

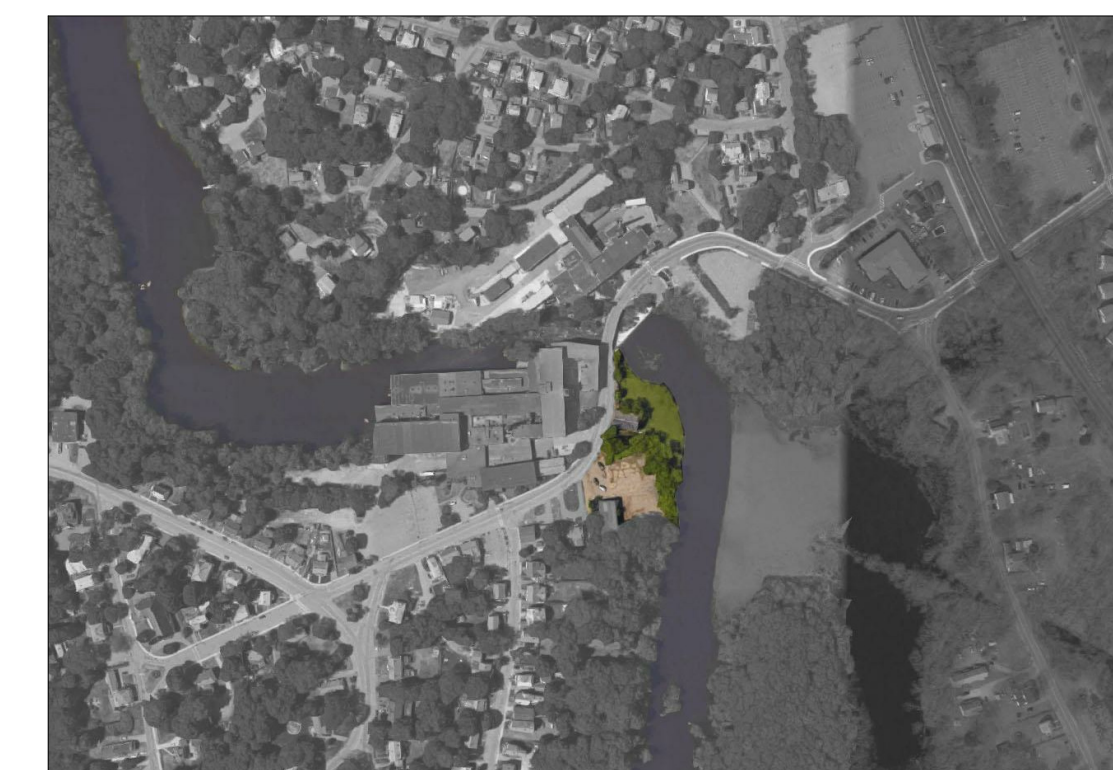
Middlesex Canal Museum & Visitor's Center



CONTACTS

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

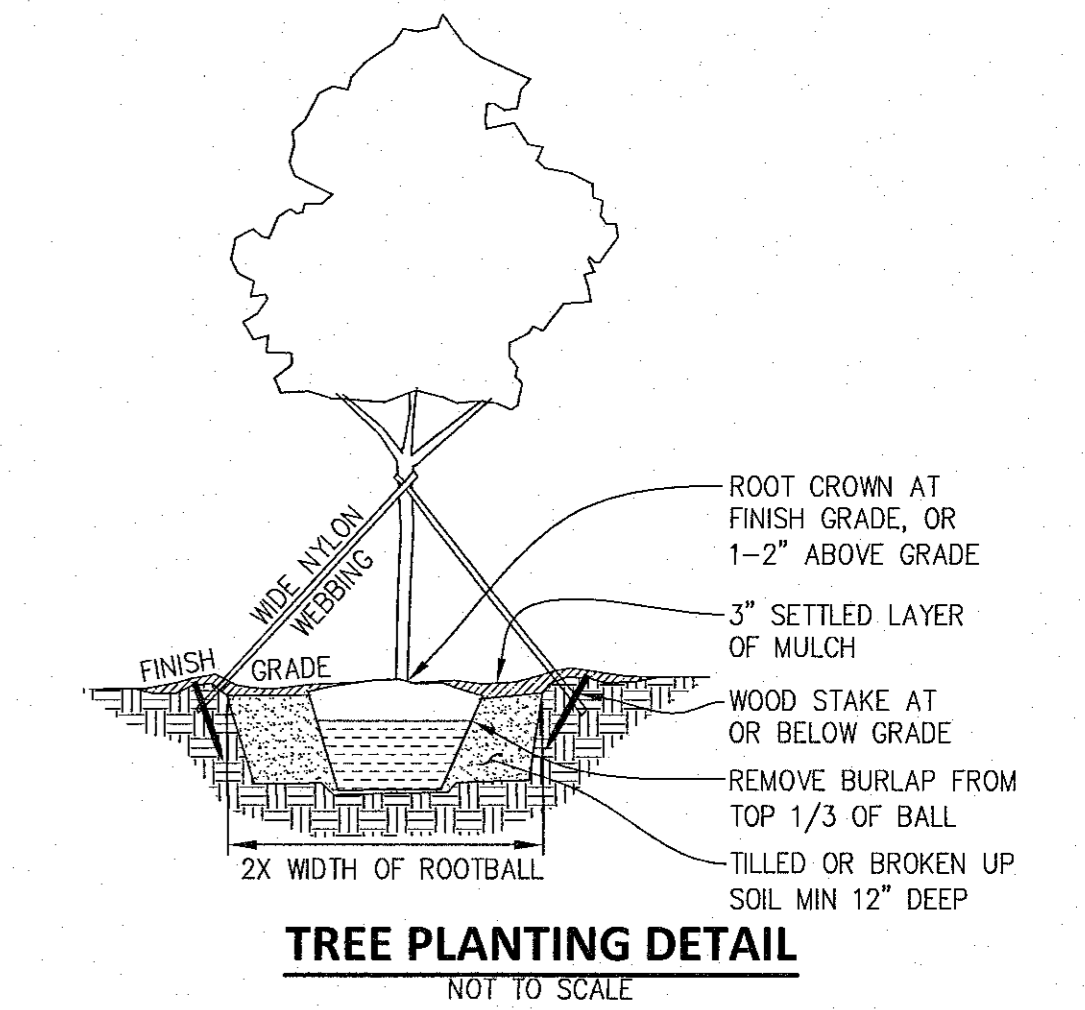
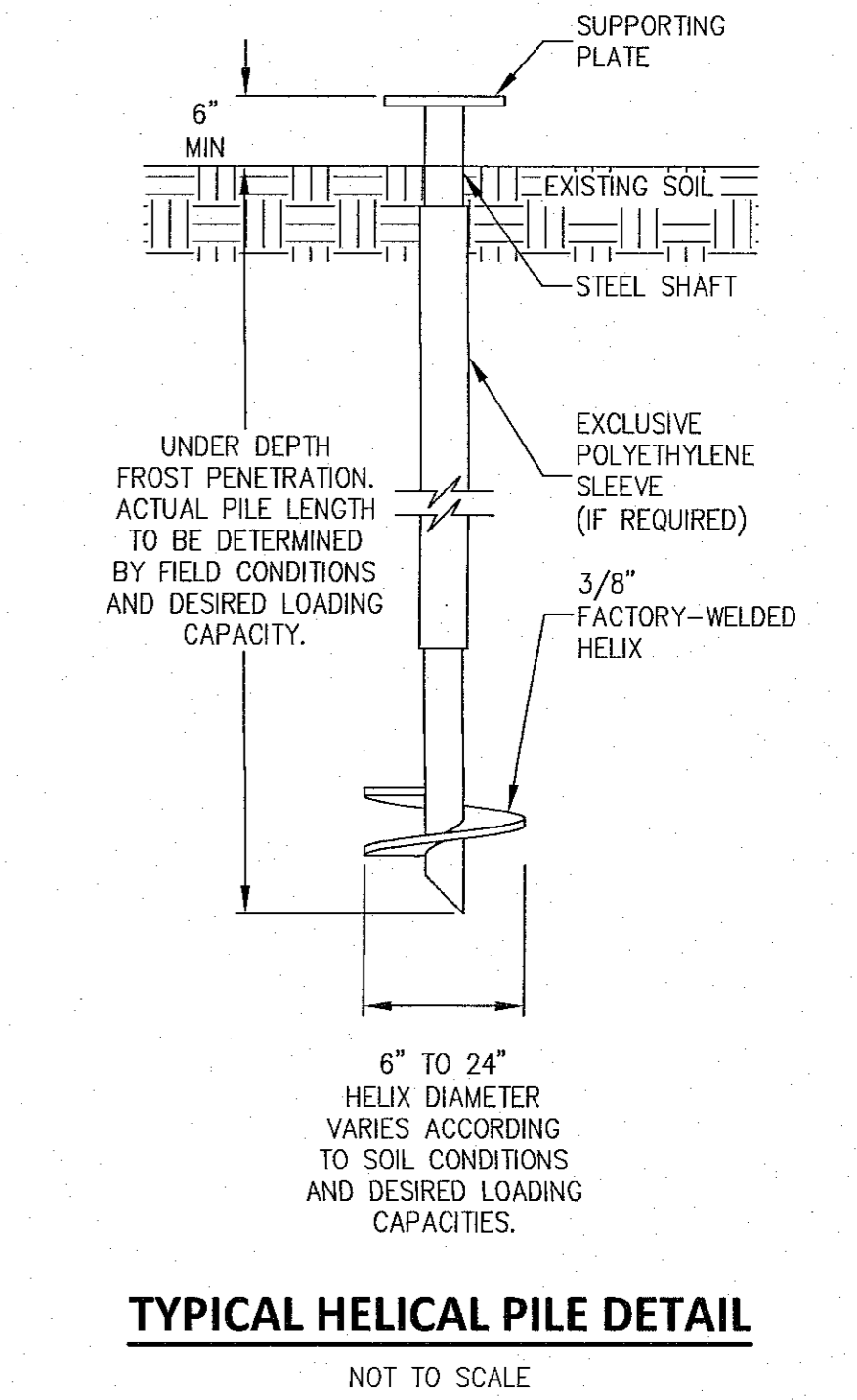
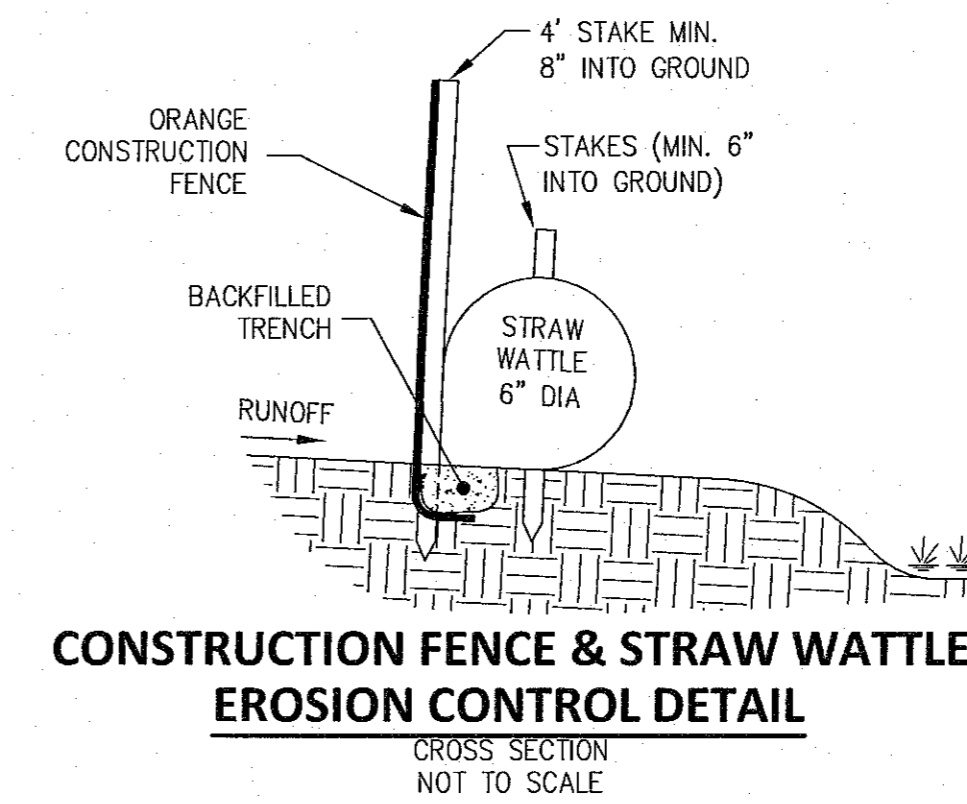
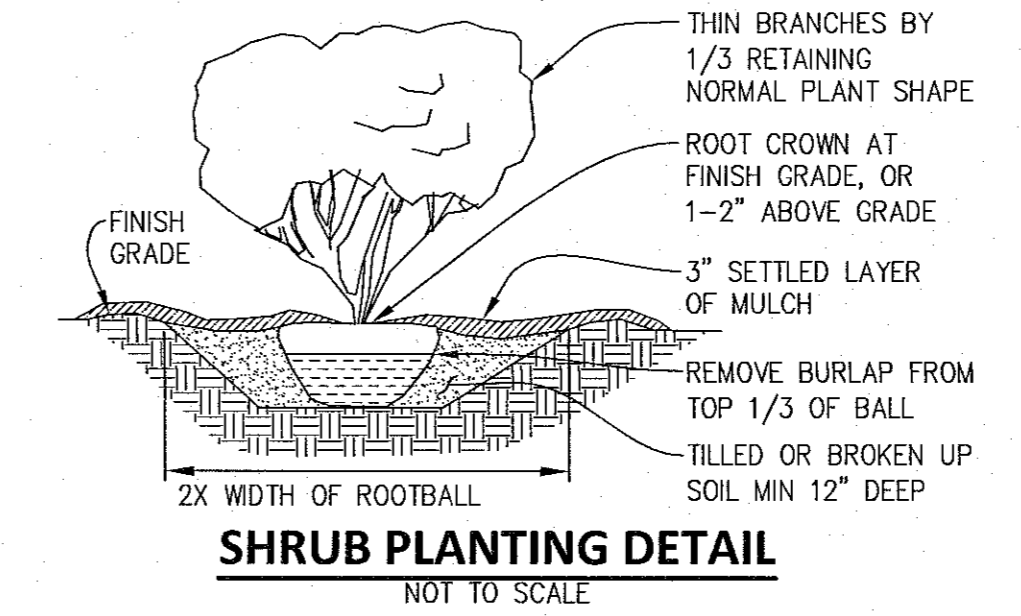
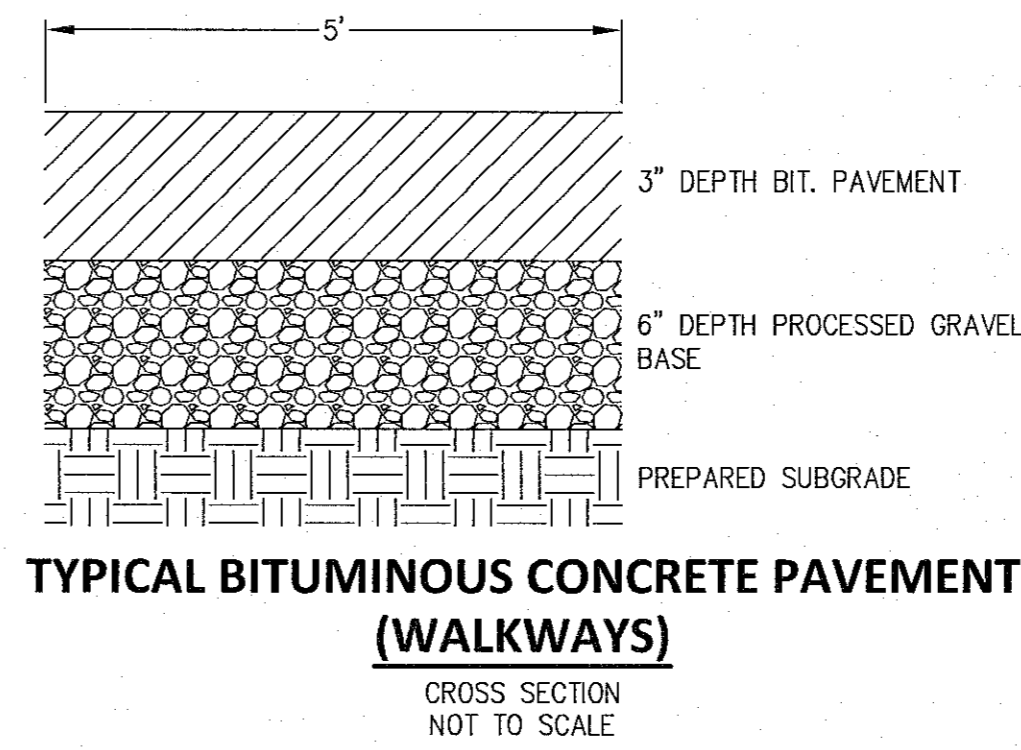
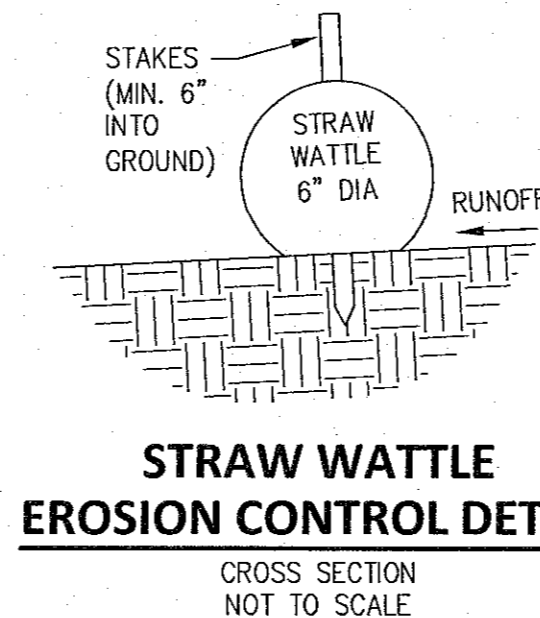
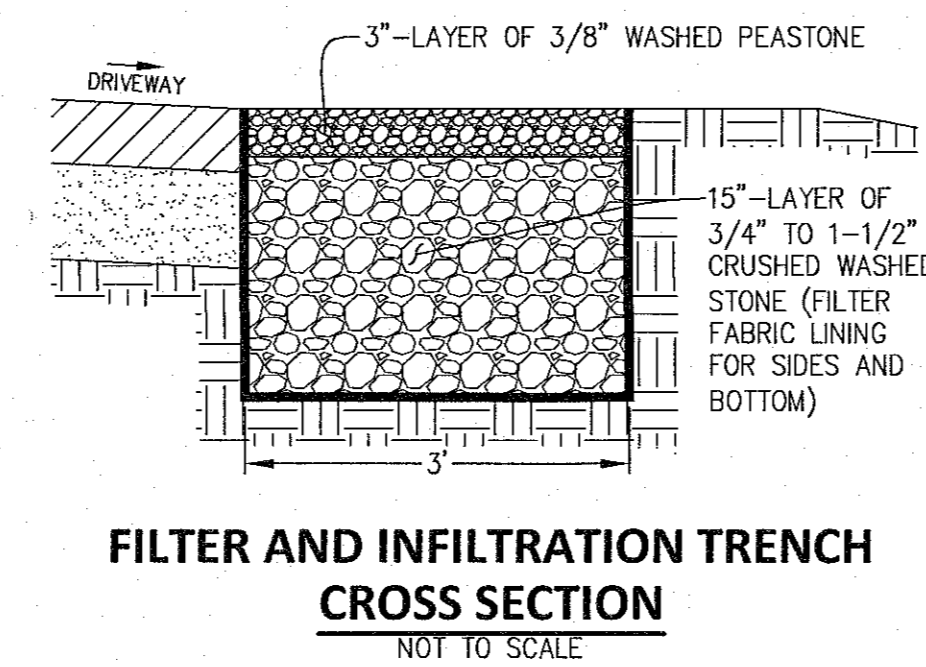
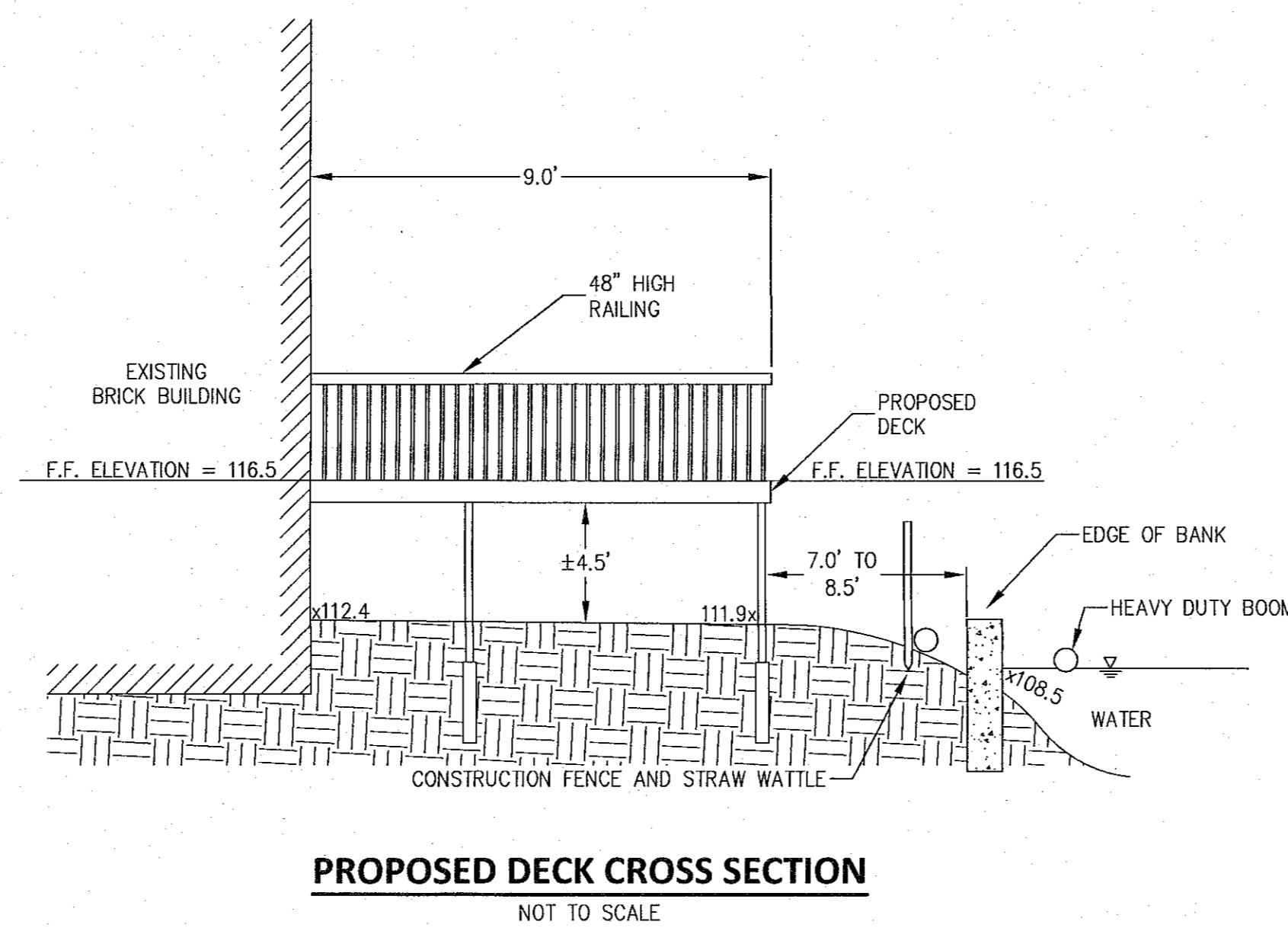
2 Old Elm St, North Billerica MA.



architects practicing the art of building

GENERAL NOTES

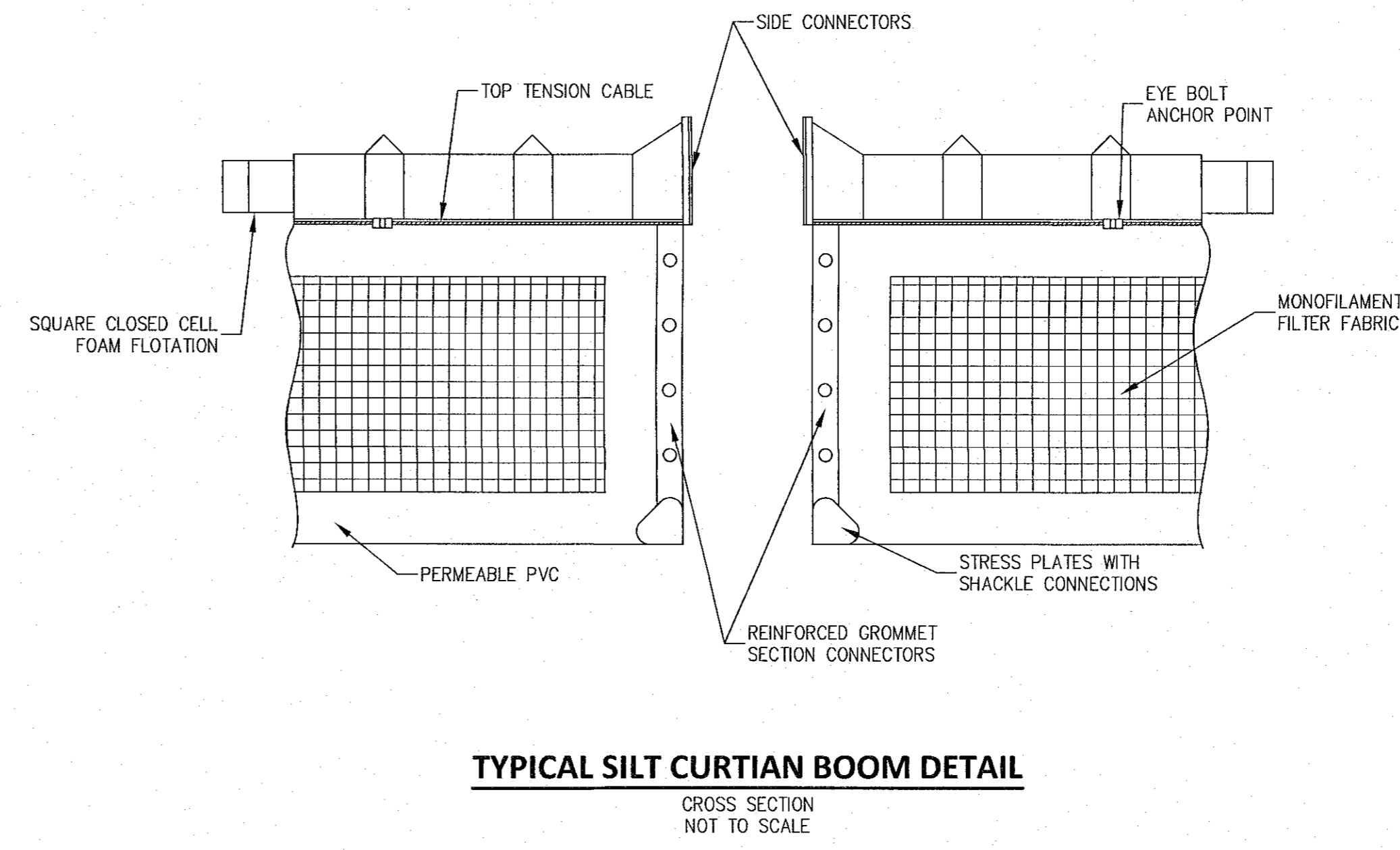
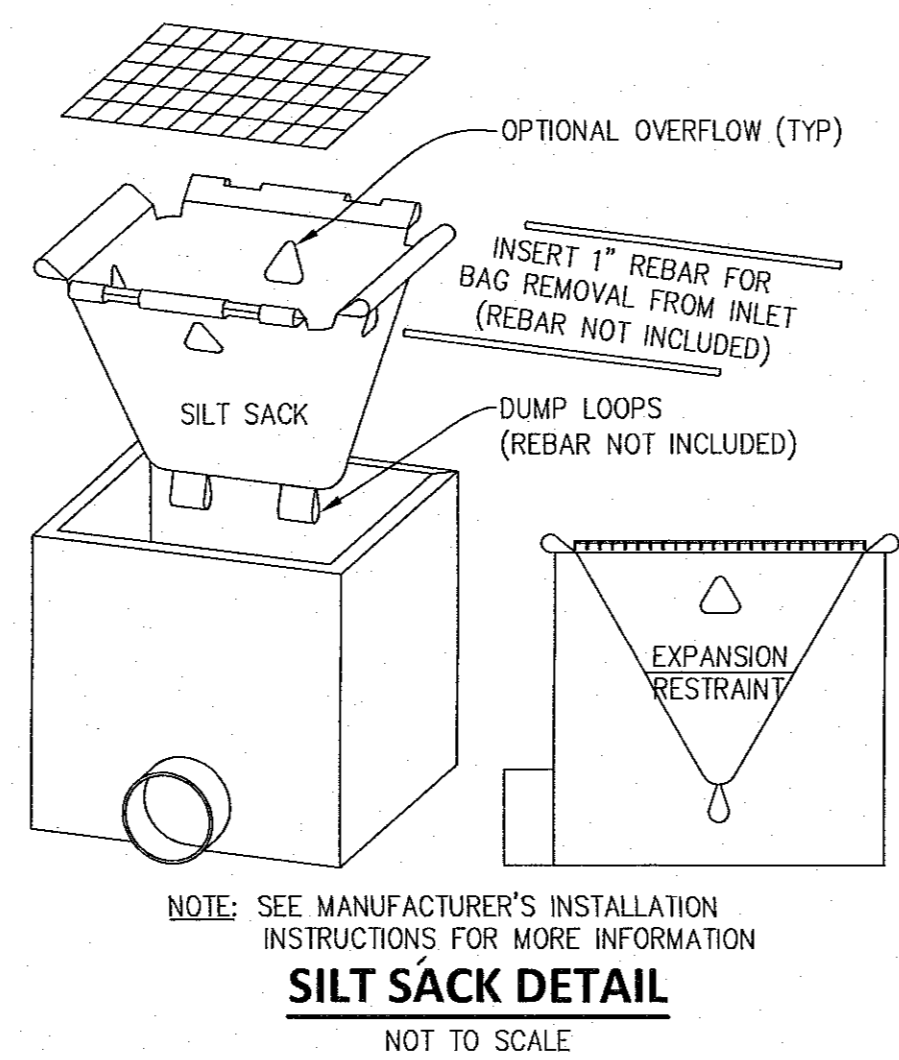
- EXISTING CONDITIONS SHOWN FROM INSTRUMENT SURVEYS IN OCTOBER OF 2017. ELEVATIONS AND TOPOGRAPHY SHOWN HEREON REFER TO NAVD88, TRANSFERRED FROM BENCHMARK "RMB" SHOWN ON FEMA HISTORIC COMMUNITY PANEL 250183 0003, CHISELED SQUARE ON THE NORTHEAST SIDE OF THE TOP OF A GRANITE BLOCK, AT THE SOUTHWEST END OF THE TALBOT MILL DAM NEAR FAULKNER STREET, ON THE SOUTHWEST SIDE OF THE SPILLWAY, AT GROUND LEVEL. THE PUBLISHED NGVD29 DATUM ELEVATION FOR "RMB" IS 114.26. THE NAVD88 ELEVATION FOR "RMB" IS 113.43. FOR THIS LOCATION, NAVD88=NGVD29-0.83'.
- 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.
- 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.
- UTILITIES OTHER THAN THOSE SHOWN MAY EXIST. CALL DIG-SAFE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION OR CONSTRUCTION.
- WETLAND FLAGS SHOWN BY OXBOW ASSOCIATES AND FIELD LOCATED SEPTEMBER 20, 2017.
- 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 PLANTS' 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.
- 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 THUNBERGII), AND PURPLE LOOSESTRIPE (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.
- 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.
- 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.
- 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.
- GREEN ENGINEERING FLOOD PLAIN APPROXIMATELY EQUIVALENT TO FEMA 100-YEAR FLOOD PLAIN PER DISCUSSION WITH BILLERICA BOARD OF HEALTH.
- SPACING BETWEEN PLANKS OF THE DECK TO BE 1/4 INCH WIDE FOR LIGHT PENETRATION AND DRAINAGE.
- 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.
- TREE REMOVAL WILL CONSIST OF CUTTING TO STUMP AT GRADE. ASSOCIATED ROOT SYSTEM TO REMAIN.
- SEE ACCOMPANYING PLANTING PLAN SKETCH FROM OXBOW ASSOCIATES FOR ADDITIONAL DETAIL ON PARCEL A PLANTINGS AS WELL AS PARCEL B (RESTORATION AREA) PLANTINGS.
- CONTRACTOR TO REMOVE SEDIMENTATION AND FLUSH LINE FROM EXISTING CATCH BASIN AND DRAINAGE PIPES.
- 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:	4,013 ±SF	21,625 ±SF
EXISTING IMPERVIOUS AREA:	2,105 ±SF	730 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	726 ±SF	-371 ±SF *
PROPOSED IMPERVIOUS AREA:	2,831 ±SF	359 ±SF
25'-50' BUFFER ZONE AREA:	707 ±SF	13,914 ±SF
EXISTING IMPERVIOUS AREA:	655 ±SF	5,456 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	0 ±SF	34 ±SF
PROPOSED IMPERVIOUS AREA:	655 ±SF	5,490 ±SF
50'-100' BUFFER ZONE AREA:	N/A	25,710 ±SF
EXISTING IMPERVIOUS AREA:	N/A	12,346 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	N/A	0 ±SF
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:	726 ±SF	-337 ±SF
PROPOSED IMPERVIOUS AREA:	3,486 ±SF	14,304 ±SF
100'-200' RIVERFRONT AREA:	N/A	22,860 ±SF
EXISTING IMPERVIOUS AREA:	N/A	13,607 ±SF
PROPOSED CHANGE IN IMPERVIOUS AREA:	N/A	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.



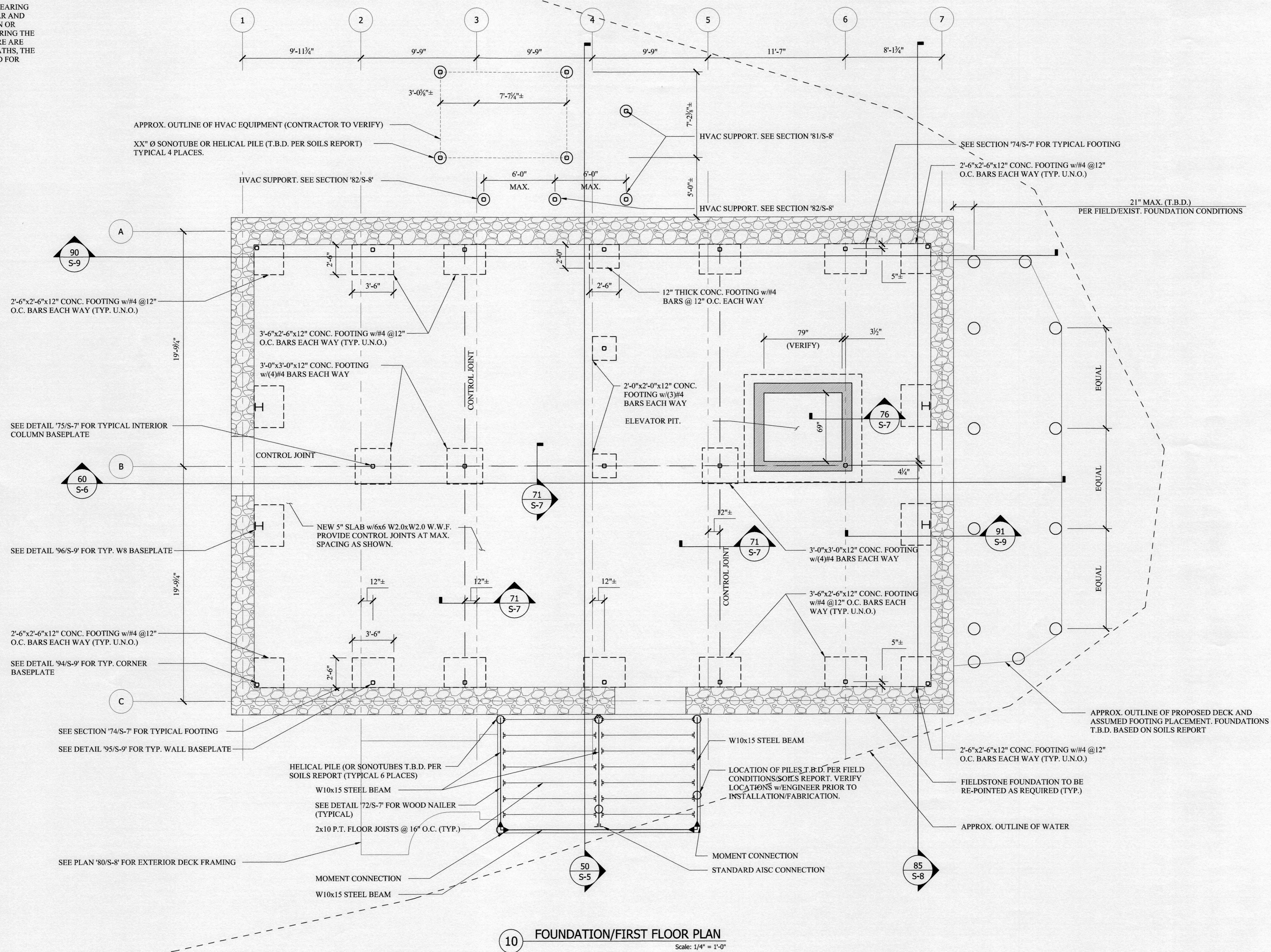
DETAIL SHEET

**2 OLD ELM STREET
BILLERICA, MASSACHUSETTS**

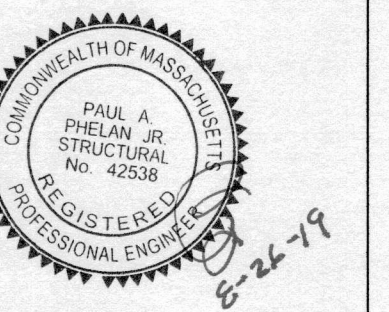
PLAN PREPARED FOR: MIDDLESEX CANAL ASSOCIATION 71 FAULKNER STREET BILLERICA, MA 01821	PLAN PREPARED BY: CIVIL ENGINEERING • SURVEYING 10 GEORGE STREET, UNIT 208 LOWELL, MASSACHUSETTS 01852 978-201-9390 - LANDPLEX.COM	
SHEET: 2 OF 2	SEE SCALE	SEPTEMBER 11, 2018

4.	PER TECHNICAL REVIEW	5/15/19
3.	PER TECHNICAL REVIEW MEETING	4/12/19
2.	PER CONSERVATION COMMENTS	2/20/19
1.	PER CONSERVATION COMMENTS	11/12/18
NO.	REVISION DESCRIPTION	DATE

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.

