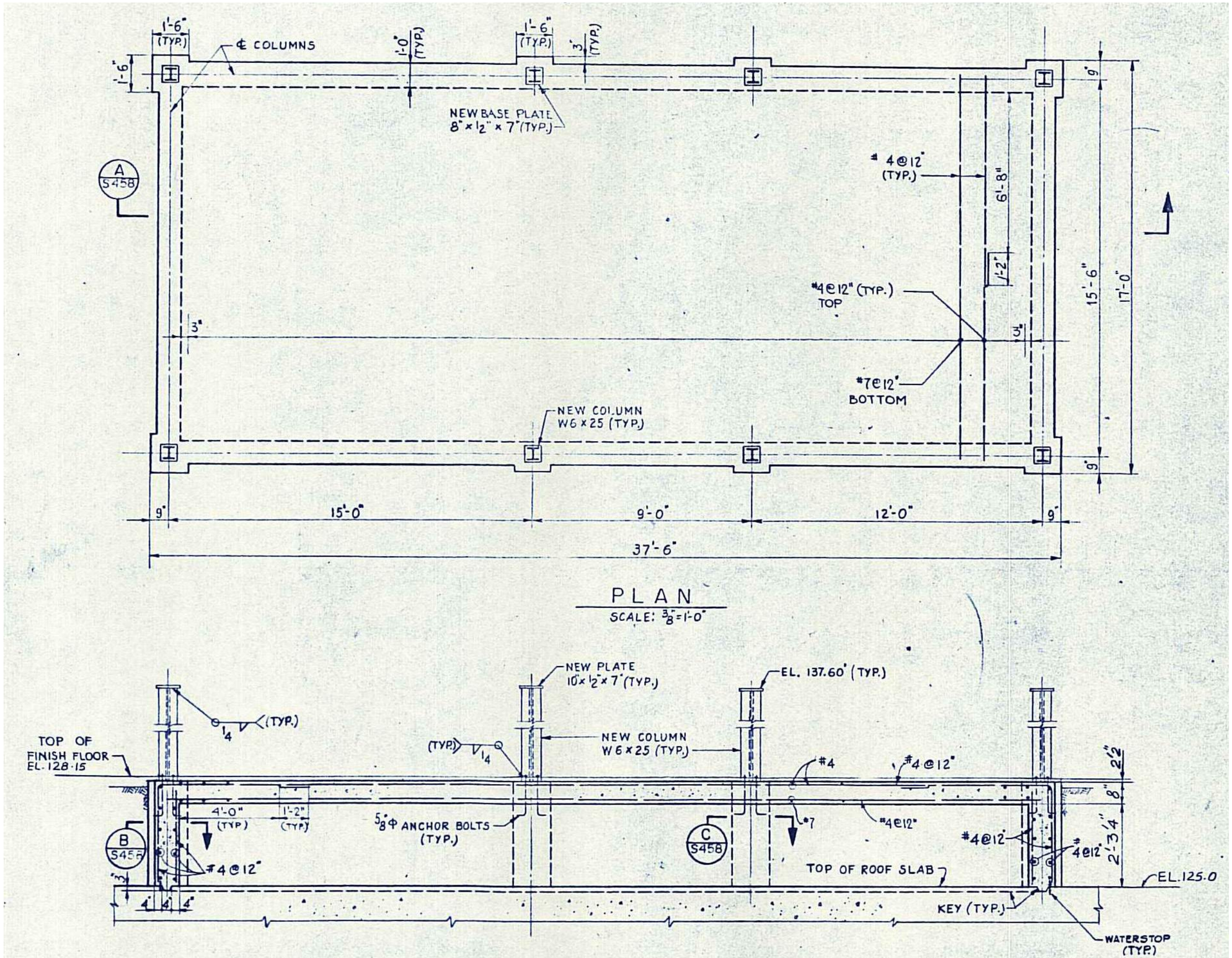
HALVORSON DESIGN PARTNERSHIP



TEST PIT LOCATION PLAN

HARVARD SQUARE - CAMBRIDGE, MASSACHUSETTS
AUGUST 01, 2016

HALVORSON DESIGN PARTNERSHIP



TEST PIT LOCATION PLAN

GPR INVESTIGATION
OUT OF TOWN NEWS STAND
CAMBRIDGE, MASSACHUSETTS

October 25th, 2016
File 2016059

Prepared for:
HDR Engineering Consultants
695 Atlantic Avenue
Boston, MA 02111

EDWOSB CERTIFICATION AWARD
U.S. Women's Chamber of Commerce
EDWOSB Federal
Certified Economically Disadvantaged Women-Owned Small Business

1.0 INTRODUCTION

This report details the results of a geophysical survey conducted by Hager GeoScience, Inc. (HGI) for HDR Engineering Consultants (HDR) at the Out of Town News (OOTN) Stand in Cambridge, Massachusetts.

The objectives of the survey were to determine the

- Boundary between the concrete fill and concrete structural slab inside the OOTN building,
- Limits of the structural slab and obstructions around the exterior of the building, and
- Extent of a known slab at the northern point of the kiosk, or to identify it as part of existing infrastructure.

Additional areas near the building and around the stairs to the MBTA station were also surveyed to determine conditions/potential problems between the surface and the MBTA station roof, reportedly 3 to 3.5 feet below grade.

2.0 DATA ACQUISITION

HGI personnel performed the fieldwork during the night of Tuesday, October 4th, 2016. Grids were laid out over the survey area using paint, chalk, open reel fiberglass tapes, and T-squares. Travis Lucia of HDR met the crew on its arrival at the site and delineated the extent of the survey area. The crew collected geophysical data in all accessible portions of the survey area using ground penetrating radar (GPR), supplemented by precision utility locating (PUL). Grid locations were surveyed using HGI's Sokkia RTK GNSS GRX2 GPS system. Plates 1 and 2, AutoCAD Map 3D 2016 plots created from the HGI data, GPS, field notes and the base map "188201-1.dwg" supplied by HDR, present an overview of both the interior and exterior survey areas. Magenta lines define the survey extent.

Discussions specific to the GPR and PUL data collection are provided below, while Appendix A contains more general discussions of the methods and their limitations.

2.1 GPR Survey

HGI used a GSSI SIR-4000 digital acquisition system with 900- and 350-MHz antennas to collect GPR data along orthogonal traverses spaced 1 foot apart inside the OOTN building and 5 feet apart outside the building. The data were displayed in real time on the system's color monitor for initial quality control while being simultaneously recorded on its flash drive. Data from the GPR survey were subsequently downloaded to a PC at the HGI office for processing and analysis using GSSI's RADAN® 7 software.

The signal-to-noise ratio of the GPR data allowed for a signal penetration up to 5 to 6 feet below grade. Table 1 below shows the pertinent parameters used for the GPR data collection.

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Table 1. GPR Survey Acquisition Parameters

Antenna Frequency (MHz)	Range (ns)	Survey Mode	Scan Rate (per sec)	Scan Rate (per ft)	Sample Rate (per scan)	Effective Signal Depth (ft)
900	30	Wheel	100	60	512	2-3
350	70	Wheel	100	60	512	5-6

2.2 Precision Utility Locating

A Ditch Witch Subsite 950 R/T and 3M Dynatel 2250 precision utility locator (PUL) were used in conjunction with the GPR method to provide real-time utility locating. The PUL locating did not provide additional utility information to that from the GPR survey.

2.3 GPS

HGI used its Sokkia RTK GNSS GRX2 GPS system to locate the survey grids and select surface features for reference. The Sokkia system provided a relative accuracy of less than 0.164 feet horizontally and 0.328 feet vertically for points in the Massachusetts State plane coordinate system (MA83F).

3.0 DATA REDUCTION AND ANALYSIS

3.1 GPR

The downloaded GPR data were archived, processed, and analyzed using GSSI's RADAN® 7. Prior to analysis, the raw GPR data required processing to reduce the detrimental effects of site-specific noise associated with interfering background frequency signals and reflections from surface and subsurface structures. The processed records were then used to construct 3D models of the surveyed areas. 3D models are useful for viewing the spatial qualities of the data and identifying subtle spatial features that may not be apparent in individual 2D records. The 3D model was sliced horizontally and vertically to observe patterns of GPR anomalies present in the radar data.

Each 2D record was also individually evaluated for possible anomalies. Preliminary interpretations based on analysis of the individual 2D records were plotted and evaluated in a spatial context using the 3D model. Conversely, spatial anomalies observed in the 3D model were re-examined on the individual records to ensure that all possible anomalies were evaluated. The interpreted individual GPR targets were then exported to AutoCAD, where linear trends and areal anomalies were determined.

Due to the non-uniqueness of the reflected GPR signal, the exact identity of features causing

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anomalies cannot always be determined, and further investigation through excavation or drilling is recommended.

4.0 RESULTS

Plate 1 shows the results of HGI's geophysical survey for the interior survey at the OOTN Stand. The grid origin is approximately 6 inches off the north and west baseboards and extends throughout the store interior. The plate shows several linear anomalies that were detected by the GPR survey.

HDR's ground-truthing of the structural concrete slab showed the concrete fill layer above it to be approximately 11 inches thick, with a surface brick layer 2 to 3 inches thick. HGI's GPR data indicated that the concrete fill layer is approximately 0.8 to 0.9 feet thick through the majority of the survey area, with the top of the structural slab at a depth of approximately 1.0 to 1.1 feet. The thickness of the structural slab is 0.8 to 0.9 feet. Plate 1 shows a generalized cross section from the ground surface to the bottom of the structural slab.

Plates 2 and 3 are overlaid on HDR's AutoCAD files "188201-1.dwg" and "_Sta Limits_Sections_Surface_GPR.dwg," respectively. Plate 2 presents the results of the exterior survey in the kiosk area, showing linear anomalies that may be caused by utilities, anomalies caused by changes in the GPR signal, and the extent of the concrete slab previously identified by HDR in the northern triangular section. The anomalous zone adjacent to the southern wall of the building may be caused by reflections from an extended structural building slab, but it also contains other potential obstructions. Anomalous zones in the rest of the survey area may contain utilities or obstructions.

Plate 3 shows the results of HGI's survey to determine the depth to the top of the tunnel roof. The GPR data show that the top of the roof is generally 3.5 to 4 feet below grade at the locations where it could be mapped. The plate contains a dashed line showing the inferred trend of the tunnel alignment. However, the multiple subsurface structures in the survey area make it difficult to produce a complete alignment map.

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APPENDIX A: THE GEOPHYSICAL METHODS

A.1 Ground Penetrating Radar

A.1.1 Description of the Method. The principle of ground penetrating radar (GPR) is the same as that used by police radar, except that GPR transmits electromagnetic energy into the ground. The energy is reflected back to the surface from interfaces between materials with contrasting electrical (dielectric and conductivity) and physical properties. The greater the contrast between two materials in the subsurface, the stronger the reflection observed on the GPR record. The depth of GPR signal penetration depends on the properties of the subsurface materials and the frequency of the antenna used to collect radar data. The lower the antenna frequency, the greater the signal penetration, but the lower the signal resolution.

