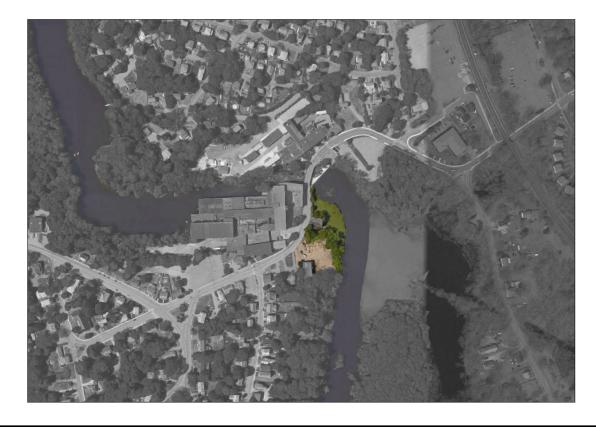
# Middlesex Canal Museum & Visitor's Center





# <u>CONTACTS</u>

OWNER	MIDDLESEX CANAL ASSOCIATION 71 FAULKNER ST NORTH BILLERICA, MA 01862 (978) 670-2740
ARCHITECT	CAVENEY ARCHITECTURE + CONSTRUCTION 128 WARREN STREET (rear), LOWELL, MA 01852 978-770-0518 INFO@CAVENEYARCH.COM
CIVIL ENGINEER & SURVEYOR	MATT HAMOR LANDPLEX, LLC 10 GEORGE ST. SUITE 208, LOWELL, MA 01852 978-201-9390 MHAMOR@LANDPLEX.COM
STRUCTURAL ENGINEER	PAUL PHELAN PHELAN ENGINEERING 76 CARLISLE RD, WESTFORD, MA 01824 978-201-9390 PAUL@PHELANENGINEERING.COM
ELECTRICAL ENGINEER	MIKE GRECO JOHNSON ENGINEERING, INC. 5 ELM ST. SUITE 14, DANVERS, MA 01923 978-646-9001 MGRECO@JOHNSONENGINEERING.BIZ
HVAC ENGINEER	ROB O'CONNELL ADA ASSOCIATES, INC. 271 MAIN ST. SUITE 306, STONEHAM, MA 02180 781-279-2800 ADAENGINE@AOL.COM
PLUMBING & F.P. ENGINEER	JAMES POLANDO 242 MERRIAM ST. WESTON, MA 02493 781-697-7173 JNPOLANDO@GMAIL.COM

2 Old Elm St, North Billerica MA.



architects practicing the art of building

## MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER - RENOVATION

## CONTACTS

#### **ARCHITECT:** JOHN CAVENEY, AIA CAC, INC. **128 WARREN STREET** LOWELL, MA 01852 978.852.8300

JCAVENEY@CAVENEYARCH.COM GENERAL CONTRACTOR:

## OWNER

TBD

MIDDLESEX CANAL ASSOCIATION 71 FAULKNER ST NORTH BILLERICA, MA 01862 (978) 670-2740

### APPLICABLE CODES

780 CMR: Massachusetts State Building Code, 9th Edition with amendments to: 2015 International Building Code (IBC) 2015 International Energy Conservation Code (IECC) 2015 International Mechanical Code (IMC) 2015 International Existing Building Code (IEBC)

2015 International Fire Code (IFC)

2010 ADA Guidelines

521 CMR: Regulations of the Massachusetts Architectural Access Board

527 CMR 1.00: Comprehensive Massachusetts State Fire Code, with amendments to 2015 NFPA 1: National Fire Code

527 CMR 12.00: MA Electrical Code, with amendments to the 2017 NFPA 70: National Electrical Code

248 CMR: Massachusetts State Fuel Gas and Plumbing Code

## **PROJECT SUMMARY**

Existing historical storehouse building to be converted into two story museum for the Middlesex Canal Association. This building will be open to members of the association as well as the public. Work to include new roof and drainage system, entrance threshold, interior finishes, fenestration, structural system and MEP work.

Located in Billerica Mills Historic District

### SQUARE FOOTAGE

FIRST FLOOR A-3 (CONDITIONED): FIRST FLOOR A-3 (UNCONDITIONED, DECK): 425 SF SECOND FLOOR A-3 (CONDITIONED): ATTIC (UNCONDITIONED):

TOTAL SF (EXISTING):

#### GENERAL CONSTRUCTION NOTES

- A. THE CONTRACTOR SHALL REFER TO ALL DRAWINGS AND SPECIFICATIONS TO DETERMINE THE TYPE AND EXTENT OF WORK PERFORMED. B. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, EQUIPMENT AND APPLIANCES REQUIRED TO PERFORM ALL SELECTIVE DEMOLITION, REMOVAL AND
- RELATED WORK NECESSARY FOR THE PROPER COMPLETION OF THE OPERATION AS REQUIRED BY THE CONTRACT DOCUMENTS. C. THE DRAWINGS INDICATE THE EXTENT OF WORK AND THE CONSTRUCTION ELEMENTS TO BE REMOVED. HOWEVER, THE CONTRACTOR SHALL MAKE AN INDEPENDENT EXAMINATION OF THE EXTENT OF WORK TO BE PERFORMED SO AS TO PROPERLY PREPARE THE AREA FOR THE WORK OF OTHER TRADES TO FOLLOW.

#### 2. GENERAL CONSTRUCTION NOTES

- A. ALL MATERIALS, HARDWARE, APPLIANCES AND EQUIPMENT TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND THE LOCAL BUILDING CODE. PROVIDE ALL NECESSARY BLOCKING, NAILERS, MOULDINGS, ETC. IN ORDER TO MEET REQUIREMENTS OF THE INSTALLATION. B. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SUPPLY SHOP DRAWINGS FROM ALL SUB CONTRACTORS TO ARCHITECT AND ENGINEERS FOR REVIEW AND
- APPROVAL BEFORE PROCEEDING WITH SAID WORK. THIS APPROVAL IS FOR GENERAL ARRANGEMENT ONLY AND DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY OR ACCURACY OF DIMENSIONS AND STRUCTURAL DETAILS NOR CORRECT INTERPRETATION OF PLANS AND SPECIFICATIONS. C. CONTRACTOR TO SEAL ALL WITH APPROPRIATE CAULKING ALL LOCATIONS NECESSARY TO PREVENT PENETRATION OF MOISTURE AND AT TRANSITIONS OF SIMILAR MATERIALS.
- D. CONTRACTOR IS RESPONSIBLE FOR PAINTING ALL SURFACES WHICH REQUIRE PROTECTION FROM THE ELEMENTS WITH THE APPROPRIATE PAINT INCLUDING ALL NECESSARY PRIMER COATS AND BACK PRIMING.
- E. ALL INTERIOR WALLS TO BE 2"x4" WOOD STUD U.N.O. F. PROVIDE ACOUSTICAL BATT AT ALL 2x6 WALLS, STC-39 MIN.

BY THE GOVERNING FIRE DEPARTMENT.

- G. WHEN HVAC, PIPING AND/OR CONDUIT IS EXPOSED, BOTH INTERIOR AND EXTERIOR, PAINT ENTIRE VISIBLE EXTENT (INCLUDING FITTINGS & HANGERS). FINISH TO BE BLACK.
- H. INSTALL ALL NECESSARY FLASHINGS WHERE NECESSARY TO MAKE THE BUILDING WATER TIGHT. I. CONTRACTOR TO VERIFY ALL DETAILS, CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. IF A CONFLICT IS DISCOVERED, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT BEFORE PROCEEDING WITH THE CONSTRUCTION. THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ANY CONSTRUCTION PROBLEM OR DEFECT CAUSED BY PROCEEDING WITH CONSTRUCTION WITHOUT NOTIFYING THE ARCHITECT OF CONFLICTS. THESE DRAWINGS ARE SCHEMATIC REPRESENTATIONS OF THE INTENDED CONSTRUCTION. J. THE GENERAL CONTRACTOR SHALL VERIFY ALL DETAILS AND DIMENSIONS BEFORE PROCEEDING WITH WORK, NOTIFY ARCHITECT OF ANY DISCREPANCIES. DO
- NOT SCALE DRAWINGS, DIMENSIONS ARE TO GOVERN OVER SCALE. K. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE INTERNATIONAL AND MA. STATE BUILDING CODE AS REQUIRED.
- L. THE GENERAL CONTRACTOR SHALL HAVE A MASSACHUSETTS CONSTRUCTION SUPERVISOR LICENSE IN THEIR TRADE.
- M. THE GENERAL CONTRACTOR SHALL COMPLY TO ALL OSHA RULES AND REGULATIONS THROUGHOUT THE PROJECT.
- N. IT IS THE CONTRACTOR'S OR OWNER'S RESPONSIBILITY TO EMPLOY CAVENEY ARCHITECTS TO PERFORM ON SITE VERIFICATION IF REQUIRED OR DESIRED. IT IS THE OWNER'S OR CONTRACTOR'S RESPONSIBILITY TO ASSURE THAT TIMELY NOTIFICATION OF THE PROJECT PROGRESS IS PROVIDED SO THAT ADEQUATE ON SITE ARCHITECTURAL PRESENCE IS OBTAINED. LIABILITY IS SEVERELY DIMINSHED IF ARCHITECT ON SITE VERIFICATION IS NOT PERFORMED. O. ALL HVAC, ELECTRICAL, FIRE ALARM, AUTOMATIC FIRE SPRINKLERS AND PLUMBING TO BE PERFORMED ON A DESIGN BUILD BASIS WITH REGISTERED ENGINEERS. ENGINEERS SHALL PROVIDE NARRATIVES, AFFIDAVITS, AND STAMPED DRAWINGS. FIRE SPRINKLER AND FIRE ALARM PLANS SHALL BE APPROVED

#### <u>3. UTILITIES</u>

- A. BEFORE STARTING CONSTRUCTION THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MAKING ALL NECESSARY ARRANGEMENTS AND FOR PERFORMING ANY NECESSARY WORK INVOLVED IN CONNECTION WITH THE DISCONTINUANCE OR INTERRUPTION OF ALL PUBLIC AND PRIVATE UTILITIES FOR SERVICES INCLUDING ANY SYSTEM WHICH WILL BE AFFECTED BY THE WORK TO BE PERFORMED UNDER THIS CONTRACT.
- B. BEFORE STARTING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY ALL CORPORATIONS, COMPANIES, INDIVIDUALS OR LOCAL AUTHORITIES OWNING CONDUITS, WIRES OR PIPES TO, THROUGH OR ACROSS THE WORK AREAS WHERE CONSTRUCTION TO BE DEMOLISHED IS LOCATED. IN ADDITION, THE CONTRACTOR SHALL ARRANGE TO HAVE ALL SERVICES, SUCH AS WATER, GAS, STEAM, ELECTRICITY, LOW TENSION SERVICE, TELEPHONE AND TELEGRAPH DISCONNECTED AT THE SERVICE MAINS OR OTHER APPLICABLE LOCATIONS IN ACCORDANCE WITH THE RULES AND REGULATIONS GOVERNING THE UTILITY INVOLVED. ALL INACTIVE WIRES, ELECTRIC SERVICES, DROPS AND CONNECTIONS SHALL BE REMOVED.

4. PROTECTION & CLEANUP

- A. THE GENERAL CONTRACTOR SHALL PROVIDE, ERECT AND MAINTAIN ALL FENCING, PLANKING, BRIDGES, BRACING, SHORING, SHEETING, LIGHTS, BARRICADES, WARNING SIGNS AND GUARDS AND OTHER DEVICES AS NECESSARY FOR THE PROTECTION OF THE GENERAL PUBLIC, ABUTTERS AND CONSTRUCTION WORKERS.
- B. THE CONTACTOR SHALL COMPLETELY REMOVE ALL PROTECTION WHEN THE WORK IS COMPLETED OR WHEN ORDERED IN WRITING TO DO SO BY THE ARCHITECT.
- C. ALL UNUSED EQUIPMENT OR MATERIALS IN OR AROUND THE BUILDING NOT OTHERWISE INDICATED TO REMAIN OR BE SALVAGED SHALL BE REMOVED IN ITS ENTIRETY AND LAWFULLY DISPOSED OF UNDER THE WORK OF THIS CONTRACT.
- D. THE CONTRACTOR SHALL COMPLETELY REMOVE FROM THE PROJECT AREA ANY AND ALL DEMOLISHED MATERIALS, AND SHALL LAWFULLY DISPOSE OF THE SAME OFF THE SITE. NO BURNING WILL BE PERMITTED ON THE PROJECT SITE.
- E. ALL WORK ADJACENT TO OPERATIONS UNDER THIS CONTRACT SHALL BE INSPECTED FOR DAMAGE AND STAINS, AND REPAIRED OR CLEANED PRIOR TO THE COMPLETION OF THE WORK.
- F. DURING THE PROGRESS OF THE WORK, THE CONTRACTOR SHALL KEEP THE PREMISES CLEAN OF DEBRIS RESULTING FROM HIS OPERATIONS AND SHALL REMOVE SURPLUS AND WASTE MATERIALS FROM THE SITE AS SOON AS POSSIBLE.

#### 5. MILLWORK

- A. SHOP DRAWINGS AND SUBMITTALS WILL BE REQUIRED FOR ALL MILLWORK. B. SUPPLY AND INSTALL ALL MILLWORK AND SPECIALTY CONSTRUCTION AS SHOWN ON PLANS, ELEVATIONS AND DETAILS.
- C. ALL MILLWORK AND WORKMANSHIP SHALL MEET AWI (ARCHITECTURAL WOODWORK INSTITUTE).
- D. ALL DIMENSIONS SHALL BE VERIFIED BY THE FABRICATOR.
- E. ALL KITCHEN BASE CABINETS TO BE 24" DEEP UNLESS OTHERWISE NOTED. F. ALL WOOD FINISHING FORMULAS TO MEET AND COMPLY WITH STATE AND FEDERAL VOC INDOOR REQUIREMENTS.
- G. CONSULT WITH OWNER ON MILLWORK AND FINISHES.
- H. PROVIDE TOE KICKS IN KITCHEN CABINET MILLWORK.
- I. SUPPLY AND INSTALL SHELF AND ROD IN ALL 24" DEEP CLOSETS. J. SUPPLY AND INSTALL FRAMED MIRRORS IN ALL TOILET ROOMS AS SHOWN.

#### 6. FOUNDATION

- A. ALL FOOTINGS SHALL BEAR ON UNDISTURBED SOIL HAVING A MINIMUM BEARING CAPACITY OF 3,000 P.S.F. B. THE BOTTOM ELEVATION OF EXTERIOR FOOTINGS SHALL BE A MINIMUM OF 4'-0" BELOW OUTSIDE FINISH GRADE. LOWER FOOTINGS AS REQUIRED TO REACH GOOD BEARING SOIL.
- C. THOROUGHLY COMPACT THE BOTTOM OF EXCAVATION PRIOR TO FORMING FOOTINGS.
- D. ALL BACKFILL USED INSIDE THE BUILDING SHALL BE WALL GRADED GRAVEL WHICH SHALL BE THOROUGHLY COMPACTED IN 8" LAYERS. ON SITE MATERIAL MAY BE USED IF ACCEPTABLE TO THE ENGINEER.
- E. ALL FOUNDATION WALLS SHALL BE BACK FILLED EVENLY ON BOTH SIDES TO PREVENT UNBALANCED LOADING.
- F. ALL CONCRETE SHALL BE PLACED IN DRY EXCAVATIONS. PUMP AWAY GROUND WATER AS REQUIRED.

#### 7. CONCRETE

A. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 P.S.I. B. ALL CONCRETE WORK SHALL COMPLY WITH A.C.I. SPECIFICATIONS.

#### **8. STRUCTURAL BEAMS**

- A. FOR ALL BEAMS AND ENGINEERED COLUMNS THAT ARE DESIGNED BY OTHERS THE CONTRACTOR SHALL SUBMIT TO THE LOCAL BUILDING DEPARTMENT THE FOLLOWING
- a. THE STRUCTURAL BEAMS MANUFACTURER AND SUPPLIER SHALL SOLELY BE RESPONSIBLE FOR ANY RELATED CONNECTING AND BRACTING. THIS BEAM AND CONNECTIONS SHALL BE DESIGNED TO CARRY ALL LOADS. b. THE STRUCTURAL BEAM MANUFACTURER SHALL SUBMIT ALL RELATED DESIGN CALCULATIONS WHICH SHALL BEAR THE SEAL OF A MA-LICENSED
- PROFESSIONAL ENGINEER WITHIN THE APPROPRIATE DISCIPLINE OF ENGINEERING PRACTICE. 9. SEPARATION WALLS

A. WALLS SEPARATING DWELLING UNITS IN THE SAME BUILDING SHALL BE CONSTRUCTED AS FIRE PARTITIONS, IN ACCORDANCE WITH SECTION 708. FIRE PARTITIONS SHALL EXTEND FROM THE TOP OF FOUNDATION OR RATED FLOOR/CEILING ASSEMBLY TO THE UNDERSIDE OF FLOOR OR ROOF SHEATHING, SLAB, OR DECK ABOVE OR TO THE RESISTANCE-RATED FLOOR/CEILING OR ROOF/CEILING ASSEMBLY ABOVE, AND SHALL BE SECURELY ATTACHED THERETO.

#### **ACCESSIBILITY LEGEND** CODE SUMMARY **IEBC COMPLIANCE PATHWAY** The scope of work is categorized as an Alteration -- Level 3. Pursuant to Section 901.2, all new construction elements, components, systems, and spaces shall comply DIAMETER with the requirements of the International Building Code, with MA Amendments. **IECC COMPLIANCE PATHWAY** Pursuant to Section 908 of the IEBC, level 3 alterations to existing structures are permitted without requiring the entire building or structure to comply with the IECC. The alterations and addition shall conform to the energy requirements of the IECC as they relate to new construction on a historical building. LEVEL OF ALTERATION Alterations Level 3 Level 3 alterations where the work area exceeds 50 percent of the building area and must 2.700 SF comply with all the requirements of alterations 1, 2 and 3. Additions (Entry Threshold) 2,550 SF TURNING Provisions for additions shall apply where work is classified as an addition as defined in 900 SF SPACE Chapter 2 (an extension or increase in floor area, number of stories, or height of a building or structure). Historical Provisions 6,575 SF A historic building undergoing repair, alteration, or change of occupancy shall be investigated and evaluated based on Chapter 12 of the IEBC. 3' - 0" OCCUPANCY Primary: Museum Assembly A-3 Accessory: Bussiness B, Storage S-1 CONSTRUCTION TYPE 4' - 0" Existing: Masonry w/ wood framing Proposed: Type 3B, fully sprinkled FIRE RATING OF BUILDING ELEMENTS (HR) Primary Structure: 0 Floor/ceiling: 0 Roof/ceiling: 0 Exterior Walls: 2hr rated for type 3B construction, existing Interior Walls: 0 ALLOWABLE BUILDING HEIGHT 75 feet (Actual: 38ft) **ALLOWABLE BUILDING STORIES** Assembly A-3: 3 (Actual: 2) ALLOWABLE AREA (Table 506.2) Area Floor Finish Number Name Allowable Area factor: Assembly A-3: 28,500sf (Actual: 5,285sf) OCCUPANT LOAD First Floor (A-3, B, S-1): 91

<b>SYMBOLS &amp; GRAPHIC</b>	CONVENTIONS
(101)	DOOR
	WINDOW
	WALL
1 A101	BUILDING
	CALLO
1 Ref 1 A101 1 Ref	EXTERIOR
Floor Level Elevation	DATUM/SPOT
N	NORTH
	EXISTING TO
	NEW
	DEM
	ASPHALT
	CONCRE
	EART
	GRAVE

Second Floor (A-3, S-1): 52

Minimum per story: 2 (Table: 1006.3.1)

\*Distances calculated based on building being fully sprinklered.

Total: 143

Number of Exits

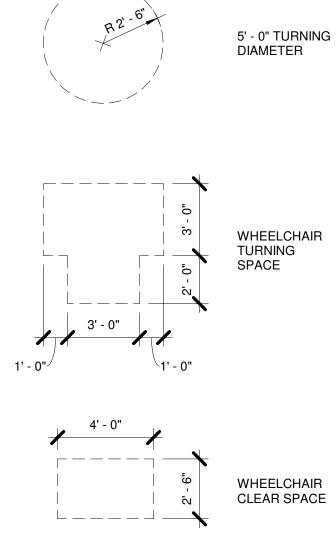
Exit Access Distance

Max. common path: 75ft

Max. dead end: 20ft

Max. exit travel distance: 250ft

WINDOW
WALL
BUILDING
CALLO
EXTERIO
DATUM/S
NORTH
EXISTING
NEW
DEM



# **Finish Schedule**

Vestibule	152 SF	Hardwood	Exposed Masonry/ GWB, Painted (TBD)	(
Gallery	1187 SF	Hardwood	Exposed Masonry/ GWB, Painted (TBD)	1
WC	57 SF	Tile (TBD)	GWB, Painted (TBD)	0
WC	58 SF	Tile (TBD)	GWB, Painted (TBD)	(
Utility	43 SF	Sealed Concrete	Exposed Masonry/ GWB	1
Board of Director's Room	177 SF	Hardwood	Exposed Masonry/ GWB, Painted (TBD)	1
Reception	100 SF	Hardwood	GWB, Painted (TBD)	T
Control Room	24 SF	Sealed Concrete	GWB, Painted (TBD)	1
Kitchen	202 SF	Linoleum Sheet Flooring	Exposed Masonry/ GWB, Painted (TBD)/ White 4"x8" Subway Tile @ All Counters	
Sprinkler Riser Room	29 SF	Sealed Concrete	Exposed Masonry/ GWB	1
Gallery	1618 SF	Hardwood	Exposed Masonry/ GWB, Painted (TBD)	Ī
WC	53 SF	Tile (TBD)	GWB, Painted (TBD)	(
Utility	35 SF	Unfinshed Sub Floor	Exposed Masonry/ GWB	1
Electrical	34 SF	Unfinished Sub Floor	Exposed Masonry/ GWB	(
Storage	887 SF	Unfinished Sub Floor	N/A	
	Gallery WC WC Utility Board of Director's Room Reception Control Room Kitchen Sprinkler Riser Room Gallery WC Utility Electrical	Gallery1187 SFWC57 SFWC58 SFUtility43 SFBoard of Director's Room177 SFReception100 SFControl Room24 SFKitchen202 SFSprinkler Riser Room29 SFGallery1618 SFWC53 SFUtility35 SFElectrical34 SF	Gallery1187 SFHardwoodWC57 SFTile (TBD)WC58 SFTile (TBD)Utility43 SFSealed ConcreteBoard of Director's Room177 SFHardwoodReception100 SFHardwoodControl Room24 SFSealed ConcreteKitchen202 SFLinoleum Sheet FlooringSprinkler Riser Room29 SFSealed ConcreteGallery1618 SFHardwoodWC53 SFTile (TBD)Utility35 SFUnfinshed Sub FloorElectrical34 SFUnfinished Sub Floor	Gallery1187 SFHardwoodExposed Masonry/ GWB, Painted (TBD)WC57 SFTile (TBD)GWB, Painted (TBD)WC58 SFTile (TBD)GWB, Painted (TBD)Utility43 SFSealed ConcreteExposed Masonry/ GWB, Painted (TBD)Board of Director's Room177 SFHardwoodExposed Masonry/ GWB, Painted (TBD)Reception100 SFHardwoodGWB, Painted (TBD)Control Room24 SFSealed ConcreteGWB, Painted (TBD)Kitchen202 SFLinoleum Sheet FlooringExposed Masonry/ GWB, Painted (TBD)/ White 4"x8" Subway Tile @ All CountersSprinkler Riser Room29 SFSealed ConcreteExposed Masonry/ GWB, Painted (TBD)WC53 SFTile (TBD)GWB, Painted (TBD)WC53 SFTile (TBD)GWB, Painted (TBD)Utility35 SFUnfinshed Sub FloorExposed Masonry/ GWBElectrical34 SFUnfinished Sub FloorExposed Masonry/ GWB

Fixture Schedule										
Fixture Type	Mark	Count	Manufacturer	Model	Product #	Finish	Comments			
Drop-In Bathroom Sink	1	3	Kohler	K-2337-8-0		White	Provide Faucet #K-R72781-4D1-BN			
Freestanding Electric Range	2	1	KitchenAid	KFEG500E		Stainless Steel				
Mop Sink	3	1	Mustee	Model 65M		White				
Refrigerator	4	1	KitchenAid	KRFF305ESS		Stainless Steel				
Toilet	5	3	TOTO USA	CT705ELN		White				
Top-Mount Kitchen Sink	6	1	Kohler	K-RH20060-4		Stainless Steel	Provide Faucet # K-R11921-SD			
Undercounter DIshwasher	7	1	Whirlpool	WDF560SAFM		Stainless Steel				
Wall-Mounted Canopy Range Hood	8	1	KitchenAid	KVWB400DSS		Stainless Steel				

Door Schedule											
ount	Mark	Manufacturer	Product Line	Model	Width	Height	Description	Finish	Comments		
1	01	JELD-WEN	5066	All Panel Exterior Door	5' - 0"	7' - 0"	Solid Wood 6 Panel	Wood			
1	02	JELD-WEN	5066	All Panel Exterior Door	5' - 0"	7' - 0"	Solid Wood 6 Panel	Wood			
1	03	JELD-WEN	W-4500	Clad Wood Outswing Patio Door	5' - 0"	7' - 0"	Custom Epic Outswing 2-Panel French Patio Door, Clad	Wood			
1	04	JELD-WEN	5066	All Panel Exterior Door	5' - 0"	7' - 0"	Solid Wood 6 Panel	Wood			
1	05	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	06	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	07	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	08	TBD	TBD	Prehung	5' - 0"	6' - 8"	Double 6 Panel	White			
1	09	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	10	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	11	TBD	TBD	Prehung	3' - 0"	6' - 8"	Pocket Door	White			
1	12	TBD	TBD	Prehung	3' - 0"	6' - 8"	Pocket Door	White			
1	13	TBD	TBD	Prehung	2' - 10"	6' - 8"	Single 6 Panel	White			
1	14	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White			
1	15	TBD	TBD	Prehung	2' - 10"	6' - 8"	Single 6 Panel	White			
1	16	TBD	TBD	Prehung	3' - 0"	6' - 8"	Single 6 Panel	White	45 minute rated door		
1	17	TBD	TBD	Prehung	5' - 0"	6' - 8"	Double 6 Panel	White			

	Window Schedule											
Count	Type Mark	Manufacturer	Product Line	Model	Unit R.O.	Unit Size	Head Height	Finish	Description	Comments		
						-						
1	01	JELD-WEN	Atlantic Premium Double-Hung	6DH-26S	2' - 11 1/2" w X 6' - 5" h	2' - 10 1/2" w X 6' - 4" h	7' - 9"	White	Brickmould Vinyl Double-Hung			
10	02	JELD-WEN	Atlantic Premium Double-Hung	6DH-26	2' - 11 1/2" w X 5' - 8" h	2' - 10 1/2" w X 5' - 7" h		White	Brickmould Vinyl Double-Hung			
1	03	JELD-WEN	Transom/Flxed	VFDPRTW	5' - 1" w X 1' - 7" h	5' - 0" w X 1' - 6" h	8' - 6"	White	Premium Vinyl Sliding Patio Door Transom Wide Stile			
4	04	VELUX	Fixed Skylight (FS) - Deck Mounted	FS	1' - 10 1/2" w X 3' - 9 3/4" h	2' - 0 1/16" w X 3' - 11 1/4" h	ו N/A	White	Fixed deck mounted skylight			

Count	Type Mark	Manufacturer	Product Line	Model	Unit R.O.	Unit Size	Head Height	Finish	Description	Comments
1	01	JELD-WEN	Atlantic Premium Double-Hung	6DH-26S	2' - 11 1/2" w X 6' - 5" h	2' - 10 1/2" w X 6' - 4" h	7' - 9"	White	Brickmould Vinyl Double-Hung	
10	02	JELD-WEN	Atlantic Premium Double-Hung	6DH-26	2' - 11 1/2" w X 5' - 8" h	2' - 10 1/2" w X 5' - 7" h		White	Brickmould Vinyl Double-Hung	
1	03	JELD-WEN	Transom/Flxed	VFDPRTW	5' - 1" w X 1' - 7" h	5' - 0" w X 1' - 6" h	8' - 6"	White	Premium Vinyl Sliding Patio Door Transom Wide Stile	
4	04	VELUX	Fixed Skylight (FS) - Deck Mounted	FS	1' - 10 1/2" w X 3' - 9 3/4" h	2' - 0 1/16" w X 3' - 11 1/4" h	N/A	White	Fixed deck mounted skylight	

1. ALL WINDOWS & DOORS TO BE ENERGY STAR 2. CONTRACTOR TO CONFIRM WINDOW & DOOR SIZES PRIOR TO ORDERING 3. CONTRACTOR TO CONFIRM WINDOW & DOOR COUNTS PRIOR TO ORDERING

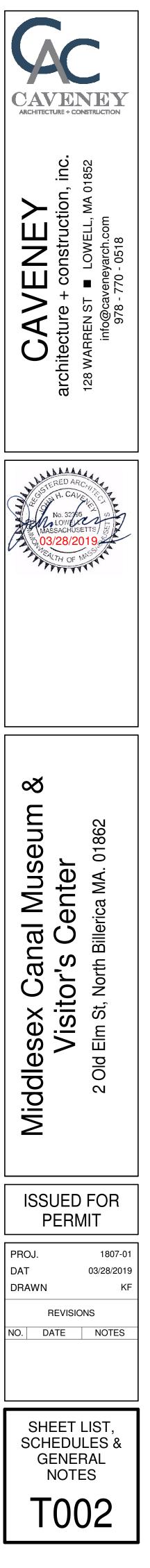
4. CONTRACTOR TO CONFIRM DOOR SWINGS PRIOR TO ORDERING 5. CONTRACTOR TO COORDINATE INDIVIDUAL DOOR HARDWARE WITH OWNER PRIOR TO ORDERING

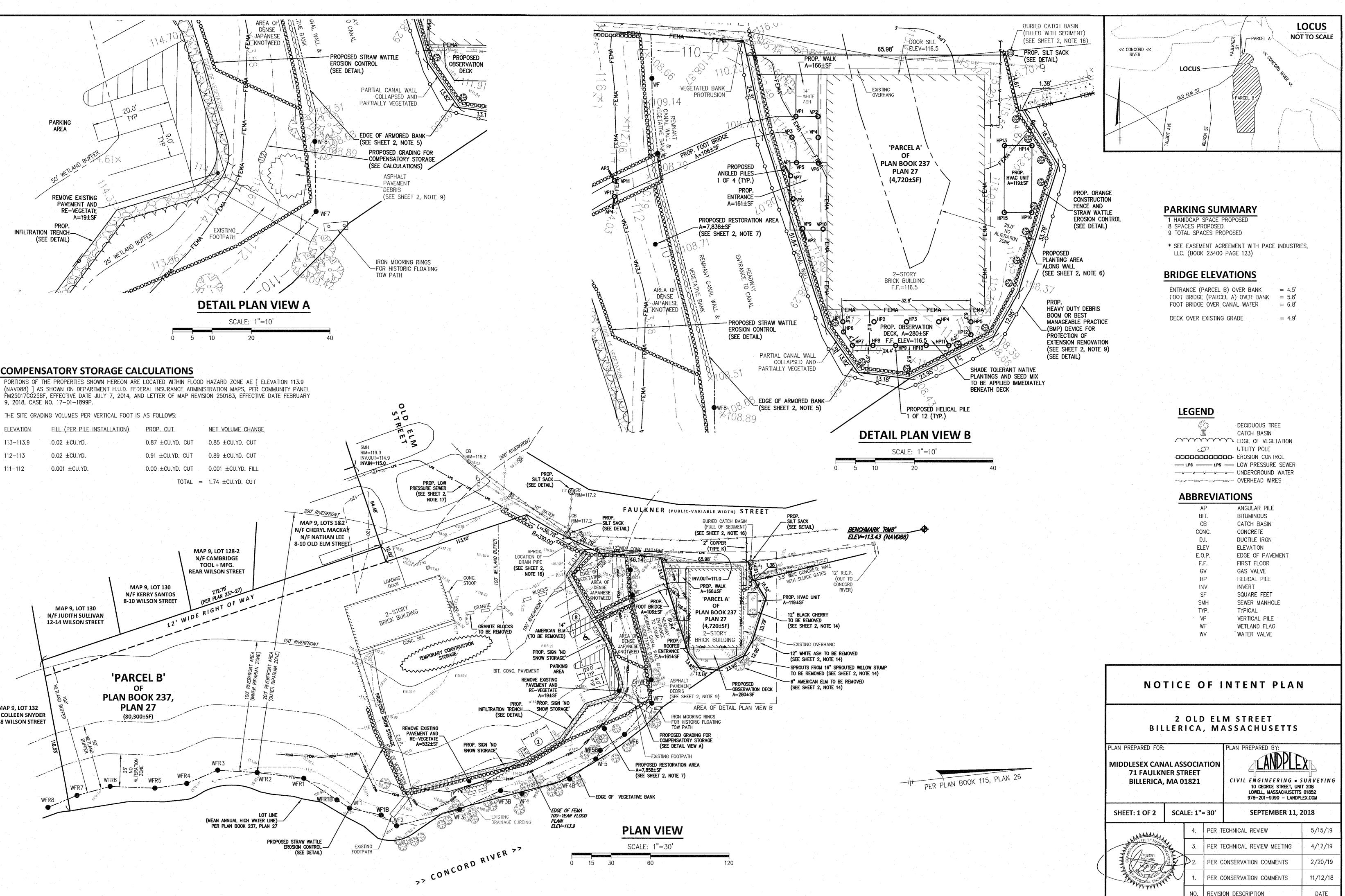
New Aspł Wall Finish

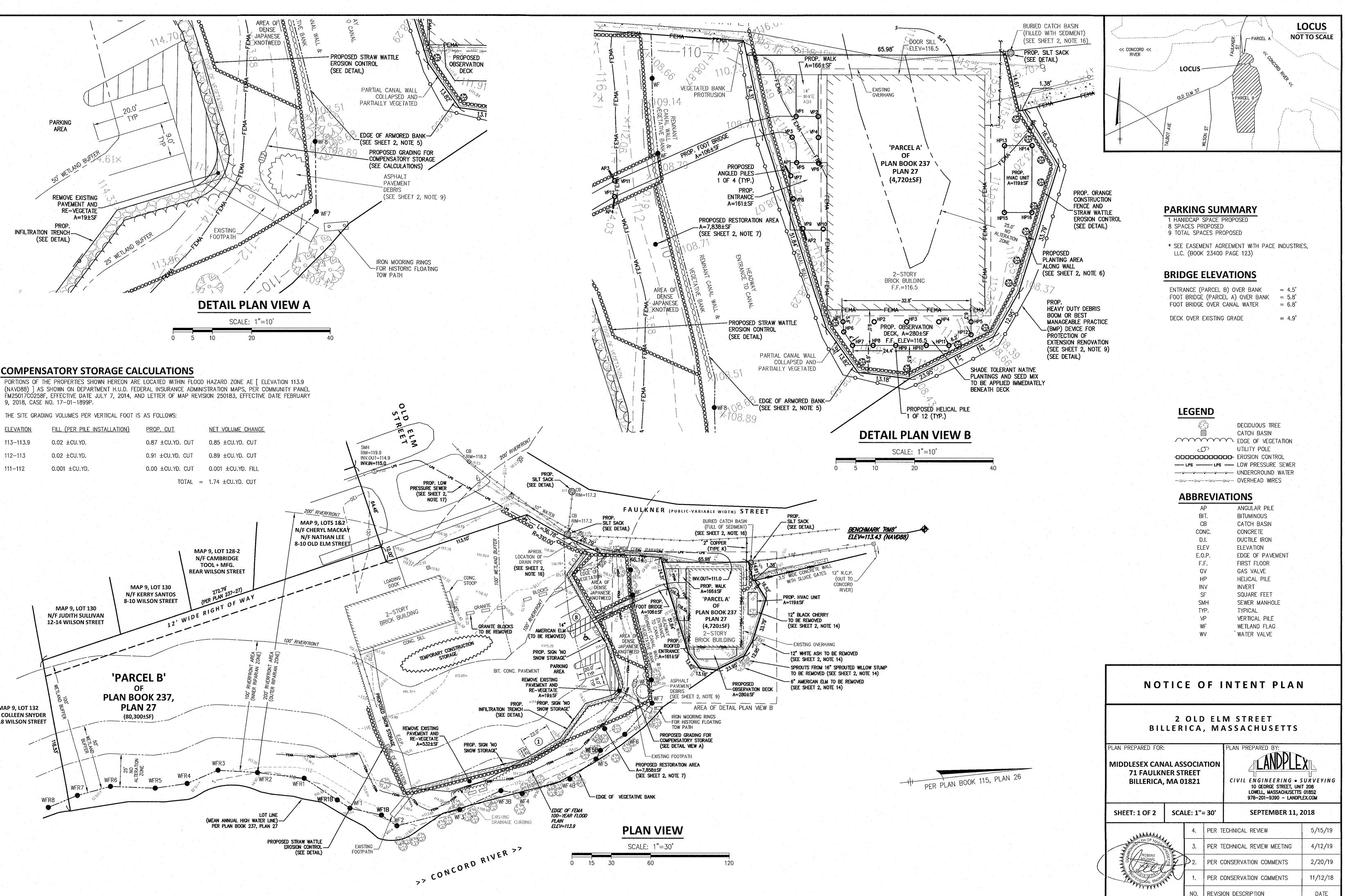
		Sheet		Sheet Issue	
		Number	Sheet Name	Date	
		1-COVEF		1	
		T001		03/28/2019	
		T002 2-CIVIL	SHEET LIST, SCHEDULES & GENERAL NOTES	03/28/2019	
		1 of 2	NOTICE OF INTENT PLAN	05/05/2019	
		2 of 2	DETAIL SHEET	05/05/2019	
		3-STRUC		1	
		S-1	FOUNDATION PLAN	04/02/2019	
		S-2 S-3	FRAMING PLAN FRAMING PLAN	04/02/2019	
		S-4	FRAMING PLAN	04/02/2019	
		S-5	SECTIONS	04/02/2019	
		S-6	SECTIONS	04/02/2019	
		S-7	DETAILS & NOTES	04/02/2019	
		S-8	DETAILS & NOTES TECTURAL	04/02/2019	
		4-Anoni A101	FIRST FLOOR PLAN	03/28/2019	
		A102	SECOND FLOOR PLAN	03/28/2019	
		A103	ATTIC PLAN	03/28/2019	
		A104	ROOF PLAN	03/28/2019	
		A111		03/28/2019	
FINISHE	S LEGEND	A112 A113	SECOND FLOOR RCP ATTIC RCP	03/28/2019	
		A110	ELEVATIONS	03/28/2019	
Existing Masonry, to be repaired and repointed as		A202	ELEVATIONS	03/28/2019	
req'd		A301	BUILDING SECTIONS	03/28/2019	
	Foundation, to be	A401	WALL SECTIONS	03/28/2019	
repaired req'd	and repointed as	A501 A502	DETAILS & ASSEMBLIES DETAILS & ASSEMBLIES	03/28/2019	
			ROTECTION	03/20/2019	
New Gypsum Interior		FP1	FIRE PROTECTION LEGEND, NARRATIVE & SPECIFICATIONS	03/28/2019	
Celling a	nd Vestibule Wall	FP2	FIRST FLOOR FIRE PROTECTION PLAN	03/28/2019	
New Wo	od	FP3	SECOND FLOOR FIRE PROTECTION PLAN	03/28/2019	
			FP4         ATTIC FIRE PROTECTION PLAN           FD5         FID5 PROTECTION DETAILS		
New Asp	halt Shingle	FP5 6-PLUME	FIRE PROTECTION DETAILS	03/28/2019	
	indit offinigio	P1	PLUMBING LEGEND & SPECIFICATIONS	03/28/2019	
		P2	FIRST FLOOR PLUMBING PLAN	03/28/2019	
		P3	SECOND FLOOR PLUMBING PLAN	03/28/2019	
		P4		03/28/2019	
		P5 7-MECHA	PLUMBING DETAILS & SCHEDULE	03/28/2019	
	Osilias Fisiah	H1	HVAC FIRST FLOOR PLAN	03/28/2019	
	Ceiling Finish	H2	HVAC SECOND FLOOR PLAN	03/28/2019	
	OWD Deinted (TDD)	H3	HVAC ATTIC FLOOR PLAN	03/28/2019	
Painted (TBD) Painted (TBD)	GWB, Painted (TBD)	H4	HVAC DETAILS & LEGEND	03/28/2019	
	GWB, Painted (TBD)	H5 8-ELECT	HVAC EQUIPMENT SCHEDULES AND SPECIFICATIONS	03/28/2019	
	GWB, Painted (TBD)	8-ELECT E1	RICAL ELECTRICAL LEGEND & SPECIFICATIONS	03/28/2019	
	N/A	E1 E2	ONE-LINE DIAGRAM, SCHEDULES & DETAILS	03/28/2019	
Painted (TBD)	N/A	E3	FIRST FLOOR POWER PLAN	03/28/2019	
	N/A N/A	E4	FIRST FLOOR LIGHTING PLAN	03/28/2019	
Painted (TBD)/		E5	SECOND FLOOR POWER PLAN	03/28/2019	
All Counters		E6	SECOND FLOOR LIGHTING PLAN	03/28/2019	
	N/A	E7 E8	ATTIC POWER PLAN ATTIC LIGHTING PLAN	03/28/2019	
Painted (TBD)	GWB, Painted (TBD)	Eo FA1	FIRE ALARM LEGEND, SPECIFICATIONS, DIAGRAMS & NARRATIVE	03/28/2019	
	GWB, Painted (TBD)	FA2	FIRST FLOOR FIRE ALARM PLAN	03/28/2019	
	GWB, Painted (TBD) GWB, Painted (TBD)	FA3	SECOND FLOOR FIRE ALARM PLAN	03/28/2019	
	N/A	FA4	ATTIC FIRE ALARM PLAN	03/28/2019	
		LP1	LIGHTNING PROTECTION LEGEND, SPECIFICATIONS, DETAILS &	03/28/2019	

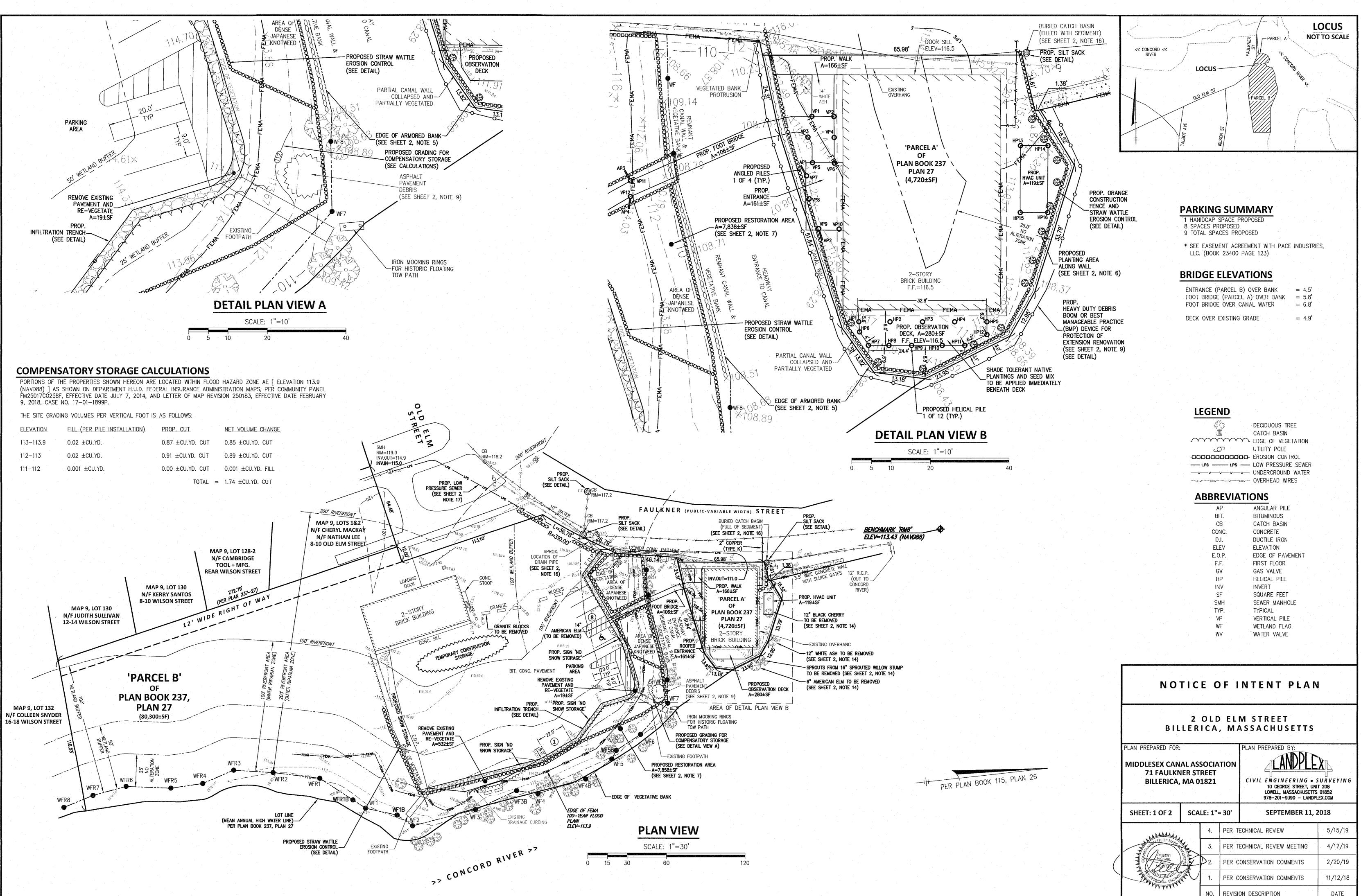
F	ixtu	re S	chec	lule

## Window Schedule









AP	ANGULAR PILE
BIT.	BITUMINOUS
CB	CATCH BASIN
CONC.	CONCRETE
D.I.	DUCTILE IRON
ELEV	ELEVATION
E.O.P.	EDGE OF PAVEMEN
F.F.	FIRST FLOOR
GV	GAS VALVE
HP	HELICAL PILE
INV	INVERT
SF	SQUARE FEET
SMH	SEWER MANHOLE
TYP.	TYPICAL
VP	VERTICAL PILE
WF	WETLAND FLAG
WV	WATER VALVE

NOTICE OF INTENT PLAN										
2 OLD ELM STREET BILLERICA, MASSACHUSETTS										
PLAN PREPARED FOR: MIDDLESEX CANAL ASSOCIATION 71 FAULKNER STREET BILLERICA, MA 01821 CIVIL ENGINEERING • SURVEYING 10 GEORGE STREET, UNIT 208 LOWELL, MASSACHUSETTS 01852 978-201-9390 - LANDPLEX.COM										
SHEET: 1 OF 2	SCA	LE: 1"=	= 30'	<b>SEPTEMBER 11, 2018</b>						
NAMANA	<b></b>		4.	PER T	ECHNICAL REVIEW	5/15/19				
THOP MUSS	A A	3.	PER T	ECHNICAL REVIEW MEETING	4/12/19					
RCBERT MICHAEL	SETTS	D 2.	PER C	ONSERVATION COMMENTS	2/20/19					
CARSSONAL ENGT	AU AU	1.	PER C	ONSERVATION COMMENTS	11/12/18					
· saddd		NO.	REVISI	ON DESCRIPTION	DATE					

## **GENERAL NOTES**

- 1. EXISTING CONDITIONS SHOWN FROM INSTRUMENT SURVEYS IN OCTOBER OF 2017. ELEVATIONS AND TOPOGRAPHY SHOWN HEREON REFER TO NAVD88, TRANSFERRED FROM BENCHMARK 'RM8' SHOWN ON FEMA HISTORIC COMMUNITY PANEL 250183 0003, CHISELED SQUARE ON THE NORTHEAST SIDE OF THE TOP OF A GRANITE BLOCK, AT THE SOUTHWEST END OF THE TALBOT MILL DAM NEAR FAULKNER STREE, ON THE SOUTHWEST SIDE OF THE SPILLWAY, AT GROUND LEVEL. THE PUBLISHED NGVD29 DATUM ELEVATION FOR 'RM8' IS 114.26. THE NAVD88 ELEVATION FOR 'RM8' IS 113.43. FOR THIS LOCATION, NAVD88=NGVD29-0.83'.
- 2. PORTIONS OF THE 'PARCEL B' SHOWN HEREON ARE LOCATED WITHIN FLOOD HAZARD ZONE AE [ ELEVATION 113.9 (NAVD88) ] AS SHOWN ON DEPARTMENT H.U.D. FEDERAL INSURANCE ADMINISTRATION MAPS, PER COMMUNITY PANEL FM25017C0258F, EFFECTIVE DATE JULY 7, 2014, AND LETTER OF MAP REVISION 250183, EFFECTIVE DATE FEBRUARY 9, 2018, CASE NO. 17-01-1899P.
- 3. PORTIONS OF THE PREMISES SHOWN HEREON ARE LOCATED WITHIN THE TOWN OF BILLERICA 'GREEN ENGINEERING' FLOOD PLAIN, SCALED FROM 'GREEN ENGINEERING' FLOOD MAP NUMBER 49.
- 4. UTILITIES OTHER THAN THOSE SHOWN MAY EXIST. CALL DIG-SAFE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION OR CONSTRUCTION.
- 5. WETLAND FLAGS SHOWN BY OXBOW ASSOCIATES AND FIELD LOCATED SEPTEMBER 20, 2017.
- 6. ON PARCEL A, A MIX OF 14 OR MORE LOW GROWING SHRUBS WILL BE PLANTED BETWEEN THE BUILDING AND RETAINING WALL. SPECIES WILL BE A MIX OF ARROWWOOD (VIBURNUM DENTATUM), LOWBUSH BLUEBERRY (VACCINIUM ANGUSTIFOLIUM), AND BLACK CHOKEBERRY (ARONIA MELANOCARPA), OR OTHER SUITABLE NATIVE PLANTINGS TO BE SUBSTITUTED WITH APPROVAL OF THE BILLERICA CONSERVATION COMMISSION. PLANTINGS WILL BE OF NATIVE STOCK AND 18-24"IN HEIGHT. NATIVE SEED MIX, SUCH AS NEW ENGLAND WETLANDS PLANTS' CONSERVATION WILDLIFE SEED MIX OR SIMILAR, WILL BE APPLIED TO THIS AREA AT THE RECOMMENDED RATE AND THE AREA WILL BE ALLOWED TO NATURALIZE WITH SELECTIVE PRUNING. NO TREES OR LARGE GROWING SHRUBS WILL BE PLANTED WITHIN 10 FEET OF THE WALL TO MINIMIZE STRUCTURAL DAMAGE RELATED TO ROOTS. SHADE TOLERANT NATIVE PLANTINGS SUCH AS CHRISTMAS FERN (POLYSTICHUM ACROSTICHOIDES) AND SHADE-TOLERANT SEED MIX SUCH AS NEW ENGLAND WETLAND PLANT'S SEMI-SHADE GRASS AND FORBS MIX WILL BE UTILIZED IN THE AREAS IMMEDIATELY UNDER THE OBSERVATION DECK. SEE ACCOMPANYING PLANTING PLAN SKETCH PREPARED BY OXBOW ASSOCIATES FOR ADDITIONAL DETAIL ON PARCEL A PLANTINGS AND SEED MIX APPLICATION.
- 7. ON PARCEL B, SELECTIVE CONTROL OF INVASIVE PLANTS WITHIN THE 5,135±SF EAST OF THE PARKING LOT AND WILL BE CARRIED OUT MANUALLY, WITH LIMITED SUPPLEMENTAL USE OF A GLYPHOSATE-BASED HERBICIDE, IF NECESSARY. SPECIES TO BE TARGETED INCLUDE JAPANESE KNOTWEED (FALLOPIA JAPONICA), ASIATIC BITTERSWEET (CELASTRUS ORBICULATUS), GLOSSY FALSE BUCKTHORN (FRANGULA ALNUS), MULTIFLORA ROSE (ROSA MULTIFLORA), JAPANESE BARBERRY (BERBERIS THUNGERBGII), AND PURPLE LOOSESTRIFE (LYTHRUM SALICARIA). THE 2,723±SF AREA OF DENSE JAPANESE KNOTWEED NORTH OF THE PARKING LOT WILL BE CONTROLLED PRIMARILY WITH FOLIAR SPRAYING OF A GLYPHOSATE-BASED HERBICIDE BY AN APPROVED APPLICATOR DURING THE GROWING SEASON. MATERIAL WILL BE CUT APPROXIMATELY TWO WEEKS FOLLOWING TREATMENT AND PLACED IN SEALED CONTRACTOR BAGS FOR PROPER OFF-SITE DISPOSAL. A SECOND ROUND OF HERBICIDE APPLICATION MAY BE NEEDED LATER IN THE SAME GROWING SEASON OR THE FOLLOWING GROWING SEASON TO TARGET AREAS OF RESPROUTING KNOTWEED. VINES, INCLUDING POISON IVY (TOXICODENDRON RADICANS) AND BITTERSWEET WILL BE CUT AND REMOVED WHERE FEASIBLE FROM TREES THAT ARE BEING STRANGLED BY THESE VINES IN BOTH RESTORATION AREA ZONES.
- 8. WITHIN BOTH ZONES THE RESTORATION AREA ON PARCEL B (7,858±SF), NATIVE SEED MIX, SUCH AS THAT SPECIFIED IN NOTE 6 ABOVE, WILL BE APPLIED AT THE RECOMMENDED RATE ON AREAS LEFT BARE DUE TO REMOVAL OF INVASIVES AND 532±SF PAVED AREA TO BE NATURALIZED. THE APPLICANT PROPOSES TO PLANT FORTY-FIVE (45) SHRUBS WITH A MIX OF THE FOLLOWING SPECIES: ARROWWOOD (VIBURNUM DENTATUM), LOWBUSH BLUEBERRY (VACCINIUM ANGUSTIFOLIUM), AND ALTERNATE-LEAVED DOGWOOD (SWIDA ALTERNIFLORA) IN HIGHER AREAS AND BUTTONBUSH (CEPHALANTHUS OCCIDENTALIS) IN ANY LOWER AREAS ADJACENT TO THE BANK. THE APPLICANT ALSO PROPOSES PLANTING OF FIVE (5) NATIVE TREES WITH A MIX OF RED MAPLE (ACER RUBRUM) AND SILVER MAPLE (ACER SACCHARINUM). PLANTINGS WILL BE OF NATIVE STOCK, 18-24 INCHES IN HEIGHT FOR SHRUBS AND AT LEAST 48 INCHES IN HEIGHT FOR TREES. APPROXIMATELY 25 OF THESE SHRUBS AND ALL TREE PLANTINGS WILL BE PLANTED IN THE VICINITY OF THE DENSE AREA OF KNOTWEED REMOVAL AND THE REMAINING 20 WILL BE PLANTED WITHIN THE AREA OF MANUAL, SELECTIVE INVASIVE CONTROL. OTHER NATIVE SPECIES MAY BE SUBSTITUTED DEPENDING UPON AVAILABILITY AND APPROVAL OF THE BILLERICA CONSERVATION COMMISSION. SEE ACCOMPANYING PLANTING PLAN SKETCH FROM OXBOW ASSOCIATES FOR ADDITIONAL DETAIL ON RESTORATION AREA (PARCEL B) PLANTINGS AND SEED MIX APPLICATION.
- 9. A BOOM INCLUDING A SILT CURTAIN WILL BE DEPLOYED AS DEPICTED ON THE ACCOMPANYING NOTICE OF INTENT PLAN, WITHIN THE RIVER AND CANAL TO PREVENT CONSTRUCTION MATERIALS FROM ENTERING THE RIVER AND BEING CARRIED DOWNSTREAM. THE BOOM WILL BE REGULARLY INSPECTED AND CLEARED OF ANY ACCUMULATED MATERIALS.
- 10. ASPHALT PAVEMENT DEBRIS TO BE REMOVED AND AREA TO BE RE-GRADED FOR COMPENSATORY STORAGE. THIS AREA IS WITHIN THE DESIGNATED RESTORATION AREA AND WILL RECEIVE SEED MIX AND NATIVE PLANTINGS AS SPECIFIED ABOVE AND IN THE ACCOMPANYING PLANTING PLAN SKETCH.
- 11. GREEN ENGINEERING FLOOD PLAIN APPROXIMATELY EQUIVALENT TO FEMA 100-YEAR FLOOD PLAIN PER DISCUSSION WITH BILLERICA BOARD OF HEALTH.
- 12. SPACING BETWEEN PLANKS OF THE DECK TO BE 1/4 INCH WIDE FOR LIGHT PENETRATION AND DRAINAGE.
- 13. HELICAL PILES HP1, HP5, HP6, HP12 TO BE INSTALLED IN PHASE 1 TO PROVIDE SOIL TEST RESULTS. RESULTS OF PHASE 1 WILL BE PROVIDED THE BILLERICA CONSERVATION COMMISSION.
- 14. TREE REMOVAL WILL CONSIST OF CUTTING TO STUMP AT GRADE. ASSOCIATED ROOT SYSTEM TO REMAIN.
- 15. SEE ACCOMPANYING PLANTING PLAN SKETCH FROM OXBOW ASSOCIATES FOR ADDITIONAL DETAIL ON PARCEL A PLANTINGS AS WELL AS PARCEL B (RESTORATION AREA) PLANTINGS.
- 16. CONTRACTOR TO REMOVE SEDIMENTATION AND FLUSH LINE FROM EXISTING CATCH BASIN AND DRAINAGE PIPES.
- 17. EROSION CONTROL TO BE INSTALLED AROUND THE LOW PRESSURE SEWER AND WATER LINE TRENCHES.