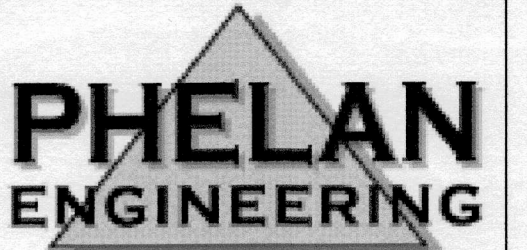


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DESIGN & PLANNING

NO.	DATE	DESCRIPTION
1	6/24/19	DECK LAYOUT
2	8/23/19	COLUMN LOCATIONS



STRUCTURAL & CIVIL CONSULTANTS
76 CARLISLE ROAD
WESTFORD, MA
TEL. (978) 256-4014

PROJECT

MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER

2 OLD ELM STREET
NORTH BILLERICA, MA

SCALE: AS NOTED

DATE: 4/02/2019
DRAWING TITLE

FOUNDATION PLAN

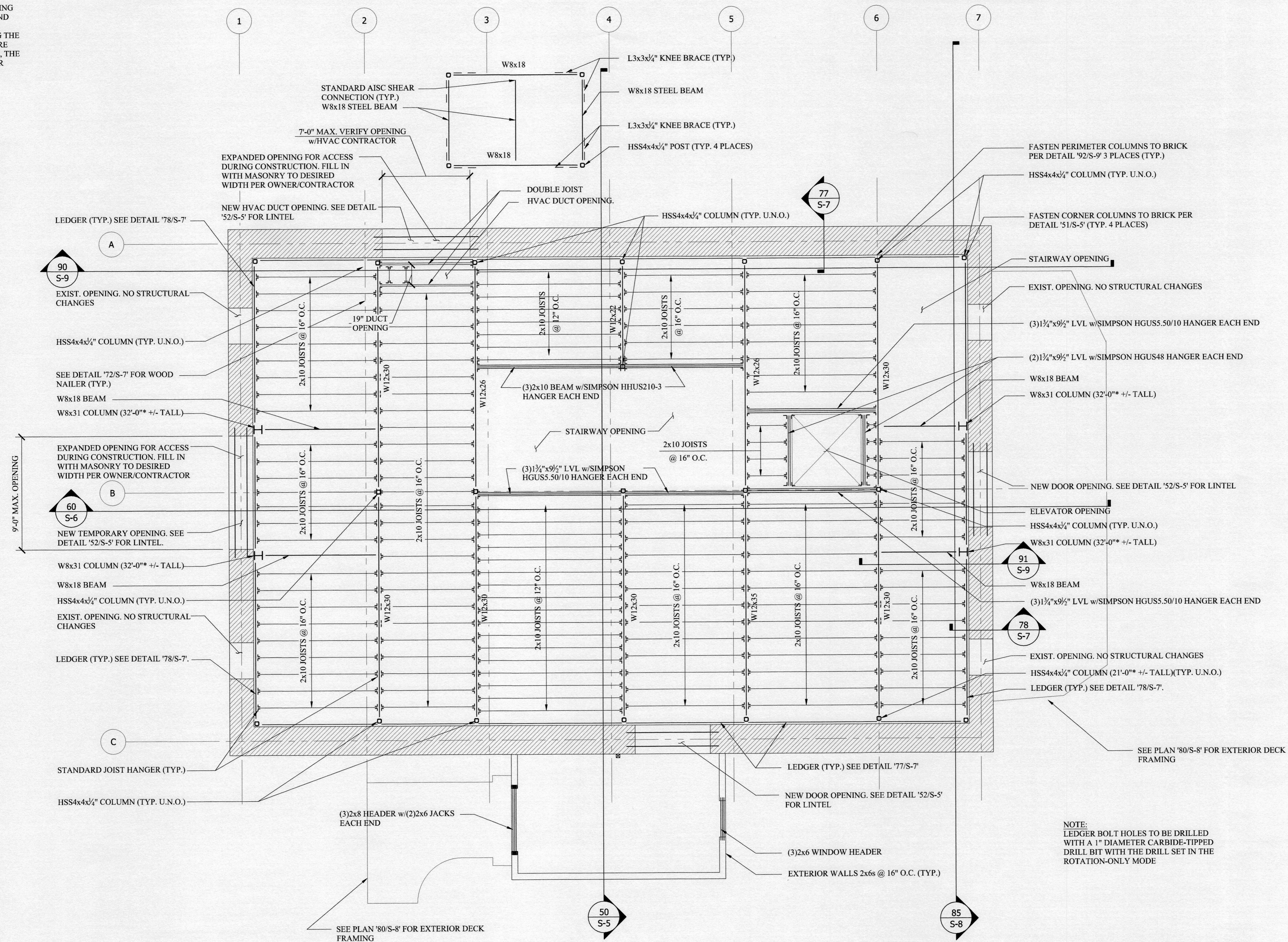
CONSTRUCTION DRAWINGS

DRAWING NUMBER

17196-S-1

NOTES:
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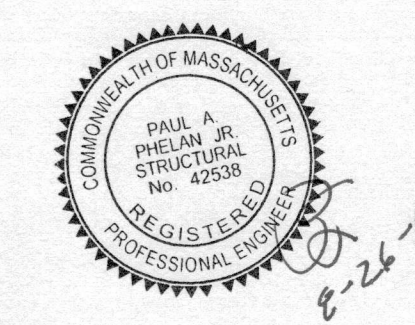


20 SECOND FLOOR FRAMING
Scale: 1/4" = 1'-0"

* CONTRACTOR TO VERIFY COLUMN HEIGHT

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DESIGN & PLANNING

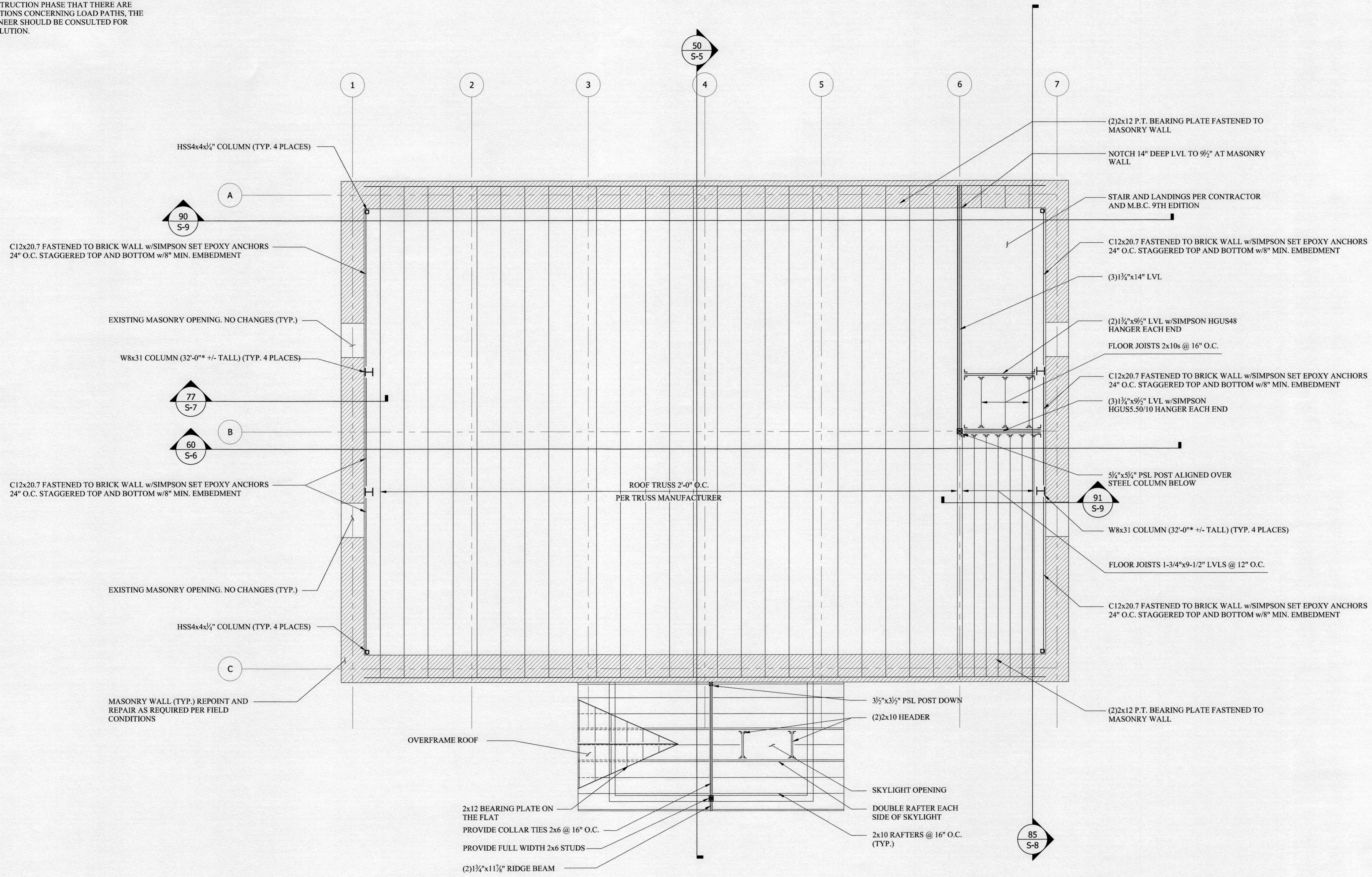
REVISIONS	
NO.	DESCRIPTION
1	8/23/19 MASONRY BRACING

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PROJECT
MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER
2 OLD ELM STREET
NORTH BILLERICA, MA

SCALE: AS NOTED
DATE: 4/02/2019
DRAWING TITLE
FRAMING PLAN
CONSTRUCTION DRAWINGS
DRAWING NUMBER
17196-S-2

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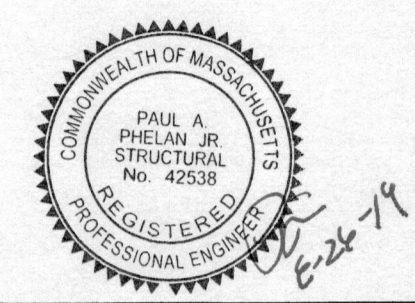


30 ATTIC FRAMING
Scale: 1/4" = 1'-0"

* CONTRACTOR TO VERIFY COLUMN HEIGHT

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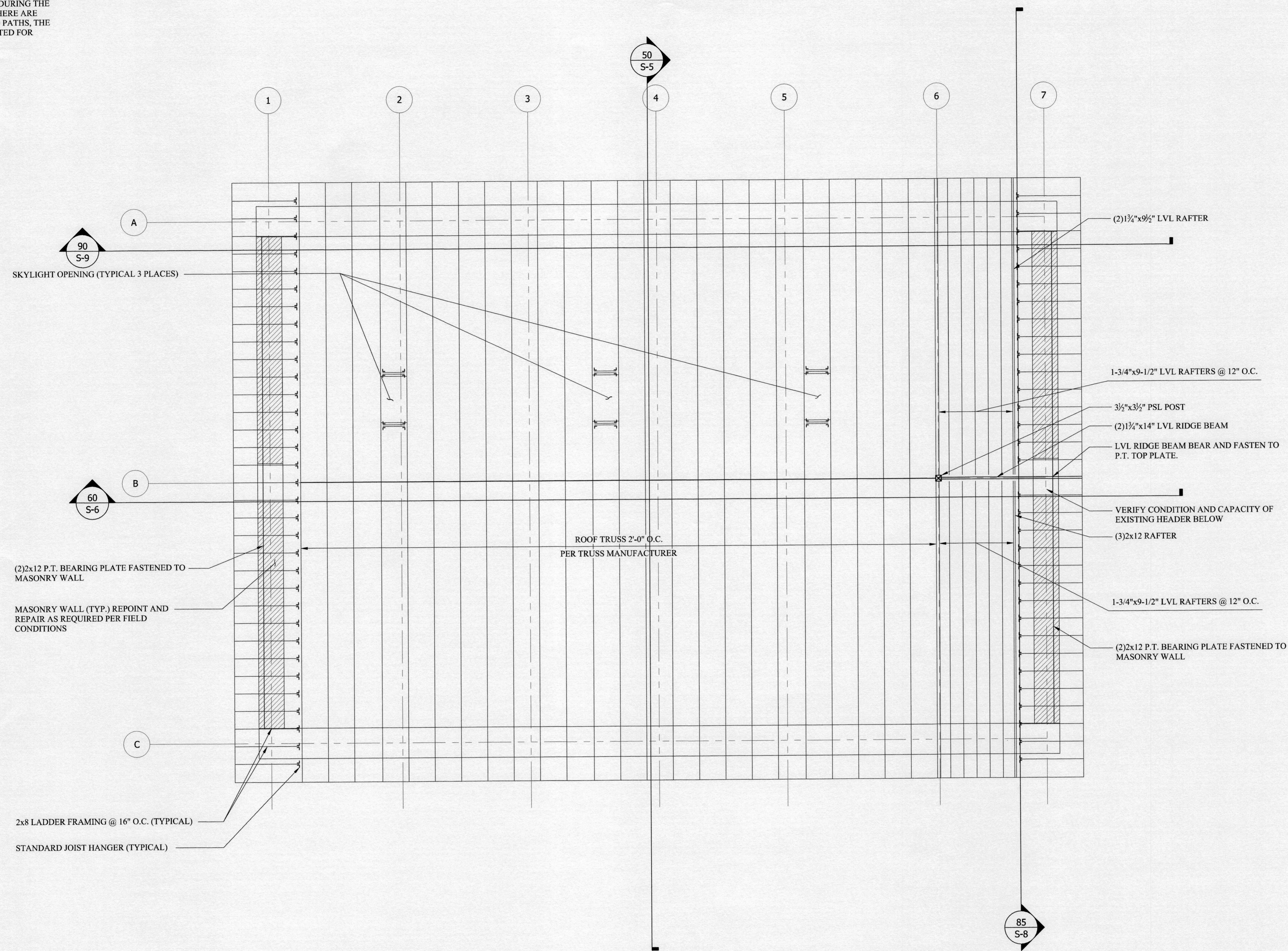
FRAMING PLAN

CONSTRUCTION DRAWINGS

DRAWING NUMBER

17196-S-3

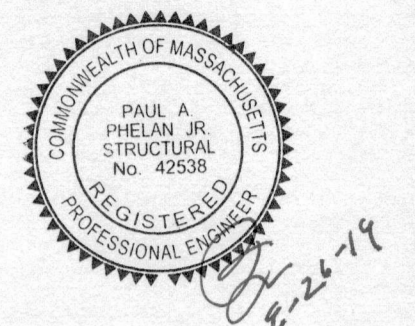
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40 ROOF FRAMING Scale: 1/4" = 1'-0"

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PHELAN ENGINEERING

STRUCTURAL & CIVIL CONSULTANTS
 76 CARLISLE ROAD
 WESTFORD, MA
 TEL. (978) 256-4014

PROJECT
MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER
 2 OLD ELM STREET
 NORTH BILLERICA, MA

SCALE: AS NOTED

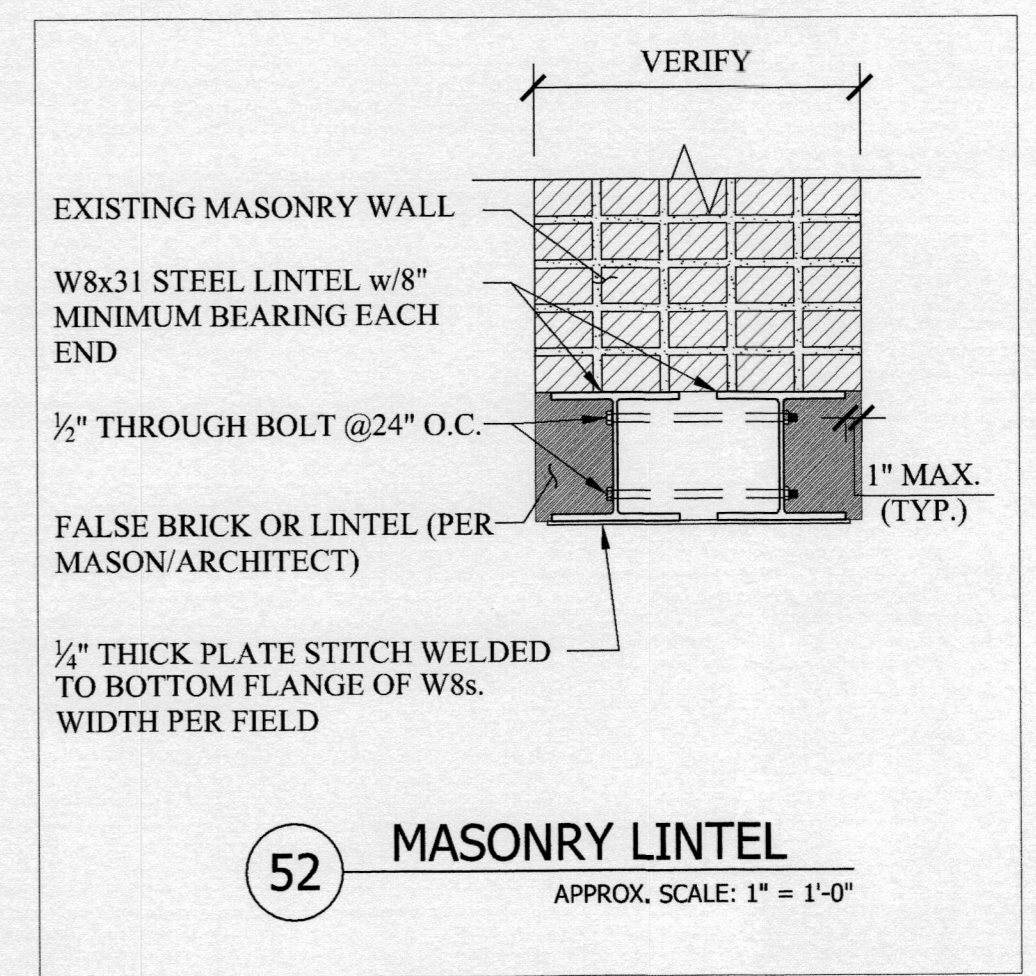
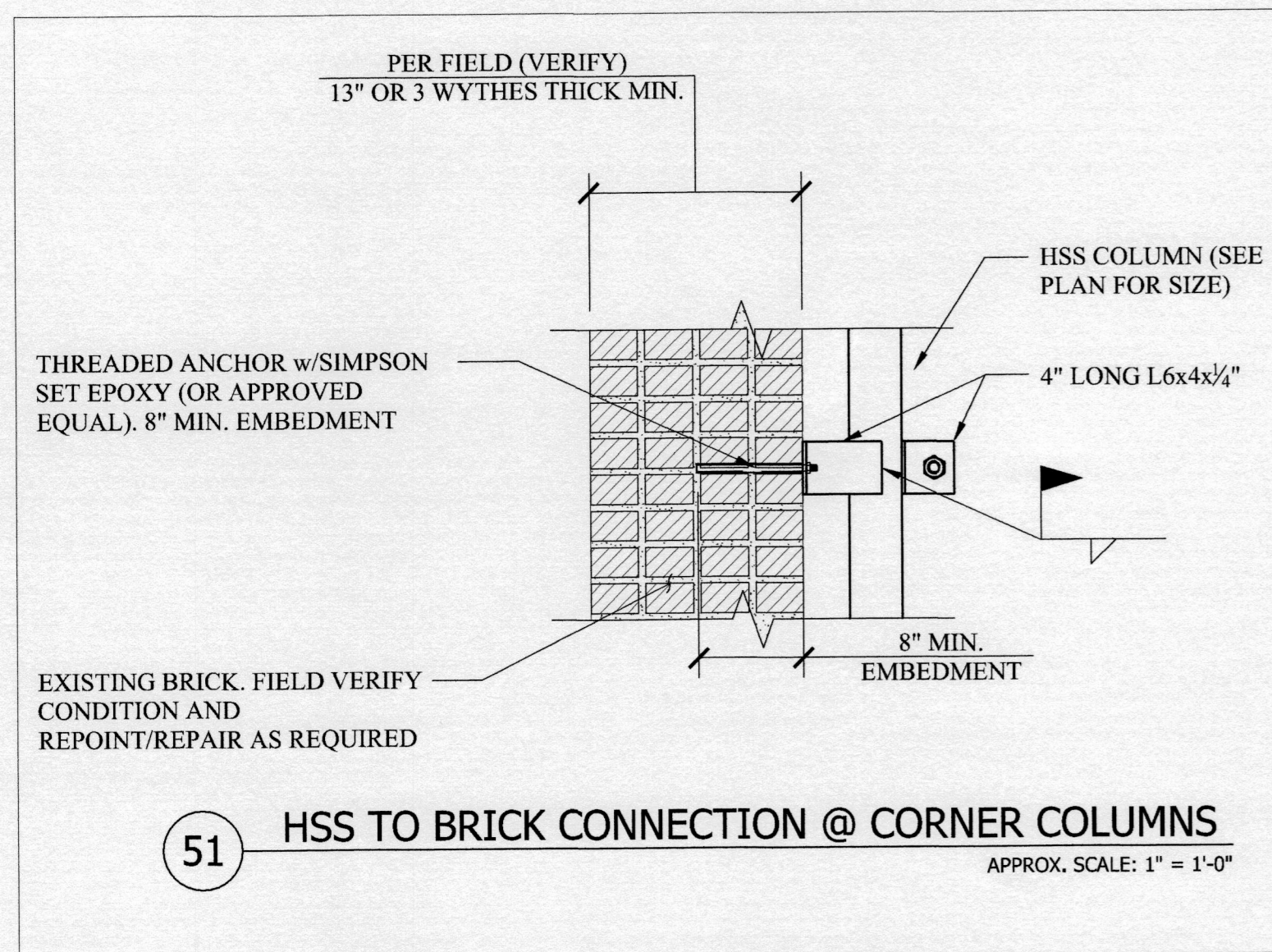
DATE: 4/02/2019
 DRAWING TITLE

FRAMING PLAN

CONSTRUCTION DRAWINGS

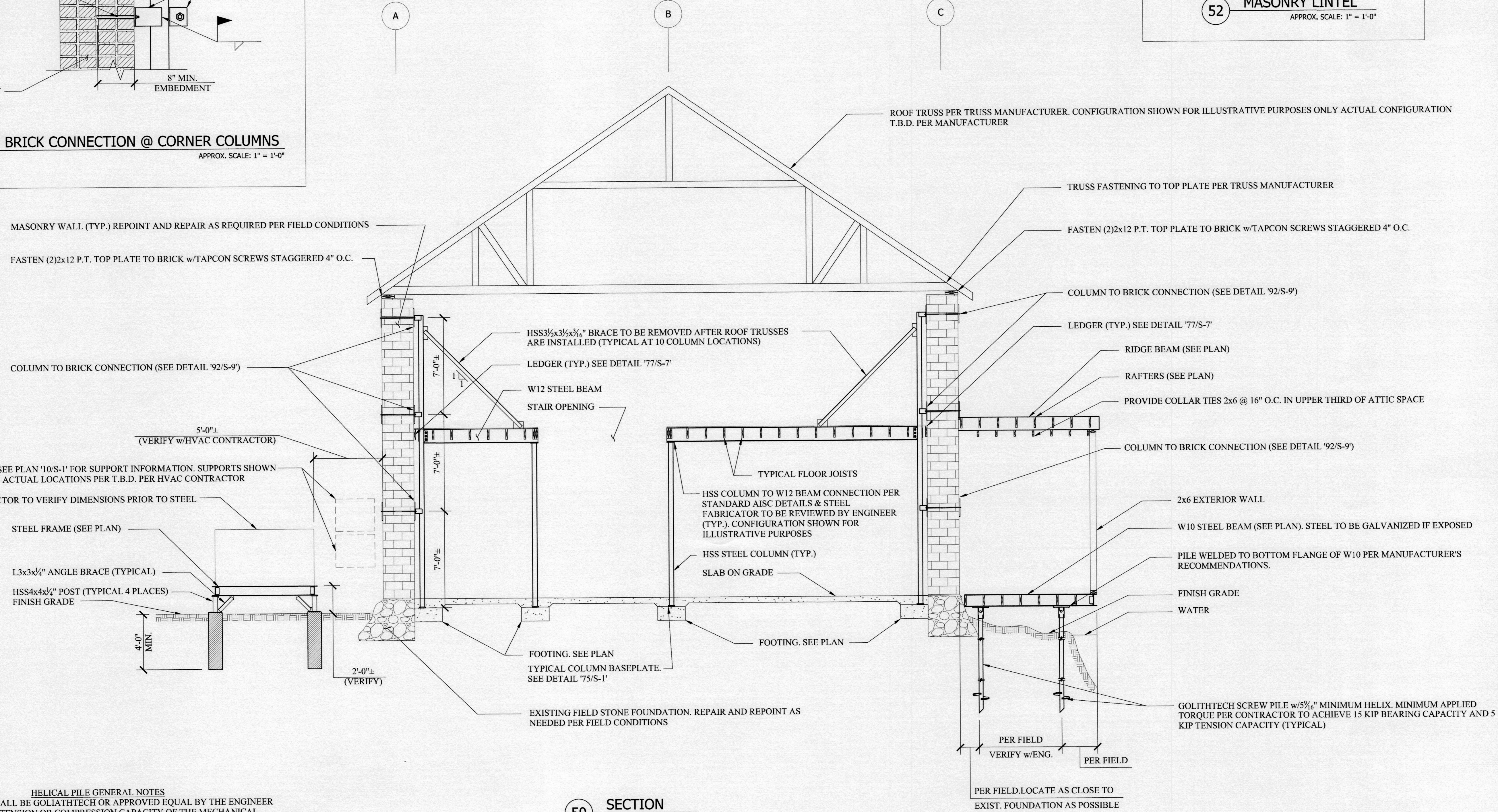
DRAWING NUMBER
17196-S-4

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.



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 PHILAN 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. LIABILITY IS SEVERELY DIMINISHED IF ENGINEER ON SITE VERIFICATION IS NOT PERFORMED. IN ADDITION, NOTHING IN THIS STATEMENT RELIEVES THE CONTRACTOR OF HIS/HER RESPONSIBILITY REGARDING THE PROVISIONS OF 780 CMR 107.

PAUL A. PHELAN, P.E.
 LICENSE NO. 42538
 REGISTERED PROFESSIONAL ENGINEER



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 FABRICATION)

- HELICAL PILE GENERAL NOTES**
1. HELICAL PILES SHALL BE GOLITHTECH 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.
 3. 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.

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

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

DESIGN & PLANNING

REVISIONS		
NO.	DATE	DESCRIPTION
1	8/23/19	MASONRY BRACING

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2 OLD ELM STREET
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SCALE: AS NOTED

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 DRAWING TITLE

SECTIONS

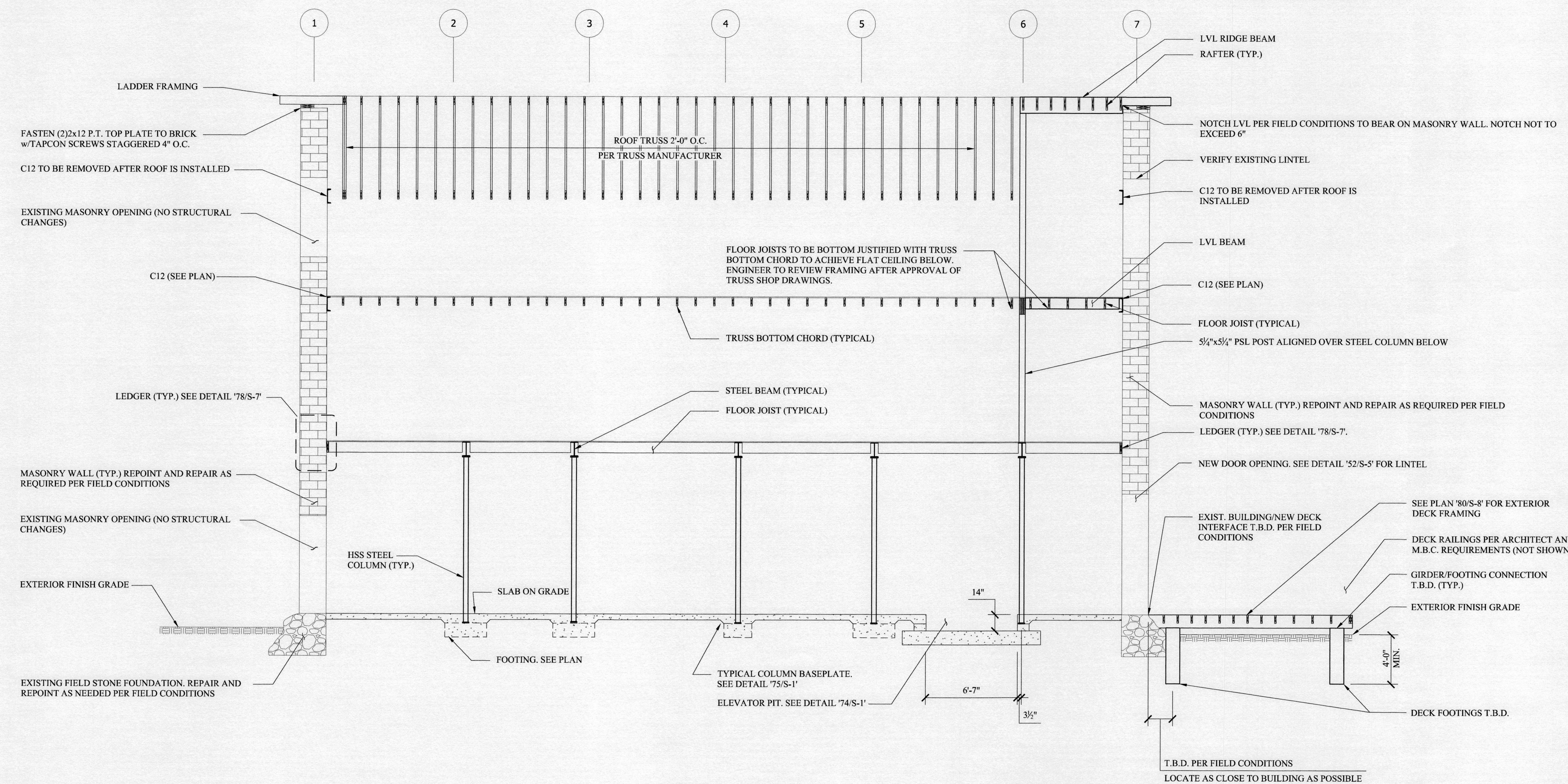
CONSTRUCTION DRAWINGS

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.

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

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 - SOLID BLOCK FLOOR STRUCTURE UNDER ALL POSTS AND MID-SPAN
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DESIGN & PLANNING

REVISIONS		
NO	DATE	DESCRIPTION
1	6/24/19	DECK LAYOUT
2	8/23/19	COLUMN LOCATIONS

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SECTIONS

CONSTRUCTION DRAWINGS

DRAWING NUMBER

17196-S-6

GENERAL NOTES

- FOUNDATIONS:**
 - ALL FOOTINGS SHALL BEAR ON UNDISTURBED, VIRGIN SOIL HAVING A MINIMUM BEARING CAPACITY OF 4000 PSF (POUNDS PER SQUARE FOOT).
 - 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.
 - ALL FOOTING EXCAVATIONS SHALL BE FINISHED BY HAND AND SHALL BE THOROUGHLY COMPACTED PRIOR TO FORMING FOOTINGS.
 - ALL FOUNDATION WALLS SHALL BE BACKFILLED EVENLY ON BOTH SIDES TO PREVENT UNBALANCED LOADINGS.
 - ALL BACKFILL USED INSIDE THE BUILDING SHALL BE WELL-GRADED GRAVEL WHICH SHALL BE THOROUGHLY COMPACTED IN 8" LAYERS.
 - ALL CONCRETE SHALL BE PLACED IN DRY EXCAVATIONS. PUMP AWAY GROUND WATER AS REQUIRED.
- CONCRETE:**
 - 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.
 - 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.
 - MAXIMUM ALLOWABLE SLUMP OF CONCRETE SHALL NOT EXCEED 4".
 - ALL CONCRETE SLABS SHALL BE CURED ACCORDING TO THE ACI SPECIFICATIONS. NOTIFY ENGINEER OF CURING METHOD AND CURING PERIOD PRIOR TO CONCRETE PLACEMENT.
 - 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.
 - AIR-ENTRAINED CONCRETE SHALL NOT BE USED IN INTERIOR SLABS-ON-GRADE UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
 - ALL CONCRETE SHALL BE PLACED UNDER THE SUPERVISION OF THE OWNER'S INDEPENDENT CONCRETE TESTING AGENCY.
 - ALL KEYS SHALL BE A MINIMUM OF 2 BY 4 INCHES (NOMINAL) UNLESS OTHERWISE NOTED ON THE DRAWINGS.
 - 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.
 - ALL EXPOSED EDGES AND CORNERS OF FINISHED CONCRETE WORK SHALL HAVE 1/4 INCH CHAMFERS UNLESS OTHERWISE SHOWN ON THE ARCHITECTURAL DRAWINGS.
 - 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.
 - THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND COORDINATING ALL ELEVATIONS RELATED TO THE CONCRETE WORK WITH THE ARCHITECTURAL DRAWINGS.
- REINFORCING STEEL:**
 - ALL REINFORCING STEEL SHALL BE ASTM A615, GRADE 60, AND SHALL BE COLD BENT.
 - 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".
 - 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.
 - 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:

SURFACES CAST AGAINST EARTH:	3"
BOTTOM OF FOOTINGS:	3"
PIERS AND WALLS:	1 1/2" @ #5 and smaller 2" @ #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 1/2" below top of slab

 - THESE DIMENSIONS SHALL BE CONSIDERED ACTUAL AND ARE NOT TO BE ADJUSTED IN EITHER DIRECTION.
 - 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.
- TIMBER:**
 - 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.
 - ALL WOOD IN CONTACT WITH MASONRY OR CONCRETE SHALL BE PRESERVATIVE TREATED LUMBER. PRESERVATIVE TREATED LUMBER SHALL BE SOUTHERN YELLOW PINE.
 - FASTEN LUMBER SECURELY TO ALL SUPPORTS.
 - ALL PLYWOOD SHALL BE APA CD EXTERIOR GRADE UNLESS OTHERWISE NOTED. SEE DRAWING FOR THICKNESSES.
 - ALL TIMBER FRAMING SHALL COMPLY WITH THE NDS (NATIONAL DESIGN SPECIFICATION) AND ALL APPLICABLE BUILDING CODES.
 - 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.
- ALL METAL PLATE FRAMING CONNECTORS (i.e. TIE STRAPS, JOIST HANGERS, HOLD-DOWNS, 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.
 - ALL FASTENERS (i.e. CARRIAGE 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 TREATED 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.

- TJI MEMBERS:**
 - 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.
 - 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.
 - 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.
 - PROVIDE SQUASH BLOCKS, WEB STIFFENERS ETC. WHICH ARE REQUIRED BY TJM PER THEIR PROJECT SPECIFICATIONS.
 - CORING OF HOLES THROUGH TJI'S SHALL CONFORM WITH THE REQUIREMENTS SET FORTH BY TJM. REFER TO HOLE CHART IN TJM'S DESIGN BROCHURE FOR TJI/Pro 120TS JOISTS.
- LAMINATED VENEER LUMBER (DESIGNATED AS "LVL" ON DRAWINGS)**
 - ALL LAMINATED VENEER LUMBER SHALL BE MANUFACTURED BY BOISE CASCADE, OR APPROVED EQUAL.
 - ALL LAMINATED VENEER LUMBER (LVL) SHALL HAVE THE FOLLOWING ALLOWABLE DESIGN PROPERTIES:
Fb = 2,900 PSI
Fv = 290 PSI
E = 2,000,000 PSI
 - FASTEN MULTIPLE MEMBER LAMINATED VENEER BEAMS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
 - 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 MODIFICATIONS PRIOR TO INSTALLATION.

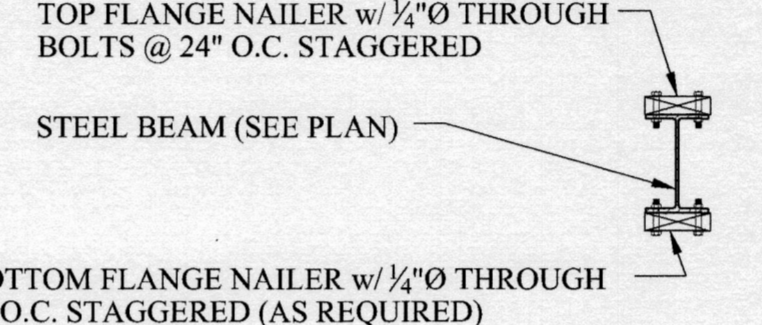
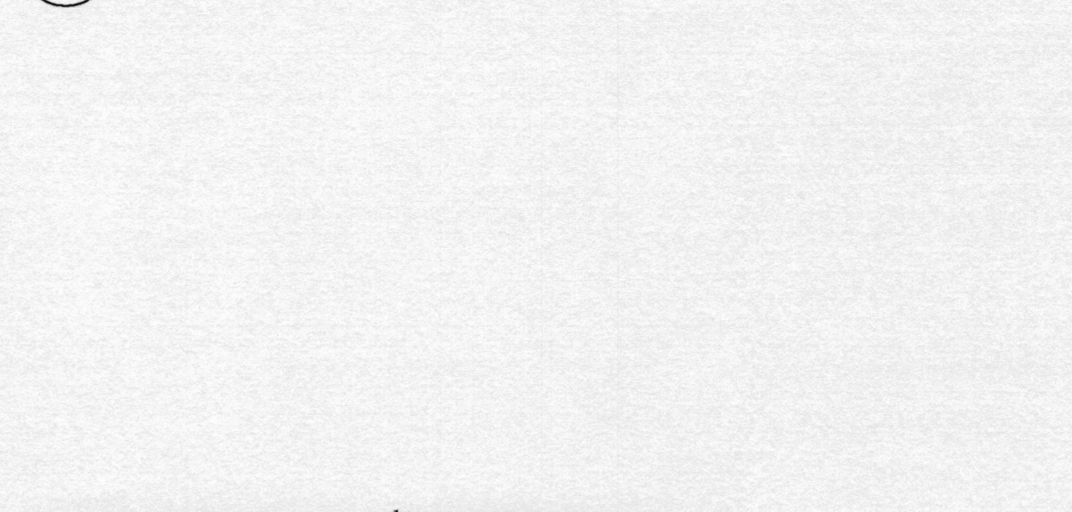
- STRUCTURAL STEEL:**
 - ALL STRUCTURAL STEEL ROLLED SHAPES, PLATES, BARS, AND "HSS" HOLLOW STRUCTURAL SECTIONS SHALL CONFORM TO THE FOLLOWING:
ASTM A992 (Fy = 50 ksi): WIDE FLANGE & STRUCTURAL TEE SHAPES
ASTM A500 - GRADE B: SQUARE AND RECTANGULAR "HSS"
ASTM A36 (Fy = 36 ksi): ALL OTHER STRUCTURAL STEEL SHAPES
 - 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.
 - 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.
 - 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.

- MISCELLANEOUS:**
 - 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.
 - ALL WORK SHALL COMPLY WITH THE LATEST EDITION OF THE MASSACHUSETTS STATE BUILDING CODE.
 - 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.

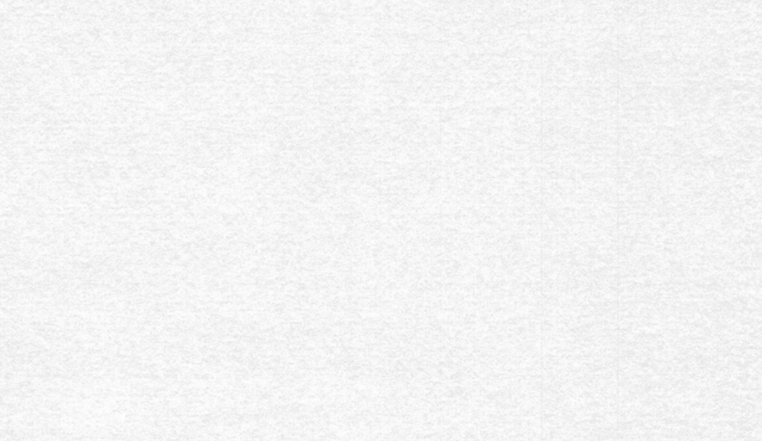
FILL JOINTS IN EXPOSED AREAS W/ DYMERIC CAULKING AS MANUFACTURED BY TREMCO OR EQUAL. COLOR TO MATCH SLAB. VERIFY COMPATIBILITY WITH FLOOR SEALER.