GPR data were collected using a Geophysical Survey Systems (GSSI) SIR 20/2000/3000/4000 ground penetrating radar system. GPR data are digitally recorded on the internal hard drive or flash memory of the system. System controls allow the GPR operator to filter out noise, attributed to both coupling noise, caused by conductive soil conditions, spurious noise caused by local EMF fields and internal system noise. For shallow surveys, we use antennas with center frequencies ranging from 2000 to 350 megahertz (MHz). For deeper penetration, we use lower frequency antennas ranging from 350 to 15 MHz, depending on the anticipated depth of the target(s) and the degree of signal penetration. All of these antenna configurations can collect data in continuous mode or as discrete point measurements using signal-stacking techniques. Since there is a tradeoff between signal penetration and resolution, the highest frequency antenna that produces the best quality data is used. In some cases, data are collected with several antenna frequencies.

A.1.2 Data Analysis and Interpretation. The horizontal scale of the GPR record shows distance along the survey traverse. In the continuous data collection mode, the horizontal scale on each GPR record is determined by the antenna speed along the surface. When a survey wheel is used, the GPR system records data with a fixed number of traces per unit distance. The GPR record is automatically marked at specified distance intervals along the survey line. The vertical scale of the radar record is determined by the velocity of the transmitted signal and the recording time window or range. The recording time interval, or range, represents the maximum two-way travel time in which data are recorded. The conversion of two-way travel time to depth depends on the propagation velocity of the GPR signal, which is site specific. When little or no information is available about the makeup of subsurface materials, we estimate propagation velocities from handbook values and experience at similar sites or by CDP velocity surveys with a bi-static antenna.

After completion of data collection, the GPR data are transferred to a PC for review and processing using RADAN® 7 software. When appropriate, we prepare 3D models of GPR data, which can be sliced in the X, Y, and Z directions.

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The size, shape, and amplitude of GPR reflections are used to interpret GPR data. Objects such as metallic UST's and utilities produce reflections with high amplitude and distinctive hyperbolic shapes. Clay, concrete pipes, boulders and other in-situ features may produce radar signatures of similar shape but lower amplitude. The boundaries between saturated and unsaturated materials such as sand and clay, bedrock and overburden generally also produce strong reflections.

A.1.3 Limitations of the Method. GPR signal penetration is site-specific. It is determined by the dielectric properties of local soil and fill materials. GPR signals propagate well in resistive materials such as sand and gravel; however, soils containing clay, ash- or cinder-laden fill or fill saturated with brackish or otherwise electrically conductive groundwater cause GPR signal attenuation and loss of target resolution. Concrete containing rebar or wire mesh also inhibits signal penetration.

The interpreted depths of objects detected using GPR are based on on-site calibration, handbook values, and/or estimated GPR signal propagation velocities from similar sites. GPR velocities and depth estimates may vary if the medium under investigation or soil water content is not uniform throughout the site.

Utilities are interpreted on the basis of reflections of similar size and depth that exhibit a linear trend; however, GPR cannot unambiguously determine that all such reflectors are related. Fiberglass USTs or utilities composed of plastic or clay may be difficult to detect if situated in soils with similar electromagnetic properties, or if situated in fill with other reflecting targets that generate "clutter" or signal scattering and thus obscure other deeper reflectors. Objects buried beneath reinforced concrete pads or slabs may also be difficult, but possible, to detect.

Changes in the speed at which the GPR antenna is moved along the surface causes slight variations in the horizontal scale of the recorded traverse. Distance interpolation may be performed to minimize the error in interpreted object positions. The variation in the horizontal scale of the GPR record may be controlled, to a certain extent, with a distance encoder or survey wheel. The GPR antenna produces a cone-shaped signal pattern that emanates approximately 45 degrees from horizontal front and back of the antenna. Therefore, buried objects may be detected before the antenna is located directly over them. GPR anomalies may appear larger than actual target dimensions.

GPR interpretation is more subjective than that for other geophysical methods. The interpretive method is based on the identification of reflection patterns that do not uniquely identify a subsurface target. Borings, test pits, site utility plans and other ground-truth are recommended to verify the GPR interpretations.

A.2 Precision Utility Locating (PUL)

A.2.1 Description of the Method. HGI uses a Schonstedt MAC-51B, Ditch Witch SUBSITE 950 R/T precision utility locators, and/or a 3M Dynatel 2250 pipe and cable locator for utility location. The locator is a two-part system consisting of a signal transmitter and receiver. In

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active mode using the transmitter, utilities are traced by inducing a variety of signals onto exposed portions of conduits and piping. Alternatively, in the absence of convenient exposures, signals can be induced onto the lines by placing the transmitter on the ground above the suspected utility location. The receiver can also be used without the transmitter as a magnetic locator or to detect signal emissions (e.g., 60 Hertz for electric lines) at specific frequencies.

A.2.2 Limitations of the Method. Mapping subsurface objects, pipes, and utilities using a locator depends on recognizing physical phenomena at the ground surface. These phenomena can be electromagnetic waves or magnetic fields that are interpreted as being caused by subsurface objects. These waves or fields, however, can be attenuated and/or distorted by factors including soil moisture, steel reinforced concrete, and proximity to other surface and subsurface utilities. It has been found that vertical depth resolution beyond 5 feet below grade is questionable.

A.3 RTK GNSS Global Positioning System (GPS)

A.3.1 Description of the Method. The RTK GPS system consists of a base (reference) receiver and a roving receiver. The base receiver remains stationary during a survey and is mounted on a tribrach and tripod. A rover receiver is used to record points remotely and can be mounted on a staff, vehicle, or other object. The base provides real-time corrections to the rover over a radio connection. The system can produce accuracy on a centimeter scale, but the level of accuracy depends on factors that include the geometry of the transmitting satellites and the receivers' view of the horizons. (e.g., the density of buildings and trees). The data can be collected as quickly as 5 Hz or 5 readings per second.

A.3.2 Data Collection and Processing. We perform our GPS surveys using a Sokkia RTK GNSS GRX2. The base station can be set up over a known or unknown point, with the position taken from satellite information. Once the system has achieved a fixed solution for the rover receiver, data points can be collected with survey-grade (centimeter-scale) precision. When GPS points are being collected at a site where the fixed solution is constantly lost and gained, points are checked multiple times for precision. All data points are saved to a Carlson Surveyor 2 field computer.

The GPS data are corrected automatically by the base receiver in the field prior to being recorded. If the base station is located on an unknown point that is later defined, the GPS data can be corrected in the office to fit the real world coordinates.

A.3.3 Limitations of the Method. The quality of the GPS signal is site-specific. The base and rover receiver need to have clear views of the horizon and good satellite geometry to achieve the highest level of accuracy and precision. Although a fixed solution can be achieved in wooded environments or sites with taller buildings, it may take more time to achieve the solutions, the fixed solution may be lost frequently when moving the rover, and in some cases the fixed solution may be wrong. Each of these situations requires longer to locate data points accurately and precisely. When the point is too close to a building, beneath a building overhang, under a

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tree, or obscured by some other object, a fixed solution may not be possible.

When the base station is set up over an unknown point, the survey data location can be at least several tens of meters from the real world location. The data points will have survey grade precision relative to the location of the base station and other data points, but will have a real world accuracy discrepancy.

HGI does not guarantee to produce a surveyor-quality map from its GPS data, as this is not its profession. If survey-level accuracy is critical for a project, we recommend hiring professional surveyors for that purpose.

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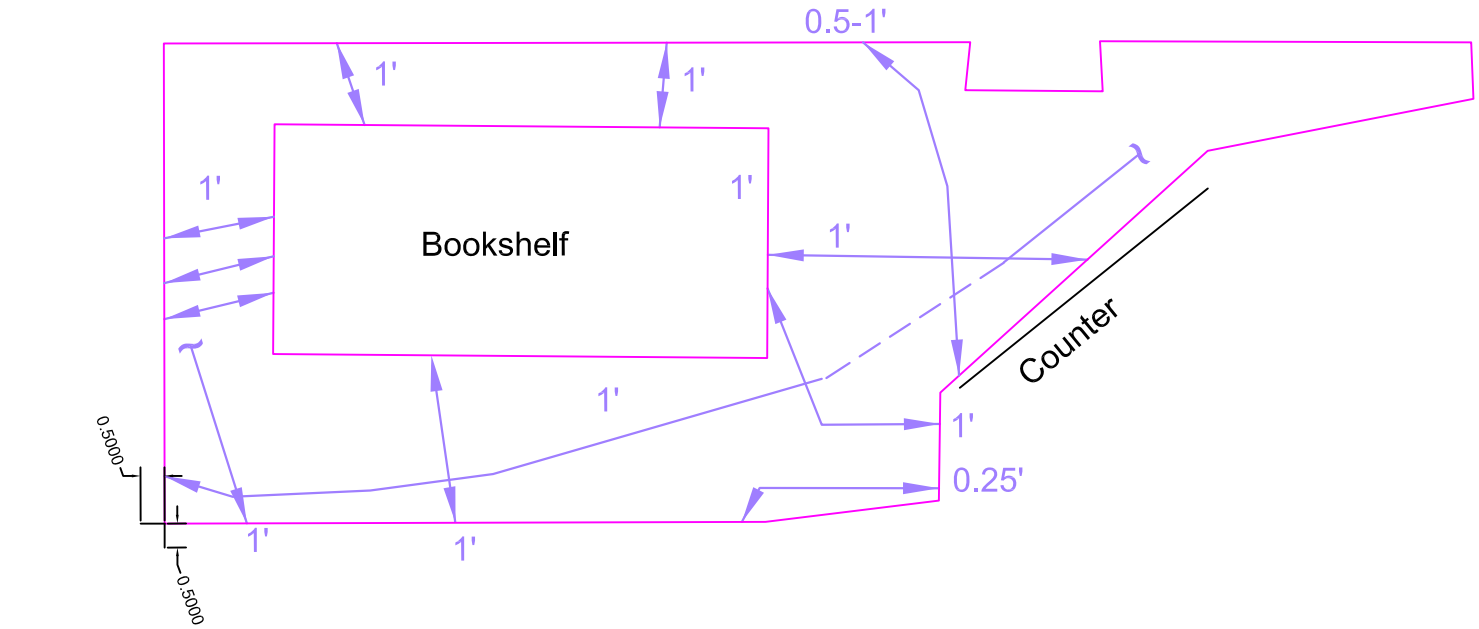
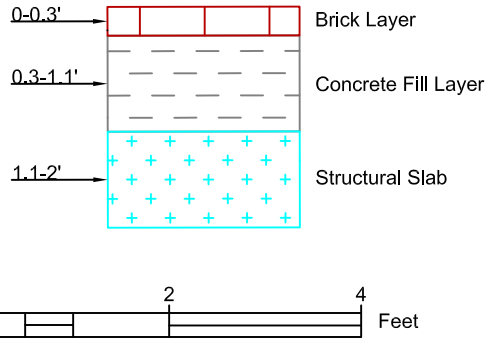


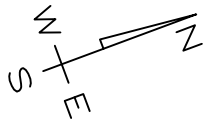
Distance off the wall

Generalized Cross-Section



Legend

- Survey Extent
- GPR-Identified Linear Anomaly
- GPR-Identified Brick Layer
- GPR-Identified Concrete Fill Layer
- GPR-Identified Structural Slab
- HGI-Identified Surface Feature



NOTES:

1.) The base map was created from HGI field notes, grid marks, and GPR results.
2.) The "~" symbol indicates the termination of a utility or the inability of the geophysical tool to resolve that utility.
3.) An arrow ending a feature indicates the possible continuation of that feature beyond the surveyed limits.
4.) Dashed GPR-identified utilities indicate lower confidence in the interpretation of the feature.
5.) Values associated with GPR-identified features are depths in feet; these are based on GPR two way travel time velocity conversions and are approximate.