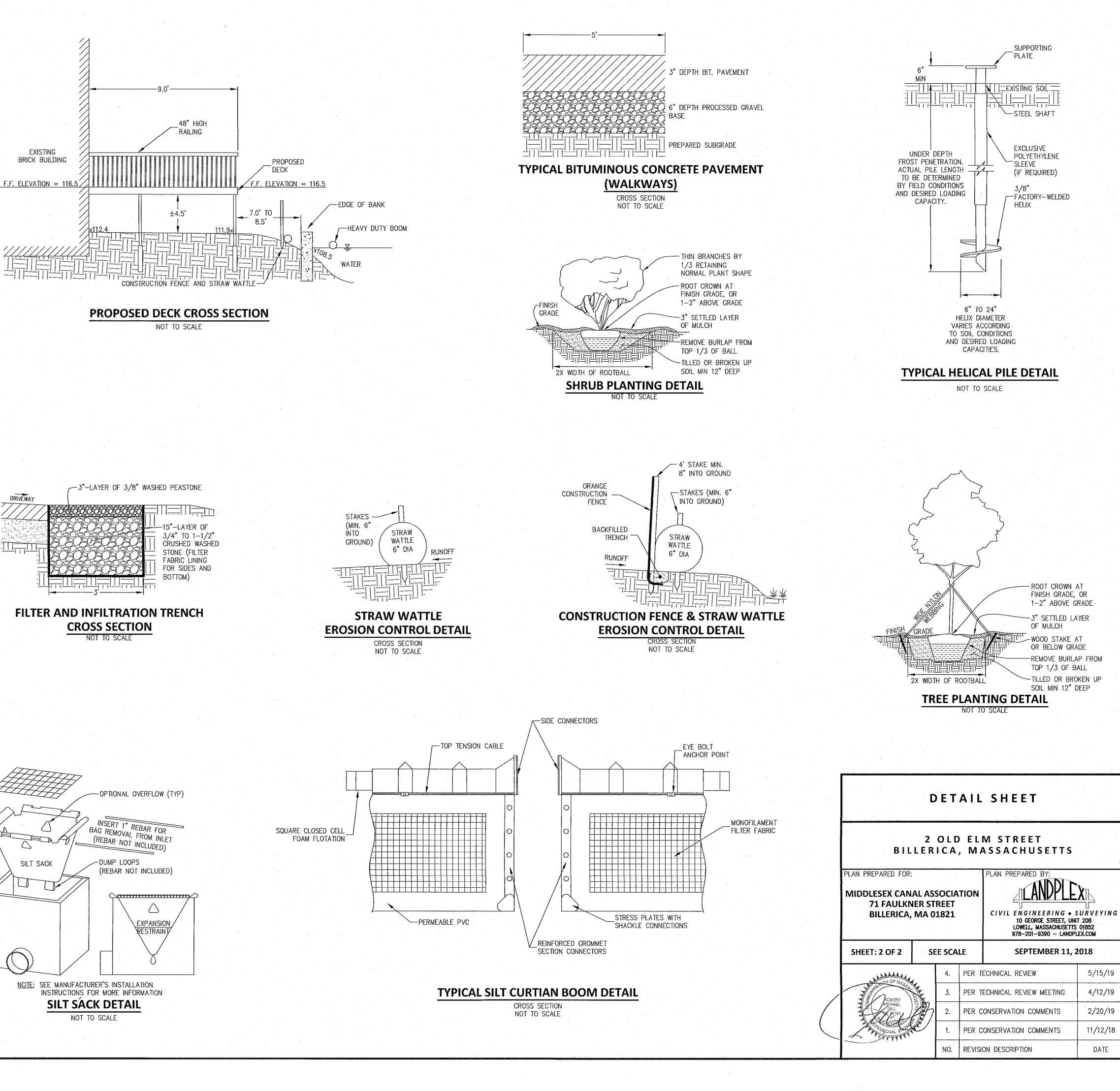
## CONSERVATION NOTES

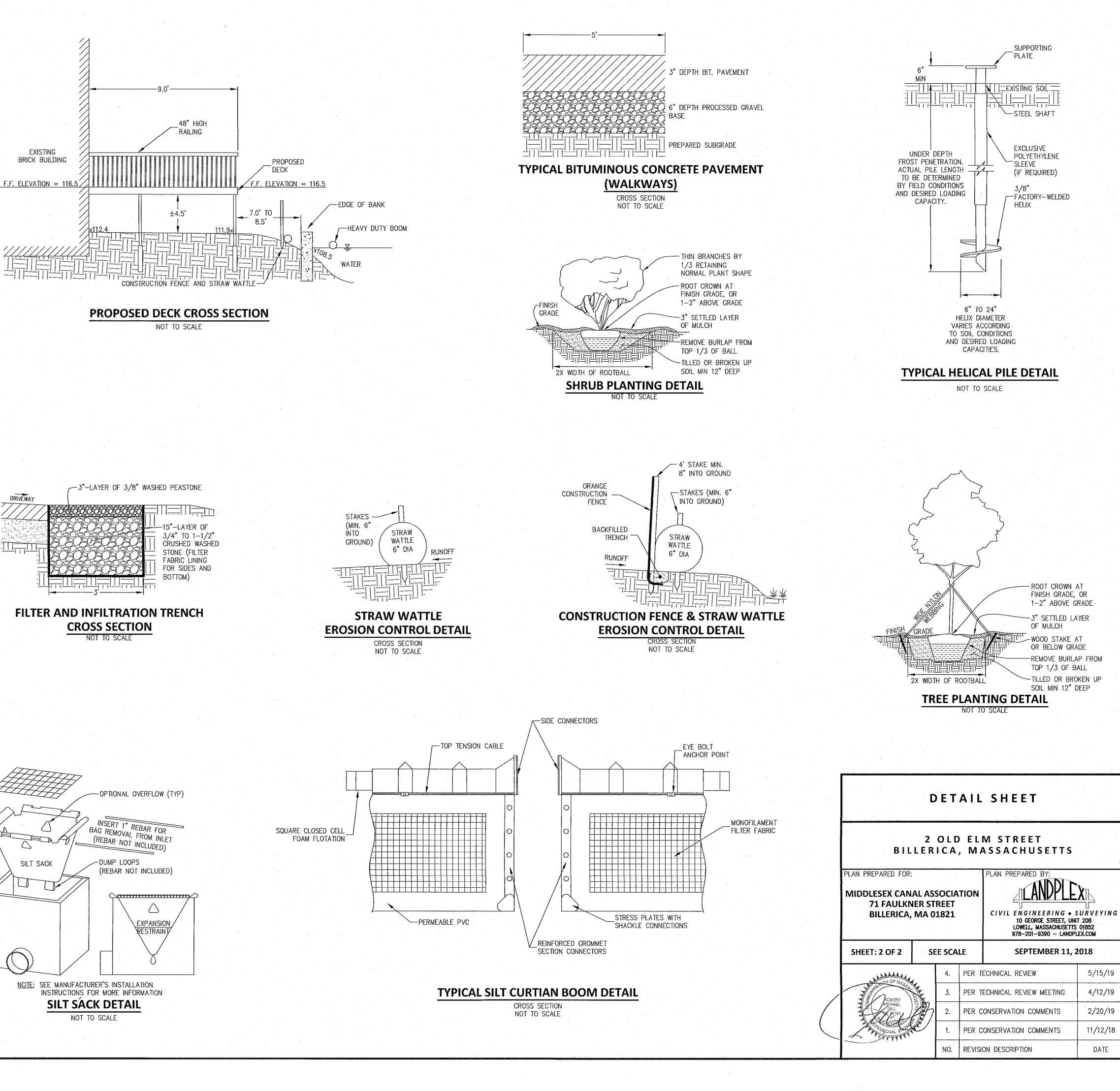
	PARCEL A	PARCEL B
LOT AREA:	4,720 ±SF	80,300 ±SF
0'-25' BUFFER ZONE AREA: EXISTING IMPERVIOUS AREA: PROPOSED CHANGE IN IMPERVIOUS AREA: PROPOSED IMPERVIOUS AREA:	'	21,625 ±SF 730 ±SF - <b>371 ±SF *</b> <b>359 ±SF</b>
25'-50' BUFFER ZONE AREA:	707 ±SF	13,914 ±SF
EXISTING IMPERVIOUS AREA:	655 ±SF	5,456 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	<b>0 ±SF</b>	<b>34 ±SF</b>
PROPOSED IMPERVIOUS AREA:	655 ±SF	<b>5,490 ±SF</b>
50'-100' BUFFER ZONE AREA:	N/A	25,710 ±SF
EXISTING IMPERVIOUS AREA:	N/A	12,346 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	<b>N/A</b>	<b>0 ±SF</b>
PROPOSED IMPERVIOUS AREA:	N/A	12,346 ±SF
0'-100' RIVERFRONT AREA:	4,720 ±SF	57,191 ±SF
EXISTING IMPERVIOUS AREA:	2,760 ±SF	14,641 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	<b>726 ±SF</b>	<b>-337 ±SF</b>
PROPOSED IMPERVIOUS AREA:	<b>3,486 ±SF</b>	<b>14,304 ±SF</b>
100'-200' RIVERFRONT AREA:	N/A	22,860 ±SF
EXISTING IMPERVIOUS AREA:	N/A	13,607 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	<b>N/A</b>	0 ±SF
PROPOSED IMPERVIOUS AREA:	N/A	13,607 ±SF

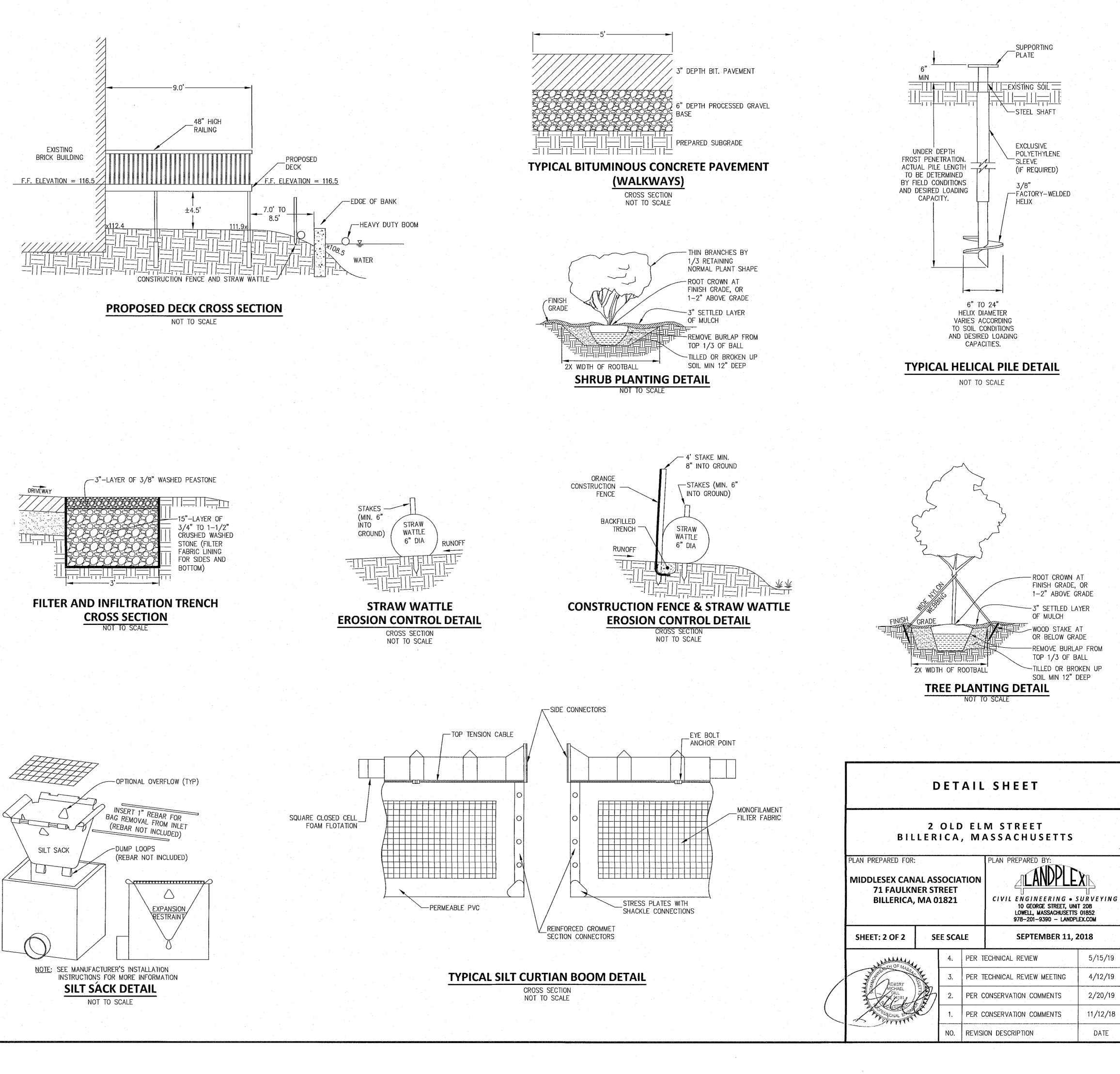
\* TO REMOVE AREAS OF EXISTING PAVEMENT AND RE-VEGETATE

AREA OF PILES = 0.03 SF TOTAL AREA OF PILES = 0.84 SF

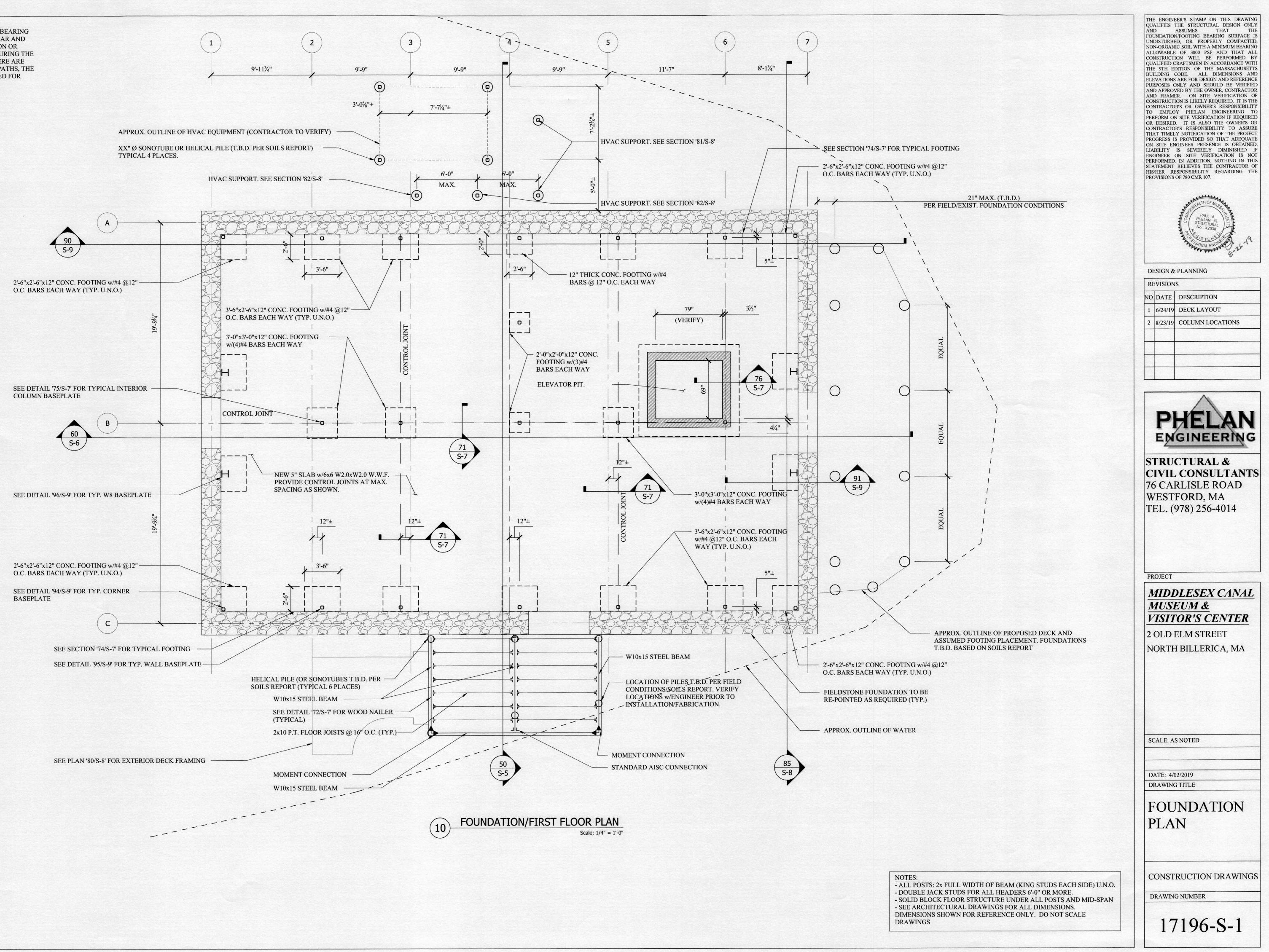
ANTHROPOGENIC MATERIALS, INCLUDING REFUSE AND ROTTING TELEPHONE POLE, AND ISOLATED CLUMPS OF ASPHALT WILL BE REMOVED.





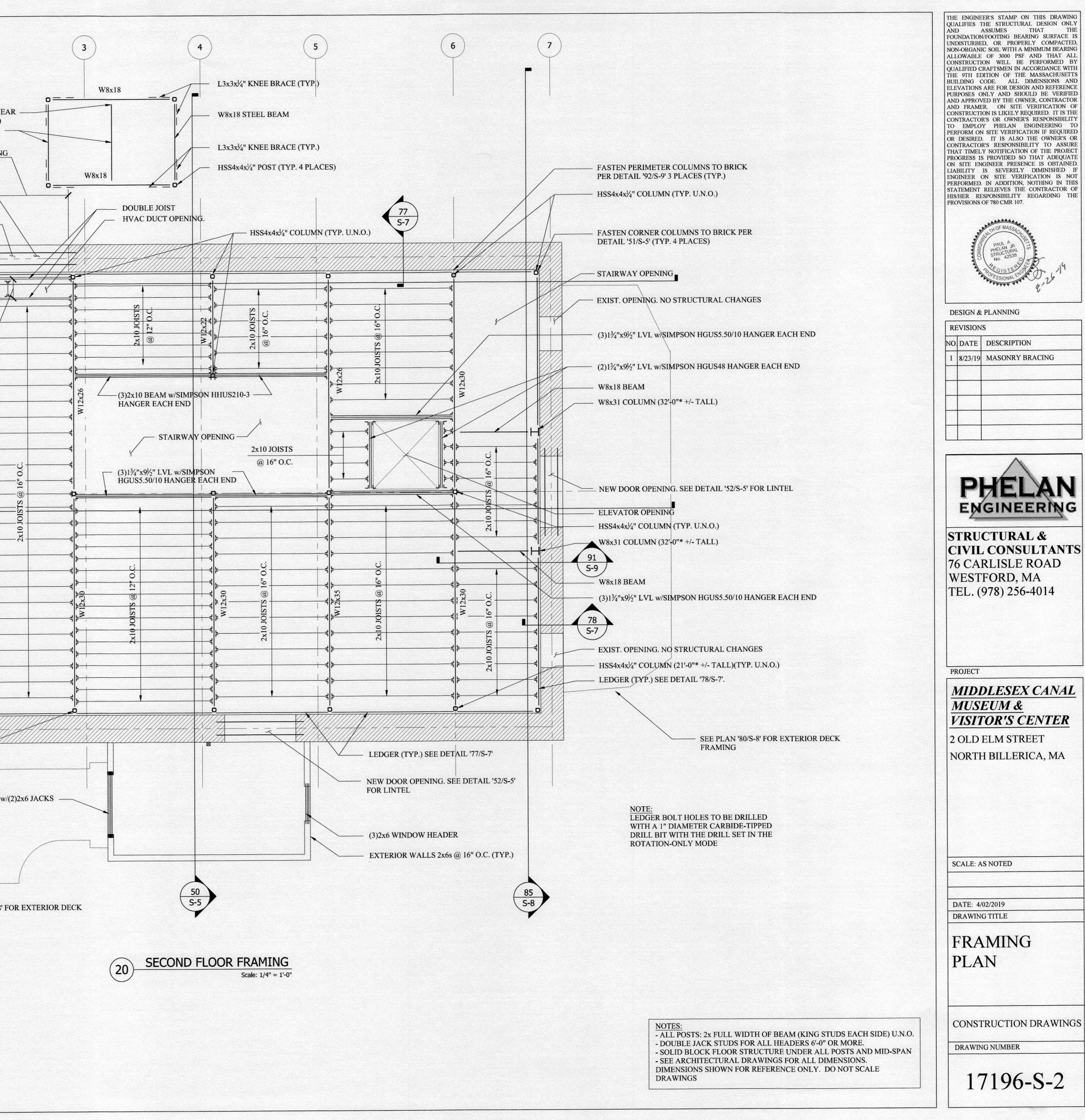


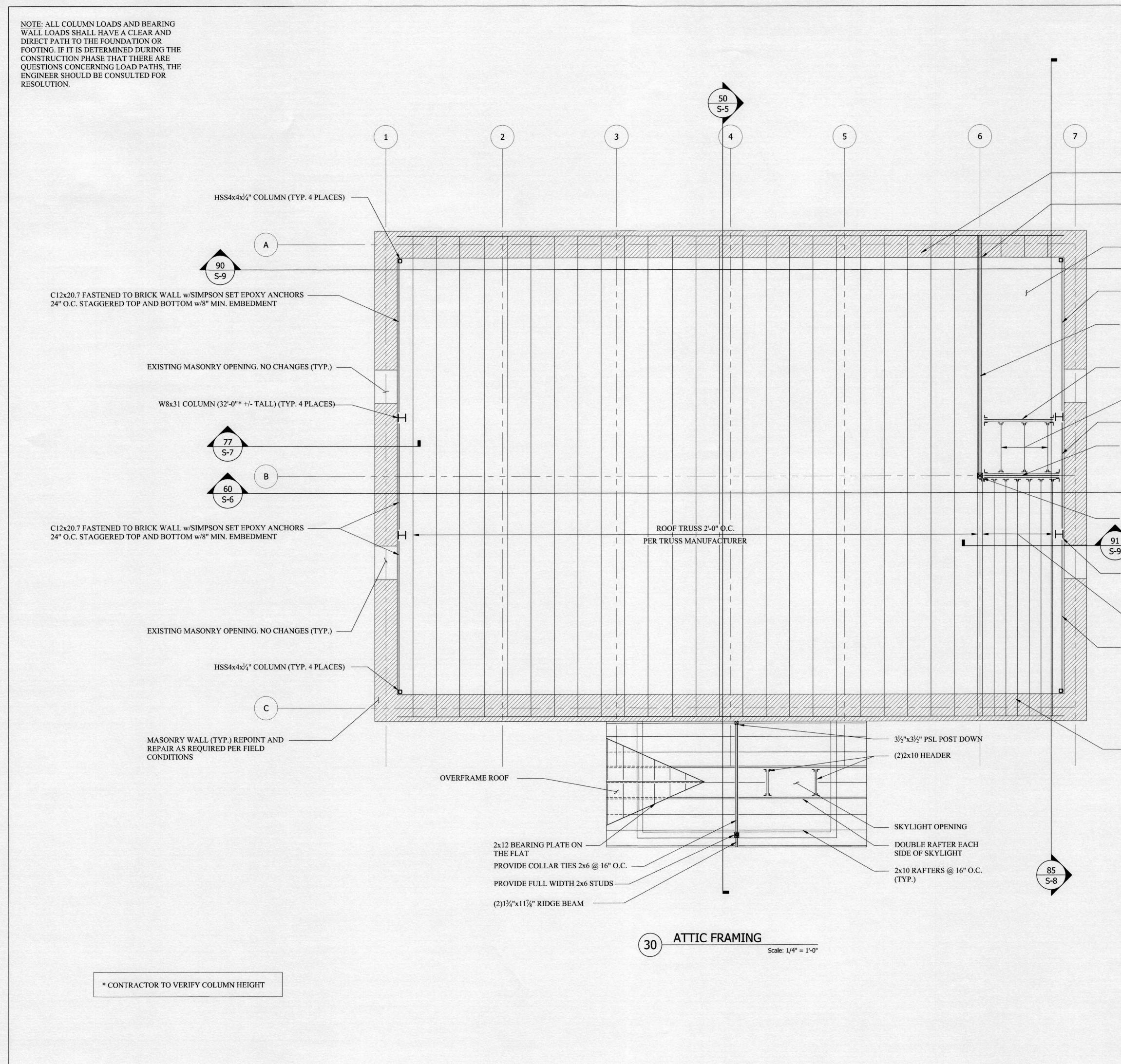
NOTE: ALL COLUMN LOADS AND BEARING WALL LOADS SHALL HAVE A CLEAR AND DIRECT PATH TO THE FOUNDATION OR FOOTING. IF IT IS DETERMINED DURING THE CONSTRUCTION PHASE THAT THERE ARE **QUESTIONS CONCERNING LOAD PATHS, THE** ENGINEER SHOULD BE CONSULTED FOR **RESOLUTION.** 



WALL LOADS SHALL HAVE A CLEAR AND DIRECT PATH TO THE FOUNDATION OR FOOTING. IF IT IS DETERMINED DURING THE CONSTRUCTION PHASE THAT THERE ARE QUESTIONS CONCERNING LOAD PATHS, THE			(2)
ENGINEER SHOULD BE CONSULTED FOR RESOLUTION.			STANDARD AIS CONNECTION ( W8x18 STEEL E
			7'-0" MAX. VERIFY O
		EXPANDED OPENI	w/HVAC CONTRAC
		DURING CONSTRU WITH MASONRY T WIDTH PER OWNE	O DESIRED
			OPENING. SEE DETAIL
	LEDGER (TYP.) SEE DETAIL '78/S-7'	'52/S-5' FOR LINTE	L ////////////////////////////////////
	A (A)		
	90 S-9		
	EXIST. OPENING. NO STRUCTURAL CHANGES		U U
			-0. 
	HSS4x4x <sup>1</sup> / <sub>4</sub> " COLUMN (TYP. U.N.O.)	-	8
	SEE DETAIL '72/S-7' FOR WOOD		2x10 JOISTS
	NAILER (TYP.) W8x18 BEAM	<b> </b>	5 5 1
	W8x31 COLUMN (32'-0"* +/- TALL)		
<b>\</b>			
BNI	EXPANDED OPENING FOR ACCESS	 ₽	
OPEN	WIDTH PER OWNER/CONTRACTOR		یر او
9-0" MAX. OPENING	60		2×10 JOISTS
.06	S-6 NEW TEMPORARY OPENING. SEE		2x10
	DETAIL '52/S-5' FOR LINTEL.		
	W8x31 COLUMN (32'-0"* +/- TALL) W8x18 BEAM		
	HSS4x4x¼" COLUMN (TYP. U.N.O.)		e. 0. C.
	EXIST. OPENING. NO STRUCTURAL	<u>∖</u>	
	LEDGED (TYD) SEE DETAIL 179/S 7		
	LEDGER (TYP.) SEE DETAIL '78/S-7'. ——		2×10 JOISTS
	( <b>c</b> )		
	STANDARD JOIST HANGER (TYP.)		
	HSS4x4x¼" COLUMN (TYP. U.N.O.) ——		(3)2x8 HEA EACH ENI
			SEE PLAN ' FRAMING

\* CONTRACTOR TO VERIFY COLUMN HEIGHT

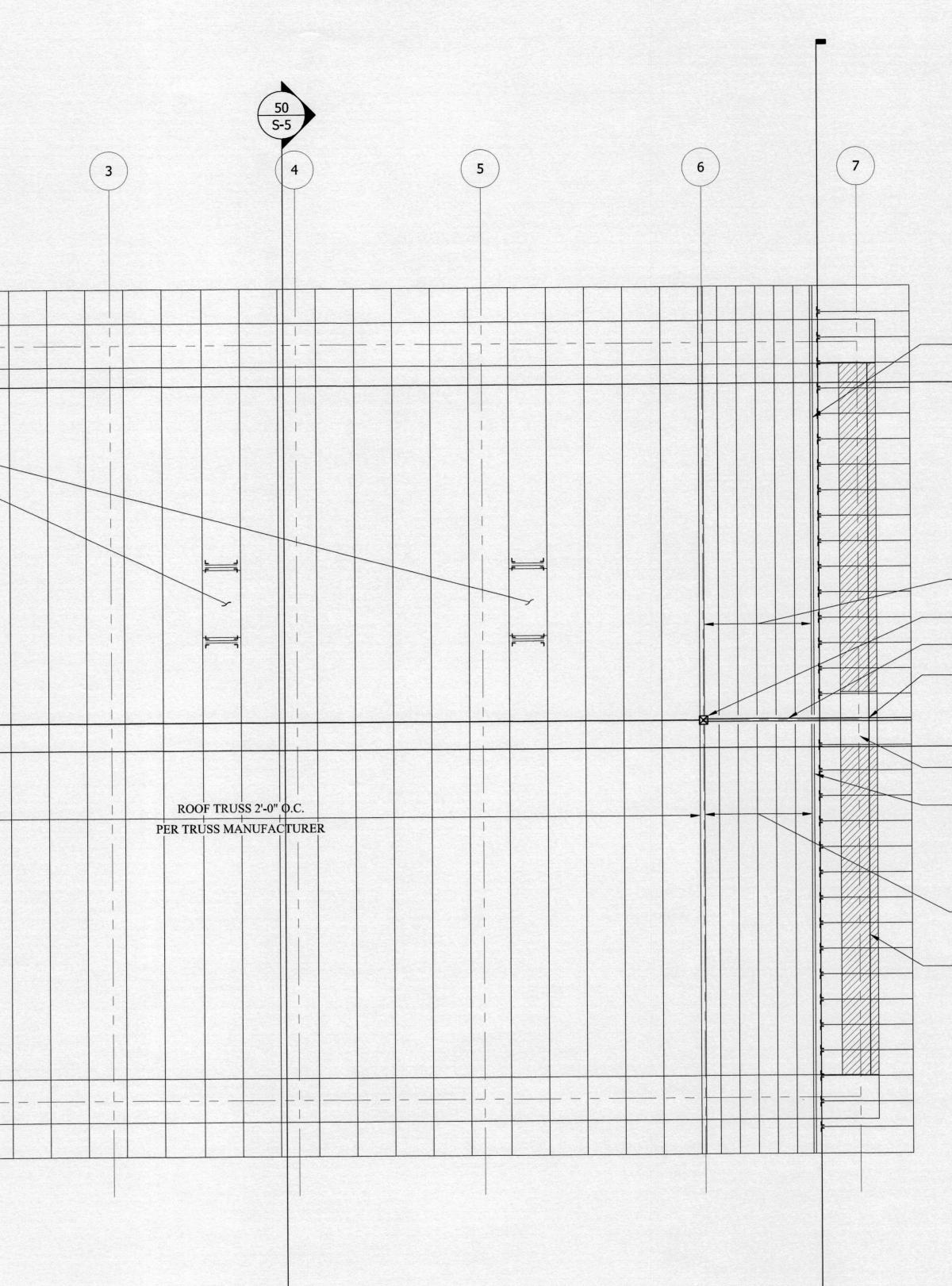




	THE ENGINEER'S STAMP ON THIS DRAWING QUALIFIES THE STRUCTURAL DESIGN ONLY AND ASSUMES THAT THE
	FOUNDATION/FOOTING BEARING SURFACE IS UNDISTURBED, OR PROPERLY COMPACTED,
	NON-ORGANIC SOIL WITH A MINIMUM BEARING ALLOWABLE OF 3000 PSF AND THAT ALL CONSTRUCTION WILL BE PERFORMED BY
	QUALIFIED CRAFTSMEN IN ACCORDANCE WITH THE 9TH EDITION OF THE MASSACHUSETTS BUILDING CODE. ALL DIMENSIONS AND
	ELEVATIONS ARE FOR DESIGN AND REFERENCE PURPOSES ONLY AND SHOULD BE VERIFIED
	AND APPROVED BY THE OWNER, CONTRACTOR AND FRAMER. ON SITE VERIFICATION OF CONSTRUCTION IS LIKELY REQUIRED. IT IS THE
	CONTRACTOR'S OR OWNER'S RESPONSIBILITY TO EMPLOY PHELAN ENGINEERING TO
	PERFORM ON SITE VERIFICATION IF REQUIRED OR DESIRED. IT IS ALSO THE OWNER'S OR CONTRACTOR'S RESPONSIBILITY TO ASSURE
	THAT TIMELY NOTIFICATION OF THE PROJECT PROGRESS IS PROVIDED SO THAT ADEQUATE ON SITE ENGINEER PRESENCE IS OBTAINED.
(2)2-12 DT DEADBIC DIATE EASTENED TO	LIABILITY IS SEVERELY DIMINISHED IF ENGINEER ON SITE VERIFICATION IS NOT
– (2)2x12 P.T. BEARING PLATE FASTENED TO MASONRY WALL	PERFORMED. IN ADDITION, NOTHING IN THIS STATEMENT RELIEVES THE CONTRACTOR OF HIS/HER RESPONSIBILITY REGARDING THE
– NOTCH 14" DEEP LVL TO 9½" AT MASONRY	PROVISIONS OF 780 CMR 107.
WALL	
	NEALTH OF MASS
– STAIR AND LANDINGS PER CONTRACTOR AND M.B.C. 9TH EDITION	PAUL A. PHELAN JR. STRUCTURAL
AND M.B.C. 9TH EDITION	S STRUCTURAL No. 42538
	SSIONAL ENGINE
<ul> <li>C12x20.7 FASTENED TO BRICK WALL w/SIMPSON SET EPOXY ANCHORS</li> <li>24" O.C. STAGGERED TOP AND BOTTOM w/8" MIN. EMBEDMENT</li> </ul>	DESIGN & PLANNING
	REVISIONS
$(3)1\frac{3}{4}$ "x14" LVL	NO. DATE DESCRIPTION
	1 8/23/19 MASONRY BRACING
(2)1 <sup>3</sup> / <sub>4</sub> "x9 <sup>1</sup> / <sub>2</sub> " LVL w/SIMPSON HGUS48	
HANGER EACH END	
FLOOR JOISTS 2x10s @ 16" O.C.	
- C12x20.7 FASTENED TO BRICK WALL w/SIMPSON SET EPOXY ANCHORS 24" O.C. STAGGERED TOP AND BOTTOM w/8" MIN. EMBEDMENT	
(3)1 <sup>3</sup> / <sub>4</sub> "x9 <sup>1</sup> / <sub>2</sub> " LVL w/SIMPSON	
HGUS5.50/10 HANGER EACH END	
	PHELAN
	ENGINEERING
5¼"x5¼" PSL POST ALIGNED OVER STEEL COLUMN BELOW	STRUCTURAL &
	CIVIL CONSULTANTS76 CARLISLE ROAD
	WESTFORD, MA
- W8x31 COLUMN (32'-0"* +/- TALL) (TYP. 4 PLACES)	TEL. (978) 256-4014
FLOOR JOISTS 1-3/4"x9-1/2" LVLS @ 12" O.C.	
- C12x20.7 FASTENED TO BRICK WALL w/SIMPSON SET EPOXY ANCHORS	
24" O.C. STAGGERED TOP AND BOTTOM w/8" MIN. EMBEDMENT	PROJECT
	MIDDLESEX CANAL
	MUSEUM &
	VISITOR'S CENTER
	2 OLD ELM STREET
	NORTH BILLERICA, MA
– (2)2x12 P.T. BEARING PLATE FASTENED TO MASONRY WALL	
	SCALE: AS NOTED
	DATE: 4/02/2019
	DRAWING TITLE
	FRAMING
	PLAN
	FLAN
NOTES:	CONSTRUCTION DRAWINGS
- ALL POSTS: 2x FULL WIDTH OF BEAM (KING STUDS EACH SIDE) U.N - DOUBLE JACK STUDS FOR ALL HEADERS 6'-0" OR MORE.	I.O.
<ul> <li>SOLID BLOCK FLOOR STRUCTURE UNDER ALL POSTS AND MID-SPA</li> <li>SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS.</li> </ul>	AN DRAWING NUMBER
DIMENSIONS SHOWN FOR REFERENCE ONLY. DO NOT SCALE DRAWINGS	17106 0 0
	17196-S-3

NOTE: ALL COLUMN LOADS AND BEARING WALL LOADS SHALL HAVE A CLEAR AND DIRECT PATH TO THE FOUNDATION OR FOOTING. IF IT IS DETERMINED DURING THE CONSTRUCTION PHASE THAT THERE ARE QUESTIONS CONCERNING LOAD PATHS, THE ENGINEER SHOULD BE CONSULTED FOR **RESOLUTION.** 

	1	2
90 S-9		
SKYLIGHT OPENING (TYPICAL 3 PLACES)		
60 S-6		
(2)2x12 P.T. BEARING PLATE FASTENED TO MASONRY WALL		
MASONRY WALL (TYP.) REPOINT AND REPAIR AS REQUIRED PER FIELD CONDITIONS		
C		
2x8 LADDER FRAMING @ 16" O.C. (TYPICAL)		
STANDARD JOIST HANGER (TYPICAL)		







Scale: 1/4" = 1'-0"

 $-(2)1\frac{3}{4}$ "x9<sup>1</sup>/<sub>2</sub>" LVL RAFTER

1-3/4"x9-1/2" LVL RAFTERS @ 12" O.C.

— 3½"x3½" PSL POST

— (2)1¾"x14" LVL RIDGE BEAM

- LVL RIDGE BEAM BEAR AND FASTEN TO P.T. TOP PLATE.

 VERIFY CONDITION AND CAPACITY OF EXISTING HEADER BELOW — (3)2x12 RAFTER

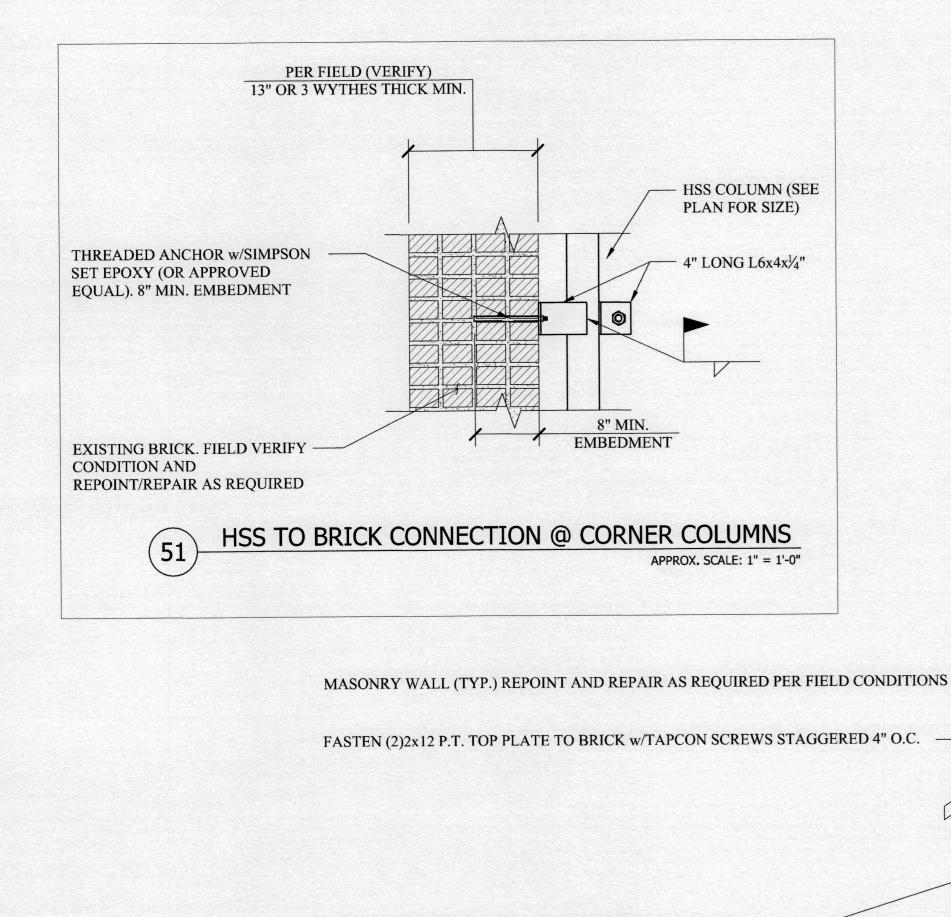
1-3/4"x9-1/2" LVL RAFTERS @ 12" O.C.

— (2)2x12 P.T. BEARING PLATE FASTENED TO MASONRY WALL

> NOTES: - ALL POSTS: 2x FULL WIDTH OF BEAM (KING STUDS EACH SIDE) U.N.O. DOUBLE JACK STUDS FOR ALL HEADERS 6'-0" OR MORE.
> SOLID BLOCK FLOOR STRUCTURE UNDER ALL POSTS AND MID-SPAN - SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS. DIMENSIONS SHOWN FOR REFERENCE ONLY. DO NOT SCALE DRAWINGS

BUILDING	IC SOIL WITH A MINIMUM BEARING E OF 3000 PSF AND THAT ALL ION WILL BE PERFORMED BY CRAFTSMEN IN ACCORDANCE WITH
ELEVATIONS	DITION OF THE MASSACHUSETTS CODE. ALL DIMENSIONS AND S ARE FOR DESIGN AND REFERENCE DNLY AND SHOULD BE VERIFIED
AND APPRO AND FRAM CONSTRUCT	VED BY THE OWNER, CONTRACTOR ER. ON SITE VERIFICATION OF ION IS LIKELY REQUIRED. IT IS THE
TO EMPLO PERFORM O	R'S OR OWNER'S RESPONSIBILITY DY PHELAN ENGINEERING TO N SITE VERIFICATION IF REQUIRED D. IT IS ALSO THE OWNER'S OR
CONTRACTO THAT TIMEI PROGRESS 1	R'S RESPONSIBILITY TO ASSURE Y NOTIFICATION OF THE PROJECT S PROVIDED SO THAT ADEQUATE
ON SITE EN LIABILITY ENGINEER	NGINEER PRESENCE IS OBTAINED. IS SEVERELY DIMINISHED IF ON SITE VERIFICATION IS NOT IN ADDITION, NOTHING IN THIS
STATEMENT HIS/HER R	RELIEVES THE CONTRACTOR OF ESPONSIBILITY REGARDING THE OF 780 CMR 107.
	PAUL A. PHELAN JR. STRUCTURAL
	P. P. 242550
	TOTESSIONAL ENGINE
	2 PLANNING
REVISION	JS DESCRIPTION
STRU CIVII 76 CA WEST	HELAN GINEERING CTURAL & CONSULTANTS RLISLE ROAD FORD, MA
STRU CIVII 76 CA WEST	CTURAL & CONSULTANTS RLISLE ROAD
STRU CIVII 76 CA WEST	CTURAL & L CONSULTANTS RLISLE ROAD FORD, MA
STRU CIVII 76 CA WEST	CTURAL & CONSULTANTS RLISLE ROAD (978) 256-4014
STRU CIVII 76 CA WEST TEL. ( PROJECT	CTURAL & CONSULTANTS RLISLE ROAD FORD, MA (978) 256-4014 DLESEX CANAL
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NOTE: ALL COLUMN LOADS AND BEARING WALL LOADS SHALL HAVE A CLEAR AND DIRECT PATH TO THE FOUNDATION OR FOOTING. IF IT IS DETERMINED DURING THE CONSTRUCTION PHASE THAT THERE ARE QUESTIONS CONCERNING LOAD PATHS, THE ENGINEER SHOULD BE CONSULTED FOR **RESOLUTION.** 



COLUMN TO BRICK CONNECTION (SEE DETAIL '92/S-9')

5'-0"± (VERIFY w/HVAC CONTRACTOR)

Α

X

2'-0"± (VERIFY)

APPROX. OUTLINE OF HVAC DUCTS. SEE PLAN '10/S-1' FOR SUPPORT INFORMATION. SUPPORTS SHOWN -----FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL LOCATIONS PER T.B.D. PER HVAC CONTRACTOR APPROX. OUTLINE OF RTU (CONTRACTOR TO VERIFY DIMENSIONS PRIOR TO STEEL -FRAME FRABRICATION)

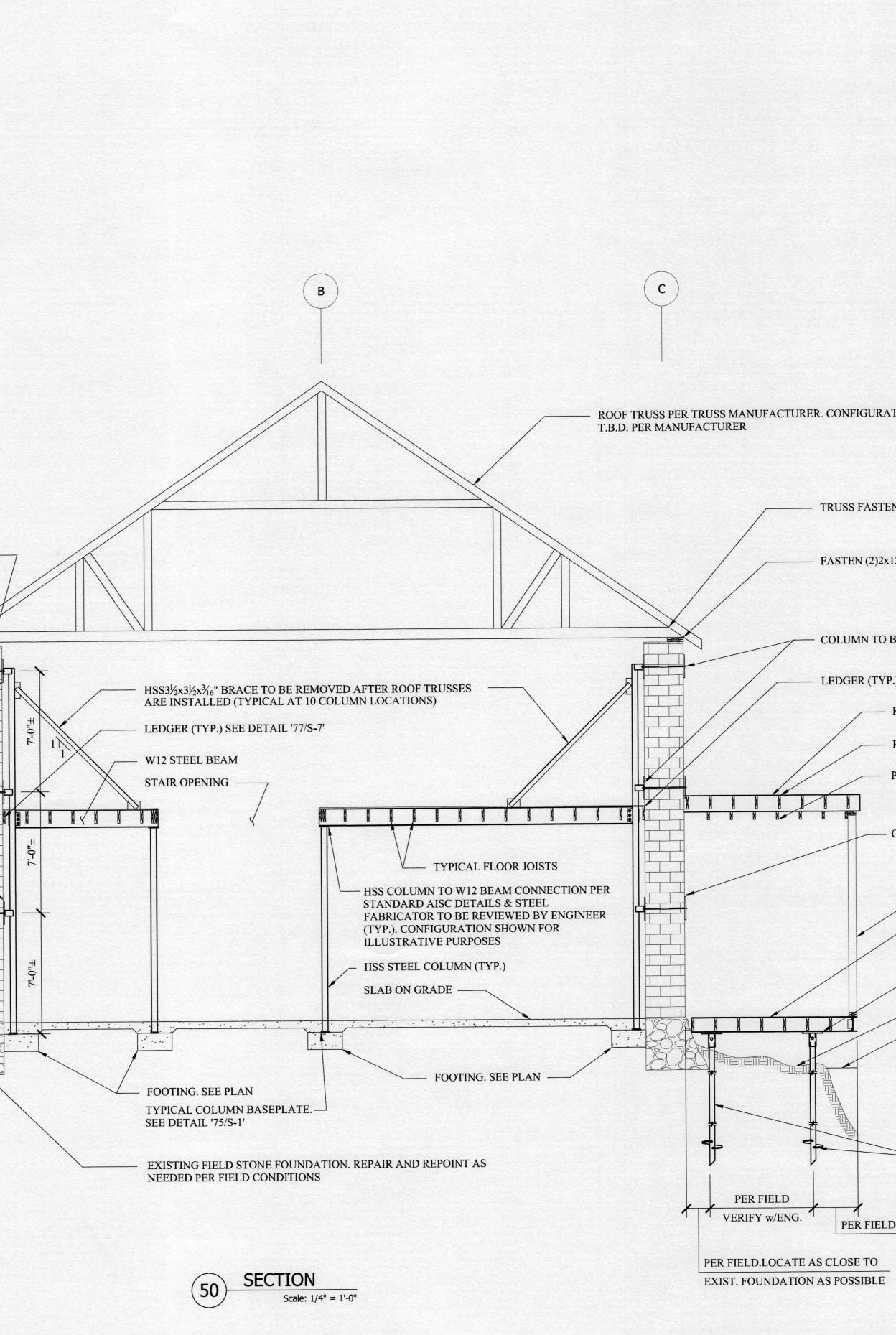
STEEL FRAME (SEE PLAN) ----

L3x3x<sup>1</sup>/<sub>4</sub>" ANGLE BRACE (TYPICAL) – HSS4x4x<sup>1</sup>/<sub>4</sub>" POST (TYPICAL 4 PLACES) -FINISH GRADE

4-0,

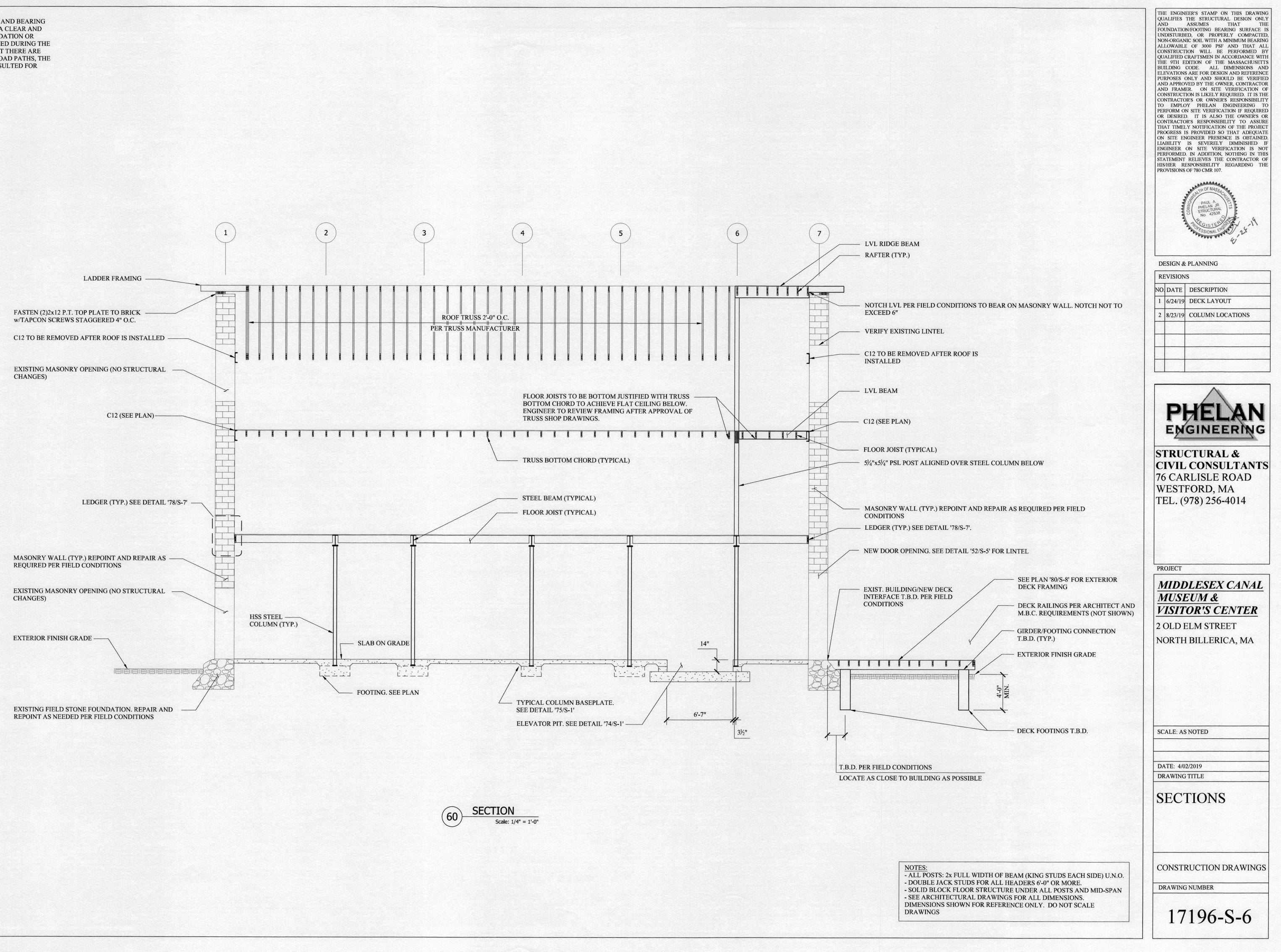
- HELICAL PILE GENERAL NOTES

   1. HELICAL PILES SHALL BE GOLIATHTECH OR APPROVED EQUAL BY THE ENGINEER
   2. THE ALLOWABLE TENSION OR COMPRESSION CAPACITY OF THE MECHANICAL
- SPLICES SHALL EQUAL OR EXCEED THE ULTIMATE CAPACITY OF THE PILE.
   THE INSTALLATION OF THE AUGER-INSTALLED STEEL PILE MUST BE CARRIED OUT AS PER THE MANUFACTURER'S INSTRUCTIONS.
- 4. THE ANCHORS MUST BE SCREWED A MINIMUM OF 4'-0" BELOW GROUND. 5. THE ANCHOR IS ROTATED INTO THE GROUND WITH SUFFICIENT APPLIED DOWNWARD
- PRESSURE TO ADVANCE THE ANCHOR ONE PITCH DISTANCE PER REVOLUTION.



W8x3 MININ END ½" TH FALS MASC	TNG MASONRY WALL TNG MASONRY WALL STEEL LINTEL w/8" AUM BEARING EACH ROUGH BOLT @24" O.C. E BRICK OR LINTEL (PER N/ARCHITECT) ICK PLATE STITCH WELDED DTTOM FLANGE OF W8S. H PER FIELD MASONRY LINTEL APPROX. SCALE: 1" = 1'-0"	THE ENGINEER'S STAMP ON THIS DRAWN QUALIFIES THE STRUCTURAL DESIGN ON AND ASSUMES THAT T FOUNDATION/FOOTING BEARING SURFACE UNDISTURBED, OR PROPERLY COMPACTIN NON-ORGANIC SOIL WITH A MINIMUM BEARIN ALLOWABLE OF 3000 PSF AND THAT A CONSTRUCTION WILL BE PERFORMED TO QUALIFIED CRAFTSMEN IN ACCORDANCE WIT THE 9TH EDITION OF THE MASSACHUSET BUILDING CODE. ALL DIMENSIONS AT ELEVATIONS ARE FOR DESIGN AND REFEREN PURPOSES ONLY AND SHOULD BE VERIFI AND APPROVED BY THE OWNER, CONTRACTOR AND FRAMER. ON SITE VERIFICATION CONSTRUCTION IS LIKELY REQUIRED. IT IS T CONTRACTOR'S OR OWNER'S RESPONSIBILIT TO EMPLOY PHELAN ENGINEERING PERFORM ON SITE VERIFICATION IF REQUIR OR DESIRED. IT IS ALSO THE OWNER'S CONTRACTOR'S RESPONSIBILITY TO ASSU THAT TIMELY NOTIFICATION OF THE PROFE PROGRESS IS PROVIDED SO THAT ADEQUA ON SITE ENGINEER PRESENCE IS OBTAIN LIABILITY IS SEVERELY DIMINISHED ENGINEER ON SITE VERIFICATION IS N STATEMENT RELIEVES THE CONTRACTOR HIS/HER RESPONSIBILITY REGARDING TO PROVISIONS OF 780 CMR 107.
RATION SHOV	VN FOR ILLUSTRATIVE PURPOSES ONLY ACTUAL CONFIGURATION	DESIGN & PLANNING          REVISIONS         NO. DATE       DESCRIPTION         1       8/23/19       MASONRY BRACING
	OP PLATE PER TRUSS MANUFACTURER PLATE TO BRICK w/TAPCON SCREWS STAGGERED 4" O.C.	PHELAN
TYP.) SEE DETA — RIDGE BEA — RAFTERS (	M (SEE PLAN)	ENGINEERING STRUCTURAL & CIVIL CONSULTANT 76 CARLISLE ROAD WESTFORD, MA TEL. (978) 256-4014
— COLUMN T	O BRICK CONNECTION (SEE DETAIL '92/S-9')	
	<ul> <li>2x6 EXTERIOR WALL</li> <li>W10 STEEL BEAM (SEE PLAN). STEEL TO BE GALVANIZED IF EXPOSED</li> <li>PILE WELDED TO BOTTOM FLANGE OF W10 PER MANUFACTURER'S RECOMMENDATIONS.</li> <li>FINISH GRADE</li> <li>WATER</li> </ul>	PROJECT MIDDLESEX CANA MUSEUM & VISITOR'S CENTER 2 OLD ELM STREET NORTH BILLERICA, MA
ELD D	- GOLITHTECH SCREW PILE w/5%6" MINIMUM HELIX. MINIMUM APPLIED TORQUE PER CONTRACTOR TO ACHIEVE 15 KIP BEARING CAPACITY AND 5 KIP TENSION CAPACITY (TYPICAL)	SCALE: AS NOTED DATE: 4/02/2019 DRAWING TITLE SECTIONS
	NOTES: - ALL POSTS: 2x FULL WIDTH OF BEAM (KING STUDS EACH SIDE) U.N.O. - DOUBLE JACK STUDS FOR ALL HEADERS 6'-0" OR MORE. - SOLID BLOCK FLOOR STRUCTURE UNDER ALL POSTS AND MID-SPAN - SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS. DIMENSIONS SHOWN FOR REFERENCE ONLY. DO NOT SCALE DRAWINGS	CONSTRUCTION DRAWING DRAWING NUMBER 17196-S-5

NOTE: ALL COLUMN LOADS AND BEARING WALL LOADS SHALL HAVE A CLEAR AND DIRECT PATH TO THE FOUNDATION OR FOOTING. IF IT IS DETERMINED DURING THE CONSTRUCTION PHASE THAT THERE ARE QUESTIONS CONCERNING LOAD PATHS, THE ENGINEER SHOULD BE CONSULTED FOR **RESOLUTION.** 



#### **GENERAL NOTES**

#### 1. FOUNDATIONS:

- A) ALL FOOTINGS SHALL BEAR ON UNDISTURBED, VIRGIN SOIL HAVING A MINIMUM BEARING CAPACITY OF 4000 PSF (POUNDS PER SQUARE FOOT). B) THE BOTTOM ELEVATION OF EXTERIOR FOOTINGS SHALL BE A MINIMUM OF 4'-0" BELOW OUTSIDE GRADE. LOWER FOOTINGS AS REQUIRED TO
- REACH SOIL PROVIDING THE REQUIRED BEARING CAPACITY. D) ALL FOOTING EXCAVATIONS SHALL BE FINISHED BY HAND AND SHALL BE
- THOROUGHLY COMPACTED PRIOR TO FORMING FOOTINGS. E) ALL FOUNDATION WALLS SHALL BE BACKFILLED EVENLY ON BOTH SIDES TO PREVENT UNBALANCED LOADINGS.
- F) ALL BACKFILL USED INSIDE THE BUILDING SHALL BE WELL-GRADED
- GRAVEL WHICH SHALL BE THOROUGHLY COMPACTED IN 8" LAYERS. G) ALL CONCRETE SHALL BE PLACED IN DRY EXCAVATIONS. PUMP AWAY GROUND WATER AS REQUIRED.
- 2. CONCRETE:
- A) ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS UNLESS OTHERWISE SPECIFIED HEREIN, NOTED ON THE DRAWINGS, OR REQUIRED BY ACI.
- B) EXTERIOR FOOTINGS, PIERS, WALLS, ETC. SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS WITH A MAXIMUM WATER/CEMENT RATIO OF 0.45.
- C) MAXIMUM ALLOWABLE SLUMP OF CONCRETE SHALL NOT EXCEED 4". D) ALL CONCRETE SLABS SHALL BE CURED ACCORDING TO THE ACI SPECIFICATIONS. NOTIFY ENGINEER OF CURING METHOD AND CURING PERIOD PRIOR TO CONCRETE PLACEMENT.
- E) ALL CONCRETE WORK SHALL COMPLY WITH THE LATEST EDITION OF THE ACI "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318)" AND "CHAPTER 19" OF THE INTERNATIONAL BUILDING CODE (IBC) PER THE LATEST EDITION OF THE MASSACHUSETTS STATE BUILDING CODE (MSBC). IN CASES OF CONFLICT, THE REQUIREMENTS OF THE MSBC SHALL GOVERN.
- F) AIR-ENTRAINED CONCRETE SHALL NOT BE USED IN INTERIOR SLABS-ON-GRADE UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
- G) ALL CONCRETE SHALL BE PLACED UNDER THE SUPERVISION OF THE OWNER'S INDEPENDENT CONCRETE TESTING AGENCY.
- H) ALL KEYS SHALL BE A MINIMUM OF 2 BY 4 INCHES (NOMINAL) UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- I) NO CONCRETE SHALL BE PLACED UNTIL THE REINFORCEMENT STEEL AND/OR EMBEDDED ITEMS HAVE BEEN REVIEWED AND APPROVED BY THE ARCHITECT, OR HIS DESIGNATED REPRESENTATIVE.
- J) ALL EXPOSED EDGES AND CORNERS OF FINISHED CONCRETE WORK SHALL HAVE 3/4 INCH CHAMFERS UNLESS OTHERWISE SHOWN ON THE ARCHITECTURAL DRAWINGS.
- K) REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS AND SIZES OF ALL DOOR AND WINDOW OPENINGS, REGLETS, WASHES, SLOPES, CONCRETE FINISHES, MASONRY ANCHORS, MISCELLANEOUS EMBEDDED ITEMS AND ALL OTHER ITEMS THAT MUST BE OTHERWISE INCORPORATED INTO THE CONCRETE WORK.
- L) THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND COORDINATING ALL ELEVATIONS RELATED TO THE CONCRETE WORK WITH THE ARCHITECTURAL DRAWINGS.

#### 3. REINFORCING STEEL:

- A) ALL REINFORCING STEEL SHALL BE ASTM A615, GRADE 60, AND SHALL BE COLD BENT.
- B) DETAILING AND FABRICATION OF CONCRETE REINFORCEMENT AND RELATED ACCESSORIES SHALL BE IN ACCORDANCE WITH LATEST EDITION OF "ACI 315 - DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".
- C) WELDED WIRE FABRIC (W.W.F.) SHALL BE ASTM A-185 (Fy = 65 ksi MINIMUM). LAP ALL SPLICES 12" MINIMUM AND SECURELY FASTEN W.W.F. IN PLACE TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT. ALL W.W.F. SHALL BE FURNISHED IN FLAT SHEETS ONLY AND SHALL BE SUPPORTED ON APPROVED SLAB BOLSTERS ONLY.
- D) ALL HORIZONTAL RODS ARE CONTINUOUS. THE LENGTH OF ALL LAP SPLICES SHALL BE AS REQUIRED FOR "CLASS B" TENSION SPLICES IN ACCORDANCE WITH THE LATEST ACI CODE REQUIREMENTS, SPLICE TABLE INCLUDED ON THE DRAWINGS, OR AS OTHERWISE NOTED ON THE STRUCTURAL DRAWINGS. PROVIDE CORNER RODS AS DETAILED ON THE CONTRACT DRAWINGS. LAP ALL BEAM AND WALL TOP BARS AT MID-SPAN AND LAP ALL WALL AND BEAM BOTTOM BARS AT SUPPORTS UNLESS OTHERWISE NOTED.