NOTE: SAW-CUT JOINTS AS SOON AS CONCRETE HAS HARDENED SUFFICIENTLY TO PREVENT AGGREGATE FROM BEING DISLODGED BY THE SAW. JOINTS MUST BE CUT BEFORE SHRINKING STRESSES BECOME SUFFICIENT TO PRODUCE CRACKING.

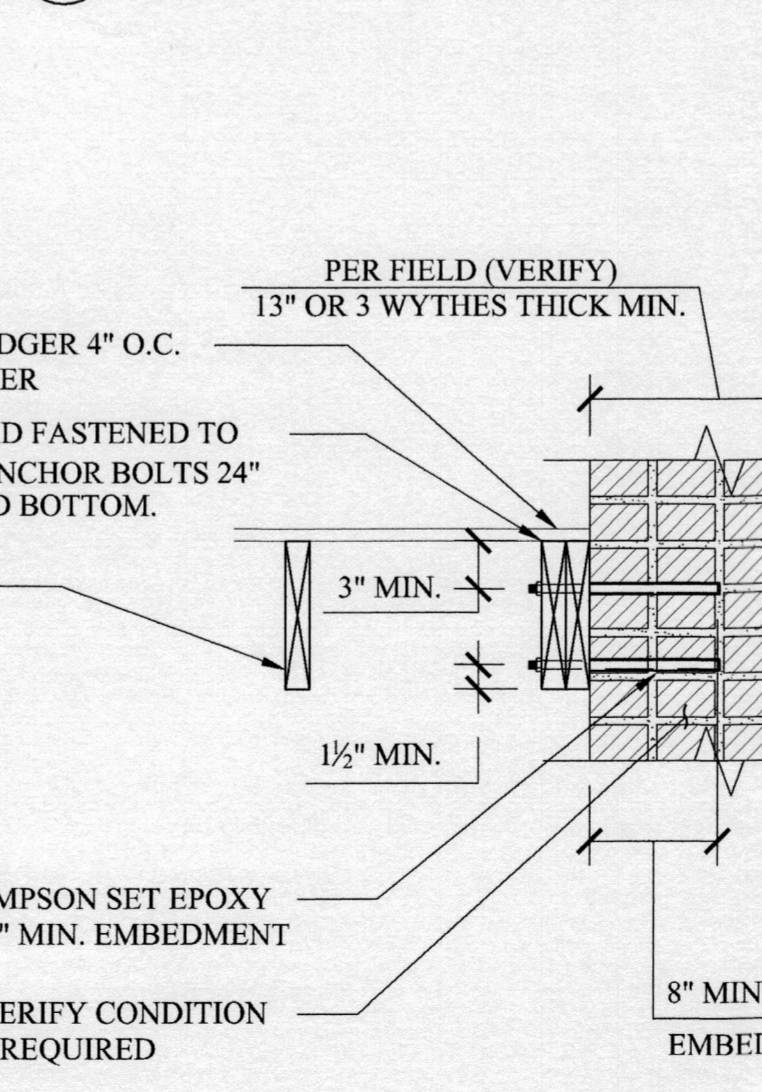
71 CONTROL JOINT DETAIL
APPROX. SCALE: 1" = 1'-0"



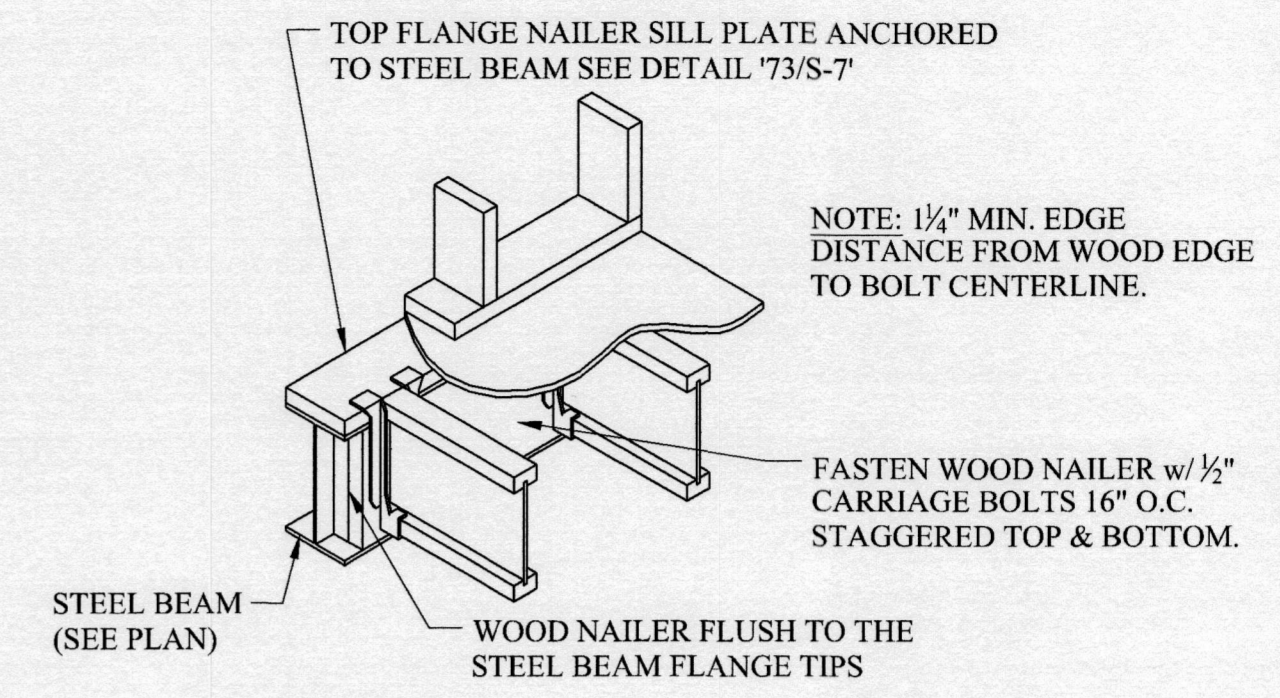
73 STEEL BEAM DETAIL
Scale: 3/4" = 1'-0"



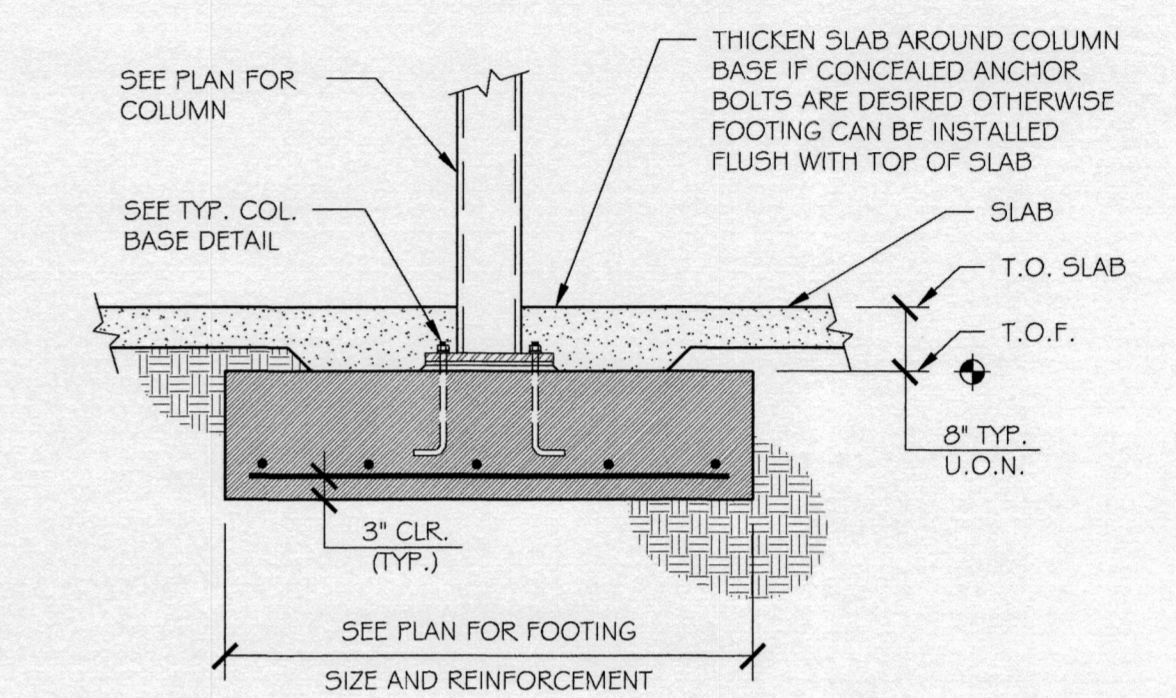
75 BASEPLATE DETAIL
Scale: 3/4" = 1'-0"



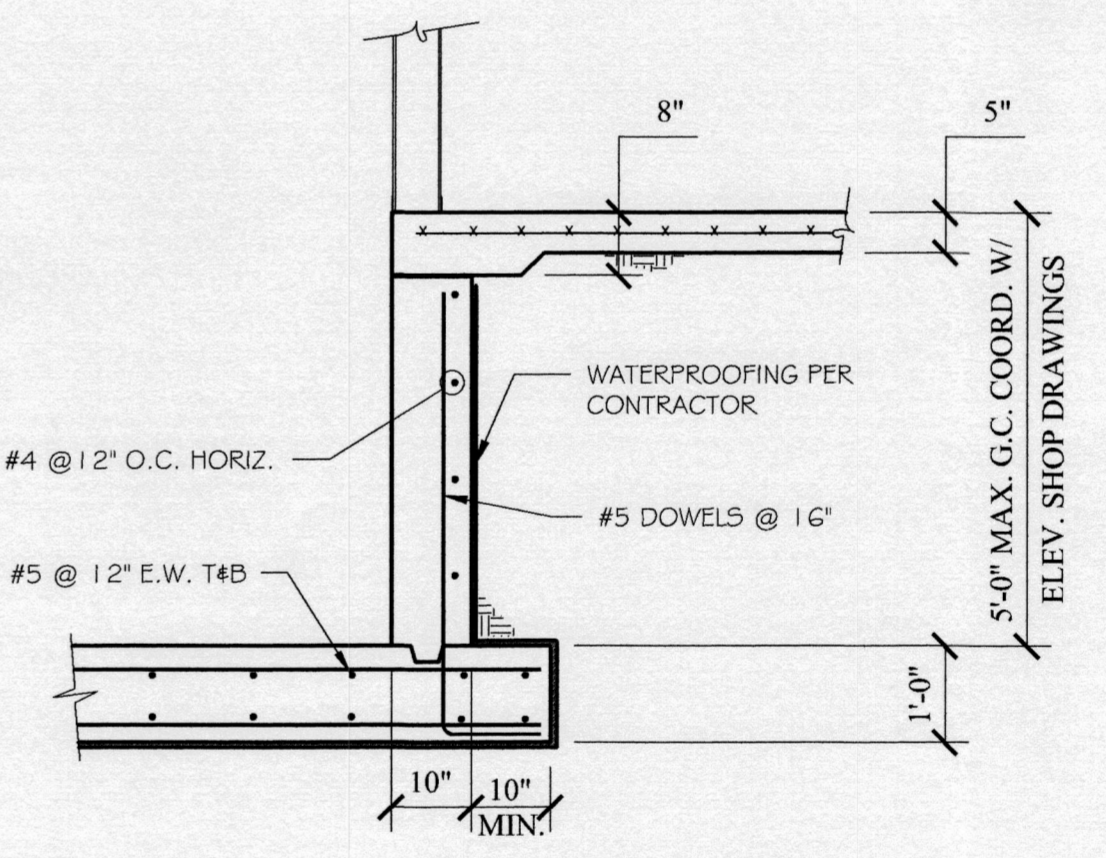
77 BRICK LEDGER (JOISTS PARALLEL)
APPROX. SCALE: 1" = 1'-0"



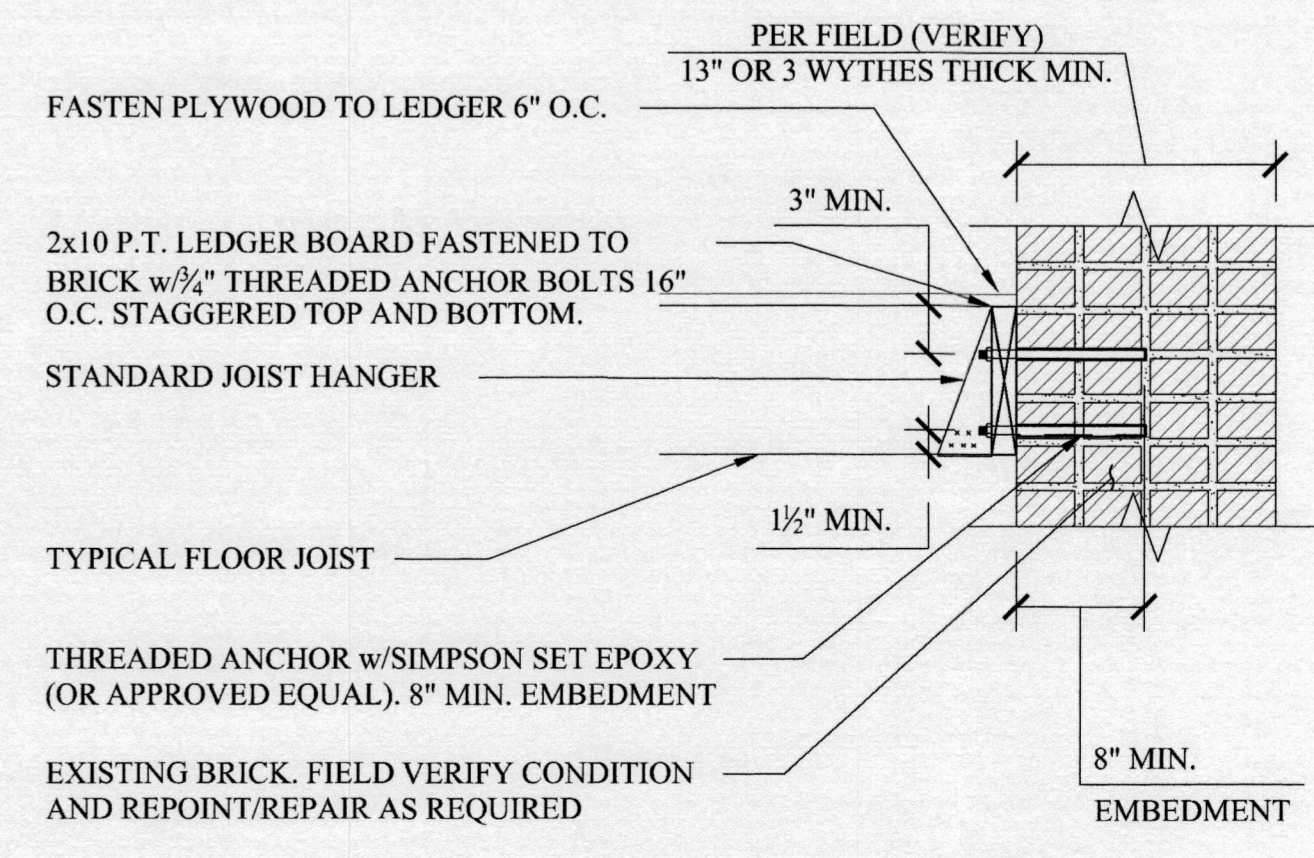
72 STEEL BEAM DETAIL
Scale: 3/8" = 1'-0"



74 TYPICAL SECTION
Scale: 1/2" = 1'-0"

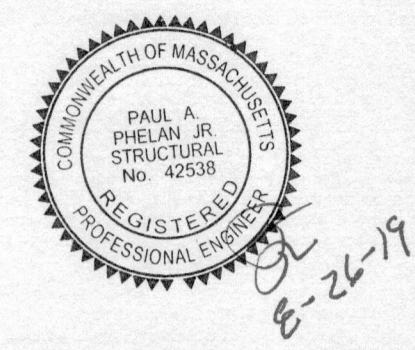


76 ELEVATOR FOUNDATION SECTION
APPROX. SCALE: 1/2" = 1'-0"



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

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SCALE: AS NOTED

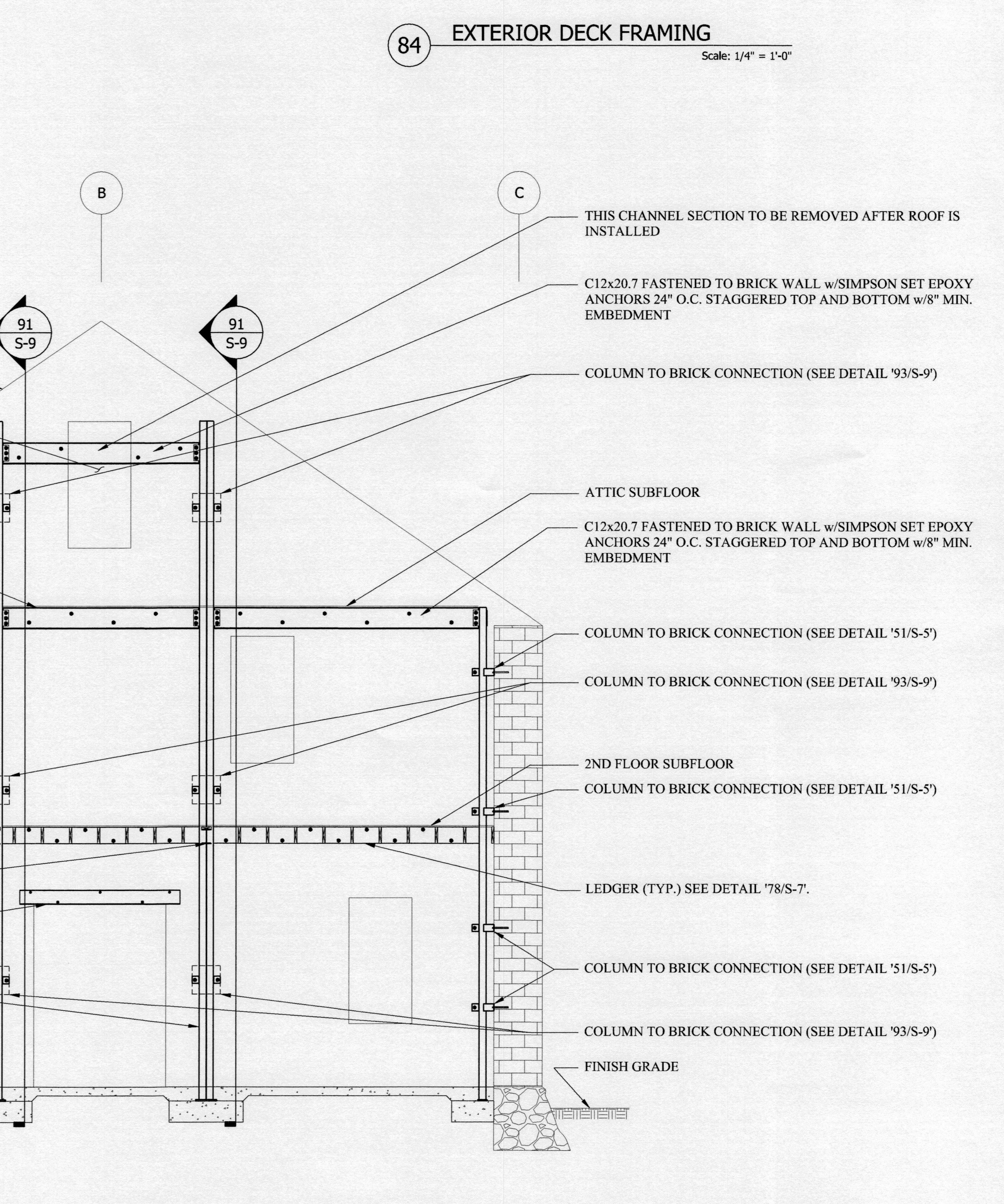
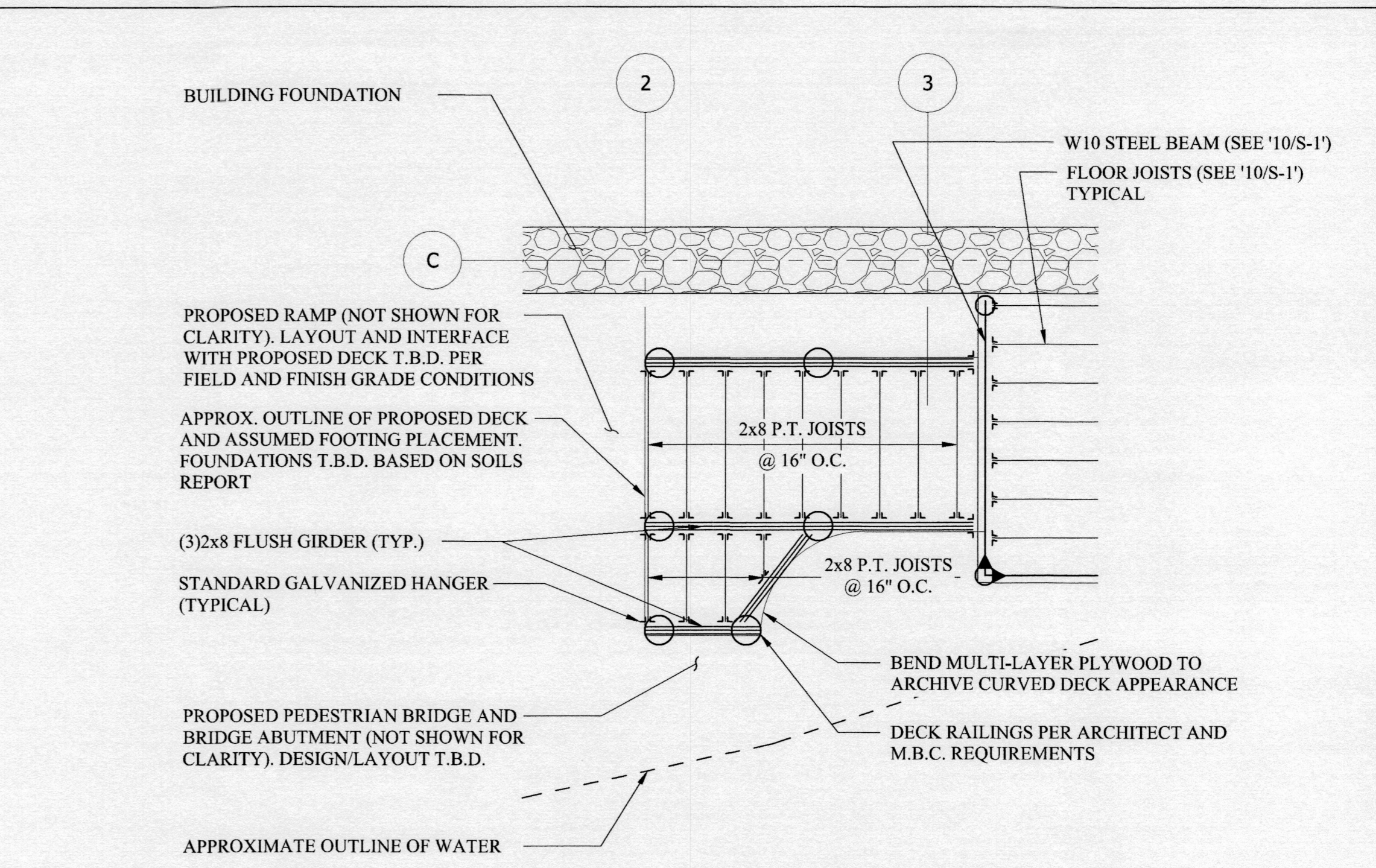
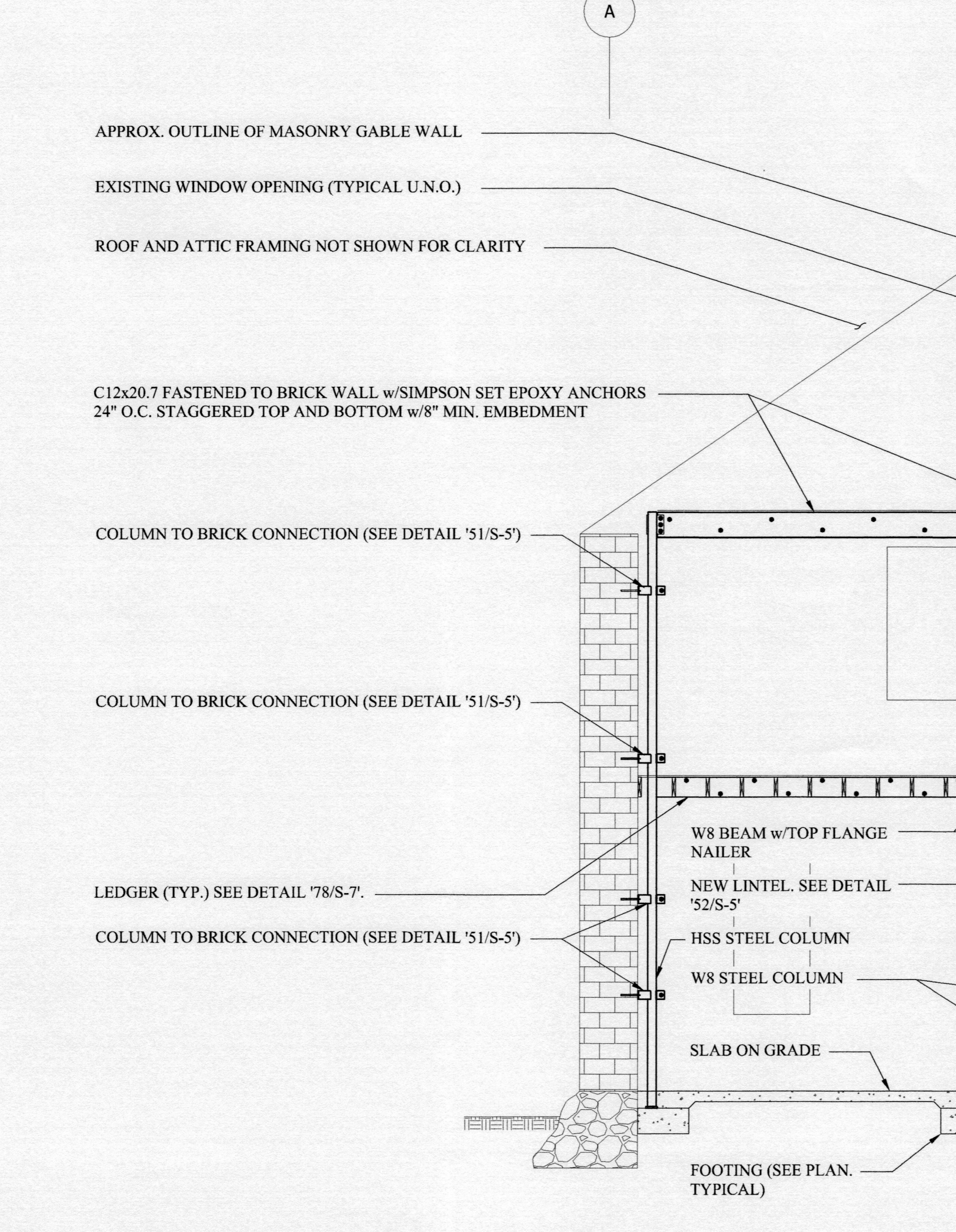
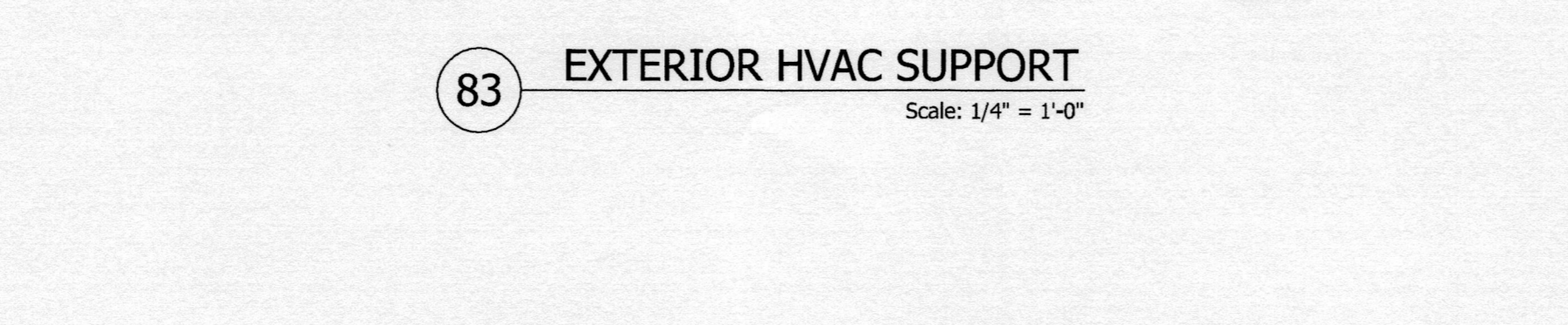
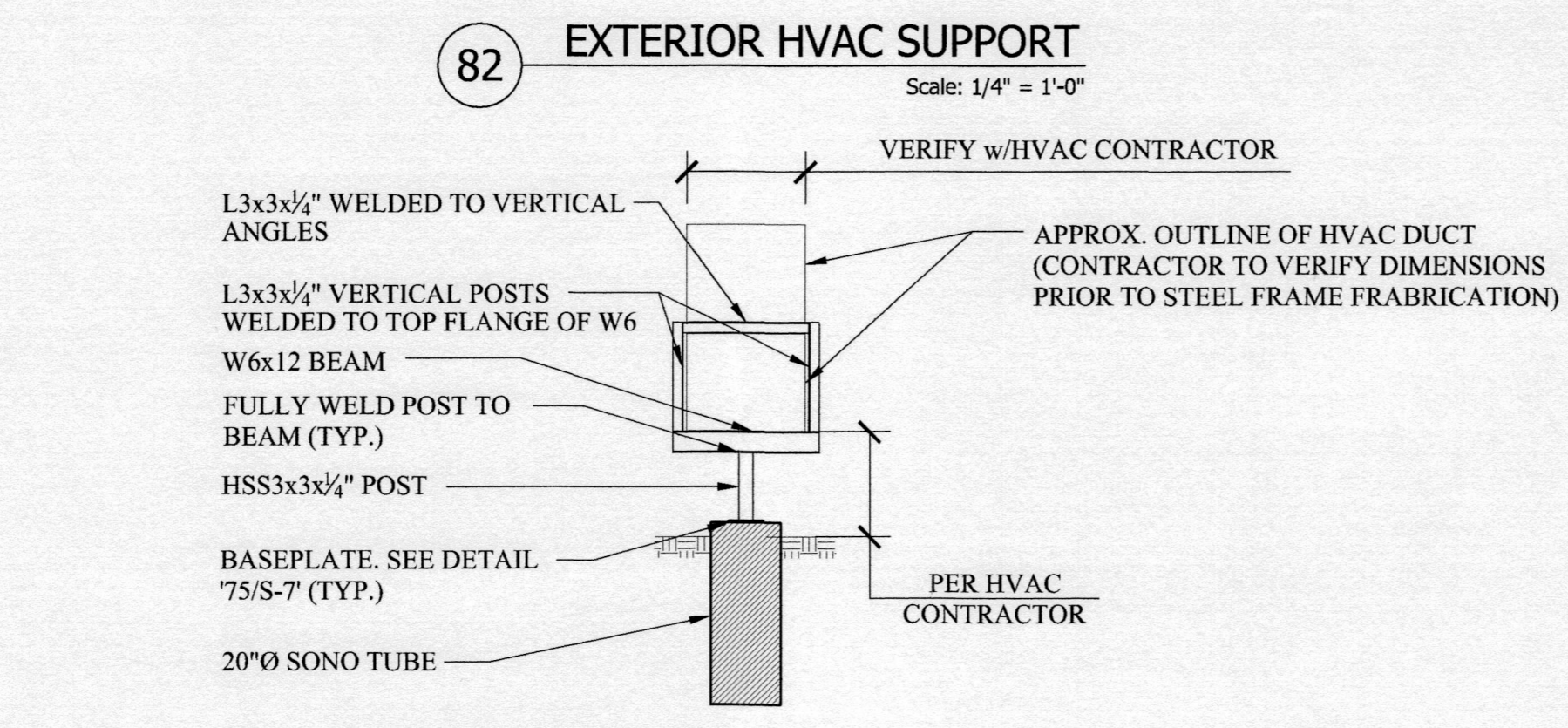
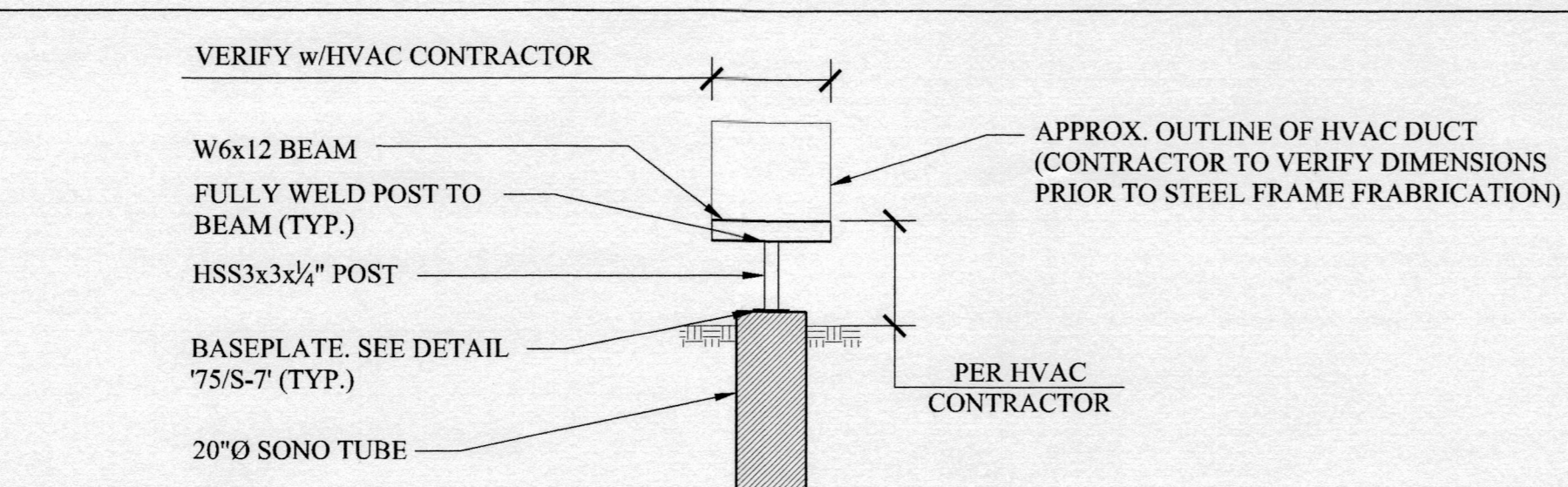
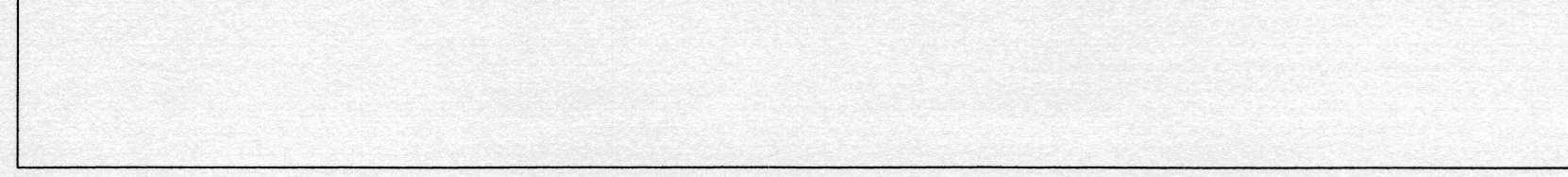
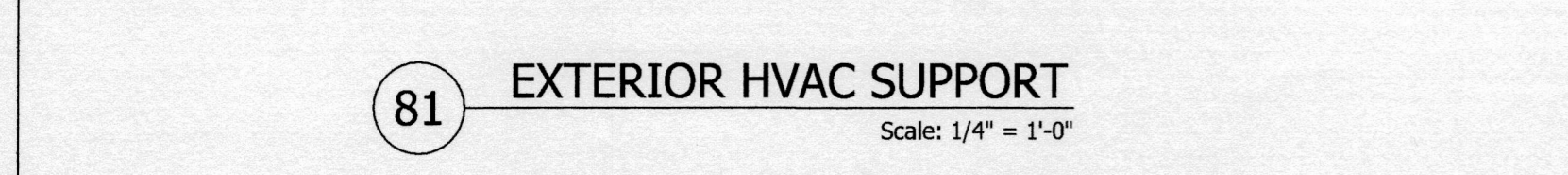
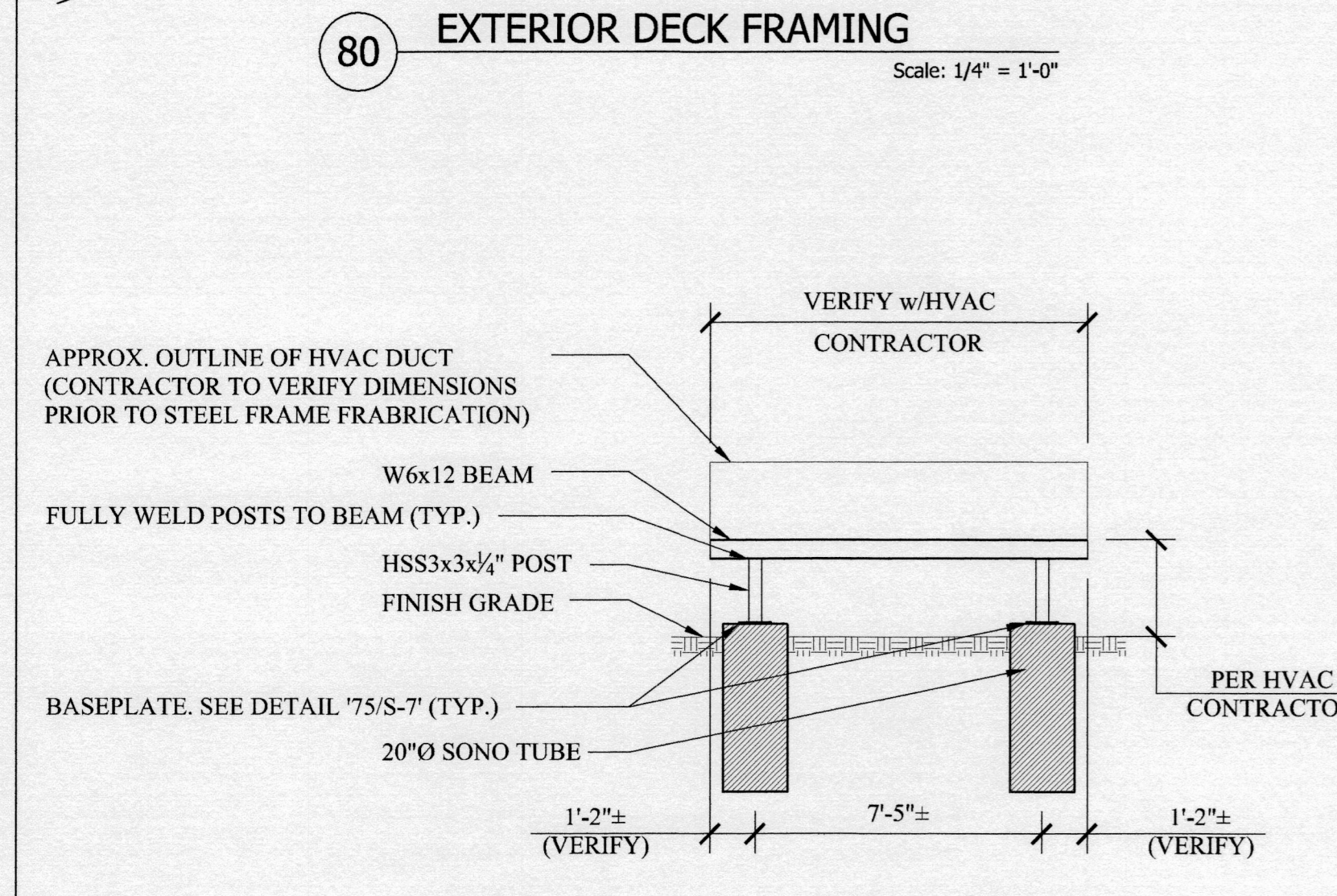
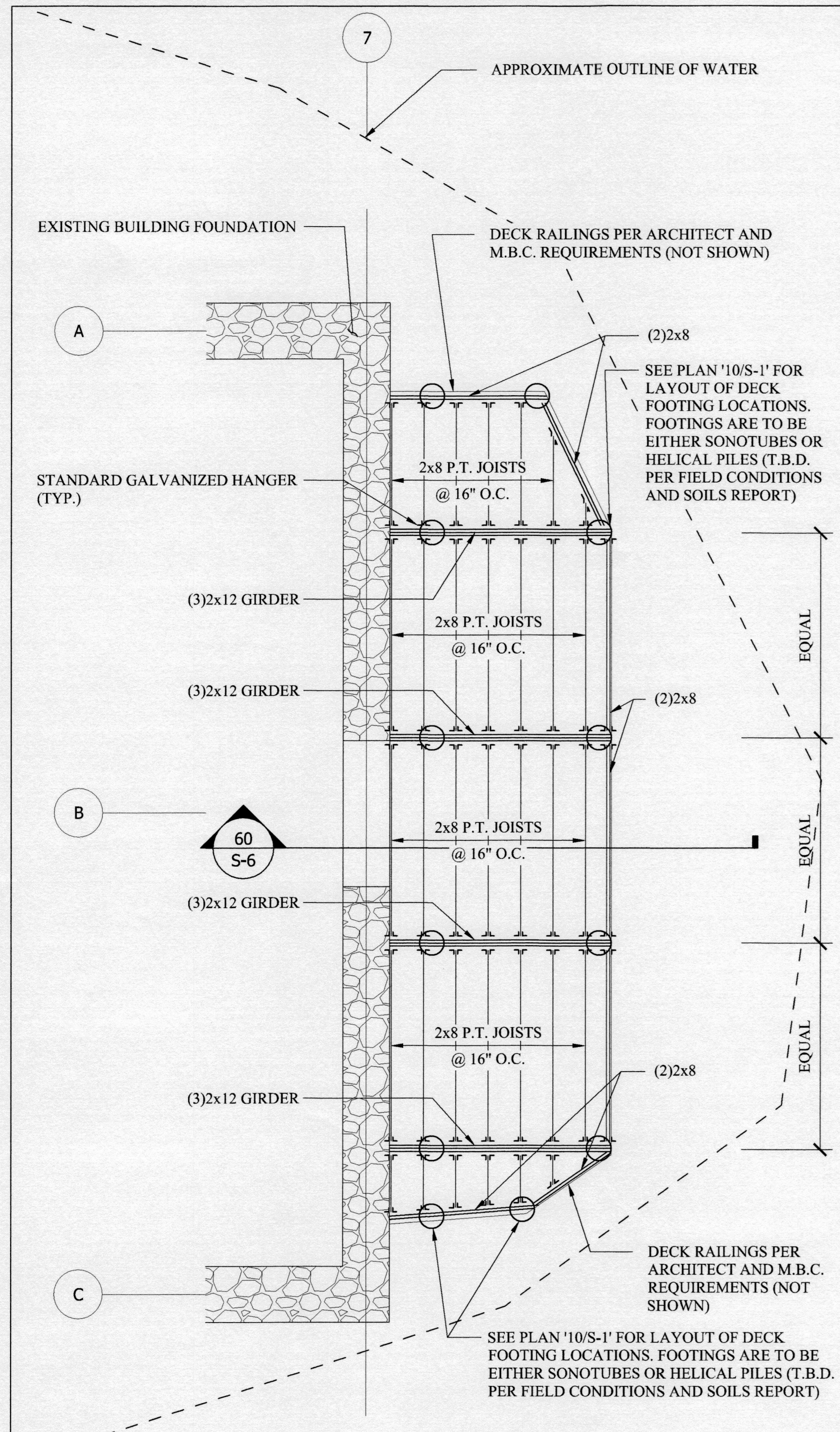
DATE: 4/02/2019
DRAWING TITLE