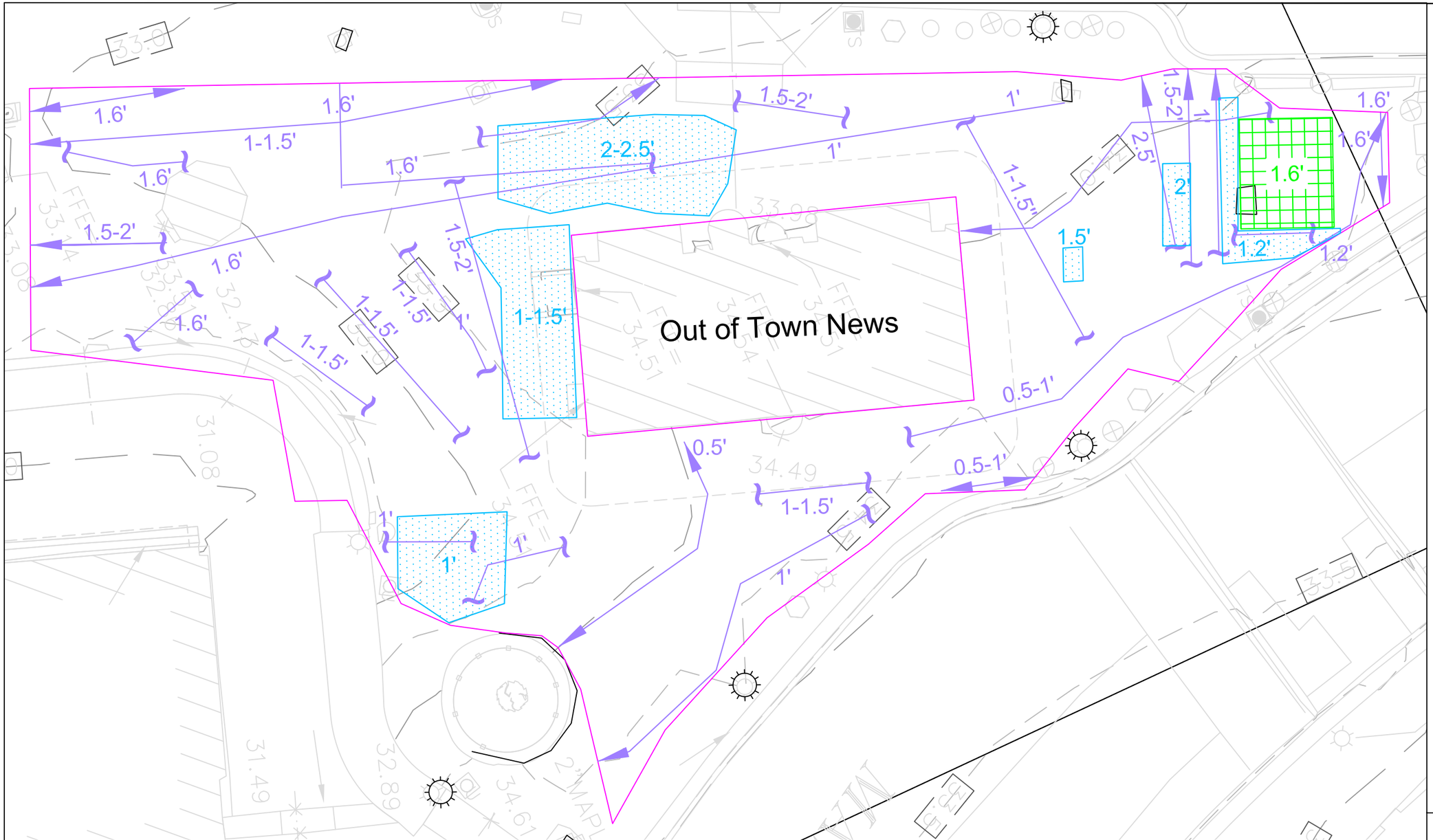
Plate 1

October 21, 2016 | File 2016059

GPR Interpretation Plot
Interior of OOTN Kiosk
Cambridge, MA

Hager GeoScience, Inc.
596 Main Street, Woburn, MA 01801
(781) 935-8111 hgi@hagergeoscience.com

NOT ALL SUBSURFACE FEATURES MAY BE DEPICTED ON THIS MAP



Legend

- Survey Extent
- GPR-Identified Concrete Slab
- GPR-Identified Anomalous Zone
- GPR-Identified Linear Anomaly
- HGI-Located Surface Feature
- HGI-Located Lamp Post

N

0 10 20 Feet

Plate 2

October 21, 2016 | File 2016059

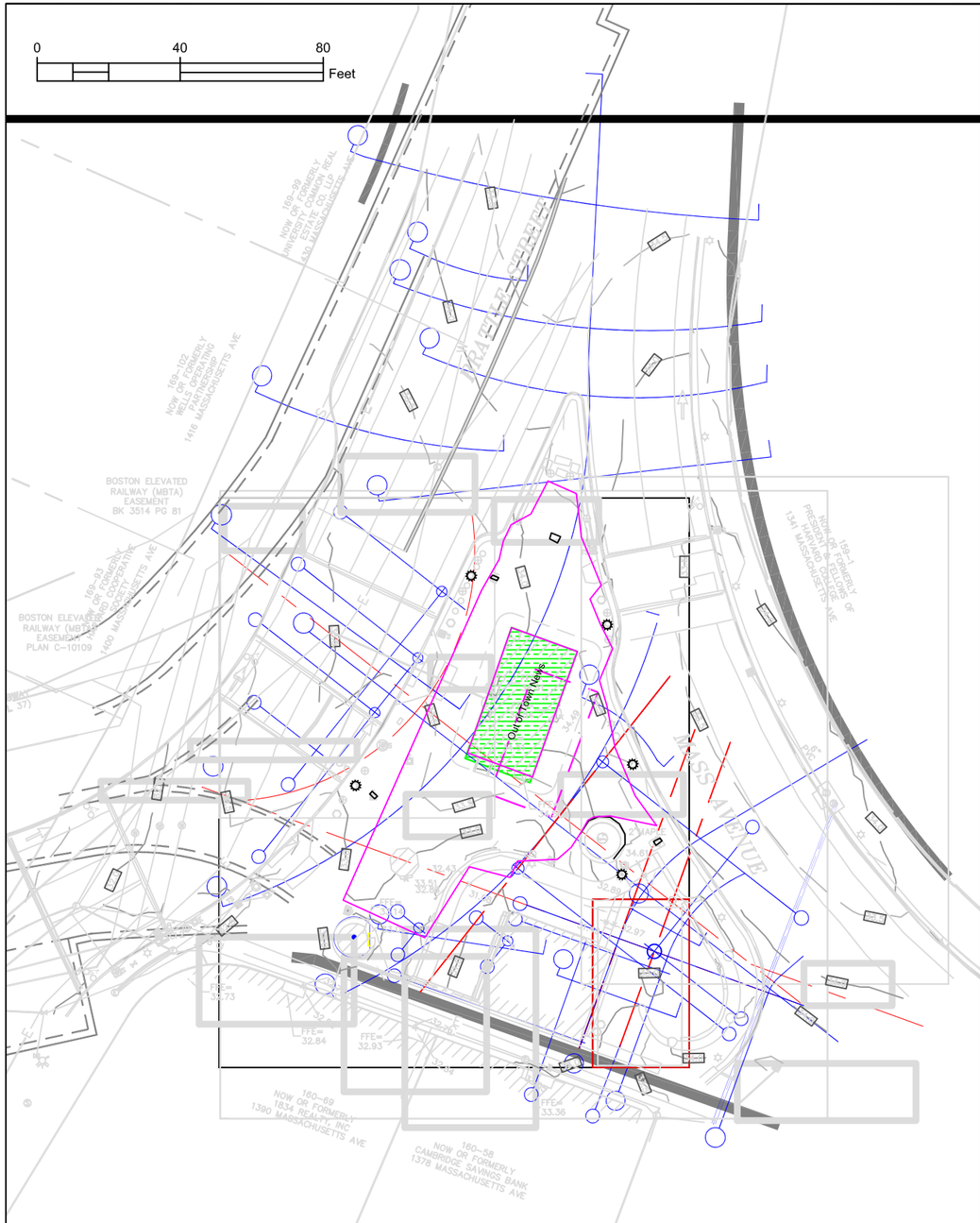
GPR Interpretation Plot
Exterior of OOTN Kiosk
Cambridge, MA