PROVIDE A CLEAR COVER FROM REINFORCING STEEL TO ADJACENT CONCRETE SURFACES AS FOLLOWS:

contend is sond needs not old o	
SURFACES CAST AGAINST EARTH	: 3"
BOTTOM OF FOOTINGS:	3"
PIERS AND WALLS:	$1 \frac{1}{2}$ " at #5 and smalle
	2" at #6 and larger
FORMED SURFACES NOT EXPOSED	TO EARTH OR WEATHER:
SLABS AND WALLS:	3/4"

BEAMS and COLUMNS:	1 1/2"
SLABS ON GRADE:	$1 \frac{1}{2}$ " below top of slab
E) THESE DIMENSIONS SHALL BE CO	ONSIDERED ACTUAL AND ARE NOT TO BE

- ADJUSTED IN EITHER DIRECTION. F) ALL REINFORCING RODS AND W.W.F. SHALL BE SECURED IN PROPER
- POSITION ON CHAIRS, STANDEES, BOLSTERS, ETC. AS MANUFACTURED BY RICHMOND SCREW ANCHOR CO. OR APPROVED EQUAL. LINES OF CHAIRS, HIGH-CHAIRS AND BOLSTERS SHALL BE SPACED AT MAXIMUM 4'-0" O.C.
- 4. TIMBER:
- A) ALL LUMBER USED SHALL BE S-P-F (SPRUCE-PINE-FIR) NO. 2 (EXCEPT FOR PRESSURE TREATED LUMBER), AND SHALL BEAR THE STAMP OF THE APPROVING GRADING AGENCY. ALL FRAMING LUMBER USED ON THE PROJECT SHALL BE KILN DRIED LUMBER AND SHALL BE STORED OFF THE GROUND AND COVERED WITH WATERPROOF SHEETING TO PROTECT IT FROM WEATHER.
- B) ALL WOOD IN CONTACT WITH MASONRY OR CONCRETE SHALL BE PRESERVATIVE TREATED LUMBER. PRESERVATIVE TREATED LUMBER SHALL BE SOUTHERN YELLOW PINE
- C) FASTEN LUMBER SECURELY TO ALL SUPPORTS. D) ALL PLYWOOD SHALL BE APA CD EXTERIOR GRADE UNLESS OTHERWISE
- NOTED. SEE DRAWING FOR THICKNESSES. E) ALL TIMBER FRAMING SHALL COMPLY WITH THE NDS (NATIONAL DESIGN
- SPECIFICATION) AND ALL APPLICABLE BUILDING CODES. F) ALL JOIST HANGERS AND OTHER METAL ACCESSORIES USED FOR
- ATTACHING STRUCTURAL COMPONENTS TOGETHER SHALL BE AS MANUFACTURED BY "SIMPSON/STRONG TIE COMPANY". IF THE TYPE OR

SIZE OF HANGER IS NOT SPECIFIED ON THE DRAWINGS, HARDWARE CONSISTENT WITH INDUSTRY STANDARDS SHALL BE USED PENDING VERIFICATION OF ADEQUACY WITH THE ENGINEER. HARDWARE SHALL BE INSTALLED USING THE NUMBER AND TYPE OF FASTENERS SPECIFIED BY THE MANUFACTURER FOR THAT SPECIFIC CONNECTION. SUBSTITUTIONS FOR PRODUCTS EQUAL TO THOSE MANUFACTURED BY SIMPSON SHALL BE SUBMITTED WITH FULL CATALOG DOCUMENTATION OF CONFIGURATIONS AND LOAD RATINGS. REFER TO FOLLOWING FOR REQUIREMENTS WHEN ATTACHING TO PRESSURE TREATED LUMBER.

- H) ALL METAL PLATE FRAMING CONNECTORS (i.e. TIE STRAPS, JOIST HANGERS, HOLDOWNS, HURRICANE CLIPS, POST CAPS, POST BASES, ETC.) IN DIRECT CONTACT WITH CROMATED COPPER ARSENATE (CCA-C), SODIUM BORATE (SBX), ALKALINE COPPER QUAT (ACQ-C & ACQ-D), COPPER AZOLE (CBA-A & CA-B) OR SBX w/ NaSiO2 PRESERVATIVE TREATED LUMBER SHALL HAVE HOT DIPPED GALVANIZED (G135 HDG PER ASTM A653) FINISH SUCH AS "ZMAX" FINISH BY SIMPSON STRONG-TIE, OR APPROVED EQUAL. ALL FRAMING CONNECTORS IN CONTACT WITH ANY OTHER TYPE OF PRESERVATIVE TREATMENT SHALL BE FABRICATED FROM TYPE 306 AND TYPE 316 STAINLESS STEEL. THE FASTENERS USED TO SECURE THESE CONNECTORS SHALL BE OF THE SAME FINISH AS THE CONNECTORS.
- I) ALL FASTENERS (i.e. CARRAIGE BOLTS, ANCHOR RODS, LAG BOLTS, NAILS, SCREWS, ETC.) IN DIRECT CONTACT WITH CROMATED COPPER ARSENATE (CCA-C), SODIUM BORATE (SBX), ALKALINE COPPER QUAT (ACQ-C & ACQ-D), COPPER AZOLE (CBA-A & CA-B) OR SBX w/ NaSiO2 PRESERVATIVE TREATMENTED WOOD SHALL HAVE HOT DIPPED GALVANIZED (G135 HDG PER ASTM A653) FINISH, OR APPROVED EQUAL. ALL FASTENERS IN CONTACT WITH ANY OTHER TYPE OF PRESERVATIVE TREATED WOOD SHALL BE FABRICATED FROM TYPE 306 AND TYPE 316 STAINLESS STEEL

#### 6. TJI MEMBERS:

- A) ALL TJI LUMBER SHALL BE MANUFACTURED BY BOISE CASCADE, OR APPROVED EQUAL. SUBSTITUTIONS WILL ONLY BE REVIEWED FOR USE IF ALL SUBSTITUTIONS ARE CLEARLY NOTED ON A MARKED UP PLAN AND ALL PERTINENT LOAD INFORMATION IS SUBMITTED WITH ASSOCIATED DATA BEING HIGHLIGHTED. SAID ALTERNATE DESIGN SHALL BE STAMPED BY A REGISTERED STRUCTURAL MASS. PE.
- B) THE CONTRACTOR MUST HAVE A COPY OF THE "BUILDER'S GUIDE TO THE FRAMEWORKS BUILDING SYSTEM" ON THE JOB AT ALL TIMES WHILE THE FRAMING IS BEING CONSTRUCTED.
- C) THE GENERAL NOTES LISTED IN THE "BUILDER'S GUIDE TO THE FRAMEWORKS BUILDING SYSTEM" REFERENCED IN ITEM 7B ABOVE IS HEREBY INCORPORATED IN THIS PROJECT ALONG WITH ALL ASSOCIATED DETAILS, RECOMMENDATIONS AND NOTES.
- D) PROVIDE SQUASH BLOCKS, WEB STIFFENERS ETC. WHICH ARE REQUIRED
- BY TJMC PER THEIR PROJECT SPECIFICATIONS. E) CORING OF HOLES THROUGH TJI'S SHALL CONFORM WITH THE **REQUIREMENTS SET FORTH BY TJMC. REFER TO HOLE CHART IN TJMC's** DESIGN BROCHURE FOR TJI/Pro 120TS JOISTS.

### 7. LAMINATED VENEER LUMBER (DESIGNATED AS "LVL" ON DRAWINGS) A) ALL LAMINATED VENEER LUMBER SHALL BE MANUFACTURED BY BOISE

- CASCADE, OR APPROVED EQUAL.
- B) ALL LAMINATED VENEER LUMBER (LVL) SHALL HAVE THE FOLLOWING ALLOWABLE DESIGN PROPERTIES: Fb = 2,900 PSI
- Fv = 290 PSI
- E = 2,000,000 PSI
- C) FASTEN MULTIPLE MEMBER LAMINATED VENEER BEAMS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
- D) THE GENERAL CONTRACTOR AND THIS SUBCONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER OF RECORD (S.E.R.) OF ANY AND ALL CUTS, CORED HOLES AND NOTCHES OTHER THAN THOSE INDICATED ON THE APPROVED SHOP DRAWINGS SO THE S.E.R. CAN REVIEW THE MODIFICATIONS PRIOR TO INSTALLATION.

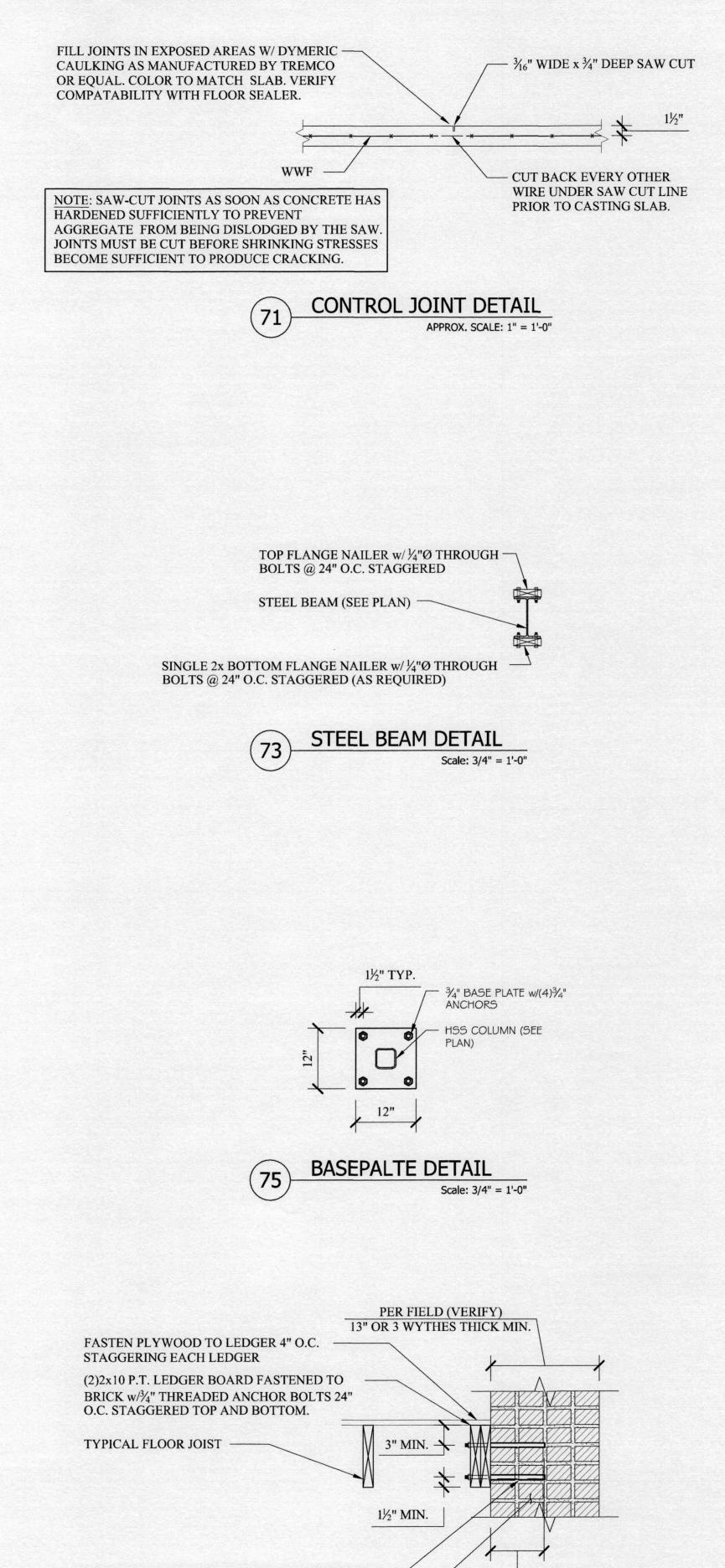
#### 8. STRUCTURAL STEEL:

- A) ALL STRUCTURAL STEEL ROLLED SHAPES, PLATES, BARS, AND "HSS" HOLLOW STRUCTURAL SECTIONS SHALL CONFORM TO THE FOLLOWING:
- ASTM A992 (Fy = 50 ksi): ASTM A500 - GRADE B:
- ASTM A36 (Fy = 36 ksi): B) ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST A.I.S.C. SPECIFICATIONS. CONNECTIONS AT HSS MEMBERS SHALL BE DESIGNED AND DETAILED TO CONFORM WITH THE LATEST EDITION OF THE A.I.S.C. "HOLLOW STRUCTURAL SECTIONS CONNECTION MANUAL." SUBMIT SHOP DRAWINGS FOR REVIEW BY THE STRUCTURAL ENGINEER. DO NOT REPRODUCE
- STRUCTURAL DRAWINGS FOR SHOP DRAWING PURPOSES. C) ALL WELDED CONNECTIONS SHALL BE MADE USING E70XX ELECTRODES. WELDING SHALL COMPLY WITH A.I.S.C. AND A.W.S. SPECIFICATIONS AND SHALL BE PERFORMED BY A.W.S. CERTIFIED WELDERS. WELD SIZES NOT INDICATED ON THE DRAWINGS SHALL BE MINIMUM WELD SIZES, AS REQUIRED BY THE A.I.S.C., BASED ON THE THICKNESS OF THE THICKER MEMBER IN THE CONNECTION.
- D) ALL CONNECTION PLATES SHALL BE MINIMUM 3/8" THICKNESS UNLESS OTHERWISE NOTED ON THE DRAWINGS. PROVIDE ALL STIFFENER PLATES IN BEAMS, GIRDERS, COLUMNS, ETC. WHERE INDICATED ON THE DRAWINGS.

#### 9. MISCELLANEOUS:

- A) THE GENERAL CONTRACTOR SHALL VERIFY ALL DETAILS AND DIMENSIONS WELL IN ADVANCE OF THE WORK TO PREVENT DELAYS IF ADJUSTMENTS HAVE TO BE MADE AND TO AFFORD AMPLE TIME TO ADJUST LAYOUT IF SO WARRANTED. NOTIFY ENGINEER OF ANY DISCREPANCIES.
- B) ALL WORK SHALL COMPLY WITH THE LATEST EDITION OF THE MASSACHUSETT STATE BUILDING CODE.
- C) THE STRUCTURAL DRAWINGS SHALL NOT BE SCALED TO OBTAIN DIMENSIONS, OFFSETS, SPACINGS, ETC. FOR ANY STRUCTURAL FRAMING MEMBERS, FOUNDATION WALLS, ETC. WRITTEN DIMENSIONS ON THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHALL BE USED. IF A CONFLICT OR DISCREPANCY IS FOUND BETWEEN WRITTEN DIMENSIONS ON ARCHITECTURAL AND STRUCTURAL DRAWINGS, THE CONTRACTOR SHALL SUBMIT A WRITTEN "REQUEST FOR INFORMATION" TO THE STRUCTURAL ENGINEER PRIOR TO PROCEEDING WITH THE WORK.

WIDE FLANGE & STRUCTURAL TEE SHAPES SQUARE AND RECTANGULAR "HSS" ALL OTHER STRUCTURAL STEEL SHAPES



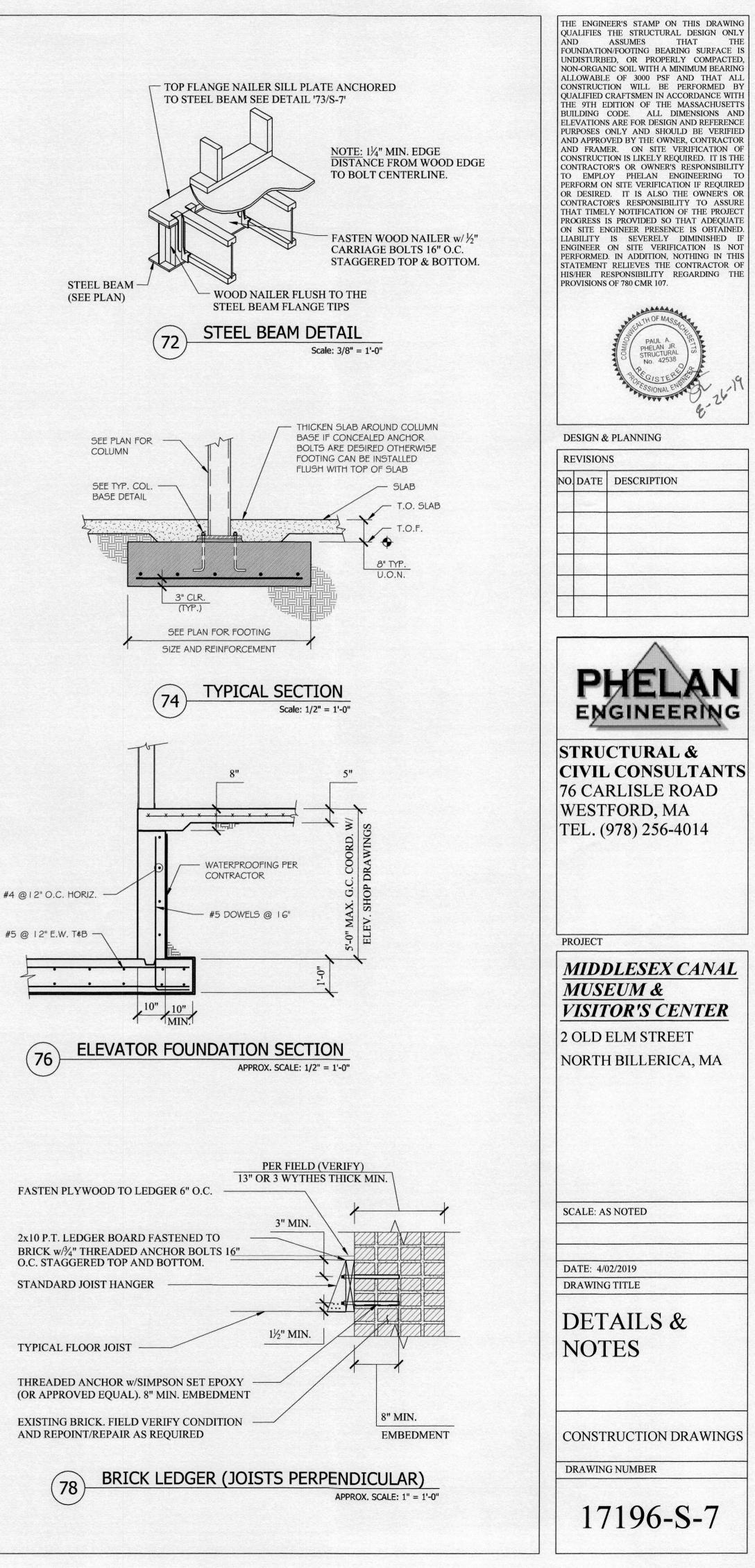
THREADED ANCHOR w/SIMPSON SET EPOXY (OR APPROVED EQUAL). 8" MIN. EMBEDMENT EXISTING BRICK. FIELD VERIFY CONDITION

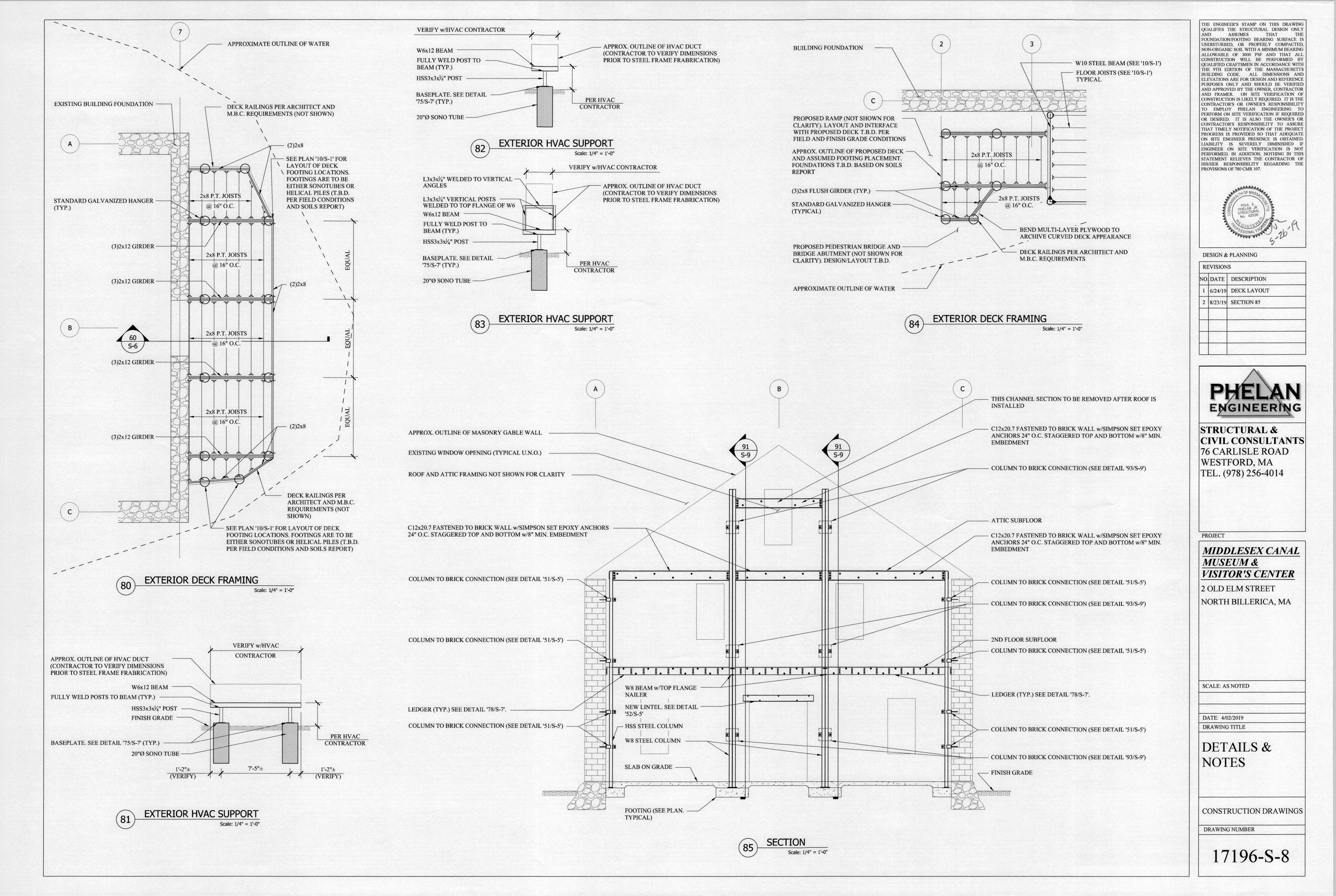
AND REPOINT/REPAIR AS REQUIRED

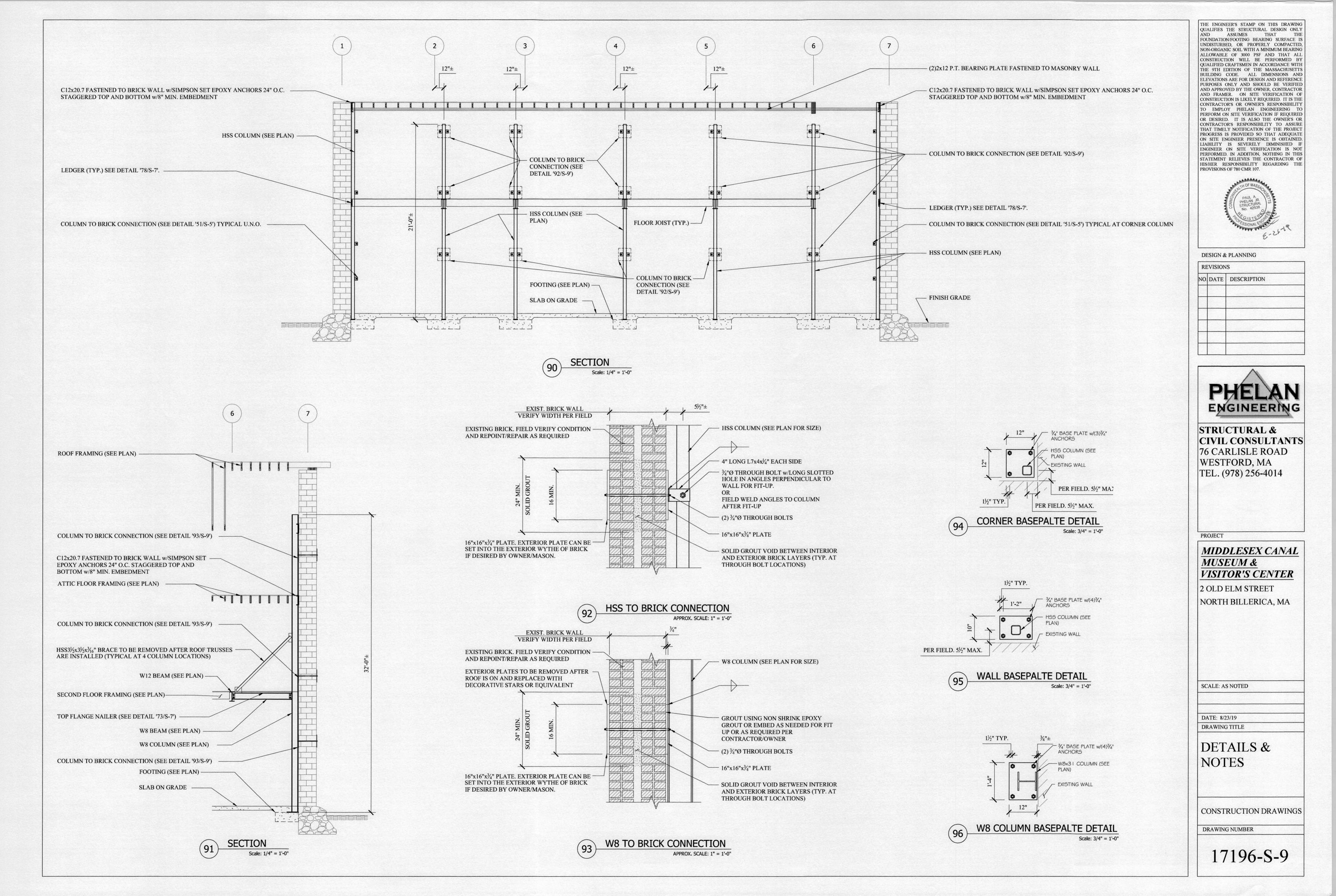
BRICK LEDGER (JOISTS PARALLEL) APPROX. SCALE: 1" = 1'-0"

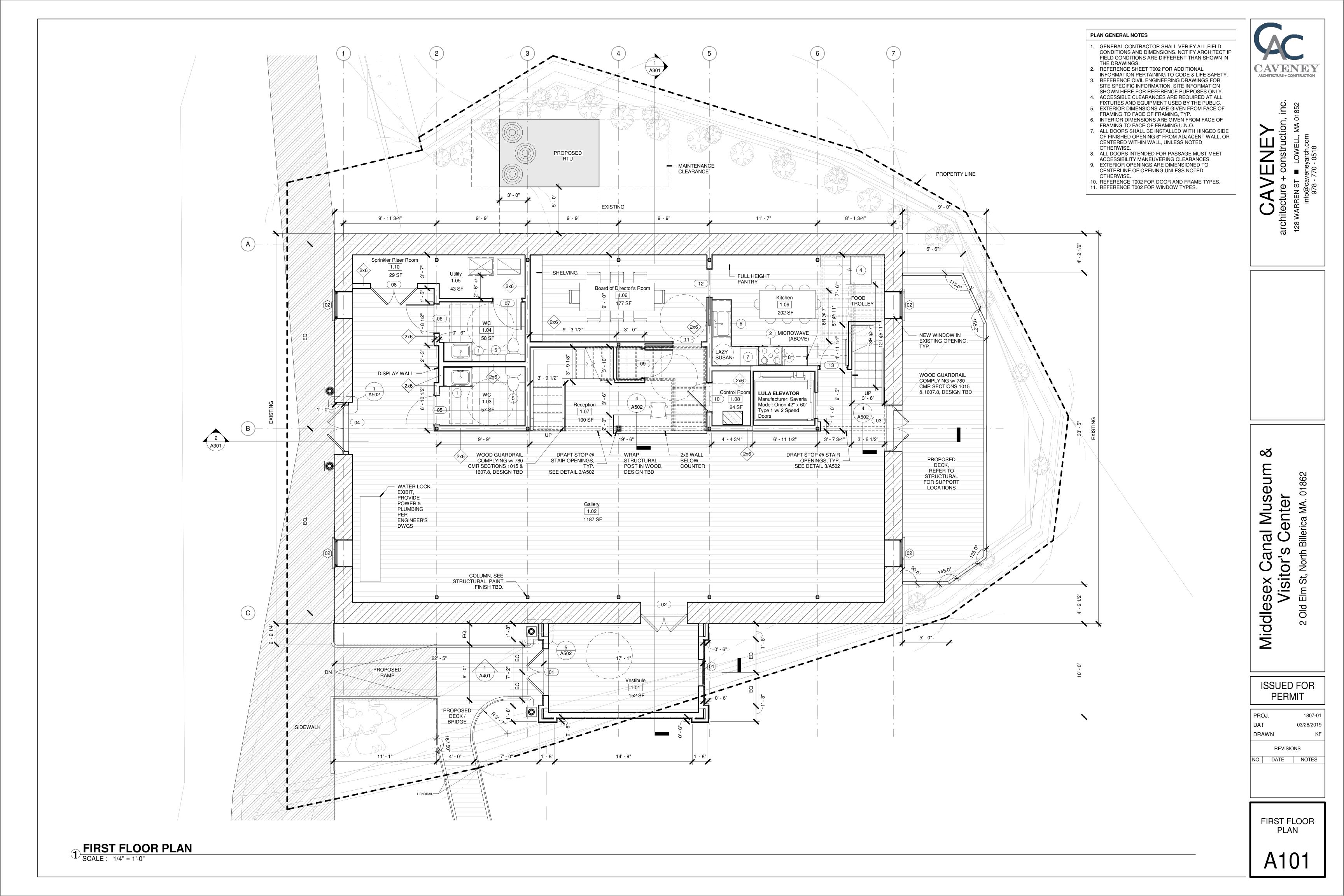
8" MIN.

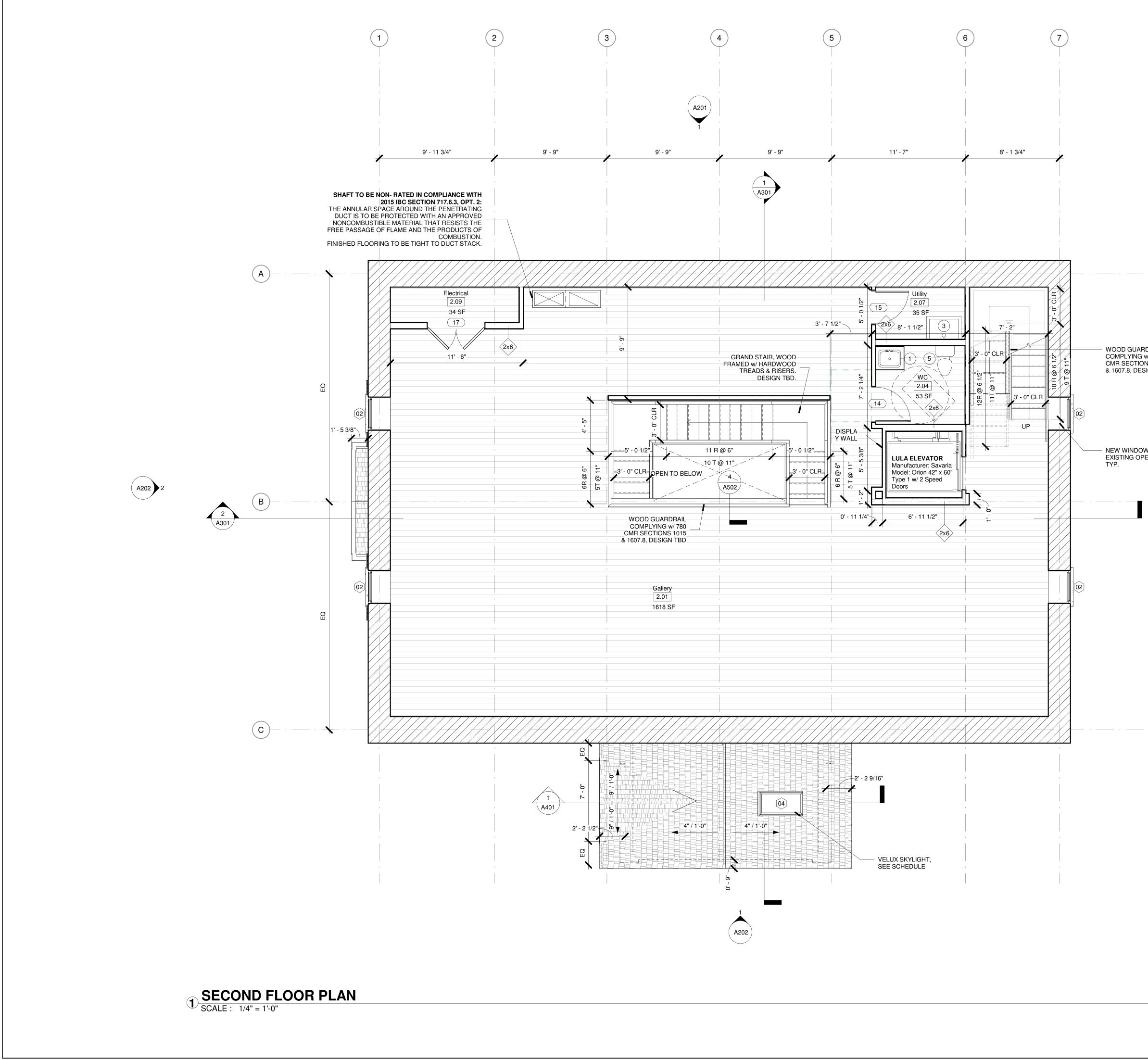
EMBEDMENT











## PLAN GENERAL NOTES

- GENERAL CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS AND DIMENSIONS. NOTIFY ARCHITECT IF FIELD CONDITIONS ARE DIFFERENT THAN SHOWN IN THE DRAWINGS.
- REFERENCE SHEET T002 FOR ADDITIONAL INFORMATION PERTAINING TO CODE & LIFE SAFETY. REFERENCE CIVIL ENGINEERING DRAWINGS FOR SITE SPECIFIC INFORMATION. SITE INFORMATION
- SHOWN HERE FOR REFERENCE PURPOSES ONLY. ACCESSIBLE CLEARANCES ARE REQUIRED AT ALL FIXTURES AND EQUIPMENT USED BY THE PUBLIC.
- . EXTERIOR DIMENSIONS ARE GIVEN FROM FACE OF FRAMING TO FACE OF FRAMING, TYP. INTERIOR DIMENSIONS ARE GIVEN FROM FACE OF
- FRAMING TO FACE OF FRAMING U.N.O. ALL DOORS SHALL BE INSTALLED WITH HINGED SIDE OF FINISHED OPENING 6" FROM ADJACENT WALL, OR CENTERED WITHIN WALL, UNLESS NOTED
- OTHERWISE. 8. ALL DOORS INTENDED FOR PASSAGE MUST MEET ACCESSIBILITY MANEUVERING CLEARANCES. . EXTERIOR OPENINGS ARE DIMENSIONED TO
- CENTERLINE OF OPENING UNLESS NOTED OTHERWISE. 10. REFERENCE T002 FOR DOOR AND FRAME TYPES.
- 11. REFERENCE T002 FOR WINDOW TYPES.

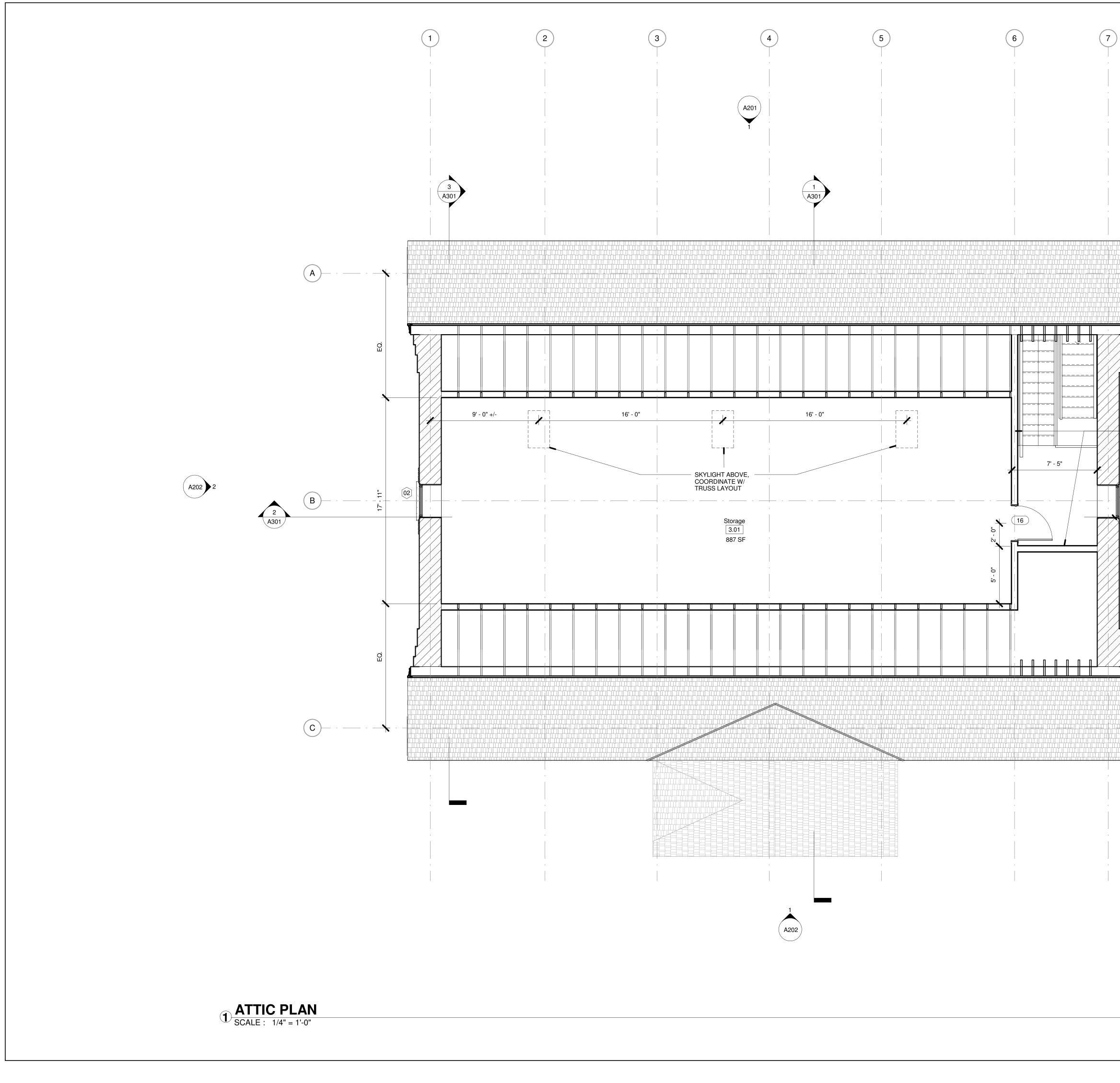
WOOD GUARDRAIL COMPLYING w/ 780 CMR SECTIONS 1015 & 1607.8, DESIGN TBD

- NEW WINDOW IN EXISTING OPENING, TYP.





PROJ.	1807-01	
DAT	03/28/2019	
DRAWN	CLM	
REVISI	ONS	
NO. DATE	NOTES	
SECOND FLOOR PLAN		
A102		



#### PLAN GENERAL NOTES

- GENERAL CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS AND DIMENSIONS. NOTIFY ARCHITECT IF FIELD CONDITIONS ARE DIFFERENT THAN SHOWN IN THE DRAWINGS.
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- 3. ALL DOORS INTENDED FOR PASSAGE MUST MEET ACCESSIBILITY MANEUVERING CLEARANCES. . EXTERIOR OPENINGS ARE DIMENSIONED TO CENTERLINE OF OPENING UNLESS NOTED OTHERWISE.
- 10. REFERENCE T002 FOR DOOR AND FRAME TYPES. 11. REFERENCE T002 FOR WINDOW TYPES.

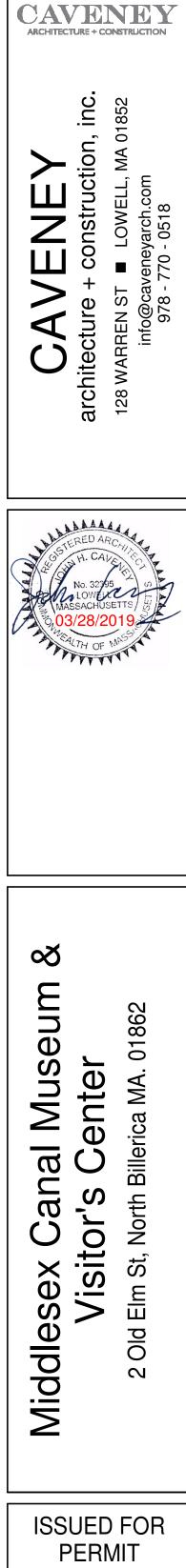
- 5/8" TYPE 'X' FIRE RATED GYPSUM BOARD UP TO ROOF SHEATHING. MAINTAIN CONTINUITY w/ RATED CEILING BELOW FOR UNINTERRUPTED 1-HR FIRE SEPARATION BETWEEN SECOND AND ATTIC FLOORS

\_\_\_\_\_

- NEW WINDOW IN EXISTING OPENING,

\_\_\_\_\_

A201



PERMIT

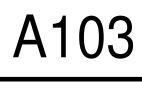
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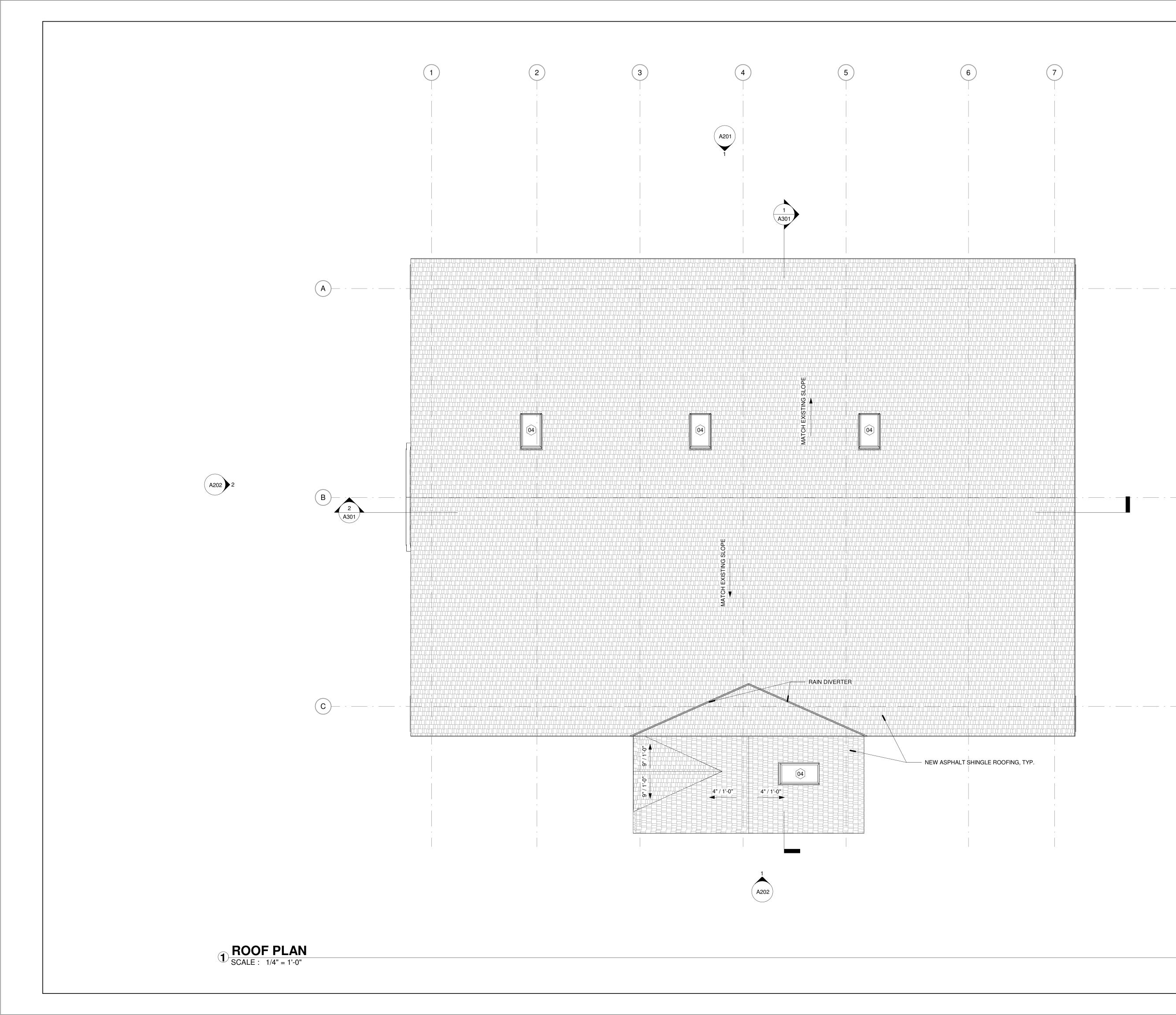
PROJ.

AT	03/28/2019
RAWN	KF
REVISI	ONS

NO. DATE NOTES

ATTIC PLAN





### PLAN GENERAL NOTES

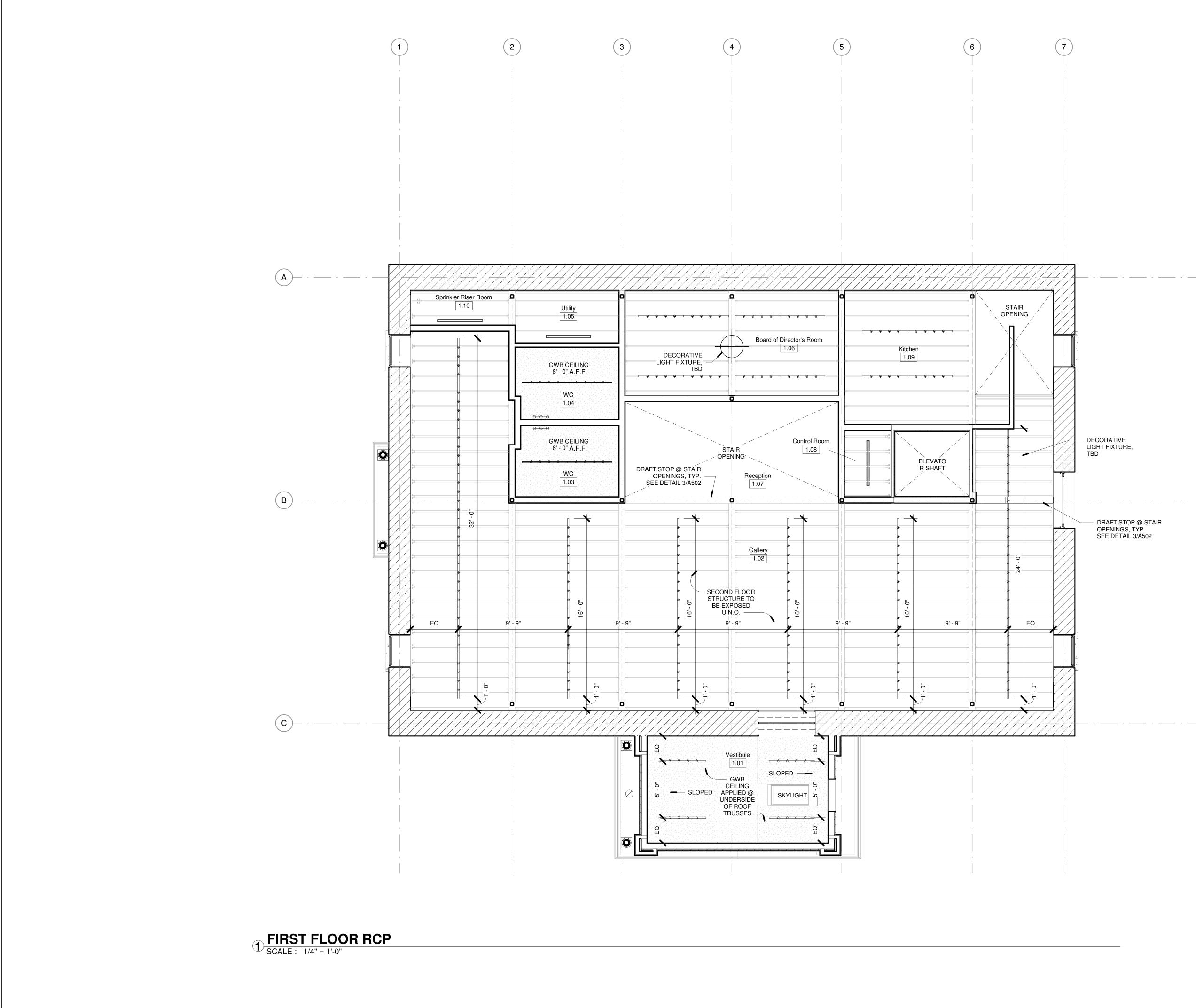
1. GENERAL CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS AND DIMENSIONS. NOTIFY ARCHITECT IF FIELD CONDITIONS ARE DIFFERENT THAN SHOWN IN THE DRAWINGS.

- REFERENCE SHEET T002 FOR ADDITIONAL INFORMATION PERTAINING TO CODE & LIFE SAFETY.
   REFERENCE CIVIL ENGINEERING DRAWINGS FOR SITE SPECIFIC INFORMATION. SITE INFORMATION SHOWN HERE FOR REFERENCE PURPOSES ONLY.
- ACCESSIBLE CLEARANCES ARE REQUIRED AT ALL FIXTURES AND EQUIPMENT USED BY THE PUBLIC.
   EXTERIOR DIMENSIONS ARE GIVEN FROM FACE OF
- FRAMING TO FACE OF FRAMING, TYP.6. INTERIOR DIMENSIONS ARE GIVEN FROM FACE OF
- FRAMING TO FACE OF FRAMING U.N.O.
  ALL DOORS SHALL BE INSTALLED WITH HINGED SIDE OF FINISHED OPENING 6" FROM ADJACENT WALL, OR CENTERED WITHIN WALL, UNLESS NOTED OTHERWISE.
- ALL DOORS INTENDED FOR PASSAGE MUST MEET ACCESSIBILITY MANEUVERING CLEARANCES.
   EXTERIOR OPENINGS ARE DIMENSIONED TO CENTERLINE OF OPENING UNLESS NOTED OTHERWISE.
- 10. REFERENCE T002 FOR DOOR AND FRAME TYPES.11. REFERENCE T002 FOR WINDOW TYPES.

CAVENEY

ARCHITECTURE + CONSTRUCTION

PEF	RMIT
PROJ.	1807-01
DAT	03/28/2019
DRAWN	KF
REVIS	SIONS
NO. DATE	NOTES
ROOF	PLAN
_	
Δ1	04



	G FIXTURE
$\rightarrow$	Decorative pendant light,
	Track lighting, see electrical drawings for specifications *Final layout to be field coordinated by owner
	Surface mounted utility light
<del></del>	Vanity light *Centered over sink typ.
0	Recessed can light *Exterior grade fixture

		N.	D D	Y
CAVENEY	architecture + construction, inc.	128 WARREN ST   LOWELL, MA 01852	info@caveneyarch.com	978 - 770 - 0518



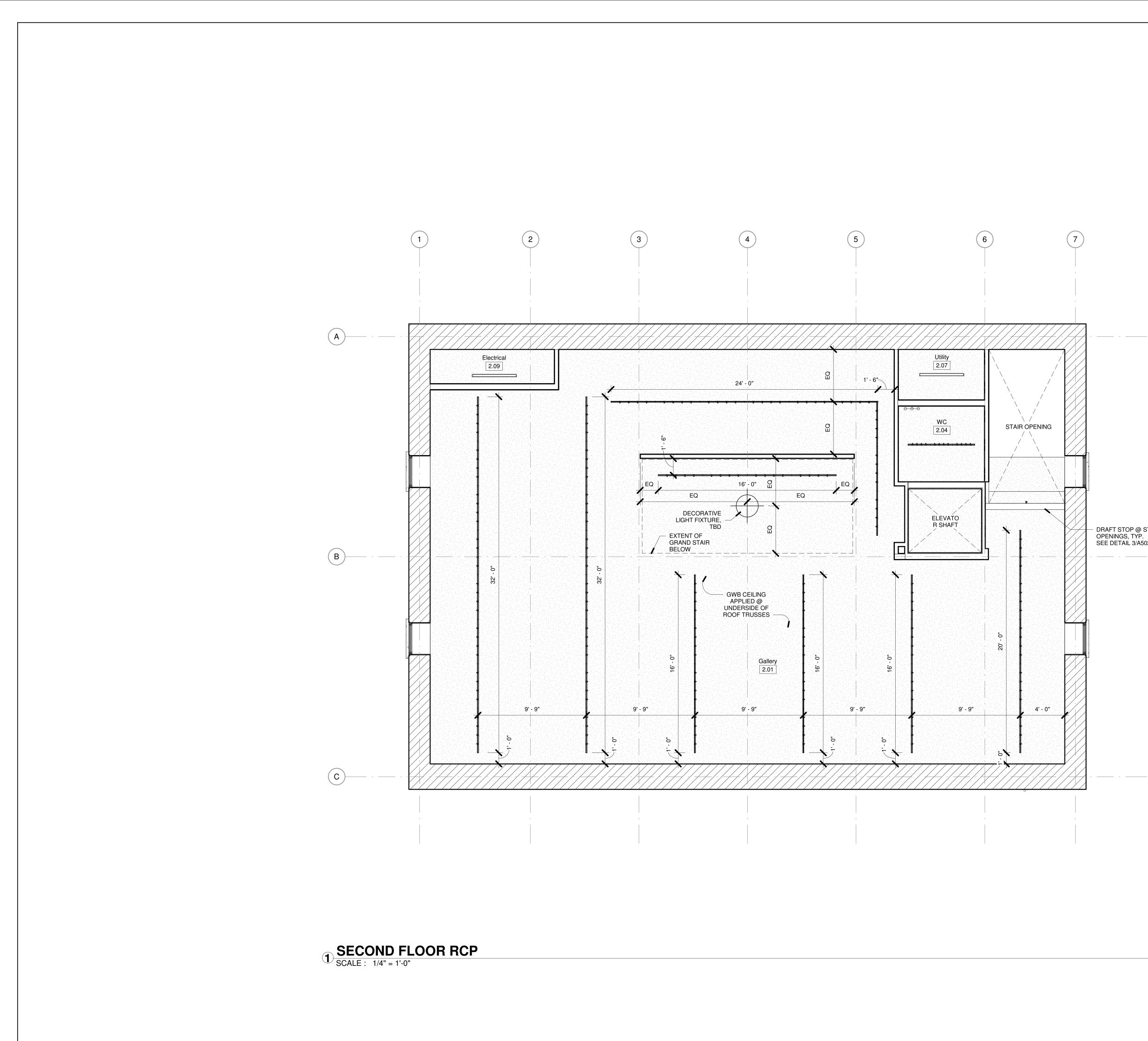
 $\infty$ Middlesex Canal Museum Visitor's Center 2 Old Elm St, North Billerica MA. 01862 

# **ISSUED FOR** PERMIT

PROJ.	1807-01
DAT	03/28/2019
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DECORATIVE
 LIGHT FIXTURE,
 TBD

DRAFT STOP @ STAIR
 OPENINGS, TYP.
 SEE DETAIL 3/A502

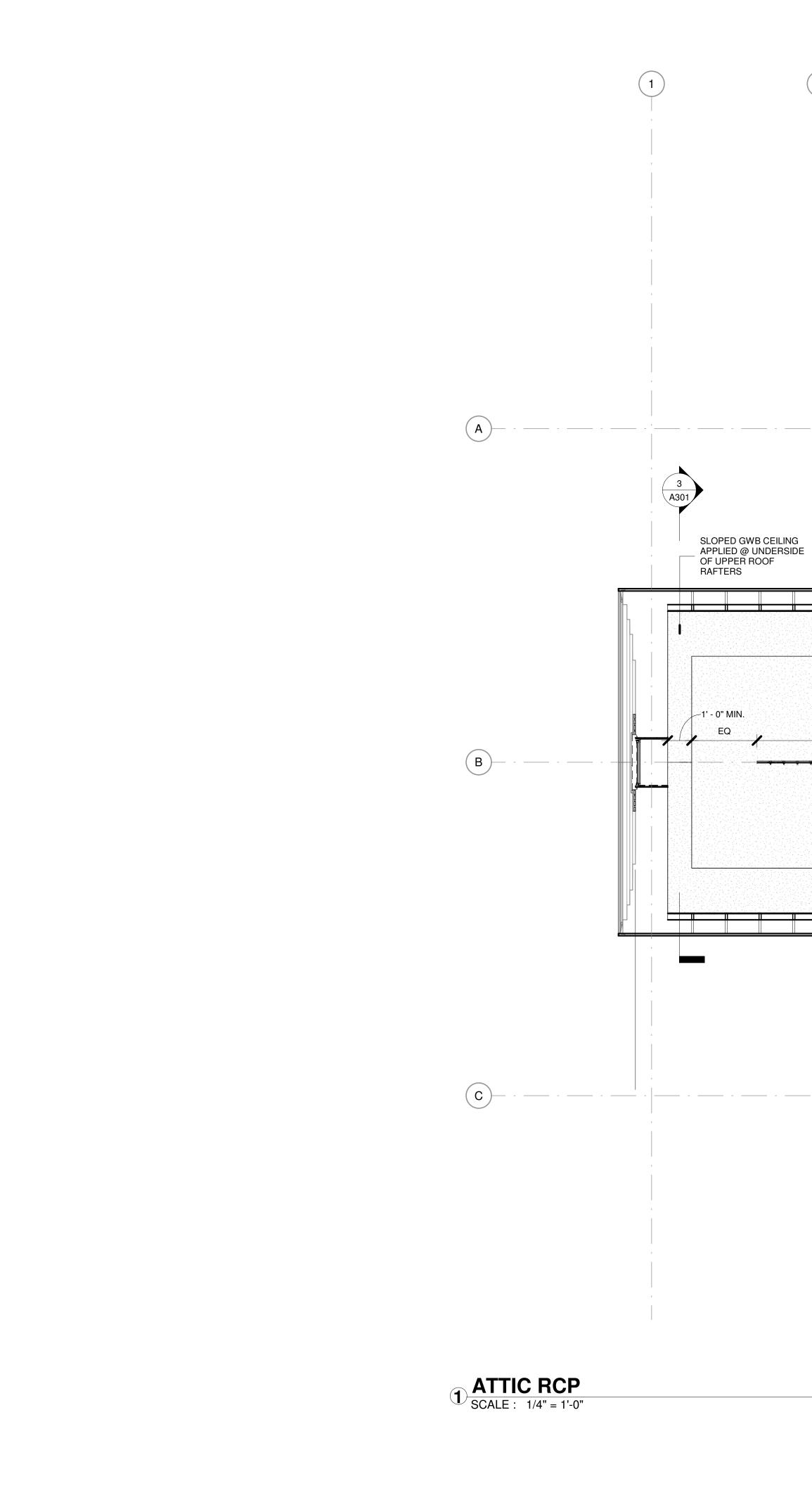


LIGHTIN	G FIXTURE
$\oplus$	Decorative pendant light,
	Track lighting, see electrical drawings for specifications *Final layout to be field coordinated by owner
	Surface mounted utility light
0-0-0	Vanity light *Centered over sink typ.
Ø	Recessed can light *Exterior grade fixture

CAX ARCHITECT		NEY
CAVENEY	architecture + construction, inc.	128 WARREN ST ■ LOWELL, MA 01852 info@caveneyarch.com 978 - 770 - 0518
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Middlesex Canal Museum &	Visitor's Center	2 Old Elm St, North Billerica MA. 01862
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DAT 03/28/2019 DRAWN KF REVISIONS NO. DATE NOTES SECOND FLOOR RCP A112

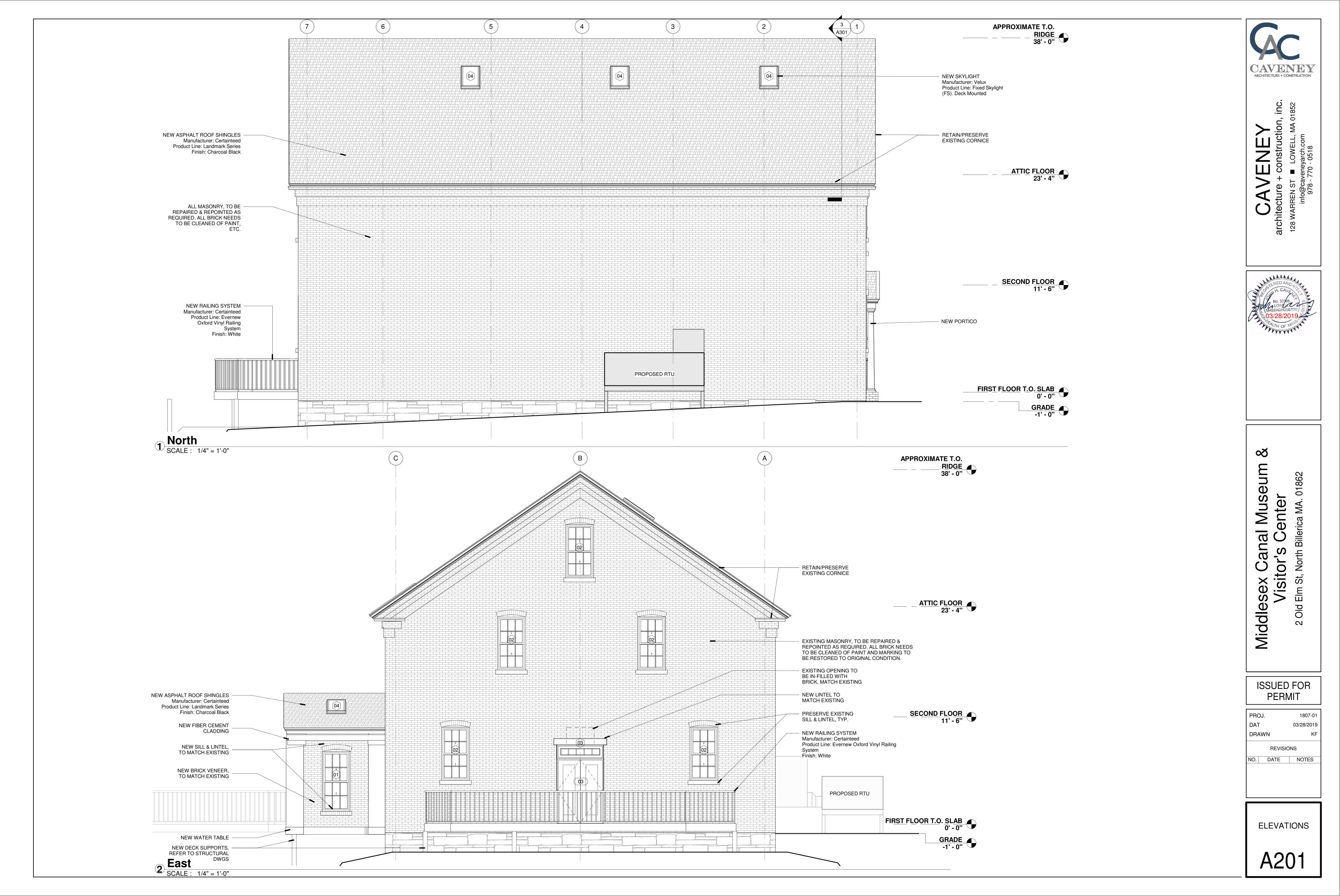
DRAFT STOP @ STAIR
 OPENINGS, TYP.
 SEE DETAIL 3/A502

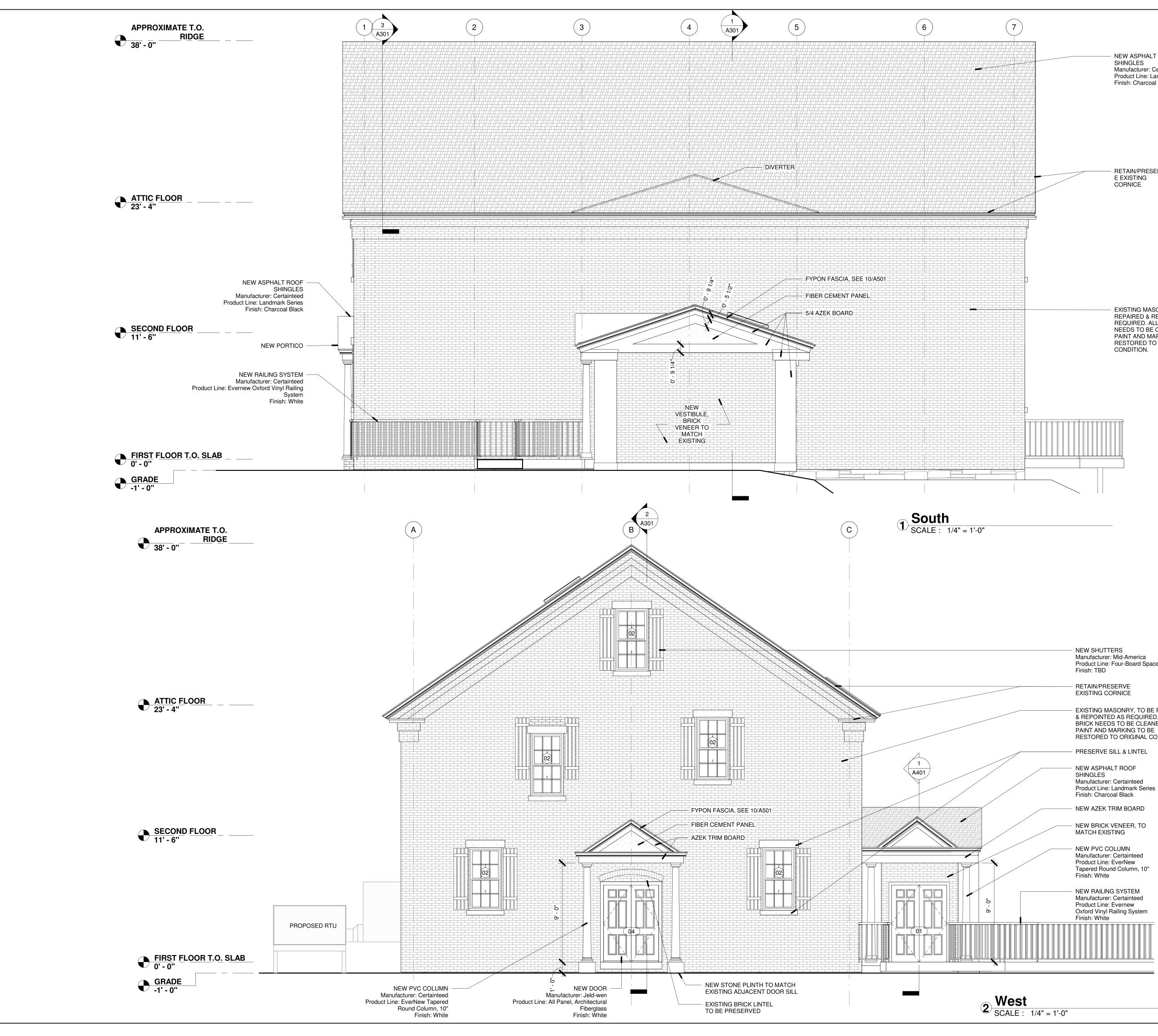


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	SLOPED GWB CEILING APPLIED @ UNDERSIDE OF ROOF TRUSSES		
ũ			EQ EQ
	40' - 0"	EQ	
ũ	GWB 9' - 6" A.F.F.		
	SLOPED GWB CEILING APPLIED @ UNDERSIDE OF ROOF TRUSSES		

	Active to the construction inc.         128 WARREN ST       LOWELL, MA 01852
SLOPED GWB CEILING APPLIED @ UNDERSIDE OF STRUCTURE	No. 32395 No. 32395 No. 32395 No. 32395 No. 32395 No. 32395 No. 32295 No. 32
	Middesex Canal Museum & Visitor's Center 2 Old Elm St, North Billerica MA. 01862
	ISSUED FOR PERMITPROJ.1807-01DAT03/28/2019DRAWNCLMREVISIONSNO.DATENOTES
	ATTIC RCP A113





NEW ASPHALT ROOF SHINGLES Manufacturer: Certainteed Product Line: Landmark Series Finish: Charcoal Black

**RETAIN/PRESERV** 

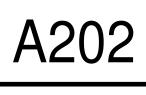
EXISTING MASONRY, TO BE REPAIRED & REPOINTED AS REQUIRED. ALL BRICK
 NEEDS TO BE CLEANED OF PAINT AND MARKING TO BE RESTORED TO ORIGINAL CONDITION.