DETAILS & NOTES

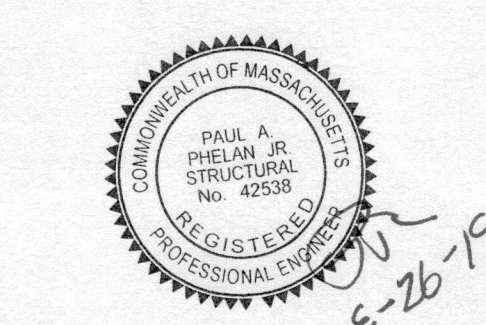
CONSTRUCTION DRAWINGS

DRAWING NUMBER

17196-S-7



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. LIABILITY IS SEVERELY DIMINISHED IF ENGINEER ON SITE VERIFICATION IS NOT PERFORMED. IN ADDITION, NOTHING IN THIS STATEMENT RELIEVES THE CONTRACTOR OF HIS/HER RESPONSIBILITY REGARDING THE PROVISIONS OF 780 CMR 107.



DESIGN & PLANNING

REVISIONS	
NO.	DATE DESCRIPTION
1	6/24/19 DECK LAYOUT
2	8/23/19 SECTION 85

PHELAN ENGINEERING

STRUCTURAL & CIVIL CONSULTANTS
 76 CARLISLE ROAD
 WESTFORD, MA
 TEL. (978) 256-4014

PROJECT

MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER
 2 OLD ELM STREET
 NORTH BILLERICA, MA

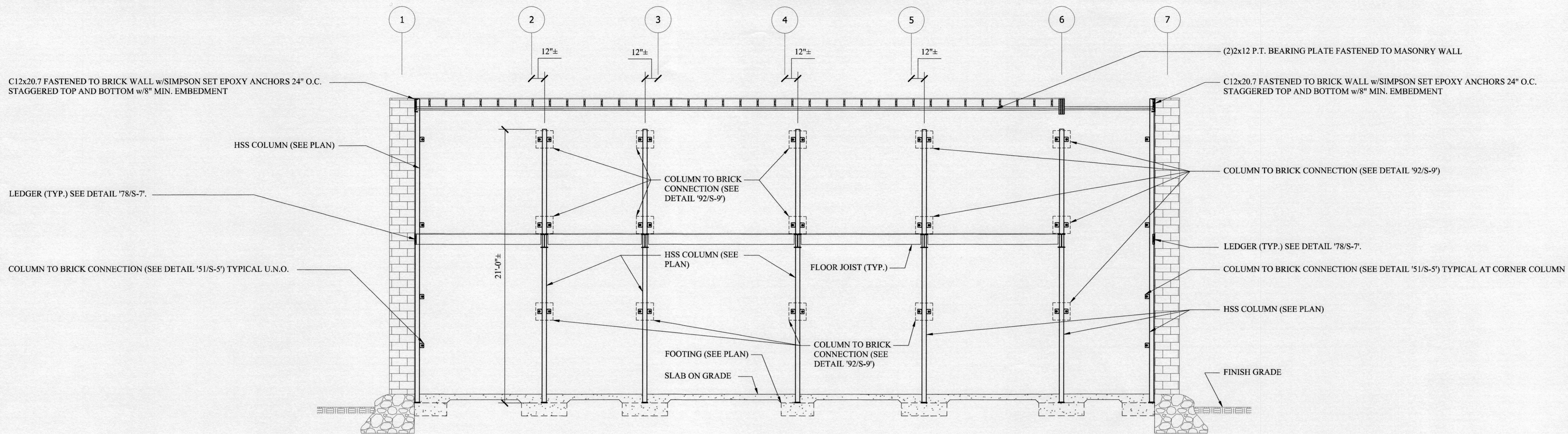
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DATE: 4/02/2019
 DRAWING TITLE

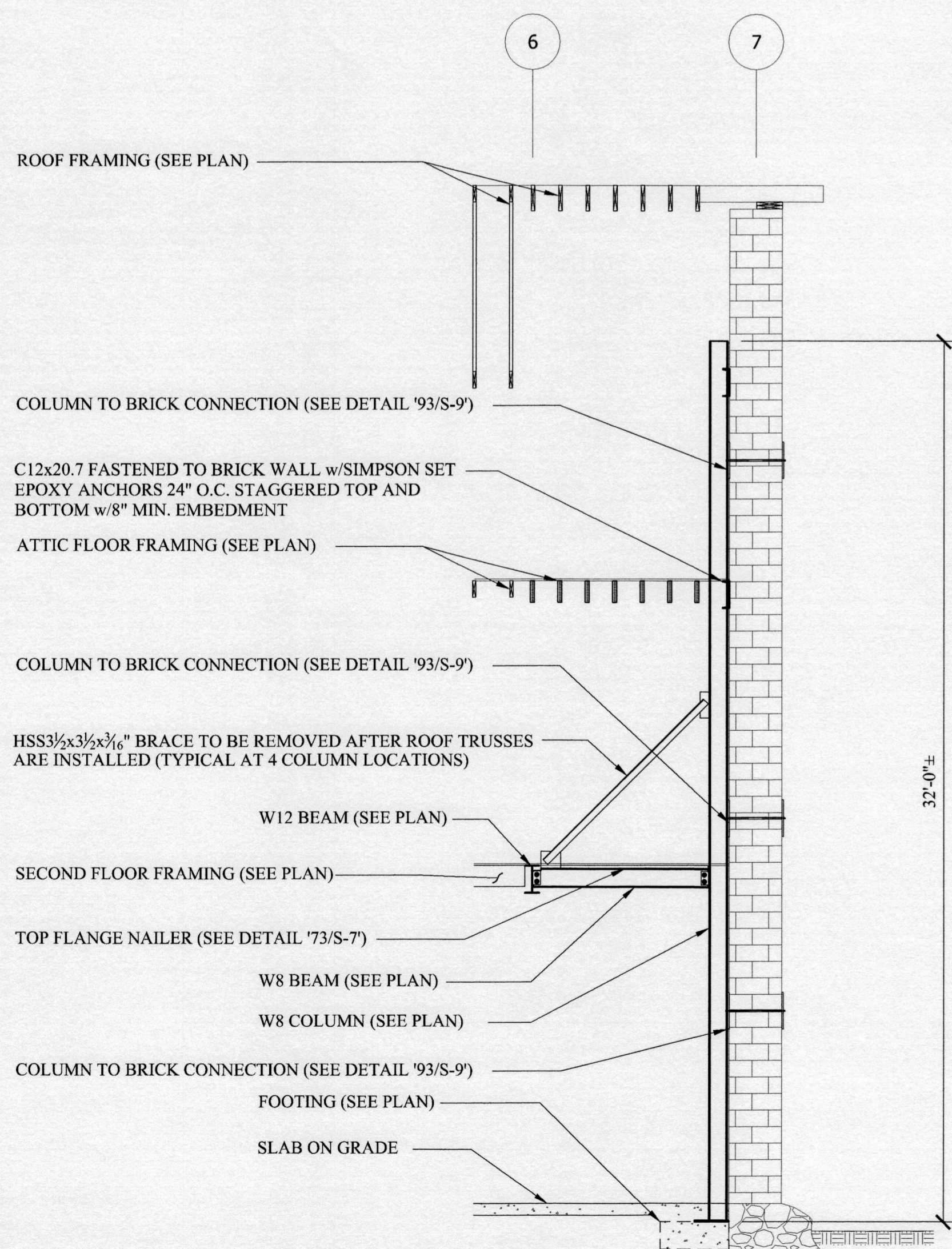
DETAILS & NOTES

CONSTRUCTION DRAWINGS
 DRAWING NUMBER

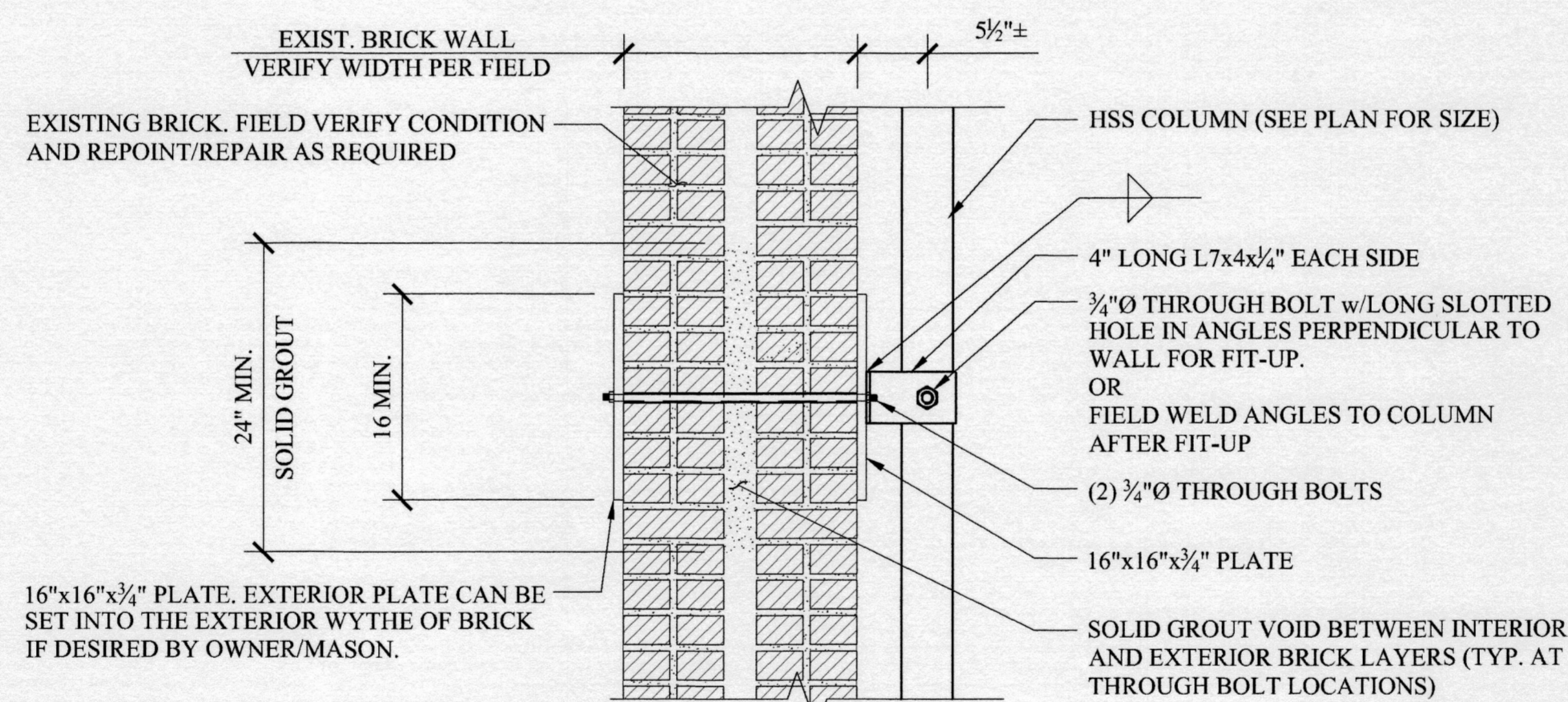
17196-S-8



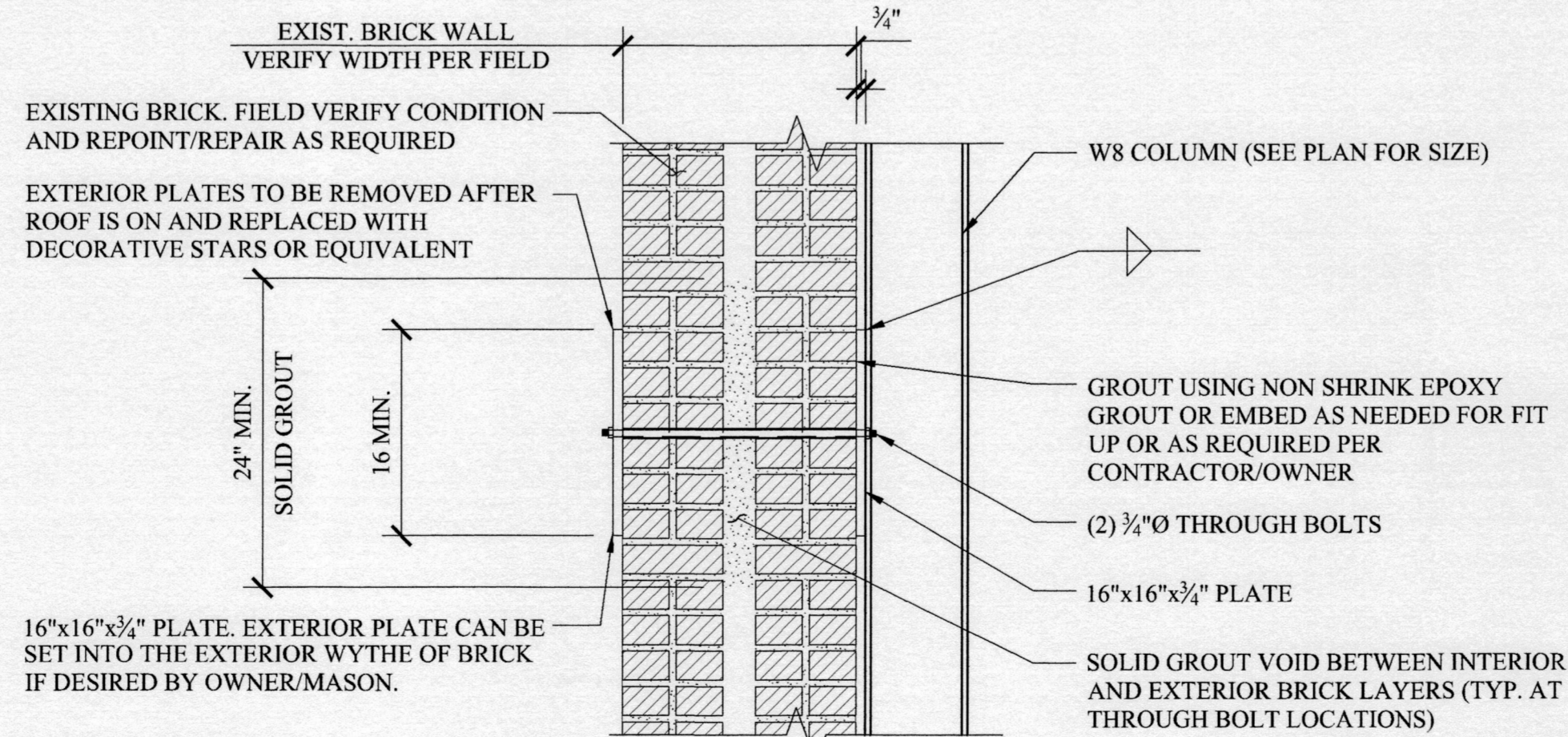
90 SECTION
Scale: 1/4" = 1'-0"



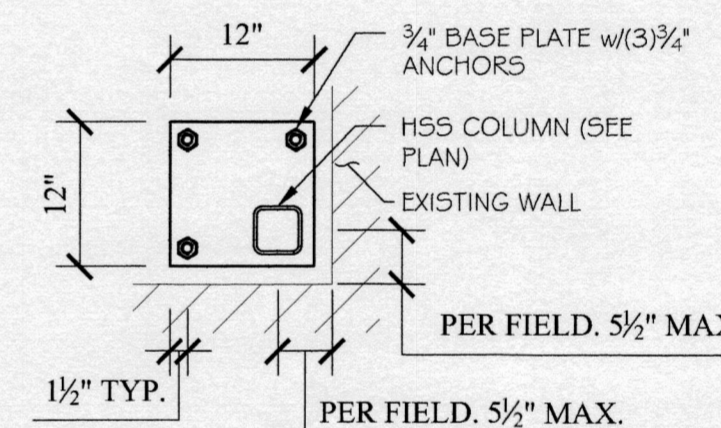
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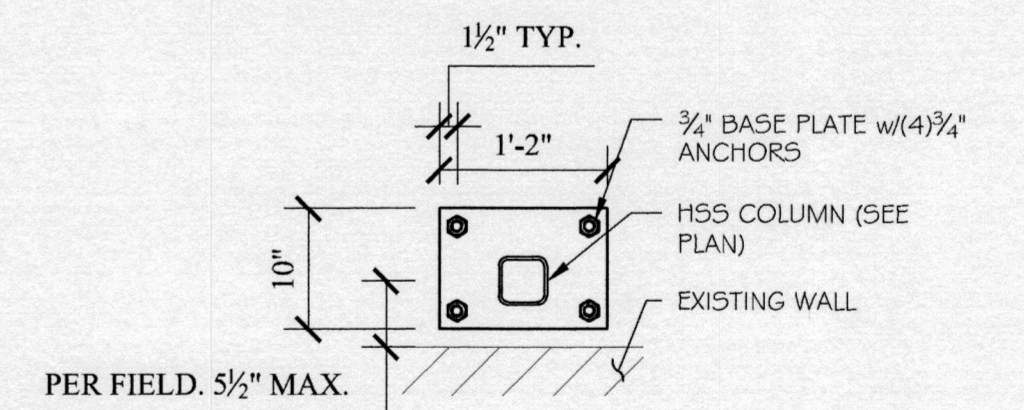
92 HSS TO BRICK CONNECTION
APPROX. SCALE: 1" = 1'-0"



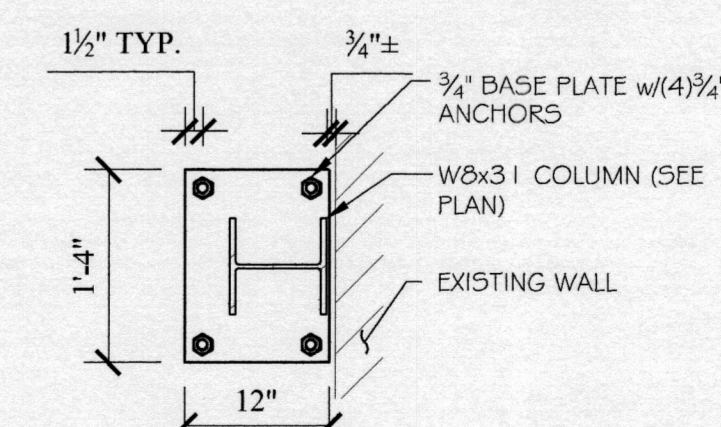
93 W8 TO BRICK CONNECTION
APPROX. SCALE: 1" = 1'-0"



94 CORNER BASEPALTE DETAIL
Scale: 3/4" = 1'-0"

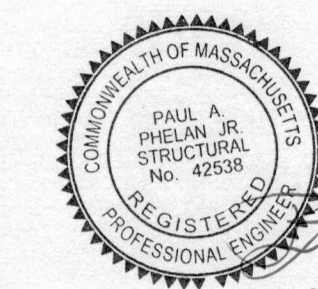


95 WALL BASEPALTE DETAIL
Scale: 3/4" = 1'-0"



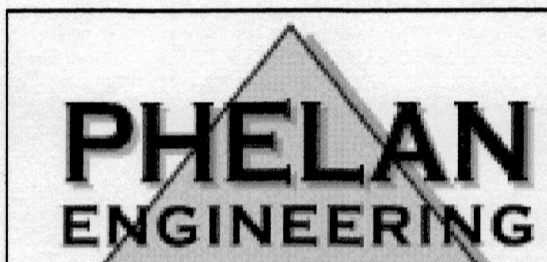
96 W8 COLUMN BASEPALTE DETAIL
Scale: 3/4" = 1'-0"

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. LIABILITY IS SEVERELY DIMINISHED IF ENGINEER ON SITE VERIFICATION IS NOT PERFORMED. IN ADDITION, NOTHING IN THIS STATEMENT RELIEVES THE CONTRACTOR OF HIS/HER RESPONSIBILITY REGARDING THE PROVISIONS OF 780 CMR 107.



DESIGN & PLANNING

REVISIONS		
NO.	DATE	DESCRIPTION



STRUCTURAL & CIVIL CONSULTANTS
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WESTFORD, MA
TEL. (978) 256-4014

PROJECT

MIDDLESEX CANAL MUSEUM & VISITOR'S CENTER

2 OLD ELM STREET
NORTH BILLERICA, MA

SCALE: AS NOTED

DATE: 8/23/19

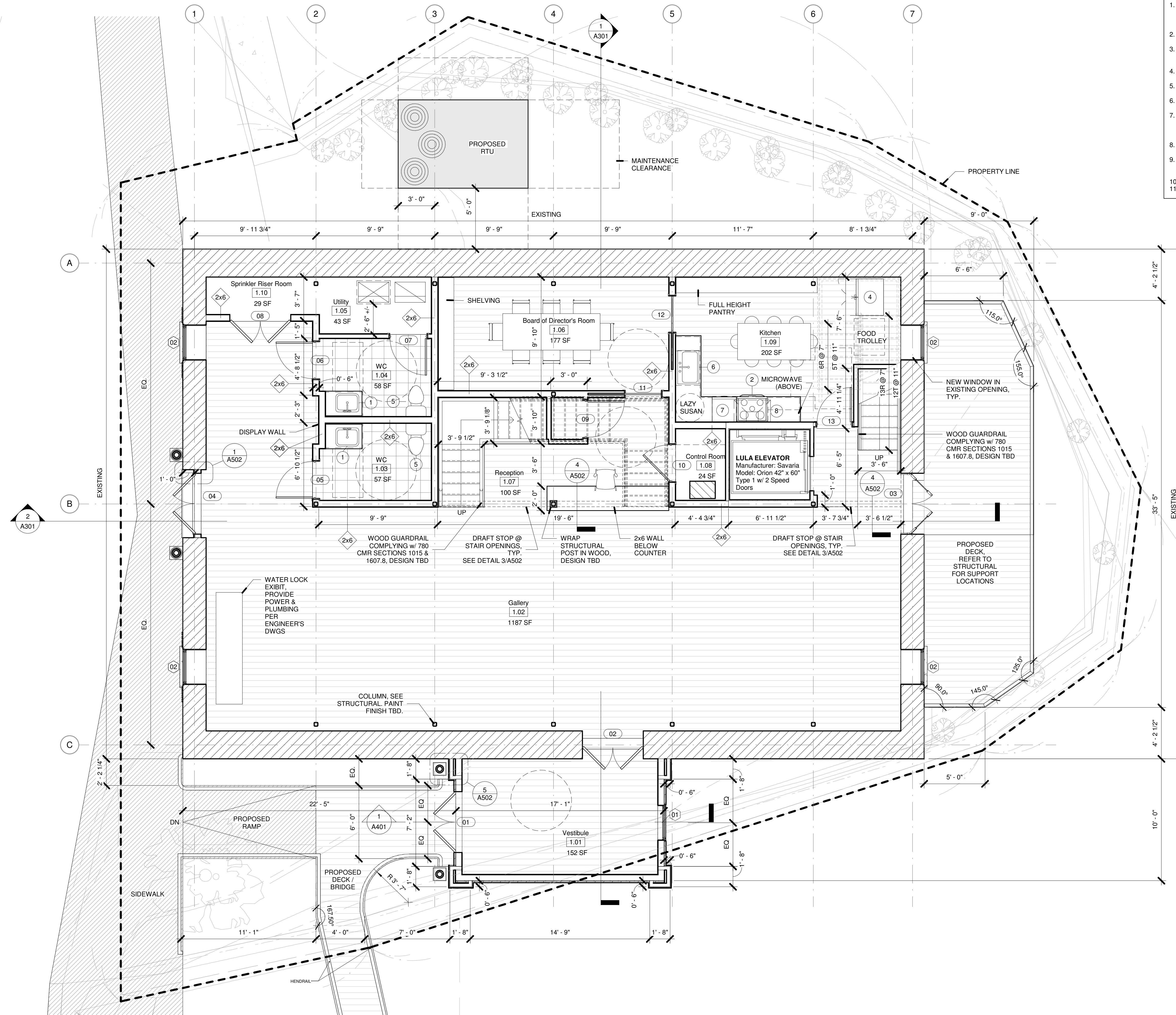
DRAWING TITLE

DETAILS & NOTES

CONSTRUCTION DRAWINGS

DRAWING NUMBER

17196-S-9



- 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.
 2. REFERENCE SHEET T002 FOR ADDITIONAL INFORMATION PERTAINING TO CODE & LIFE SAFETY.
 3. REFERENCE CIVIL ENGINEERING DRAWINGS FOR SITE SPECIFIC INFORMATION. SITE INFORMATION SHOWN HERE FOR REFERENCE PURPOSES ONLY.
 4. ACCESSIBLE CLEARANCES ARE REQUIRED AT ALL FIXTURES AND EQUIPMENT USED BY THE PUBLIC.
 5. 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 UNLESS NOTED OTHERWISE.
 7. 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.
 9. 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.

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PROJ.	1807-01
DAT	03/28/2019
DRAWN	KF

REVISIONS		
NO.	DATE	NOTES

FIRST FLOOR PLAN

A101

1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"



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DAT 03/28/2019
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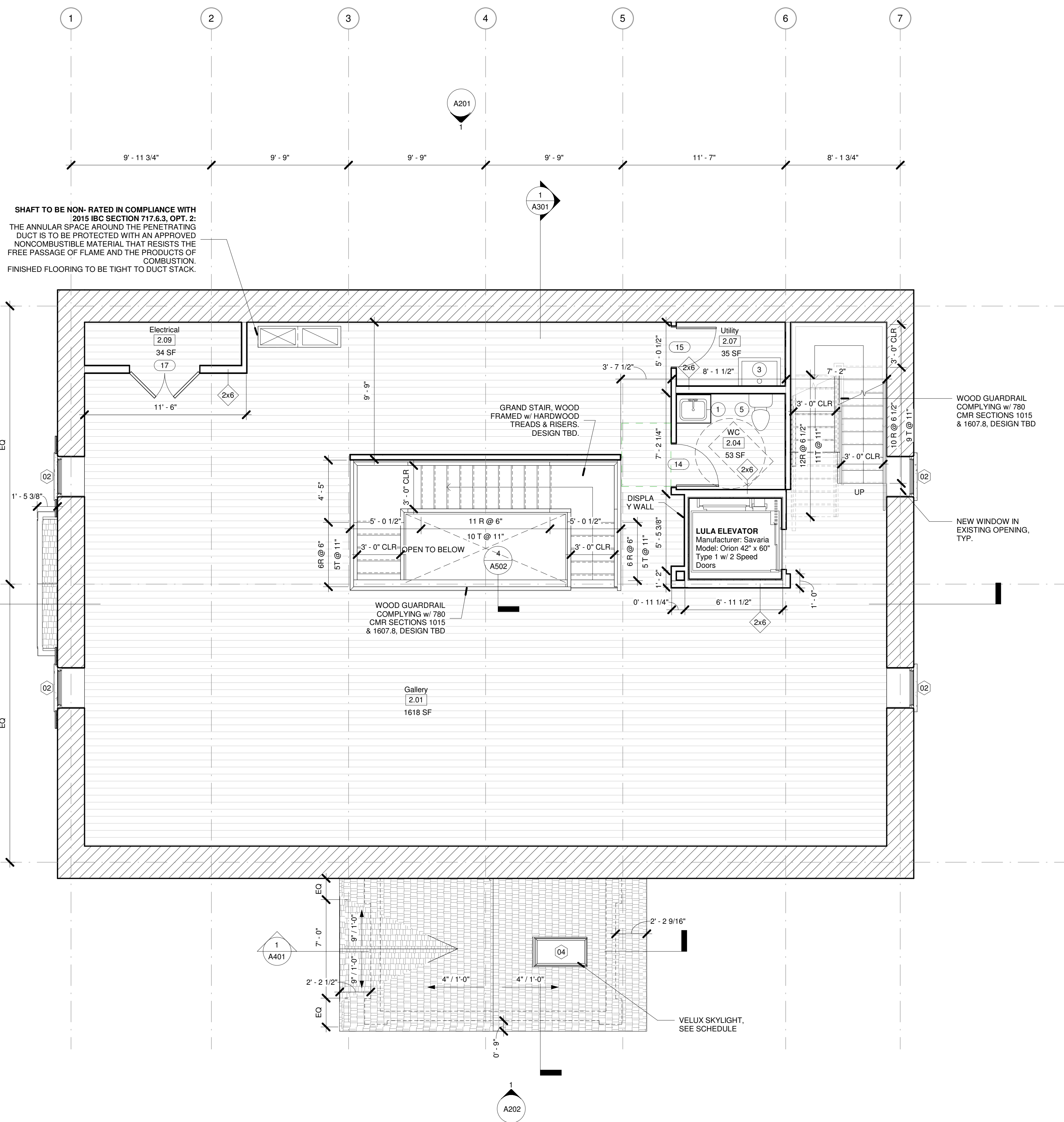
REVISIONS

NO.	DATE	NOTES

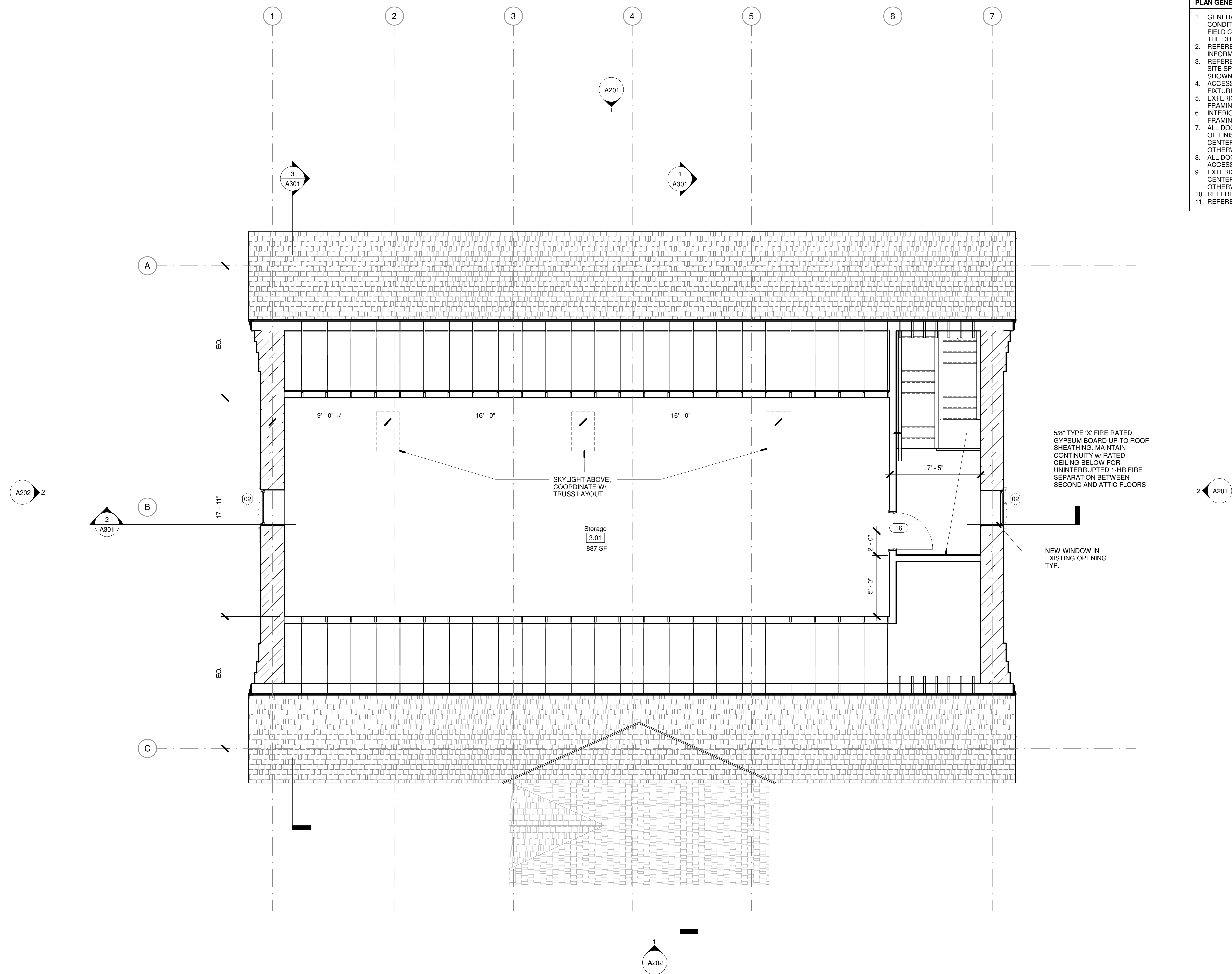
SECOND FLOOR PLAN

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.
 - 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.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.
 - REFERENCE T002 FOR DOOR AND FRAME TYPES.
 - REFERENCE T002 FOR WINDOW TYPES.



1 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"



- 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.
 2. REFERENCE SHEET T002 FOR ADDITIONAL INFORMATION PERTAINING TO CODE & LIFE SAFETY.
 3. REFERENCE CIVIL ENGINEERING DRAWINGS FOR SITE SPECIFIC INFORMATION. SITE INFORMATION SHOWN HERE FOR REFERENCE PURPOSES ONLY.
 4. ACCESSIBLE CLEARANCES ARE REQUIRED AT ALL FIXTURES AND EQUIPMENT USED BY THE PUBLIC.
 5. 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.
 7. 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.
 9. 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.