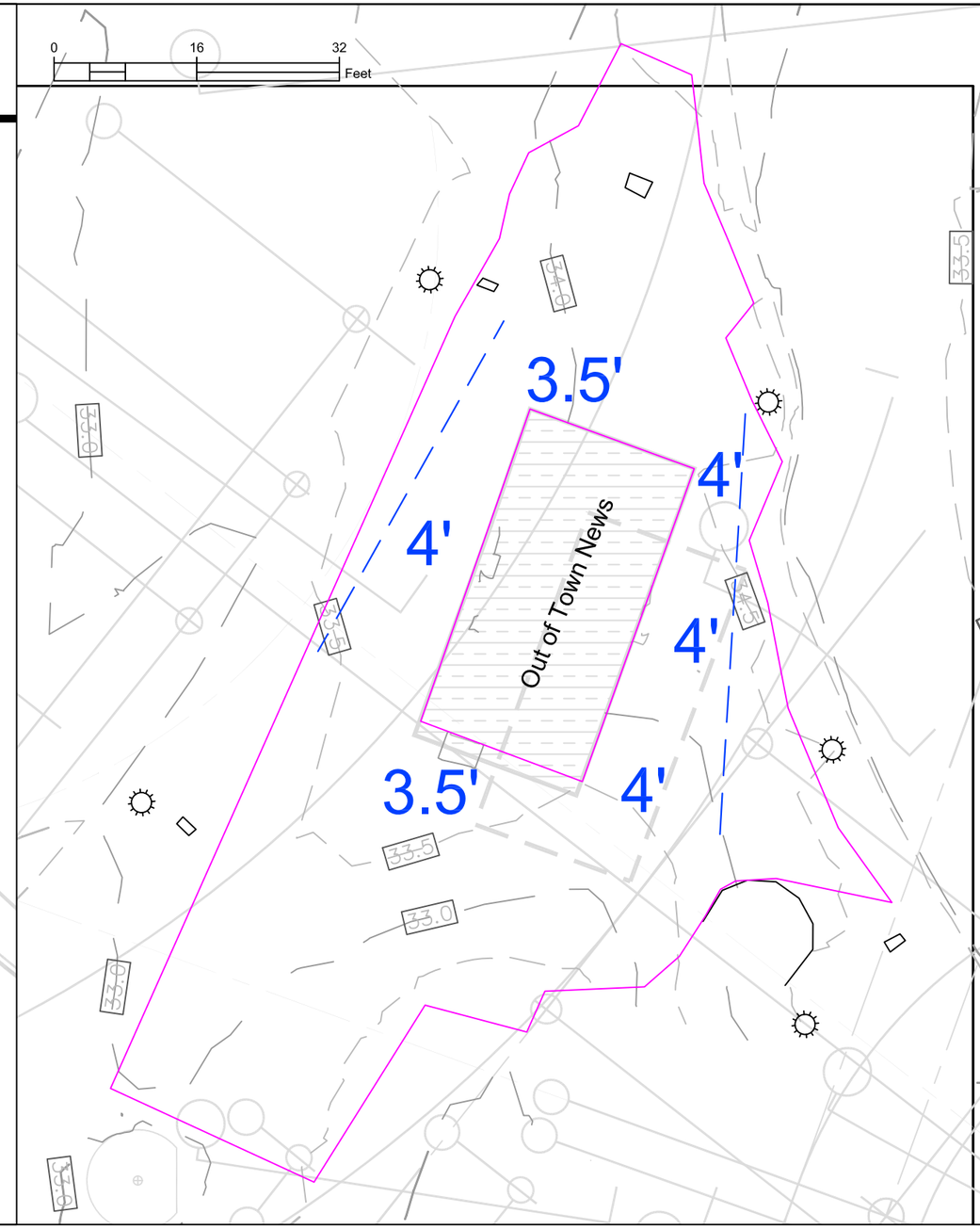
Hager GeoScience, Inc.
596 Main Street, Woburn, MA 01801
(781) 935-8111 hgi@hagergeoscience.com

NOT ALL SUBSURFACE FEATURES MAY BE DEPICTED ON THIS MAP

NOTES:

1.) The base map was created from HGI field notes, grid marks, PUL and GPR interpretations, and the file "188201-1.dwg" provided by HDR.
2.) HGI's contributions to the base map are listed in the legend. All other features are from the file listed above and have been grayed.
3.) The locations of utilities and obstructions presented by HGI are a **"best fit"** to the base map and should be considered approximate. Reference to HGI-located features is recommended.
4.) The "~" symbol indicates the termination of a utility or the inability of the geophysical tool to resolve that utility.
5.) An arrow ending a feature indicates the possible continuation of that feature beyond the surveyed limits.
6.) Dashed GPR-identified utilities indicate lower confidence in the interpretation of the feature.
7.) Values listed with GPR-identified features are depths in feet; depths of GPR-identified features are based on GPR two way travel time velocity conversions and are approximate.
8.) GPR-identified utilities are categorized based on their proximity to PUL markings and/or surface features (e.g., manholes, catch basins, hydrants, etc.).
9.) The "GPR-Identified - Anomalous Zone" category represents anomalies or anomalous areas with geometry and/or signal strength that stands out from the background GPR signal. The e areas may contain multiple individual anomalies that can have causes ranging from changes in the soil/fill to buried debris.
10.) GPR anomalous zone shapes may vary from those depicted in the legend. The shape of each anomaly reflects the general outline that best fits it and may not actually reflect the shape of the potential subsurface obstruction.
11.) Utility information presented on the base map not identified by HGI should be considered as present during any drilling or excavation activities.
12.) HGI recommends a minimum buffer of 2 to 3 feet on either side of utility centerlines and around anomaly extents as indicated on the map due to utility dimensions and inaccuracies from grid creation, data collection, and survey locating. We recommend a larger buffer for electric lines, and further that they be turned off prior to excavating. In addition, it should be assumed that utilities that appear to terminate prior to crossing any excavation may actually continue, but could not be traced farther. Drilling and/or excavating should proceed with caution.





Legend

- Survey Extent
- 3.5-4' GPR-Identified Tunnel Roof Depth
- GPR-Identified Tunnel Trend
- HGI-Located Surface Feature
- HGI-Located Lamp Post

N
W E
S

NOTES:
1.) The left section of the base map was created from the HGI survey extent and the files "188201-1.dwg" and "_Sta Limits_Sections_Surface_GPR" provided by HDR; the right side was created from the HGI field notes, grid marks, interpretation, and the file "_Sta Limits_Sections_Surface_GPR" provided by HDR.
2.) HGI's contributions to the base map are listed in the legend. All other features are from the files listed above and have been grayed.
3.) The locations of utilities and obstructions presented by HGI are a **"best fit"** to the base map and should be considered approximate. Reference to HGI-located features is recommended.
4.) Values listed with GPR-identified features are depths in feet; they are based on GPR two way travel time velocity conversions and are approximate.
5.) Utility information presented on the base map not identified by HGI should be considered as present during any drilling or excavation activities.

Plate 3

October 21, 2016 | File 2016059

GPR Interpretation for
Depth of Tunnel Roof
OOTN Kiosk
Cambridge, MA

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(781) 935-8111 hgi@hagergeoscience.com

NOT ALL SUBSURFACE FEATURES
MAY BE DEPICTED ON THIS MAP

FULMER ASSOCIATES
Building Exterior Consultants, LLC

FOENSIC ROOF SYSTEM EVALUATION
For
The Out of Town News Kiosk
Harvard Square
Cambridge, MA

February 4th, 2016

Prepared for:
TGAS
The Galante Architecture Studio
146 Mt. Auburn St.
Cambridge, MA 02138

Prepared by:
Robert Fulmer, Principal
Fulmer Associates LLC
184 Vista View Rd.
North Conway, NH 03860

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PART 1: PROJECT SUMMARY

1.0.0 General

The Out of Town News Kiosk building is located at Zero Harvard Square in Cambridge MA. Formerly known as the Harvard Square Subway Kiosk, the structure was built in 1928 and served as the "headhouse" for the Harvard Square subway station. The architect of record for the distinctive structure was the Boston Elevated Railway. The Kiosk was dismantled and stored off-site during the subway renovation project of 1978 (see photo log pg.12).
The structure was re-erected near its original Harvard Square location and subsequently added to the National Register of Historic Places. In 1984 the former subway kiosk was occupied by its current tenant, the "Out of Town News". The building is currently owned by the City of Cambridge.

The Galante Architecture Studio Inc. (herein referred to as TGAS) has requested that Fulmer Associates LLC conduct a forensic evaluation of the current roof system of the Out of Town Kiosk.
The intent and purpose of the evaluation, is to determine the existing condition and remaining service life of the roof system components and identify any areas of water infiltration. The data collected during the forensic evaluation shall serve as the basis for the "summary of conditions" report.

PART 2: PROJECT TEAM

2.0.0 Inspection and Design Development Phases

a. Mr. Yar Laasko:
Project Manager and point of contact for TGAS.

b. Fulmer Associates LLC:
Robert Fulmer, Principal: Inspection and report author.

PART 3: ROOF SYSTEM INSPECTION

3.0.0 Inspection Scope and Intent:

a. General:
Robert Fulmer, Principal of Fulmer Associates LLC conducted a forensic inspection and evaluation of the roof system and associated components of the Out of Town News Kiosk, on Thursday February 4th, 2016.
The intent of the forensic inspection was to document and evaluate the existing condition(s) of the following principal roof system assemblies:

- Low-Slope Roof System: Flat seam copper roof assembly.
- Steep-Slope Roof System: Standing seam copper roof assembly.
- Copper flashing details.
- Roof drainage system.
- Decorative copper cornice assembly.

b. Inspection Access and Equipment:
Exterior roof access was facilitated by ladder. The access method and inspection equipment were provided by Fulmer Associates LLC.
Existing systems conditions were measured, noted and documented with digital photographs by Robert Fulmer.

c. Document Review:
Prior to the roof inspection, TGAS provided Fulmer Associates LLC with the following 1978 project drawing sheets produced by the “Massachusetts Bay Transportation Authority” and labeled “Harvard Square Station”:
1. “Kiosk-Plans & Elevations”, sheet AD-A801.
2. “Kiosk-Sections & Details”, sheet AD-A802.
3. “Kiosk-Details”, sheet AD-A803.

3.0.1 Low-Slope Roofing:
(See photos 5, 8, 9, 10, 11, 18, 19, 20, 27 & 28 for documentation).

a. Existing Conditions:
The existing low-slope roof system is a fully soldered, flat seam copper roof, fabricated from 16 oz natural (red), cold rolled copper panels. This system is shown in the 1978 “Renovation Drawings” described in section 3.0.0, item b of this report. The design conformation of this system includes four “quadrants” * located on each corner of the rectangular building, respectively.

* The “quadrants” are identified as “Area A” on the aforementioned 1978 drawings, sheet AD-A801, 21/A801.

Drainage for each roof quadrant is facilitated by a roof deck with a structural pitch to a single three-inch interior drain, located at the base of each valley in the adjacent standing seam copper roof. Perimeter blocking beneath the copper at the eaves of each flat seam roof quadrant, further mitigates roof run-off to the pedestrian access areas below.
Multiple failed solder seams and several “stress fractures” within the copper panels were observed.
Multiple areas of water infiltration within the flat seam copper system were both observed during the inspection and described by the building tenant.
The flat seam roof assembly is described in the following section.

b. Test Area # 2:
The Test Area for the flat seam copper system was located adjacent to the eave of the Northwest roof quadrant. The forensic inspection revealed the following roof assembly, listed sequentially from the copper roof to the roof deck:

1. 16 oz. copper panels, fully soldered. The “finished” copper panel dimensions are 35” x 14” (TYP).
2. A single layer of 4# rosin paper (slip sheet).
3. A single layer of 30# felt.
4. CDX sheathing.
5. Solid wood roof deck (3”).