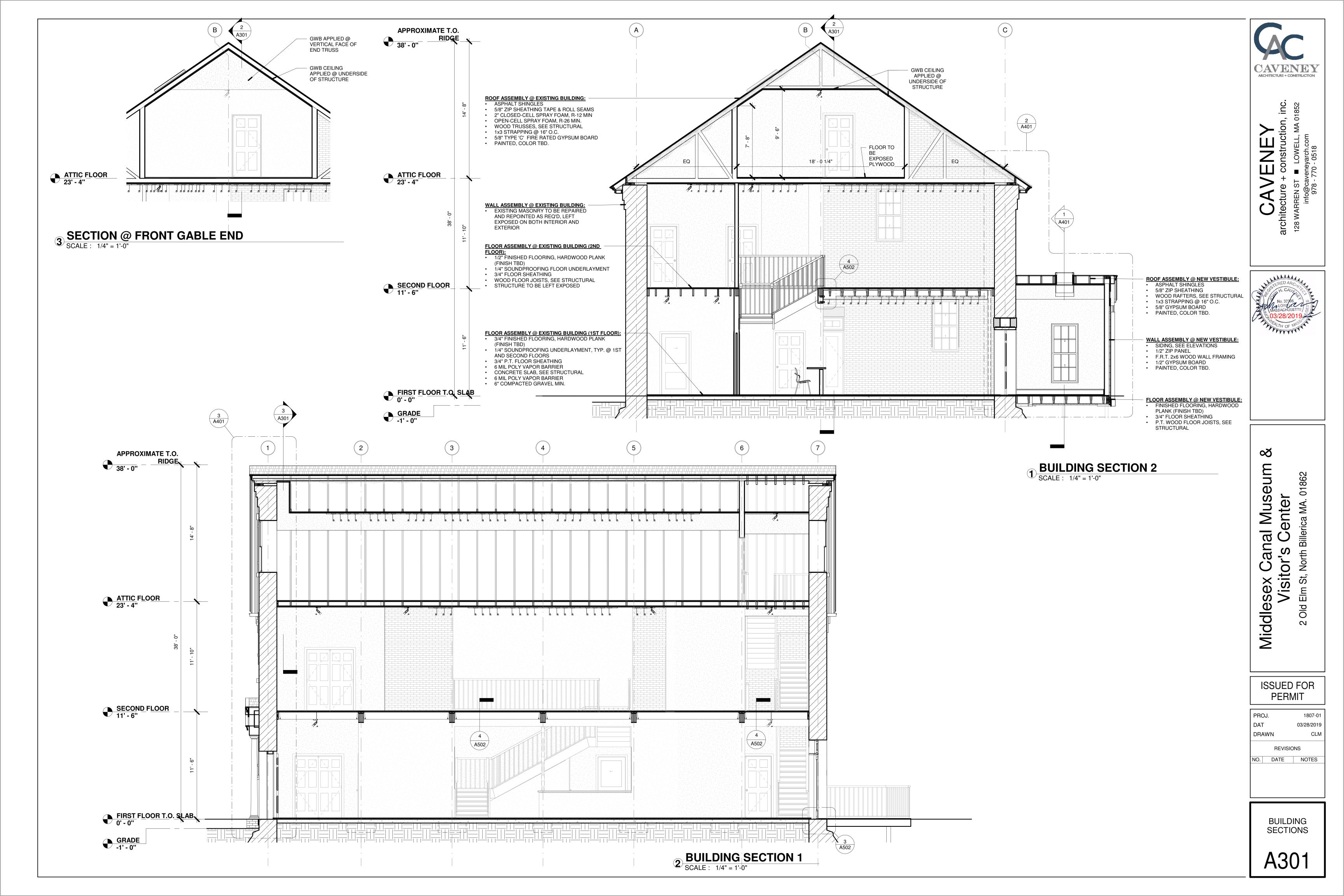
Product Line: Four-Board Spaced Shutter - S4 Finish: TBD

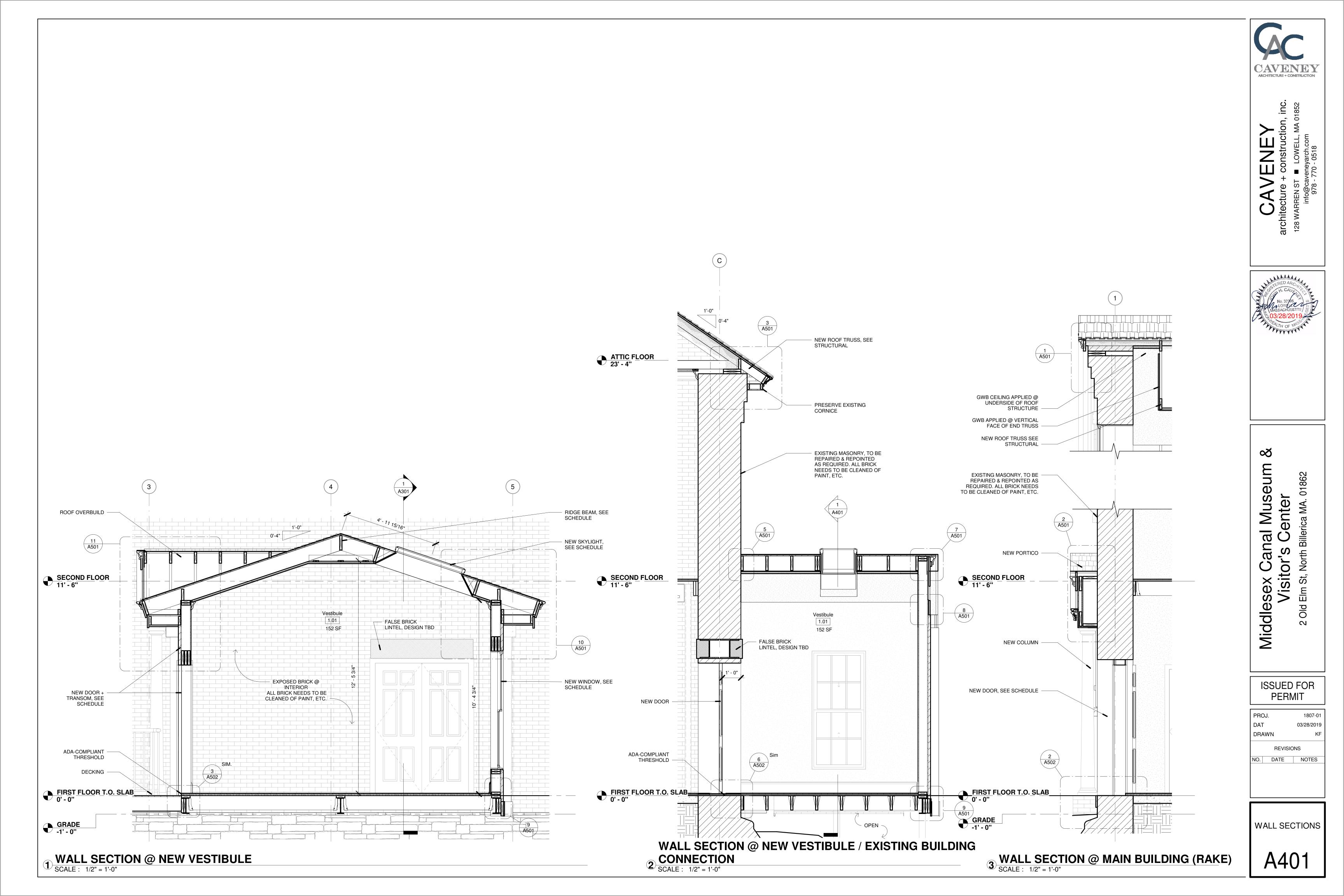
EXISTING MASONRY, TO BE REPAIRED & REPOINTED AS REQUIRED. ALL BRICK NEEDS TO BE CLEANED OF PAINT AND MARKING TO BE RESTORED TO ORIGINAL CONDITION.

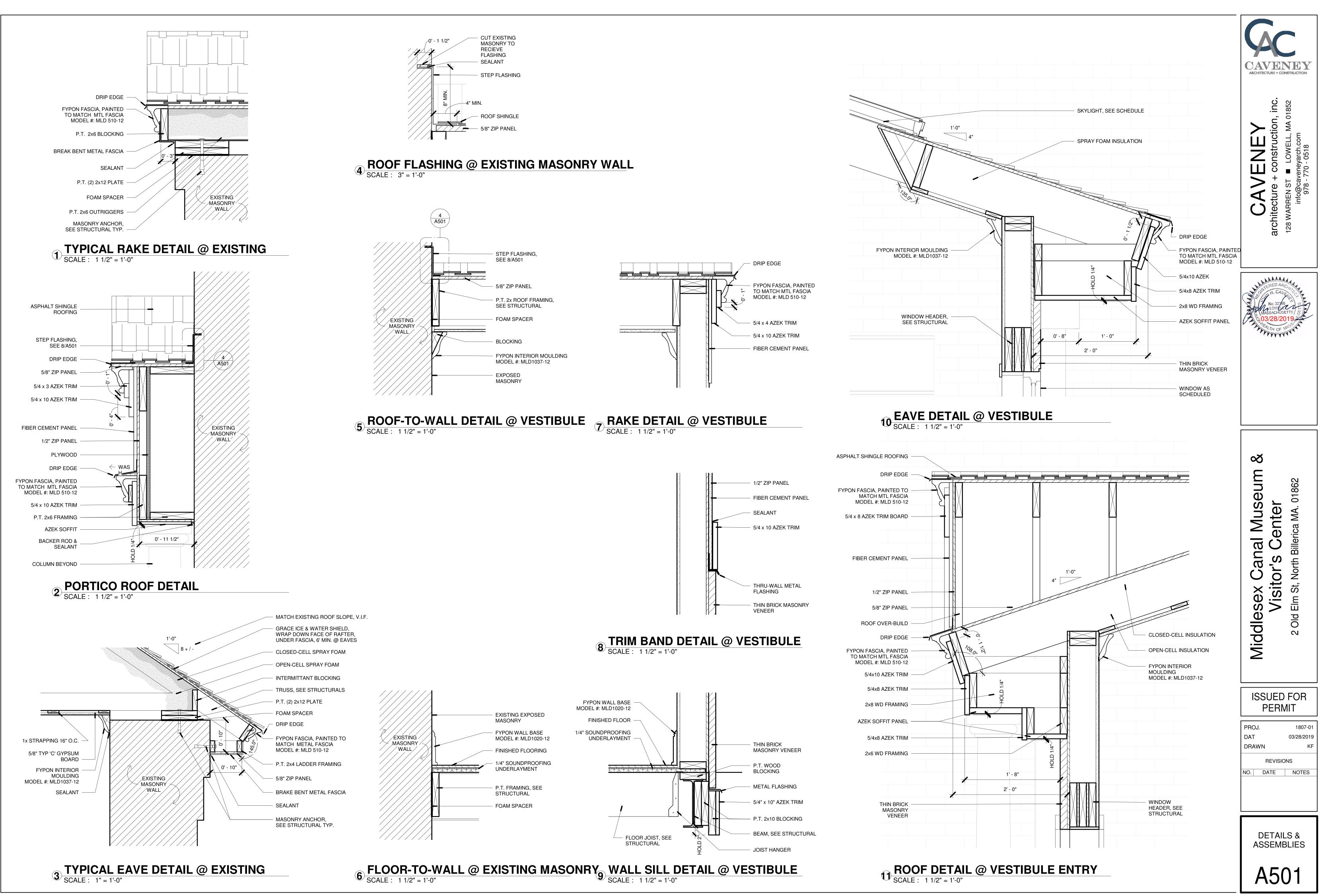
CAVENEY ARCHITECTURE + CONSTRUCTION inc. 1852 CAVENEY hitecture + construction, ir WARREN ST ■ LOWELL, MA 018 info@caveneyarch.com 978 - 770 - 0518 archited 128 WARI LABAAAAA TALTH UT Š Museum 01862 enter ca MA. Canal Bille  $\bigcirc$ S St, North Visitor' Middlesex ШШ pIO  $\sim$ **ISSUED FOR** PERMIT 1807-01 PROJ. DAT 03/28/2019 DRAWN KF REVISIONS NO. DATE NOTES

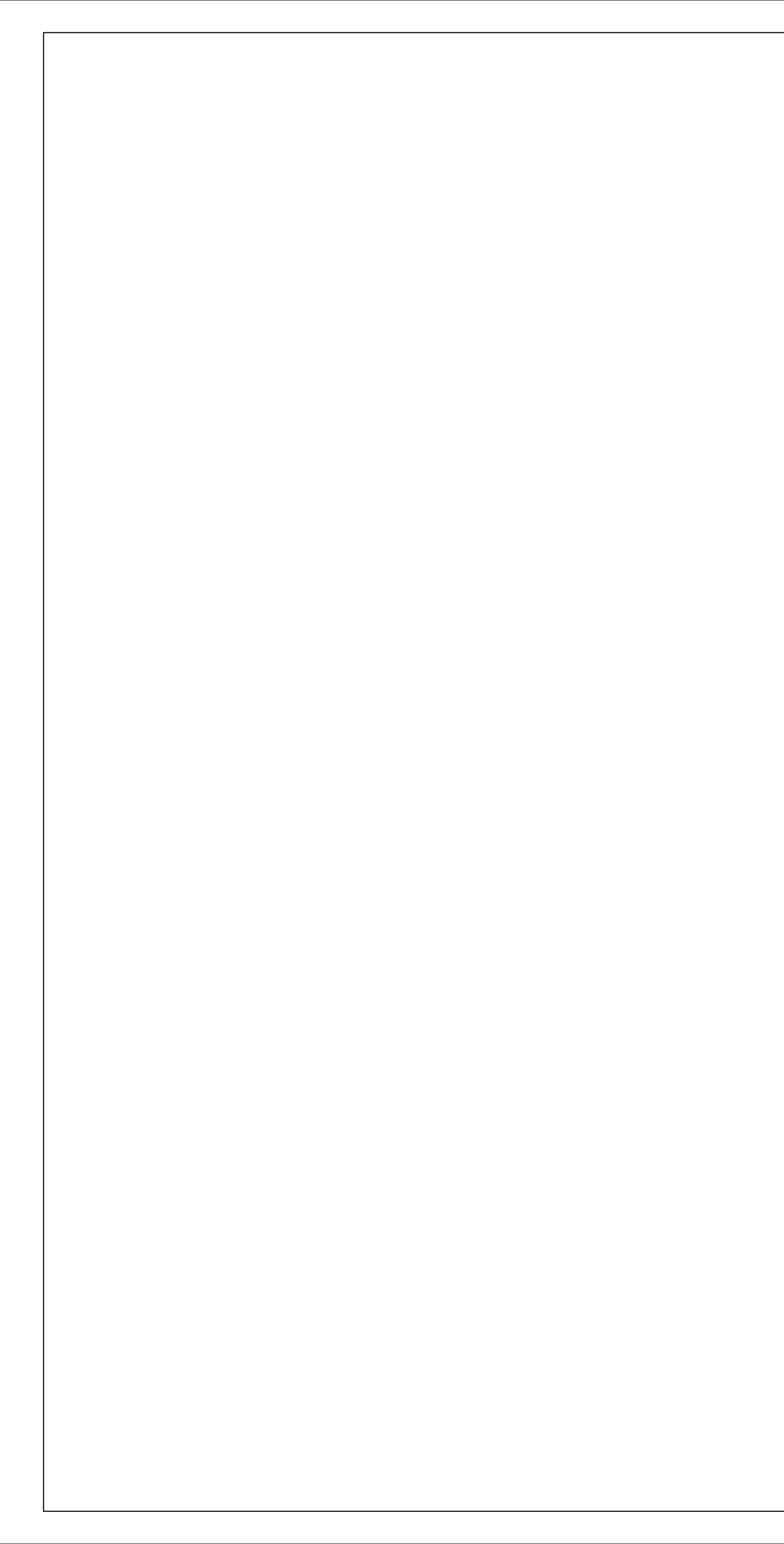
ELEVATIONS

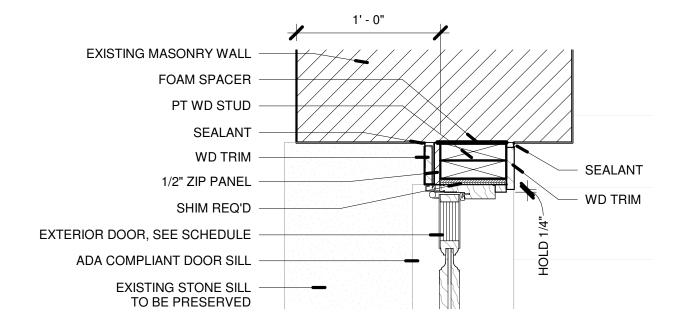




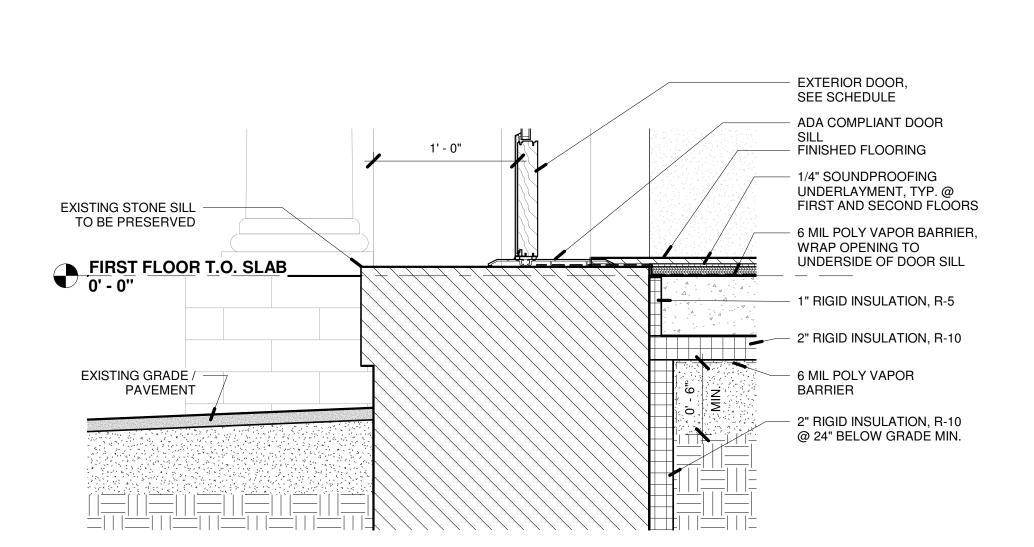




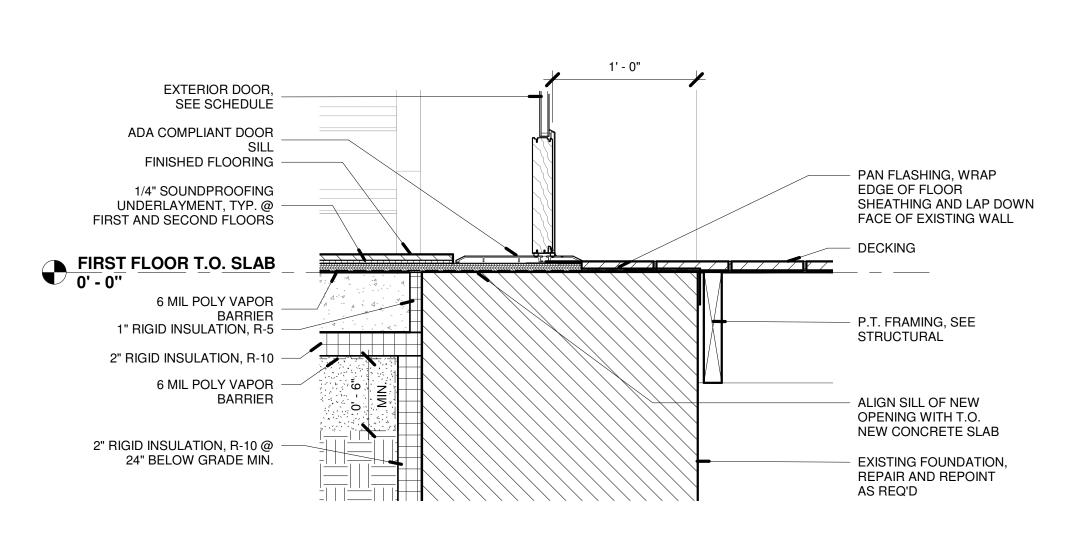




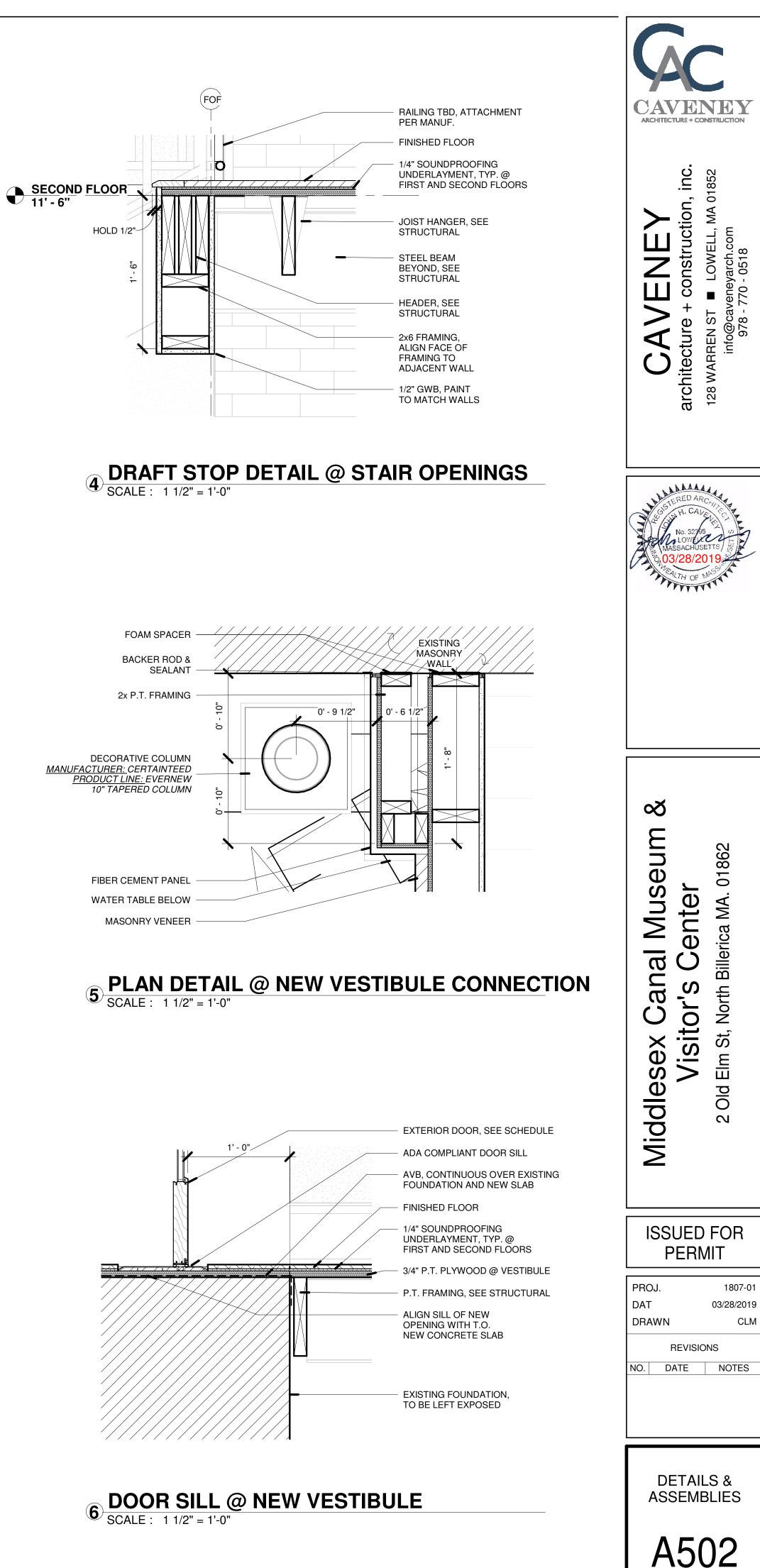
# **DOOR JAMB @ EXISTING STREET SIDE DOOR** SCALE : 1 1/2" = 1'-0"







**3 DOOR SILL @ NEW DECK** SCALE : 1 1/2" = 1'-0"



A502

	James N. Polando, PE, CPD, FASPE	James N. Polando, PE, CPD, FASPE
	Consulting Engineer	Consulting Engineer
	FIRE PROTECTION NARRATIVE REPORT	• Elevation Difference from First Floor Level: +/- 0 Ft.
PENDANT SPRINKLER	December 12, 2018	D. Type/description and design layout of the automatic sprinkler system(s).
	<b>Project:</b> Middlesex Canal Museum and Visitors Center.	• Wet pipe sprinkler system throughout all building areas, with the exception of
DRY PENDANT SPRINKLER	2 Old Elm St.	elevator shaft, and areas protected with dry-pipe sprinklers.
SIDEWALL HORIZONTAL SF	North Billerica, MA	• Dry-pipe sprinkler system protecting the attic and Second floor areas of the bu
		• Sprinkler systems to be hydraulically calculated by the installing contractor, and calculated to provide 0.10 GPM/SF over the hydraulically most remote 1,500 for th
R RESIDENTIAL SPRINKLER	Canal Visitors Center and Museum.	Hazard), except as noted herein.
FS FLOW SWITCH	Code reference: 780 CMR 9 <sup>th</sup> Edition	<ul> <li>The dry-pipe system calculations are to include q 30% factor, as required by N</li> </ul>
LP LOW PRESSURE SWITCH	Code reference. 700 CNIK 9 Edition	• Storage rooms shall be protected to 0.15 GPM (Ordinary hazard Group I)over
TS TAMPER SWITCH	Fire Protection systems as follows, per 780 CMR Chapter 9:	areas,
SPR SPRINKLER PIPING DCVA DOUBLE CHECK	Design methodology for the protection of the occupancy and hazards in accordance with	E. Automatic sprinkler system(s) control equipment location.
VALVE ASSEMBLY	this code and applicable NFPA Standards:	<ul> <li>All alarm check valves and sprinkler flow monitoring equipment is located in</li> </ul>
SACV SPRINKLER ALARM CHECK VALVE	Building to be protected with sprinkler systems, fed from a new sprinkler water service main	floor water/sprinkler service room. This room is accessed from the building m
CHECK VALVE	from the street main. The building will be protected throughout in compliance with NFPA-	and does not have direct access from outdoors.
-P	13standards. Building sprinkler systems include both dry-pipe type in areas subject to freezing, and wet-pipe type in all other areas of the building.	F. Type/description and design layout of the automatic standpipe system(s).
GATE VALVE WITH		<ul> <li>No applicable.</li> </ul>
	Systems and equipment to comply with NFPA-13, and 24.	
PRESSURE SWITCH		<ul> <li>G. Standpipe system hose valve(s) type and location.</li> <li>No Applicable.</li> </ul>
NO AUTO SPRINKLERS	Sequence of operation of all fire protection systems and operations:	• No Applicable.
	1. Wet-Pipe sprinkler system: System to be pressurized with water at all times and be	H. Fire department Siamese connection type(s) and location.
FLOOR CONTROL VALVE	IBLY equipped with quick response sprinklers, fused for release of water upon heat opening	• Fire department pumper connection is a 4" Storz connection, located on the bu
DICL DUCTILE IRON CEMENT L	each sprinkler.	perpendicular to Old Elm Street, and is to be located approximately 3 feet above
DACV DRY PIPE ALARM CHECK	2. Dry-Pipe sprinkler system: System to be changed with pressurized air to prevent the	I. Type/description and design layout of the fire protective signaling system(s).
GENERAL FIRE PROTECTION NOTES:	flow of water to the piping system, until such time that one or more sprinklers are	• Separate fire alarm drawings, narrative, and specifications have been prepared
1. ALL WORK SHALL BE IN STRICT ACCORD WITH THE	opened by heat. This opening will allow water to flow into the piping system and	system will be an addressable system to monitor fire protection and HVAC du smoke detectors and carbon monoxide sensors, with manual pull stations and a
MASSACHUSETTS BUILDING CODE, 780 CMR.	discharge. 3. <b>Testing criteria to be used for final system acceptance:</b> All testing is to comply	notification.
<ol> <li>THE FIRE PROTECTION CONTRACTOR IS TO APPLY, PAY SECURE PERMITS FOR THE WORK REQUIRED UNDER THIS CONTRACT.</li> </ol>	with NFPA-13, 24 and 25.	<ul> <li>Refer to fire alarm narrative on drawing FA1.</li> </ul>
3. THE FIRE PROTECTION CONTRACTOR SHALL PROVIDE AL	B. Building and site access for fire-fighting and/or rescue vehicle(s) and personnel.	J. Fire protective signaling system(s) control equipment and remote annunciato
MATERIALS, SUPPLIES, TOOLS AND ALL OTHER ITEMS NE TO COMPLETE THE WORK, EXCEPT AS SPECIFICALLY NOT	Building is accessed Old Elm.	<ul> <li>The protective signaling system(s) control equipment and remote annunctato</li> <li>The main fire alarm panel is located in the second floor electrical room. A remote annunctato</li> </ul>
OTHERWISE ON THE DRAWINGS.	C. Fire hydrant(s) location and water supply information.	annunciator is located at the first floor main entrance.
<ol> <li>ALL WORK SHALL BE COORDINATED WITH THE OWNER, HOURS OF WORK TO BE AS DIRECTED BY THE OWNER.</li> </ol>	• Fire hydrants are located along Old Elm Street.	K Type/description and design layout of the smalle control or exhaust system/s
THE FIRE PROTECTION CONTRACTOR SHALL VERIFY ALL PIP		<ul> <li>K. Type/description and design layout of the smoke control or exhaust system(s</li> <li>No Smoke Control System.</li> </ul>
(REQUIRED TO BE 5. CONNECTED TO, OR OTHERWISE AL BY THE WORK OF THIS CONTRACT) IN THE FIELD, PRIOF		
WORK.	<ul> <li>Residual Pressure: 90 PSIG</li> <li>Flow Rate: 998 GPM</li> </ul>	L. Smoke control or exhaust system(s) control equipment location.
<ol> <li>FIRE PROTECTION CONTRACTOR SHALL COORDINATE ALL REQUIRED ELECTRICAL WORK WITH THE OWNER'S ELECTR CONTRACTOR.</li> </ol>	Registered Plumbing and Fire Protection Engineer	N/A     Registered Plumbing and Fire Protection Engineer
7. FIRE PROTECTION CONTRACTOR SHALL COORDINATE WIT	- 242 Merriam Street Cell 781.697.7173	242 Merriam Street Cell
OWNER ON EXACT LOCATIONS OF ALL EXPOSED-TO-VIEW		Weston, MA 02493 JNPoland
THAT IS PART OF THIS CONTRACT.		

#### PART ONE - GENERAL

#### 1.1. WORK INCLUDED

- A. This Section establishes the criteria for design, engineering, approvals, products, coordination, installation, and testing of a complete fire protection system. Wet-pipe type sprinkler system throughout building
- Dry-pipe type system for protection at the unheated areas, as shown on the drawings.
   B. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.
- C. Give notices, file plans, obtain permits and licenses, pay fees and backcharges, and obtain necessary approvals from authorities having jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda, and Change Orders.

#### 1.2. RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1.

#### 1.3. CODE REVIEW A. Applicable Codes and Standards:

- 1. Massachusetts State building Code, 9<sup>th</sup> Edition.
- 2. NFPA 13 Standard for the Installation of Sprinkler Systems.
- 3. NFPA 24 Standard for the installation of private water service mains.
- NFPA 101 Life Safety Code.
- B. Sprinklers:
- 1. Code Reference: Massachusetts State Building Code Section 9 Fire Protection Systems. 1.4. SYSTEM DISCRITION
  - A. The facility is to be supplied by a 4-inch fire service protected by the use of a 4 inch size double check valve assembly. The fire service is to connect to the site water main provided under the civil contract. The system is to be provided with one fire department connection. The installation shall comply the owner's insurance underwriter and all
  - local fire department and building department requirements. B. The wet-pipe system is to provide protection to the first floor, and be a single fire zone.
  - C. A dry system is to provide protection of the unheated attic areas, as they are subject to freezing. The second floor is to be fed from the attic area and shall be part of the dry-pipe system.
  - D. The facility is to be fully sprinkled per NFPA 13, "Standard for the Installation of Sprinkler Systems" and all local fire department requirements. The system shall be hydraulically calculated to provide the following application densities:
  - Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mL/s over 139-sq. m) area. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (9.5 mL/s over 139-sq. m) area.
  - Dry-pipe sprinkler systems the area calculated shall be increased by 30% to comply with NFPA-13-11.2.3.2.5. 4. Sprinkler Occupancy Hazard Classifications:
  - a. Office and Public Areas: Light Hazard Museum display areas: Light Hazard
  - Building Service Areas: Ordinary Hazard, Group 1 Electrical Equipment Rooms: Ordinary Hazard, Group 1
  - General Storage Areas, including Attic: Ordinary Hazard, Group 1 Mechanical Equipment Rooms: Ordinary Hazard, Group 1
- 1.5. QUALITY ASSURANCE

D. Flow Test information: a. Date: September 12, 2018 Conducted by: ASAP Sprinklers Static Pressure: 113 PSIG

request maintenance contracts to be priced.

1.8. SPRINKLER WORKING PLANS

Residual Pressure: 90 PSIG Pitot Pressure: 35 PSI Flow Rate: 998 GPM Elevation: Approximately 115 Ft. Distance from building: Approximately 100 Ft.

those used in the design.

A. Codes and Regulations:

1.6. REFERENCES

1.7. SUBMITTALS

Bidders, AIA Document A701.

4. Underwriters' Laboratories (UL).

5. Owner's Insurance Underwriter.

#### A. Substitutions: The Manufacturers names used first throughout this Section are used for the design and to establish the standard of quality upon which the design is based. All materials substituted shall be equal in all respects to

1. Submit list of proposed substitutes for review and approval in compliance with Article 3 of the Instructions to

2. Comply with the provisions of Section 01300 of these specifications.

 In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies and authorities having jurisdiction. 2. Local and state building, plumbing, mechanical, electrical, fire, and health department codes and standards.

3. Occupational Safety and Health Act (OSHA).

A. Comply with pertinent provisions of Section 01300.

B. Record Drawings: Prepare records drawings in accordance with the provisions of Section 01720.

1. Use the working drawings prepared under the provisions of this Section for the Record Drawings. C. Operation and Maintenance Manuals: Upon completion of the installation work of this section, prepare and submit

two copies of the Operating and Maintenance Manual for the Owner's use. D. The Contractor shall furnish maintenance and 24-hour callback service for the equipment provided for a period of 3months after substantial completion and acceptance of the work. This service shall include regular examinations of the installation by competent and trained employees of the contractor and shall include all necessary adjustments, greasing, oiling, cleaning supplies and parts to keep the equipment in proper operation except when such is made necessary by misuse accidents or negligence not caused by the Contractor or Sub-Contractor's of any tier. "PLUS"

E. Acceptable Substitute Manufacturers: All bidders desiring to furnish equipment other than that specified must submit a complete verification specification for the substituted equipment along with literature, wiring diagrams, piping diagrams, and a list of similar sized installations where proposed equipment is installed. The complete submittal must be presented to the Architect at least (7) full working days prior to the bid opening for approval. Substitutions will not be permitted after the contract has been awarded. Refer to Section 15050 for Substitutions.

A. Working plans will be prepared by the installing subcontractor according to the requirements of NFPA Standard No. 13. Working plans shall be prepared by a NICET-certified Level III automatic sprinkler system designer or be stamped by a professional engineer registered in the state of Massachusetts.

B. Submit working plans to the authorities having jurisdiction for approval, including the Building Department, Fire Department, Owner's Insurance Underwriter, and the Architect. C. Deviation from the approved plans will require re-approval by the reviewing authorities.

#### 1.9. PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacement necessary to the approval of the Architect at no change in Contract Sum.
- 1.10. WARRANTY
  - A. Upon completion of the Work and as a condition of its acceptance, deliver to the Architect two copies of a written Warranty agreeing to replace work of this Section which fails due to defective materials or workmanship within one year after Date of Substantial Completion as that date is determined in accordance with the General Conditions.
  - B. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
  - Failures in operation of operating component or components. Leakage.
  - C. Obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation in Owner's name.

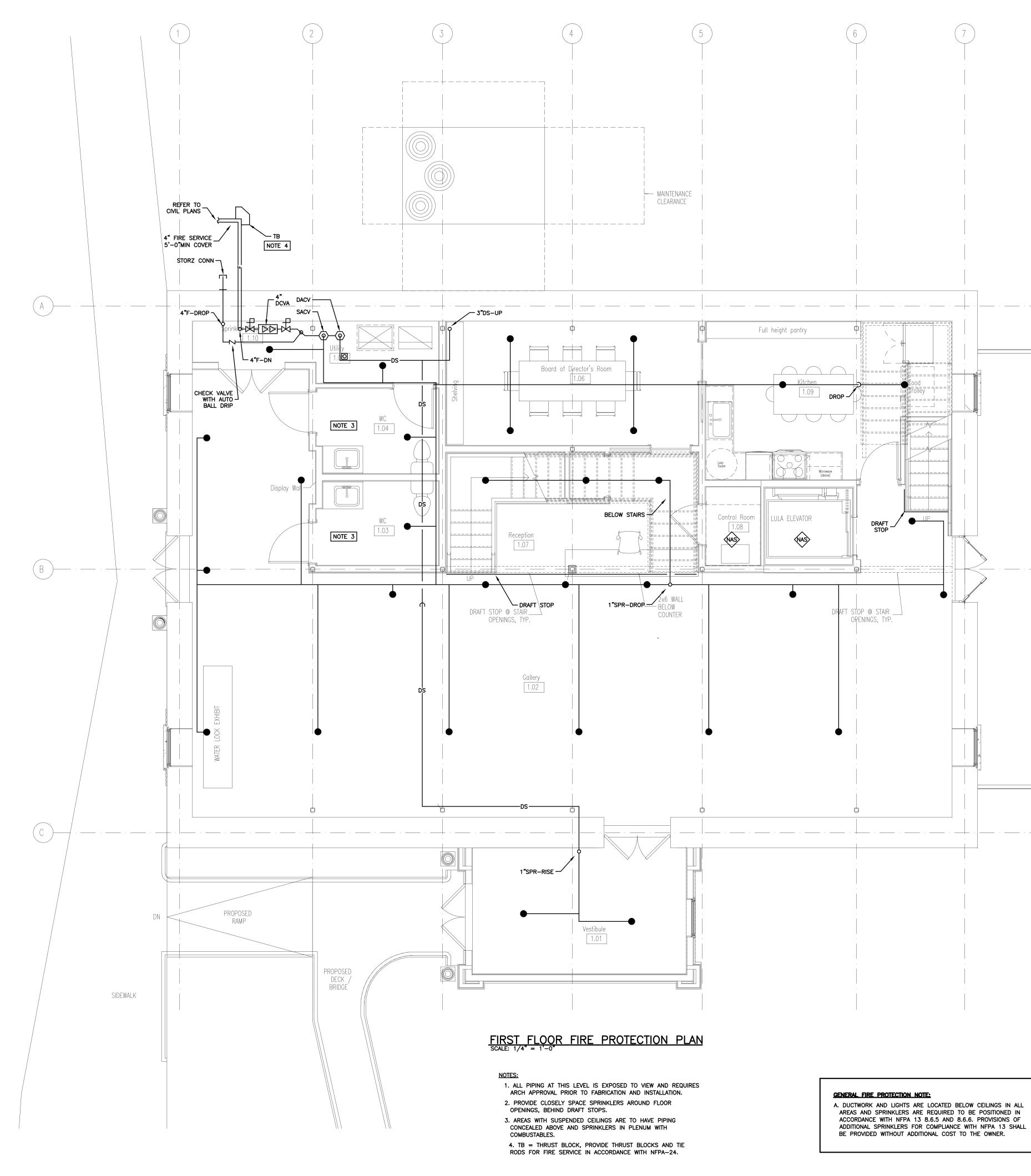
#### PART TWO - PRODUCTS

- 2.1. ACCEPTABLE PRODUCTS
  - A. Materials and equipment provided under this Section shall be approved by Factory Mutual Research Corporation. Components required for a complete installation which are not available with the FM-approval shall be UL-listed.
  - B. Acceptable Manufacturers:
  - Grooved Fittings and Coupling: Victaulic.
     Sprinkler Heads: Victualic, Viking or Central.
  - Pipe Hangers and Supports: B-Line, Globe, or PHD. 4. Inserts: B-Line, Michigan, or Unistrut.
- 2.2. PIPING AND VALVES
  - A. Schedule 40 black steel with threaded or mechanical joints. Piping 3 inches or larger shall be Schedule 10 with rollgroove fittings. Provide hot-dip galvanized steel pipe for dry system applications.
  - B. Valves shall be listed indicating valves capable of being fitted with a tamper monitoring switch.
  - C. Double Check Valve assembly to be Watts Model 709, complete with strainer and shut-off valves equipped with tamper switches.
- 2.3. SPRINKLER HEADS A. Provide Quick-Response 1/2-inch orifice, 165°F rated sprinkler heads, recessed type, painted white in finish ceilings,
  - and rough brass finish is areas without suspended ceilings. B. Dry-pipe sprinklers to be rough brass finish, upright type, ½" orifice, quick response, 165°F rated.
- 2.4. PIPE HANGERS AND SUPPORTS
  - A. Support the work of this Section with hangers and supports attached to the building structure in compliance with NFPA standards.
- SLEEVES AND PENETRATIONS 2.5.
- A. Provide sleeves for all work of this Section where piping penetrates floors or walls. 2.6. SPRINKELR ALARM CHECK VALVES
  - A. Wet Alarm Check Valve: UL, FM Black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12,
  - aluminum bronze clapper, stainless steel spring and shaft, EPDM seal, and Nitrile seat O-rings. Valve internal parts

	James N. Polando, PE, CPD, FASPE	CAVEN ARCHITECTURE + CONSTR
	Consulting Engineer Building life safety system features (auxiliary functions) required to be integrated as	Pitter in the serve
ран	<ul> <li>• Auxiliary fire alarm connections include indication at FACP that fire protection system has been activated.</li> </ul>	Kion, inc.
N.	<ul> <li>Type/description and design layout of the fire extinguishing system(s).</li> <li>None</li> </ul>	ENEY construction LOWELL, MA
0.	<ul> <li>Fire extinguishing system(s) control equipment location.</li> <li>Not applicable.</li> </ul>	
P.	<ul> <li>Fire protection system(s) equipment room location.</li> <li>Fire protection system and related equipment located on first floor, with access from grade via the main building entrance along Old Elm Street.</li> </ul>	<b></b>
Q.	<ul> <li>Fire protection system(s) equipment identification and operation signs.</li> <li>Equipment identification and operating sigs are to be NFPA compliant.</li> </ul>	ecture RREN (
R.	<ul> <li>Fire protection system(s) alarm/ supervisory signal transmission method and location.</li> <li>Fire alarm system is connected to third party monitoring company via dual telephone line connection.</li> </ul>	CA architecture
S.	<ul> <li>Fire command center location.</li> <li>No Fire Command Center.</li> </ul>	
T.	<ul> <li>Type/description and location of any emergency alarm system.</li> <li>No Emergency Alarm System.</li> </ul>	S
U.	<ul> <li>Type/description and location of any alternative fire suppression system or protection.</li> <li>None.</li> </ul>	ENGINEERS
V.	<ul> <li>Type/description and location of any carbon monoxide protection.</li> <li>Carbon Monoxide detection for the RTU located in the second floor stairway and monitored by the FACP.</li> </ul>	EERING EI
	End of Report	FIRE PROTECTION CONSULTING ENGINEERIN INC.® 5 ELM STREET SUITE 14 DANVERS, MA 0192
	Registered Plumbing and Fire Protection Engineer Merriam Street Cell 781.697.7173 ston, MA 02493 JNPolando@gmail.com	
VV C2		
2.7.	<ul> <li>shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psi. Victaulic FireLock® Series 751, or equal.</li> <li>B. Provide complete tim with valve, as detailed on the drawings and required by the AHJ.</li> <li>C. Dry System Check Valve: FM Single set-point, latched clapper design, black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12, aluminum bronze clapper, staliness steel spring and shaft, peroxide cured EPDM diaphragm, EPDM seal, brass seat, and Nitrile seat O-rings. Valve internal parts shall be replaceable without removing the valve from the installed position. Valve shall be externally resetable. Required air pressure is 13 psi. Water working pressure is 300 psi. Valve shall be provided with complete trim as a ViceQ-Quick Riser, or equal. Victaulic FireLock® XT Series 768N, or equal.</li> <li>Provide Series 7C7 Compressor Package, or equal.</li> <li>Provide Series 7C7 Compressor Package, or equal.</li> <li>Provide Series 7C7 Compressor Package, or equal.</li> <li>Cater Series 7C8N or explain at 120 Volts.</li> <li>ACCESSORIES</li> <li>A. Fire Department pumper connection shall be a 4 inch "Storz" type, as by Potter Roemer or equal, as approved by the Billerica Fire Department, and is to be located as shown on the plans.</li> <li>Electric Beil shall be 120 Volt, exterior mounted as by Victaulic, 120 Volt, rated.</li> <li>C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire flow switches rated for low voltage</li> </ul>	dlesex Canal Musel Visitor's Center
	<ul> <li>shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psi. Victaulic FireLock® Series 751, or equal.</li> <li>Provide complete trim with valve, as detailed on the drawings and required by the AHJ.</li> <li>Dr System Check Valve: TM Single set-point, latched clapper design, black enamel coated ductile iron body conforming to ASTM A-536, grade 65-45-12, aluminum bronze clapper, stalniess steel spring and shaft, peroxide cured EPDM diaphragm. EPDM seal, brass seal, and Nitrile seat O-rings. Valve internal parts shall be replaceable without removing the valve from the installed position. Valve shall be externally resetable. Required air pressure is 13 psi. Vater working pressure is 030 psi. Valve shall be provided with complete trim as a Vic®-Quick Riser, or equal. Victaulic FireLock® NXT Series 768N, or equal.</li> <li>Provide Series 7C7 Compressor Package, or equal, consisting of a riser-mounted compressor, Series 757P air maintenance device and flexible hoses for installation. Compressor package shall be complete with 1/3 HP compressor wired for operation at 120 Volts.</li> <li>ACCESSORIES</li> <li>A. Fire Department pumper connection shall be a 4 inch "Storz" type, as by Potter Roemer or equal, as approved by the Billerica Fire Department, and is to be located as shown on the plans.</li> <li>B. Electric Bell shall be 120 Volt, exterior mounted as by Victaulic, 120 Volt, rated.</li> <li>C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire service tamper switches rated for low voltage operation.</li> </ul>	
2.7.	<ul> <li>shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psi. Victaulic FireLock® Series 751, or equal.</li> <li>Provide complete trim with valve, as detailed on the drawings and required by the AHJ.</li> <li>Dry System Check Valve: FM Single setpoint, tached clapper design, black nemael coated ductile iron body conforming to ASTM A-538, grade 65-45-12, aluminum bronze clapper, stainless steel spring and shaft, peroxide cured EPDM diaphram, EPDM saal, brass seat, and Nitrile seat C-rings. Valve internal parts shall be proized air pressure is 13 psi. Water working pressure is 300 psi. Valve shall be provided with complete trim as a Vice&amp;-Outck Riser, or equal. Victaulic FireLock® NXT Series 768N, or equal.</li> <li>Provide Series 7C7 Compressor Package, or equal, consisting of a riser-mounted compressor, Series 757P air maintenance device and flexible hoses for installation. Compressor package shall be complete with 1/3 HP compressors wired for operation at 120 Volts.</li> <li>ACCESSORIES</li> <li>A. Fire Department pumper connection shall be a 4 inch "Storz" type, as by Potter Roemer or equal, as approved by the Billefica Fire Department, and is to be located as shown on the plans.</li> <li>B. Electric Bell shall be 120 Volt, exterior mounted as by Victaulic, 120 Volt, rated.</li> <li>C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire service tamper switches rated for low voltage operation.</li> <li>D. Flow switches shall be Potter Electric, or equal, UL Listed, FM Approved fire flow switches rated for low voltage operation.</li> </ul>	Middlesex Canal Musel Visitor's Center
2.7.	<ul> <li>shall be replaceable without terrowing the valve from the installed position. Water working pressure is 300 psi. Wetaulic First-Loadb Series 751 or equal.</li> <li>Provide complete trim with valve, as detailed on the drawings and required by the AHJ.</li> <li>Dry System Check Valve: FIN Single settooni, latched obspore design, black enamel costed ductile iron body conforming to ASTM A-538, grade 65-45-12, aluminum bronze clapper, stainless steel spring and shall perplaceable without removing the valve from the installed position. Valve shall be externally resulted are preserve is 01 psi. Valve shall be set C-rings. Valve internal peries table be replaceable without removing the valve from the installed position. Valve shall be externally resulted. Required ar preserve is 01 psi. Valve shall be set C-rings. Valve internal peries DS-Quick Reser, or 01.</li> <li>Provide Series 707 Compressor Package, or equal, consisting of a riser-mounted compressor. Series 757P air maintenance device and flexible hoses for installation. Compressor package shall be complete with 1/3 HP compressor wired for operation at 120 Volts.</li> <li>ACCESSORIES</li> <li>A Fire Department pumper connection shall be a 4 inch "Storz" type, as by Potter Reemer or equal, as approved by the Billerica Fire Department, and is to be located as shown on the plans.</li> <li>B. Electric Bell shall be Potter Electric, or equal, UL listed, FM Approved fire service tamper switches rated for low voltage operation.</li> <li>C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire flow switches rated for low voltage operation.</li> <li>ThREE - EXECUTION</li> <li>INSTALLATION AND SPACING OF SPRINKLER HEADS</li> <li>A. Centor sprinklors in celling lites and align with oeiling components such as lighting fixtures, diffusers, and smoke detectors.</li> </ul>	dlesex Canal Musel Visitor's Center
2.7. PAR 3.1.	<ul> <li>shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psl. Victaulic FireLock6 Series 751, or equal.</li> <li>B. Provide complete tim with valve, as defailed on the drawings and required by the AH.</li> <li>C. De provide complete tim with valve, as defailed on the drawings and required by the AH.</li> <li>B. Provide complete tim with valve, as defailed on the drawings and required by the AH.</li> <li>C. De provide complete tim with valve, as defailed on the drawings and required by the AH.</li> <li>D. Provide complete tim with valve, as defailed on the drawings and required by the AH.</li> <li>D. Provide Charlo Field.cold Signal 595.41-21, aummum provide with complete tim as a Vice-Culck Riser, or equal without removing the valve from the installed position. Valve shall be extensity resultable. Required air pressure is a 12 psl. Water working pressure is of a psl. Valve internal parts shall be replaceable without removing the valve for membrane or equal.</li> <li>D. Prove without removing the valve of or installation. Compressor package shall be complete with 1/3 HP complexes wire for operation at 120 Volts.</li> <li>ACCESSORIES</li> <li>A. Fire Department pumper connection shall be a 4 inch "Storz" type, as by Potter Roemer or equal, as approved by the Billerca Fire Department, and is to be located as shown on the plans.</li> <li>B. Electric Bell shall be 120 Volt, exterior mounted as by Victaulic, 120 Volt, rated.</li> <li>C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire service tamper switches rated for low voltage operation.</li> <li>D. Flow switches shall be Potter Electric, or equal, UL Listed, FM Approved pressure switches rated for low voltage operation.</li> <li>THREE - EXECUTION</li> <li>INSTALLATION AND SPACING OF SPRINKLER HEADS</li> <li>A. Conter sprinkers in ceiling tiles and align with ceiling components such as lighting fixtures, diffusers, and smoke distector.</li> <li>D. Prove additional heads as re</li></ul>	Middlesex Canal Musel Visitor's Center berwit
2.7. PAR 3.1. 3.2.	<ul> <li>shall be reglezable without removing the valve from the installed position. Water working pressure is 300 pcl. Victualio FinLock&amp; Series 751, or equal.</li> <li>Provide complete tim with yoke, as detailed on the drawings and required by the AHJ.</li> <li>Ory System Check Valve: FM Single set-point, taitched clapper design, black snamel coated ductile iron body conforming to ASTM AS30 gaide 54-51:23, inductions to provide black snamel coated ductile iron body conforming to ASTM AS30 gaide 54-51:24.</li> <li>Drovide Setting to ASTM AS30 gaide 54-54:23, inducting the snape state is an induced with a set Victor and Kinesr, or equal. Terminal to a state of the state is a state of the snape state is a snape state is a snape state of the snape state is a snape state is a snape state is a snape state of the snape state snape state of the snape state of the snape state of the snape</li></ul>	ISSUED FOR PERMIT PROJ. NO. DATE: CO DRAWN BY: REVISIONS
2.7.	<ul> <li>shall be replacedele wilhout encoving the valve from the installed position. Water working pressure is 300 pel. Wexnet Field-cells Series 751 concents.</li> <li>Provide encoving the string why we as detailed on the drawings and required by the AHJ.</li> <li>Dry System Check Valve: TM Single set-point, latched clapper design, black enamel coated ductile iron body conforming to ASTM -ASS, grade 65-45-12, animum bronze design, black enamel coated ductile iron body conforming to ASTM -ASS, grade 65-45-12, animum bronze dapper, statifies set being and shall be provide carried PEDM dispingtions is 300 gal. Juminum bronze dapper, statifies set being and shall be provide to an end the shall be provide acting by eschart the required by the AHJ.</li> <li>Provide Beries 707 Compressor Package, or equal, constiting of a riser-mounted complex trim as a Vado-Cuck Riser, or equal. Voltatile Field-cole NAT Series 768N, or equal.</li> <li>Provide Beries 707 Compressor Package, or equal, constiting of a riser-mounted compressor. Series 757 air maintenance device and flexible hoses for installation. Compressor package shall be complete with 1/3 HP compressor where for operation at 120 Volts.</li> <li>ACCESSORIES</li> <li>A Fire Department pumper connection shall be a 4 inch "Stort" type, as by Potter Roemer or equal, as approved by the Billerica Fire Department, and is to be located as shown on the plans.</li> <li>B. Electric Bell shall be Potter Electric, or equal, UL listed, FM Approved fire flow switches rated for low voltage operation.</li> <li>E. Pressure switches shall be Potter Electric, or equal, UL listed, FM Approved pressure switches rated for low voltage operation.</li> <li>E. Pressure switches shall be Potter Electric, or equal, UL Listed, FM Approved pressure switches rated for low voltage operation.</li> <li>E. Pressure switches shall be Potter Electric, or equal, UL Listed, FM Approved pressure switches rated for low voltage operation.</li> <li>E. Pressure s</li></ul>	ISSUED FOR PERMIT PROJ. NO. DATE: C DRAWN BY: REVISIONS