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



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128 WARREN ST ■ LOWELL, MA 01852
info@caveneyarch.com
978 - 770 - 0518



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

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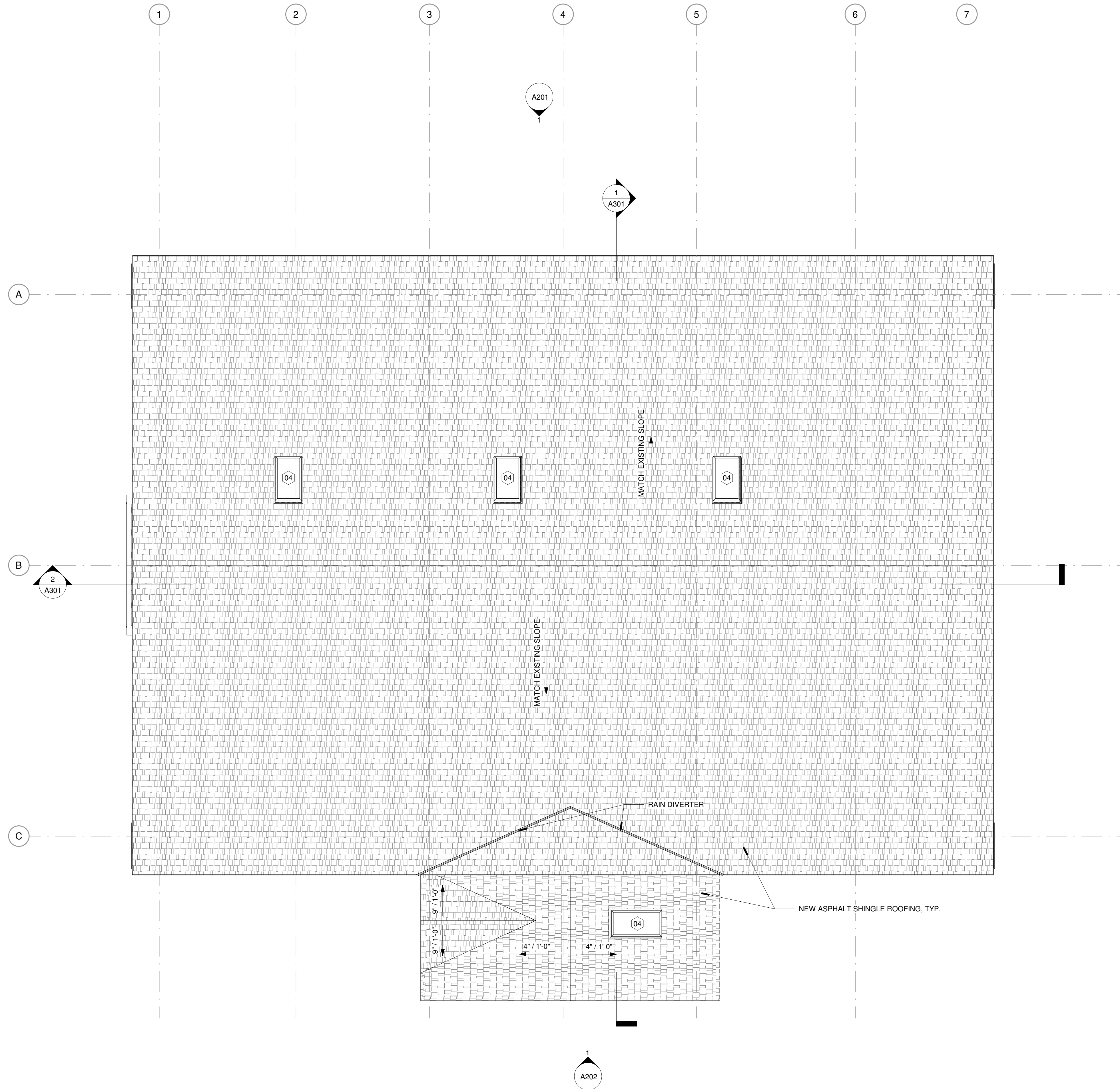
PROJ. 1807-01
DAT 03/28/2019
DRAWN KF

REVISIONS

NO.	DATE	NOTES

ATTIC PLAN

A103



- 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.
 2. REFERENCE SHEET T002 FOR ADDITIONAL INFORMATION PERTAINING TO CODE & LIFE SAFETY.
 3. REFERENCE CIVIL ENGINEERING DRAWINGS FOR SITE SPECIFIC INFORMATION. SITE INFORMATION SHOWN HERE FOR REFERENCE PURPOSES ONLY.
 4. ACCESSIBLE CLEARANCES ARE REQUIRED AT ALL FIXTURES AND EQUIPMENT USED BY THE PUBLIC.
 5. 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.
 7. 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.
 9. 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.

1 ROOF PLAN
SCALE: 1/4" = 1'-0"



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NO.	DATE	NOTES

ROOF PLAN

A104



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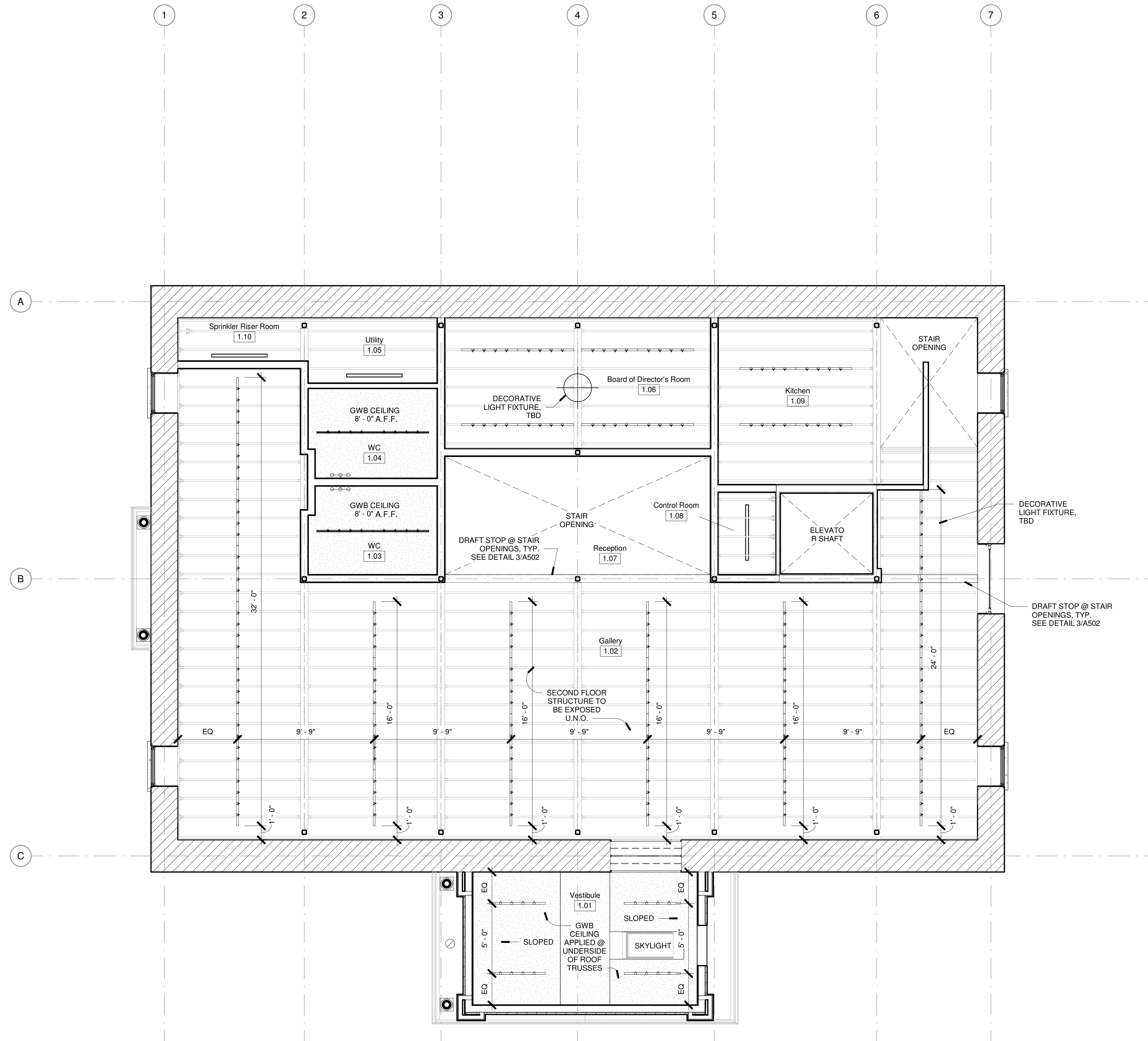
PROJ. 1807-01
 DAT 03/28/2019
 DRAWN KF

REVISIONS
 NO. DATE NOTES

FIRST FLOOR RCP

A111

LIGHTING FIXTURE	
	Decorative pendant light.
	Track lighting, see electrical drawings for specifications *Final layout to be field coordinated by owner
	Surface mounted utility light
	Vanity light *Centered over sink typ.
	Recessed can light *Exterior grade fixture



1 FIRST FLOOR RCP
 SCALE : 1/4" = 1'-0"



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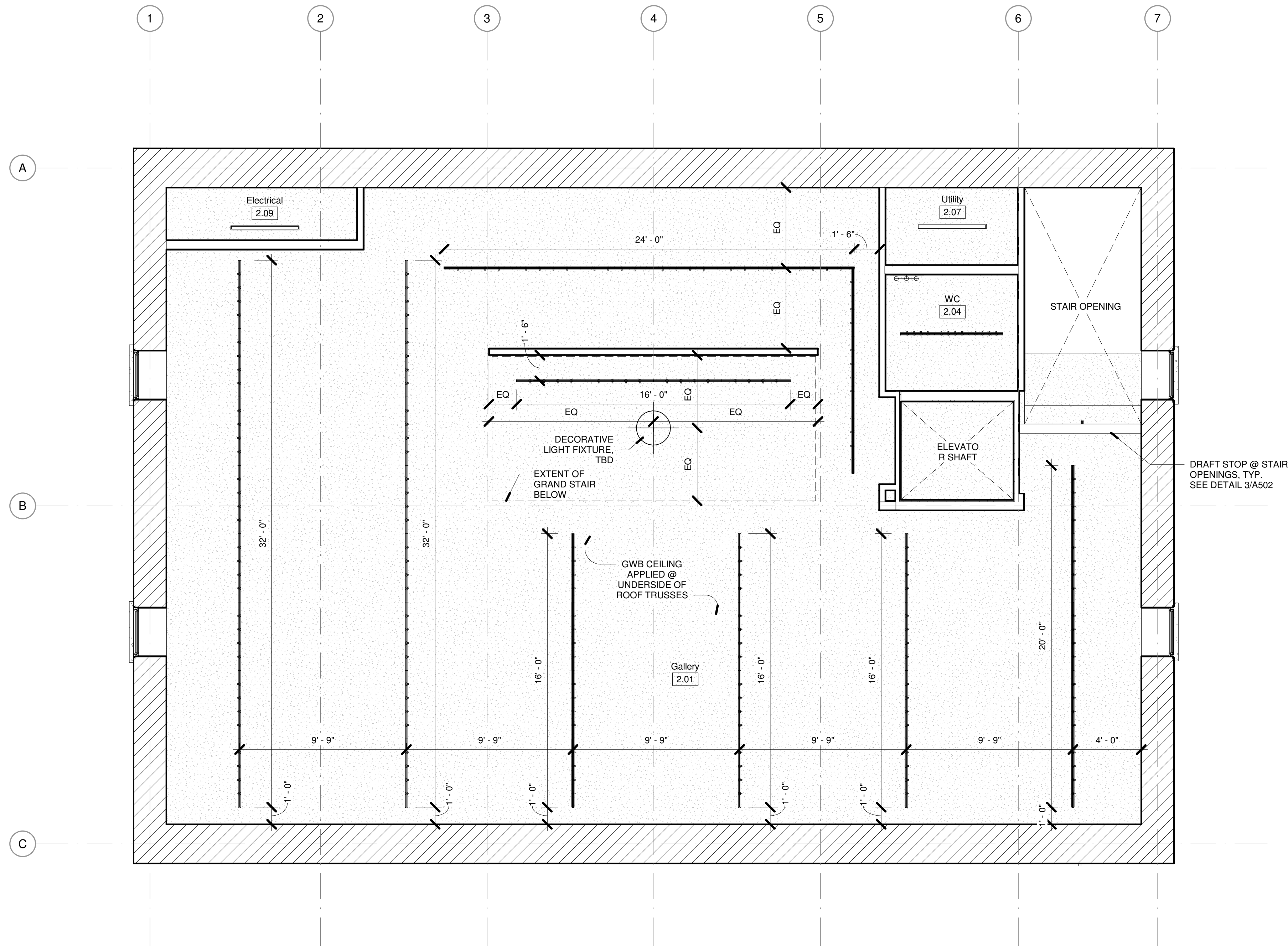
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 DAT 03/28/2019
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REVISIONS
 NO. DATE NOTES

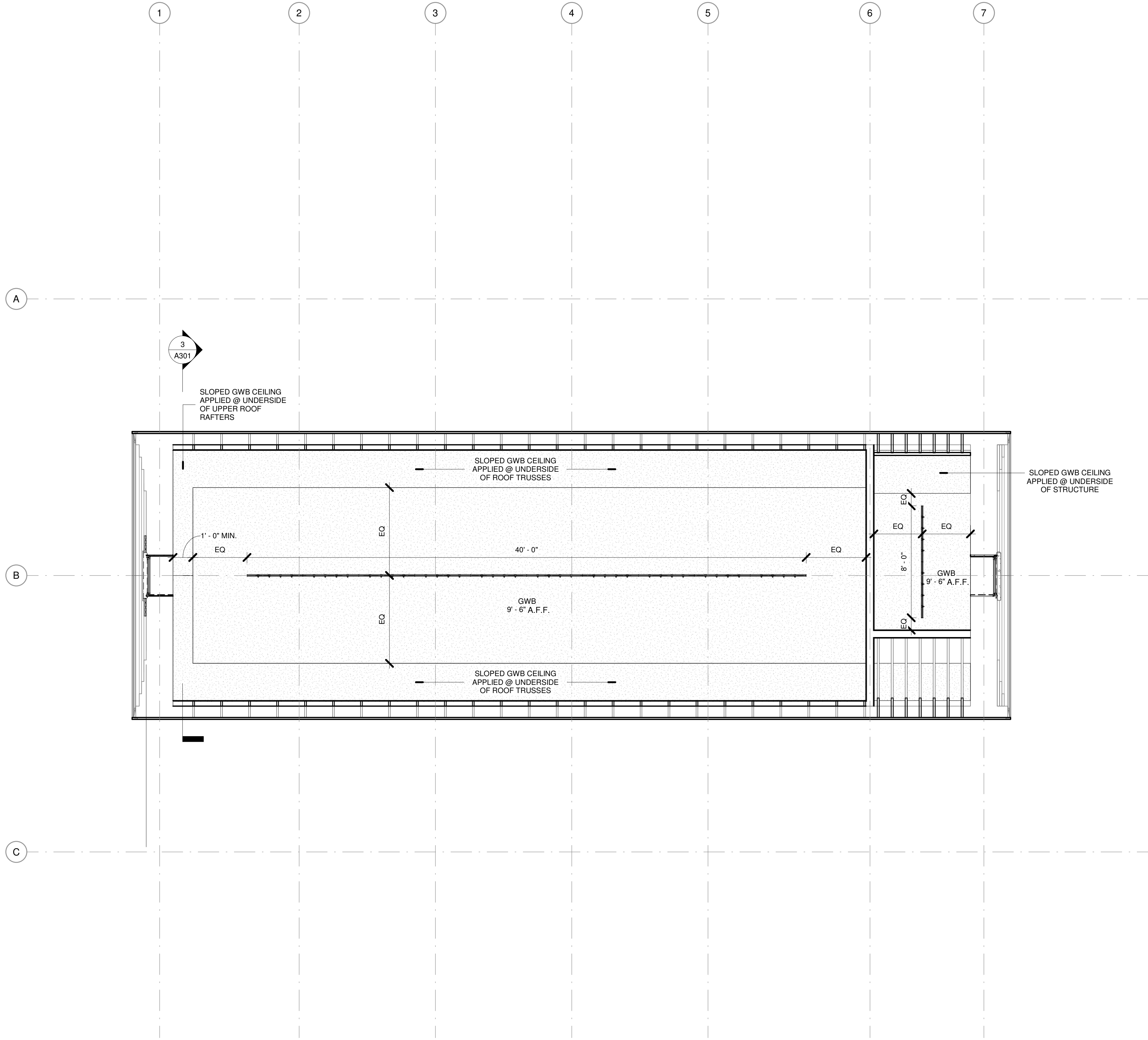
SECOND FLOOR RCP

A112

LIGHTING FIXTURE	
	Decorative pendant light.
	Track lighting, see electrical drawings for specifications *Final layout to be field coordinated by owner
	Surface mounted utility light
	Vanity light *Centered over sink typ.
	Recessed can light *Exterior grade fixture



1 SECOND FLOOR RCP
 SCALE : 1/4" = 1'-0"



① **ATTIC RCP**
SCALE: 1/4" = 1'-0"



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2 Old Elm St, North Billerica MA, 01862

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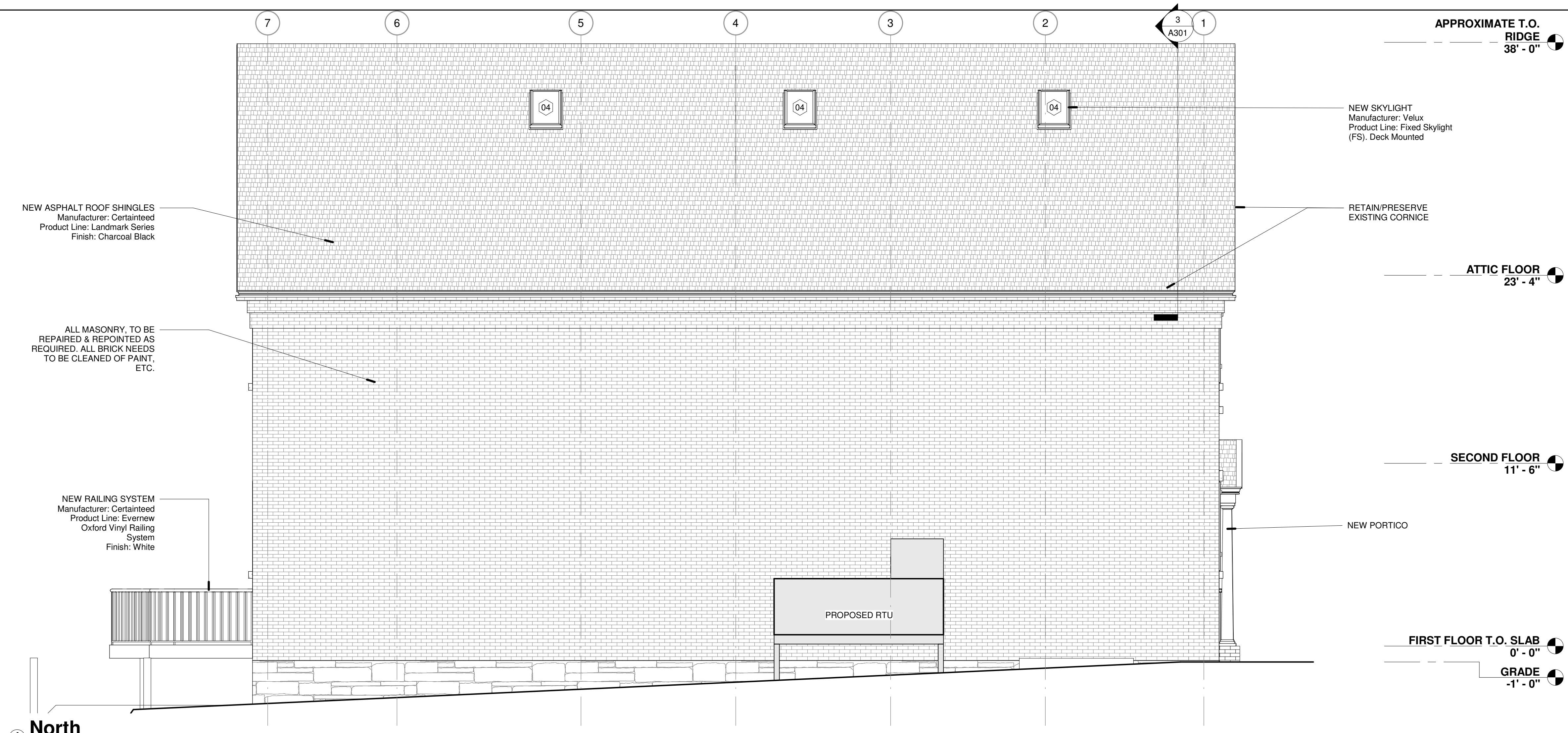
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DAT 03/28/2019
DRAWN CLM

REVISIONS
NO. DATE NOTES

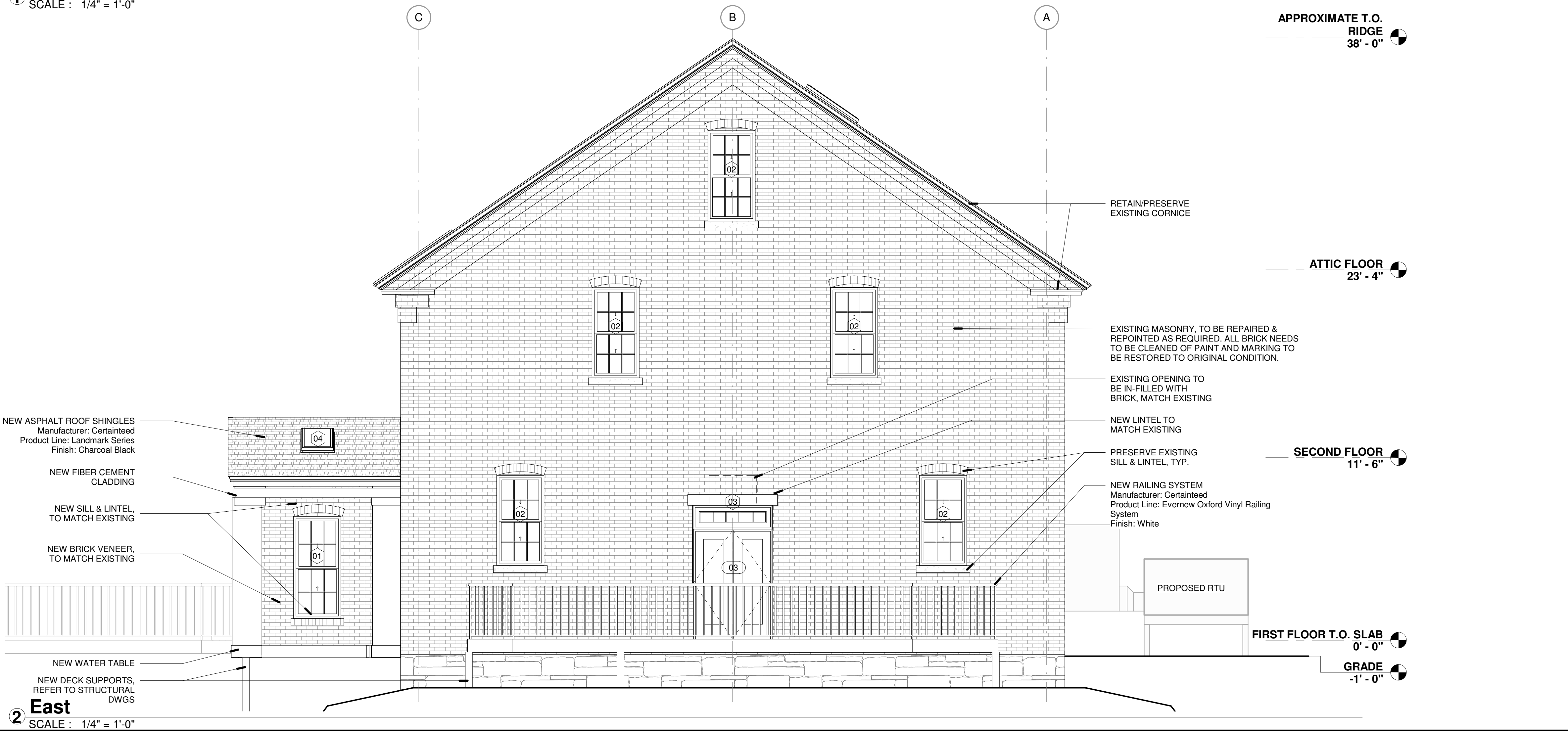
NO.	DATE	NOTES

ATTIC RCP

A113



1 North
SCALE : 1/4" = 1'-0"



2 East
SCALE : 1/4" = 1'-0"



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REVISIONS		
NO.	DATE	NOTES

ELEVATIONS

A201



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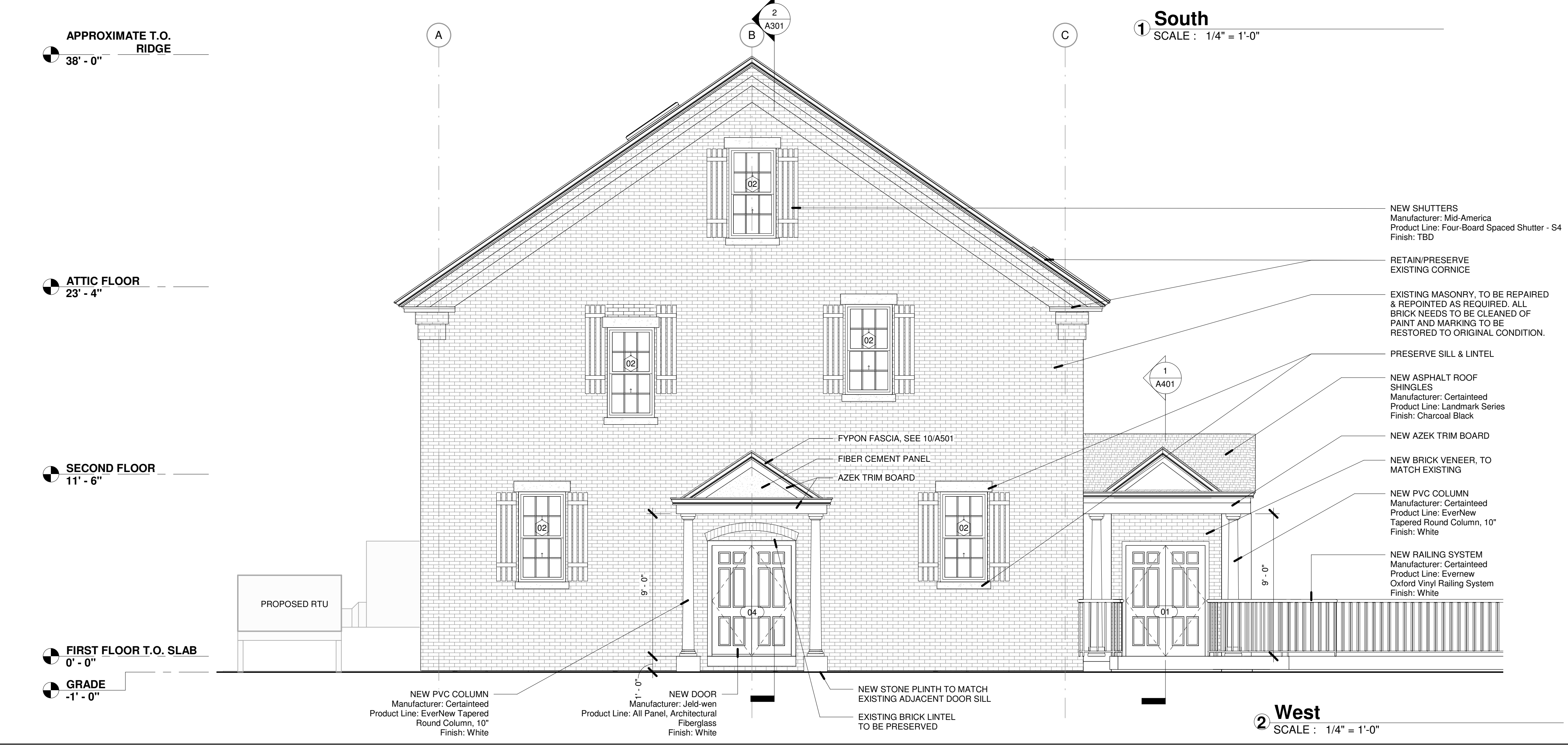
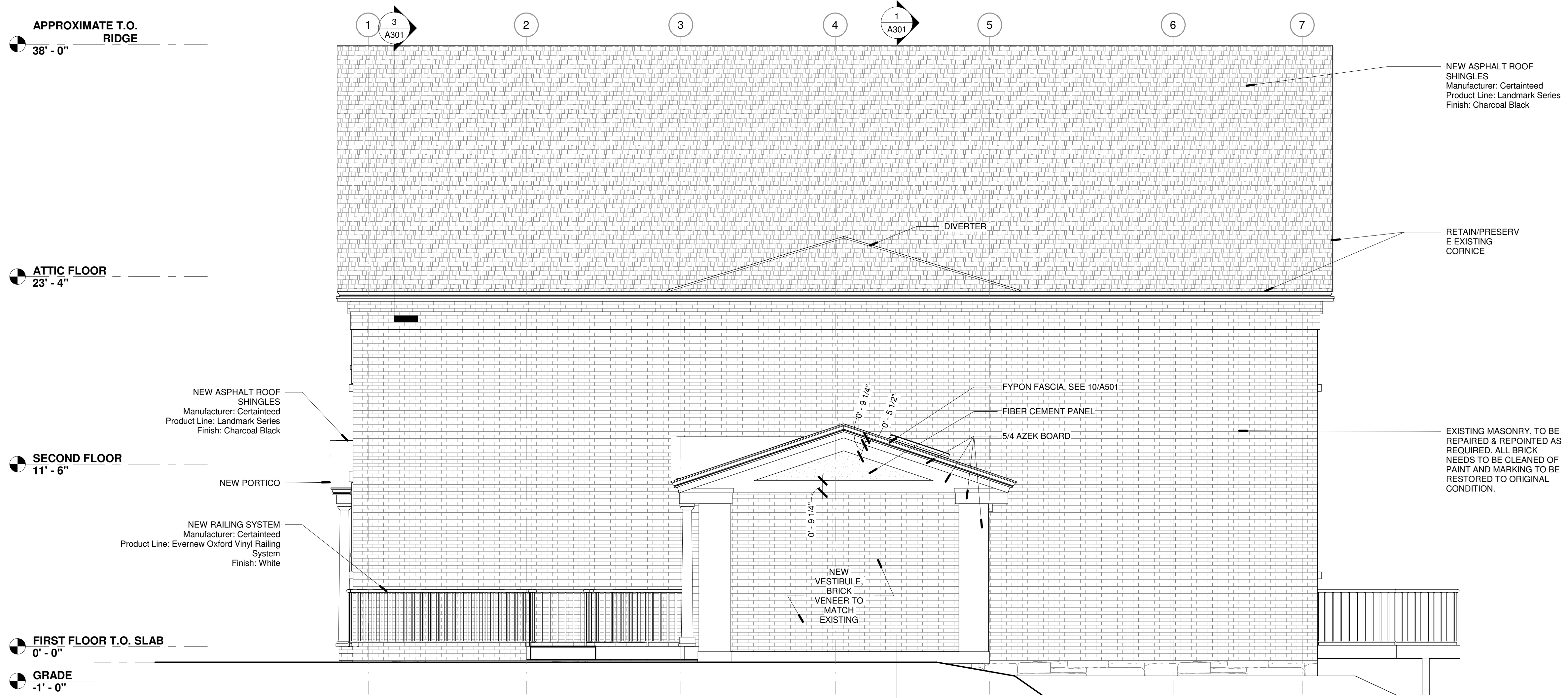
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DAT 03/28/2019
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REVISIONS

NO.	DATE	NOTES

ELEVATIONS

A202



APPROXIMATE T.O. RIDGE
38' - 0"

ATTIC FLOOR
23' - 4"

SECOND FLOOR
11' - 6"

FIRST FLOOR T.O. SLAB
0' - 0"

GRADE
-1' - 0"

APPROXIMATE T.O. RIDGE
38' - 0"

ATTIC FLOOR
23' - 4"

SECOND FLOOR
11' - 6"

FIRST FLOOR T.O. SLAB
0' - 0"

GRADE
-1' - 0"

1 South
SCALE : 1/4" = 1'-0"

2 West
SCALE : 1/4" = 1'-0"



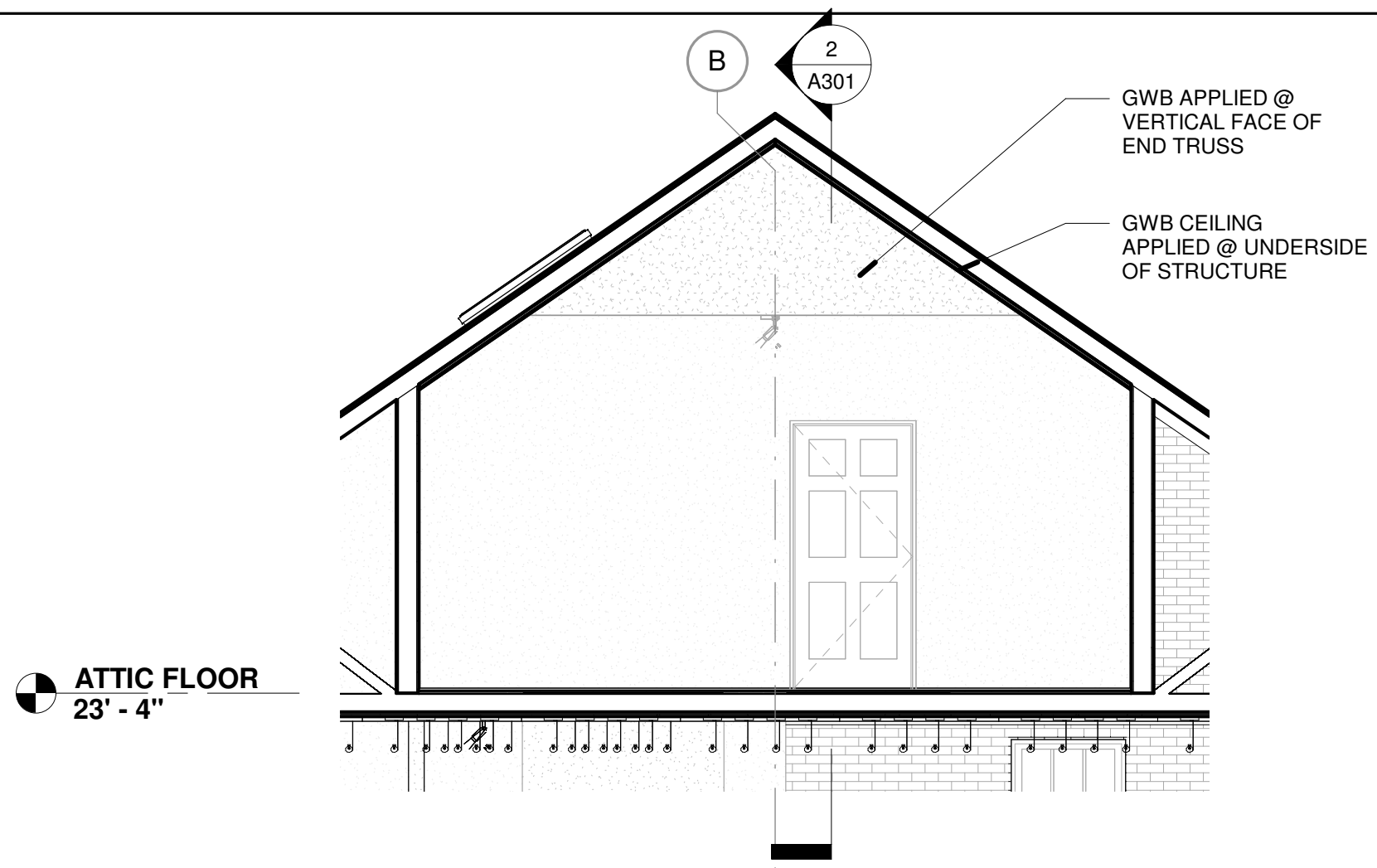
ISSUED FOR PERMIT

PROJ. 1807-01
DAT 03/28/2019
DRAWN CLM

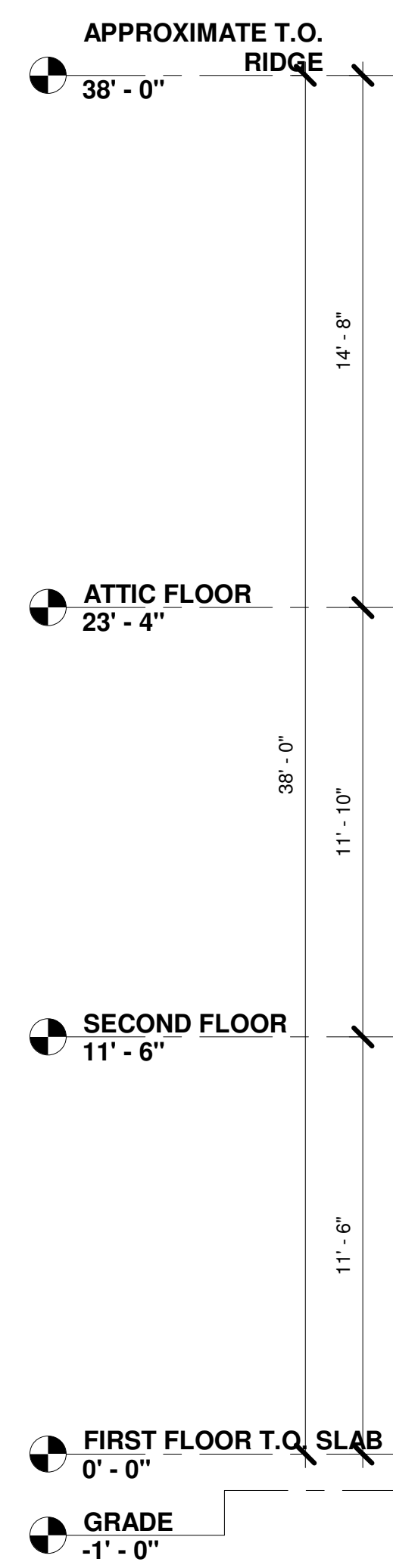
REVISIONS
NO. DATE NOTES

BUILDING SECTIONS

A301



SECTION @ FRONT GABLE END
SCALE: 1/4" = 1'-0"



ROOF ASSEMBLY @ EXISTING BUILDING:

- ASPHALT SHINGLES
- 5/8" ZIP SHEATHING TAPE & ROLL SEAMS
- 2" CLOSED CELL SPRAY FOAM, R-12 MIN
- OPEN-CELL SPRAY FOAM, R-26 MIN.
- WOOD TRUSSES, SEE STRUCTURAL
- 1x3 STRAPPING @ 16" O.C.
- 5/8" TYPE 'C' FIRE RATED GYPSUM BOARD
- PAINTED, COLOR TBD.