At the sheathing level of the Test Area, stained wood and rusted fasteners were observed, indicating a potential moisture presence.

c. Observations:
1. Thermodynamic Movement:
Provisions for thermodynamic movement were not designed or installed within the copper roofing systems (i.e. expansion joints, slip joints etc.).
In addition, the existing flat seam copper panels were fabricated in a confirmation (35” x 14”) that exceeds the industry standards for maximum copper panel size for flat seam copper roofing.
The result of both issues is that approximately 37 failed solder joints were observed throughout the flat seam copper system, in addition to approximately 9 “stress fractures”. This condition is symptomatic of constricted material movement and a lack of expansion provisions within the copper roof systems. In addition, although the existing copper thickness would support some additional service life, the expansion issues cannot be remediated effectively. As the copper continues to age, the oxidization (a.k.a. patinazation) process thins the copper, causing the material to become increasingly susceptible to stress fractures.

2. Water Infiltration:
   Although, two roof drains are current sources of water infiltration, the primary sources are the abovementioned failed solder joints and copper stress fractures.
   The leakage issue is exacerbated when the roof drains become obstructed and the low slope roofs are flooded.

3.0.2 Steep-Slope Roofing:
(See photos 5, 6, 9, 12, 13, 14, 15, 16, 17, 20 & 22 for documentation).

a. Existing Conditions:
The existing steep-slope roof system is a “double lock”, standing seam, natural (red), copper roof, fabricated from cold rolled 16 oz copper panels. The standing seams are located 15” on-center, with height of 1”. This system is shown in the 1978 “Renovation Drawings” described in section 3.0.0, item b of this report.
The design conformation of this system utilizes two cross-axial tunnel vaults* that bisect the roof laterally on both the north / south and east / west planes. Drainage for each roof section is facilitated by four valleys that terminate onto the flat seam copper roof adjacent to a single three-inch interior drain, located at the base of each valley. Multiple failed solder seams in all valleys and several “stress fractures” within the copper standing seam panels were observed. The method of panel attachment utilizes copper clips secured into dimensional wood blocking, beneath each standing seam.
The standing seam roof assembly is described in the following section.

b. Test Area # 1:
The Test Area for the standing seam copper system was located adjacent to the low-slope roof within the Northwest roof quadrant. The forensic inspection revealed the following roof assembly, listed sequentially from the copper roof to the roof deck:

1. 16 oz. copper standing seam panels, with “double lock”, 1” seams, located 15” on-center. (TYP).
2. 1 1/2” wood blocking at each standing seam.
3. A single layer of 4# rosin paper.
4. A single layer of 30# felt.
5. A single layer of 1 1/2” EPS (Expanded Polystyrene) insulation.
6. A single layer of 3 mil plastic sheeting.
7. A single layer of 15# felt.
8. Solid wood deck.

* The cross-axial tunnel vaults are identified as “Area B” on the aforementioned 1978 drawings, sheet AD-A801, 21/A801.

c. Observations:

1. Thermodynamic Movement:
   Provisions for thermodynamic movement were not designed or installed within the copper roofing systems (i.e. expansion joints, slip joints etc.). The result is that approximately 80% of the solder joints within the four valleys have failed. In addition, approximately 5 “stress fractures” were observed within the standing seam panel assembly.
   These conditions are symptomatic of restricted material movement and indicate a lack of expansion provisions within the copper roof systems. In addition, although the existing copper thickness would support some additional service life, the expansion issues cannot be remediated effectively. As the copper continues to age, the oxidization (a.k.a. patinazation) process thins the copper, causing the material to become increasingly susceptible to stress fractures.

2. Water Infiltration:
   Although, test cuts were not made in the copper valleys, the multiple broken solder seams within the valleys are most likely sources of water infiltration.

3. Thermal Assembly:
   In it’s current configuration, the thermal assembly is problematic. The single layer of 1 1/2” EPS (Expanded Polystyrene) insulation with multiple butt joints in the foam board panels, creates thermal bridging conditions within the assembly.

3.0.3 Roof Drainage System:
(See photos 5, 7, 8, 14 & 28 for documentation)

a. Existing Conditions:
Drainage for the roof system is facilitated by roof decks with structural pitch to four, three-inch bronze roof drains with three-inch copper, interior drain leaders. The drains are located at the base of each valley within the copper roof system. The copper leaders are encased (possibly in-filled) within limestone and brick chases that extend from just below the soffit to grade. It is presumed that the leaders terminate into the below grade storm water drainage system.

b. Observations:
On the day of inspection, it was observed that three of the four roof drains were obstructed, causing significant standing water on the corresponding low-slope roof sections. On the East elevation, standing water depth at both drains was in excess of three inches. As described in section 3.0.1, this water accumulation on the low-slope roofs is a current source of water infiltration.

On the day of inspection, the Northeast drain was observed to be leaking below the soffit. The building tenant stated that interior water infiltration occurs at both the Northeast and Southwest roof drains.

3.0.4 Decorative Copper Cornice Assembly:

(See photos 21, 22, 23, 24, 25, 26 & 27 for documentation).

a. Existing Conditions:
A decorative architectural detail covers the cornice of the building on all elevations. The ornate cornice covering was fabricated from lead coated copper and painted. It attaches to the copper roofing at the eave and terminates at the steel soffit framing, where it is attached with ¼" steel rivets. The cornice assembly is shown in the 1978 "Renovation Drawings" described in section 3.0.0, item b of this report. Sheet A802, Note #1 and detail 5.3/802, specifies that the "Existing lead coated copper roof cornice and blocking to be saved, cleaned and reinstalled….."
The cornice is currently covered with multiple layers of dark brown paint.

b. Observations:
While some portions of the decorative cornice detail are in average condition, some points of attachment to steel framing, lap joints and areas of water infiltration are in poor condition. The points of attachment of the copper cornice to the steel framing, show the corrosive effects of a dissimilar metals reaction. There are no indications of an insulating layer between the two materials. While the lead coating and paint layer help to mitigate the reaction between copper and steel, the lower cornice edge is penetrated by multiple ¼" steel rivets. Excessive oxidization of the lead coated copper was observed in areas of water infiltration into the cornice assembly. In addition, a section of cornice has been damaged on the Southwest fascia.

PART 4: SUMMARY of CONDITIONS and RECOMENDATIONS

4.0.0 General:

The conclusions and recommendations contained in this section are based on the observations made and data collected during the forensic roof inspection and evaluated for conformance with applicable code bodies and industry standards.

4.0.1 Low-Slope Roofing:

Based on the results of the forensic inspection, the flat seam copper roof system is found to be in failed condition and should be replaced. The absence of thermodynamic provisions has significantly damaged the copper panels.

As a result of the age of the existing copper, there is insufficient material thickness to adequately clean the copper in order to execute solder repairs.
In addition, areas of water infiltration from the failed low-slope roof system have saturated the wood roof deck and soffit below. Repairs to those assemblies may be executed during roof replacement, as required.

4.0.2 Steep-Slope Roofing:

Based on the results of the forensic inspection, the standing seam copper roof system is found to be in poor condition and should be replaced.
As is the case with the flat seam copper system, the absence of thermodynamic provisions has damaged the copper standing seam panels as well. The age and condition of the copper, precludes the addition of expansion provisions.
The thermal assembly should be redesigned and upgraded during the replacement of the standing seam roof system.

4.0.3 Roof Drainage System:

The existing roof drainage system utilizes four, three inch bronze drains that feed into three inch copper leaders. The exterior leaders are encased within brick and limestone chases. Although three inch components are adequate to drain the system, increasing the component diameters to four inch should be considered in light of the volume of organic debris that has obstructed three of four drains within the existing system. However, the possibility exists that the brick and limestone chases could be in-filled with masonry around the copper leaders. This condition should be confirmed in a subsequent inspection.
In addition, all drains should be inspected with a video borescope from the roof to the storm water system, to verify both condition and proper function of the system.

4.0.4 Decorative Copper Cornice Assembly:

The existing decorative cornice assembly is fabricated from lead coated copper. As the original copper roof of the Kiosk was also lead coated copper, it is possible that the existing decorative cornice may be original to the building.
It is documented that the existing cornice assembly was salvaged, re-conditioned and re-installed as part of the 1978 renovation project.
During the exterior inspection of the cornice, it was determined that the current overall condition of the assembly is Fair.
Further examination should be undertaken by removing representative sections of the cornice assembly to determine its interior and attachment point condition.
This inspection would provide support for a “restore or replicate” design decision.

4.0.5 Conditions Requiring Confirmation:

As a result of the forensic roof inspection, the following conditions should be confirmed or further investigated, to provide support for the design process:

a. Roof Drainage System:
All roof drains should be inspected with a video borescope from the roof to the storm water system, to verify both condition and proper function of the system. In addition, all (four) masonry chases should be inspected for masonry in-fill, which may preclude the increase of the drain and leader sizes.

b. Decorative Copper Cornice Assembly:
An inspection should be undertaken to remove representative sections of the cornice assembly in order to confirm its interior and attachment point condition. This inspection would provide support for a “restore or replicate” design decision. Note: If replication of the cornice is undertaken, a fabricator will require a small cross section of the assembly to facilitate fabrication of the new cornice.

c. Soffit:
A selective forensic inspection of the soffit should be performed, in order to confirm the condition of the wood and fasteners.
Note: The focus of this inspection should be on the areas of potential water infiltration damage.

PART 5: EVALUATION CRITERIA and INDUSTRY STANDARDS

The following industry standards, sources and codes, were utilized as criteria in evaluating systems, conditions and methodologies described in this report.

- Revere Copper Inc. “Copper and Commonsense”, 8th edition
- SMACNA, (Sheet Metal & Air Conditioning Contractor’s National Association)” Architectural Sheet Metal Manual”, 7th edition, 2012.
- NRCA “The NRCA Roofing Manual: Steep-slope Roof Systems” 2013 edition
- ASTM D226 Type II, “Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing”
- ASTM B370, “Cold Rolled Copper (Roofing)”
- ASTM B32-08, “Solder”
- ICC R903.4, “Roof Drainage”
- ICC R905, 4.3.1. Ice Barrier (Metal Roofs)

Prepared and reviewed by:

Robert Fulmer, Principal, Fulmer Associates LLC
02.25.16

- End of Document -

Out of Town News Kiosk

Photo Log

" The Harvard Square Subway Kiosk, stored off-site during the subway renovation project of 1978"

Photo 1
Out of Town News Kiosk, West elevation

Photo 2
Out of Town News Kiosk, East elevation

Photo 3
Out of Town News Kiosk, North elevation

Photo 4
Out of Town News Kiosk, South elevation

Photo 5
West elevation: Roof drains are located at the base of each valley. Three of four drains are obstructed.

Photo 6
Facing South and showing three obstructed drains. Water infiltration is occurring when failed solder joints within the flat seam copper system are flooded.