SPECIFICATIONS

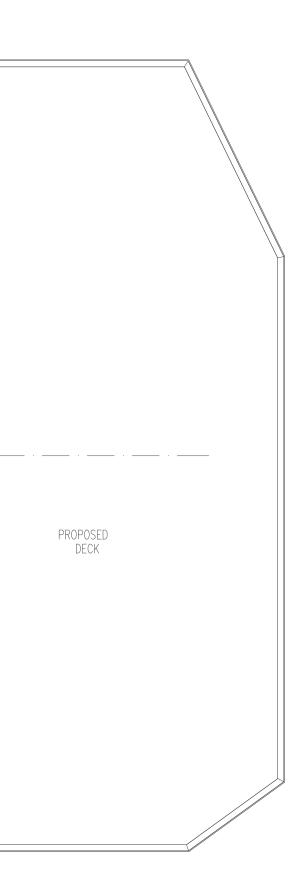
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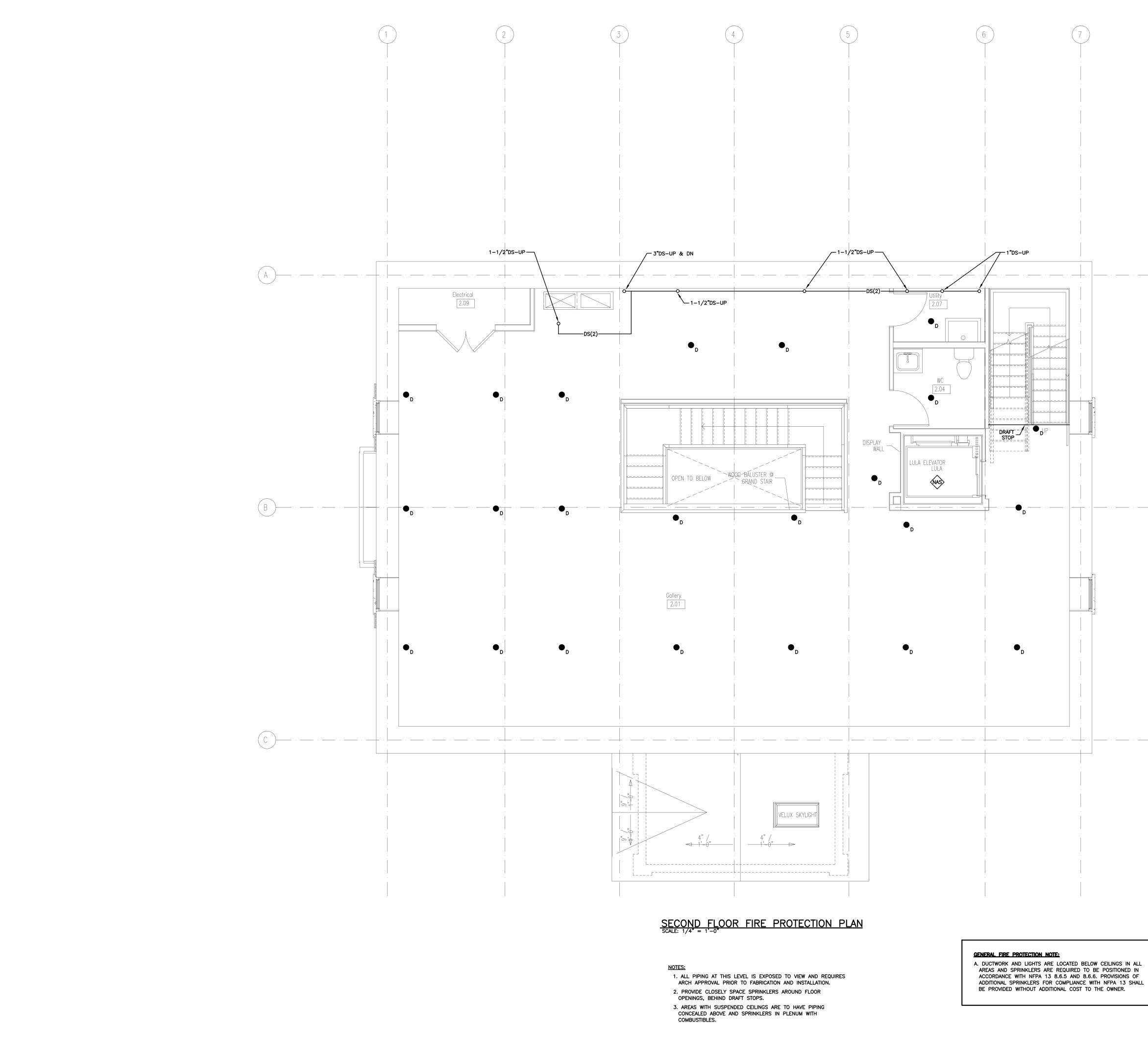




AVENEY ARCHITECTURE + CONSTRUCTION



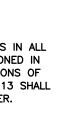


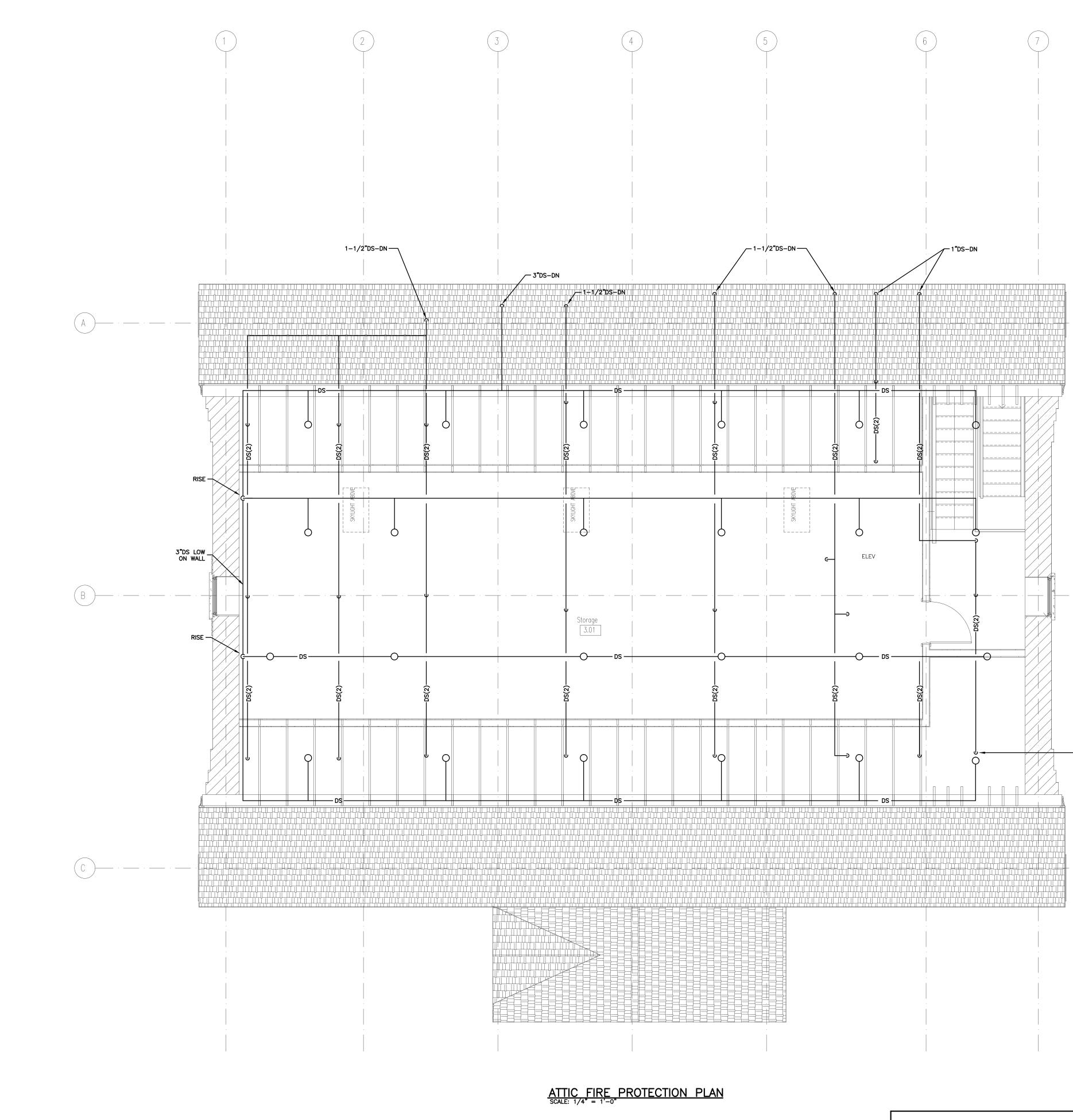






AVENEY ARCHITECTURE + CONSTRUCTION





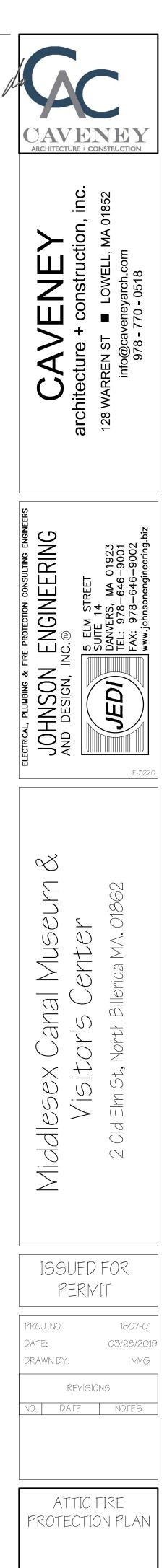
NOTES:

1. ALL DRY SPRINKLER (DS) PIPING TO SLOPE TOWARD MAIN DRAIN AT DRY ALARM CHECK VALVE.

2. SLOPES TO BE IN COMPLIANCE WITH NFPA-13.

3. DS(2) PIPING TO SERVE 2ND FLOOR SPRINKLERS TO BE INSTALLED BELOW ATTIC FLOOR AND ABOVE 2ND FLOOR CEILING.

**GENERAL FIRE PROTECTION NOTE:** A. DUCTWORK AND LIGHTS ARE LOCATED BELOW CEILINGS IN ALL AREAS AND SPRINKLERS ARE REQUIRED TO BE POSITIONED IN ACCORDANCE WITH NFPA 13 8.6.5 AND 8.6.6. PROVISIONS OF ADDITIONAL SPRINKLERS FOR COMPLIANCE WITH NFPA 13 SHALL



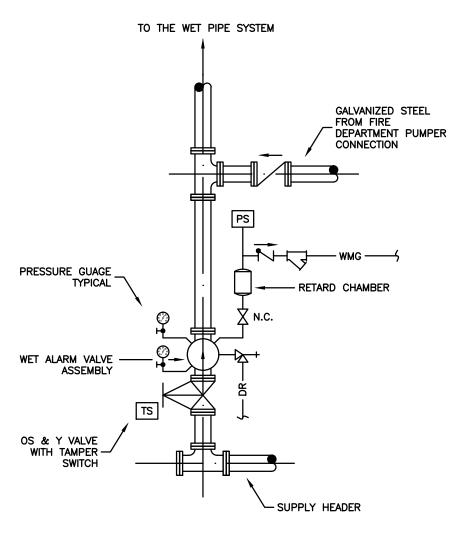


1" DROP TO DS IN 2ND FLOOR CEILING TYP UNLESS OTHERWISE NOTED

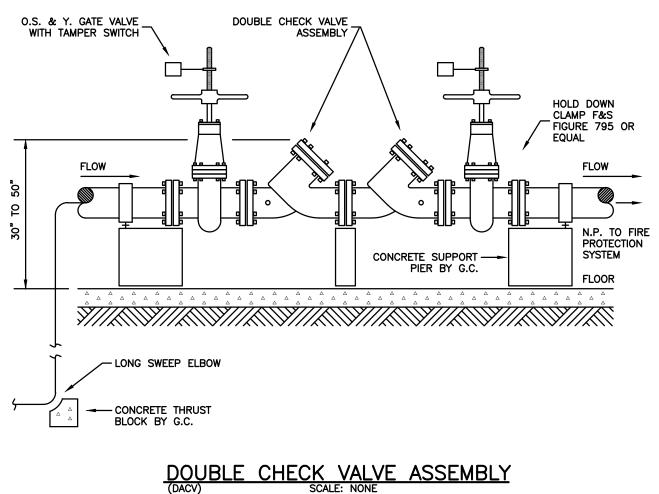
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BE PROVIDED WITHOUT ADDITIONAL COST TO THE OWNER.

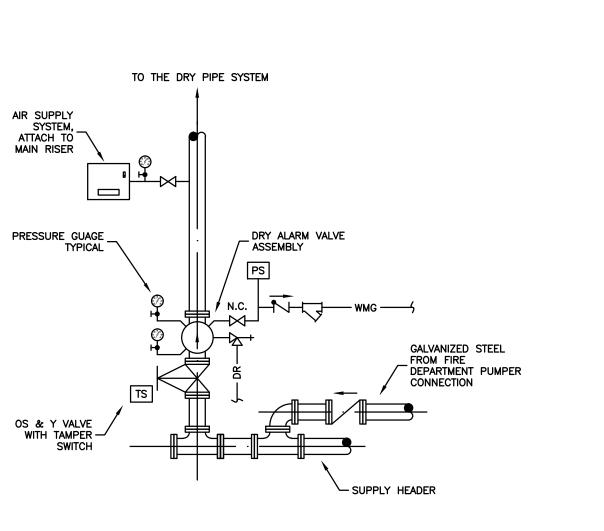


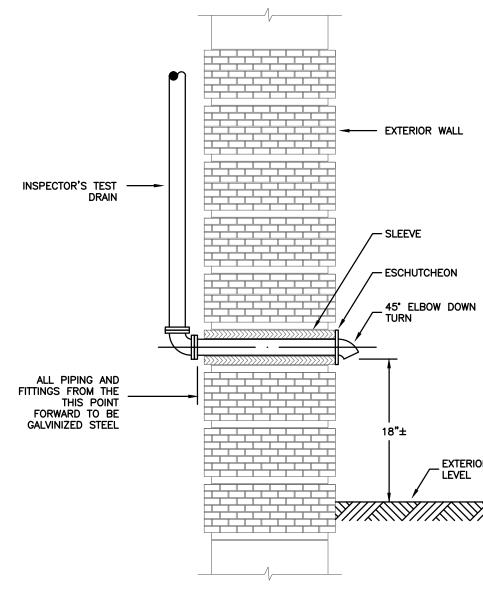
WET PIPE ALARM VALVE ASSEMBLY (DACV) SCALE: NONE



# NOTES:

OF WALL. 2. SUPPORTS AT DEVICE SHALL IN NO MANNER INTERFERE





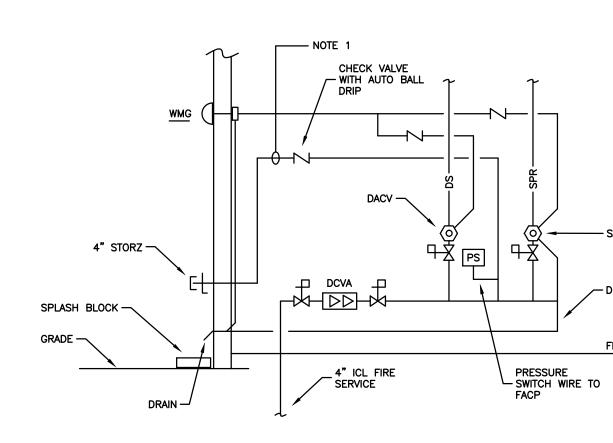
DRY PIPE ALARM VALVE ASSEMBLY (DACV) SCALE: NONE

SPRINKLER DRAIN PIPING THRU WALL

NOTES: 1. ANNULAR SPACE BETWEEN SLEEVE AND DRAIN PIPING TO BE SEALED WEATHER TIGHT.

1. DOUBLE CHECK VALVE ASSEMBLY SHALL BE INSTALLED 30"MIN. - 53"MAX. FROM FINISHED FLOOR TO TOP OF DEVICE. AND A MINIMUM CLEARANCE OF 12" FROM FACE

WITH THE OPERATION, TESTING AND SERVICING OF THE DEVICE. INCLUDING THE INTEGRAL RELIEF VALVE AND DRAIN. 3. N.P. - INDICATES NON-POTABLE WATER.



# SPRINKLER SERVICE DIAGRAM

NOTES:

1. ALL PIPING AND FITTINGS BETWEEN FD. PUMPER CONN. AND CHECK VALVE TO BE GALVANIZED STEEL.

2. REFER TO ALARM VALVE DETAILS FOR ACCESSORIES AND TRIM.





\_\_\_EXTERIOR GRADE LEVEL

— SACV

FLOOR

## PLUMBING LEGEND

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OLD WATER (CW) WATER (HW) WATER CIRCULATION (HWC) DIL (S) OR WASTE (W) DIL OR WASTE BURIED OR AT CEILING BELOW :NT (V) ATURAL GAS OOR DRAIN (FD) DOF DRAIN USH FLOOR CLEANOUT (FCO) D CLEANOUT DIL STACK ASTE STACK ENT STACK ASTE & TRAP ASTE & VENT BOVE FINISHED FLOOR ISTING TO REMAIN NT THROUGH ROOF WATER HEATER ATER CLOSET VATORY HOWER JB/SHOWER NK AR SINK TCHEN SINK RINKING FOUNTAIN NOT IN PLUMBING CONTRACT **VERT** JBIC FEET PER HOUR OWN EILING NDERGROUND ALL HYDRANT ATER HAMMER ARRESTOR DUCED PRESSURE CKFLOW PREVENTER ERIFY IN FIELD ATER METER ATE VALVE

GLOBE VALVE
PLUG VALVE
CHECK VALVE
BUTTERFLY VALVE
BALL VALVE
3 WAY VALVE
RELIEF VALVE

PRESSURE REGULATING VALVE SCREWED UNION FLANGED UNION

FLOW SWITCH

TEMPERATURE GAUGE
PRESSURE GAUGE
FLANGED UNION
PIPE GUIDE
PIPE CAP
PIPE TURNING DOWN
PIPE TURNING UP
TEE DOWN
DROP AND RUN
BACKWATER VALVE
BALANCING VALVE

GENERAL PLUMBING NOTES:

1. ALL WORK SHALL BE IN STRICT ACCORD WITH THE MASSACHUSETTS PLUMBING AND GAS CODES, 248 CMR.

2. THE PLUMBING CONTRACTOR IS TO APPLY, PAY AND SECURE PERMITS FOR THE WORK REQUIRED UNDER THIS CONTRACT.

- 3. THE PLUMBING CONTRACTOR SHALL PROVIDE ALL MATERIALS, SUPPLIES, TOOLS AND ALL OTHER ITEMS NECESSARY TO COMPLETE THE WORK, EXCEPT AS SPECIFICALLY NOTED OTHERWISE ON THE
- DRAWINGS. 4.ALL WORK SHALL BE COORDINATED WITH THE OWNER, AND HOURS OF WORK TO BE AS DIRECTED BY THE OWNER.

5. THE PLUMBING CONTRACTOR SHALL VERIFY ALL PIPE SIZES (REQUIRED TO BE CONNECTED TO, OR OTHERWISE ALTERED BY THE

WORK OF THIS CONTRACT) IN THE FIELD, PRIOR TO NEW WORK. 6.PLUMBING CONTRACTOR SHALL COORDINATE ALL REQUIRED ELECTRICAL WORK WITH THE ELECTRICAL CONTRACTOR.

7.PLUMBING CONTRACTOR SHALL COORDINATE WITH THE OWNER ON EXACT LOCATIONS OF ALL EXPOSED-TO-VIEW WORK THAT IS PART OF THIS CONTRACT.

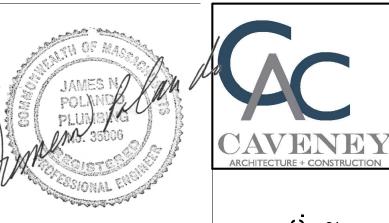
 ALL MATERIALS SHALL BE NEW, AND BE MASSACHUSETTS LISTED FOR USE IN PLUMBING SYSTEMS.

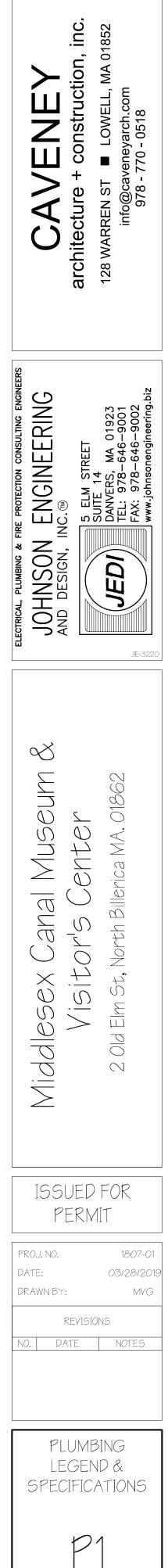
PLUM	BING S	SYSTEMS SPECIFICATION-
PART	ONE -	GENERAL
1.01	WORI A.	K INCLUDED Perform work and provide material and equipr and as specified or indicated in this Section of coordinate work of this Section with work of ot
	В.	complete and fully functional installation. Give notices, file plans, obtain permits and lice backcharges, and obtain necessary approvals jurisdiction as required to perform work in accurate provide the contract Decument
	C.	requirements and with the Contract Document All work shall be in strict conformance with the Code, the 2009 IPC (International Plumbing C Code.
	D.	<ol> <li>In general, the work of this Section shall includ</li> <li>Waste, and vent piping systems within</li> <li>Domestic water piping systems.</li> <li>Valves, unions, and flanges.</li> <li>Propane gas piping system.</li> <li>Plumbing Fixtures, drains and accesso</li> <li>Plumbing connections to Owner furnish</li> </ol>
	E.	<ol> <li>Hangers, supports, and attachments.</li> <li>The description of each system is as follows:</li> <li>The waste piping system shall connect system.</li> <li>The vent piping system shall terminate</li> <li>The water system shall begin by conne</li> <li>The gas piping system shall begin at the</li> </ol>
1.02	RELA A.	the site contractor, at the locations sho TED WORK Related work specified in other Sections includ limited to: 1. Electrical Power and Wiring. 2. HVAC systems, including the domestic
1.03	REFE A.	<ol> <li>Scope as defined by the General Contr RENCES</li> <li>Codes, Regulations and Guidelines:</li> <li>In addition to complying with the specif pertinent regulations of Local, State an agencies and authorities having jurisdic</li> </ol>
	В.	All equipment shall be UL Listed, as a minimu
PART	TWO -	- PRODUCTS
2 01	PIPIN	G FITTINGS AND JOINTS

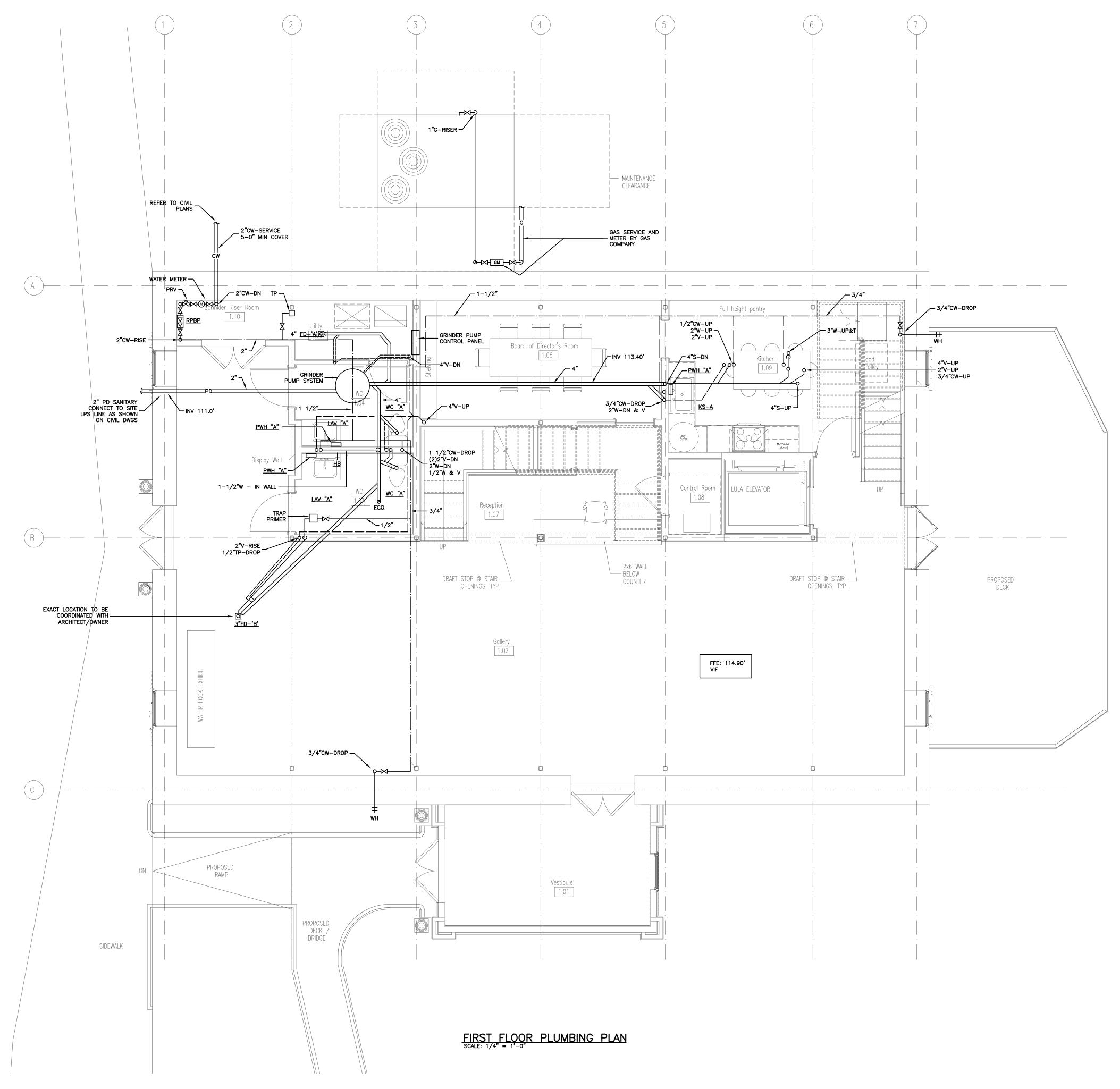
2.01 PIPING, FITTINGS, AND JOINTS
 A. Waste Piping Systems (Basement areas and only):

		"ManaBlock" system. The cost for each system is to b
		cost estimates, for comparative review by the Archit
		and owner.
	E. Gas Sy	stems:
		dule 40 black steel, with threaded malleable iron fittings, tubing with sweat soldered fittings, in accordance with NI ments.
2.02	VALVES	
	bronze	ball valves for all shut-off service. Ball valves shall be tw bodied, Apollo, Watts or Nibco, full-port design with blow stems.
	B. Gas se approve	rvice shut-off valves shall be bronze ball valves with tee hed for use on propane gas systems.
2.03		RS AND SUPPORTS hangers, rods, and attachments to support the Work of t
	Provide by the a	e building structure with UL-listed or FM-approved attach oversized hangers on insulated piping. All spacing shall authorities having jurisdiction. Hanger systems shall be a ctured by B-Line or Carpenter and Patterson.
2.04	WATER HEAT	ERS
		o be heated by the HVAC system water heating boiler, ar
	B. Plumbir	e domestic water storage tank. ng contractor to provide safety relief, vacuum relief and al pries for a complete and code compliant installation.
2.05	INSULATION	
	hazard	ves and Insulation Materials: ASTM E-84 composite fire a rating maximum 25 for Flame Spread and 50 for Smoke ves shall be waterproof.
	C. Accepta	on shall be installed over heat traced piping. able Manufacturers: Provide heavy density fiberglass ins Corning, Certain-Teed, Knauf, or Manville.
		owing systems shall be insulated accordingly.
	1. 2.	Hot water piping: 1-inch thick (R-3 minimum resistance). Cold water piping: 1-inch vapor sealed (R-3 minimum res Fittings and Valves consistent with system.
2.06	PLUMBING FI	5
	•	plumbing fixtures in accordance with the Architect's
	B. Provide a	t schedule. Il accessories and trim for complete installations, includrain outlets, tailpieces, drains, 1/4 turn supply stops, pip
	carriers as	s required. ontinuous feed garbage disposers in each kitchen sink,
		or Model 33 all stainless steel.
		por, area, shower and roof drains where shown on the plang clamps for positive sealing to waterproofing systems.

ipment as shown on Drawings of the Specifications. Completely other trades and provide a licenses, pay fees and als from authorities that have	<ol> <li>Piping shall be Schedule 40 PVC (solid wall) conforming to ASTM- 2665, with socket type solvent cemented joints.</li> <li>Fittings to be drainage pattern with socket ends.</li> <li>Joint cement shall be as recommended by the pipe manufacturer.</li> <li>B. Waste Piping Systems (All buildings, all areas above Basement and above slab levels)         <ol> <li>4-inch and larger: No-hub cast-iron pipe and fittings heavy-duty stainless steel no-hub couplings.</li> <li>Waste and vent piping 3 inches and smaller: Standard weight galvanized steel pipe with galvanized cast-iron drainage fittings. No- hub cast-iron pipe and fittings or Type L conper with cast brass</li> </ol> </li> </ol>
ccordance with all legal ents. the New Hampshire State Building g Code), and NFPA-54 Fuel Gas lude, but not be limited to: in the buildings.	<ul> <li>hub cast-iron pipe and fittings or Type L copper with cast brass drainage fittings and solder joints.</li> <li>3. Vent Piping: No-hub cast-iron pipe and fittings or standard-weight galvanized steel pipe with galvanized cast-iron drainage fittings, or Type L copper tubing with drainage pattern fittings.</li> <li>C. Vent Piping Systems: <ol> <li>Piping shall be Schedule 40 PVC (solid wall) conforming to ASTM-2665, with socket type solvent cemented joints.</li> <li>Fittings to be drainage pattern with socket ends.</li> <li>Joint cement shall be as recommended by the pipe manufacturer</li> </ol> </li> </ul>
ssories ished equipment. 5: sect to the site sanitary drainage ate by venting through the roof. inecting to the site water main. It the gas supply line provided by hown on the plans. cludes, but is not necessarily	<ul> <li>D. Water Systems:</li> <li>1. PEX Type b, 3/8-inch thru 2-inch conforming to, ASTM F876, ASTM 877, ASTM E84, ASTM E119-14, CSA 137.5, NFPA 251, NSF 61 (NSF®us-pw), NSF 372, UBC 7-1, and UL 263. PEX tubing shall have a Standard Dimensional Ratio (SDR-9), with a 100 psi at 180°F / 160 psi at 73°F pressure, temperature rating, a "5006" chlorine listing and a 5306, 6 month ultraviolet UV exposure listing. Tubing shall be as by Veiga, or approved equal.</li> <li>2. PEX Press fittings, shall conform to, ASTM F877, NSF 61, NSF 61-372, PEX fittings for use with SDR-9 designated tube shall be PEX press, made from lead free bronze, or Radel R polymer, Fittings shall be manufactured by the same manufacturer as the tubing.</li> </ul>
entractor. ecified requirements, comply with and national governmental ediction. num.	<ol> <li>ALTERNATE WATER PIPING SYSTEM:</li> <li>a. Provide a cost for a complete manufacturer designed water distribution system that incorporates a central distribution block and dedicated PEX lines to each fixture and faucet within each unit. One main distribution system shall be provided for each unit. The system shall be "ManaBlock" as by Veiga, and the cost shall be used to compare the costs difference between the standard</li> </ol>
r each system is to be listed in the review by the Architect, engineer nalleable iron fittings, or Type L n accordance with NFPA-54	<ul> <li>3.01 EXAMINATION</li> <li>A. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.</li> <li>B. Examine roughing in for gutters and gutter connections prior to making connections thereto. Gutters and gutter outlets are to be provided by the General</li> </ul>
Ball valves shall be two-piece bort design with blow-out proof ball valves with tee handles, support the Work of this Section FM-approved attachments.	<ul> <li>Contractor.</li> <li>C. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed</li> <li>D. Examine all utility connections prior to making connections thereto.</li> <li>E. Do not proceed until unsatisfactory conditions have been corrected.</li> <li>F. Verify all points of connection in the field, prior to doing any work.</li> <li>3.02 EQUIPMENT ROUGHINGS AND CONNECTIONS</li> <li>A. Provide roughing and final connections for water, waste, and vent systems including indirect wastes, traps, tailpieces, stops and supplies, valves, and unions for all equipment and fixtures including those supplied under other</li> </ul>
ing. All spacing shall as required er systems shall be as Patterson. ater heating boiler, and include a vacuum relief and all other liant installation.	<ul> <li>sections.</li> <li>B. Refer to architectural floor plans and equipment schedules for all equipment provided under other sections or by Owner.</li> <li>3.03 TESTING         <ul> <li>A. Test the piping installation work of this Section in accordance with the direction of the reviewing inspectors and the requirements of this Section.</li> </ul> </li> <li>3.04 PIPE IDENTIFICATION OF PIPING AND EQUIPMENT         <ul> <li>A. Flow arrows shall be provided on all systems.</li> <li>B. Install markers on insulated piping only after insulation is complete and has been</li> </ul> </li> </ul>
E-84 composite fire and smoke ad and 50 for Smoke Developed. d piping. density fiberglass insulation by anville. cordingly. ninimum resistance). led (R-3 minimum resistance). ystem.	<ul> <li>accepted by the Architect. Install marker adjacent to access panels where piping is concealed.</li> <li>3.05 ADJUSTMENTS AND BALANCING         <ul> <li>After completing installation work and equipment start-ups, perform the necessary adjustments to systems installed under this Section. Submit verification that systems are operating at the specified temperatures and pressures.</li> <li>B. Adjust temperatures, pressure relief valves, pressure regulating valves, and thermostatic control valves, and verify that normally open or closed valves are set in accordance with the Contract Drawings and proper operation.</li> </ul> </li> </ul>
with the Architect's Fixture and te installations, including but not urn supply stops, pipe fittings and n each kitchen sink, similar to In- nere shown on the plans, complete	END OF SECTION



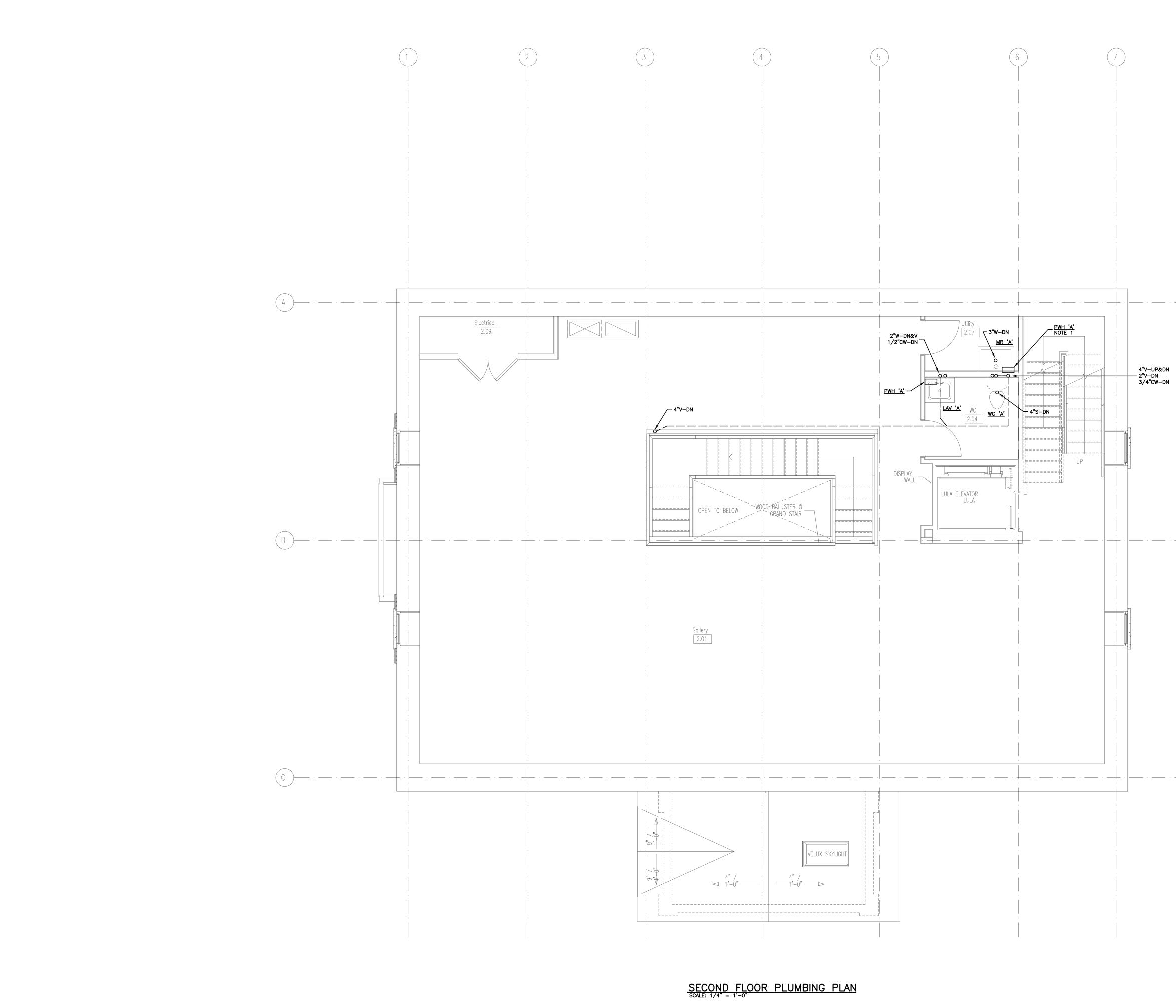




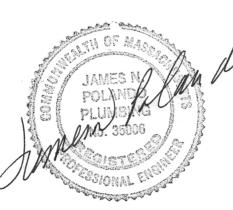




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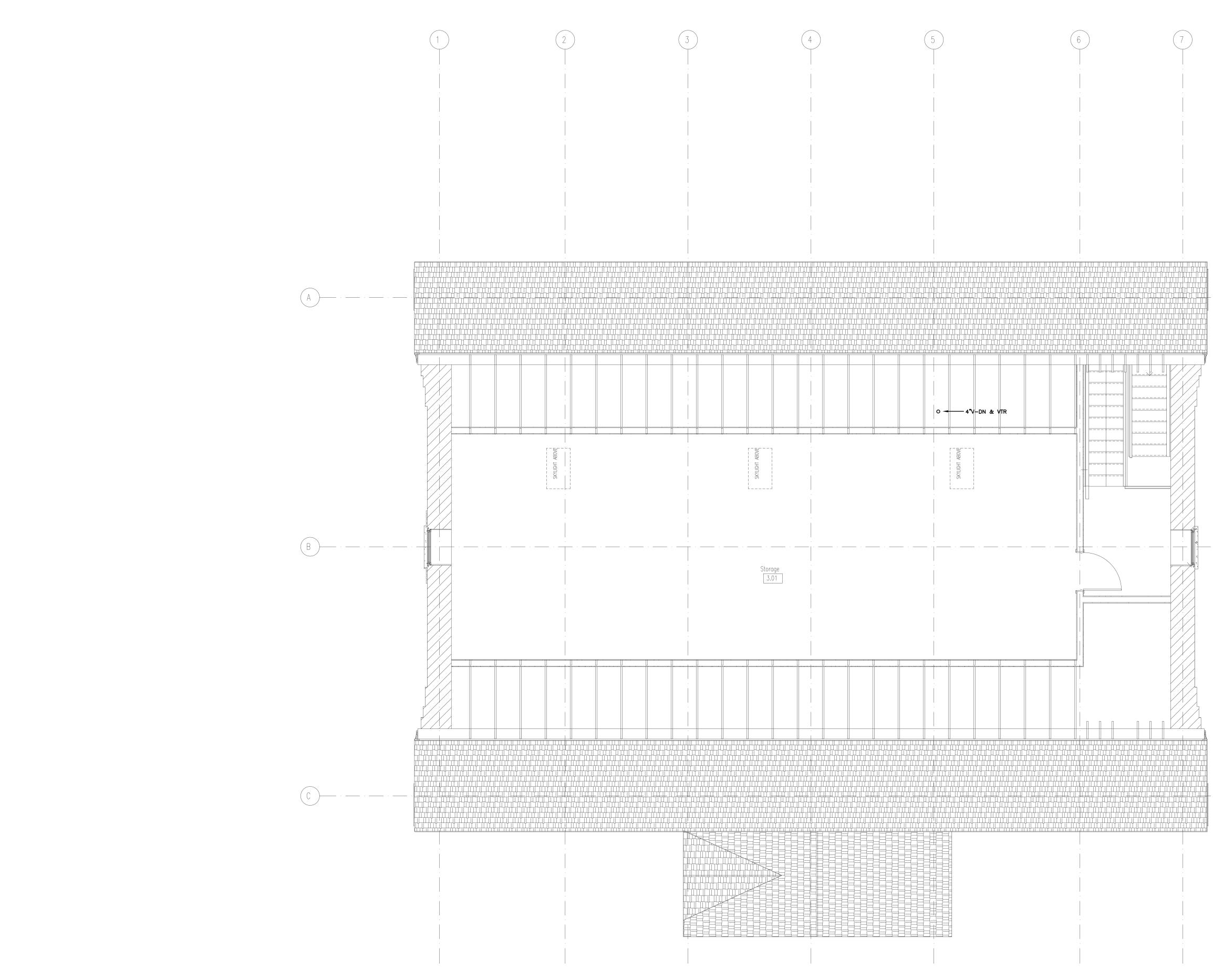
NOTES: 1. INSTALL WATER HEATER IN UTILITY 2.07 AT 4'-0" AFF.



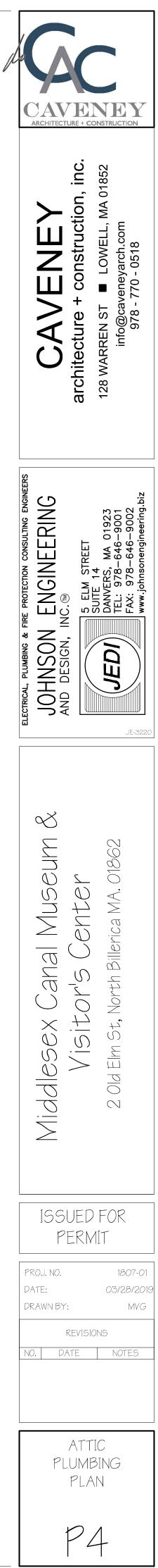


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CAVENEY ARCHITECTURE + CONSTRUCTION



ATTIC PLUMBING PLAN SCALE: 1/4" = 1'-0"

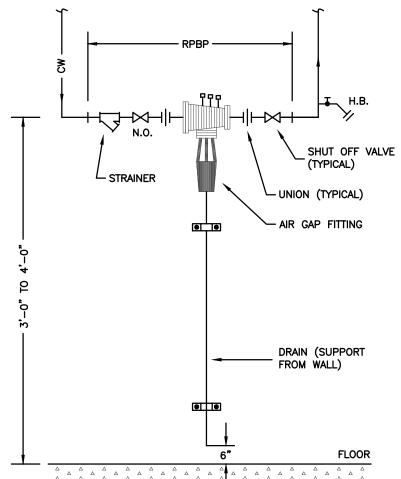




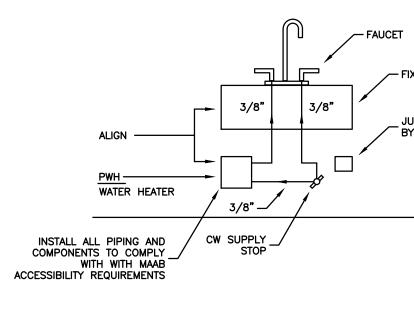


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### BACKFLOW PREVENTER RPBP PIPING SCALE: NONE

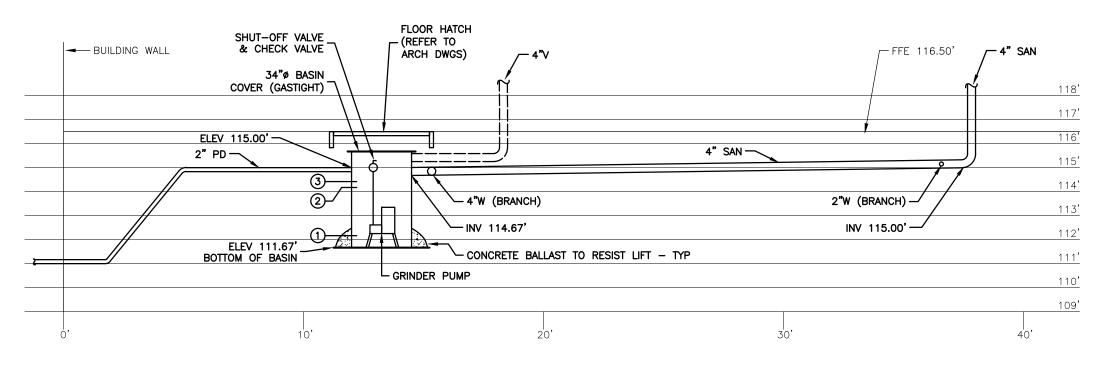




NOTES: 1. BACKFLOW PREVENTER SHALL BE INSTALLED 36"MIN. – 48"MAX. FROM FINISHED FLOOR TO CENTERLINE OF DEVICE AND A MINIMUM CLEARANCE OF 12" FROM FACE OF WALL. 2. SUPPORTS AT DEVICE SHALL IN NO MANNER INTERFERE WITH THE OPERATION, TESTING AND SERVICING OF THE

DEVICE, INCLUDING THE INTEGRAL RELIEF VALVE AND DRAIN.

3. N.P. - INDICATES NON-POTABLE WATER.



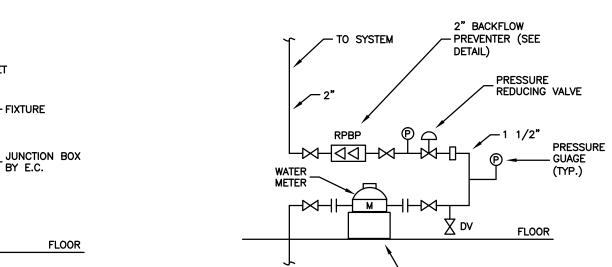
#### MAIN SEWER PROFILE SCALE: H: 1/4" = 1'-0" / V: 1/4" = 1'-0"

GRINDER PUMP OPERATIONAL NOTES:

① PUMP OFF: ELEVATION 112.17'

② PUMP ON: ELEVATION 114.17'

(3) HIGH LEVEL ALARM: ELEVATION 114.42'



WATER SERVICE DETAIL

\_ CONCRETE PAD

2" WATER SERVICE

DESIGNATION	MAAB	MANUF.	MODEL	DESCRIPTION	TRIM	ACCESSORIES	s/w	VENT	CW	HW	NOTES
WC-A	Yes	тото	CT705ELN	White vitreous china, floor mounted, 1.6 GPF, Floor outlet, top spud, universal height, complete with quiet-close, openfront seat, less cover.	TOTO TET2GA sensor flushing system, hard-wired with stainless steel wall panel.	Closet flange, sealing ring, nuts, bolts and bolt covers	4"	2"	1"		1, 2
LAV-A	Yes	Kohler	К-2337-8	Vitreous china, self-rimming sink with overflow.	Worth widespread mixing faucet K-R76257-4D, brushed nickel finish. Provide open grid drain with brushed nickel finish.	McGuire LFBV2165 angle supplies with 1/4 turn stops, 1/2" IPS inlets. Provide P-Trap and wall escutcheons.	1 - 1/2"	1 - 1/2"	1/2"	1/2"	1, 2, 3
KS-A	Νο	Kohler	K-RH20060-4	Top Mount stainless steel, 18 gauge, single bowl 33" x 22" x 9" deep sink. Provide stainless steel basket strainer.	Kohler K-R11921-SD, pull-down sink faucet with soap dispenser. Brushed nickel finish.	McGuire LFBV2165 angle supplies with 1/4 turn stops, 1/2" IPS inlets. Provide P-Trap and wall escutcheons.	1 - 1/2"	1 - 1/2"	1/2"	1/2"	1, 2, 4
НВ	No	Chicago	952	CP with integral VB and removable Tee handle					1/2"		
MR	No	Mustee	65M	Floor mounted molded stone basin	63.600A Mixing faucet, 65.700 Hose kit, 66.600 mop hanger, Stainless Steel rim guards.	67.2436 wall guard kit	3"	2"	3/4"	3/4"	1, 2

**1** All fixtures, faucets and trim to be Mass Plumbing Board approved.

2 All fixtures to be new and installed to comply with the Architect's mounting dimensions and detials.
3 Provide Insulation kit, TruBro or equal.

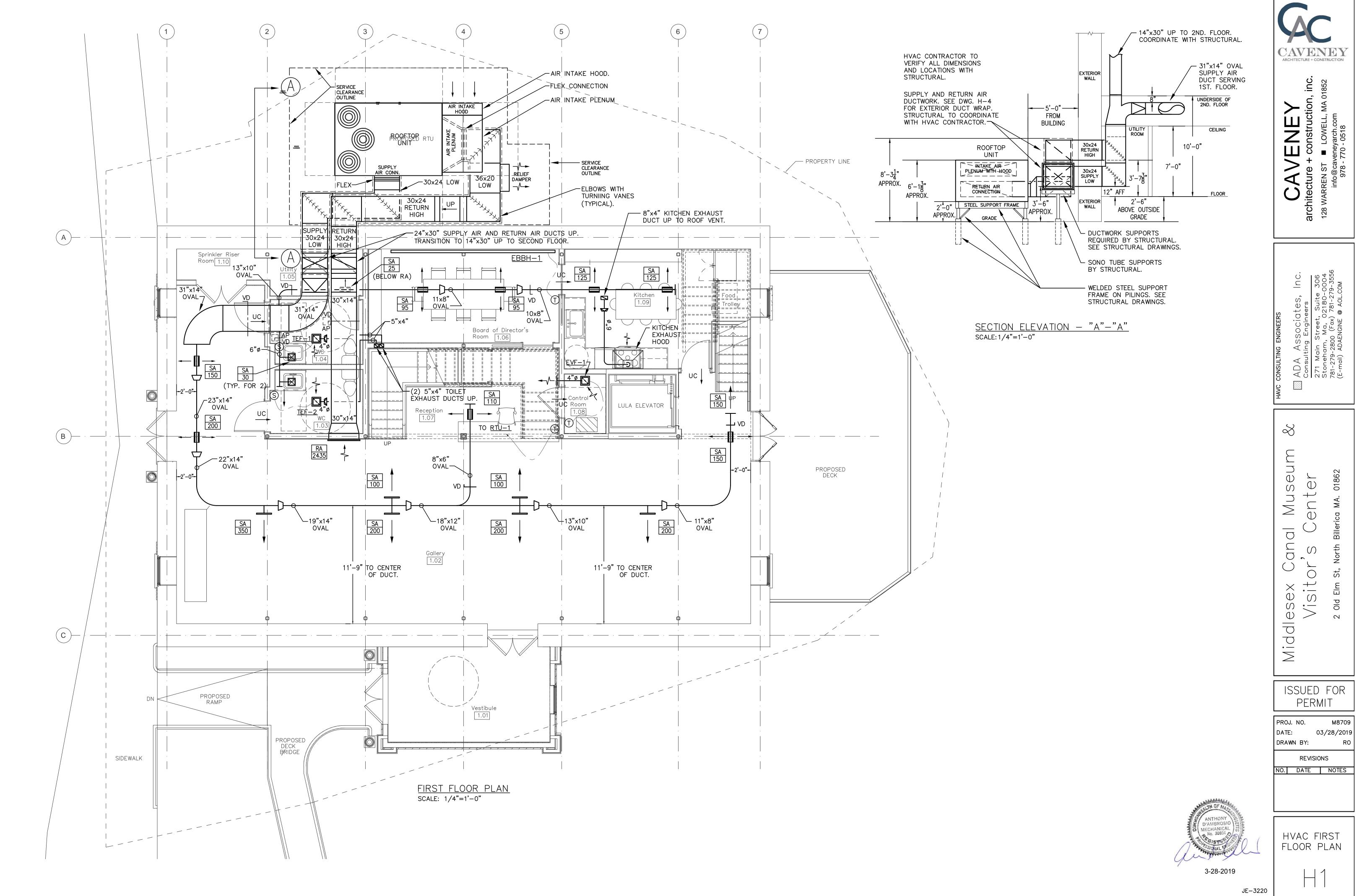
4 Dishwasher to be fed from HW below sink, and waste to be discharged to KS tailpiece.

GENERAL NOTES  $$A_{\rm A}$$  All finishes and fixture color selections to be as specified by the Architect.