WALL ASSEMBLY @ EXISTING BUILDING:

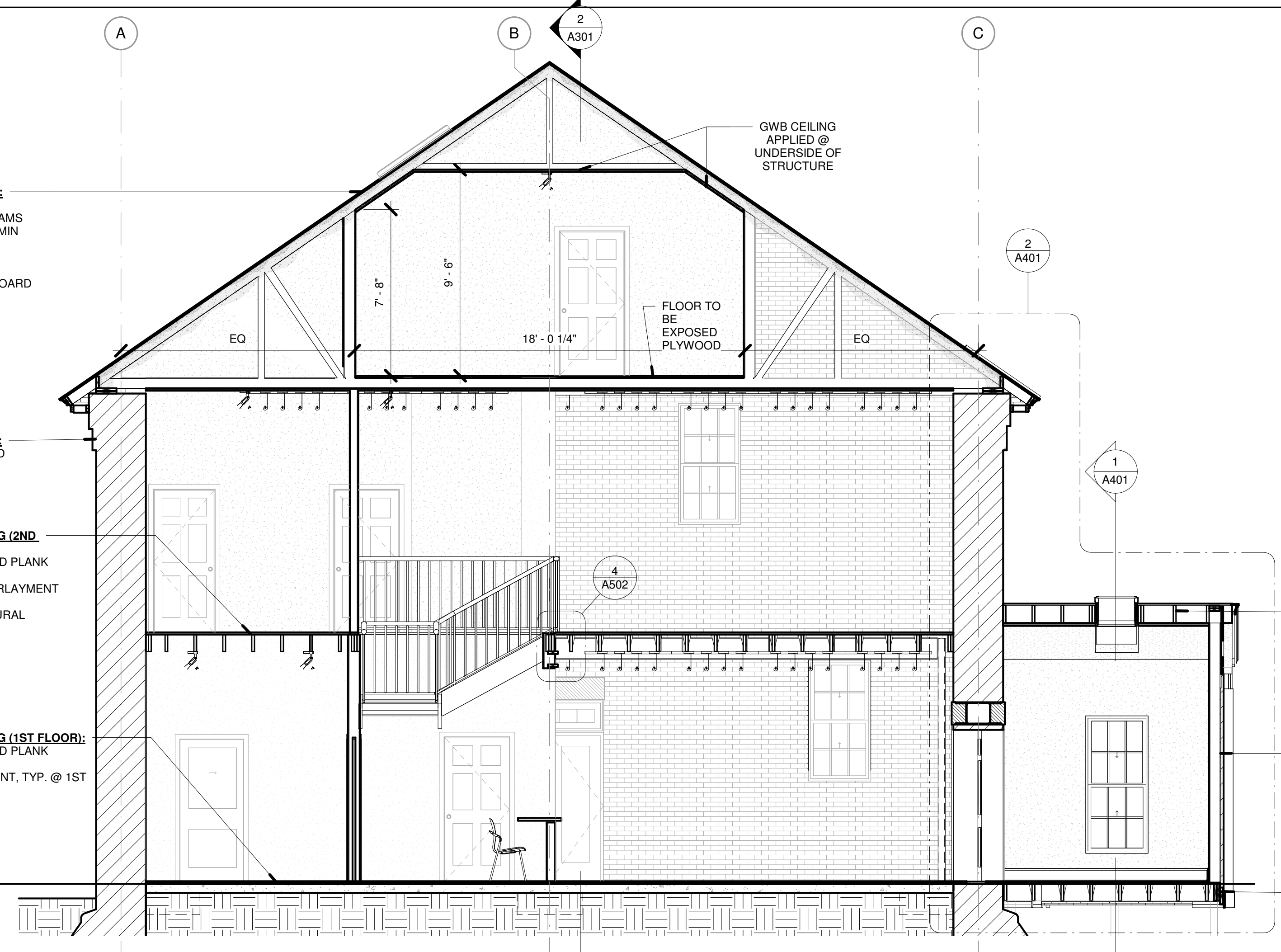
- EXISTING MASONRY TO BE REPAIRED AND REPOINTED AS REQ'D. LEFT EXPOSED ON BOTH INTERIOR AND EXTERIOR

FLOOR ASSEMBLY @ EXISTING BUILDING (2ND FLOOR):

- 1/2" FINISHED FLOORING, HARDWOOD PLANK (FINISH TBD)
- 1/4" SOUNDPROOFING FLOOR UNDERLAYMENT
- 3/4" FLOOR SHEATHING
- WOOD FLOOR JOISTS, SEE STRUCTURAL
- STRUCTURE TO BE LEFT EXPOSED

FLOOR ASSEMBLY @ EXISTING BUILDING (1ST FLOOR):

- 3/4" FINISHED FLOORING, HARDWOOD PLANK (FINISH TBD)
- 1/4" SOUNDPROOFING UNDERLAYMENT, TYP. @ 1ST AND SECOND FLOORS
- 3/4" P.T. FLOOR SHEATHING
- 6 MIL POLY VAPOR BARRIER
- CONCRETE SLAB, SEE STRUCTURAL
- 6 MIL POLY VAPOR BARRIER
- 6" COMPACTED GRAVEL MIN.



ROOF ASSEMBLY @ NEW VESTIBULE:

- ASPHALT SHINGLES
- 5/8" ZIP SHEATHING
- WOOD RAFTERS, SEE STRUCTURAL
- 1x3 STRAPPING @ 16" O.C.
- 5/8" GYPSUM BOARD
- PAINTED, COLOR TBD.

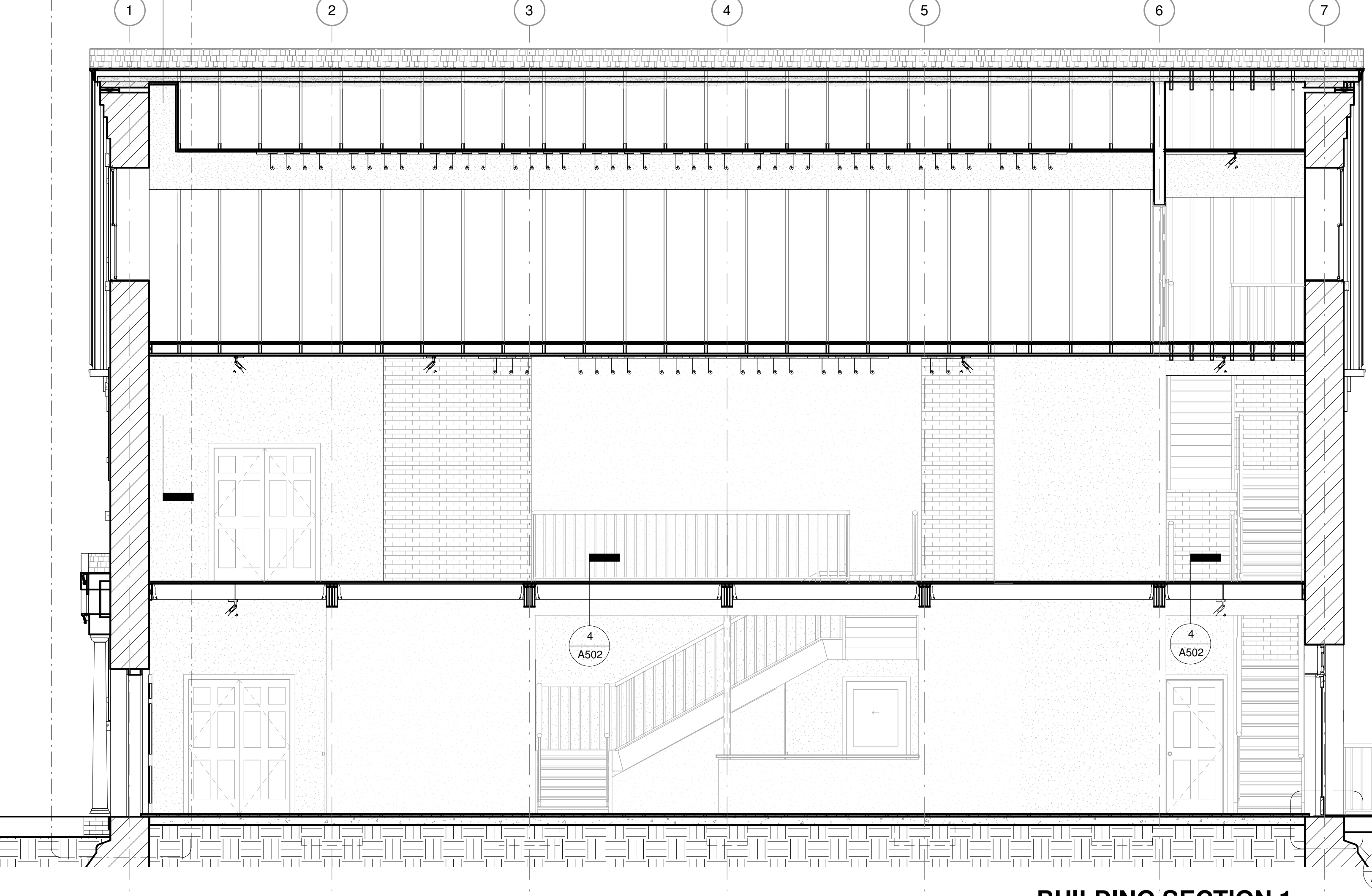
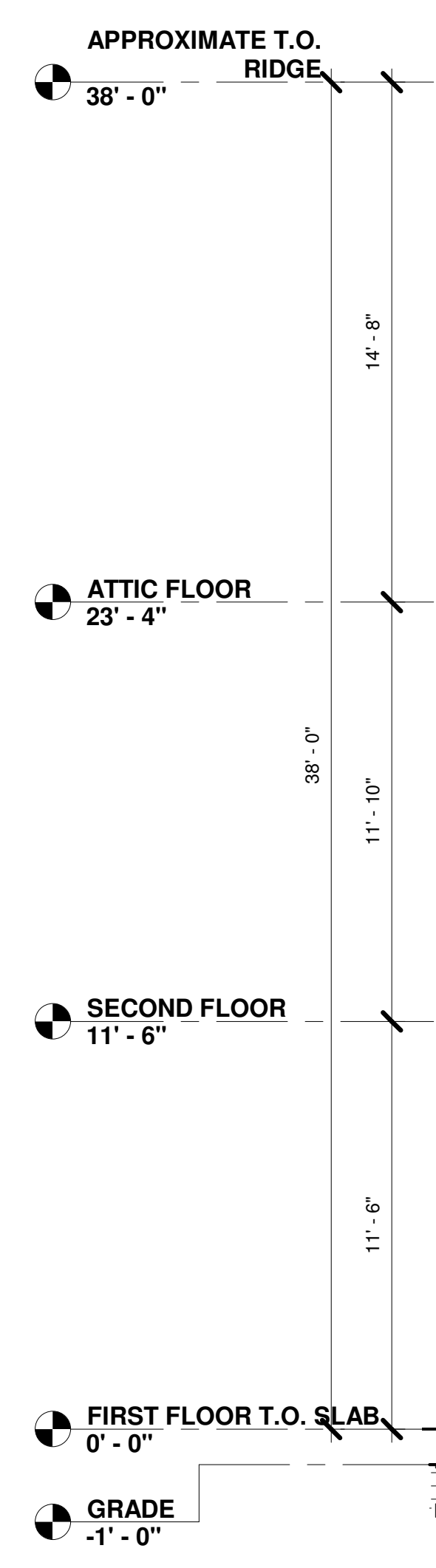
WALL ASSEMBLY @ NEW VESTIBULE:

- SIDING, SEE ELEVATIONS
- 1/2" ZIP PANEL
- F.R.T. 2x6 WOOD WALL FRAMING
- 1/2" GYPSUM BOARD
- PAINTED, COLOR TBD.

FLOOR ASSEMBLY @ NEW VESTIBULE:

- FINISHED FLOORING, HARDWOOD PLANK (FINISH TBD)
- 3/4" FLOOR SHEATHING
- P.T. WOOD FLOOR JOISTS, SEE STRUCTURAL

BUILDING SECTION 2
SCALE: 1/4" = 1'-0"



BUILDING SECTION 1
SCALE: 1/4" = 1'-0"



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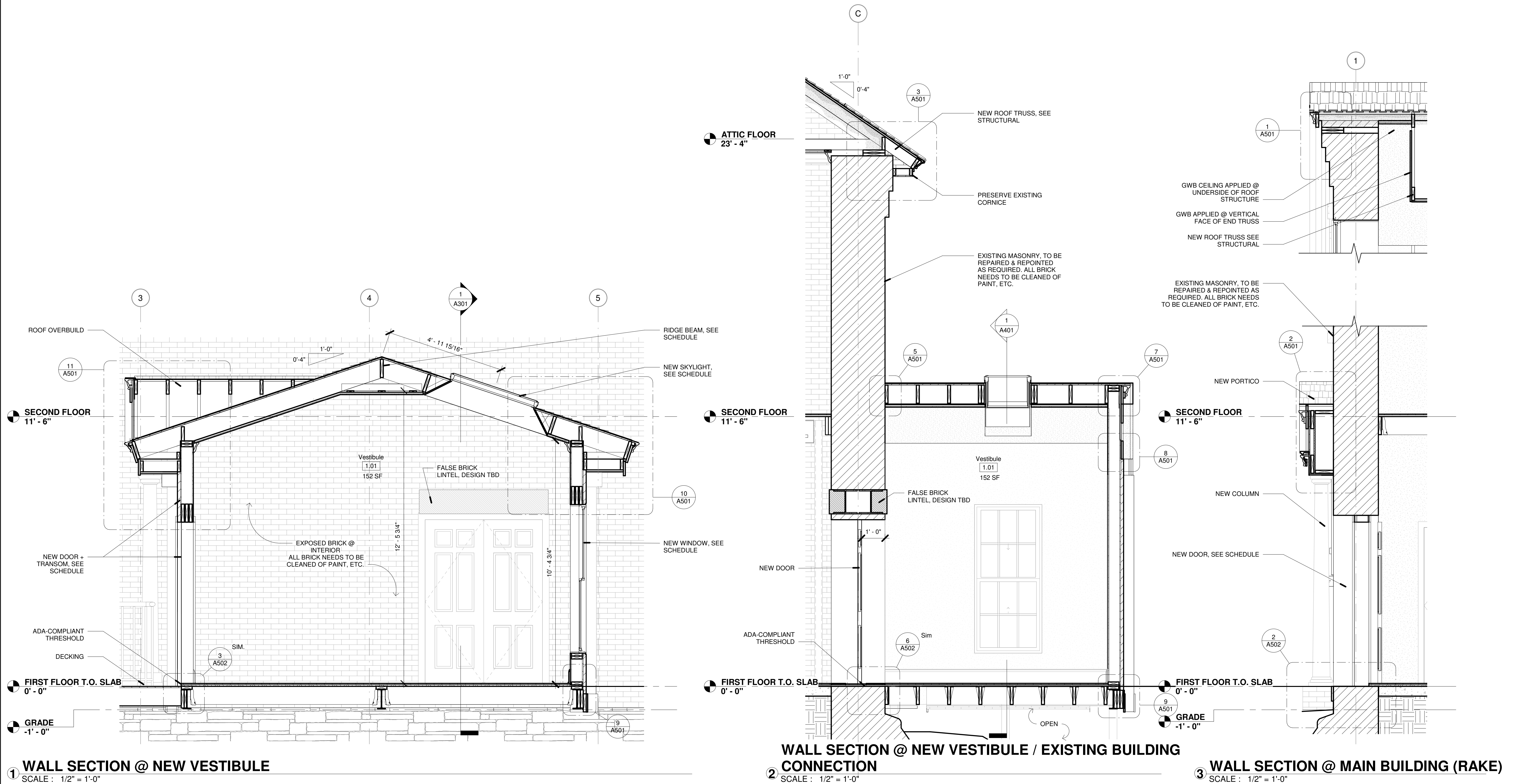
PROJ. 1807-01
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REVISIONS

NO.	DATE	NOTES

WALL SECTIONS

A401





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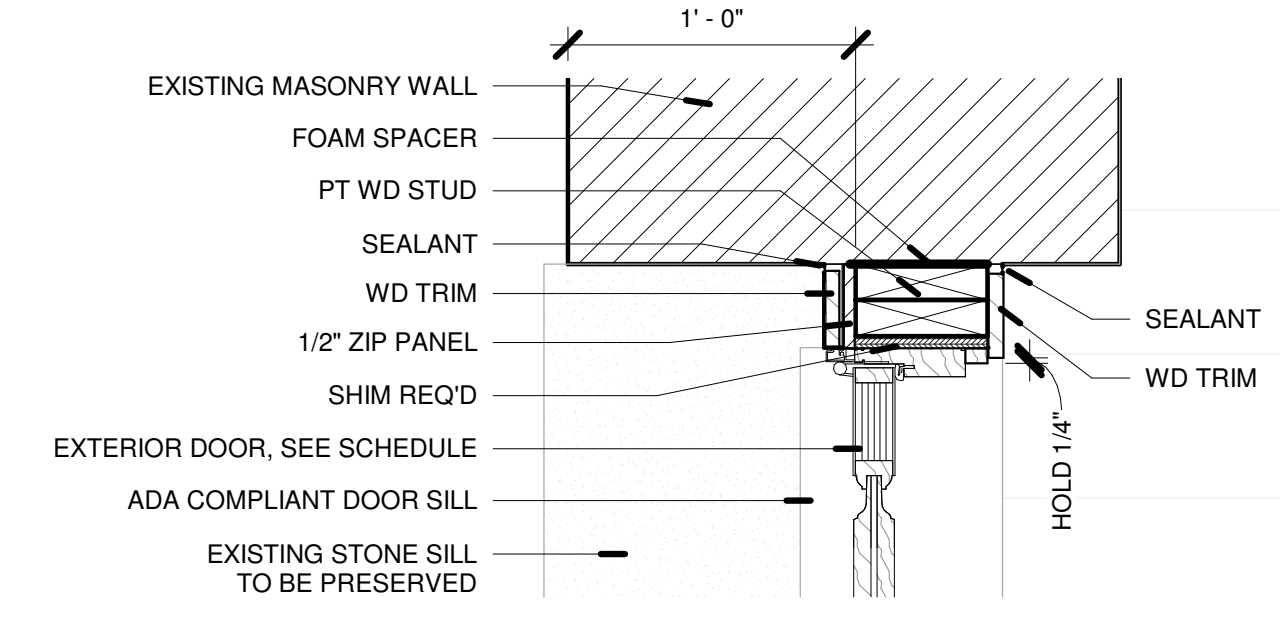
PROJ. 1807-01
DAT 03/28/2019
DRAWN CLM

REVISIONS

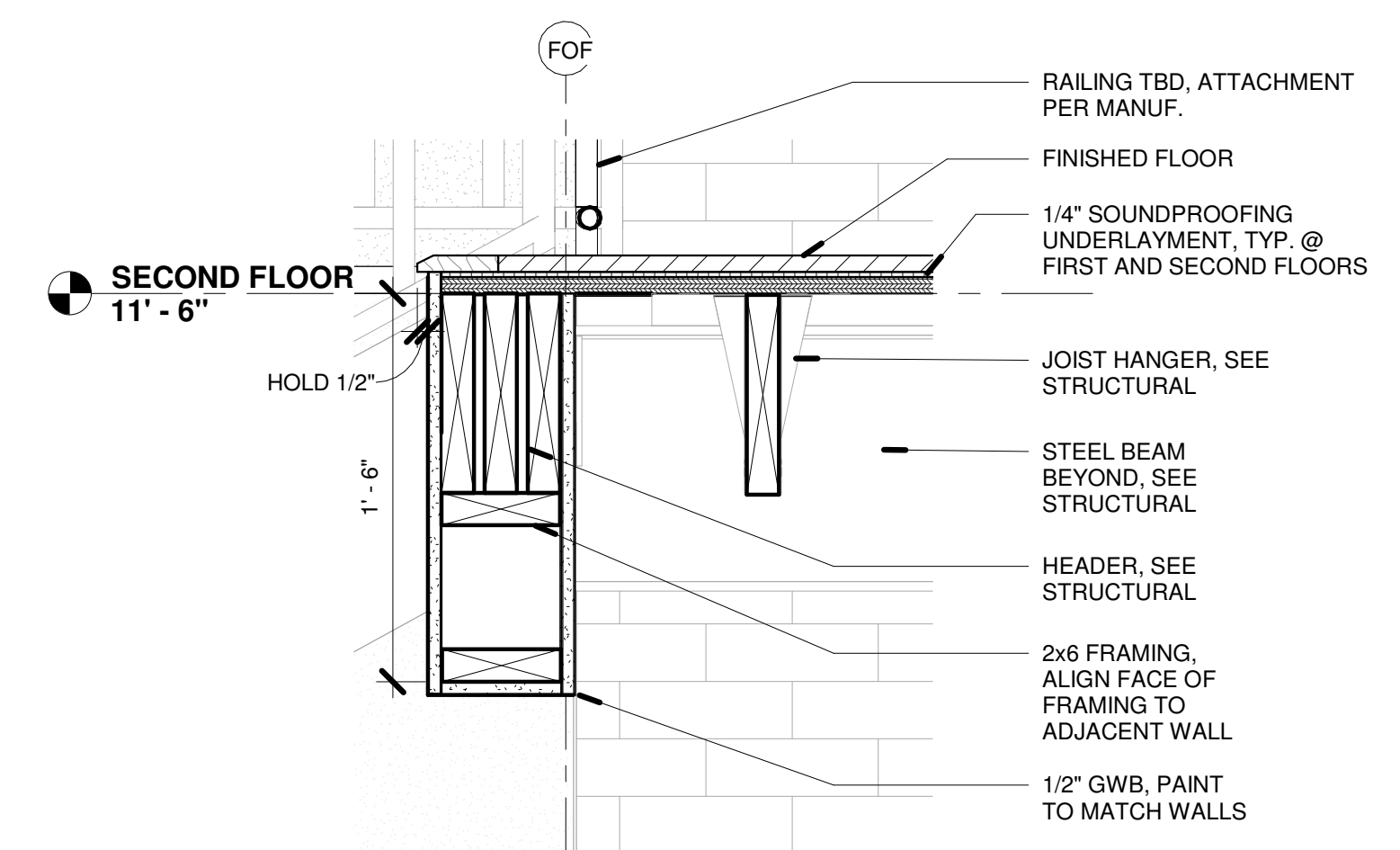
NO.	DATE	NOTES

DETAILS & ASSEMBLIES

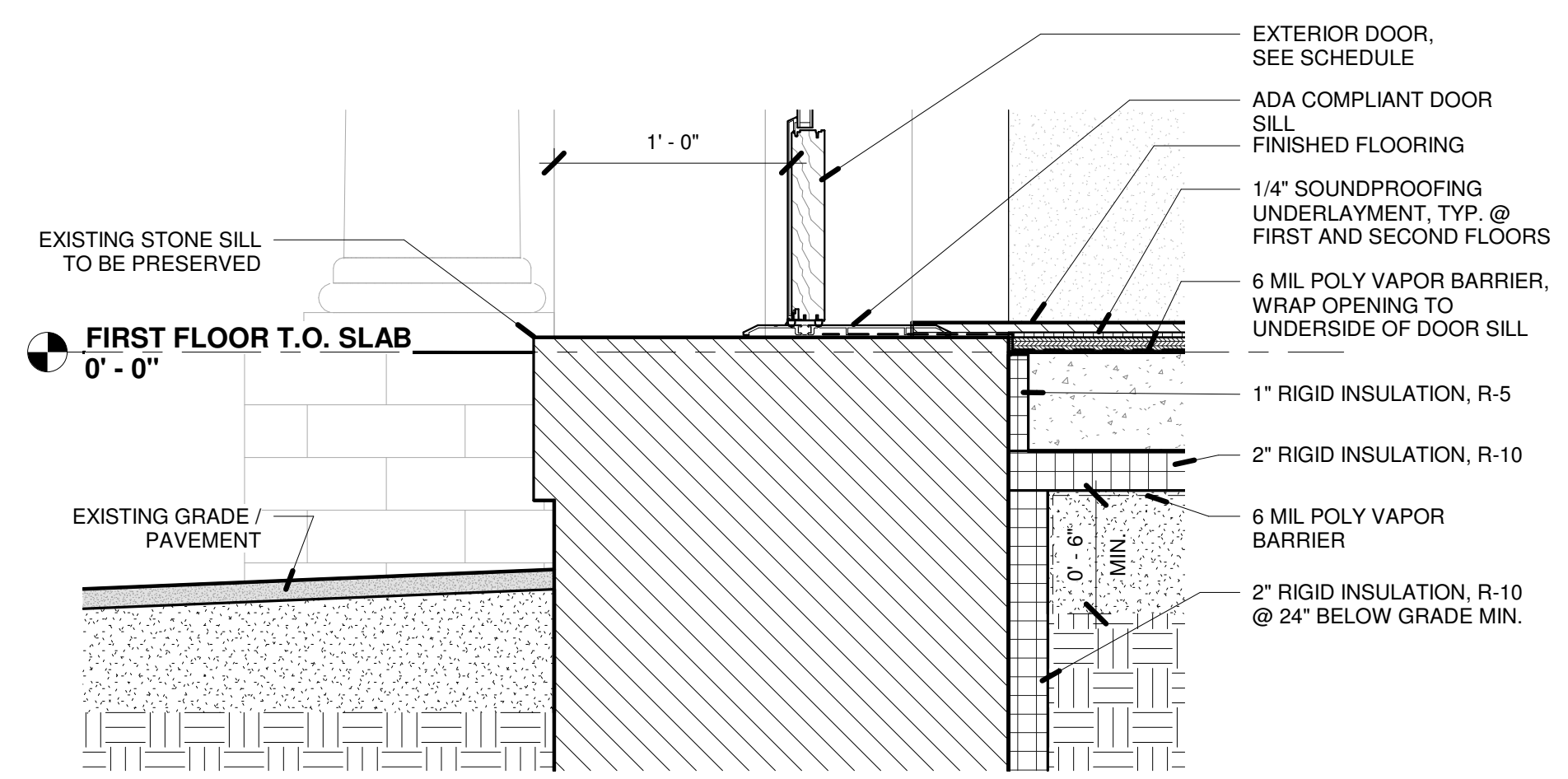
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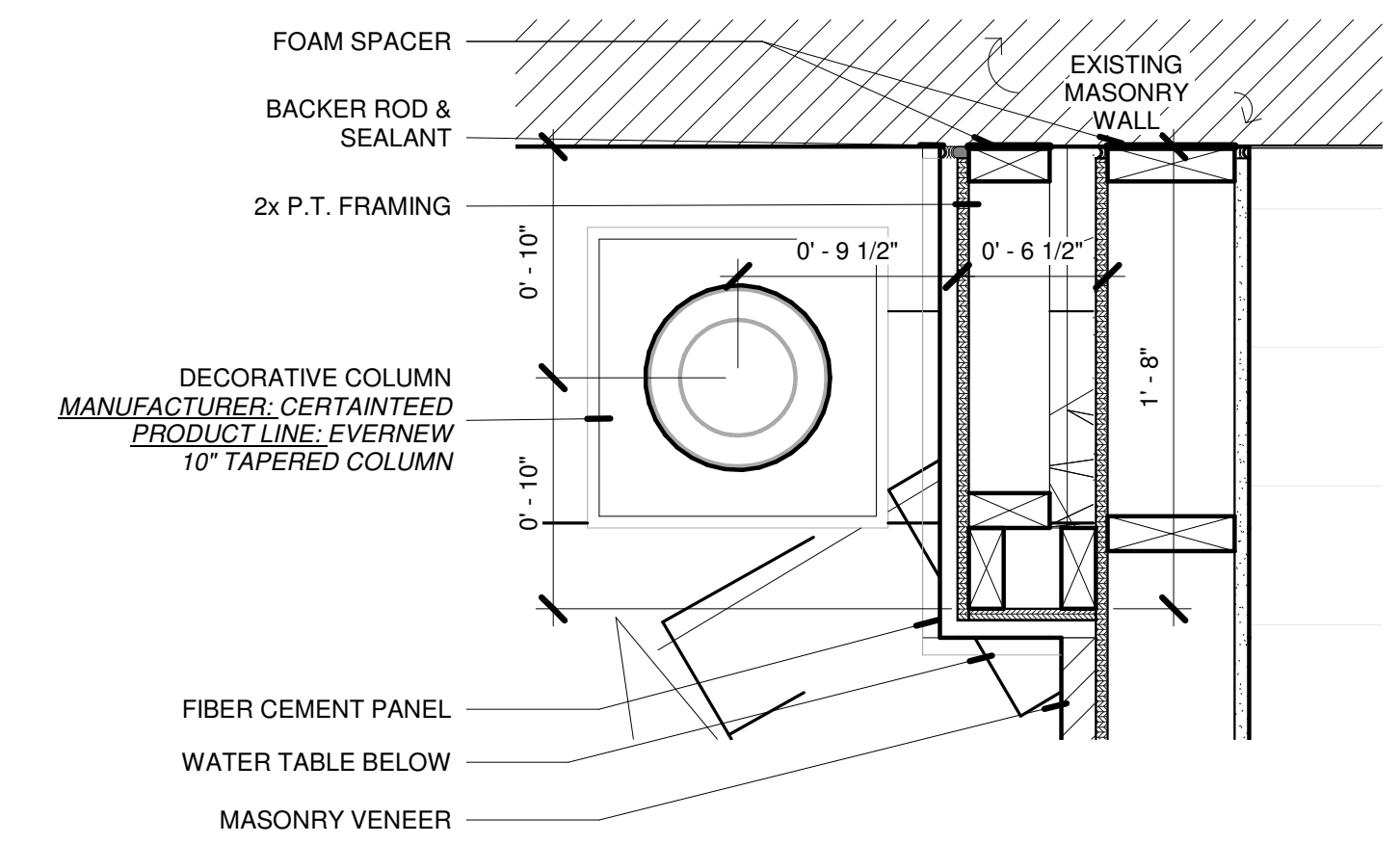
1 DOOR JAMB @ EXISTING STREET SIDE DOOR
SCALE : 1 1/2" = 1'-0"



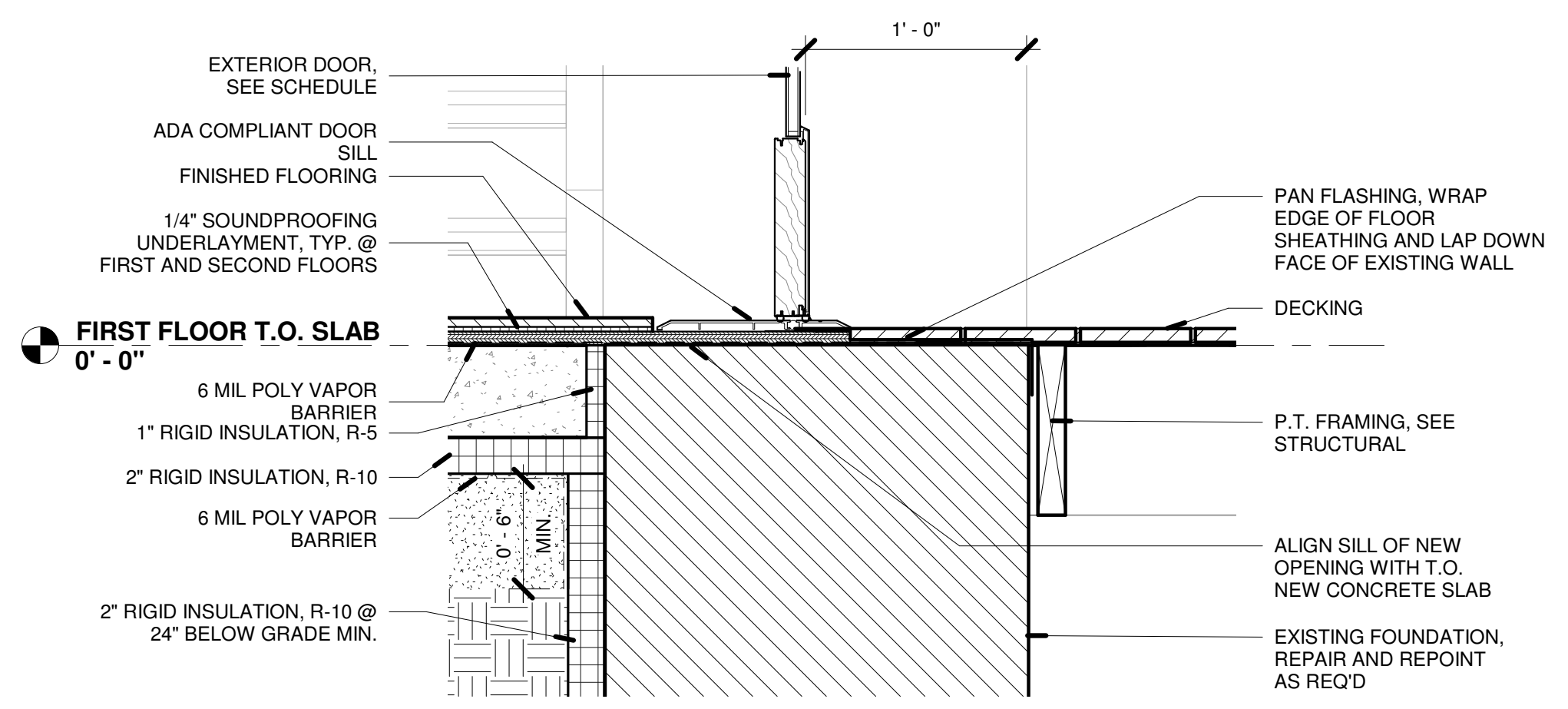
4 DRAFT STOP DETAIL @ STAIR OPENINGS
SCALE : 1 1/2" = 1'-0"



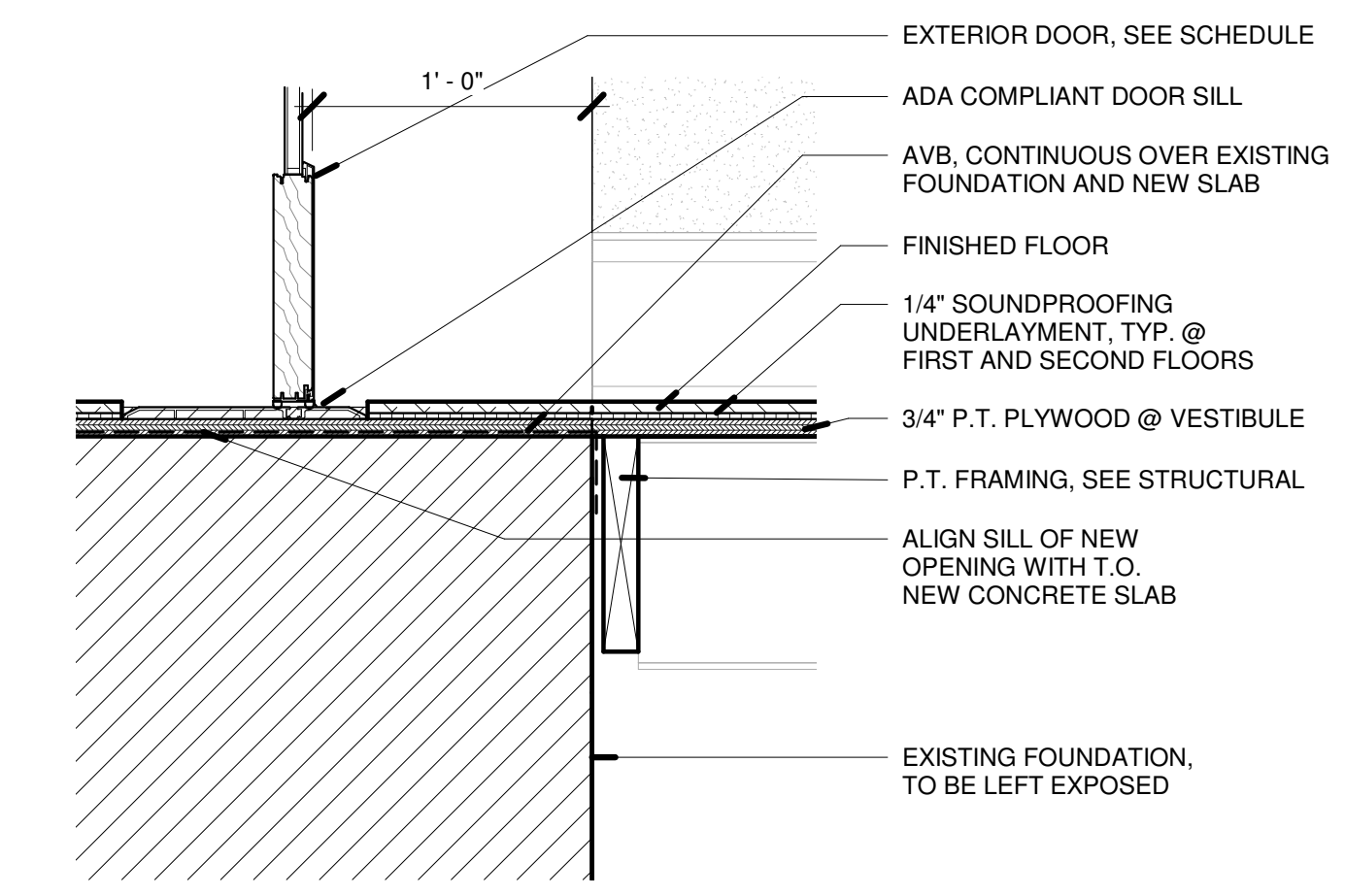
2 DOOR SILL @ EXISTING STREET SIDE DOOR
SCALE : 1 1/2" = 1'-0"



5 PLAN DETAIL @ NEW VESTIBULE CONNECTION
SCALE : 1 1/2" = 1'-0"

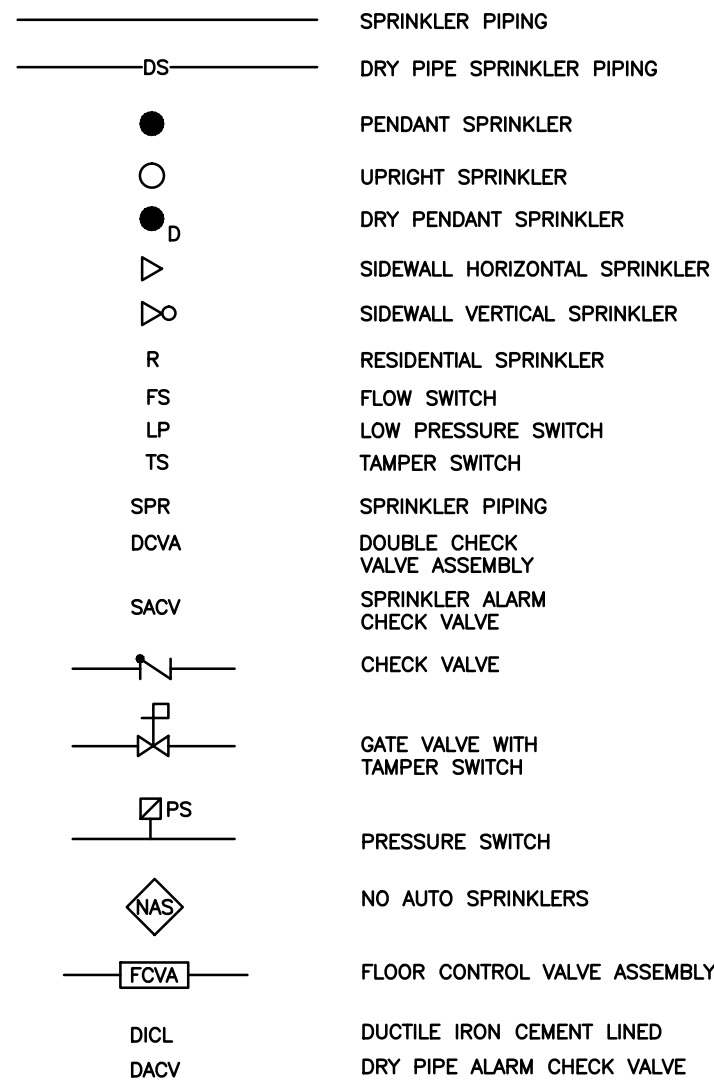


3 DOOR SILL @ NEW DECK
SCALE : 1 1/2" = 1'-0"



6 DOOR SILL @ NEW VESTIBULE
SCALE : 1 1/2" = 1'-0"

SPRINKLER LEGEND



GENERAL FIRE PROTECTION NOTES:

- 1. ALL WORK SHALL BE IN STRICT ACCORD WITH THE MASSACHUSETTS BUILDING CODE, 780 CMR.
2. THE FIRE PROTECTION CONTRACTOR IS TO APPLY, PAY AND SECURE PERMITS FOR THE WORK REQUIRED UNDER THIS CONTRACT.
3. THE FIRE PROTECTION 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 FIRE PROTECTION CONTRACTOR SHALL VERIFY ALL PIPE SIZES (REQUIRED TO BE 5. CONNECTED TO, OR OTHERWISE ALTERED BY THE WORK OF THIS CONTRACT) IN THE FIELD, PRIOR TO NEW WORK.
6. FIRE PROTECTION CONTRACTOR SHALL COORDINATE ALL REQUIRED ELECTRICAL WORK WITH THE OWNER'S ELECTRICAL CONTRACTOR.
7. FIRE PROTECTION CONTRACTOR SHALL COORDINATE WITH THE OWNER ON EXACT LOCATIONS OF ALL EXPOSED-TO-VIEW WORK THAT IS PART OF THIS CONTRACT.