Photo 7
Detail of 3” bronze roof drain. Drains on the East and West elevations are leaking at the exterior wall, below the soffits.

Photo 8
Southwest roof drain. All copper drain lines should be “scoped” to determine their interior condition.

Photo 9
Failed solder seam at the low-slope/ steep-slope transition.

Photo 10
West elevation eave: Copper stress failure due to restricted thermal dynamic movement.

Photo 11
West elevation: Solder seam failure in the flat seam copper roof.

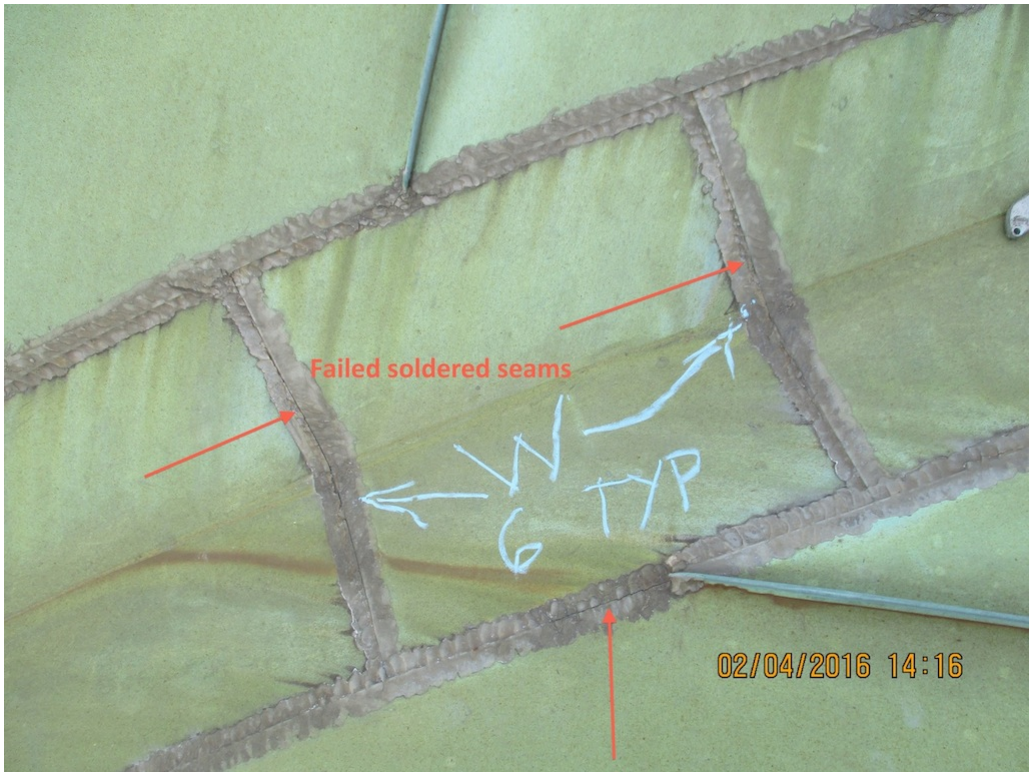

Photo 12
Southwest valley: Multiple solder seam failures (TYP).

Photo 13
North elevation: Copper stress failure at the flat seam/ standing seam transition.

Photo 14
East elevation: Failed solder seam at a water infiltration site.

Photo 15
Northeast valley: Multiple failed solder seams. Note: “oil-canning” due to lack of thermal movement provisions.

Photo 16
West elevation: Site of Test Area #1, standing seam copper.

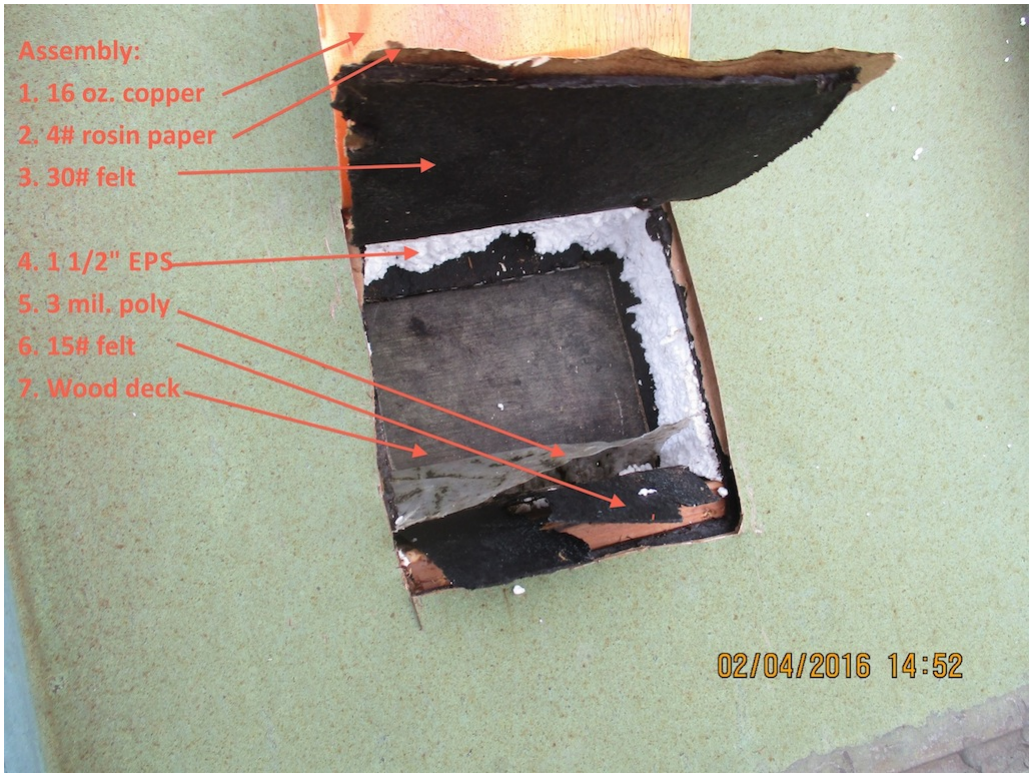

Photo 17
West elevation: Test Area # 1 Assembly.

Photo 18
North elevation: Site of Test Area #21 flat seam copper.

Photo 19
North elevation: Test Area #2 assembly.

Photo 20
Northwest location Test Areas. Note marked locations of failed solder seams.

Photo 21
North elevation: Detail of decorative lead coated copper cornice and steel framing.

Photo 22
North elevation: Detail of transition between the standing seam copper roof and decorative cornice. Note failed solder joint.

Photo 23
North elevation: Detail of decorative cornice attachment to steel framing. Note accelerated oxidization of the lead coated copper cornice and steel rivets due to a lack of dissimilar metals separation.

Photo 24
North elevation: Note decorative cornice deterioration due to water infiltration and a dissimilar metals reaction.

Photo 25
Southwest decorative cornice damage and wood blocking.

Photo 26
West elevation: Decorative cornice detail. Note accelerated oxidization of the lead coating.

Photo 27
Northwest soffit deterioration.

Photo 28
Northwest copper roof drain leader. This detail is source of water infiltration within the masonry chase and was leaking on the day of inspection.

FULMER ASSOCIATES
Building Exterior Consultants, LLC

ADDENDUM # 01

SECOND FORENSIC ROOF SYSTEM EVALUATION
For

The Out of Town News Kiosk

Harvard Square
Cambridge, MA

March 31st, 2016

Prepared for:
TGAS
The Galante Architecture Studio
146 Mt. Auburn St.
Cambridge, MA 02138

Prepared by:
Robert Fulmer, Principal
Fulmer Associates LLC
184 Vista View Rd.
North Conway, NH 03860

ADDENDUM # 01;
TO BE ADDED TO THE O.O.T.N. KIOSK ROOF INSPECTION REPORT ENTITLED "FORENSIC ROOF SYSTEM EVALUATION FOR THE OUT OF TOWN NEWS KIOSK" AND DATED FEBRUARY 4TH, 2016

PART 1: SECOND ROOF SYSTEM INSPECTION

1.0.0 Inspection Scope and Intent:

a. General:
On Thursday March 31st, 2016 Robert Fulmer, Principal of Fulmer Associates LLC conducted a second forensic inspection and evaluation of the roof system and components on the Out of Town News Kiosk. The intent of the second forensic inspection was to evaluate and determine the existing condition(s) of the roof assembly sheathing, soffits and decorative copper cornice.

b. Inspection Access and Equipment:
Exterior roof access was obtained by ladder. The access method and inspection equipment were provided by Fulmer Associates LLC.
The aforementioned system components were measured, noted and documented with digital photographs by Robert Fulmer.

c. Inspection Weather Conditions:
The weather conditions on the day of inspection were noted as clear, with a temperature of 68 degrees Fahrenheit, with winds from the Southwest at 12 – 23 MPH with gusts to 42 MPH.

1.0.1 Roof system sheathing and soffit:
(See photos 1, 2, 7, 8, & 9 for documentation).

a. Test Areas #1 and #2:
Test Areas #1 and #2 were located on the Northwest standing seam copper roof. The test cut for area #1 was located above the existing soffit and revealed the following assembly sequence:

- 16 oz standing seam copper roof panel.
- 4# rosin paper.
- 30# non-perforated, organic asphalt felt.
- A single layer of 1 ½" EPS (expanded polystyrene) insulation.
- 15# non-perforated, organic asphalt felt.
- 3 mil. polyethylene.
- A single layer of 1 ¾" cedar plank sheathing.
-

The test cut for area #2 was located above the interior building space. The roof assembly in area #2 was observed to be identical to the assembly in area #1.

b. Roof sheathing configuration:
The 1978 Kiosk construction documents, sheet AD-A802, Details 4-3 and 5-3 indicate that the roof system sheathing shall be “3” nom. Cedar”.
This inspection revealed that the as-built (existing) roof sheathing is actually a single layer of 1 ¾” cedar planks. The planks are 4” wide and are joined on both lateral “butted” edges by continuous, 1” wood splines (see photo #9). The cedar sheathing planks extend beyond the exterior walls to form the exposed soffit on all elevations. Above the interior space, the exposed underside of the cedar sheathing forms the finished interior ceiling.
The underside of the (exposed) cedar planks show one decorative beaded lateral edge on each plank.

c. Condition observations:
Although the exposed soffit on all elevations displays indications of substantial water infiltration, the cedar soffit and ceiling planks observed in areas available for inspection during this investigation, were found to be in average to good condition, with few indications of significant deterioration. It should be noted however that due to past water infiltration events, the steel support framing for the soffit and cornice assembly show significant oxidization in areas where the cedar is in contact with the steel.