CAVENEY ARCHITECTURE + CONSTRUCTION



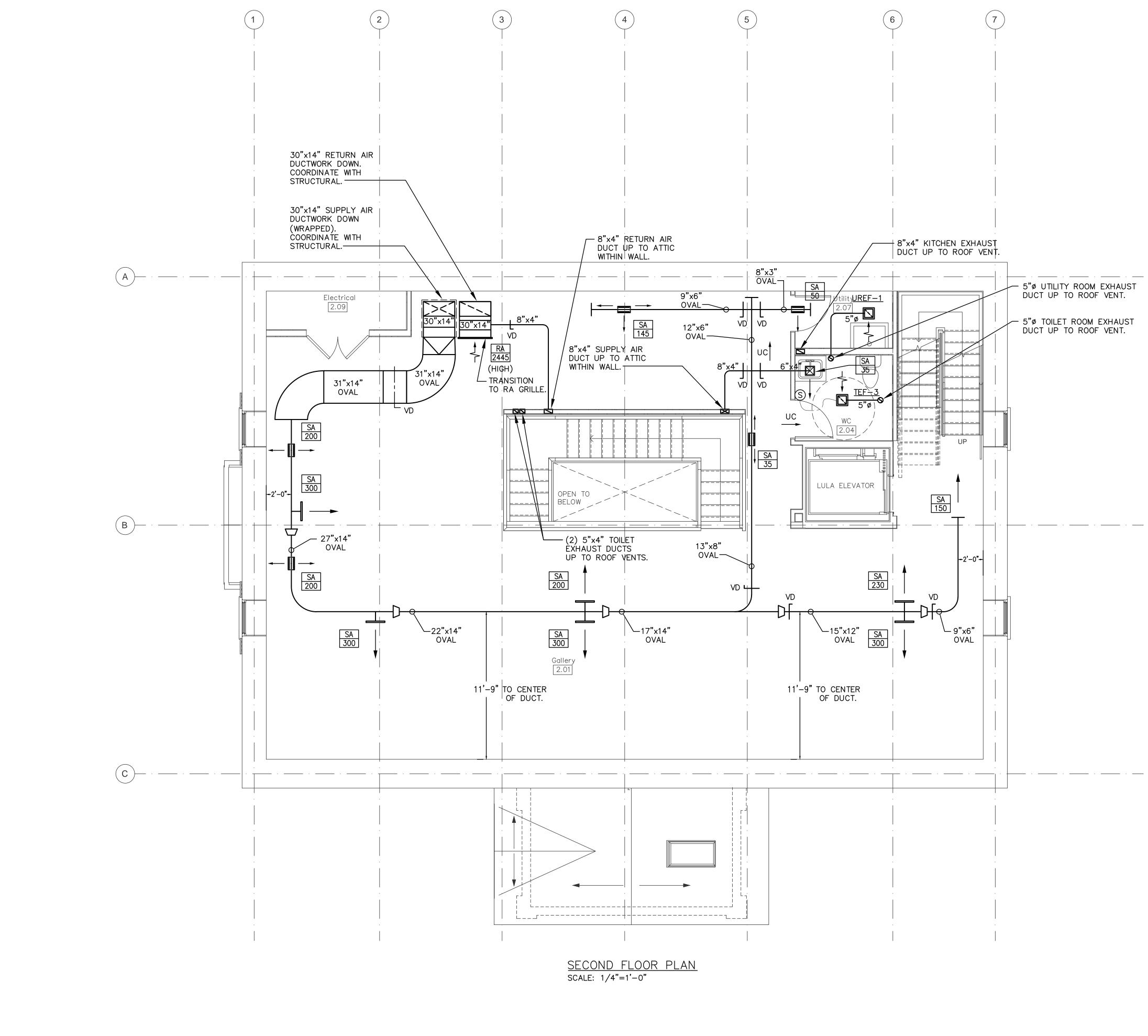
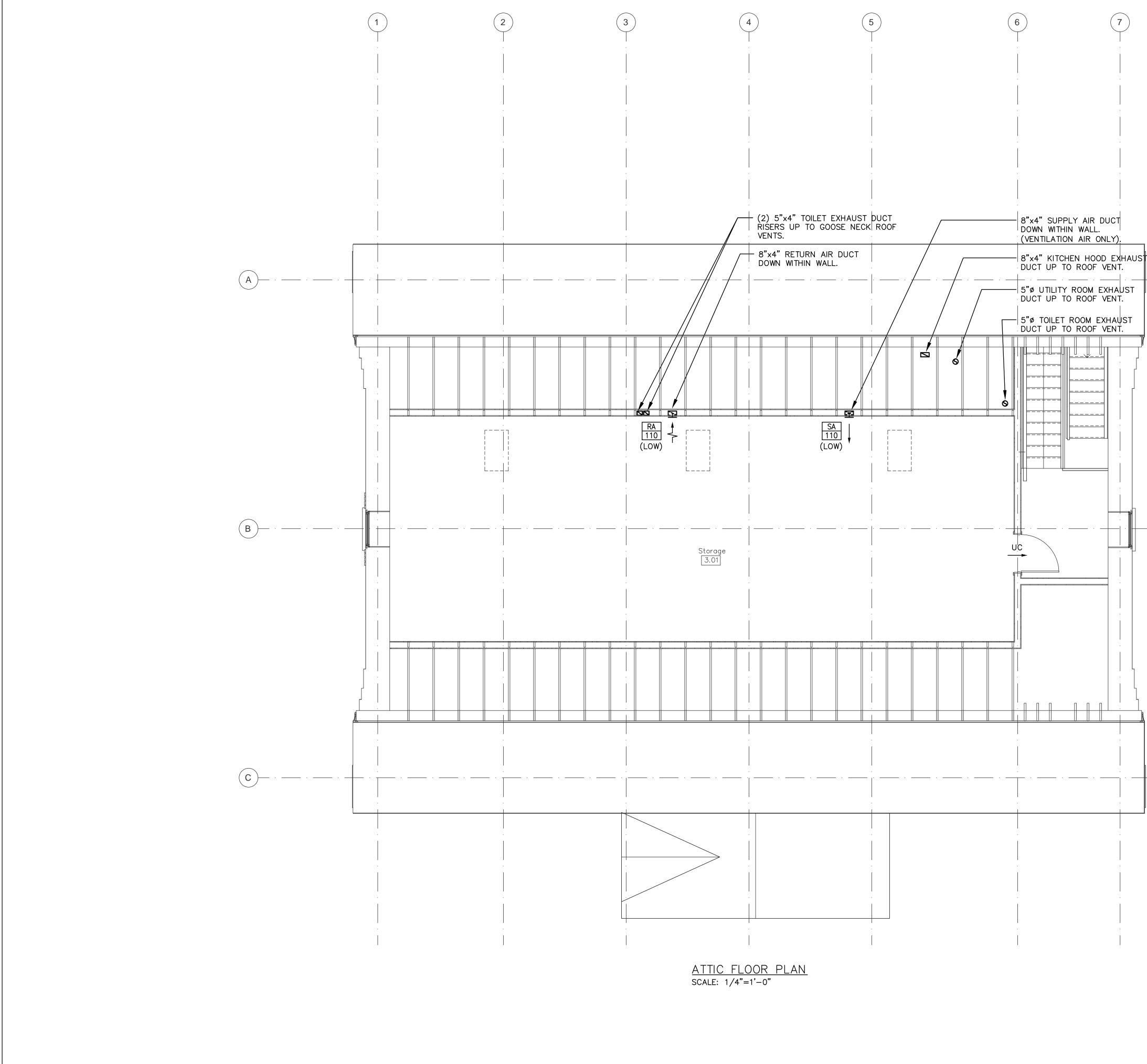


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	HAVC CONSULTING ENGINEERS ADA ASSOCIATES, InC. Consulting Engineers 271 Main Street, Suite 306 Stoneham, Ma, 02180-0004 781-279-2800 (Fax) 781-279-3556 (E-mail) ADAENGINE @ AOL.COM
	Middlesex Canal Museum & Visitor's Center <sup>2 Old Elm St, North Billerica MA. 01862</sup>
	ISSUED FOR PERMIT PROJ. NO. M8709 DATE: 03/28/2019 DRAWN BY: RO REVISIONS NO. DATE NOTES
JE-3220	hvac second floor plan H2





	<b>CAVERATION INC.</b> 128 WARREN ST. = LOWELL, MA 01852 Info@caveneyarch.com 978 - 770 - 0518
	HAVC CONSULTING ENGINEERS ADA ASSOCIATES, Inc. Consulting Engineers 271 Main Street, Suite 306 Stoneham, Ma, 02180-0004 781-279-2800 (Fax) 781-279-3556 (E-mail) ADAENGINE @ AOL.COM
	Middlesex Canal Museum & Visitor's Center <sup>2 Old Elm St, North Billerica MA. 01862</sup>
	ISSUED FOR PERMIT PROJ. NO. M8709 DATE: 03/28/2019 DRAWN BY: RO REVISIONS NO. DATE NOTES
JE-3220	hvac attic floor plan H3



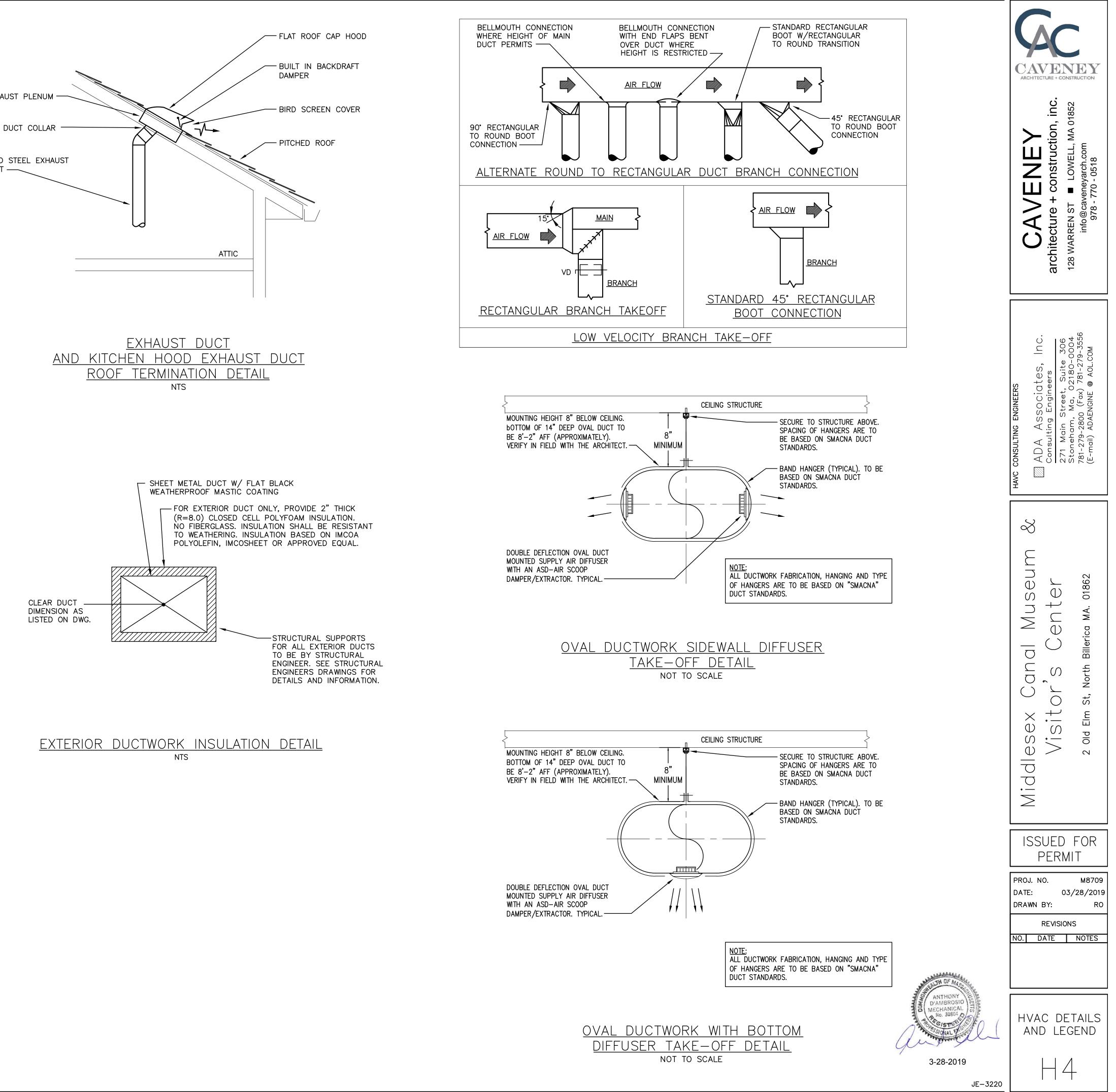
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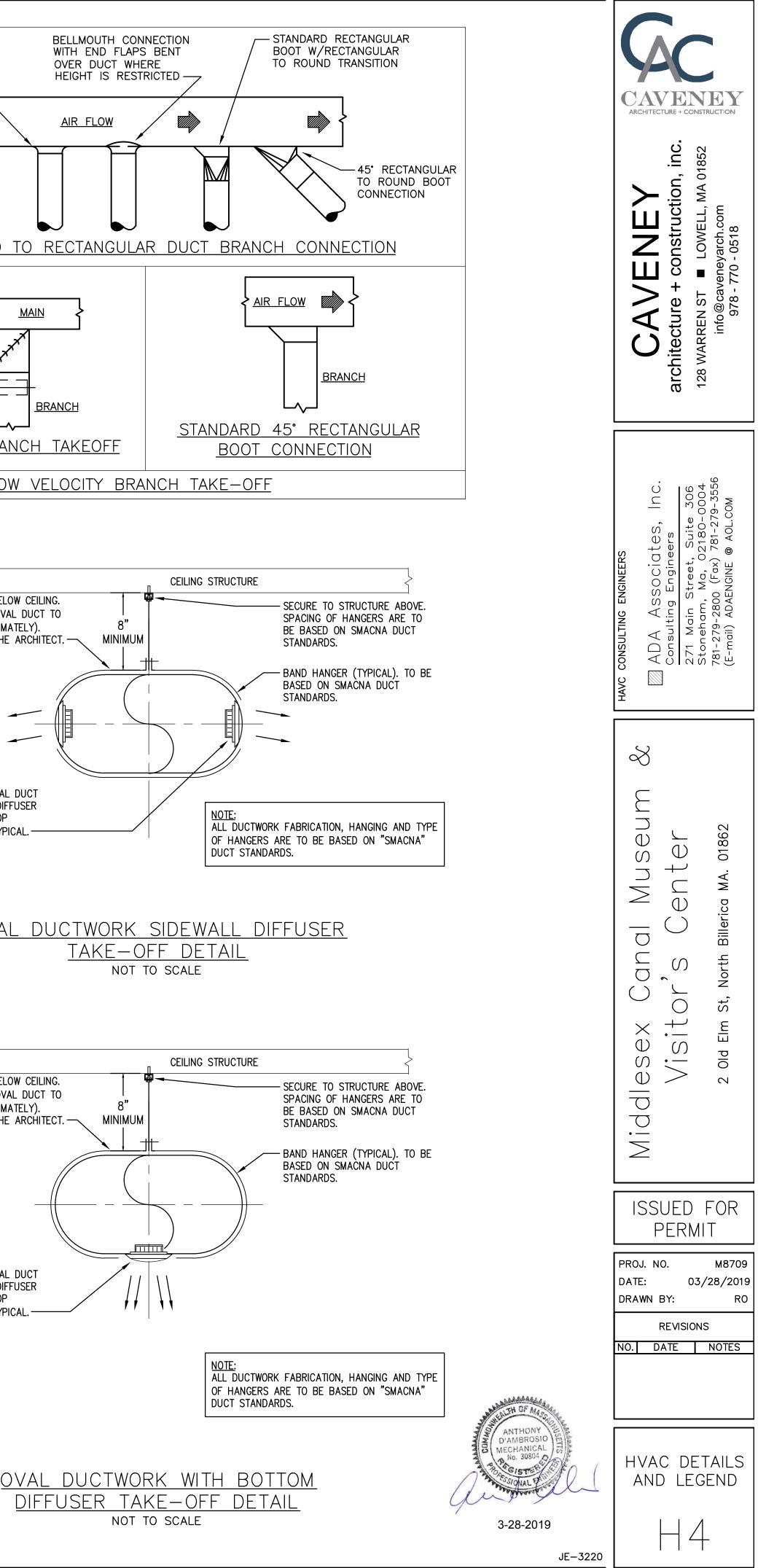
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## HVAC LEGEND

(T)	WALL MOUNTED THERMOSTAT	
S	WALL MOUNTED ON/OFF CONTROL SWITCH (BY ELECTRICAL)	EXHAL
╾┠┿┨╺╸	OVAL DUCT WITH SIDEWALL SUPPLY AIR DIFFUSERS	5"ø [
<b>←</b> ⊠─	SURFACE MOUNTED CEILING SUPPLY AIR DIFFUSER	RIGID
	BOTTOM OF OVAL DUCT SUPPLY AIR DIFFUSER	DUCT
<i>~~</i>	SIDEWALL RETURN AIR GRILLE	
	DUCT TRANSITION	
	DUCT TRANSITION TO OVAL	
<u> </u>	DUCT WRAPPING (DASHED LINES)	
Ker Kerkerkerkerkerkerkerkerkerkerkerkerkerke	ELBOW WITH TURNING VANES.	
$\sum$	RADIUS ELBOW	
1	VOLUME/BALANCING DAMPER	
	ACCESS PANEL IN CEILING	
-\	EXHAUST OR RETURN AIR	
	SUPPLY AIR	
G.C.	GENERAL CONTRACTOR	
<u>RTU-1</u>	ROOFTOP UNIT	
<u>TEF-1</u>	TOILET EXHAUST FAN	
<u>UREF-1</u>	UTILITY ROOM EXHAUST FAN	
<u>EBBH-1</u>	ELECTRIC BASEBOARD HEATER	
U.C.	UNDERCUT DOOR BY 1" FOR AIR TRANSFER	
S 100	SUPPLY DIFFUSER OR GRILLE TYPE CFM	
R 100	RETURN GRILLE TYPE CFM	





## SPECIFICATIONS & NOTES

- 1. SCOPE OF WORK
- A. The scope of work under this contract shall include the total provision of a complete heating and ventilating system in accordance with these specifications and all applicable codes and regulations.
- B. The Contractor shall bear responsibility for obtaining all approvals required for the start and completion of this project.
- C. Review all sections of the specification for provisions therein affecting the work of this section.
- 1. Provide Toilet Room exhaust fans.
- 2. Provide Utility Room exhaust fan.
- 3. Provide new Packaged Rooftop Unit to provide heating and cooling air to the First and Second Floors.
- 4. Provide an Electric Baseboard Radiation Heater for the Board of Director's Room.
- 5. Provide a Ventilation Fan for the Elevator Control Room.
- 6. Provide all electric automatic temperature controls to achieve the required sequence of operation.
- 7. Provide testing, adjusting and balancing of air system.
- 2. RELATED WORK SPECIFIED UNDER OTHER SECTIONS
  - A. The specifications for the overall construction delineate various items of work under each trade. The list below sets forth the work not included in this section of the specifications.
  - B. In the absence of more detailed information, this list shall be taken as a specific instruction to the HVAC trade to exclude the work not assigned to it.
  - C. The following items of labor and materials incidental and/or related to the installation of HVAC work will be provided and/or installed under other sections of these specifications at no cost to this Contractor.
- 3. General Section
  - a. Temporary power, lights and water.
  - b. Electrical power for HVAC equipment.
  - c. Cutting and patching.
- 6. Materials, workmanship and equipment performance shall conform with the latest edition of the applicable codes and regulations, including local codes and ordinances.
- 7. The HVAC contractor shall pay all fees, submit all necessary documents. obtain all permits and certification, and all necessary approvals from authorities having jurisdiction.
- 8 The HVAC contractor shall furnish to the other trades advance information on locations and sizes of all frames, boxes, sleeves, and openings needed for his own work, and also furnish information and shop drawings necessary to permit trades affected by this contractor's work to install their work properly and without delay.
- 9. The HVAC contractor shall, with the approval of the Architect and without extra cost to the Owner, make reasonable modifications in his work as required by normal structural interferences.
- 10. All mechanical equipment shall be installed in strict accordance with the manufacturer's recommendations. All work shall be installed so that parts requiring periodic inspection, operation, maintenance and repair are readily accessible.
- 11. General: Furnish and install the diffusers, registers and grilles as required by the drawings or approved equals with off-white factory finish and suitable for installation in ceilings, ductwork and walls specified by the Architect.
- 12. Refer to the architectural drawings for exact location of equipment and required framing.
- 13. Furnish and install manual balancing dampers as shown on the drawings. Provide access panel in hard ceilings, for service access to balancing air dampers as shown on drawings.

- sequences shall be as follows:
- a. Packaged Rooftop Unit: information.
- b. Toilet Exhaust Fans:
- c. Utility Room Exhaust Fan: switch.
- d. Elevator Machine Room Ventilation Fan: Set for 70°F (adjustable setting).
- e. Electric Baseboard Heater:
- date of completion and acceptance.
- stored and protected.
- prior to the ordering of any equipment.
- and Operations Manuals.

14. Low Pressure Ductwork shall consist of galvanized steel sheets and or aalvanized steel sinale wall spiral lockseam oval or round ductwork. reinforcing and companion angles, and hangers. Metal Specifications, gauges and construction of seam, joints and reinforcing shall be according to SMACNA Low Velocity Standards. All transverse seams of all ducts shall be coated with duct sealer and made air tight. The ducts shall be securely fastened to the building construction as recommended in Section 5 of SMACNA-"Low Velocity Standard." Provide any supplementary steel between structural beams as required to support all ductwork. Ducts shall not be supported from other ducts, equipment, piping or conduit. Elbows shall be radius type or 90° mitered type w/air foil turning vanes (see drawings). Inside dimension of lined ductwork shall be the dimensions as shown on the drawing. Diffuser and grille duct take-offs from the main ducts shall be 45° entry fittings.

15. Provide the complete balancing and adjusting of the air system including test and record air handler motor currents and nameplate data, fan speed, static pressures, and motor amperage: test and and adjust each diffuser, grille and register to within 10% of the design requirements, list design and measured air velocities. Test and Balance Agency shall an independent agency specializing in the testing and balancing of HVAC systems. All work shall be per. the Associated Air Balance Council (AABC), SMACNA, or the National Environmental Balancing Bureau (NEBB) requirements.

16. Automatic temperature controls shall be electric type. System shall include all thermostats, relays, transmitters, automatic valves, damper motors, and all required line voltage and low voltage wiring including required power wiring from panels. All control wiring shall be in strict accordance with the National Electric Code. Control

Rooftop Unit shall be controlled by a wall mounted 7-day programmable heating/cooling thermostat with night setback. The internally mounted Co2 sensor shall monitor and control the amount of outside fresh air required to the building. A supply air smoke detector is provided with the unit. The Rooftop Unit shall be supported by a structural steel frame on pilings by Structural. Refer to Structural drawings for support

Toilet exhaust fan shall be controlled by an on/off wall mounted switch. The Toilet Exhaust Fan shall have a built-in time delay to operate the Exhaust Fan for a pre-set duration after the Fan has been turned off. Set time delay for 5 minutes (adjustable).

Utility Room exhaust fan to be controlled by an on/off wall mounted

Elevator Machine Room Ventilation Fan to be controlled by a wall mounted thermostat. Fan shall turn on when temperature is higher than setpoint and shall turn-off when temperature reaches setpoint.

Electric Baseboard Heater in the Director's Board Room shall be controlled by a wall mounted t'stat.

# 17. Contractor shall guarantee his work for a period of one year from the

18. The HVAC contractor shall protect his material and equipment from loss or damage at all times. All materials on the job site shall be suitably

19. Contractor shall submit shop drawings for approval to the Architect

20. Contractor shall furnish to the Owner, three (3) copies of Maintenance

21. Insulate all outdoor supply air and return air ductwork from the Rooftop Unit until the ductwork passes through the building. Insulate with 2" thick (R=8.0) closed cell polyfoam insulation. No fiberglass is allowed. Insulation shall be resistant to weathering. Insulation is based on Imcoa Polyolefin, Imcosheet or approved equal. See Exterior Ductwork Detail on Dwg. H-4.

22. Insulate all concealed supply air ductwork with 1-1/2" thick flexible glass fiber insulation with FKS vapor barrier, Owens-Corning type-100 ductwrap or approved equal. Ductwrap can be substituted with Reflectix 1" thick Big Bubble Wrap R=8.0. Install one layer of 5/16" Bubble Wrap to the ductwork but spacers must be provided for the R=8.0 rating. Refer to manufacturers recommendations for installation requirements.

23. Exterior ductwork shall be supported by structural steel supports. See Structural drawings for details and information.

## TOILET EXHAUST FANS:



TOILET EXHAUST FAN: PANASONIC WHISPERGREEN SELECT CEILING MOUNTED EXHAUST FAN, MODEL# FV-05-11VKS1, 100 CFM AT .25" SP, .7 SONES, 120/1/ 14.0 WATTS. WITH BUILT-IN PICK-A-FLOW AIR FLOW SELECTOR WITH TIME DELA' PROVIDE WALL ON/OFF SWITCH.

## UTILITY ROOM EXHAUST FAN:

UREF-1 UTILITY ROOM EXHAUST FAN: PANASONIC WHISPERGREEN SELECT CEILING MOUNT EXHAUST FAN, MODEL# FV-05-11VKS1, 100 CFM AT .25" SP. .7 SONES, 120/1/ 14.0 WATTS. WITH BUILT-IN PICK-A-FLOW AIR FLOW SELECTOR WITH TIME DELAY PROVIDE WALL ON/OFF SWITCH.

## ELEVATOR MACHINE ROOM VENTILATION FAN:

<u>EVF-1</u> ELEVATOR MACHINE ROOM VENTILATION FAN: PANASONIC WHISPERCEILING DC, CEILING MOUNTED VENTILATION FAN, MODEL# FV-05-11VQ1, 80 CFM AT .1" SP, .6 SONES, 120/1/60, 10.8 WATTS. WITH BUILT-IN PICK-A-FLOW AIR FLOW SELECTOR. PROVIDE A WALL MOUNTED THERMOSTAT FOR OPERATION.

## ELECTRIC BASEBOARD HEATER:

<u>EBBH-1</u> ELECTRIC BASEBOARD HEATER: QMARK/MARLEY MODEL# QMKC25008W, 208/1/60, 12.0 AMPS, 2500 WATTS, 2.5-KW, 8,525 BTU/HR. PROVIDE DOUBLE-POLE POWER ON/OFF DISCONNECT SWITCH. SERVES BOARD OF DIRECTORS ROOM.

## ROOFTOP UNIT (PACKAGED):

<u>RTU-1</u> CARRIER WEATHERMASTER PACKAGED ROOFTOP UNIT: MODEL # 48HCDE17FB-5, 15 TONS, 174 MBH COOLING CAPACITY, 11.5 EER, GAS HEAT INPUT 220 MBH INPUT, 176 MBH OUTPUT STAGE-1, 176 MBH INPUT, 142 MBH OUTPUT STAGE-2, 208-230/3/60, 4.77 BHP (MED. STATIC MOTOR), DISCONNECT SIZE: 97 FLA, 450 LRA, 91 MCA, 100 MOCP. ACCESSORIES: UNIT HAS ECONOMIZER, POWERED EXHAUST, VFD, BAROMETRIC HOOD, MEDIUM STATIC MOTOR, SUPPLY AIR SMOKE DETECTOR, CO2 SENSOR, 7-DAY PROGRAMMABLE THERMOSTAT W/NIGHT SETBACK AND DISCONNECT SWITCH. TOTAL WEIGHT WITH ACCESSORIES 2,859 LBS. ROOFTOP UNIT SHALL BE STRUCTURALLY SUPPORTED WITH A STEEL FRAME PROVIDED BY THE STRUCTURAL ENGINEER. REFER TO STRUCTURAL DRAWINGS. MAXIMUM OUTSIDE FRESH AIR SETTING FOR ROOFTOP UNIT IS 1.120 CFM.

## SUPPLY AIR DIFFUSERS, REGISTERS AND GRILLES:

### SUPPLY AIR GRILLES FOR OVAL DUCTWORK:

SUPPLY AIR GRILLES SHALL BE BASED ON TITUS #S300FL, DOUBLE DEFLECTION, 3/4" BLADE SPACING, ADJUSTABLE BLADES, ALUMINUM, NATURAL FINISH, FOAM GASKET FOR SEALING, WITH ASD-AIR SCOOP DAMPER/EXTRACTOR FOR AIR BALANCING. SIZES SHALL BE DETERMINE AND BASED ON THE CFM'S AND DUCT SIZE.

### SUPPLY AIR GRILLE FOR ATTIC:

SUPPLY AIR DIFFUSERS SHALL BE BASED ON TITUS #300RS, DOUBLE DEFLECTION, 3/4" SPACING, STEEL, WHITE FINISH, SURFACE MOUNT, WITH OPPOSED BLADE DAMPER FOR BALANCING. SIZE TO BE BASED ON CFM AND DUCT SIZE.

### RETURN AIR GRILLE FOR ATTIC:

SUPPLY AIR DIFFUSERS SHALL BE BASED ON TITUS #350RL, 35° DEFLECTION, 3/4" SPACING, STEEL, WHITE FINISH, SURFACE MOUNT, WITH OPPOSED BLADE DAMPER FOR BALANCING. SIZE TO BE BASED ON CFM AND DUCT SIZE.

### SUPPLY AIR DIFFUSERS FOR SMALL ROOMS:

SUPPLY AIR DIFFUSERS SHALL BE BASED ON TITUS #250, ADJUSTABLE SQUARE DIFFUSER, STEEL, WHITE FINISH, SURFACE MOUNT, WITH OPPOSED BLADE DAMPER FOR BALANCING.

### **RETURN AIR GRILLES:**

RETURN AIR GRILLES FOR MUSEUM DISPLAY AND GALLERY AREA ARE BASED ON TITUS CT-581, 1/2" SPACING, EXTRUDED ALUMINUM, 1/8" BARS, 15' DEFLECTION, SURFACE MOUNT TYPE WITH TYPE-A FASTENING TO WALL. SIZES SHALL BE BASED ON THE CFM SHOWN ON DRAWINGS AND RETURN AIR DUCTWORK SHALL TRANSITION TO GRILLE SIZE. COLOR TO BE WHITE. VERIFY WITH ARCHITECT PRIOR TO ORDERING IF GRILLE IS TO BE PAINTED OTHER THAN WHITE. SPECIFY A MILL FINISH.

60,  TED 60, /. 		architecture + construction 128 WAREN ST = LOWELL, MA 01852 Dinfo@caveneyarch.com 978 - 770 - 0518
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 Ξ ΕD		al Museum & Center Billerica MA. 01862
		Middlesex Canal Visitor's ( <sup>2</sup> old Elm st, North Bille
		ISSUED FOR PERMIT PROJ. NO. M8709 DATE: 03/28/2019 DRAWN BY: RO REVISIONS NO. DATE NOTES
	ANTHONY D'AMBROSIO MECHANICAL No. 30804 3-28-2019	HVAC EQUIPMENT SCHEDULES AND SPECIFICATIONS

JE-3220

	ATIONS
ABBREVIA A	AMPERE
AC AF	ALTERNATING CURRENT ARC-FAULT CIRCUIT INTERRUPTER
AFF AL	ABOVE FINISHED FLOOR ALUMINIUM
ARCH	ARCHITECT
ATS C	AUTOMATIC TRANSFER SWITCH CONDUIT
CB CT	CIRCUIT BREAKER CURRENT TRANSFORMER
CU DWG	COPPER DRAWING
E	ELECTRIC
EC EMT EWC	ELECTRICAL CONTRACTOR ELECTRICAL METAL TUBING ELECTRIC WATER COOLER
FA	FIRE ALARM
FACP G	MAIN FIRE ALARM CONTROL PANEL GROUND
GC GFI	GENERAL CONTRACTOR GROUND FAULT INTERRUPTOR
GRC JB	GALVANIZED RIGID CONDUIT JUNCTION BOX
МС МСВ	MECHANICAL CONTRACTOR MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY NATIONAL ELECTRICAL CODE
NF	NON FUSED
NIC NTS	NOT IN CONTRACT NOT TO SCALE
P PC	POLE PLUMBING CONTRACTOR
PVC RECP	POLYVINYL CHLORIDE RECEPTACLE
TYP	TYPICAL
UON VFD	UNLESS OTHERWISE NOTED VARIABLE FREQUENCY DEVICE
W WP	WIRE WEATHERPROOF
POWER LE	
<b></b> `	120/208 VOLT PANEL BRANCH CIRCUIT OR FEEDER CONCEALED IN
	CONSTRUCTION FINISHED AREAS, EXPOSED IN UNFINISHED AREAS
—OE—	OVERHEAD ELECTRIC
HP1-3	1P HOMERUN TO PANEL HP1, CIRCUIT 3 (2-#12&1-#12G-1/2"C, UNO)
$\frown$	2P HOMERUN TO PANEL HP1, CIRCUIT 3 & 5
HP1-3,5	(2-#12&1-#12G-1/2"C, UNO)
HP1-1,3,5	3P HOMERUN TO PANEL HP1, CKT 1, 3, & 5 (3-#12&1-#12G-1/2"C, UNO)
_	
	JUNCTION BOX
년~ 다 <sub>100/70</sub>	JUNCTION BOX WITH EQUIPMENT CONNECTION DISCONNECT SWITCH, 100A DISCONNECT WITH 70A FUSE
100/70	DISCONNECT SWITCH, 100A, NON FUSED
	MOTOR AS NOTED
E	GROUND
	UTILITY COMPANY KW-HR/DEMAND METER
₽ ₽	DUPLEX RECEPTACLE DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER
	DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER MOUNTED ABOVE COUNTER
₽	
	QUAD RECEPTACLE DUPLEX FLOOR RECEPTACLE
$\bigcirc$	SINGLE DEDICATED RECEPTACLE
D-	SINGLE DEDICATED GFI RECEPTACLE
	SPECIAL PURPOSE RECEPTACLE
۲	NEMA TYPE AS INDICATED ON PLAN
⊗ \$	MOTOR WITH ADJACENT SINGLE POLE TOGGLE TYPE DISCONNECT SWITCH
°)	TRANSFORMER WINDING
。 ~	UTILITY POLE
	WEATHERHEAD
<u>IGHTING LI</u>	<u>EGEND</u>
	2' X 4' LED FIXTURE, TYPE C, CIRCUIT 8, CONTROLLED FROM SWITCH "a", TYPICAL OF ALL.
	FIXTURE SHOWN HALF-SHADED INDICATES FIXTURE CONTAINS AND EMERGENCY BALLAST
	2' X 2' LED FIXTURE
	1' X 4' LED FIXTURE
<b>⊢−−−</b> 1	4' LED STRIP FIXTURE, OR AS INDICATED
Ю	WALL MOUNTED FIXTURE
	PENDANT FIXTURE
0	RECESS MOUNTED FIXTURE RECESSED WALL WASHER
	TRACK LIGHTING TRACK & HEADS
— — ⊦⊛†	ILLUMINATED EXIT SIGN, WALL MOUNTED DIRECTIONAL ARROWS AS INDICATED ON PLANS
<b>Ø</b> †	ILLUMINATED EXIT SIGN, CEILING MOUNTED DIRECTIONAL ARROWS AS INDICATED ON PLANS
1	DUAL HEAD EMERGENCY LIGHTING FIXTURE WITH INTERNAL BATTERY
л Н	SINGLE HEAD EMERGENCY LIGHTING FIXTURE WITH INTERNAL BATTERY - EXTERIOR
- <del>1</del>	SINGLE POLE TOGGLE SWITCH
<del>. თ</del> . 3 - <del>თ</del> . 4	THREE-WAY SWITCH
- <del>07</del> F	EXHAUST FAN SWITCH
D	DIMMER SWITCH

PART 1 - GENERAL REQUIREMENTS A. GENERAL REQUIREMENTS:

ELECTRICAL SPECIFICATIONS

1. IN GENERAL THE ELECTRICAL WORK SHALL CONSIST OF THE FOLLOWING: A. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL NEW PANELBOARDS, FEEDERS, BRANCH CIRCUITS, WIRING DEVICES, AND CONDUITS AS REQUIRED AND AS SHOWN ON THE DRAWINGS.

B. INSTALL NEW EQUIPMENT AND PROVIDE A COMPLETELY AND FULLY OPERATIONAL SYSTEM AS HEREIN STATED. INCLUDE ANY AND ALL EQUIPMENT, APPARATUS, ETC. REQUIRES TEMPORARY RELOCATION TO PERFORM THE WORK AS INTENDED; EXCEPT FOR THE ITEMS LISTED IN SECTION RELATED WORK BY OTHERS.

C. THE CONTRACTOR SHALL REMOVE ANY UNUSED CONDUIT. 2. THE OWNERS GENERAL CONDITIONS, SPECIAL CONDITIONS AND SUPPLEMENTAL CONDITIONS OR REQUIREMENTS ARE PART OF THIS WORK.

3. THE INSTALLATION OF THE SYSTEMS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT EDITIONS OF THE COMMONWEALTH OF MASSACHUSETTS BUILDING CODE, THE COMMONWEALTH OF MASSACHUSETTS ELECTRIC CODE, NATIONAL FIRE PROTECTION ASSOCIATION AND ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND ORDINANCES

4. ALL MATERIALS SHALL BE NEW AND SHALL BEAR THE UNDERWRITERS' LABEL.

5. OBTAIN AND PAY FOR ALL REQUIRED PERMITS, LICENSES AND CERTIFICATES, INCLUDE ALL FEDERAL, STATE AND LOCAL TAXES 6. ERECT EQUIPMENT AND MATERIALS IN NEAT AND WORKMANLIKE MANNER. ALL

RECOMMENDATIONS 7. THE ELECTRICAL CONTRACTOR (EC) SHALL VERIFY THE LOCATIONS AND MOUNTING HEIGHTS OF ALL EQUIPMENT, LIGHT FIXTURES, PANELBOARDS, OUTLETS AND MECHANICAL

EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS

EQUIPMENT WITH THE OWNER PRIOR TO COMMENCING ANY WORK. 8. THE EC SHALL NOT BORE, NOTCH OR IN ANY WAY CUT INTO THE STRUCTURAL

MEMBER, WITHOUT PROPER WRITTEN APPROVAL OF A STRUCTURAL ENGINEER. 9. EXAMINE ALL DRAWINGS AND OTHER SECTIONS OF THE SPECIFICATIONS FOR

REQUIREMENTS WHICH AFFECT THE WORK OF THIS SECTION. COORDINATE WORK WITH OTHER TRADES.

10. PROVIDE TEMPORARY POWER AND LIGHTING DURING CONSTRUCTION. POWER CONSUMPTION CHARGES SHALL BE PAID BY OWNER.

11. THE COMPLETED ELECTRICAL INSTALLATION SHALL BE GUARANTEED IN WRITING BY THE ELECTRICAL CONTRACTOR TO BE FREE FROM DEFECTS OF MANUFACTURE AND INSTALLATION FOR A PERIOD OF ONE YEAR FROM THE DATE OF WRITTEN ACCEPTANCE BY THE OWNER. ANY DEFECTS FOUND SHALL BE CORRECTED BY THE ELECTRICAL CONTRACTOR WITHOUT EXPENSE TO THE OWNER.

12. THE EC SHALL NOTIFY THE OWNER UPON: (1) COMPLETION OF ALL ROUGH WIRING BEFORE CLOSURE OF ALL WALLS AND (2) UPON "SUBSTANTIAL COMPLETION" OF ALL ELECTRICAL WORK. AFTER SUBSTANTIAL COMPLETION, THE OWNER'S REPRESENTATIVE SHALL PREPARE A PUNCH LIST OF ITEMS TO BE CORRECTED. THE EC SHALL CORRECT, AT NO ADDITIONAL COST, ANY DEFICIENCIES FOUND.

13. THE GENERAL CONTRACTOR SHALL PROVIDE PLASTER CUTTING AND CHANNELING AND DRILLING THROUGH STRUCTURAL BEAMS NECESSARY FOR THE ELECTRICAL WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ROUTINE DRILLING THROUGH 2X4 AND/OR 2X6 WOOD FRAME WALLS AND 2X10 AND/OR 2X12 FLOOR JOISTS TO ENABLE THE INSTALLATION OF ELECTRICAL WIRING.

**B. RELATED WORK BY OTHERS:** 

1. THERMOSTATS AND CONTROL WIRING SHALL BE SUPPLIED AND INSTALLED BY THE HVAC

3. CUTTING AND PATCHING SHALL BE PROVIDED BY THE GENERAL CONTRACTOR. 4. NATIONAL GRID BACKCHARGES FOR INSTALLATION OF THE PRIMARY CABLE SHALL BE PAID FOR BY THE OWNER.

1. SUBMITTALS: EC SHALL PROVIDE FOUR (4) COPIES OF SUBMITTALS FOR ELECTRICAL FOUIPMENT TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION, SUBMITTALS SHALL INDICATE ALL MATERIALS AND RATINGS. PROVIDE INFORMATION ON THE FOLLOWING ITEMS:

- a. LIGHT SWITCHES AND RECEPTACLES
- b. PANELBOARDS c. LIGHTING FIXTURES d. ALL FIRE DETECTION SYSTEM COMPONENTS
- . CIRCUIT BREAKERS f. DISCONNECT SWITCHES
- WIRING DEVICES h. CONDUIT
- TEST REPORTS

C. SUBMITTALS

k. OCCUPANCY SENSORS D. SUBSTITUTIONS:

1. MATERIALS, EQUIPMENT, APPARATUS OR OTHER PRODUCTS ARE SPECIFIED BY MANUFACTURER, BRAND NAME, TYPE OR CATALOG NUMBER TO ESTABLISH THE DESIRED QUALITY OR STYLE AND SHALL NOT BE SUBSTITUTED WITHOUT PRIOR APPROVAL FROM THE OWNER (PROJECT ENGINEER).

2. THE PROCEDURE FOR SUBSTITUTION SHALL BE VIA SUBMITTING TO THE PROJECT ENGINEER SPECIFICATION SHEETS AND DRAWINGS CLEARLY SHOWING THE MATERIAL, EQUIPMENT AND WIRING CHANGES.

3. WHERE SUBSTITUTIONS ALTER THE DESIGN OR SPACE REQUIREMENTS THE CONTRACTOR SHALL ACCOMPLISH THE REVISED DESIGN AND CONSTRUCTION WITH NO ADDITIONAL CHARGES TO THE OWNER.

4. THE GENERAL ARRANGEMENT AND SIZES OF THE CONDUIT, WIRE AND MATERIAL INDICATED ON THE DRAWINGS ARE BASED ON EQUIPMENT FOR WHICH MANUFACTURER NAMES ARE GIVEN IN THE SPECIFICATION OR INDICATED ON THE DRAWINGS. SHOULD THE CONTRACTOR (ELECTRICAL, HVAC, OR PLUMBING CONTRACTOR) SUBMIT AND RECEIVE APPROVAL OF SUBSTITUTE EQUIPMENT IN ACCORDANCE WITH THE GENERAL AND SPECIAL CONDITIONS, THAT CONTRACTOR SHALL BE RESPONSIBLE FOR ALTERING THE ARRANGEMENT AND SIZES OF THE ASSOCIATED CONDUIT, WIRE AND MATERIAL TO ACCOMMODATE 1 EQUIPMENT AT NO ADDITIONAL COST TO THE OWNER. DETAILED DRAWINGS SHOWING EACH REQUIRED CHANGE SHALL BE SUBMITTED FOR APPROVAL OF THE ENGINEER AND NO SUCH CHANGE SHALL BE MADE WITHOUT WRITTEN APPROVAL.

E. CONTRACT DRAWINGS

1. ELECTRICAL DRAWINGS ARE GENERALLY DIAGRAMMATIC AND SHOW THE ARRANGEMENT AND LOCATION OF ELECTRICAL EQUIPMENT, DEVICES AND RACEWAY. THE CONTRACTOR SHALL CAREFULLY INVESTIGATE THE STRUCTURAL AND FINISH CONDITIONS AFFECTING HIS/HER WORK AND ARRANGE IT ACCORDINGLY. SHOULD CONDITIONS ON THE JOB MAKE NECESSARY TO REARRANGE CONDUIT OR EQUIPMENT THE CONTRACTOR SHALL SO ADVISE THE OWNER (PROJECT ENGINEER) AND SECURE HIS APPROVAL BEFORE PROCEEDING WITH SUCH WORK.

2. THE RIGHT IS RESERVED BY THE ENGINEER TO MAKE MINOR CHANGES TO ACCOMMODATE ANY CONDITIONS, WHICH MAY ARISE DURING THE WORK WITHOUT ADDITIONAL COMPENSATION TO THE CONTRACTOR FOR SUCH CHANGES.

3. DURING THE PROGRESS OF WORK, THE CONTRACTOR SHALL RECORD, ON A SET OF DRAWINGS MAINTAINED FOR THIS PURPOSE, ALL REVISIONS IN ANY PORTION OF THE ELECTRICAL WORK. AS NECESSITATED BY FIELD CONDITIONS. UPON COMPLETION OF TH WORK THE CONTRACTOR SHALL PROVIDE THE OWNER FOUR (4) SETS OF CORRECTED DRAWINGS, CLEARLY MARK TO SHOW ANY CHANGES IN THE ACTUAL INSTALLATION FROM THAT SHOWN ON THE CONTRACT DRAWINGS OR THE CONTRACTOR'S SHOP DRAWINGS. CHANGES TO SHOP DRAWINGS SHALL BE MADE ON THE ORIGINAL TRACINGS AND RESUBMIT FOR APPROVAL

4. THE CONTRACTOR SHALL VISIT THE SITE AND BECOME ACQUAINTED WITH THE CONDITIONS PRIOR TO PERFORMING THE WORK.

5. ALL WORK SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER.

6. ALL EQUIPMENT, DEVICES, MATERIAL, ETC., SHALL BE NEW AND UNUSED AND WHEN OF A GIVEN KIND OR TYPE SHALL BE OF THE SAME MANUFACTURE.

7. THE ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATIONS OF ALL ITEMS INSTALLED UNDER THIS SECTION WITH ITEMS INSTALLED BY OTHER TRADES TO THE EXTENT THAT INTERFERENCE BETWEEN SUCH ITEMS ARE AVOIDED WITHOUT ADDITIONAL COST TO THE OWNER.

### MECHANICAL EQUIPMENT TAGS

$\frown$	
TEF	TOP LETTERS DENOTE EQUIPMENT TYPE
	BOTTOM NUMBERS DENOTES FOUNDMENT NUMBER

- BOTTOM NUMBERS DENOTES EQUIPMENT NUMBER EVF ELEVATOR MACHINE RM VENT FAI
- EBBH ELECTRIC BASEBOARD HEATER
- RTU ROOF TOP UNIT (AT GRADE)
- TEF TOILET EXHAUST FAN UREF UTILITY ROOM EXHAUST FAN

OF THE CONDUCTOR INSULATION.

#### PART 2 - PRODUCTS

#### A. HANGERS AND SUPPORTS:

1. FURNISH AND INSTALL ALL HANGERS AND SUPPORTS AS REQUIRED BY APPLICABLE CODES AND STANDARDS AND AS MAY BE SHOWN ON THE DRAWINGS.

2. SUPPLEMENTARY STEEL FRAMING CHANNEL SHALL BE USED WHERE REQUIRED TO MEET THE SPACING REQUIREMENTS AND/OR PROPERLY TRANSMIT LOADS TO THE BUILDING STRUCTURE. LOADS IMPOSED ON INSERTS, ANCHÓRS, CLAMPS, FRAMING CHANNEL, STUDS, BOLTS, HANGER RODS, ETC. SHALL NOT EXCEED THE MANUFACTURER'S RECOMMENDATIONS

. THE USE OF ANCHORS SET BY HAND DRIVEN IMPACT DEVICES IS NOT PERMITTED IN BLOCK OR TILE CONSTRUCTION. SUCH ANCHORS MAY BE SET IN CONCRETE OR BRICK WHERE THE THICKNESS OF THE WALL OR SLAB IS AT LEAST ONE AND ONE HALF (1 1/2) TIMES THE LENGTH OF THE

4. METAL FRAMING CHANNEL USED TO SUPPORT ELECTRICAL EQUIPMENT OR MULTIPLE CONDUIT RUNS SHALL BE DESIGNED TO ACCEPT HARDENED STEEL NUTS AND CONDUIT STRAPS, CLAMPS, HANGERS, ETC. THE CROSS SECTION SHALL BE APPROXIMATELY 1 1/2 INCHES X 1 1/2 INCHES OR 1 1/2 INCHES X 3 INCHES. CHANNEL SHALL BE FABRICATED FROM (12) GAUGE STEEL. CHANNEL SIZE MAY VARY ACCORDING TO LOADS AND SHALL BE CHOSEN IN ACCORDANCE WITH THE MANUFACTURER'S LOAD DATA.

5. ALL NUTS AND BOLTS SHALL BE TIGHTENED WITH A MINIMUM OF FIFTY (50) FOOT POUNDS OF TORQUE. LOCK NUTS SHALL BE USED WHERE VIBRATIONS INVOLVED.

6. HANGER ROD SHALL BE STEEL. THE CONTRACTOR SHALL SIZE HANGER IN ACCORDANCE WITH MANUFACTURER'S DATA. ALL HANGER RODS SHALL BE FREE OF BURRS WITH THE THREADS ACCURATELY CUT. RODS SHALL BE PROPERLY ALIGNED SO THAT THEY HANG PLUMB WITHOUT BENDS OR OFFSETS.

7. ALL HANGERS AND SUPPORTS SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE CODE REQUIREMENTS TO PROVIDE ADEQUATE SUPPORT FOR ALL ELECTRICAL EQUIPMENT, CONDUIT, AND/OR RACEWAYS.

8. LIGHTING FIXTURES INSTALLED IN SUSPENDED CEILINGS SHALL BE SECURED TO THE CEILING GRID BY MEANS OF APPROVED CEILING CLIPS. ADDITIONALLY ALL LIGHTING FIXTURES SHALL HAVE SAFETY CHAINS ATTACHED AND SECURED TO THE DECK OR BUILDING STEEL (STRUCTURE) ABOVE. SAFETY CHAINS SHALL BE MINIMUM #10 JACK CHAIN; SLACK IN CHAINS SHALL BE MADE SNUG. A MINIMUM OF TWO CHAINS SHALL BE INSTALLED FOR EACH 2' X 4' AND 2' X 2' FIXTURE AT OPPOSITE CORNERS, AND A MINIMUM OF ONE CHAIN FOR EACH SINGLE FIXTURE.

B. CONDUIT, TUBING, BOXES, AND FITTINGS: 1. WHERE THE WORD CONDUIT APPEARS WITHIN THIS SPECIFICATION IT SHALL INDICATE ELECTRICAL RACEWAYS IN GENERAL. SPECIFIC RACEWAYS ARE CALLED OUT BY THE PROPER AND/OR TRADE

NAME SUCH AS RIGID STEEL, INTERMEDIATE METAL CONDUIT, ELECTRICAL METALLIC TUBING (EMT/THINWALL CONDUIT), ETC. 2. FURNISH AND INSTALL CONDUIT OF THE TRADE SIZES INDICATED ON THE DRAWINGS AND AS

SPECIFIED. LOCATION AND TYPE OF CONDUIT SHALL BE AS LISTED BELOW UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

3. PVC ELECTRICAL CONDUIT SHALL NOT BE INSTALLED INDOORS. 4. ALUMINUM CONDUIT SHALL NOT BE INSTALLED.

5. SURFACE MOUNTED CONDUIT RUNS INSTALLED INSIDE THE BUILDING, NOT SUBJECT TO PHYSICAL DAMAGE, SHALL BE TYPE EMT CONDUIT (ELECTRICAL METAL TUBING). EMT CONDUIT SHALL BE USED FOR ALL BRANCH CIRCUIT WIRING AT THE EXPOSED CEILING. THE EC SHALL TAKE GREAT CARE IN INSTALLING EMT AT THE EXPOSED CEILINGS IN A NEAT AND UNIFORM MANNER.

6. ELECTRICAL METALLIC TUBING ELBOWS AND BENDS SHALL BE MADE OF THE SAME GRADE OF MATERIAL AND GALVANIZED, SHERADIZED OR OTHERWISE PROCESSED IN THE SAME MANNER AS THE STRAIGHT LENGTHS. COUPLING AND CONNECTORS SHALL BE SET SCREW TYPE; WET LOCATIONS SHALL BE RAIN-TIGHT COMPRESSION TYPE.

7. ELECTRICAL METALLIC TUBING (EMT) SHALL HAVE A UNIFORM WALL THICKNESS SUFFICIENTLY ACCURATE TO PERMIT THE APPLICATION OF APPROVED COUPLINGS AND FITTINGS. THE EXTERIOR SURFACE SHALL BE THOROUGHLY AND EVENLY COATED (GALVANIZED OR SHERADIZED) WITH METALLIC ZINC APPLIED DIRECTLY TO THE SURFACE OF THE STEEL SO THAT METAL-TO-METAL CONTACT AND GALVANIC PROTECTION AGAINST CORROSION ARE PROVIDED. THE INTERIOR SURFACE SHALL BE PROTECTED BY ZINC, ENAMEL, OR OTHER SUITABLE CORROSION RESISTANT COATING.

8. POLYVINYL CHLORIDE (PVC) CONDUIT, SHALL BE USED FOR BELOW GRADE, ENCASED AND/OR OUTDOOR APPLICATIONS 9. PVC CONDUIT SHALL BE SCHEDULE 40 RATED FOR 90 DEGREE C, UL RATED AND SHALL COMPLY

WITH NEMA SPECIFICATION TC-2 (CONDUIT), TC-3 (FITTINGS) AND UL-651 STANDARD FOR RIGID NONMETALLIC CONDUIT. CONDUIT FITTINGS SHALL BE HOMOGENEOUS PLASTIC MATERIAL FREE FROM VISIBLE CRACKS, HOLES OR FOREIGN INCLUSIONS. CONDUIT SHALL BE MANUFACTURED BY CARLON, CAL PIPE, KRALOY, OR APPROVED EQUAL.

10. EXPOSED CONDUIT RUNS ABOVE GROUND INSIDE BUILDINGS WHERE SUBJECT TO PHYSICAL DAMAGE SHALL BE TYPE GRC (GALVANIZED RIGID CONDUIT)

11. RIGID STEEL METAL CONDUIT SHALL HAVE A UNIFORM WALL THICKNESS SUFFICIENTLY ACCURATE TO PERMIT THE CUTTING OF CLEAN, TRUE THREADS. THE EXTERIOR SURFACE SHALL BE THOROUGHLY AND EVENLY COATED (GALVANIZED OR SHERADIZED) WITH METALLIC ZINC APPLIED DIRECTLY TO THE SURFACE OF THE STEEL SO THAT METAL-TO-METAL CONTACT AND GALVANIC PROTECTION AGAINST CORROSION ARE PROVIDED. THE INTERIOR SURFACE SHALL BE PROTECTED BY ZINC. ENAMEL OR OTHER EQUIVALENT CORROSION-RESISTANT COATING. THE CONDUIT SHALL BE THREADED AT EACH END; A COUPLING SHALL BE SUPPLIED FOR ONE END AND A MEANS O PROTECTION FOR THE THREAD AT THE OTHER END. ALL THREADS SHALL BE CLEANLY CUT AND PROPERLY COATED TO PROTECT AGAINST CORROSION.

12. RIGID CONDUIT ELBOWS, BENDS, COUPLINGS AND NIPPLES FOR RIGID METALLIC CONDUIT SHALL BE MADE OF THE SAME GRADE OF MATERIAL AND GALVANIZED, SHERADIZED OR OTHERWISE PROCESSED IN THE SAME MANNER AS THE STRAIGHT LENGTHS. FITTINGS SHALL BE OF THE SAME MANUFACTURER AS THE STRAIGHT LENGTHS.

13. EQUIPMENT CONNECTION TO MOTORS, CONTROL DEVICES, ETC., SUBJECT TO VIBRATION OR REQUIRING PERIODIC REMOVAL SHALL BE FLEXIBLE STEEL CONDUIT. LENGTHS OF FLEXIBLE CONDUIT OF ANY TYPE GREATER THAN 6' SHALL NOT BE ACCEPTABLE. IN WET OR CORROSIVE AREAS OR AS OTHERWISE DESIGNATED FLEXIBLE CONDUIT SHALL BE LIQUID-TIGHT FLEXIBLE STEEL CONDUIT. 14. LIQUID-TIGHT FLEXIBLE STEEL CONDUIT CONNECTORS SHALL HAVE A TAPERED THREAD FOR LIQUID TIGHT SEAL AND SHALL MAINTAIN POSITIVE RELIABLE GROUND CONNECTIONS WITH THE

15. AN INSULATED GROUND WIRE SHALL BE RUN IN ALL RACEWAYS.

16. EXPANSION FITTINGS SHALL BE INSTALLED ACROSS EXPANSION JOINTS. 17. PULL SLEEVE AND EXPANSION FITTINGS SHALL BE MADE OF THE SAME MATERIAL AS THE CONDUIT TO WHICH IT IS ATTACHED. EXPANSION FITTINGS SHALL BE SUPPLIED WITH COOPER BONDING JUMPERS.

C. TYPE MC CABLE:

BRANCH CIRCUIT WIRING SHALL BE PERMITTED TO BE INSTALLED CONCEALED ABOVE SUSPENDED CEILINGS AND WITHIN HOLLOW WALL CAVITIES UTILIZING FLEXIBLE METALLIC TYPE MC CABLE. 2. MC CABLE SHALL NOT BE INSTALLED SURFACE MOUNTED, EXPOSED ON DRYWALL, PLYWOOD OR CONCRETE SURFACES.

3. TYPE MC CABLE SHALL NOT BE EMBEDDED WITHIN CONCRETE OR PLASTER.

4. TYPE MC CABLE SHALL BE USED FOR 20A AND 30A RATED BRANCH CIRCUIT WIRING ONLY. 5. TYPE MC CABLE SHALL HAVE A MINIMUM WIRE SIZE WITHIN OF 12/2 WITH FULL SIZE INSULATED GROUND WIRE

TYPE MC CABLE SHALL BE FLEXIBLE STEEL CONDUIT OF THE SINGLE-STRIP TYPE, GALVANIZED OR SHERADIZED, AND SHAPED INTO INTERLOCKING CONVOLUTIONS OF UNIFORM CROSS SECTION PROVIDING A SMOOTH INTERIOR AND EXTERIOR SURFACE. THE CONVOLUTION SHALL BE FIRMLY JOINED TO ONE ANOTHER TO ASSURE A COMPLETE LOCK WITHOUT IMPEDING THE FLEXIBILITY OF THE CONDUIT. THE CONDUIT SHALL BE DESIGNED TO PERMIT THE APPLICATION OF APPROVED FITTINGS.

1. FURNISH, INSTALL AND CONNECT ALL WIRE IN ACCORDANCE WITH THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS.

2. ALL FEEDERS AND BRANCH CIRCUIT RUNS SHALL INCLUDE A FULL SIZE, GREEN, INSULATED GROUND CONDUCTOR UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.

3. ALL WIRE SHALL BE DELIVERED TO THE JOB SITE ON REELS AND/OR IN COMPLETE COILS, PROPERLY PACKAGED AND IDENTIFIED.

4. ALUMINUM CONDUCTORS SHALL NOT BE INSTALLED.

5. CONDUCTORS LARGER THAN NO. 10 AWG SHALL BE STRANDED.

6. ALL WIRE USED FOR FEEDERS, AND SUB FEEDERS SHALL HAVE THE OUTER COVERING OF THE CONDUCTOR MARKED WITH COLOR CODING TAPE AS FOLLOWS: FOR 120/208 VOLT SYSTEMS WITH BLACK FOR "A", RED FOR "B", AND BLUE FOR "C" PHASES, WHITE FOR NEUTRAL AND GREEN FOR INSULATED GROUND. CONDUCTORS SHALL BE MARKED AT BOTH ENDS AND IN ALL JUNCTION BOXES BY APPROVED PLASTIC TAPE APPLIED SPIRALLY AND HALF LAPPED OVER THE EXPOSED PORTIONS

7. ALL CONDUCTORS SHALL BE COPPER.

8. MINIMUM SIZE CONDUCTORS SHALL BE NO. 12 AWG EXCEPT FOR CONTROL USE.

9. UNLESS OTHERWISE SPECIFIED OR INDICATED ON THE DRAWINGS, THE TYPE OF CONDUCTOR INSULATION SHALL BE TYPE THHN, THHW, THWN-2 OR XHHW. 10. UNLESS OTHERWISE NOTED OR INDICATED ON THE DRAWINGS, ALL BRANCH CIRCUIT WIRING SHALL BE 2-#12&1-#12G-1/2"C.

#### E. RECEPTACLES:

1. EXCEPT WHERE INDICATED OTHERWISE OR REQUIRED BY CODE, CONVENIENCE RECEPTACLES SHALL BE COMMERCIAL GRADE GROUNDING TYPE, RATED 20 AMPS, 125 VOLTS. RECEPTACLES SHALL BE BACK AND SIDE WIRED WITH SCREW TYPE TERMINALS OR PRESSURE TYPE, SCREWLESS TERMINALS HAVING SUITABLE CONDUCTOR RELEASE ARRANGEMENT, ALL RECEPTACLES SHALL BE WHITE. RECEPTACLES SHALL BE PASS AND SEYMOUR MODEL PS5362W OR APPROVED EQUAL.

2. PROVIDE COMMERCIAL GRADE GFI DUPLEX RECEPTACLES AS REQUIRED BY CODE. RECEPTACLES SHALL EACH HAVE SELF-TEST AND GFI TRIPPING (NO FEED THROUGH IS PERMITTED). RECEPTACLES SHALL BE RATED 20 AMP, 125 VOLT. ALL GFCI RECEPTACLES SHALL BE WHITE. RECEPTACLES SHALL BE PASS AND SEYMOUR MODEL 2097W OR APPROVED EQUAL.

3. PROVIDE COMMERCIAL GRADE QUAD RECEPTACLES AS SHOWN ON THE DRAWINGS. QUAD RECEPTACLES SHALL BE COMMERCIAL GRADE GROUNDING TYPE, RATED 20 AMPS, 125 VOLTS. RECEPTACLES SHALL BE BACK AND SIDE WIRED WITH SCREW TYPE TERMINALS OR PRESSURE TYPE, SCREWLESS TERMINALS HAVING SUITABLE CONDUCTOR RELEASE ARRANGEMENT, ALL RECEPTACLES SHALL BE WHITE. RECEPTACLES SHALL BE PASS AND SEYMOUR MODEL 420W OR APPROVED EQUAL.

4. FLOOR RECEPTACLES: PROVIDE WIREMOLD SERIES 880 FLOOR BOXES. FLOOR BOX SHALL BE APPROVED FOR USE IN WOOD FLOOR. FLOOR BOX SHALL BE TWO GANG AND SHALL BE STAMPED STEEL CONSTRUCTION. a. BOXES SHALL BE EQUIPPED WITH REMOVABLE BARRIER BETWEEN COMPARTMENTS.

b. TWO GANG STEEL FLOOR BOX SHALL HAVE FOUR (4) 1/2", FOUR (4) 1" AND FIVE (5) 3/4" THREADED CONDUIT OPENINGS.

FLOOR BOX SHALL BE PROVIDED WITH COVERPLATES AND FLANGES, WITH FINISH AND STYLE SELECTED BY 5. PROVIDE WATERPROOF-IN-USE SURFACE MOUNTED WEATHERPROOF RECEPTACLES, AS NOTED ON THE

DRAWINGS (WP). PROVIDE WEATHERPROOF DIE CAST ALUMINUM BACKBOX WITH BLACK POWDER COAT FINISH AND SEALING GASKETS. PROVIDE UNIVERSAL-IN-USE COVER IN COMPLIANCE WITH NEC ARTICLE 406. COVER SHALL HAVE HIGH IMPACT, UV RESISTANT POLYCARBONATE BASE WITH TRANSPARENT THERMOPLASTIC COVER. /EATHERPROOF DIE-CAST BACKBOX AND IN-USE COVER SHALL BE MANUFACTURED BY THOMAS AND BETTS/STEEL CITY OR EQUAL.

F. LIGHTING FIXTURES & CONTROLS:

I. LIGHTING FIXTURES: FIXTURES SHALL BE PROVIDED COMPLETE, WITH LAMPS, AS SHOWN ON THE FIXTURE SCHEDULE. FURNISH ALL FITTINGS AND OTHER MISCELLANEOUS MATERIALS FOR COMPLETE INSTALLATION OF

2. TOGGLE SWITCHES: PROVIDE TOGGLE SWITCHES AS SHOWN ON THE DRAWINGS. TOGGLE SWITCHES SHALL BE COMMERCIAL GRADE, WHITE, WITH STAINLESS STEEL FACEPLATES. TOGGLE SWITCHES SHALL BE COMMERCIAL GRADE, RATED 20A, 120V AND SHALL BE PASS AND SEYMOUR CS20AC1W OR APPROVED EQUAL. DIMMER SWITCHES: PROVIDE SLIDE BAR, 120 VOLT, 600 WATTS, DIMMER SWITCHES BY LEVITON MODEL

6633-P, APPROVED FOR DIMMING OF SPECIFIED LED LAMPS. G. MAIN PANELBOARD P1:

I. PROVIDE DEAD-FRONT MAIN DISTRIBUTION PANELBOARD, WITH PROPER VOLTAGE AND AMP RATING AS REQUIRED. PANELBOARD SHALL BE SURFACE-MOUNTED AND BE RATED FOR SERVICE ENTRANCE.

2. PROVIDE COPPER BUS BARS AND FULL SIZE INSULATED NEUTRAL BUS. PANEL BUSWORK SHALL BE RATED TO CARRY, AS MINIMUM, AMPERE RATING OF OVERCURRENT DEVICE THAT SERVES PANEL.