James N. Polando, PE, CPD, FASPE
Consulting Engineer

FIRE PROTECTION NARRATIVE REPORT
December 12, 2018

Project: Middlesex Canal Museum and Visitors Center.
2 Old Elm St.
North Billerica, MA

General: Renovation of a 2 1/2 story existing storehouse building for housing the Middlesex Canal Visitors Center and Museum.

Code reference: 780 CMR 9th Edition

Fire Protection systems as follows, per 780 CMR Chapter 9:

Design methodology for the protection of the occupancy and hazards in accordance with this code and applicable NFPA Standards:
Building to be protected with sprinkler systems, fed from a new sprinkler water service main from the street main. The building will be protected throughout in compliance with NFPA-13 standards. Building sprinkler systems include both dry-pipe type in areas subject to freezing, and wet-pipe type in all other areas of the building.

Systems and equipment to comply with NFPA-13, and 24.

Sequence of operation of all fire protection systems and operations:

- 1. Wet-Pipe sprinkler system: System to be pressurized with water at all times and be equipped with quick response sprinklers, fused for release of water upon heat opening each sprinkler.
2. Dry-Pipe sprinkler system: System to be changed with pressurized air to prevent the flow of water to the piping system, until such time that one or more sprinklers are opened by heat. This opening will allow water to flow into the piping system and discharge.
3. Testing criteria to be used for final system acceptance: All testing is to comply with NFPA-13, 24 and 25.

B. Building and site access for fire-fighting and/or rescue vehicle(s) and personnel.
Building is accessed Old Elm.

C. Fire hydrant(s) location and water supply information.

- Fire hydrants are located along Old Elm Street.
• Test Date: 9/12/2018
• Static Pressure: 113 PSIG
• Residual Pressure: 90 PSIG
• Flow Rate: 998 GPM

242 Merriam Street
Weston, MA 02493

Registered Plumbing and Fire Protection Engineer

Cell 781.697.7173
JNPolando@gmail.com

James N. Polando, PE, CPD, FASPE
Consulting Engineer

Elevation Difference from First Floor Level: +/- 0 Ft.

D. Type/description and design layout of the automatic sprinkler system(s).

- Wet pipe sprinkler system throughout all building areas, with the exception of the elevator shaft, and areas protected with dry-pipe sprinklers.
• Dry-pipe sprinkler system protecting the attic and Second floor areas of the building.
• Sprinkler systems to be hydraulically calculated by the installing contractor, and be calculated to provide 0.10 GPM/SF over the hydraulically most remote 1,500 SF (Light Hazard), except as noted herein.
• The dry-pipe system calculations are to include q 30% factor, as required by NFPA-13.
• Storage rooms shall be protected to 0.15 GPM (Ordinary hazard Group I) over the entire areas,

E. Automatic sprinkler system(s) control equipment location.

- All alarm check valves and sprinkler flow monitoring equipment is located in the First floor water/sprinkler service room. This room is accessed from the building main entry, and does not have direct access from outdoors.

F. Type/description and design layout of the automatic standpipe system(s).

- No applicable.

G. Standpipe system hose valve(s) type and location.

- No Applicable.

H. Fire department Siamese connection type(s) and location.

- Fire department pumper connection is a 4" Storz connection, located on the building face perpendicular to Old Elm Street, and is to be located approximately 3 feet above grade.

I. Type/description and design layout of the fire protective signaling system(s).

- Separate fire alarm drawings, narrative, and specifications have been prepared. The new system will be an addressable system to monitor fire protection and HVAC duct-mounted smoke detectors and carbon monoxide sensors, with manual pull stations and alarm notification.
• Refer to fire alarm narrative on drawing FA.1.

J. Fire protective signaling system(s) control equipment and remote annunciator location

- The main fire alarm panel is located in the second floor electrical room. A remote annunciator is located at the first floor main entrance.

K. Type/description and design layout of the smoke control or exhaust system(s).

- No Smoke Control System.

L. Smoke control or exhaust system(s) control equipment location.

- N/A

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M. Building life safety system features (auxiliary functions) required to be integrated as part of the fire protective signaling system(s).

- Auxiliary fire alarm connections include indication at FACP that fire protection system has been activated.

N. Type/description and design layout of the fire extinguishing system(s).

- None

O. Fire extinguishing system(s) control equipment location.

- Not applicable.

P. Fire protection system(s) equipment room location.

- Fire protection system and related equipment located on first floor, with access from grade via the main building entrance along Old Elm Street.

Q. Fire protection system(s) equipment identification and operation signs.

- Equipment identification and operating signs are to be NFPA compliant.

R. Fire protection system(s) alarm/ supervisory signal transmission method and location.

- Fire alarm system is connected to third party monitoring company via dual telephone line connection.

S. Fire command center location.

- No Fire Command Center.

T. Type/description and location of any emergency alarm system.

- No Emergency Alarm System.

U. Type/description and location of any alternative fire suppression system or protection.

- None.

V. Type/description and location of any carbon monoxide protection.

- Carbon Monoxide detection for the RTU located in the second floor stairway and monitored by the FACP.

End of Report

242 Merriam Street
Weston, MA 02493

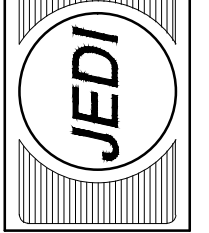
Registered Plumbing and Fire Protection Engineer

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JNPolando@gmail.com



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

JOHNSON ENGINEERING AND DESIGN, INC.
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SUITE 14
DANVERS, MA 01923
TEL: 978-646-9001
FAX: 978-646-9002
www.johnsonengineering.biz



JE 3220

Middlesex Canal Museum & Visitor's Center
2 Old Elm St, North Billerica MA, 01862

FIRE PROTECTION

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.
1. Wet-pipe type sprinkler system throughout building
2. Dry-pipe 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, 9th Edition.
2. NFPA 13 - Standard for the Installation of Sprinkler Systems.
3. NFPA 24 - Standard for the installation of private water service mains.
4. NFPA 101 - Life Safety Code.
B. Sprinklers:
1. Code Reference: Massachusetts State Building Code Section 9 Fire Protection Systems.
1.4. SYSTEM DISCRETION
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 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:
1. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mLi/s over 139-sq. m) area.
2. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (9.5 mLi/s over 139-sq. m) area.
3. 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
b. Museum display areas: Light Hazard
c. Building Service Areas: Ordinary Hazard, Group 1
d. Electrical Equipment Rooms: Ordinary Hazard, Group 1
e. General Storage Areas, including Attic: Ordinary Hazard, Group 1
f. Mechanical Equipment Rooms: Ordinary Hazard, Group 1
1.5. QUALITY ASSURANCE

- 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 those used in the design.
1. Submit list of proposed substitutions for review and approval in compliance with Article 3 of the Instructions to Bidders, AIA Document A701.
2. Comply with the provisions of Section 01300 of these specifications.
1.6. REFERENCES
A. Codes and Regulations:
1. 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).
4. Underwriters' Laboratories (UL).
5. Owner's Insurance Underwriter.
1.7. SUBMITTALS
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 3-months 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" request maintenance contracts to be priced.
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.
1.8. SPRINKLER WORKING PLANS
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.
D. Flow Test information:
a. Date: September 12, 2018
b. Conducted by: ASAP Sprinklers
c. Static Pressure: 113 PSIG
d. Residual Pressure: 90 PSIG
e. Pitot Pressure: 35 PSI
f. Flow Rate: 998 GPM
g. Elevation: Approximately 115 FL
h. Distance from building: Approximately 100 Ft.

- 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:
1. Failures in operation of operating component or components.
2. 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:
1. Grooved Fittings and Coupling: Victaulic.
2. Sprinkler Heads: Victaulic, Viking or Central.
3. 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 roll-groove 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 in areas without suspended ceilings.
B. Dry-pipe sprinklers to be rough brass finish, upright type, 1/2" 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.
2.5. SLEEVES AND PENETRATIONS
A. Provide sleeves for all work of this Section where piping penetrates floors or walls.
2.6. SPRINKLER 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

- shall be replaceable without removing the valve from the installed position. Water working pressure is 300 psi. Victaulic FireLock® Series 751, or equal.
B. Provide complete trim with valve, as detailed on the drawings and required by the AHJ.
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, stainless steel spring and shaft, peroxide cured EPDM diaphragm, EPDM seal, and Nitrile seat O-rings. Valve internal parts shall be replaceable without removing the valve from the installed position. Valve shall be externally resettable. Required air pressure is 13 psi. Water working pressure is 300 psi. Valve shall be provided with complete trim as a Vic®-Quick Riser, or equal. Victaulic FireLock® NXT Series 768N, or equal.
D. 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.
2.7. ACCESSORIES
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.
B. Electric Bell shall be 120 Volt, exterior mounted as by Victaulic, 120 Volt, rated.
C. Tamper switches shall be Potter Electric, or equal, UL listed, FM Approved fire service tamper switches rated for low voltage operation.
D. Flow switches shall be Potter Electric, or equal, UL Listed, FM Approved fire flow switches rated for low voltage operation.
E. Pressure switches shall be Potter Electric, or equal, UL Listed, FM Approved pressure switches rated for low voltage operation.
PART THREE - EXECUTION
3.1. INSTALLATION AND SPACING OF SPRINKLER HEADS
A. Center sprinklers in ceiling tiles and align with ceiling components such as lighting fixtures, diffusers, and smoke detectors.
B. Provide additional heads as required by NFPA 13, including appendices to protect areas where ceiling head spray pattern is obstructed.
3.2. INSTALLATION OF PIPING
A. Coordinate installation with work of other sections and install piping level or pitched back to main riser or low-point drain. Provide drain valve on trapped piping. Install sprinkler heads with return bend drops to ceiling.
3.3. TESTING
A. Test systems according to provisions of NFPA Standards and the additional requirements of the approving authority and this Section.
B. Hydrostatically test piping at 200 psi or higher for two hours, measured with a pressure gauge at the bottom of the Section being tested.
C. Test and certify water flow, pressure, and supervisory tamper switches.
END OF SECTION

ISSUED FOR PERMIT

PROJ. NO. 1807-01
DATE: 03/28/2018
DRAWN BY: MWG

Table with 3 columns: NO., DATE, NOTES

FIRE PROTECTION LEGEND, NARRATIVE & SPECIFICATIONS

FP1



CAVENEY
architecture + construction, inc.
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
SUITE 14
DANVERS, MA 01923
TEL: 978-646-9001
FAX: 978-646-9002
www.johnsonengineering.biz



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

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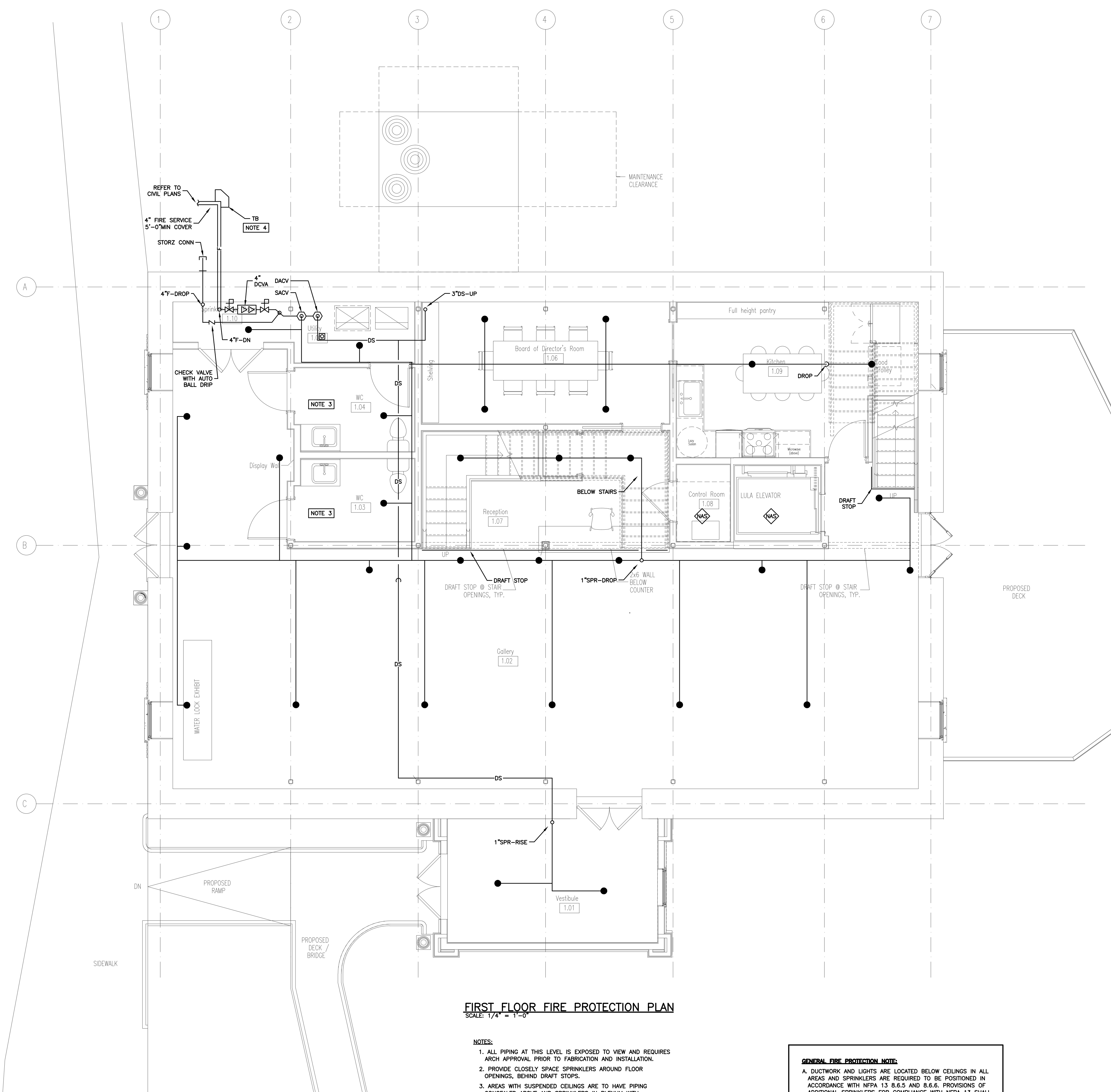
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DATE: 03/28/2018
DRAWN BY: M/G

REVISIONS

NO.	DATE	NOTES

FIRST FLOOR FIRE PROTECTION PLAN

FP2



FIRST FLOOR FIRE PROTECTION PLAN
SCALE: 1/4" = 1'-0"

- NOTES:**
- ALL PIPING AT THIS LEVEL IS EXPOSED TO VIEW AND REQUIRES ARCH APPROVAL PRIOR TO FABRICATION AND INSTALLATION.
 - PROVIDE CLOSELY SPACE SPRINKLERS AROUND FLOOR OPENINGS, BEHIND DRAFT STOPS.
 - AREAS WITH SUSPENDED CEILINGS ARE TO HAVE PIPING CONCEALED ABOVE AND SPRINKLERS IN PLENUM WITH COMBUSTIBLES.
 - TB = THRUST BLOCK, PROVIDE THRUST BLOCKS AND TIE RODS FOR FIRE SERVICE IN ACCORDANCE WITH NFPA-24.

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 BE PROVIDED WITHOUT ADDITIONAL COST TO THE OWNER.



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

ELECTRICAL, PLUMBING & FIRE PROTECTION CONSULTING ENGINEERS
JOHNSON ENGINEERING
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 5 ELM STREET
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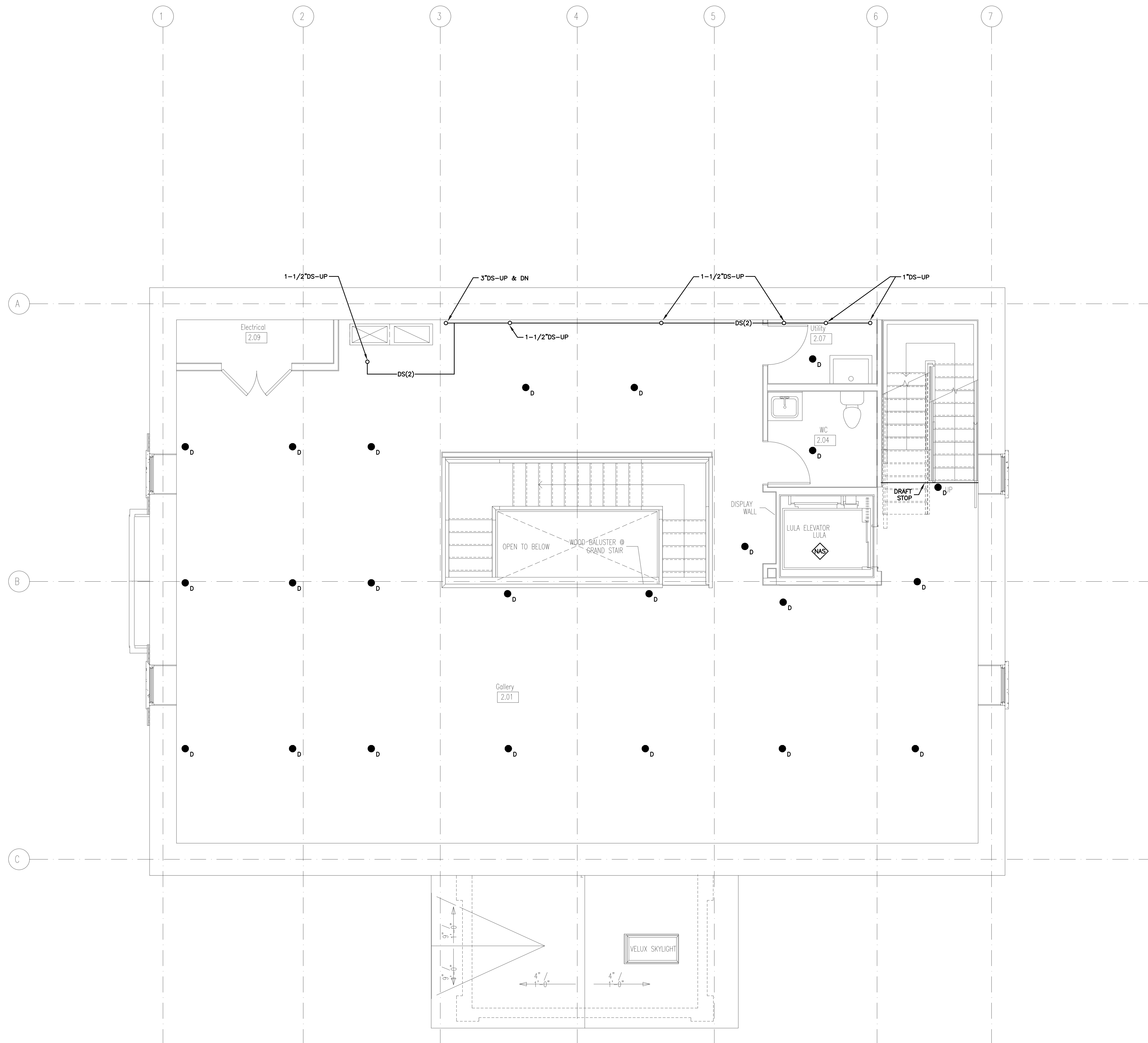
PROJ. NO. 1807-01
 DATE: 03/28/2018
 DRAWN BY: M/G

REVISIONS

NO.	DATE	NOTES

SECOND FLOOR
 FIRE PROTECTION
 PLAN

FP3



SECOND FLOOR FIRE PROTECTION PLAN
 SCALE: 1/4" = 1'-0"

- NOTES:**
1. ALL PIPING AT THIS LEVEL IS EXPOSED TO VIEW AND REQUIRES ARCH APPROVAL PRIOR TO FABRICATION AND INSTALLATION.
 2. PROVIDE CLOSELY SPACE SPRINKLERS AROUND FLOOR OPENINGS, BEHIND DRAFT STOPS.
 3. AREAS WITH SUSPENDED CEILINGS ARE TO HAVE PIPING CONCEALED ABOVE AND SPRINKLERS IN PLENUM WITH COMBUSTIBLES.

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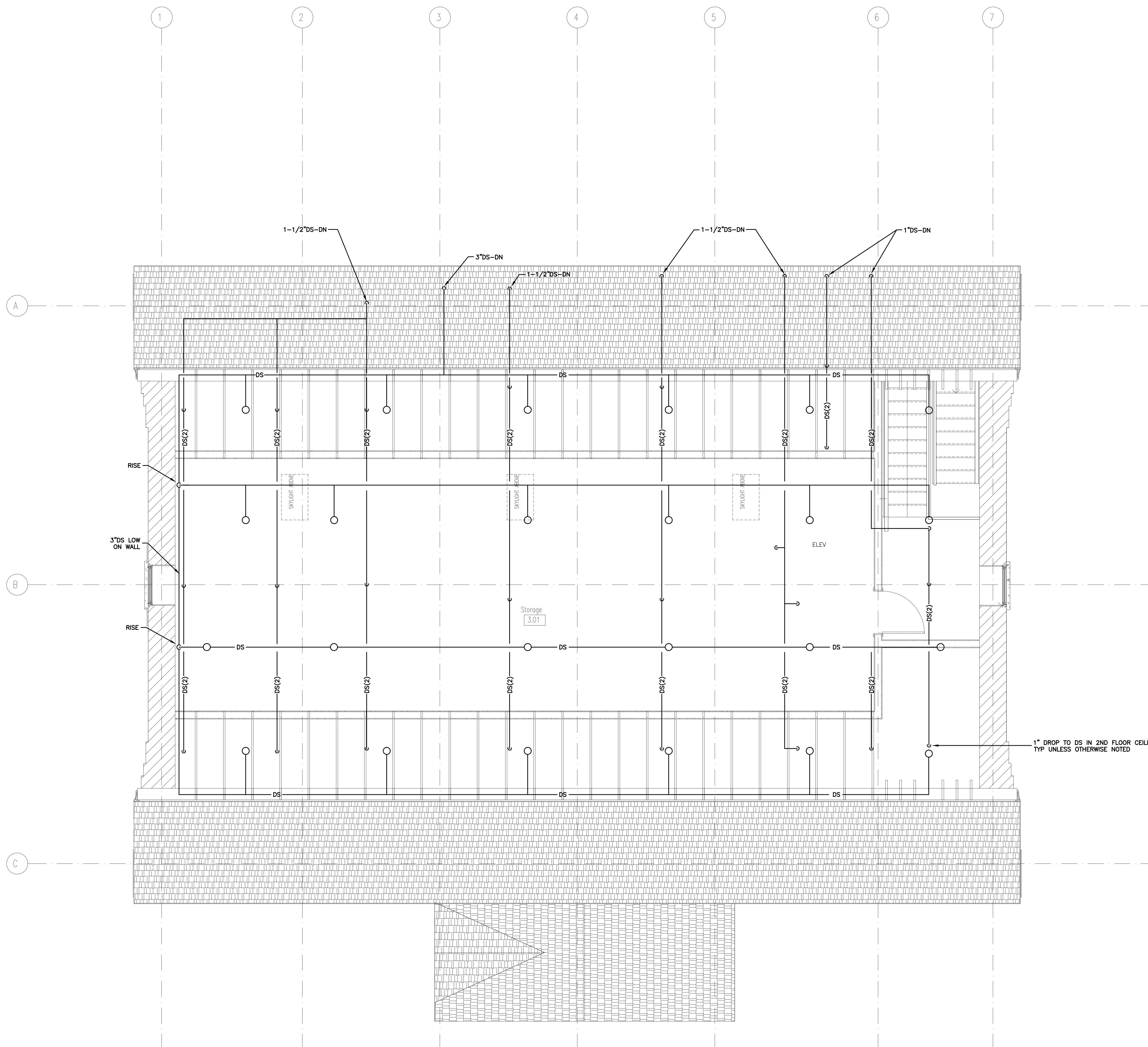
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PROJ. NO. 1807-01
 DATE: 03/28/2018
 DRAWN BY: M/G

REVISIONS
 NO. DATE NOTES

ATTIC FIRE
 PROTECTION PLAN

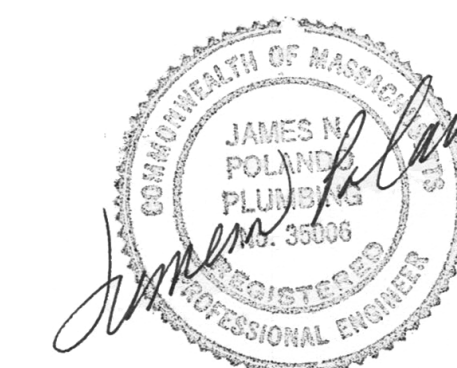
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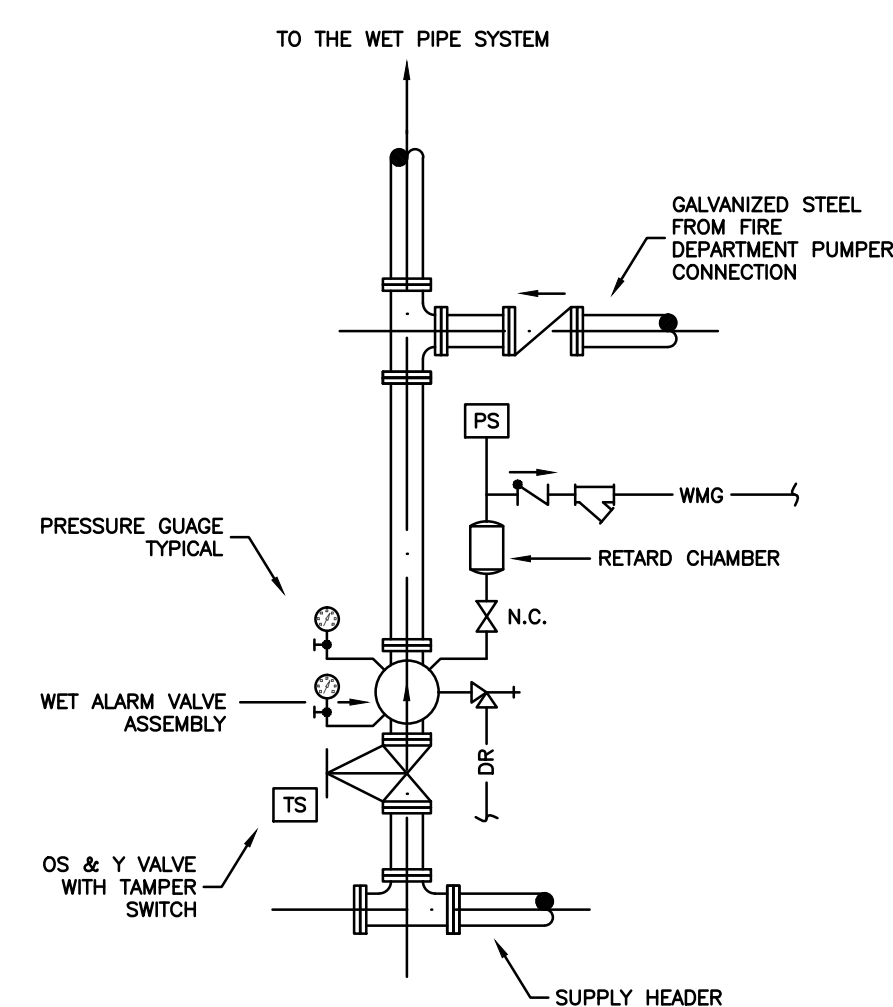
ATTIC FIRE PROTECTION PLAN
 SCALE: 1/4" = 1'-0"

- 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.

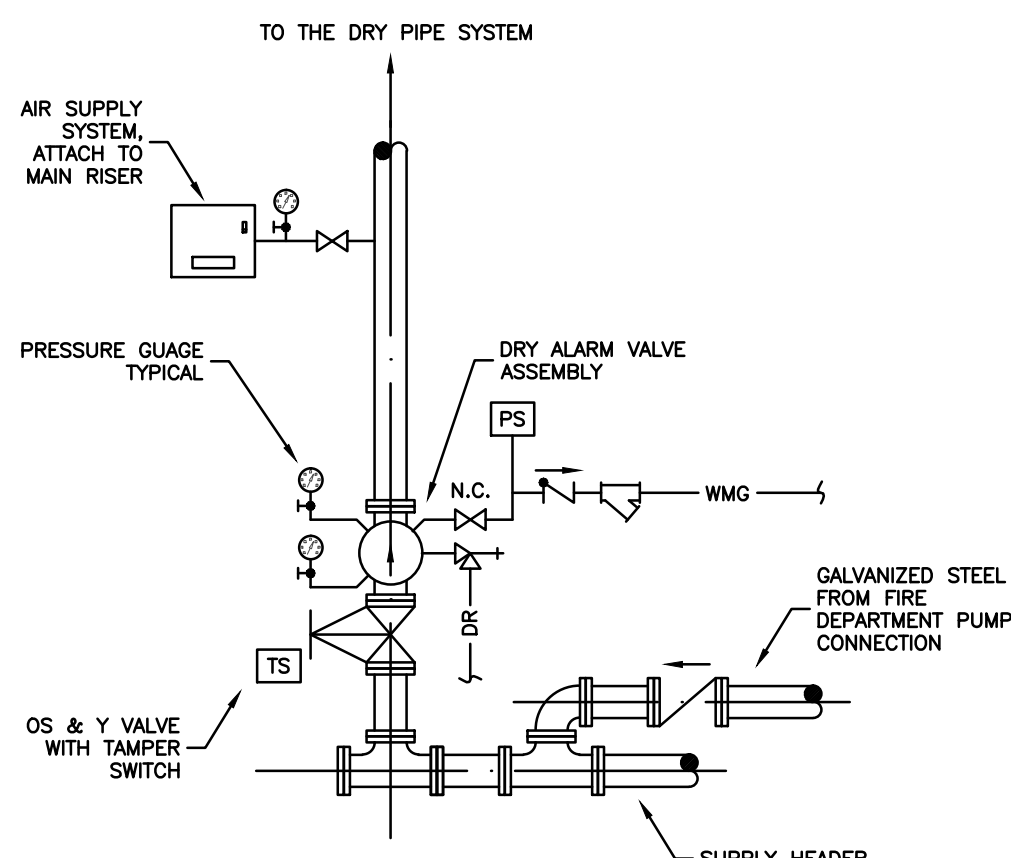
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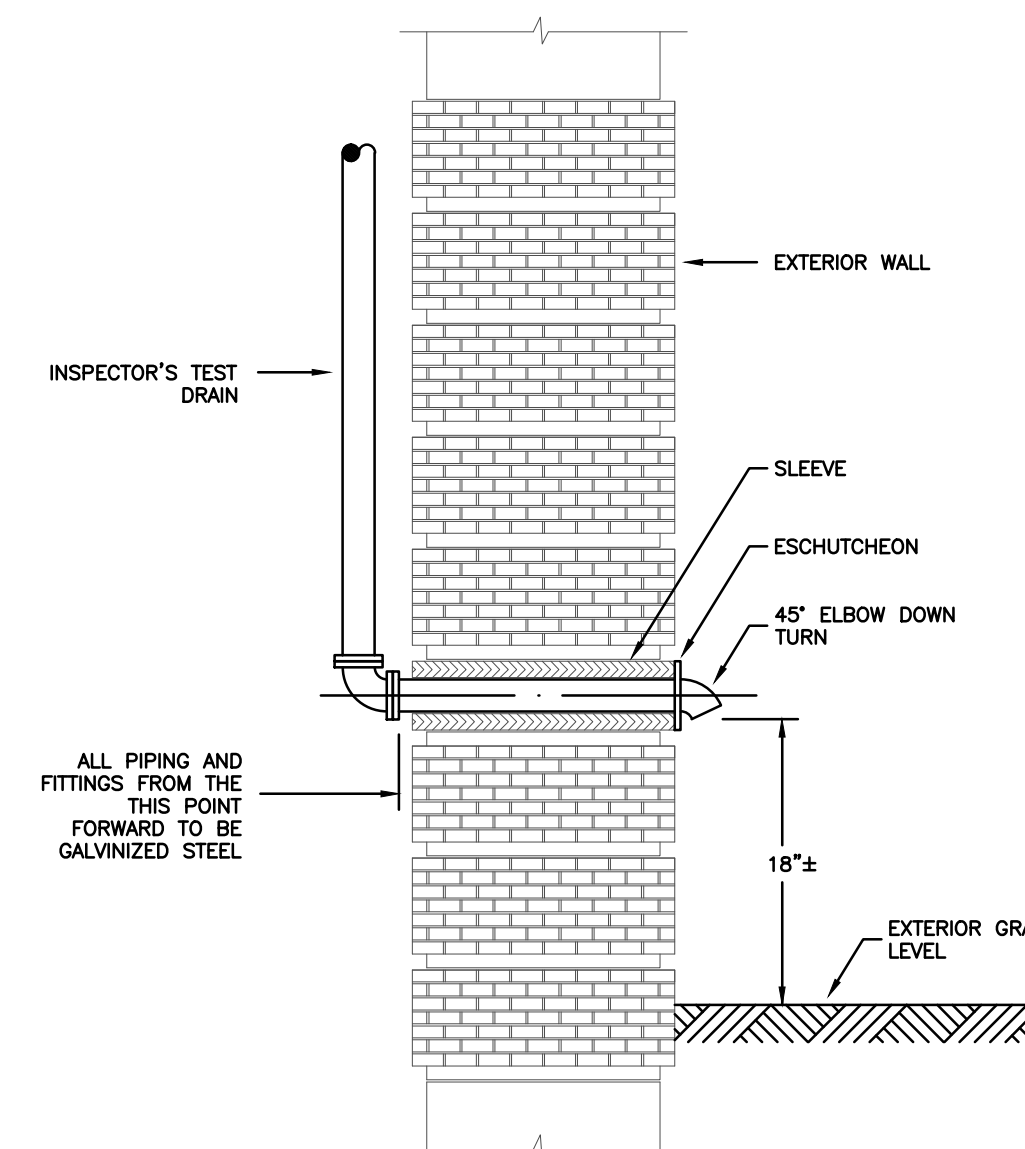
CAVENEY
architecture + construction, inc.
128 WARREN ST ■ LOWELL, MA 01852
info@caveneyarch.com
978 - 770 - 0518



WET PIPE ALARM VALVE ASSEMBLY
(DACV) SCALE: NONE

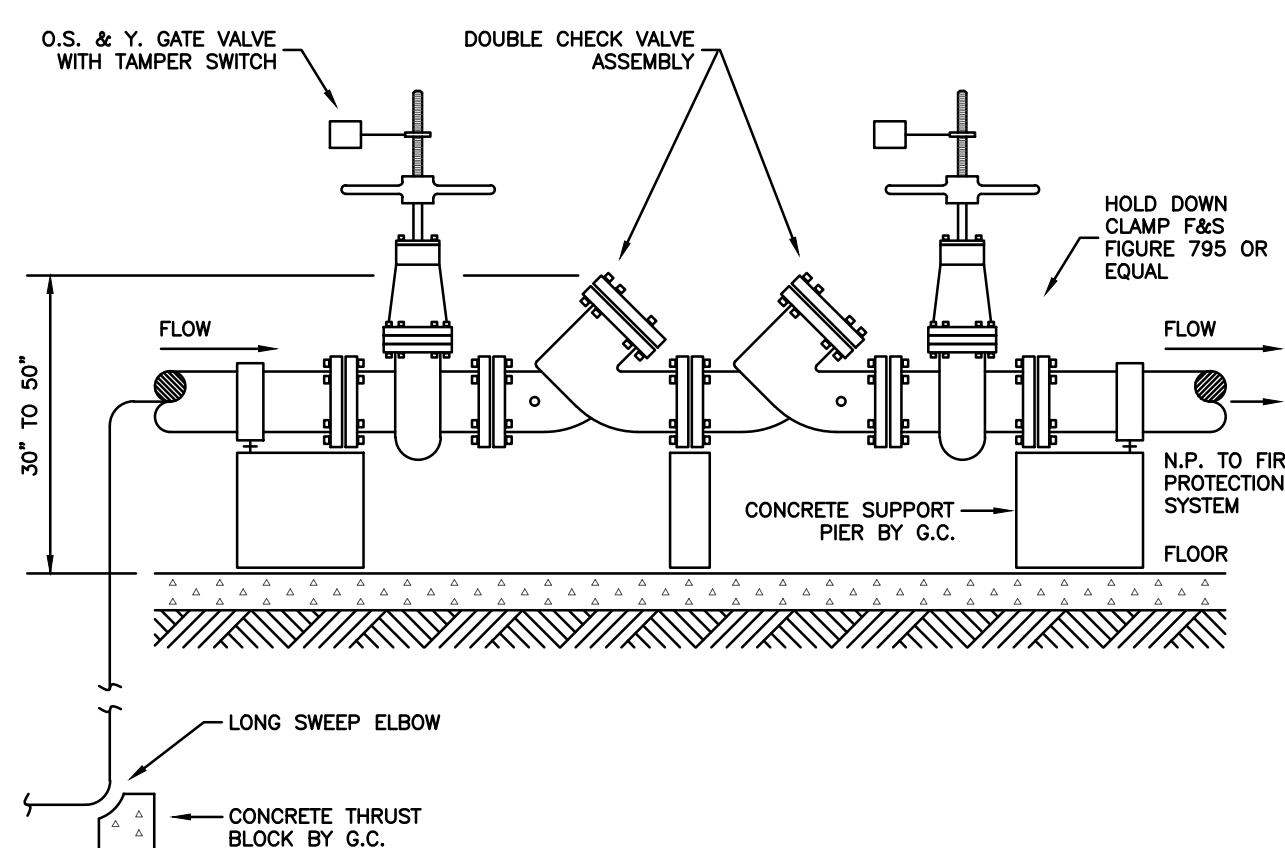


DRY PIPE ALARM VALVE ASSEMBLY
(DACV) SCALE: NONE



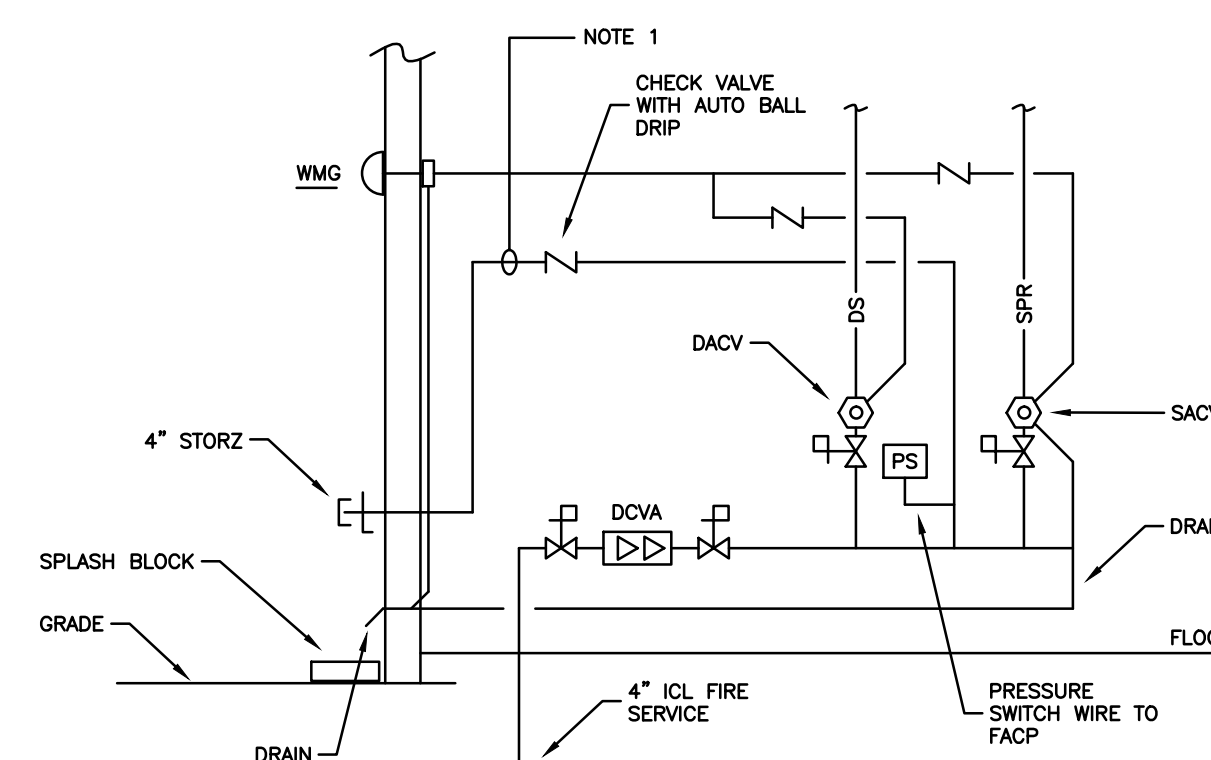
SPRINKLER DRAIN PIPING THRU WALL
SCALE: NONE

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



DOUBLE CHECK VALVE ASSEMBLY
(DACV) SCALE: NONE

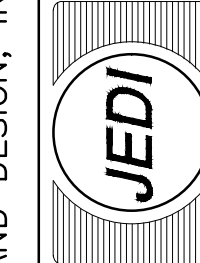
NOTES:
1. DOUBLE CHECK VALVE ASSEMBLY SHALL BE INSTALLED 30" MIN. - 43" MAX. FROM FINISHED FLOOR TO TOP OF DEVICE, AND A MINIMUM CLEARANCE OF 12" FROM FACE OF WALL.
2. SUPPORTS AT DEVICE SHALL IN NO MANNER INTERFERE WITH THE OPERATION, TESTING AND SERVICING OF THE DEVICE, INCLUDING THE INTEGRAL RELIEF VALVE AND DRAIN.
3. N.P. - INDICATES NON-POTABLE WATER.