1.0.2 Decorative copper cornice:
(See photos 3, 4, 5, 6 &10 for documentation).

a. Test area #3:
Test area #3 was located on the North elevation cornice and selected to provide access to the interior of the decorative copper cornice assembly to assess the condition of the cornice and it’s structural support system. The existing cornice assembly was salvaged from the building and re-installed as part of the 1978 restoration project.

b. Cornice configuration:
The cornice is custom fabricated in two sections, from 16 oz lead coated copper and formed into a decorative configuration with dentil moulding accents. The cornice is joined and soldered to the copper roof panels along it’s top edge. Continuous cedar and pine blocking provide attachment for the cornice profile, while the lower edge of the copper cornice returns approximately 4 ¾”along the soffit and is riveted to the continuous outer cornice steel support angle, using

steel rivets. The exposed “face” of the copper cornice is covered with multiple layers of paint.

c. Condition observations:

When the cornice assembly was exposed during the test cut in area #3, it was observed that the interior cornice assembly (wood blocking and steel framing) was saturated. It was also observed that the horizontal leg of the outer steel angle frame was significantly oxidized (see photo 5) due to the conditions of water infiltration, exacerbated by a dissimilar metals reaction between the steel and the copper cornice cover. The steel angle frame in this location has lost approximately 75% of its material thickness due to oxidization. No insulating materials were observed between the copper and steel frame. While the lead coating on the copper and paint layers help to mitigate the reaction between the copper and steel components, multiple steel rivets penetrate the lower copper cornice covering.

Heavy oxidization of the steel framing was observed adjacent to the test area and sporadically throughout the other elevations.

The steel angle cornice frame in the Northeast quadrant requires replacement.

While some portions of the decorative copper cornice covering were found to be in average condition, a number of points of attachment to steel framing, lap joints and areas of water infiltration are found to be in poor to failed condition. Moderate to heavy oxidization of the lead coated copper was observed in areas of water infiltration and on the interior side of the cornice assembly in the test area. In addition, a section of cornice has received mechanical damage on the Southwest fascia.

Existing conditions indicate little remaining service life for the copper cornice covering. It is therefore recommended that the existing cornice be replicated and replaced during the upcoming restoration project.

Prepared and reviewed by:

Robert L. Fulmer

Robert Fulmer, Principal, Fulmer Associates LLC
03.31.16

- End of Document -

Photo 1

"Test Areas # 1 and #2, Northwest elevation. T.A. #1 is located above the soffit, while T.A. #2 is located above the interior ceiling.

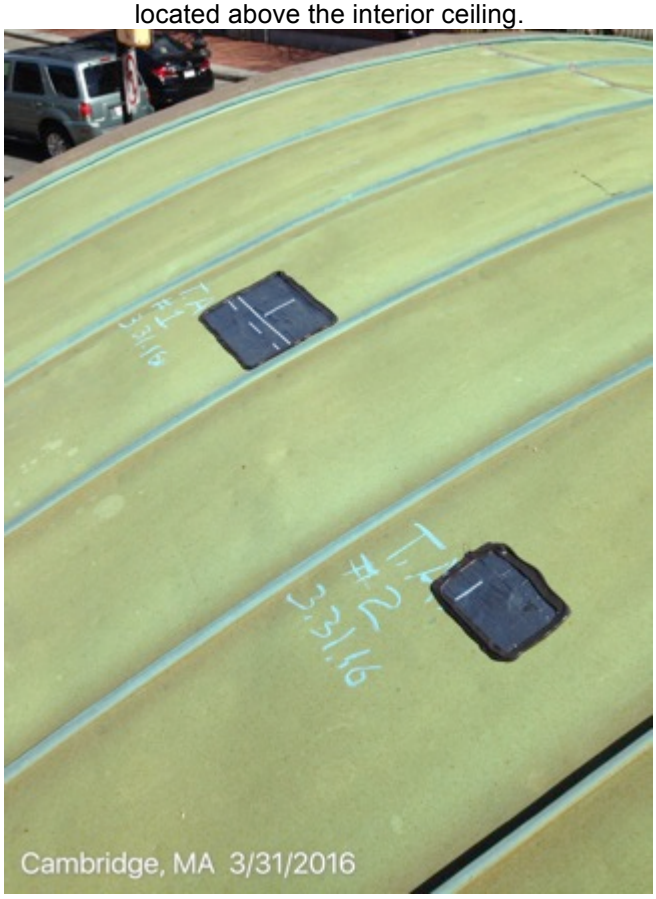

Photo 2

Test area #1 and # 2 after waterproof repairs. Sheathing was observed to be 1 ¾" x 4" cedar planks.

Photo 3
Cornice test area on the Northwest elevation.

Photo 4
Cornice test cut. Note cedar support blocking and significant oxidization of copper cornice.

Photo 5
Cornice attachment point. Note substantial oxidization of the horizontal leg of the steel cornice angle. The steel has lost 75% of it's thickness in this location.

Photo 6
Significant oxidization due to a dissimilar metals reaction and water infiltration.

Photo 7
Soffit at the Northeast elevation. Although evidence of water infiltration exists, the cedar soffit was found to be in average condition.

Photo 8
East elevation soffit showing oxidization of the steel frame due to water infiltration.

Photo 9
Soffit detail showing 1 ¾” x 4” cedar plank with spline joints and beaded on the exposed face.

Photo 10
North elevation showing stress fractures at the copper cornice/ roof juncture, due to a lack of thermodynamic provisions.

United States Department of the Interior

NATIONAL PARK SERVICE
Western Archeological and Conservation Center
255 N. Commerce Park Loop
Tucson, Arizona 85745

National Register/National Historic Landmarks
Research Request Response Cover Sheet

Requested NR/NHL Program Resource Name and Reference Number

Harvard Square subway kiosk 78000~~290~~ 441

Requested Documentation

Nomination Text X Photographs X Maps X Correspondence _____

Please note that only the requested documentation denoted above was scanned. This documentation was scanned in the original order found within the folder. Additionally, the scans represent the condition in which the materials were originally stored.

Heidi Charles — 3/9/2016

Fulfilled By — Date

Form No. 10-300 (Rev. 10-74) PH0500381

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

DATA SHEET

FOR NPS USE ONLY
RECEIVED JUL 6 1977
DATE ENTERED JAN 30 1979

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC: Harvard Square Subway Kiosk

AND/OR COMMON: Same

2 LOCATION

STREET & NUMBER: Massachusetts Avenue, Corner of Boylston Street — NOT FOR PUBLICATION

CITY, TOWN: Cambridge — VICINITY OF — CONGRESSIONAL DISTRICT: 8th

STATE: Massachusetts — CODE: 02138 — COUNTY: Middlesex — CODE: 017

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME: Massachusetts Bay Transit Authority

STREET & NUMBER: 45 High Street

CITY, TOWN: Boston — VICINITY OF — STATE: Massachusetts, 02110

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.: Middlesex County Registry of Deeds

STREET & NUMBER: 128 Third Street

CITY, TOWN: Cambridge — STATE: Massachusetts, 02141

6 REPRESENTATION IN EXISTING SURVEYS

TITLE: Survey of Architectural History in Cambridge
Inventory of the Historic Assets of the Commonwealth

DATE: 1973 — __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS: Cambridge Historical Commission
Massachusetts Historical Commission

CITY, TOWN: Cambridge — STATE: 02139
Boston — Mass. 02108

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Harvard Square Subway Kiosk is located on a traffic island at the intersection of Massachusetts Avenue, Brattle and Boylston Streets in Cambridge, a bustling commercial center. Because of the use and location of the site, it is often congested, and the Kiosk itself is partially obscured by telephone booths, vending machines and informal newstands.

Attributable only to an anonymous Boston elevated streetcar railway engineer, the building is clearly derivative of contemporary industrial design. The dominant element is the broad copper-clad roof composed of cross-axial tunnel vaults. Flat sections filling each corner complete the rectangular plan. The deeply extended eaves reveal wooden soffit and shallow rafters. The two stairwells to the subway area are enclosed by twin pavilions, one 15' x 15'6" and the other 12' x 15'6". Both have corner posts of alternating limestone blocks and brick, infilled on three sides with steel factory sash above low brick walls. The basement is constructed of fine polished granite.

Curvilinear iron detail at the entrance and the imaginative profile of the roof are the sole decorative elements of the uncluttered composition.

8 SIGNIFICANCE

PERIOD

__PREHISTORIC
__1400-1499
__1500-1599
__1600-1699
__1700-1799
__1800-1899
X 1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

__ARCHEOLOGY-PREHISTORIC
__ARCHEOLOGY-HISTORIC
__AGRICULTURE
X ARCHITECTURE
__ART
__COMMERCE
__COMMUNICATIONS
__COMMUNITY PLANNING
__CONSERVATION
__ECONOMICS
__EDUCATION
__ENGINEERING
__EXPLORATION/SETTLEMENT
__INDUSTRY
__INVENTION
__LANDSCAPE ARCHITECTURE
__LAW
__LITERATURE
__MILITARY
__MUSIC
__PHILOSOPHY
__POLITICS/GOVERNMENT
__RELIGION
__SCIENCE
__SCULPTURE
__SOCIAL/HUMANITARIAN
X THEATER
__TRANSPORTATION
__OTHER (SPECIFY)

SPECIFIC DATES 1928

BUILDER/ARCHITECT

STATEMENT OF SIGNIFICANCE

Harvard Square is a center of transportation, commercial and academic activity, and university and community interaction in Cambridge. The Square is bisected by Massachusetts Avenue, a major commercial thoroughfare flanked by the confines of Harvard Yard on one side and a complex system of small commercial streets on the other. Harvard Square is the point of intersection between this edge and the major secondary commercial streets in the area.

The simple MBTA Kiosk serves as an internationally recognized symbol for the Square. At previous times in history, freestanding structures occupied the site and identified the Square. From 1708-1758 a courthouse stood there, and during the early 19th century a markethouse occupied the same site.

Beyond its traditional role as a focus for Harvard Square, the Kiosk is representative of the acceptance of straightforward industrial design as a legitimate component of modern architecture. The Kiosk is particularly significant in this regard because of its prominent location in a busy commercial area; most contemporary examples were isolated in industrial and urban fringe areas.

A landmark in Harvard Square since 1928, the Kiosk remains a single stable element in an environment of continual change.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Cambridge Historical Commission, Report Four: Old Cambridge, Cambridge, 1973.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY .03 acres

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	19	325480	4693200
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE Blaine Mallory & Joseph Orfant, National Register Editor (Allison Crump, Cambridge Historical Commission)

ORGANIZATION Massachusetts Historical Commission

DATE June 13, 1977

STREET & NUMBER 294 Washington Street

TELEPHONE 617-727-8470

CITY OR TOWN Boston

STATE Massachusetts, 02108

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL X

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE Elizabeth Reed Amadon

TITLE Executive Director, Mass. Historical Comm.