3. PROVIDE ANTI-TURN, SOLDERLESS LUGS SUITABLE FOR COPPER OR ALUMINUM WIRE.

PROVIDE SEPARATELY MOUNTED GROUND BUS. GROUND BUS SHALL BE BONDED TO PANELBOARD ENCLOSURI

5. PROVIDE BOLT-ON, MOLDED CASE, CIRCUIT BREAKERS WITH THERMAL - MAGNETIC TRIPS. MULTIPLE POLE BREAKERS SHALL BE SINGLE HANDLE, COMMON TRIP.

6. MAIN CIRCUIT BREAKERS SHALL BE MOUNTED VERTICALLY, SEPARATE FROM THE BRANCH BREAKERS. 7. CURRENT LIMITING CIRCUIT BREAKERS SHALL NOT BE USED.

8. MAIN DISTRIBUTION PANELBOARD SHALL BE CAPABLE OF SUPPORTING ADDITIONAL BOLT-ON CIRCUIT BREAKERS WITHOUT MODIFICATION UP TO THE FRAME SIZE, AS FOLLOWS: PANEL SIZE BRANCH CIRCUIT BREAKER FRAME SIZE 225 AMP

9. PROVIDE FULLY RATED CIRCUIT BREAKERS EQUAL TO SHORT CIRCUIT INTERRUPTING CURRENT SPECIFIED. 10. PROVIDE TYPED NAME CARD IN EACH PANELBOARD. CARD SHALL INDICATE EQUIPMENT, FED BY EACH CIRCUIT BREAKER

11. PANELBOARD SHALL BE MANUFACTURED BY EATON OR APPROVED EQUAL.

H. PANELBOARD P2:

1. PROVIDE DEAD FRONT PANELBOARDS, SURFACE OR FLUSH MOUNTED AS REQUIRED. PANELBOARDS SHALL BE MOUNTED WITH CABINET TOP AT 78" ABOVE FINISHED FLOOR. PANELBOARDS SHALL BE RATED FOR 120/208 VOLT SERVICE (PHASE AS NOTED IN THE PANEL SCHEDULE), AND SHALL HAVE COPPER BUS. PROVIDE FULL SIZE INSULATED NEUTRAL BUS AND GROUND BUS. ALL BREAKERS SHALL BE BOLT-ON TYPE. ALL PANELBOARDS SHALL HAVE SEPARATE, VERTICALLY MOUNTED MAIN CIRCUIT BREAKER (UNLESS OTHERWISE NOTED) PANELBOARDS SHALL HAVE DOOR-IN-DOOR CONSTRUCTION. PANELBOARDS SHALL BE FULLY RATED FOR AIC RATING AS SHOWN ON THE DRAWINGS LOAD CENTER TYPE PANELBOARDS ARE NOT ACCEPTABLE. SERIES RATED PANELBOARDS ARE NOT ACCEPTABLE. SPACES FOR ELECTRICAL PANELBOARDS AND SWITCHBOARDS SHALL INCLUDE AN EXCLUSIVELY DEDICATED SPACE EXTENDING FROM THE FLOOR TO THE STRUCTURAL CEILING WITH A WIDTH THAT OF THE EQUIPMENT (30 INCHES MINIMUM) AND A DEPTH OF 36 INCHES, NO PIPING, DUCTWORK OR EQUIPMENT FOREIGN TO THE ELECTRICAL EQUIPMENT SHALL BE PERMITTED TO BE INSTALLED IN, ENTER OR PASS THROUGH SUCH SPACE. ALL PANELBOARDS SHALL BE MOUNTED SO THAT THE DISTANCE FROM THE TOF CIRCUIT BREAKER OPERATING HANDLE TO THE FLOOR SHALL NOT EXCEED 6'-6". PROVIDE CIRCUIT BREAKER HANDLE LOCK-ON ACCESSORY FOR EACH CONSTANTLY POWERED CIRCUIT SUCH AS EXIT LIGHTING, EMERGENCY LIGHTING AND NIGHT LIGHTING. PROVIDE TYPEWRITTEN DIRECTORY CARDS IN EACH PANEL; IDENTIFY LOADS SERVED BY EACH CIRCUIT BREAKER. PANELBOARDS SHALL BE MANUFACTURED BY EATON, OR APPROVED EQUAL.

I. SIGNAGE:

1. ALL PANELBOARDS SHALL BE PROVIDED WITH WARNING LABEL OF ARC-FLASH HAZARD PER NEC-110.16. J. DISCONNECT SWITCHES

1. SWITCHES SHALL BE QUICK-MAKE AND QUICK-BREAK SUCH THAT, DURING NORMAL OPERATION OF THE SWITCH, THE OPERATION OF THE CONTACTS SHALL NOT BE CAPABLE OF BEING RESTRAINED BY THE OPERATING HANDLE AFTER THE CLOSING OR OPENING ACTION OF THE CONTACTS HAS STARTED. SWITCHES SHALL BE HORSEPOWER RATED FOR 600 VOLTS AC AND SHALL BE FUSED TYPE WITH DUAL ELEMENT FUSES. K. FIRESTOPPING:

FIRESTOPPING SHALL BE INSTALLED BY THE ELECTRICAL CONTRACTOR FOR ALL NEW OR EXISTING ELECTRICAL CONDUITS WHICH ENTER OR PASS THROUGH FIRE RATED WALLS OR FLOORS. FIRE SEAL FITTINGS SHALL BE USED AROUND CABLE, IN SLEEVES, OR IN CORE DRILLED HOLES PASSING THROUGH FIRE RATED WALLS AND FLOORS. FIRESTOPPING SHALL BE T&B FIRE SEAL, OR EQUAL BY O.Z. GEDNEY OR MINNESOTA MINING AND MANUFACTURING COMPANY.

A. METER SOCKET SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. METER SOCKETS SHALL BE PROVIDED IN ACCORDANCE WITH UTILITY COMPANY REQUIREMENTS, AND SHALL BE RATED FOR USE WITH CT'S SUPPLIED

B. METER SOCKET SHALL BE PROVIDED FOR 120/208V, 3-PHASE SERVICE, WITH MANUAL BY-PASS, ABLE TO ACCEPT A CLASS 320 METER.

C. METER SOCKETS SHALL BE MANUFACTURED BY MILBANK MANUFACTURING COMPANY, ANCHOR MANUFACTURING, GENERAL ELECTRIC, OR EQUAL.

ELECTRIC SERVICE

L. METER SOCKETS:

THE BUILDING WILL BE SERVED FROM A UTILITY POLE WITH OVERHEAD WIRES TO A WEATHERHEAD ON THE

2. NGRID WILL INVOICE THE OWNER DIRECTLY FOR INSTALLATION OF THE NEW SERVICE. SPECIFICALLY, NGRID

WILL PROVIDE THE FOLLOWING:

A. NGRID WILL PROVIDE AND INSTALL THE PRIMARY OVERHEAD CABLE.

B. TERMINATE PRIMARY CABLE AT THE WEATHERHEAD.

C. PROVIDE THE ELECTRIC METER.

D. INSTALL CT'S AND WIRING FOR ELECTRIC METER.

3. THE ELECTRICAL CONTRACTOR SHALL INCLUDE IN HIS BID THE FOLLOWING WORK:

. INSTALLATION OF SCHEDULE 40 PVC CONDUIT AND GRC ELBOWS FROM THE MAIN PANEL, TO THE METER SOCKET, AND FROM THE METER SOCKET TO THE WEATHERHEAD.

B. INSTALLATION OF THE WEATHERHEAD.

C. INSTALLATION OF SECONDARY SERVICE CONDUCTORS FROM THE MAIN PANEL TO THE WEATHERHEAD WITH ENOUGH SLACK FOR USE BY THE UTILITY COMPANY.

D. TERMINATE THE SECONDARY CABLE CONNECTIONS AT THE MAIN PANEL AND AT THE METER.

E. SUPPLY AND INSTALL METER SOCKET IN ACCORDANCE WITH NGRID REQUIREMENTS.

4. THE GENERAL CONTRACTOR SHALL INCLUDE IN HIS BID THE FOLLOWING WORK:

A. THE GENERAL CONTRACTOR SHALL PROVIDE CORE DRILLING THROUGH EXTERIOR WALL FOR INSTALLATION OF THE SERVICE CONDUIT.

### PART 3 - EXECUTION

A. GENERAL

I. FURNISH ALL REQUIRED HANGERS, CLAMPS, ANCHORS, INSERTS, AND SUPPORTS, INCLUDING SUPPLEMENTARY STEEL FRAMING, NECESSARY FOR THE PROPER INSTALLATION OF THE WORK AND INSTALL THEM IN ACCORDANCE WITH GENERALLY ACCEPTED GOOD PRACTICE. 2. ELECTRICAL EQUIPMENT OR MATERIAL SHALL NOT BE INSTALLED USING HANGERS OR SUPPORTS OF OTHER TRADES

3. EQUIPMENT RACKS OR SUPPORTS FOR DISCONNECT SWITCHES, ETC., SHALL BE FURNISHED AND INSTALLED AS SHOWN ON THE DRAWINGS OR REQUIRED FOR THE SUPPORT OF EQUIPMENT. RACKS SHALL BE CONSTRUCTED OF STEEL ANGLE OR CHANNEL AND SHALL BE WALL OR COLUMN SUPPORTED AS REQUIRED.

4. FURNISH AND INSTALL SLEEVES AS REQUIRED OR AS SHOWN ON THE DRAWINGS. UNLESS OTHERWISE SPECIFIED, RACEWAYS PASSING THROUGH FLOORS SHALL BE GROUTED IN, MAINTAINING THE INTEGRITY OF THE AREA BEING PENETRATED.

5. ALL ELECTRICAL WIRING INSTALLED UNDER THIS PROJECT SHALL BE TESTED FOR CONTINUITY, GROUNDS AND SHORT CIRCUITS BY MEGGER TEST. THE CONTRACTOR SHALL DEMONSTRATE BY MEGGER TEST THAT THE INSULATION RESISTANCE OF ALL CIRCUITS ARE IN ACCORDANCE WITH THE ICEA REQUIREMENTS. WHEN TEST VALUES ARE BELOW THOSE SPECIFIED BY ICEA REQUIREMENTS FOR THE PARTICULAR TYPE OF INSULATION THE CONTRACTOR SHALL CORRECT THE FAULT(S) BY REPLACING DEFECTIVE MATERIAL WITH NEW MATERIALS AND DEMONSTRATE BY FURTHER TEST. AT JOB COMPLETION, THE ENTIRE INSTALLATION SHALL BE FREE OF GROUND AND SHORT CIRCUITS. **B. LABELING:** 

. PROVIDE AND INSTALL LAMINATED BLACK AND WHITE PHENOLIC NAMEPLATES ON AL PANELBOARDS, SWITCHBOARDS, SAFETY SWITCHES AND MOTOR STARTERS WITH NOMENCLATURE ENGRAVED THROUGH THE BLACK OUTER LAYER TO THE WHITE INNER CORE. INDOOR EQUIPMENT SHALL BE LABELED TO MATCH INDIVIDUAL FACILITIES STANDARDS, THE NAMEPLATES SHALL INDICATE EQUIPMENT SERVED, LOCATION, PANELBOARD, BREAKER NUMBER FED FROM

2. EC SHALL PROVIDE NEW, DATED, TYPED PANELBOARD DIRECTORY CARD IDENTIFYING ALL NEW AND EXISTING CIRCUITS PER PANEL SCHEDULES. EC SHALL PERMANENTLY AFFIX NEW PANELBOARD DIRECTORY CARD TO THE INSIDE OF THE PANELBOARD IN A PROTECTIVE SLEEVE. C. CONDUIT INSTALLATION:

1. CONDUIT ENDS SHALL BE CUT SQUARE AND REAMED. ALL THREADS CUT ON CONDUIT IN THE FIELD SHALL BE CLEAN AND TRUE. FIELD CUT THREADS SHALL BE COATED TO PREVEN THREAD COATING SHALL NOT INTERFERE WITH ELECTRICAL CONTINUITY OF THE CONDUIT SYSTEM. RUNNING THREAD SHALL NOT BE USED.

2. BENDING OF CONDUIT SHALL BE DONE WITH AN APPROVED BENDING DEVICE. ANY CONDUIT DEFORMED IN BENDING SHALL BE REPLACED. ALL OFFSETS SHALL BE MADE WITH THE LARGEST RADIUS POSSIBLE WHEREVER PRACTICAL, MANUFACTURER'S STANDARD ELBOWS SHALL BE INSTALLED, UNLESS NOTED OTHERWISE.

3. ALL CONDUITS WITHIN THE BUILDING SHALL BE RUN CONCEALED WHERE PRACTICABLE AND AS PERMITTED BY BUILDING CODE. 4. ALL EXPOSED CONDUIT AND ALL CONDUIT ABOVE THE HUNG CEILING SHALL BE RUN IN

STRAIGHT LINES, AT RIGHT ANGLES TO OR PARALLEL WITH WALLS AND BEAMS, AND SHALL BE SUPPORTED BY APPROVED CLAMPS OR HANGERS TO PROVIDE A RIGID INSTALLATION. CONDU HANGERS SHALL NOT BE FASTENED TO OTHER PIPES. PERFORATED PIPE HANGERS SHALL NOT BE USED FOR SUPPORTING CONDUIT. FOR EACH LENGTH OF CONDUIT 1 1/4" AND LARGER MAXIMUM SUPPORT SPACING SHALL BE 8 FEET.

5. ALL CONDUIT RUNS SHALL BE LOCATED SO THAT PULL OR JUNCTION BOXES WILL BE

6. ALL EXPOSED CONDUIT RUNS SHALL BE INSTALLED TO AVOID PIPES. A MINIMUM SEPARATION OF THREE (3) INCHES SHALL BE REQUIRED WHERE CONDUIT RUN IS PARALLEL TO OR ACROSS STEAM, HOT WATER OR CONDENSATE PIPES.

7. EXPANSION FITTINGS SHALL BE USED ON ALL CONDUIT RUNS CROSSING BUILDING EXPANSION JOINTS. THE CONTRACTOR SHALL BOND ACROSS EXPANSION FITTINGS USING NEC APPROVED BONDING JUMPERS.

8. EXPANSION FITTINGS SHALL BE USED WHEN A CONDUIT LEAVES THE EARTH AND IS FASTENED TO A STRUCTURE OR UTILITY POLE. D. WIRE INSTALLATION

1. WIRE SHALL BE INSTALLED SO AS NOT TO DAMAGE THE CONDUCTOR INSULATION. IF IT IS NECESSARY TO LUBRICATE THE WIRE IN ORDER TO FACILITATE PULLING APPROVED PULLING COMPOUND SHALL BE USED. NO OILS OR GREASES OF ANY KIND SHALL BE USED FOR THIS PURPOSE. CONDUCTORS SHALL BE CONTINUOUS WITHOUT JOINTS OR SPLICES INSOFAR AS PRACTICABLE. THE NECESSARY SPLICES AND/OR TAPS SHALL BE MADE IN PULL BOXES, JUNCTION BOXES AND/OR OUTLET BOXES.

2. PULLING TENSION OF THE WIRE SHALL BE SUCH THAT THE WIRE WILL NOT BE DAMAGED. WIRE SHALL BE PULLED IN SUCH A DIRECTION AS TO MINIMIZE PULLING TENSION, AND SHALL NOT EXCEED VALUES RECOMMENDED BY THE WIRE MANUFACTURER. E. SPLICE, TAPS, CONNECTIONS, AND TERMINATION'S:

1. CUTTING OR REMOVING INSULATION FROM CONDUCTORS SHALL BE DONE WITH CARE TO AVOID NICKING STRANDS OR THE CONDUCTOR OF A SOLID WIRE.

2. SPLICES, TAPS, OR CONNECTIONS IN NO. 8 AWG AND SMALLER SHALL BE MADE WITH TIN-PLATED COPPER, INSULATED, COMPRESSION CONNECTORS OR INSULATED SPRING CONNECTORS AS MANUFACTURED BY THE FOLLOWING OR APPROVED EQUAL:

3. ELECTRICAL PRODUCTS DIVISION 3M (SCOTCHLOCK) b. IDEAL INDUSTRIES . THOMAS AND BETTS

3. SPLICES, TAPS, AND CONNECTIONS IN NO. 6 AWG AND LARGER SHALL BE MADE WITH TIN-PLATED, HIGH CONDUCTIVITY, COPPER COMPRESSION OR CAST, HIGH CONDUCTIVITY, HIGH STRENGTH, COPPER ALLOY, BOLT-TYPE CONNECTORS AS MANUFACTURED BY THE FOLLOWING OR APPROVED EQUAL. BURNDY ENGINEERING CO.

b. DOSSERT MFG. CO. . THOMAS AND BETTS

d. POLARRIS

4. ALL WIRE SPLICES OR TAPS IN NO. 6 AWG OR LARGER CONDUCTORS SHALL BE INSULATED EITHER BY TAPING OR UL LISTED SELF INSULATED COMPRESSION BOLT TYPE CONNECTORS 5. INSULATION OF SPLICE OR TAP SHALL BE, AT A MINIMUM, EQUAL TO THE WIRE INSULATION. UNIFORM COVERING OF VINYL PLASTIC TAPE OF AT LEAST 4 LAYERS (HALF-LAPPED IN TWO (2) DIRECTIONS) SHALL BE APPLIED.

6. VINYL PLASTIC TAPE SHALL BE "SCOTCH TAPE NO. 88" AS MANUFACTURED BY THE 3M COMPANY F. PULL BOXES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING PULL BOXES TO FACILITATE CABLE OR WIRE PULLING OPERATION. PULL BOXES SHALL BE SIZED AND INSTALLED PER NEC

G. GROUNDING AND BONDING

1. IT IS THE INTENT OF THIS SPECIFICATION TO REQUIRE A COMPLETE AND CONTINUOUS GROUNDING SYSTEM TO PROVIDE AN ADEQUATE PATH FOR GROUND FAULT CURRENTS AND TO PROVIDE SAFETY TO PERSONNEL FROM ACCIDENTAL ELECTRIC SHOCK HAZARDS. 2. PROVIDE PROPER GROUNDING IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE, FOR

ALL ELECTRICAL SYSTEMS INSTALLED UNDER THIS PROJECT. 3. AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED IN EACH RACEWAY AND CABLE ASSEMBLY. INSULATED GROUNDING CONDUCTORS SHALL BE COLORED GREEN. WHERE GROUNDING CONDUCTORS ARE NOT SPECIFICALLY INDICATED, THE CONTRACTOR SHALL

UNDERSTAND THAT IT IS REQUIRED TO PROVIDE A CODE SIZED GROUNDING CONDUCTOR AS SPECIFIED ABOVE

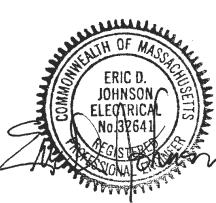
4. CONDUITS SHALL BE EFFECTIVELY GROUNDED TO THE METAL FRAMEWORK OF PANELBOARDS, SWITCHES, MOTORS, STARTERS, AND JUNCTION BOXES BY MEANS OF GROUNDING BUSHING AND BONDING JUMPERS.

5. EQUIPMENT GROUNDING CONDUCTORS SHALL BE TERMINATED ON THE GROUND BUS WITHIN ALL PANELBOARDS AND SWITCHBOARDS. GROUND LUGS SHALL BE PROVIDED FOR GROUND FERMINATIONS WITHIN PULLBOXES AND OTHER ENCLOSURES NOT EQUIPPED WITH A GROUND

6. THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE CONNECTED TO THE METAL FRAME OF MOTORS WITH A BOLTED SOLDERLESS LUG. 7. GROUNDING CONDUCTORS, AND BONDING JUMPERS, SHALL BE SIZED IN ACCORDANCE WITH

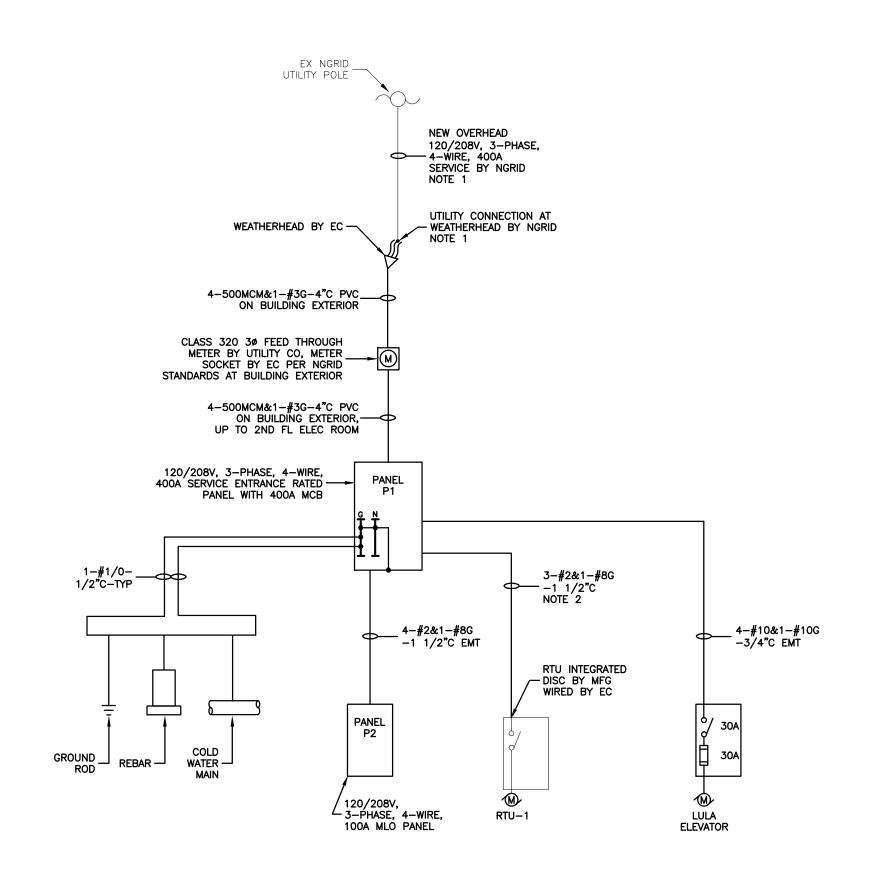
THE REQUIREMENTS OF THE NEC UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS. H. DIG SAFE

1. PRIOR TO EXCAVATION, THE GC SHALL PRE-MARK PROPOSED LOCATIONS OF NEW BELOW GRADE ELECTRICAL DUCTBANKS. THE GC SHALL CONTACT AND MEET WITH DIG SAFE UTILITY OPERATORS TO EXPLAIN PROPOSED ROUTING AND DETERMINE LOCATION OF ALL EXISTING BELOW GRADE UTILITIES.



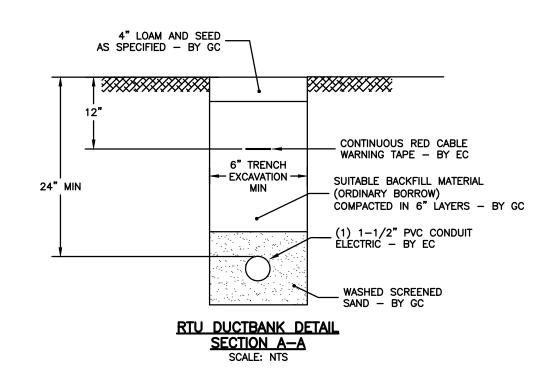


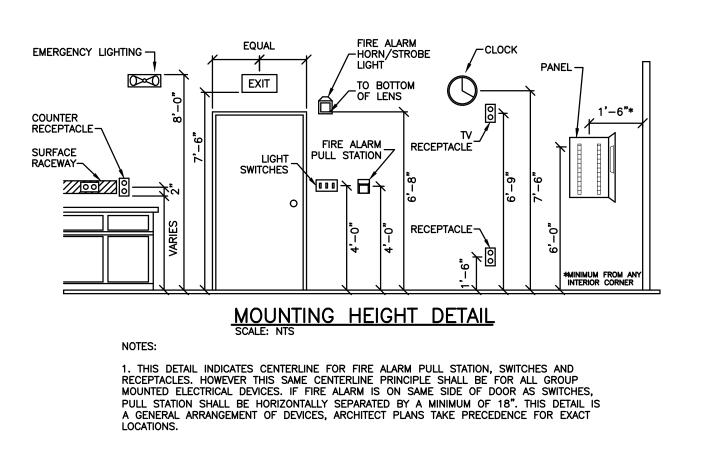
	CAVENEY			128 WARREN ST 🔳 LOWELL, MA 01852	info@caveneyarch.com	978 - 770 - 0518
ELECTRICAL, PLUMBING & FIRE PROTECTION CONSULTING ENGINEERS	JOHNSON ENGINEERING	AND DESIGN, INC.	5 ELM STREET	Danvers. MA 01923		FAX: 978–646–9002 www.johnsonengineering.biz
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#### ONE-LINE DIAGRAM SCALE: NTS

NOTES:
1. EC SHALL PROVIDE COORDINATION WITH NGRID FOR INSTALLATION OF THE MAIN ELECTRICAL SERVICES, NGRID WORK REQUEST#: 26889108.
2. EC SHALL PROVIDE UNDERGROUND PVC CONDUIT FROM THE RTU AND TRANSITION TO EMT CONDUIT UPON ENTERING THE BUILDING. EC AND GC SHALL COORDINATE EXACT LOCATION OF CONDUITS AND TRENCH, IN THE FIELD, PRIOR TO EXCAVATION. REFER TO SECTION A-A DUCTBANK DETAIL ON THIS DRAWING AND NOTE 6 ON DRAWING E3.





PANEL D	ESIGN		:	P1										
LOCATION:				2ND FL ELEC RM VOLTAGE: 120 / 208			208				POLES:			42
NEW/ EX	ISTIN	G:		NEW	PHASE:	3			MCB TRIP AMP:	400	AIC RATI	NG KA:	:	22
SURFAC	E/FLU	SH:		SURFACE	WIRE:	4			BUS AMP:	400				
									_					
NOTE	СКТ	POLE	TRIP	DESCRIPTION	N OF LOAD				DESCRIF	PTION OF LOAD	TRIP	POLE	СКТ	NOTE
	NO.		AMP				KVA	KVA			AMP		NO.	
	1	3	100	RTU-1			26.2	6.0	LULA ELEVATOR		30	3	2	2
	3	-	-	-			-	-	-		-	-	4	
	5	-	-	-			-	-	-		-	-	6	
	7	3	100	PANEL P2			20.9	6.0	SEWAGE GRINDER	PUMP	30	3	8	2
	9	-	-	-			-	-	-		-	-	10	
	11	-	-	-			-	-	-		-	-	12	
	13	1	20	1ST FLOOR BATHROC	MS GFI		0.4	0.6	1ST FL UTILITY RO	OMS GFI	20	1	14	
	15	1	20	OFFICE 106 RECP			1.2	0.6	WATER LOCK EXH	BIT GFI	20	1	16	
	17	1	20	ELEVATOR CAB LTG			0.4	1.0	KITCHEN & HALL R	ECP	20	1	18	
	19	1	20	ELEVATOR PIT GFI & I	LIGHT		0.4	1.6	RECEPTION RECP		20	1	20	
2	21	2	50	ELEC STOVE			8.3	0.2	FACP		20	1	22	
	23	-	-	-			-	1.0	GALLERY RECP		20	1	24	
	25	2	30	PLUMB WATER HEAT	ER WC103		4.2	1.0	GALLERY RECP		20	1	26	
	27	-	-	-			-	0.9	FP AIR COMP		20	1	28	
	29	2	30	PLUMB WATER HEAT	ER WC104		4.2	2.5	EBBH-1 ELEC BASE	BOARD HTR	20	2	30	
	31	-	-	-			-	-	-		-	-	32	
	33	2	30	PLUMB WATER HEAT	ER WC204		4.2		SPACE				34	
	35	-	-	-			-		SPACE				36	
	37	2	30	PLUMB WATER HEAT	ER KITCHEN		4.2	4.2	PLUMB WATER HE	ATER UTILITY 207	30	2	38	
	39	-	-	-			-	-	-		-	-	40	
1	41	1	20	DISHWASHER			1.4	0.2	1ST FLOOR TOILET	S ELEC FLUSH	20	1	42	1
				TOTAL CONNECTED	(VA		101.8							
				TOTAL CONNECTED A	AMPS @ 125%	, D	353.2							

LIGHTING FIXTURE SCHEDULE										
ТҮРЕ	DESCRIPTION	MOUNTING	VOLTAGE	LAMP	LAMP WATTS	MANUFACTURER	CATALOG NUMBER			
А	4' LED UTILITY STRIP FIXTURE	SURFACE	120	LED	36	SIMKAR	CHLED-4-50-35			
В	3 SCONCE BATHROOM VANITY FIXTURE	SURFACE	120	LED			TBD			
С	EXTERIOR SURFACE MOUNTED LIGHT	SURFACE	120				TBD			
D	DECORATIVE PENDANT FIXTURE	PENDANT	120				TBD			
Е	LED DUAL HEAD EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY - WHITE	SURFACE	120	LED	4W	EMERGI-LITE	EL-2LED			
E1	LED DUAL HEAD EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY - BLACK	SURFACE	120	LED	4W	EMERGI-LITE	B-EL-2LED			
E2	LED EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY BLACK - WEATHERPROOF	SURFACE	120	LED	4W	EMERGI-LITE	B-LUX-SD-CW (WIDE BEAM)			
т	WHITE 8' LINEAR TRACK FOR USE WITH HAMPTON BAY H SERIES HEADS	SURFACE	120	1	2400W MAX	HAMPTON BAY	MODEL # 804329 INTERNET #303241599 STORE SKU #1002639543			
T1	WHITE LINE VOLTAGE GOOSENECK H SERIES TRACK HEAD	TRACK	120	SEE BELOW	SEE BELOW	DIRECT LIGHTING	50070-HT-WH			
T1	TRACK HEAD FLOOD PAR20 LED BULB, DAMP LOCATION DIMMABLE, HIGH CRI90 SPOT LIGHT BULB, 5000K DAYLIGHT, E26 MEDIUM SCREW BASE	TRACK HEAD	120	PAR20 LED	8W	TORCHSTAR	ZD1PAR20H-D-8W50			
х	LED EXIT SIGN WITH RED LENS AND INTERNAL BATTERY BACKUP	WALL/CEILING	120	LED	2W	EMERGI-LITE	ELXN400-RN			
X1	LED EXIT SIGN WITH INTERNAL BACKUP BATTERY WEATHERPROOF	SURFACE	120	LED	2W	EMERGI-LITE	WW-SVXN-1-R-CW			
Y	LED ELEVATOR PIT LIGHT & MACHINE RM LIGHT WITH WIREGUARD	WALL OR CEILING	120	LED	14W	LDPI LIGHTING	LEVP14U53			

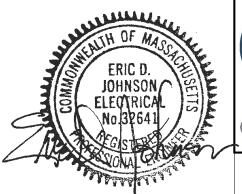
NOTE: 1. EC SHALL PROVIDE GFCI CIRCUIT BREAKER.

2. EC SHALL VERIFY ELECTRICAL REQUIREMENTS PER MANUFACTURER SPECS PRIOR TO PURCHASE AND ROUGH-IN.

PANEL D	ESIGN	NATION	:	P2										
LOCATION:		2ND FL ELEC RM VOLTAGE: 120 / 2			208		MAIN LUG ONLY:	YES	POLES:			42		
NEW/ EX	ISTING	NG: NEW PHASE: 3 AIC RATII		NG KA	:	22								
SURFAC	E/FLU	SH:		SURFACE	WIRE:	4			BUS AMP:	100				
		1		Γ			1		Т					
NOTE	СКТ	POLE	TRIP	DESCRIPTI	ON OF LOAD				DESCRIP	TION OF LOAD	TRIP	POLE	СКТ	NOTE
	NO.		AMP				KVA	KVA			AMP		NO.	
	1	1	20	DEDICATED EXTER	IOR GFI		0.2	1.0	1ST FLOOR LIGHTIN	G	20	1	2	
	3	1	20	EXHAUST FAN TEF-	1,2,3		0.1	1.0	1ST FLOOR LIGHTIN	G	20	1	4	
	5	1	20	WC 204 GFI			0.2	0.6	ATTIC LIGHTING		20	1	6	1
	7	1	20	2ND FL & UTILITY R	OOMS GFI		1.2	0.2	EXTERIOR & VESTIE	BULE LIGHTING	20	1	8	1
	9	1	20	2ND FL MUSEUM 20	1 RECP		1.2	1.2	EXTERIOR GFI		20	1	10	
	11	1	20	2ND FL MUSEUM 20	1 RECP		1.2	0.8	ELEC RM 210 GFI		20	1	12	
	13	1	20	ATTIC GFI			1.2	0.2	DEDICATED ATTIC C	<b>FI</b>	20	1	14	
	15	1	20	UREF-1 & EVF-1			0.1	0.2	DEDICATED ATTIC C	<b>FI</b>	20	1	16	
1	17	1	20	2ND FLOOR TOILET	ELEC FLUSH		0.1	1.4	ATTIC GFI		20	1	18	
	19	1	20	KITCHEN COUNTER	R GFI		0.4	1.5	RECEPTION HEATER	R RECP	20	1	20	
	21	1	20	KITCHEN COUNTER	R GFI		0.4	0.4	VESTIBULE GFI		20	1	22	
1	23	1	20	MICROWAVE ABOV	E STOVE		1.5	0.9	2ND FLOOR LIGHTIN	١G	20	1	24	
1	25	1	20	FRIDGE			1.0	1.1	2ND FLOOR LIGHTIN	١G	20	1	26	
1	27	1	20	KITCHEN STOVE HO	DOD		1.4		SPARE		20	1	28	
1	29	1	20	FIRE SPRINKLER BE	ELL		0.2		SPARE		20	1	30	
	31	1	20	SPARE					SPARE		20	1	32	
	33	1	20	SPARE					SPARE		20	1	34	
	35	1	20	SPARE					SPARE		20	1	36	
	37			SPACE					SPACE				38	
	39			SPACE					SPACE				40	
	41			SPACE					SPACE				42	
				TOTAL CONNECTED	) KVA		20.9		1 .		I	L		
				TOTAL CONNECTED	D AMPS @ 125%	ó	72.5	1						

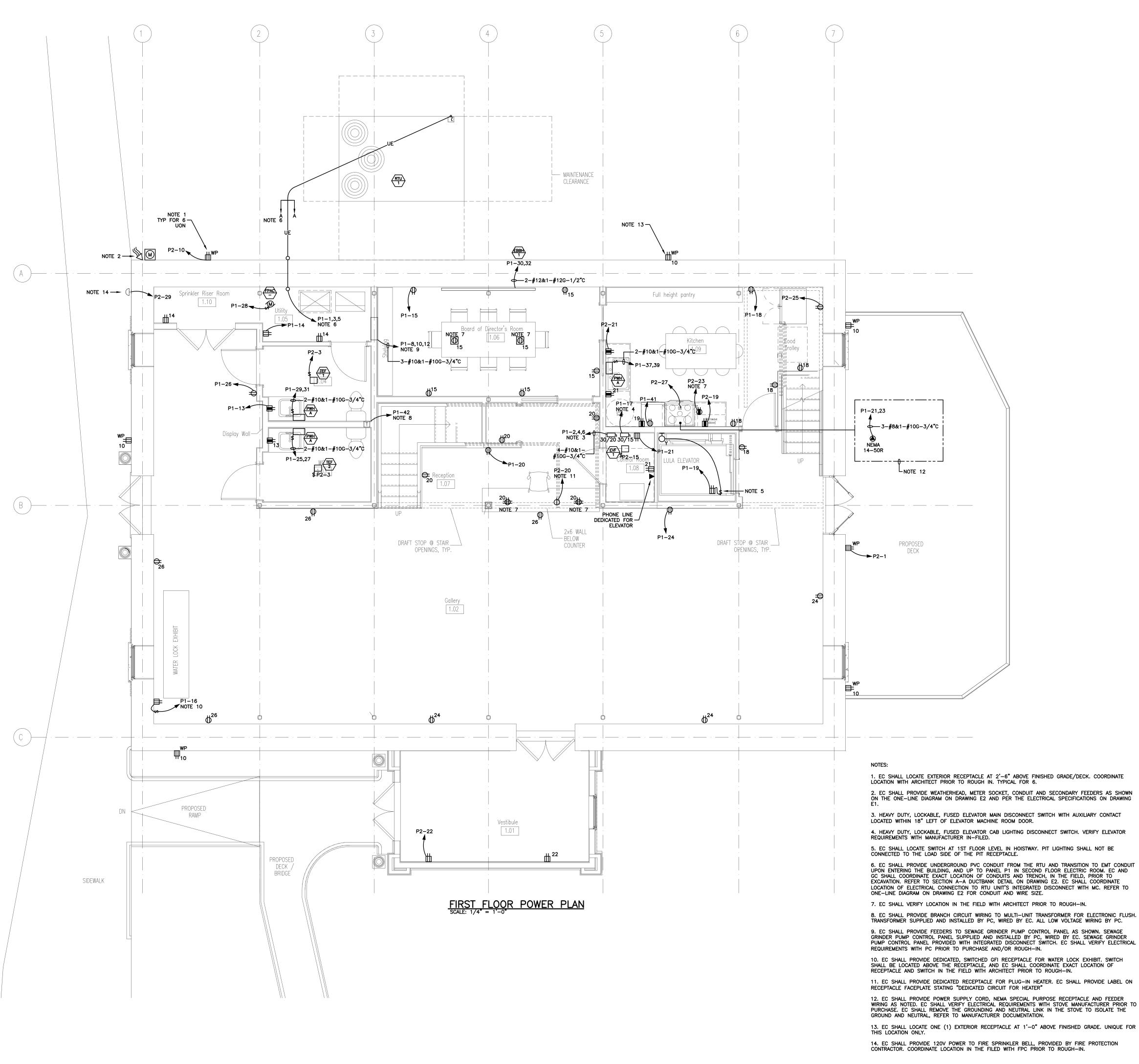
NOTE: 1. EC SHALL PROVIDE GFCI CIRCUIT BREAKER.

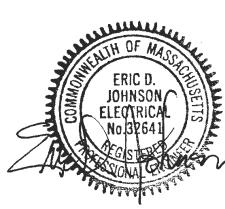
1. EC SHALL VERIFY ALL FIXTURES SELECTIONS AND QUANTITIES WITH THE OWNER/ARCHITECT PRIOR TO PURCHASE. 2. EC SHALL VERIFY ALL FIXTURE AND SWITCH LOCATIONS WITH THE OWNER/ARCHITECT PRIOR TO ROUGH IN.













1. EC SHALL LOCATE EXTERIOR RECEPTACLE AT 2'-6" Above finished grade/deck. Coordinate Location with architect prior to rough in. Typical for 6.

3. HEAVY DUTY, LOCKABLE, FUSED ELEVATOR MAIN DISCONNECT SWITCH WITH AUXILIARY CONTACT

4. HEAVY DUTY, LOCKABLE, FUSED ELEVATOR CAB LIGHTING DISCONNECT SWITCH. VERIFY ELEVATOR REQUIREMENTS WITH MANUFACTURER IN-FILED.

5. EC SHALL LOCATE SWITCH AT 1ST FLOOR LEVEL IN HOISTWAY. PIT LIGHTING SHALL NOT BE CONNECTED TO THE LOAD SIDE OF THE PIT RECEPTACLE.

6. EC SHALL PROVIDE UNDERGROUND PVC CONDUIT FROM THE RTU AND TRANSITION TO EMT CONDUIT UPON ENTERING THE BUILDING, AND UP TO PANEL P1 IN SECOND FLOOR ELECTRIC ROOM. EC AND GC SHALL COORDINATE EXACT LOCATION OF CONDUITS AND TRENCH, IN THE FIELD, PRIOR TO EXCAVATION. REFER TO SECTION A-A DUCTBANK DETAIL ON DRAWING E2. EC SHALL COORDINATE LOCATION OF ELECTRICAL CONNECTION TO RTU UNIT'S INTEGRATED DISCONNECT WITH MC. REFER TO ONE-LINE DIAGRAM ON DRAWING E2 FOR CONDUIT AND WIRE SIZE.

7. EC SHALL VERIFY LOCATION IN THE FIELD WITH ARCHITECT PRIOR TO ROUGH-IN.

8. EC SHALL PROVIDE BRANCH CIRCUIT WIRING TO MULTI-UNIT TRANSFORMER FOR ELECTRONIC FLUSH. TRANSFORMER SUPPLIED AND INSTALLED BY PC, WIRED BY EC. ALL LOW VOLTAGE WIRING BY PC.

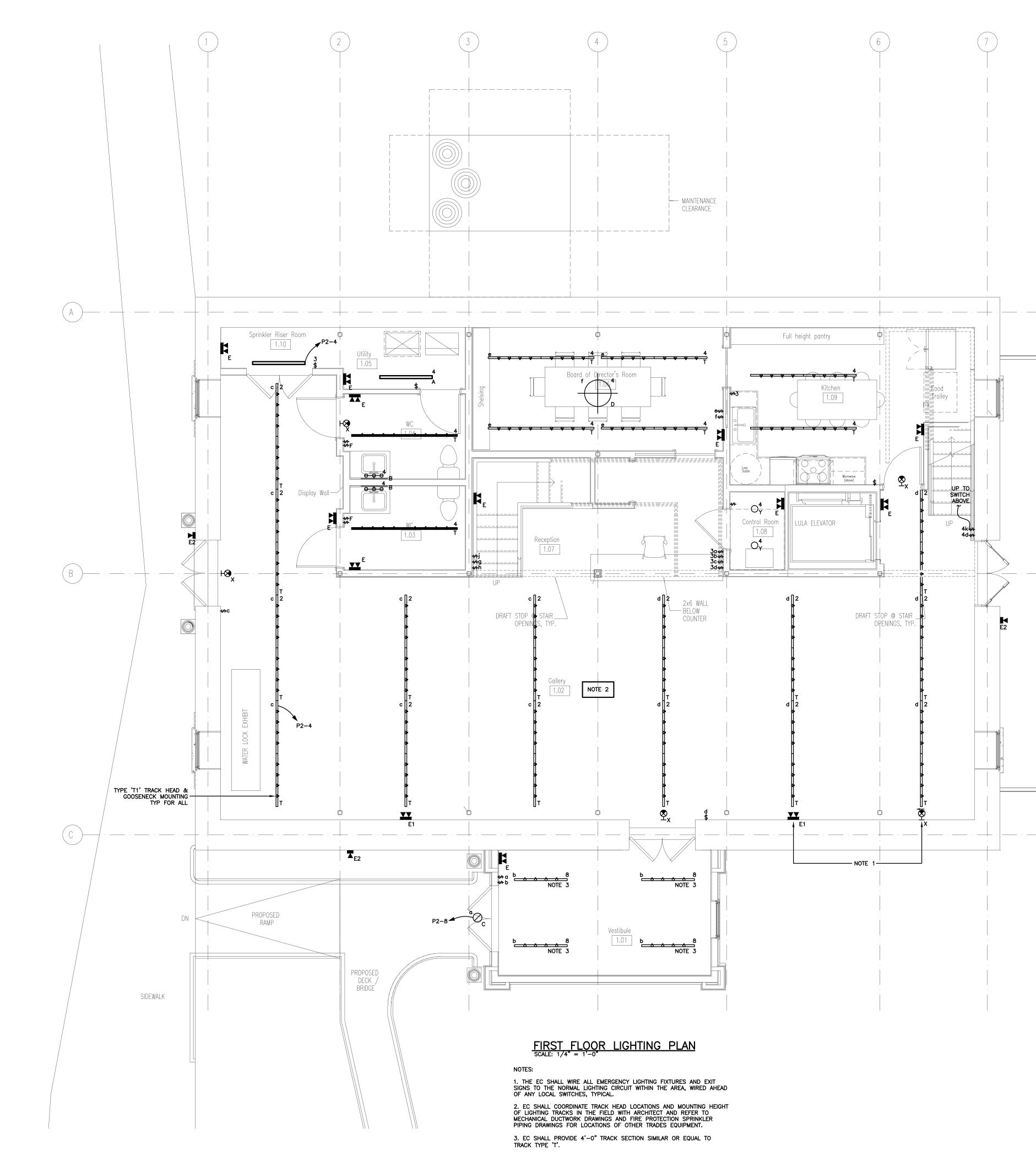
9. EC SHALL PROVIDE FEEDERS TO SEWAGE GRINDER PUMP CONTROL PANEL AS SHOWN. SEWAGE GRINDER PUMP CONTROL PANEL SUPPLIED AND INSTALLED BY PC, WIRED BY EC. SEWAGE GRINDER PUMP CONTROL PANEL PROVIDED WITH INTEGRATED DISCONNECT SWITCH. EC SHALL VERIFY ELECTRICAL REQUIREMENTS WITH PC PRIOR TO PURCHASE AND/OR ROUGH-IN.

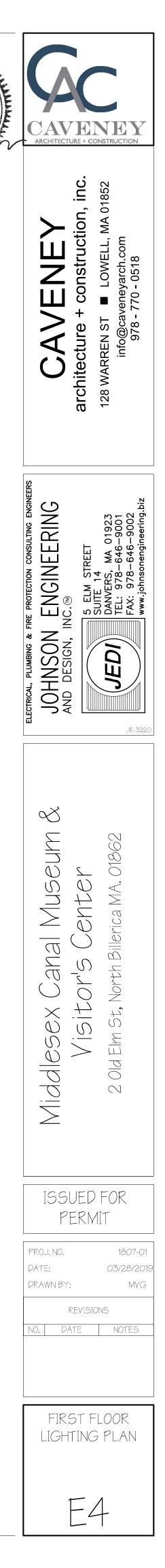
10. EC SHALL PROVIDE DEDICATED, SWITCHED GFI RECEPTACLE FOR WATER LOCK EXHIBIT. SWITCH SHALL BE LOCATED ABOVE THE RECEPTACLE, AND EC SHALL COORDINATE EXACT LOCATION OF RECEPTACLE AND SWITCH IN THE FIELD WITH ARCHITECT PRIOR TO ROUGH-IN.

11. EC SHALL PROVIDE DEDICATED RECEPTACLE FOR PLUG-IN HEATER. EC SHALL PROVIDE LABEL ON RECEPTACLE FACEPLATE STATING "DEDICATED CIRCUIT FOR HEATER"

12. EC SHALL PROVIDE POWER SUPPLY CORD, NEMA SPECIAL PURPOSE RECEPTACLE AND FEEDER WIRING AS NOTED. EC SHALL VERIFY ELECTRICAL REQUIREMENTS WITH STOVE MANUFACTURER PRIOR TO PURCHASE. EC SHALL REMOVE THE GROUNDING AND NEUTRAL LINK IN THE STOVE TO ISOLATE THE GROUND AND NEUTRAL, REFER TO MANUFACTURER DOCUMENTATION.



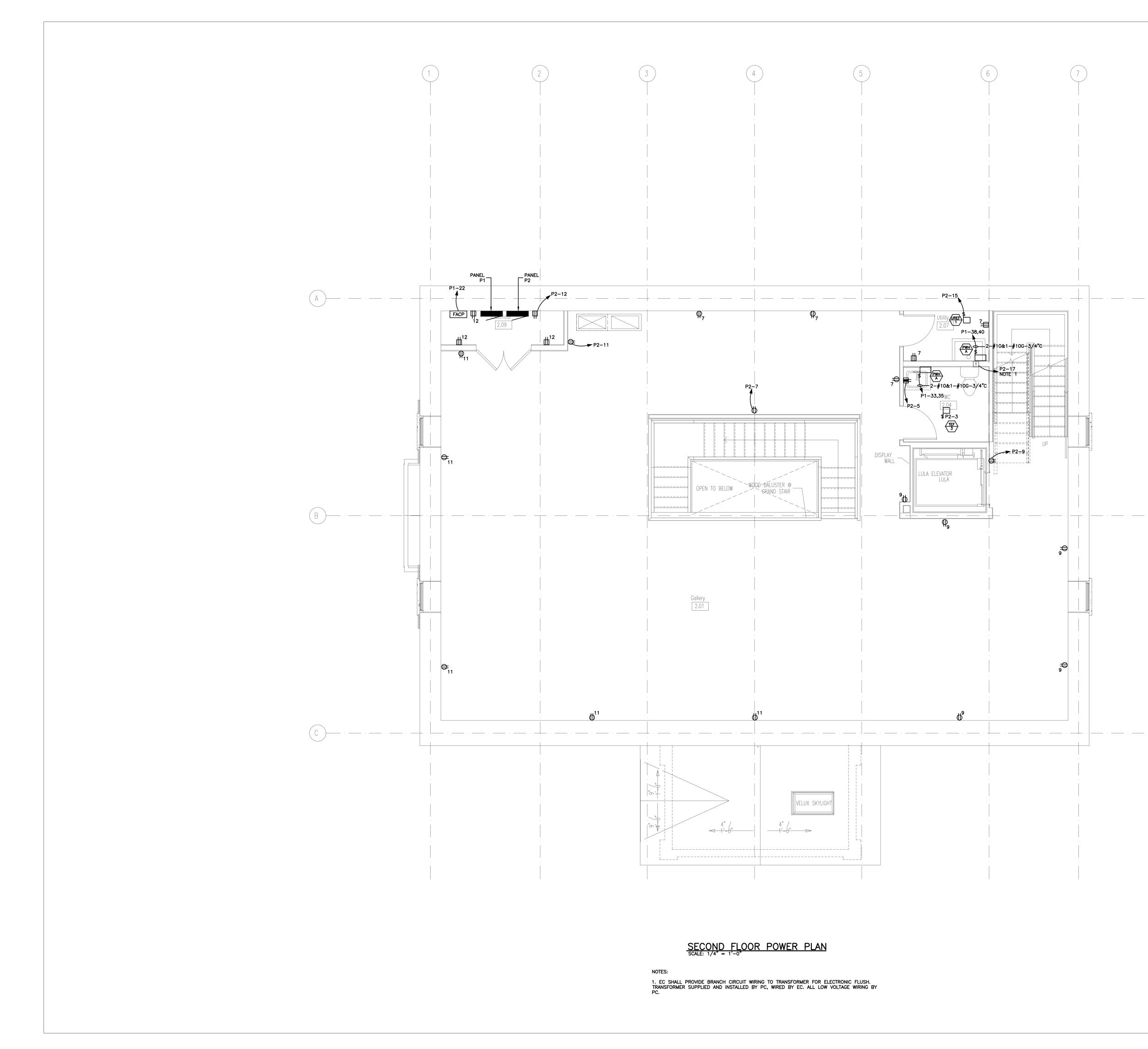


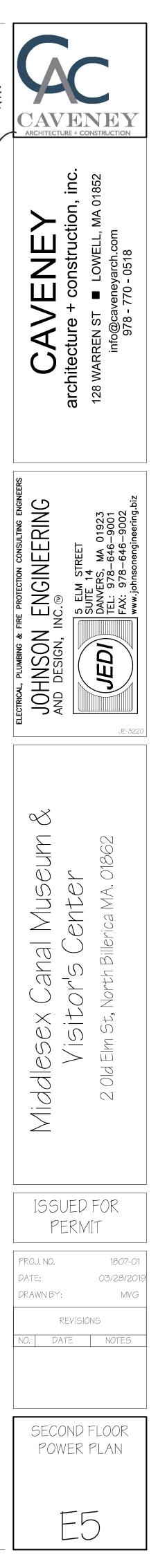


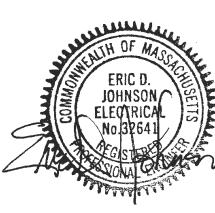
PROPOSED DECK

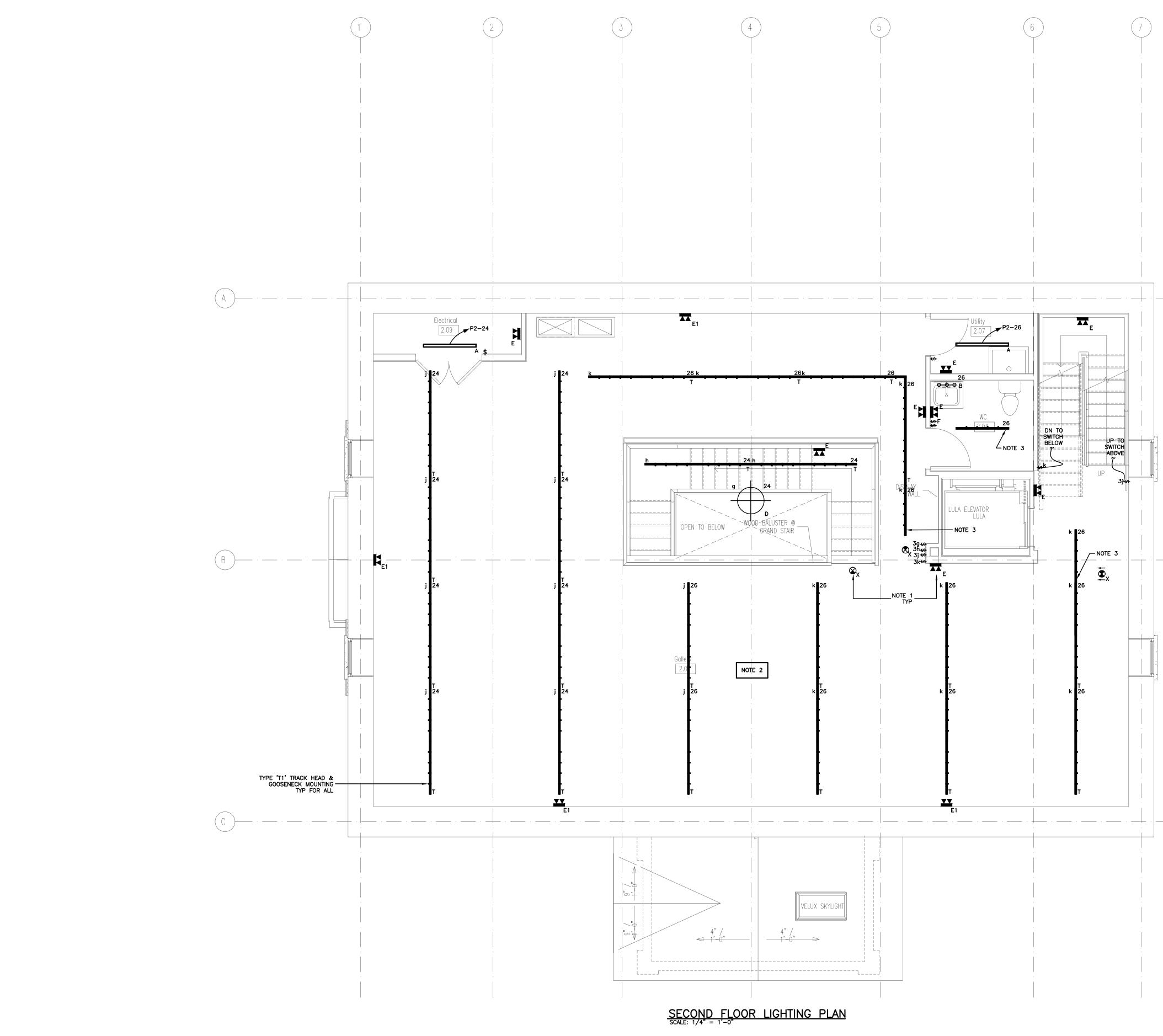
OPTIONAL LIGHTING DIMMER CONTROLS:

EC SHALL PROVIDE OPTIONAL COST TO OWNER TO PROVIDE DIMMING SWITCHES FOR TRACK LIGHTING. DIMMERS SHALL CONTROL A MAXIMUM OF 600 WATTS PER DIMMER, AND SHALL PROVIDE CONTROL TO A MAXIMUM OF 75 TRACK HEADS (APPROXIMATELY ONE DIMMER PER BAY OF TRACK).

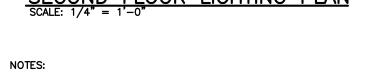


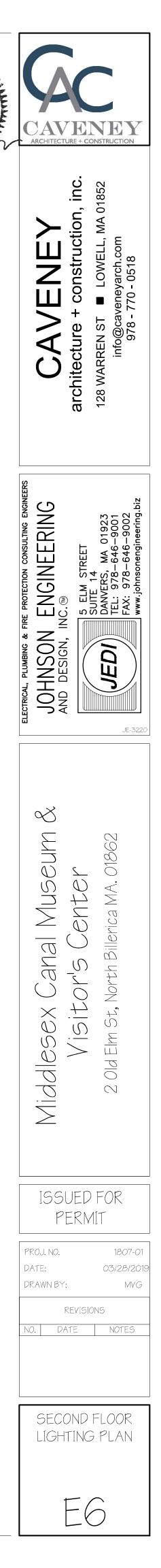






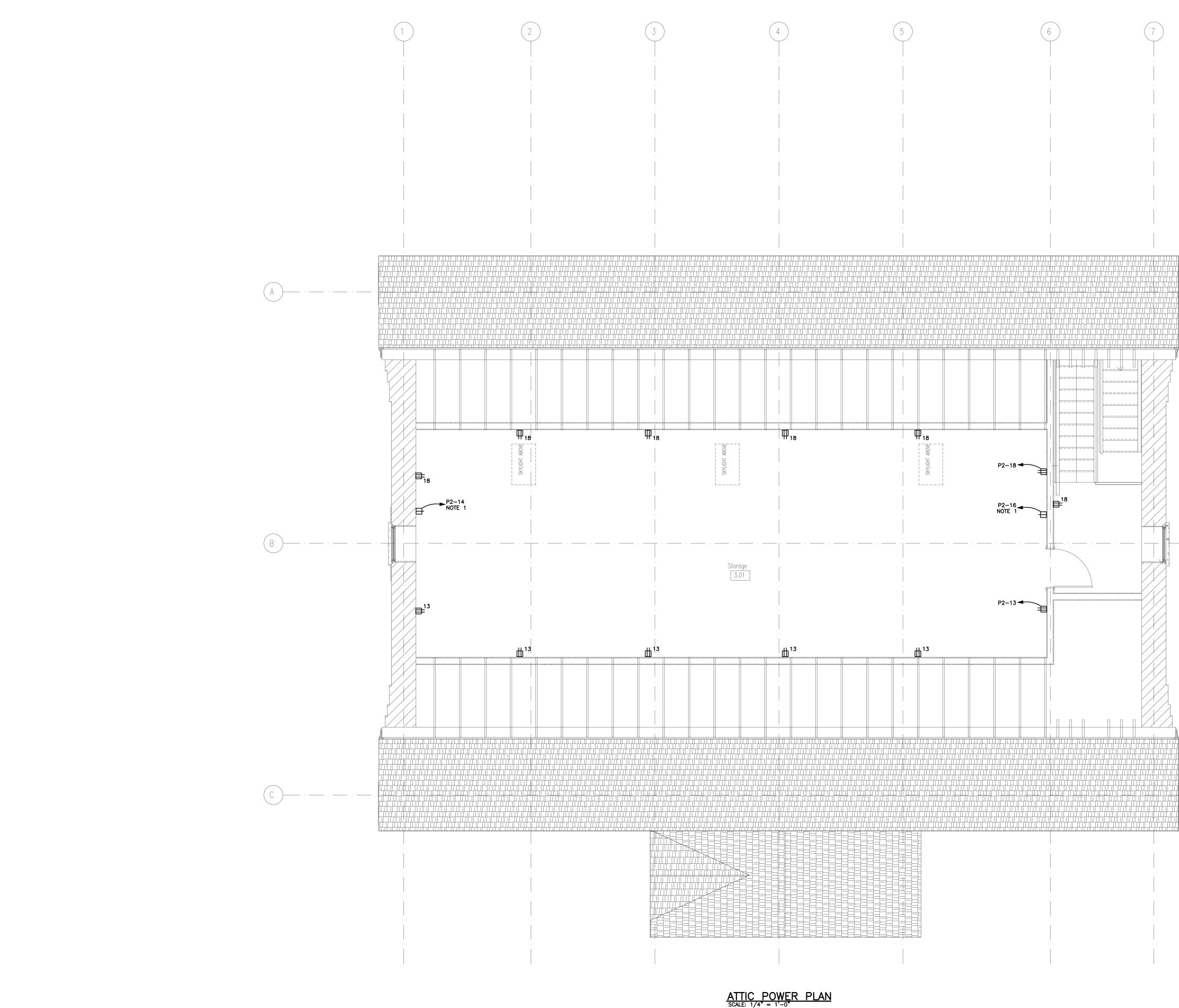
1. THE EC SHALL WIRE ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS TO THE NORMAL LIGHTING CIRCUIT WITHIN THE AREA, WIRED AHEAD OF ANY LOCAL SWITCHES, TYPICAL. 2. EC SHALL COORDINATE TRACK HEAD LOCATIONS AND MOUNTING HEIGHT OF LIGHTING TRACKS IN THE FIELD WITH ARCHITECT AND REFER TO MECHANICAL DUCTWORK DRAWINGS AND FIRE PROTECTION SPRINKLER PIPING DRAWINGS FOR LOCATIONS OF OTHER TRADES EQUIPMENT. 3. EC SHALL PROVIDE 4'-0" TRACK SECTION SIMILAR OR EQUAL TO TRACK TYPE 'T'.