DATE 6/27/77

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

DATE 1 30 78

ATTEST:

KEEPER OF THE NATIONAL REGISTER

DATE 1-30-78

GPO 892-453

Property Harvard Square Subway Kiosk

State Mass. Working Number 7.6.77.1090 | Middlesex

TECHNICAL

Photos 2

Maps 2

CONTROL

pl

OK 7.7.77

Conversation w/Joseph Orfant: MBTA is extending redline + wants to demolish or alter Kiosk.
LBF 1.24.78
Franklin

Arch'l **HISTORIAN**

Accept – L. Belbe 12/14/77

ARCHITECTURAL HISTORIAN

J. Gilmore
11.22.77
Accept

TO HAER

ARCHEOLOGIST

OTHER

HAER

Inventory Accept Ecoy

Review 11/29/77 11/30

Donald C. Jackson

REVIEW UNIT CHIEF

1/28/78

Not 50 years old but structure does possess notable associative values – Why not an historic district? What prompted this single site nomination? Structure is of minor significance technologically – Why not nominate entire subway system? – HAER has no objections to placement of site on NR but HAER defers comment on its acceptability

The significance of this Kiosk is well articulated: (1) as a visual focus of Harvard Sq. and (2) as an unit of the subway

Accept Laboviti

BRANCH CHIEF

1.30.78

KEEPER

1 30 78

National Register Write-up _____ Send-back _____ Entered JAN 30 1978

Federal Register Entry 3.7.78 Re-submit _____

INT:2106-74

RAPID TRANSIT
TO ALL
POINTS
HARVARD
SQUARE
UT OF TOWN NEWS AND

Middlesex County

Harvard Square Subway Kiosk
Cambridge, Massachusetts
1977
Charles M. Sullivan
Cambridge Historical Commission
57 Inman Street
Cambridge, Mass. 02139
Photo #1 of 2
Looking southeast from above.

Harvard Square M.B.T.A. Kiosk
View southeast from above
Photo: Charles M. Sullivan, 1-77
Cambridge Historical Commission

JUL 6 1977

JAN 30 1978

PROPERTY OF THE NATIONAL REGISTER

RAPID TRANSIT
TO ALL
POINTS
OUT
NO
STOPPING
Theatre /Concert
Sports Events
Tickets on sale
HARVARD

Middlesex Co.

Harvard Square Subway Kiosk
Cambridge, Massachusetts
1977
Charles M. Sullivan
Cambridge Historical Commission
57 Inman Street
Cambridge, Mass. 02139
Photo #2 of 2
Looking northeast from head of
Boylston Street

Harvard Square M.B.T.A. Kiosk
View northeast from head of Boylston
Photo: Charles M. Sullivan, 1-77
Cambridge Historical Commission

JUL 6 1977

JAN 30 1978

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Massachusetts Cultural Resource Information System

Scanned Record Cover Page

Inventory No:	CAM.901
Historic Name:	Harvard Square Subway Kiosk
Common Name:	MBTA Survey Phase I
Address:	Massachusetts Ave Massachusetts Ave and Boylston St
City/Town:	Cambridge
Village/Neighborhood:	Old Cambridge; Harvard Square
Local No:	RL-CA 104-003
Year Constructed:	
Architect(s):	
Architectural Style(s):	
Use(s):	Rail Station
Significance:	Architecture; Transportation
Area(s):	CAM.G: Cambridge Multiple Resource Area CAM.AM: Old Cambridge Historic District CAM.BG: Harvard Square Historic District
Designation(s):	Local Historic District (6/23/1986); Nat'l Register District (4/13/1982); Nat'l Register Individual Property (1/30/1978); Nat'l Register MRA (4/13/1982)
Building Materials(s):	

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Commonwealth of Massachusetts
Massachusetts Historical Commission
220 Morrissey Boulevard, Boston, Massachusetts 02125
www.sec.state.ma.us/mhc

This file was accessed on:

CAM.901

FORM F - STRUCTURE

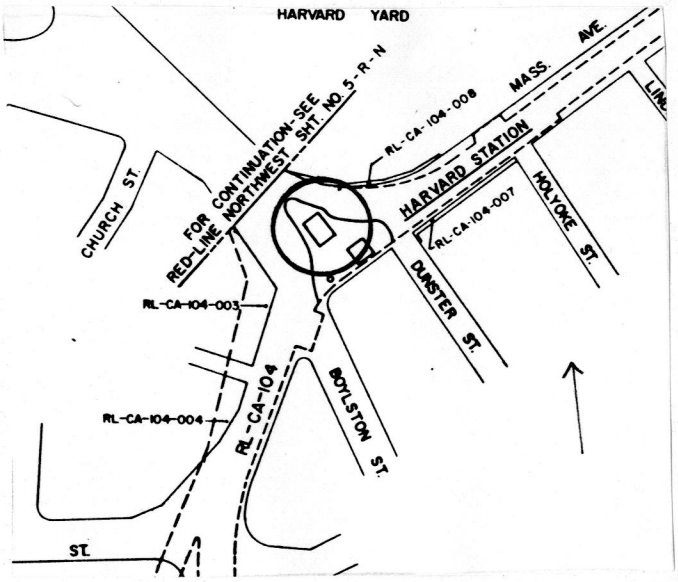
MASSACHUSETTS HISTORICAL COMMISSION
Office of the Secretary, State House, Boston

In Area no.	Form no.
RL-CA	104-003

2. Photo (3x3" or 3x5")
Staple to left side of form
Photo number _____

photo to come

4. Map. Draw sketch of structure location in relation to nearest cross streets, buildings, other structures, natural features. Indicate north.



DO NOT WRITE IN THIS SPACE
USGS Quadrant _____
MHC Photo no. _____

1. Town Cambridge

Address Massachusetts Ave. at Boylston St.

Name Harvard Square Kiosk

Present use superstructure will be entrance kiosk

Present owner MBTA

3. Type of structure (check one)

bridge	____	pound	____
canal	____	powder house	____
dam	____	street	____
fort	____	tower	____
gate	____	tunnel	____
kiln	____	wall	____
lighthouse	____	windmill	____

other subway kiosk

5. Description

Date 1928

Source Co-Operation May, 1928

Construction material wood, lead covered copper

Dimensions _____

Setting will cover island entry at surface

Condition restorable

6. Recorded by Architectural Preservation Associates

Organization MBTA

Date April 1984

(over)

CAM.901

7. Original owner Commonwealth of Massachusetts

Original use subway entrance kiosk

Subsequent uses (if any) and dates

8. Historical significance.

The site of the Harvard Square Station is one of central importance in the development of Cambridge. Near it from 1708-1758 stood a courthouse; in the early 19th century a markethouse occupied the site. Horsecars stopped at about this place after 1854 using a rail system. In 1912 it became the western terminus of the Cambridge-Main St. subway, the Boston side of which, called the Cambridge Extension, then terminated at the newly built station of Park St. Under. The route made intermediate stops at Central and Kendall Squares, and, except for a portion crossing the Charles River and extending until the Beacon Hill Tunnel, it was entirely underground. The Cambridge section was built and owned, until it was sold to the Commonwealth in 1920, by the Boston Elevated Railroad Co. It formed a second major trunk line in the Metropolitan area. Crossing at right angles to the Tremont St subway, its function was to collect passengers at outlying points for distribution to inner-city stations.

Harvard Sq. Station was called at the time it opened the "most interesting station in the subway."(1) It was designed to separate incoming and outgoing subway passengers, and to integrate subway and trolley car systems. This was accomplished by means of inclined passageways leading to an underground surface car facility at an intermediate level, with exit ramps at opposite ends of the station.Because this work involved the relocation of Harvard University property, an advisory commission of the most prominent Boston architects was formed to advise the railway, with the firm of Peabody and Stearns doing the actual design work of the Massachusetts Ave. portal.

In the mid '20s the Harvard Sq. Businessmens' Assoc. and others successfully lobbied for a smaller headhouse, as the original structure was too large, and obstructed the increasingly high volume of auto traffic in the square. The new kiosk, built on the original site, served the same function of sheltering the entry/exit stairway, but was smaller and more contemporary in design.

9. Bibliography and/or references

Boston Elevated Railway Co. Co-Operation.May, 1928
"The Cambridge Subway.", Electric Railway Journal.May 11, 1912, vol. 39 # 19, p. 784
L.E. Moore, "The Cambridge Subway.", Engineering News. Feb. 1, 1912 vol. 67, #5
National Register Nomination.

CAM.901

INVENTORY FORM CONTINUATION SHEET

MASSACHUSETTS HISTORICAL COMMISSION
Office of the Secretary, Boston

Community: Cambridge	Form No: RL-CA 104-003
Property Name: Harvard Square Kiosk	

Indicate each item on inventory form which is being continued below.

Influenced by the industrial design of the period, the structure had a broad copper-clad roof in the form of cross-axial tunnel vaults with flat sections filling each corner to complete a rectangular plan.

All of the original Harvard Sq. Station will be demolished in the Red Line Extension, begun in 1976. However, the 1928 kiosk will be reinstalled at about its original site. The landmark is listed on the National Register of Historic Places. The station, when completed, will return to several of the early concepts: stacked track, integrated underground-surface systems below street level, and flat surface finish.

Staple to Inventory form at bottom

MHC INVENTORY FORM CONTINUATION SHEET

MHC Inventory scanning project, 2008-2013

MACRIS No. CAM.901

NR-ND- 11/30/78
NRDIS/MRA 7/27/88
LHD - 6/23/56

INR CAM. 901

FORM F - STRUCTURE

MASSACHUSETTS HISTORICAL COMMISSION
Office of the Secretary, State House, Boston

In Area no.	Form no.
G, AB	901

AM

PI OC & HAR-SQ
USGS BOST, S
SECT F

2. Photo (3x3" or 3x5")
Staple to left side of form
Photo number _____

4. Map. Draw sketch of structure location in relation to nearest cross streets, buildings, other structures, natural features. Indicate north.

FOR DETAILED INFO
SEE NR FILE

1. Town CAMBRIDGE

Address CENTER OF HARVARD SQ.
MASSACHUSETTS AVE

Name HARVARD SQUARE SUBWAY KIOSK

Present use TRANSPORTATION SERVICES

Present owner MBTA

3. Type of structure (check one)

bridge	____	pound	____
canal	____	powder house	____
dam	____	street	____
fort	____	tower	____
gate	____	tunnel	____
kiln	____	wall	____
lighthouse	____	windmill	____

other FREE STANDING PAVILION

5. Description

Date _____

Source _____

Construction material _____

Dimensions _____

Setting _____

Condition _____

6. Recorded by J. ORFANT

Organization MHC

Date 2.14.78

DO NOT WRITE IN THIS SPACE
USGS Quadrant _____
MHC Photo no. _____

(over)

5M-5-73-075074

CAM.901

7. Original owner (if known) _____

   Original use _____

   Subsequent uses (if any) and dates _____

8. Historical significance.

9. Bibliography and/or references such as local histories, deeds, assessor's records, early maps, etc.