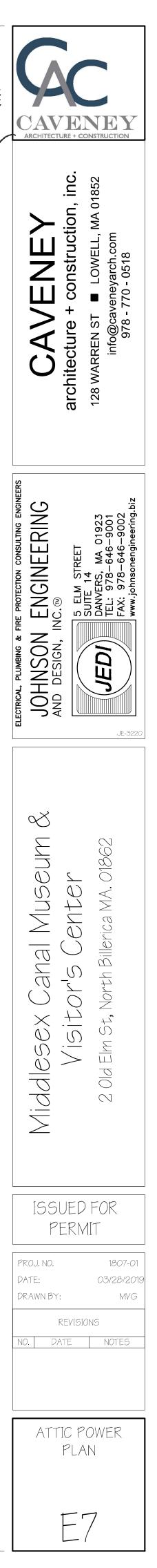


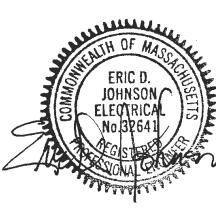
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OPTIONAL LIGHTING DIMMER CONTROLS: EC SHALL PROVIDE OPTIONAL COST TO OWNER TO PROVIDE DIMMING SWITCHES FOR TRACK LIGHTING. DIMMERS SHALL CONTROL A MAXIMUM OF 600 WATTS PER DIMMER, AND SHALL PROVIDE CONTROL TO A MAXIMUM OF 75 TRACK HEADS (APPROXIMATELY ONE DIMMER PER BAY OF TRACK).

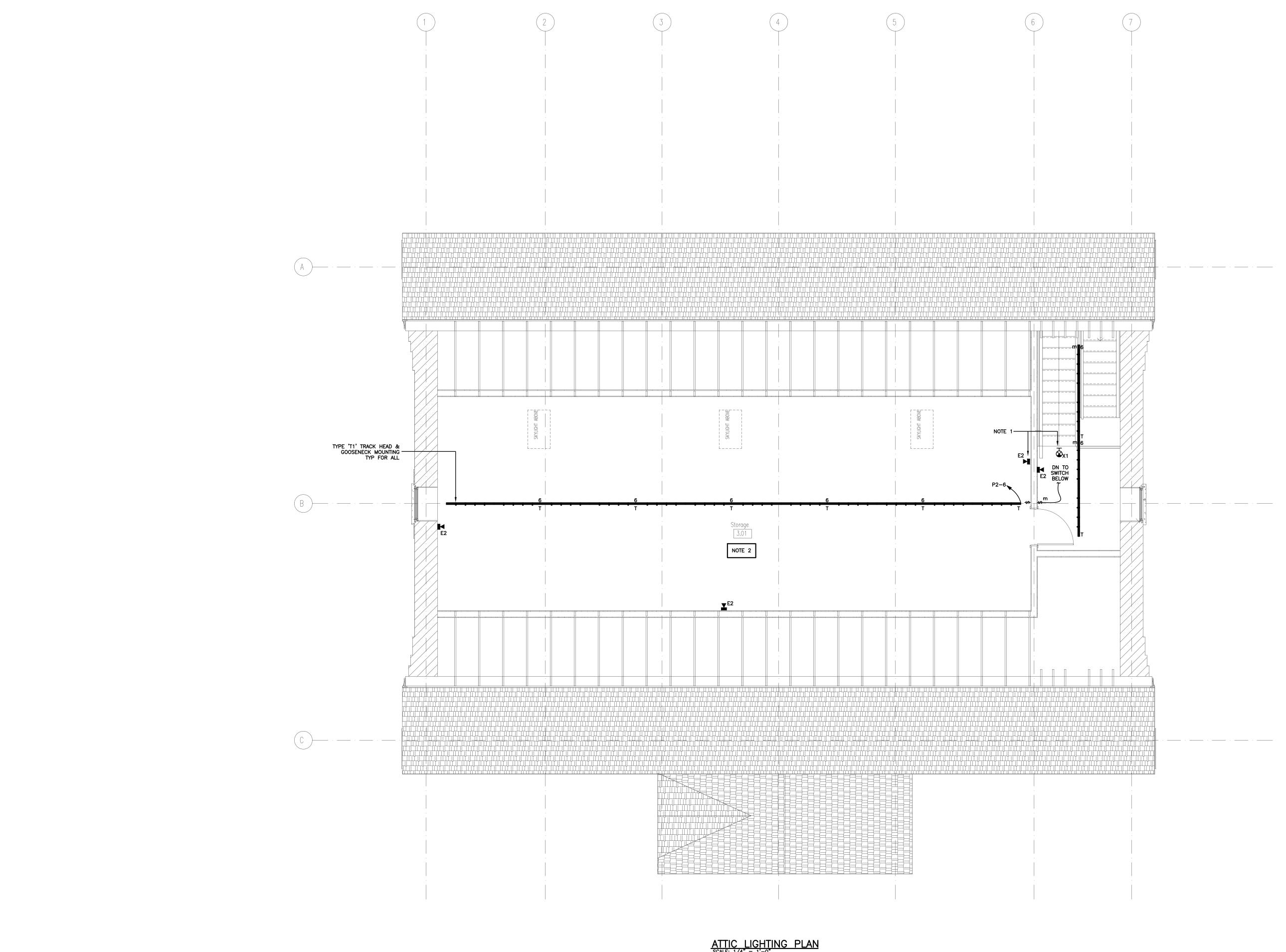


NOTES: 1. EC SHALL PROVIDE DEDICATED GFI RECEPTACLE. EC SHALL PROVIDE LABEL ON RECEPTACLE FACEPLATE STATING "DEDICATED CIRCUIT".





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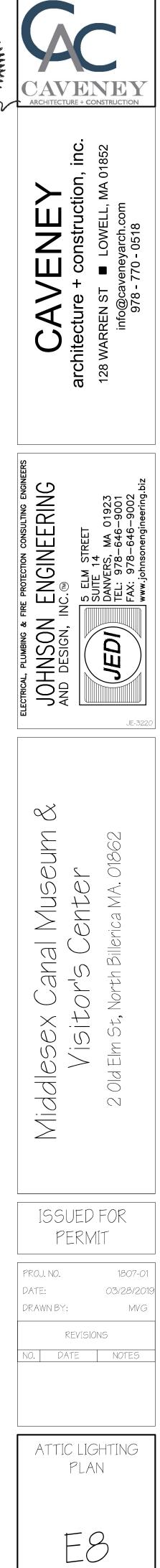


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NOTES:

1. EC SHALL WIRE ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS TO THE NORMAL LIGHTING CIRCUIT WITHIN THE AREA, WIRED AHEAD OF ANY LOCAL SWITCHES, TYPICAL.

2. EC SHALL COORDINATE TRACK HEAD LOCATIONS AND MOUNTING HEIGHT OF LIGHTING TRACKS IN THE FIELD WITH ARCHITECT AND REFER TO MECHANICAL DUCTWORK DRAWINGS AND FIRE PROTECTION SPRINKLER PIPING DRAWINGS FOR LOCATIONS OF OTHER TRADES EQUIPMENT.



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OPTIONAL LIGHTING DIMMER CONTROLS: EC SHALL PROVIDE OPTIONAL COST TO OWNER TO PROVIDE DIMMING SWITCHES FOR TRACK LIGHTING. DIMMERS SHALL CONTROL A MAXIMUM OF 600 WATTS PER DIMMER, AND SHALL PROVIDE CONTROL TO A MAXIMUM OF 75 TRACK HEADS (APPROXIMATELY ONE DIMMER PER BAY OF TRACK).

FIRE DETECTION AND ALARM SYSTEM

A. GENERAL

1. THE PLANS SHOW THE INSTALLATION OF A COMPLETE NEW FIRE ALARM SYSTEM THROUGHOUT THE BUILDING.

2. THE CONTRACTOR SHALL PLACE IN OPERATION A NEW FULLY ADDRESSABLE SYSTEM. 3. THE COMPLETED FIRE ALARM SYSTEM SHALL MEET ALL LOCAL AND STATE CODES.

4. EQUIPMENT AND COMPLETED INSTALLATION SHALL BE U.L. LISTED OR APPROVED AND SHALL MEET APPROVAL OF THE LOCAL FIRE DEPARTMENT, MASSACHUSETTS STATE FIRE MARSHALL, AUTHORITIES HAVING JURISDICTION AND SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE LATEST EDITION OF THE MASSACHUSETTS STATE BUILDING CODE, MASSACHUSETTS ELECTRICAL CODE, ADA CODE, NFPA 71, 72, 72E AND LIFE SAFETY CODE #101.

5. THE COMPLETE FIRE ALARM SYSTEM SHALL CONTAIN SMOKE DETECTION, HORN/STROBE ALARMS, PULL STATIONS, DUCT SMOKE DETECTORS, WATER AND TAMPER FLOW SWITCHES AND OTHER DEVICES AS SHOWN

ON THE FLOOR PLANS. 6. THE OWNER SHALL BE RESPONSIBLE FOR TELEPHONE LINE CONNECTION CHARGES.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF DUAL TELEPHONE HOMERUN WIRING.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FIRE ALARM TESTING AND CERTIFICATION CHARGES.

9. THE OWNER SHALL BE RESPONSIBLE FOR ENTERING INTO AN ANNUAL FIRE ALARM SYSTEM MONITORING CONTRACT WITH A UL LISTED CENTRAL STATION MONITORING COMPANY AND PAYING FOR ALL ON GOING ANNUAL AND MONTHLY FEES.

B. MAIN FIRE ALARM CONTROL PANEL (FACP)

1. ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDRESSABLE MAIN FIRE ALARM CONTROL PANEL.

2. THE SYSTEMS SHALL HAVE BUILT-IN 24 VDC POWER SUPPLY AND INTEGRAL BATTERY CHARGER.

3. TWENTY-FOUR (24) HOURS OF BATTERY STANDBY POWER SHALL BE PROVIDED WITH FIVE (5) MINUTES (+20%) OF ALARM SIGNALING AT THE END OF THIS TWENTY-FOUR (24) HOUR PERIOD, AS REQUIRED BY NFPA 72, CHAPTER 10.6.7.2.1.

4. LIGHTNING PROTECTION SHALL BE INCLUDED WITHIN THE FACP TO PROTECT THE PANEL FROM LIGHTNING SURGES ON THE 120 VOLT SUPPLY CIRCUIT.

5. FACP SHALL BE NOTIFIER FIRE WARDEN SERIES NFW2-100, OR APPROVED EQUAL.

6. THE FACP SHALL HAVE A DIGITAL ELECTRONIC TELEPHONE AUTODIALER (DAC), NOTIFIER MODEL NO. UDACT-2 TO ENABLE AUTOMATIC TRANSMISSION OF THE ALARM SIGNAL TO THE APPROVED FIRE ALARM THIRD PARTY MONITORING COMPANY VIA LOCAL TELEPHONE LINES. TWO TELEPHONE LINES ARE REQUIRED. C. SEQUENCE OF OPERATION

1. REFER TO FIRE ALARM NARRATIVE FOR SEQUENCE OF OPERATION.

D. REMOTE DEVICES

1. SMOKE DETECTORS SHALL BE ADDRESSABLE PHOTOELECTRIC TYPE AND SHALL OPERATE AT 24 VDC,

NOTIFIER MODEL NO. NP-100.

2. PULL STATIONS SHALL BE ADDRESSABLE, SEMI-FLUSH, DOUBLE ACTION BREAK ROD STATIONS. NOTIFIER MODEL NO. NOT-BG12LX.

3. HORN/STROBE UNITS SHALL BE PROVIDED IN A COMMON ENCLOSURE. THE VISUAL STROBE SHALL MEET ALL REQUIREMENTS OF THE ADA CODE. HORN AND STROBE UNITS SHALL BE NOTIFIER P2W SERIES, AND SHALL BE WHITE IN COLOR.

4. STROBE ONLY UNITS SHALL BE PROVIDED IN A COMMON ENCLOSURE. THE VISUAL STROBE SHALL MEET ALL REQUIREMENTS OF THE ADA CODE. STROBE UNITS SHALL BE NOTIFIER SW SERIES, AND SHALL BE WHITE

5. ALL HORN/STROBE UNITS AND STROBE ONLY UNITS SHALL BE SYNCHRONIZED. 6. KNOX BOX SHALL BE RECESSED MOUNTED NEAR THE FRONT ENTRY. BOX SHALL BE ALUMINUM WITH

TAMPER SWITCH. LOCATION AND MODEL SHALL BE APPROVED BY THE LOCAL FIRE DEPARTMENT PRIOR TO PURCHASE AND/OR ROUGH-IN.

7. ADDRESSABLE HEAT DETECTORS SHALL BE LOW-PROFILE, MATTE WHITE, WITH A FIXED TEMPERATURE OF 135°F, NOTIFIER MODEL NO. FST-851. 8. MONITOR MODULES FOR TAMPER, FLOW, PRESSURE AND OTHER SPRINKLER AND HVAC SYSTEM SWITCHES, CAN BE COMBINED TO DUAL UNITS. PROVIDE MONITOR MODULES NOTIFIER MODEL NO. NDM-100.

9. PROVIDE LCD REMOTE ANNUNCIATOR, INSTALLED AS INDICATED ON THE DRAWINGS. VERIFY LOCATION WITH LOCAL FIRE DEPARTMENT PRIOR TO INSTALLATION. ANNUNCIATOR SHALL BE FLUSH MOUNTED AND SHALL BE SUPERVISED FOR SYSTEM TROUBLE. REMOTE ANNUNCIATOR SHALL HAVE SILENCE SWITCH AND RESET SWITCH CAPABILITY AND SHALL HAVE 80 CHARACTER DISPLAY WHICH REPEATS ALARM MESSAGE ON FACP.

10. PROVIDE WEATHERPROOF PULL STATIONS, SEMI-FLUSH, DOUBLE ACTION BREAK ROD STATIONS, WITH A MONITOR MODULE LOCATED IN A HEATED SPACE. NOTIFIER MODEL NO. NBG-12LOB. 11. PROVIDE WEATHERPROOF HORN/STROBE. HORN/STROBE UNITS SHALL BE PROVIDED IN A COMMON

ENCLOSURE. THE VISUAL STROBE SHALL MEET ALL REQUIREMENTS OF THE ADA CODE. HORN AND STROBE UNITS SHALL BE NOTIFIER P2RK SERIES. 12. PROVIDE A SUPERVISED EXTERIOR BEACON 24 VDC WITH A RED LENS. LOCATION SHALL BE DETERMINED BY THE LOCAL FIRE DEPARTMENT. BEACON SHALL BE EDWARDS 125 SERIES, RED. LOCATION SHALL BE

APPROVED BY THE LOCAL FIRE DEPARTMENT PRIOR TO ROUGH-IN. 13. PROVIDE REMOTE TEST STATION INTERCONNECTED TO DUCT SMOKE DETECTOR PROVIDED WITH RTU UNIT. COORDINATE INTERCONNECTION WITH MC.

14. THE SPRINKLER CONTRACTOR SHALL PROVIDE WATER FLOW SWITCHES ON THE WET SPRINKLER PIPING SYSTEMS. SHOULD A SPRINKLER HEAD RELEASE, WATER FLOW WILL CAUSE A CONTACT CLOSURE ON THE FLOW SWITCH. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDRESSABLE MODULE ADJACENT TO WATER TAMPER SWITCH AS SHOWN ON THE DRAWINGS. ACTIVATION OF WATER FLOW SWITCH SHALL CAUSE FIRE ALARM CONTROL PANEL TO ALARM AND TRANSMIT CALL TO THE FIRE DEPARTMENT. WATER FLOW SWITCHES PROVIDED BY OTHERS, WIRED BY EC.

15. THE SPRINKLER CONTRACTOR SHALL PROVIDE A TAMPER SWITCH ON EACH CONTROL VALUE OF THE SPRINKLER SYSTEM. SHOULD VALVE BE MOVED FROM ITS PRESET CONDITION, THIS SHALL CAUSE CONTACT CLOSURE ON THE TAMPER SWITCH. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDRESSABLE MODULE ADJACENT TO EACH TAMPER SWITCH AS SHOWN ON THE DRAWINGS. ACTIVATION OF TAMPER SWITCH SHALL CAUSE TROUBLE ALARM AT THE FIRE ALARM CONTROL PANEL. TAMPER SWITCHES PROVIDED BY OTHERS, WIRED BY EC.

16. THE SPRINKLER CONTRACTOR SHALL PROVIDE A LOW PRESSURE ALARM DEVICE ON THE INCOMING SPRINKLER LINE FOR MONITORING EXTERNAL STREET PRESSURE. SHOULD THE STREET PRESSURE DROP BELOW A PREDETERMINED VALUE, LOW-PRESSURE DEVICE SHALL CAUSE A CONTACT CLOSURE. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDRESSABLE CONTROL MODULE ADJACENT TO THE LOW PRESSURE SWITCH AS SHOWN ON THE DRAWINGS. ACTIVATION OF THE LOW PRESSURE SWITCH SHALL CAUSE A TROUBLE CONDITION AT THE MAIN FIRE ALARM CONTROL PANEL. LOW PRESSURE SWITCH PROVIDED BY

E. WIRING

OTHERS, WIRED BY EC.

1. ALL FIRE ALARM WIRE AND CABLE SHALL BE UL LISTED FOR FIRE ALARM USE.

2. THE FIRE ALARM SYSTEM SHALL BE A COMPLETE AUTOMATIC AND MANUAL, CLOSED CIRCUIT, CLASS A, 4-WIRE, CONNECTED AND LEFT IN FIRST-CLASS OPERATING CONDITION. 3. FIRE ALARM WIRING SHALL BE PLENUM RATED, TYPE FPLP, WITH RED OUTER JACKET. INSTALLATION SHALL

MEET REQUIREMENTS OF NEC ARTICLE 770 AND 725. CONDUCTORS SHALL BE SOLID COPPER #16 MINIMUM, WITH LOW SMOKE, LOW FLAME TYPE JACKET. 4. FOR FIRE ALARM WIRING IN EXPOSED AREAS, PROVIDE TYPE THHN INSULATION. WIRE SIZE SHALL BE #16 AWG MINIMUM. ALL SURFACE MOUNTED WIRING RELATED TO THE FIRE ALARM SYSTEM SHALL BE INSTALLED IN TYPE EMT CONDUIT.

F. SHOP DRAWINGS

1. CONTRACTOR SHALL PROVIDE TIER 2 SHOP DRAWINGS WHICH SHALL INCLUDE BOTH EQUIPMENT CATALOG CUTS (PRODUCT DATA SHEETS), VOLTAGE DROP CALCULATIONS, AND BATTERY CALCULATIONS. LANDLORD WILL BE PRÒVIDED WITH FINAL COPIES OF ALL SHOP DRAWINGS.

G. TESTING 1. REFER TO FIRE ALARM NARRATIVE FOR FIRE ALARM TESTING REQUIREMENTS.

H. MANUFACTURERS

1. THE COMPLETE FIRE ALARM SYSTEM, DETECTION DEVICES AND MAIN FIRE ALARM PANEL SHALL BE MANUFACTURED BY NOTIFIER, AS SUPPLIED BY FIRE COMMAND SYSTEMS, INC (CONTACT FIRE COMMAND SYSTEMS, INC. AT 978-401-9840 EXT 101). MAIN FIRE ALARM CONTROL PANEL SHALL BE NOTIFIER FIRE WARDEN SERIES, WITH NOTIFIER REMOTE DEVICES, OR EQUAL BY SIMPLEX.

10.18.2.1.1

F FIRE ALARM MANUAL PULL STATION FIRE ALARM HORN/STROBE UNIT CANDELA RATING AS INDICATED (WHITE) SI (15) FIRE ALARM STROBE ONLY CANDELA RATING AS INDICATED (WHITE) SMOKE DETECTOR, PHOTOELECTRIC TYPE SMOKE DETECTOR, PHOTOELECTRIC TYPE WITH ELEVATOR RECALL HEAT DETECTOR, FIXED TEMPERATURE TYPE, WEATHERPROOF MANUAL PULL STATION WITH ADDRESSABLE MONITOR MODULE LOCATED IN HEATED SPACE SMOKE DUCT DETECTOR, PHOTOELECTRIC TYPE REMOTE TEST STATION FIRE ALARM EXTERIOR BEACON

MAIN FIRE ALARM CONTROL PANEL FIRE ALARM REMOTE ANNUNCIATOR PANEL KNOX BOX FIRE ALARM REMOTE RELAY MONITOR MODULE FOR SPRINK TAMPER SWITCH  $\langle P \rangle$ MONITOR MODULE FOR SPRINK PRESSURE SWITCH WP

AUTO DIALER TO A UL LISTED REMOTE SUPERVISING STATION. 5. AUTOMATIC SPRINKLER SYSTEM: THE BUILDING IS EQUIPPED WITH A COMPLETE AUTOMATIC SPRINKLER SYSTEM.

FIRE ALARM NARRATIVE

EQUIPMENT SUPPLIER.

6. SITE ACCESS: OLD ELM ST.

8. SEQUENCE OF OPERATION - GENERAL ALARM:

THE OPERATION OF ANY ADDRESSABLE MANUAL PULL STATION OR SYSTEM SMOKE DETECTOR SHALL RESULT IN THE FOLLOWING: A. ALL ALARM NOTIFICATION DEVICES (HORN/STROBES) SHALL SOUND AND STROBE LIGHTS SHALL FLASH.

B. MAIN FIRE ALARM LOCAL BUZZER SHALL SOUND. D. ADDRESSABLE DEVICE IN ALARM SHALL INDICATE ON THE MAIN FIRE ALARM CONTROL PANEL. DESCRIPTION OF THE SPECIFIC ADDRESSABLE DEVICE IN ALARM SHALL BE SHOWN ON THE DISPLAY.

ANY ELEVATOR SMOKE DETECTOR OR ELEVATOR MACHINE ROOM SMOKE DETECTOR IS ACTIVATED

F. TRANSMIT SIGNAL VIA AUTO DIALER TO A REMOTE SUPERVISING STATION. G. THE CONTROL PANEL SHALL INDICATE THE DEVICE IN ALARM UNTIL MANUALLY RESET. THIS SHALL SILENCE THE PANEL BUZZER.

H. ALL ALARM NOTIFICATION DEVICES SHALL BE SILENCED BY ACTUATING A "SILENCE" SWITCH.

9. SEQUENCE OF OPERATION - OTHER ADDRESSABLE DEVICES A. KNOX BOX, HVAC MONITOR MODULES, TAMPER SWITCHES AND ALL SPRINKLER SWITCHES SHALL TRANSMIT A SUPERVISORY TROUBLE CONDITION AND LOCAL ALARM

NOTIFICATION SHALL SOUND UPON ACTIVATION. TROUBLE ALARM SHALL BE SELF-RESTORING.

10. TESTING & CLOSEOUT:

1. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED FIRE

2. PRIOR TO FORMAL FIRE DEPARTMENT TEST, THE CONTRACTOR SHALL CONDUCT A PRELIMINARY TEST. THE ELECTRICAL CONTRACTOR AND THE EQUIPMENT MANUFACTURER SHALL COMPLETELY TEST THE SYSTEM. THE MANUFACTURER SHALL ISSUE A LETTER OF ACCEPTABILITY STATING THAT ALL SYSTEM COMPONENTS ARE INSTALLED AND ALL REMOTE DEVICES ARE FUNCTIONING.

3. AFTER LETTER OF ACCEPTABILITY HAS BEEN RECEIVED FOR THE PRELIMINARY TEST, THE ELECTRICAL CONTRACTOR SHALL CONDUCT THE ACCEPTANCE TEST, AS

MANY TIMES AS REQUIRED. THE ELECTRICAL CONTRACTOR, EQUIPMENT MANUFACTURER'S REPRESENTATIVE, OWNER'S REPRESENTATIVE, FIRE DEPARTMENT REPRESENTATIVE AND SERVICE COMPANY REPRESENTATIVE SHALL CONDUCT THE ACCEPTANCE TEST IN ACCORDANCE WITH NFPA 72. EVERY BUILDING FIRE ALARM DEVICE SHALL BE TESTED TO INSURE PROPER OPERATION AND CORRECT ANNUNCIATION AT THE CONTROL PANEL. AT LEAST ONE HALF OF ALL TESTS SHALL BE PERFORMED ON BATTERY STANDBY POWER.

4. WHEN THE TESTING HAS BEEN COMPLETED TO THE SATISFACTION OF BOTH THE CONTRACTOR'S JOB FOREMAN AND THE REPRESENTATIVES OF THE MANUFACTURER AND OWNER. THE FINAL ACCEPTANCE TESTING OF THE FIRE ALARM SYSTEM SHALL BE REPORTED ON A STANDARD FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION FORM AS STATED IN NFPA 72, FIGURE

FIRE ALARM LEGEND

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> (S)<sub>E</sub> E HEAT DETECTOR, FIXED TEMPERATUR

RTS Ю FACP

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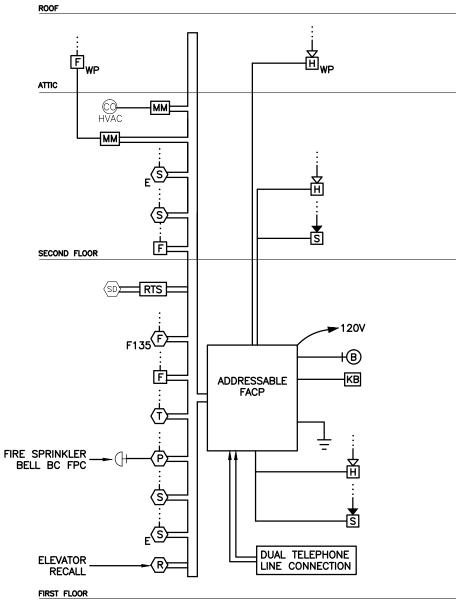
INDICATES WEATHERPROOF DEVICE

#### 1. BUILDING ADDRESS: 2 OLD ELM ST, NORTH BILLERICA, MA 01862 SUMMARY: THIS FIRE ALARM NARRATIVE IS PREPARED TO DESCRIBE THE DESIGN INTENT AND METHODOLOGY FOR THE BUILDING AT THE ABOVE REFERENCED ADDRESS. EQUIPMENT WILL BE UL LISTED AND MANUFACTURED BY A SINGLE

3. TYPE OF OCCUPANCY: USE GROUP A-3 - ASSEMBLY 4. DESIGN METHODOLOGY FOR PROTECTION OF OCCUPANTS: THE PURPOSE OF THIS PROJECT IS TO PROVIDE A COMPLETE NEW FIRE DETECTION AND ALARM SYSTEM IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE STATE OF MASSACHUSETTS BUILDING CODE. A NEW ADDRESSABLE MAIN FIRE ALARM PANEL WILL BE INSTALLED AND LOCATED IN THE BUILDINGS MAIN ELECTRICAL CLOSET ON THE 1ST FLOOR AND A REMOTE ANNUNCIATOR WILL BE LOCATED AT THE BUILDINGS MAIN ENTRANCE. NEW ADDRESSABLE, SMOKE DETECTORS, AND MANUAL PULL STATIONS ARE SHOWN ON THE DRAWINGS. NEW SYNCHRONIZED HORN/STROBE UNITS AND STROBE ONLY UNITS ARE ALSO INDICATED. NOTIFICATION TO THE FIRE DEPARTMENT SHALL BE MADE VIA

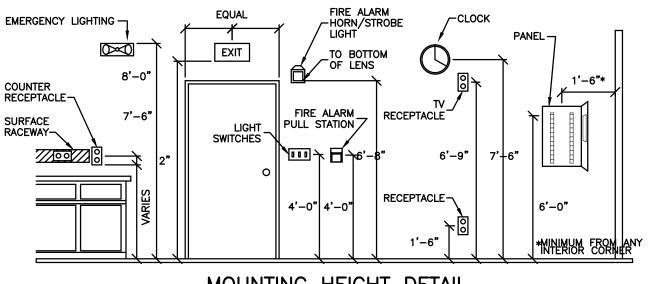
7. LOCATION OF THE FACP: THE MAIN FIRE ALARM CONTROL PANEL SHALL BE LOCATED IN THE BUILDINGS MAIN ELECTRICAL CLOSET ON THE 1ST FLOOR AND A REMOTE ANNUNCIATOR WILL BE LOCATED AT THE BUILDINGS MAIN ENTRANCE.

E. THE FACP SHALL SIGNAL THE ELEVATOR CONTROLLER TO RECALL THE ELEVATOR TO THE MAIN FLOOR LEVEL. ELEVATOR RECALL TO MAIN LEVEL SHALL OCCUR WHEN



<u>FIRE ALARM ONE-LINE DIAGRAM - ADDRESSABLE</u>

1. QUANTITY OF DEVICES SHOWN ARE DIAGRAMMATIC ONLY, SEE FLOOR PLANS FOR EXACT QUANTITIES AND LOCATIONS OF ALL DEVICES. 2. SEE SPECIFICATION FOR STANDARDS, SYSTEM OPERATION, MATERIALS AND TESTING REQUIREMENTS.



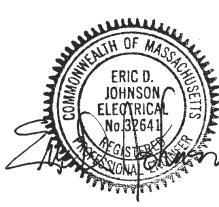
MOUNTING HEIGHT DETAIL

NOTES:

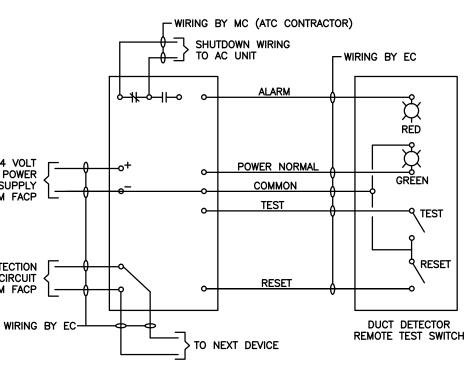
1. THIS DETAIL INDICATES CENTERLINE FOR FIRE ALARM PULL STATION, SWITCHES AND RECEPTACLES. HOWEVER THIS SAME CENTERLINE PRINCIPLE SHALL BE FOR ALL GROUP MOUNTED ELECTRICAL DEVICES. IF FIRE ALARM IS ON SAME SIDE OF DOOR AS SWITCHES, PULL STATION SHALL BE HORIZONTALLY SEPARATED BY A MINIMUM OF 18". THIS DETAIL IS A GENERAL ARRANGEMENT OF DEVICES, ARCHITECT PLANS TAKE PRECEDENCE FOR EXACT LOCATIONS.

24 VOLT POWER SUPPLY FROM FACP

DETECTION CIRCUIT FROM FACP

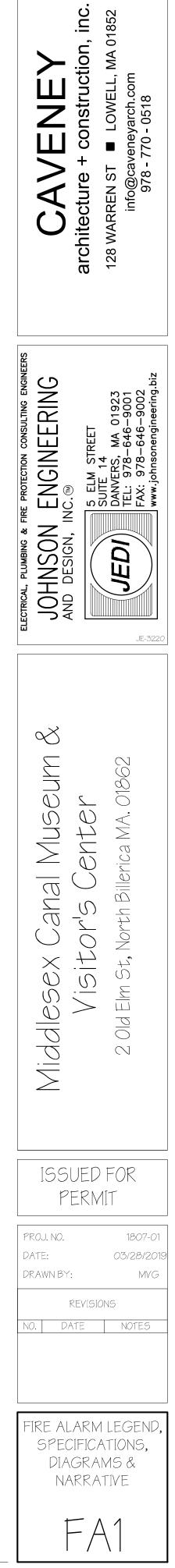


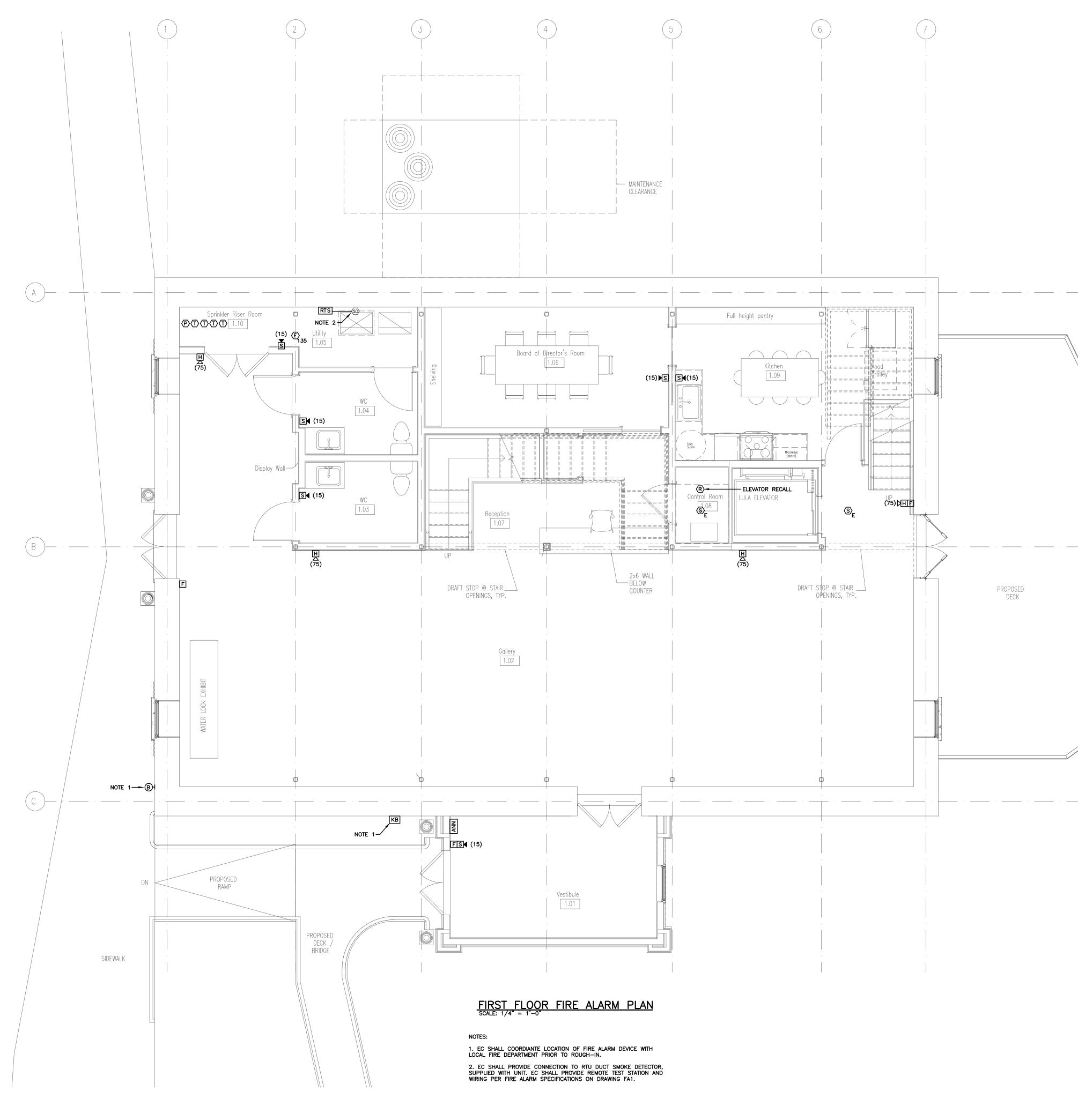




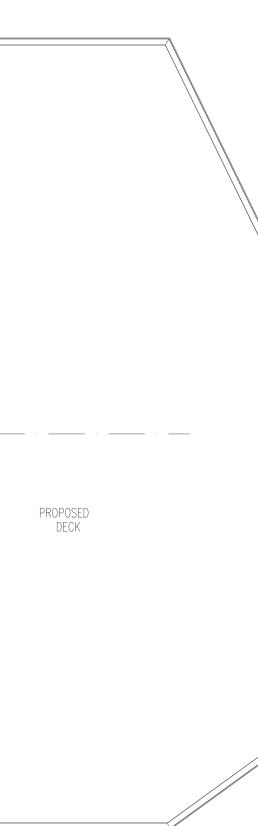
DUCT SMOKE DETECTOR WIRING DIAGRAM

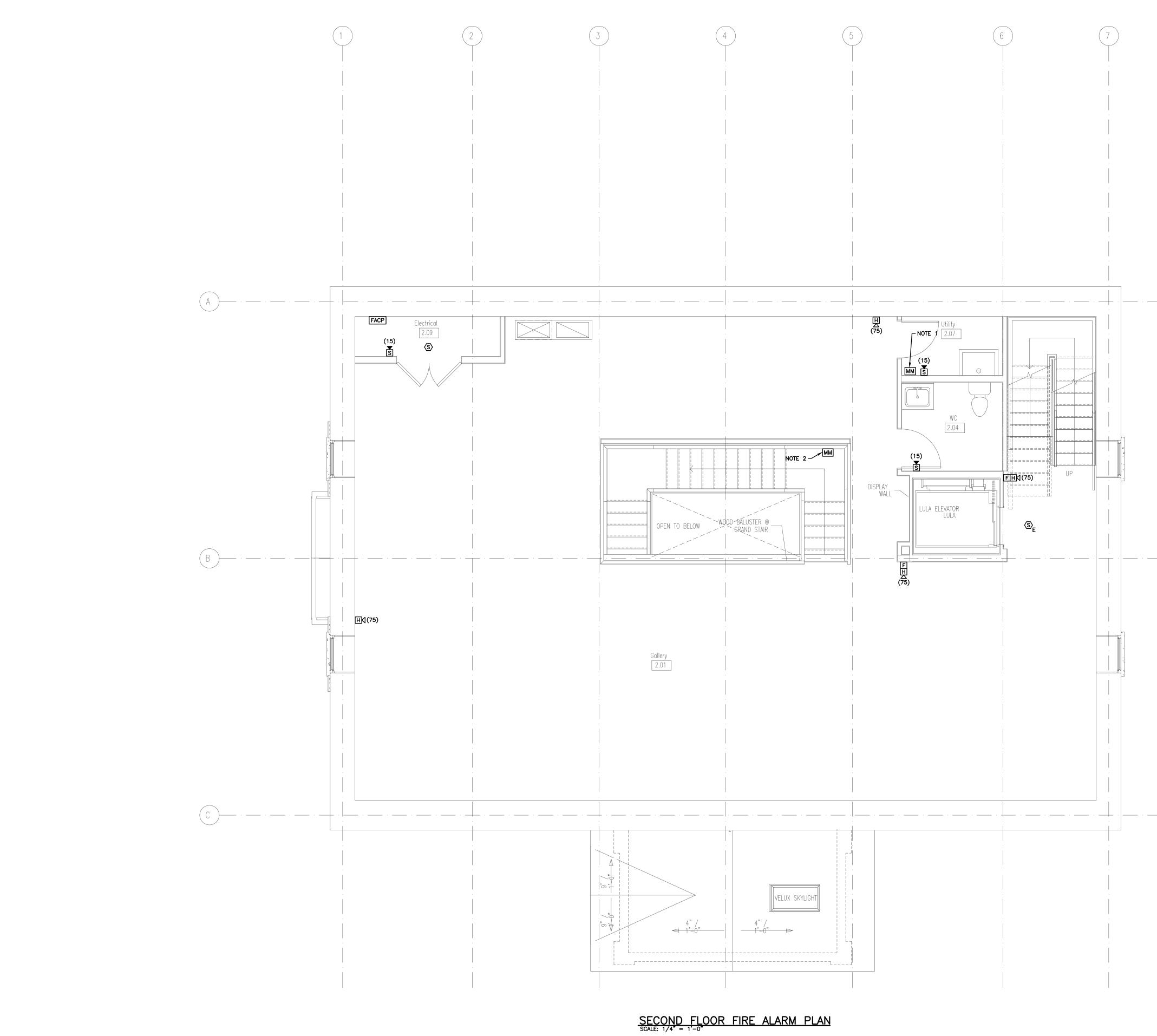
1. EC SHALL PROVIDE REMOTE TEST STATION AND FIRE ALARM INTERCONNECT WIRING. DUCT SMOKE DETECTOR IS SUPPLIED WITH RTU BY THE MANUFACTURER AND WIRED BY EC, SHUT-DOWN WIRING AND MOUNTING WITHIN DUCTWORK BY MC.



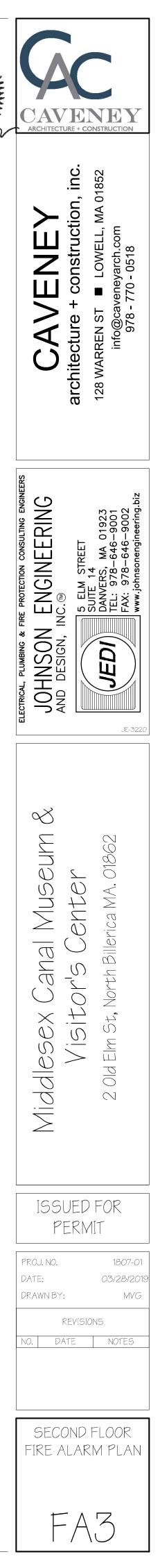


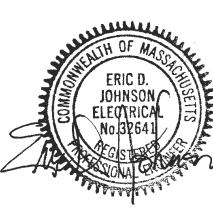




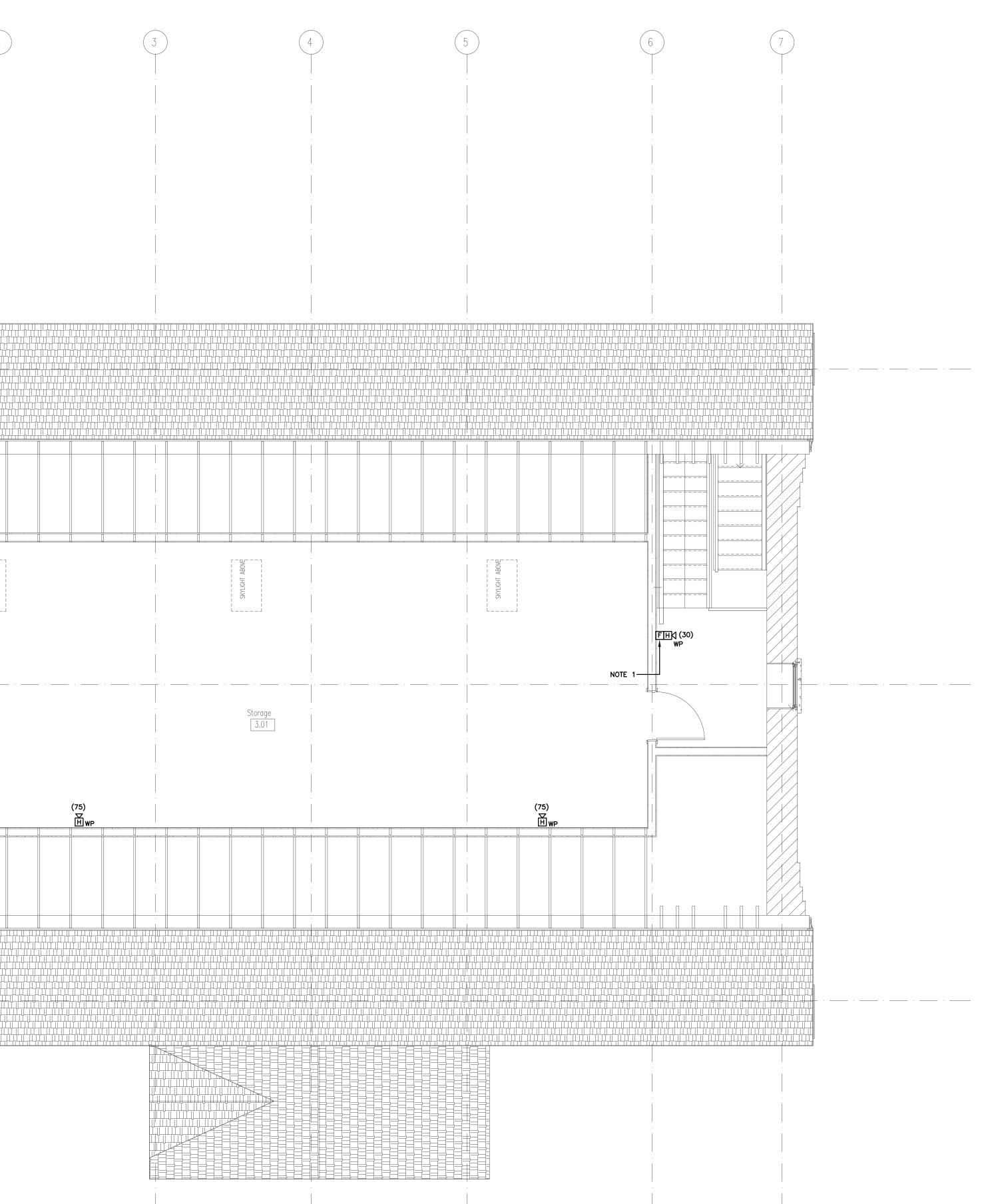


NOTES: 1. EC SHALL PROVIDE MONITOR MODULE FOR WEATHERPROOF PULL STATION IN ATTIC ABOVE. REFER TO DRAWING FA4. 2. EC SHALL PROVIDE MONITOR MODULE INTERCONNECTED TO HVAC CO DETECTOR (PROVIDED BY MC). COORDINATE LOCATIONS AND INTERCONNECTION WITH MC.





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SKYLIGHT ABOVE	
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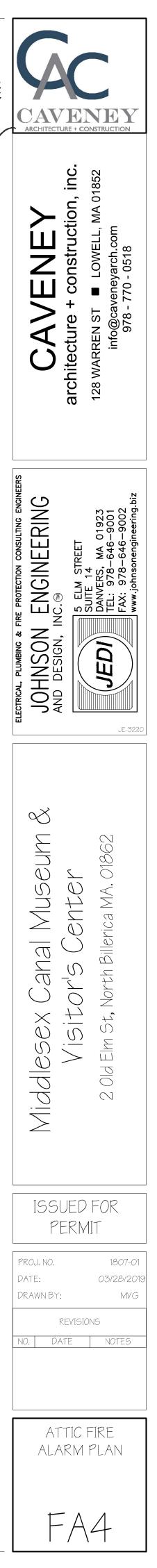


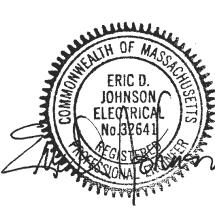
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ATTIC FIRE ALARM PLAN

NOTES:

1. EC SHALL PROVIDE CONNECTION OF WEATHERPROOF PULL STATION TO MONITOR MODULE IN UTILITY ROOM ON THE SECOND FLOOR. REFER TO DRAWING FA3.





LIGHTNING PROTECTION SPECIFICATIONS:

#### PART I. GENERAL

lightning.

1.01 **Objective:** To provide safety for the building and occupants by preventing damage to the Middlesex Canal Museum caused by

**1.02 Standards:** The following specifications and standards of the latest issue form a part of this specification:

(1)Lightning Protection Institute (LPI)

Standard of Practice for the Design, Installation, Inspection of Lightning Protection Systems, LPI 175

(2)Underwriters Laboratories, Inc., Lightning Protection Components, UL 96

(3) Underwriters Laboratories, Inc., Installation Requirements for Lightning Protection Systems, UL 96A

(4)National Fire Protection Association Standard of the Installation of Lightning Protection, NFPA 780

1.03 System Design: The work covered by this section of the specifications consists of furnishing all labor, materials and items of service required for the completion of a functional and unobtrusive lightning protection system approved by the architect, engineer, Lightning Protection Institute (LPI) Certified Master Designer and in strict accordance with this section of the specifications and the applicable

contract drawings.

If any departure from the contract or submittal drawings are deemed necessary by the Contractor, details of such departures and reasons therefore shall be submitted as soon as practical to the architect and engineer for approval.

The lightning protection system shall be designed by an LPI Certified Master Designer and the drawing shall bear the seal. The seal be current at the time of submission and shall be signed by the Master Designer. This shall be accepted in lieu of a state certified engineers stamp on the lightning protection drawings.

The lightning protection installation company shall employ LPI Certified Master Installers to do the actual installation and the certification shall be part of the submittal package. The card shall be carried onsite at all times.

1.04 Submittals: Complete design drawings showing the type, size, and locations of all grounding, down conductors, roof conductors, and air terminals shall be submitted to the architect and engineer for approval.

1.05 **Quality Assurance:** The lightning protection system shall conform to the requirements and standards for lightning protection systems of LPI, UL and NFPA. Upon completion, application shall be made to the Lightning Protection Institute Inspection Program for inspection and issuance of the system certification.

#### PART II. PRODUCTS

2.01 **Standard:** The system to be furnished under this specification and shall be the standard product of a manufacturer regularly engaged in the production of lightning protection equipment and shall be the manufacturer's latest approved design. The equipment shall be UL listed and properly UL labeled. All equipment shall be new, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and UL and NFPA requirements.

Acceptable Manufacturers: Northeast Lightning Protection, Bloomfield, CT

East Coast Lightning Protection Equipment, Winsted, CT

ACME Lightning Rod Co., Hartford, CT

- 2.02 Equipment: Provide and install a complete lightning protection system in compliance with the specifications and standards of the most current editions of the National Fire Protection Association's Lightning Protection Standard NFPA-780, and Underwriters Laboratories Lightning Protection Standard UL96A and LPI 175. The system shall be installed by a lightning protection contractor who is listed by Underwriters Laboratories, Inc. and a member of LPI.
- 2.03 **Materials:** All lightning protection materials and components shall comply in weight, size and composition with UL 96 and NFPA-780 lightning protection material requirements for this type of structure. All materials shall not be used in combinations that form electrolytic corrosion. Metals acceptable for use with copper: nickel, brass, tin, lead, stainless steel, Monel. Metals acceptable for use with aluminum: magnesium, zinc, galvanized steel, stainless steel, lead, wrought iron, galvalume. Once a material is determined these sentences shall be removed prior to bid set inclusion. Class I materials shall be used.

#### PART III. EXECUTION

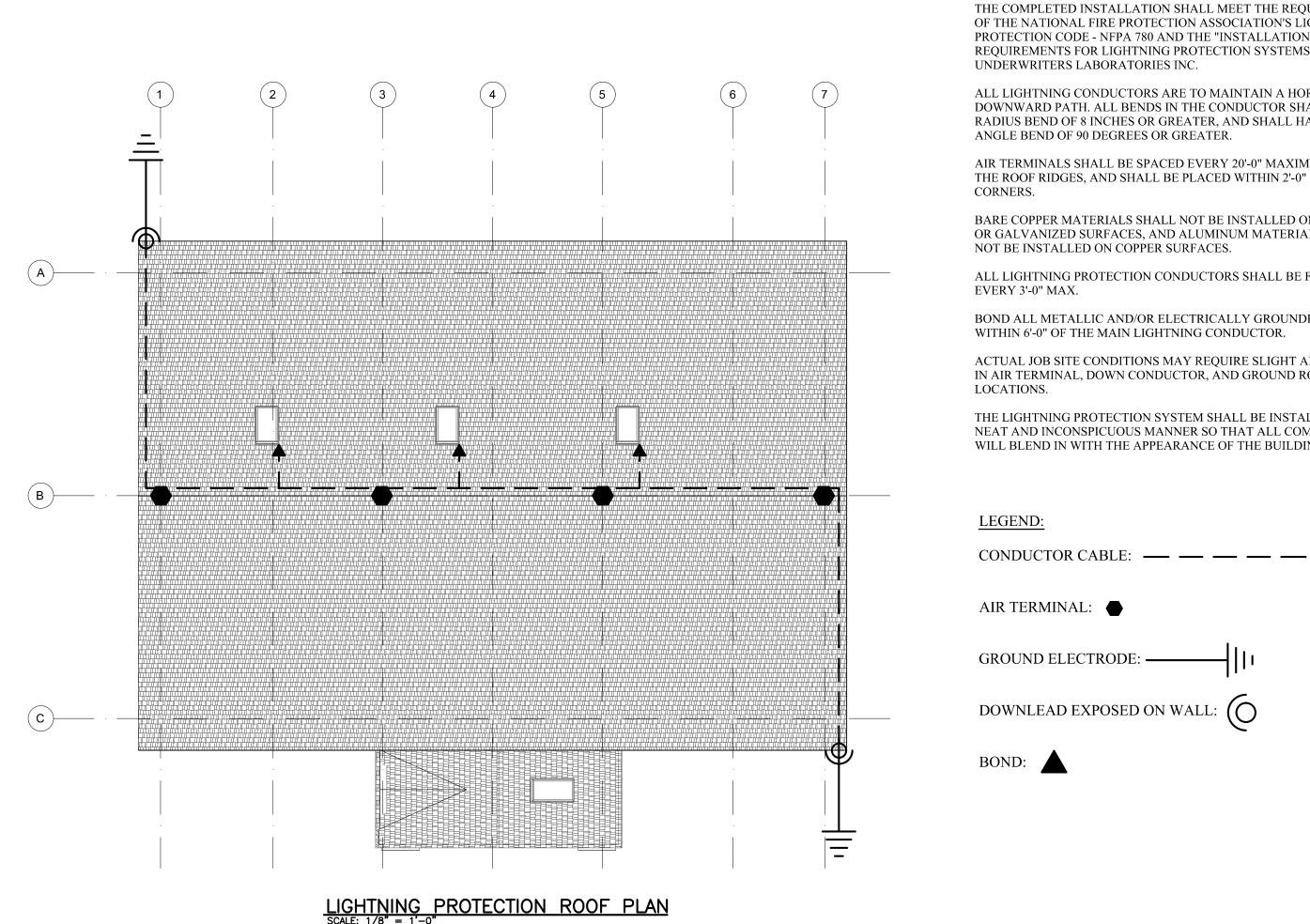
- 3.01 **Installation:** The installation shall be accomplished by an experienced installation company that is listed with Underwriters Laboratories for lightning protection installation. The installation company shall utilize Lightning Protection Institute Certified Master Installers. The company shall be members in good standing of the National Fire Protection Association, The Lightning Protection Institute, and Underwriters Laboratories. All equipment shall be installed in a neat, workmanlike manner. The system shall consist of a complete conductor network at the roof and include air terminals, connectors, splices, bonds, down leads and proper ground terminals, all of which shall be installed by a qualified lightning protection contractor.
- 3.02 **Coordination:** The lightning protection installer will work with other trades to ensure a correct, neat and unobtrusive installation. The roofing contractor will be responsible for sealing and flashing all lightning protection roof penetrations as per the roof manufacturer's recommendations.

Note: Lightning Protection penetrations and/or attachment procedures should be addressed in the roofing section of the specifications. It shall be the responsibility of the lightning protection installer to assure a sound bond to the main water service and to assure interconnection with other ground systems. This note to be removed prior to bid set inclusion.

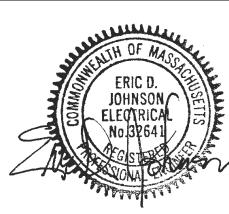
3.03 Inspection and Certification: This system shall receive the LPI-IP certification to the UL96A inspection criteria. The owner or their representative shall be required to sign off on various phases of concealed installation of the LPS. The contractor shall keep a pictorial record (dated photographs) of each concealed part of the installation. The contractor shall submit record drawings to LPI-IP engineering staff prior to the onsite inspection for review and stamping. This and all photographs shall be delivered to the owner with the as built drawings and Certification in the form of the O & M manual.

3.04 **Related:** Surge protection devices shall be furnished and installed by the electrical contractor at the point of first disconnect of each electrical service, including, but not limited to and generators, solar arrays, and wind generators. Each surge unit must comply with UL96a 13.1 and be visible during the onsite inspection.

Middlesex C And Visit	s List for anal Museum ors Center lerica, MA Lightning Protection Institute Master Designer #1074 UL Manufacturer: # E97802 · UL Installation: # E83972 NECA: # 15867
NEC29 - Cable       29 strands of 17 gauge (1.15mm) basket weave copper cable.         192 pounds per thousand feet       (286 grams/meter).         59,450       circular mils (30mm²) of conductivity.         Exceeds Class I requirements.       UL Listed.         NEAT15CB - Class I - COPPER 3x15" (9.5mmX381mm)	NEBF9B - Bonding Clamp Cast bronze, 4-square-inch bonding clamp with bolt pressure cable holder. Approximately 9 oz. (255 grams).
NEAT SCB - Class T - COPPER § XTS (9.5mmX381mm) §" (9.5mm) diameter, threaded base, UL listed.	NEPC*UB-U-Bolt Clamp Cast bronze pipe clamp. Fits up to 6.75" (171.45mm) O.D. pipe. Stainless steel U-bolt, nuts and washers. From 9oz. (255 grams) to 2 lbs. 5.4 oz. (1060 grams).
A cast bronze malleable base which easily forms to ridges and other contoured surfaces. Has a 1-way bolt pressure cable holder. 5/16-18 stainless steel bolt and washer. 8" x 2" (20.3cm x 5.1cm); approximately 12 oz. (340 grams).	<ul> <li>NEFL2C - Fastener Loop         <ul> <li>#" hole, Medium stamped copper loop. Use with class I conductors.</li> </ul> </li> </ul>
NEBF3B - Straight splicer 4-bolt hex brass. 3½"X¾" (88.9mmX19mm); approximately 6 oz. (170 grams).	NEFL4C - Stamped Adhesive Crimp Copper Loop. For use on built-up, single membrane or other flat roof surfaces where mechanical penetrations must be avoided. Use with adhesives compatible to roof surface. $2\frac{1}{4}$ "X $3\frac{1}{2}$ " (57mmX89mm); approximately 1.4 oz (40 grams).
Cast bronze secondary bonding plate. 18 "X2½" (47.63mmX63.5mm); approximately 7.1 oz. (201 grams).	NEGC5/8 - Ground Rod Clamp Cast bronze, cable to 5/8" (1.59cm) ground rod, clamp.
NEBF100B - Round-Round Patent Pending Cast bronze bolt pressure cable to cable or cable to rod clamp. Specifically designed for cable splices on single membrane roofs. 1%"X12" (39.7mmX44.45mm); approximately 7.6 oz. (215 grams).	Approximately 9.3 oz. (264 grams). NEGR3 – Copper clad steel rod 5/8"X10' (1.59cmX3.05m)

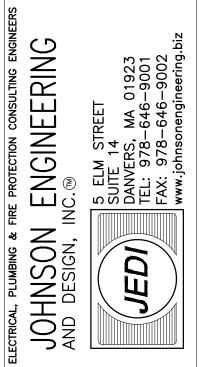


NOTES: UNDERWRITERS LABORATORIES INC.



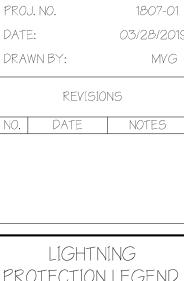


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ROTECTION LEGEN SPECIFICATIONS, DETAILS & ROOF PLAN  $\mathcal{N}$ 

THE COMPLETED INSTALLATION SHALL MEET THE REQUIREMENTS OF THE NATIONAL FIRE PROTECTION ASSOCIATION'S LIGHTNING PROTECTION CODE - NFPA 780 AND THE "INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS, UL96A" OF

ALL LIGHTNING CONDUCTORS ARE TO MAINTAIN A HORIZONTAL OR DOWNWARD PATH. ALL BENDS IN THE CONDUCTOR SHALL HAVE A RADIUS BEND OF 8 INCHES OR GREATER, AND SHALL HAVE AN

AIR TERMINALS SHALL BE SPACED EVERY 20'-0" MAXIMUM ALONG THE ROOF RIDGES, AND SHALL BE PLACED WITHIN 2'-0" OF OUTSIDE

BARE COPPER MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM OR GALVANIZED SURFACES, AND ALUMINUM MATERIALS SHALL

ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED

BOND ALL METALLIC AND/OR ELECTRICALLY GROUNDED BODIES WITHIN 6'-0" OF THE MAIN LIGHTNING CONDUCTOR.

ACTUAL JOB SITE CONDITIONS MAY REQUIRE SLIGHT ALTERATIONS IN AIR TERMINAL, DOWN CONDUCTOR, AND GROUND ROD

THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED IN A NEAT AND INCONSPICUOUS MANNER SO THAT ALL COMPONENTS WILL BLEND IN WITH THE APPEARANCE OF THE BUILDING.