SPRINKLER SERVICE DIAGRAM
SCALE: NONE

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.

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PROJ. NO. 1807-01
DATE: 03/28/2018
DRAWN BY: M/G

REVISIONS
NO. DATE NOTES

FIRE PROTECTION DETAILS

FP5

PLUMBING LEGEND

----	COLD WATER (CW)
----	HOT WATER (HW)
----	HOT WATER CIRCULATION (HWC)
----	SOIL (S) OR WASTE (W)
----	SOIL OR WASTE BURIED OR AT CEILING BELOW
----	VENT (V)
-----C-----	NATURAL GAS
□ FD	FLOOR DRAIN (FD)
□ RD	ROOF DRAIN
⊙ FCO	FLUSH FLOOR CLEANOUT (FCO)
—□ CO	END CLEANOUT
SS	SOIL STACK
WS	WASTE STACK
VS	VENT STACK
W&T	WASTE & TRAP
W&V	WASTE & VENT
AFF	ABOVE FINISHED FLOOR
ETR	EXISTING TO REMAIN
VTR	VENT THROUGH ROOF
HW HTR	HOT WATER HEATER
WC	WATER CLOSET
LAV	LAVATORY
SH	SHOWER
TUB	TUB/SHOWER
SK	SINK
BAR SK	BAR SINK
KS	KITCHEN SINK
DF	DRINKING FOUNTAIN
NIPC	NOT IN PLUMBING CONTRACT
INV.	INVERT
CFH	CUBIC FEET PER HOUR
DN	DOWN
CLG	CEILING
UG	UNDERGROUND
WH	WALL HYDRANT
WHA	WATER HAMMER ARRESTOR
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
VF	VERIFY IN FIELD
⊗	WATER METER
⊗	GATE 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.
8. ALL MATERIALS SHALL BE NEW, AND BE MASSACHUSETTS LISTED FOR USE IN PLUMBING SYSTEMS.

PLUMBING SYSTEMS SPECIFICATION-

PART ONE - GENERAL

1.01 WORK INCLUDED

- A. 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.**
- B. Give notices, file plans, obtain permits and licenses, pay fees and backcharges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with the Contract Documents.**
- C. All work shall be in strict conformance with the New Hampshire State Building Code, the 2009 IPC (International Plumbing Code), and NFPA-54 Fuel Gas Code.**
- D. In general, the work of this Section shall include, but not be limited to:**
 1. Waste, and vent piping systems within the buildings.
 2. Domestic water piping systems.
 3. Valves, unions, and flanges.
 4. Propane gas piping system.
 5. Plumbing Fixtures, drains and accessories
 6. Plumbing connections to Owner furnished equipment.
 7. Hangers, supports, and attachments.
- E. The description of each system is as follows:**
 1. The waste piping system shall connect to the site sanitary drainage system.
 2. The vent piping system shall terminate by venting through the roof.
 3. The water system shall begin by connecting to the site water main.
 4. The gas piping system shall begin at the gas supply line provided by the site contractor, at the locations shown on the plans.

1.02 RELATED WORK

- A. Related work specified in other Sections includes, but is not necessarily limited to:**
 1. Electrical Power and Wiring.
 2. HVAC systems, including the domestic hot water heaters and tanks.
 3. Scope as defined by the General Contractor.

1.03 REFERENCES

- A. Codes, Regulations and Guidelines:**
 1. In addition to complying with the specified requirements, comply with pertinent regulations of Local, State and national governmental agencies and authorities having jurisdiction.
- B. All equipment shall be UL Listed, as a minimum.**

PART TWO - PRODUCTS

2.01 PIPING, FITTINGS, AND JOINTS

- A. Waste Piping Systems (Basement areas and under slab on grade locations, only):**

"ManaBlock" system. The cost for each system is to be listed in the cost estimates, for comparative review by the Architect, engineer and owner.

2.02 VALVES

- A. Provide ball valves for all shut-off service. Ball valves shall be two-piece bronze bodied, Apollo, Watts or Nibco, full-port design with blow-out proof ball and stems.**
- B. Gas service shut-off valves shall be bronze ball valves with tee handles, approved for use on propane gas systems.**

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers, rods, and attachments to support the Work of this Section from the building structure with UL-listed or FM-approved attachments. Provide oversized hangers on insulated piping. All spacing shall as required by the authorities having jurisdiction. Hanger systems shall be as manufactured by B-Line or Carpenter and Patterson.**

2.04 WATER HEATERS

- A. Water to be heated by the HVAC system water heating boiler, and include a separate domestic water storage tank.**
- B. Plumbing contractor to provide safety relief, vacuum relief and all other accessories for a complete and code compliant installation.**

2.05 INSULATION

- A. Adhesives and Insulation Materials:** ASTM E-84 composite fire and smoke hazard rating maximum 25 for Flame Spread and 50 for Smoke Developed. Adhesives shall be waterproof.
- B. Insulation shall be installed over heat traced piping.**
- C. Acceptable Manufacturers:** Provide heavy density fiberglass insulation by Owens-Corning, Certain-Teed, Knauf, or Manville.
- D. The following systems shall be insulated accordingly:**
 1. Hot water piping: 1-inch thick (R-3 minimum resistance).
 2. Cold water piping: 1-inch vapor sealed (R-3 minimum resistance).
 3. Fittings and Valves consistent with system.

2.06 PLUMBING FIXTURES

- A. Provide plumbing fixtures in accordance with the Architect's Fixture and Equipment schedule.**
- B. Provide all accessories and trim for complete installations, including but not limited to, drain outlets, tailpieces, drains, 1/2 turn supply stops, pipe fittings and carriers as required.**
- C. Provide continuous feed garbage disposers in each kitchen sink, similar to In-Sink-Erator Model 33 all stainless steel.**
- D. Provide floor, area, shower and roof drains where shown on the plans, complete with flashing clamps for positive sealing to waterproofing systems.**

PART THREE - EXECUTION

1. Piping shall be Schedule 40 PVC (solid wall) conforming to ASTM-2665, with socket type solvent cemented joints.
2. Fittings to be drainage pattern with socket ends.
3. Joint cement shall be as recommended by the pipe manufacturer.

B. Waste Piping Systems (All buildings, all areas above Basement and above slab levels)

1. 4-inch and larger: No-hub cast-iron pipe and fittings heavy-duty stainless steel no-hub couplings.
2. 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 copper with cast brass drainage fittings and solder joints.
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.

C. Vent Piping Systems:

1. Piping shall be Schedule 40 PVC (solid wall) conforming to ASTM-2665, with socket type solvent cemented joints.
2. Fittings to be drainage pattern with socket ends.
3. Joint cement shall be as recommended by the pipe manufacturer

D. Water Systems:

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.
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.

3. ALTERNATE WATER PIPING SYSTEM:

- 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 water distribution system shown on the drawings, and a**

3.01 EXAMINATION

- 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.**
- 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 Contractor.**
- C. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed**
- D. Examine all utility connections prior to making connections thereto.**
- E. Do not proceed until unsatisfactory conditions have been corrected.**
- F. Verify all points of connection in the field, prior to doing any work.**

3.02 EQUIPMENT ROUGHINGS AND CONNECTIONS

- 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 sections.**
- B. Refer to architectural floor plans and equipment schedules for all equipment provided under other sections or by Owner.**

3.03 TESTING

- A. Test the piping installation work of this Section in accordance with the direction of the reviewing inspectors and the requirements of this Section.**

3.04 PIPE IDENTIFICATION OF PIPING AND EQUIPMENT

- A. Flow arrows shall be provided on all systems.**
 - B. Install markers on insulated piping only after insulation is complete and has been accepted by the Architect. Install marker adjacent to access panels where piping is concealed.**
- 3.05 ADJUSTMENTS AND BALANCING**
 - A. 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.**
 - 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.**

END OF SECTION



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JOHNSON ENGINEERING AND DESIGN, INC.
5 ELM STREET
SUITE 14
DANVERS, MA 01923
TEL: 978-646-9001
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PLUMBING LEGEND & SPECIFICATIONS



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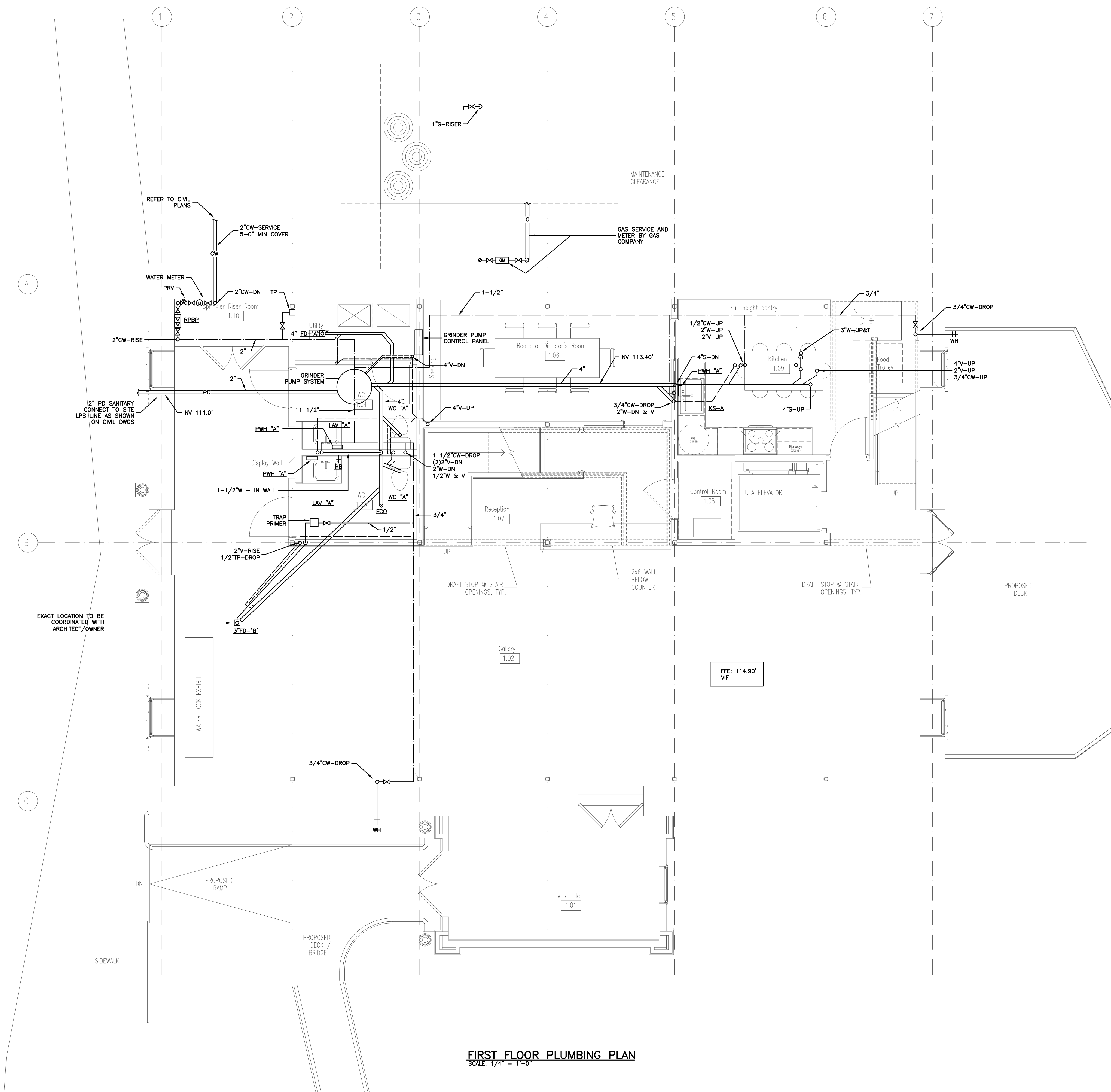
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FIRST FLOOR
 PLUMBING PLAN

P2



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



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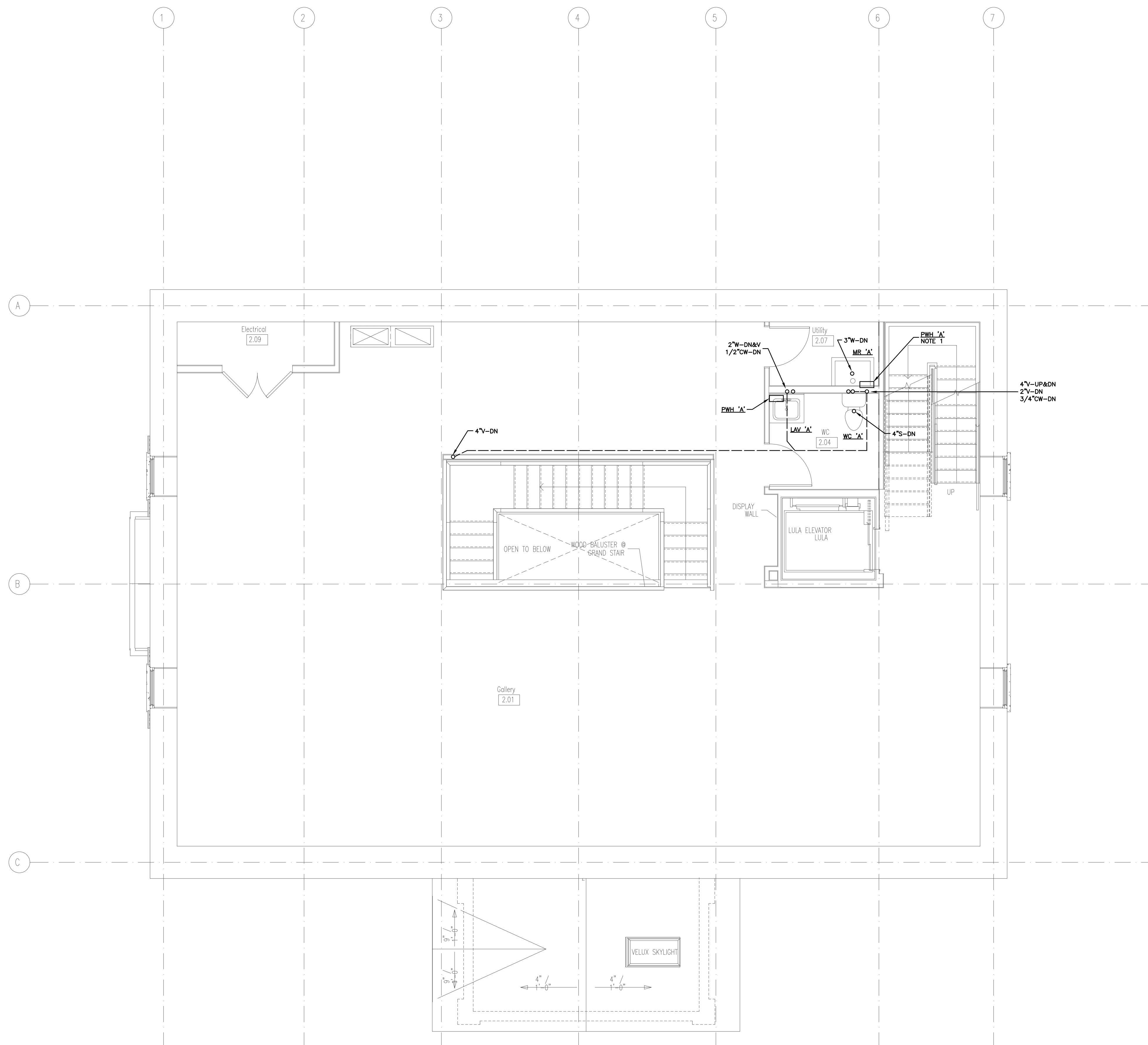
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SECOND FLOOR
 PLUMBING PLAN

P3



SECOND FLOOR PLUMBING PLAN

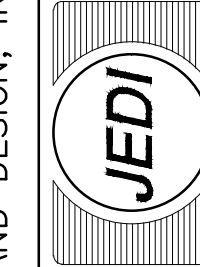
SCALE: 1/4" = 1'-0"

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



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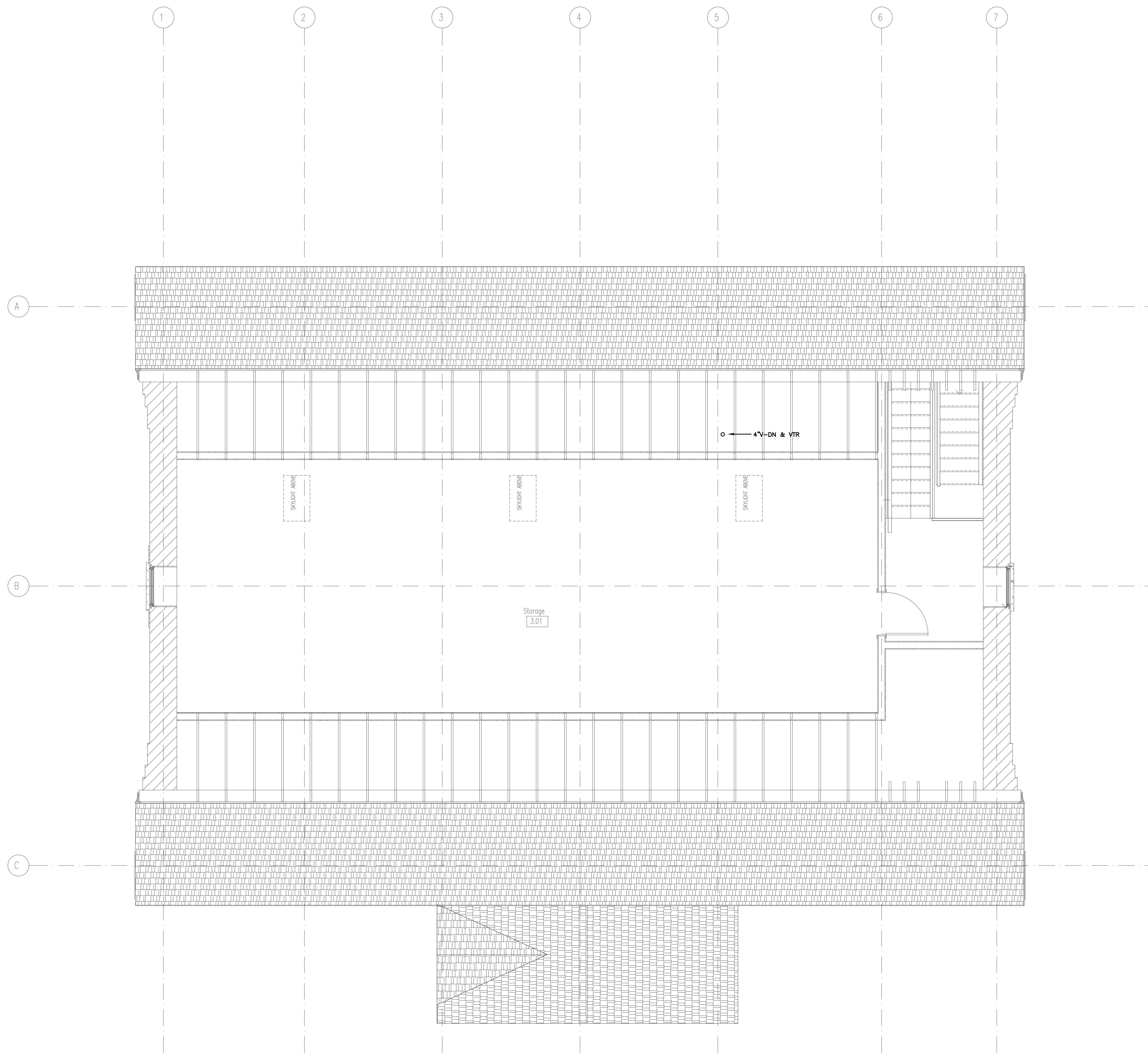
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ATTIC
 PLUMBING
 PLAN

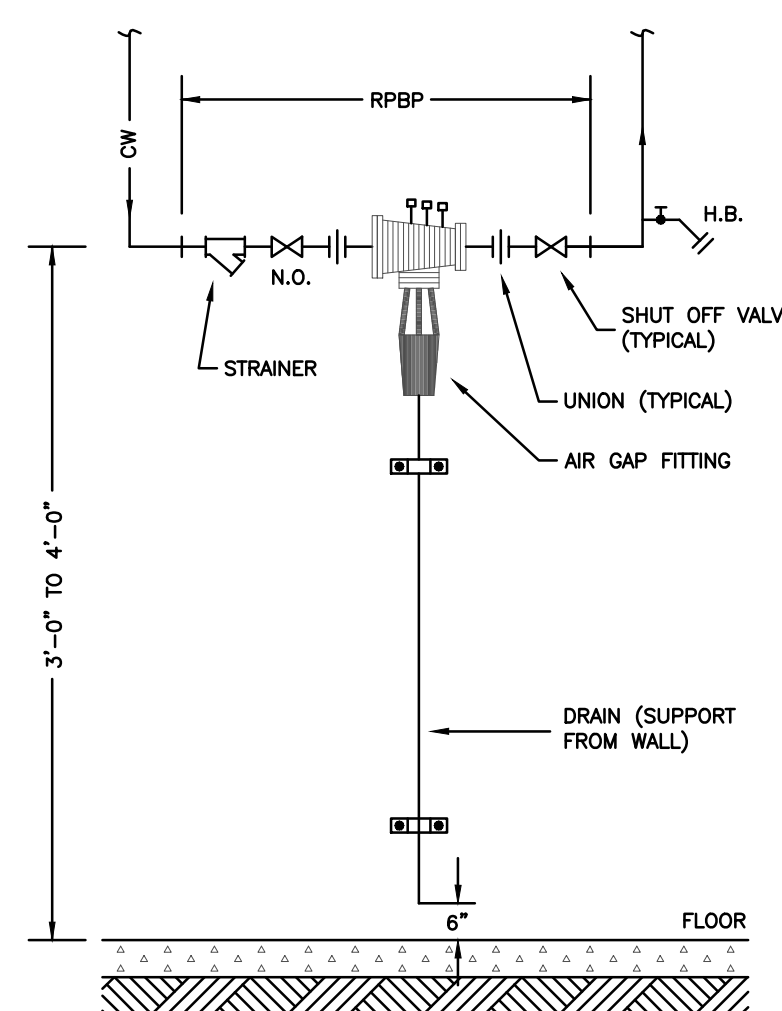
P4



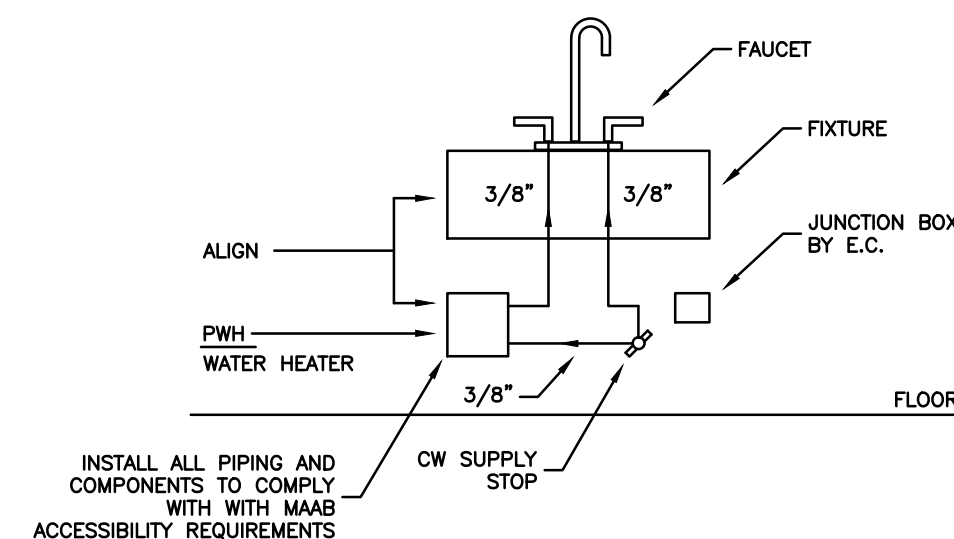
ATTIC PLUMBING PLAN
 SCALE: 1/4" = 1'-0"



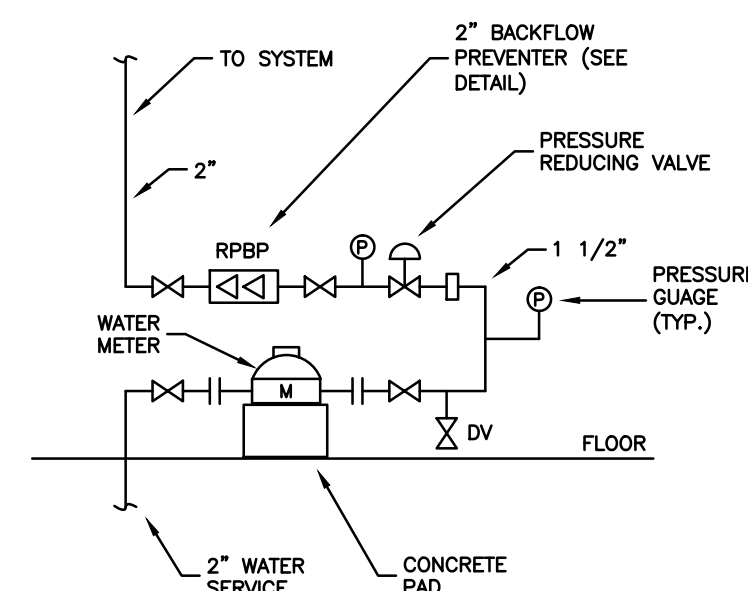
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**BACKFLOW PREVENTER
RPBP PIPING**
SCALE: NONE



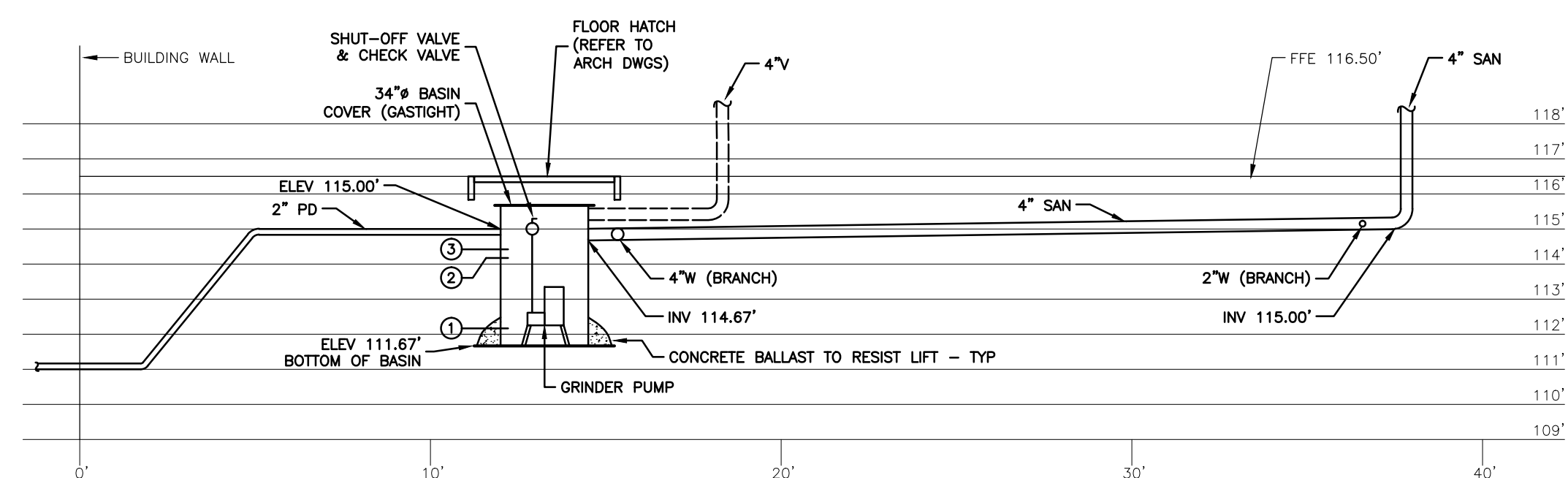
POINT OF USE WATER HEATER
SCALE: NONE



WATER SERVICE DETAIL
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'

PLUMBING FIXTURE SCHEDULE AND CONNECTIONS											
DESIGNATION	MAAB	MANUF.	MODEL	DESCRIPTION	TRIM	ACCESSORIES	S/W	VENT	CW	HW	NOTES
WC-A	Yes	TOTO	CT70SELN	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	K-2337-8	Vitreous china, self-rimming sink with overflow.	Worth widespread mixing faucet K-R76257-40, 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	No	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
HB	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

NOTES:

- 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 details.
- 3 Provide insulation kit, Trulbro or equal.
- 4 Dishwasher to be fed from HW below sink, and waste to be discharged to KS tailpiece.

GENERAL NOTES

- A. All finishes and fixture color selections to be as specified by the Architect.

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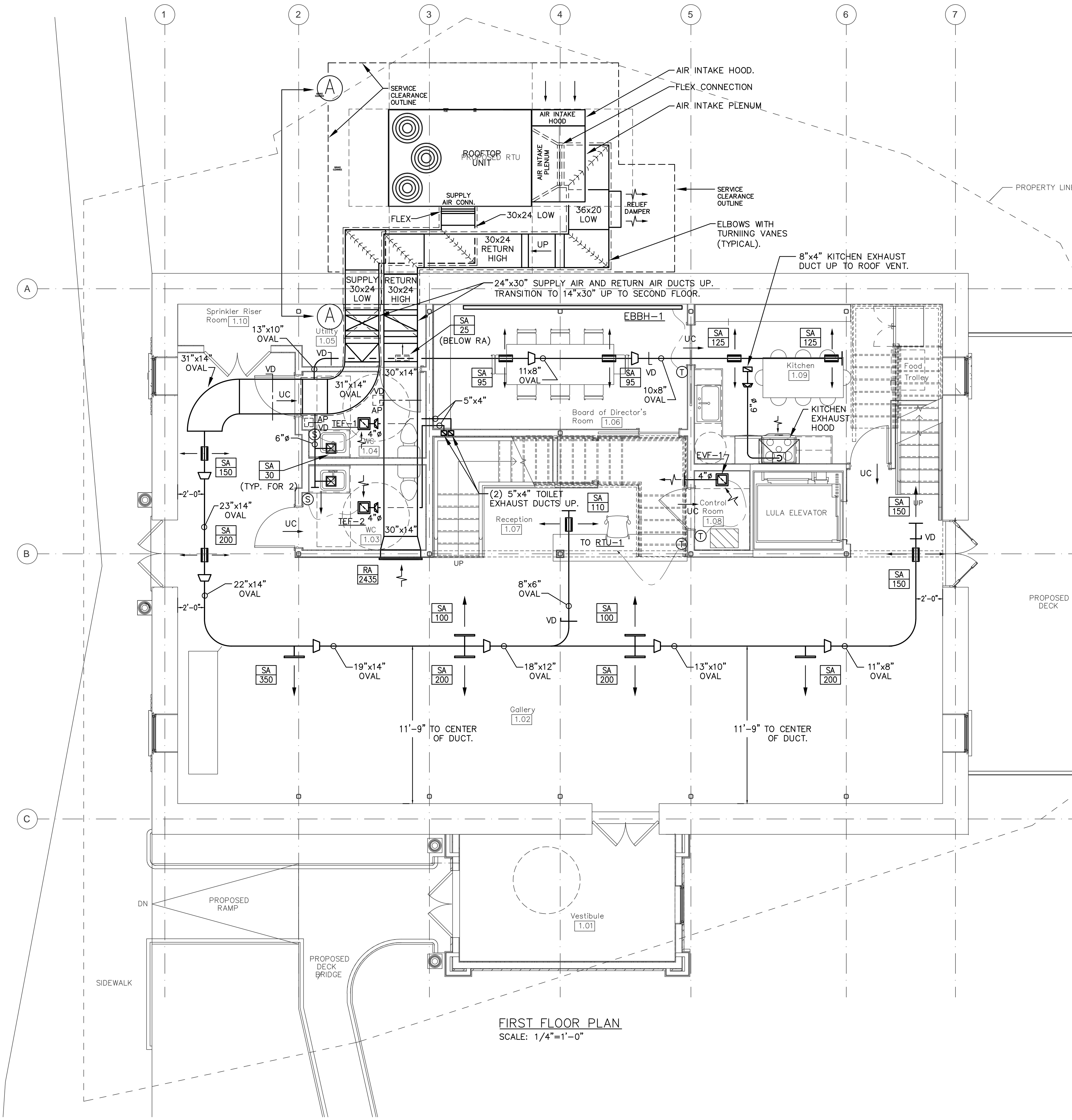
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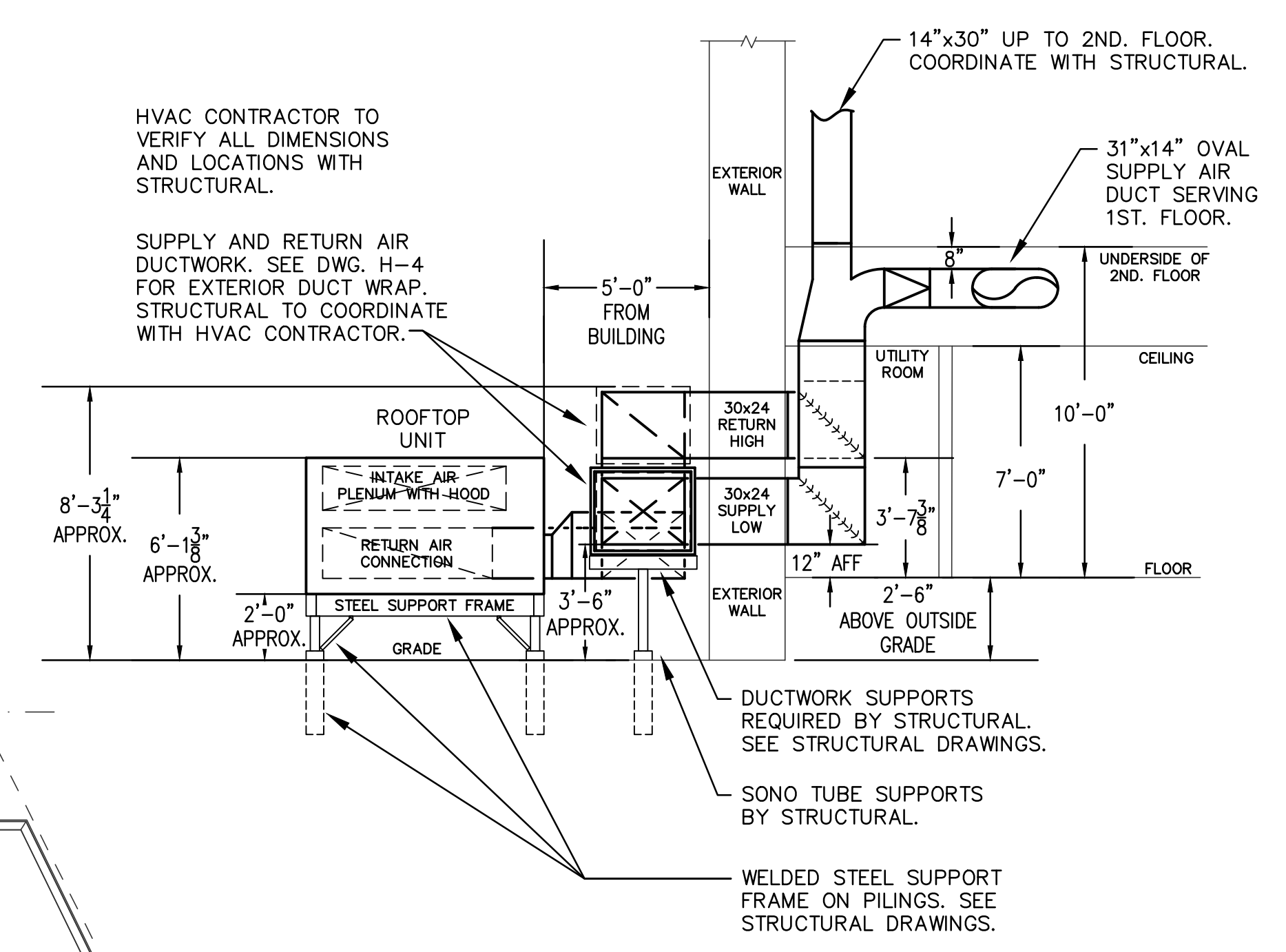
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PLUMBING
DETAILS &
SCHEDULE

P5



FIRST FLOOR PLAN
SCALE: 1/4"=1'-0"



SECTION ELEVATION - "A"-"A"
SCALE: 1/4"=1'-0"

HVAC CONTRACTOR TO VERIFY ALL DIMENSIONS AND LOCATIONS WITH STRUCTURAL.

SUPPLY AND RETURN AIR DUCTWORK. SEE DWG. H-4 FOR EXTERIOR DUCT WRAP. STRUCTURAL TO COORDINATE WITH HVAC CONTRACTOR.

DUCTWORK SUPPORTS REQUIRED BY STRUCTURAL. SEE STRUCTURAL DRAWINGS.

SONO TUBE SUPPORTS BY STRUCTURAL.

WELDED STEEL SUPPORT FRAME ON PILINGS. SEE STRUCTURAL DRAWINGS.

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info@caveneyarch.com
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ADA Associates, Inc.
Consulting Engineers
271 Main Street, Suite 306
Stonham, Ma. 02180-0004
781-279-2800 (Fax) 781-279-3556
(E-mail) ADAENGINE@aol.com

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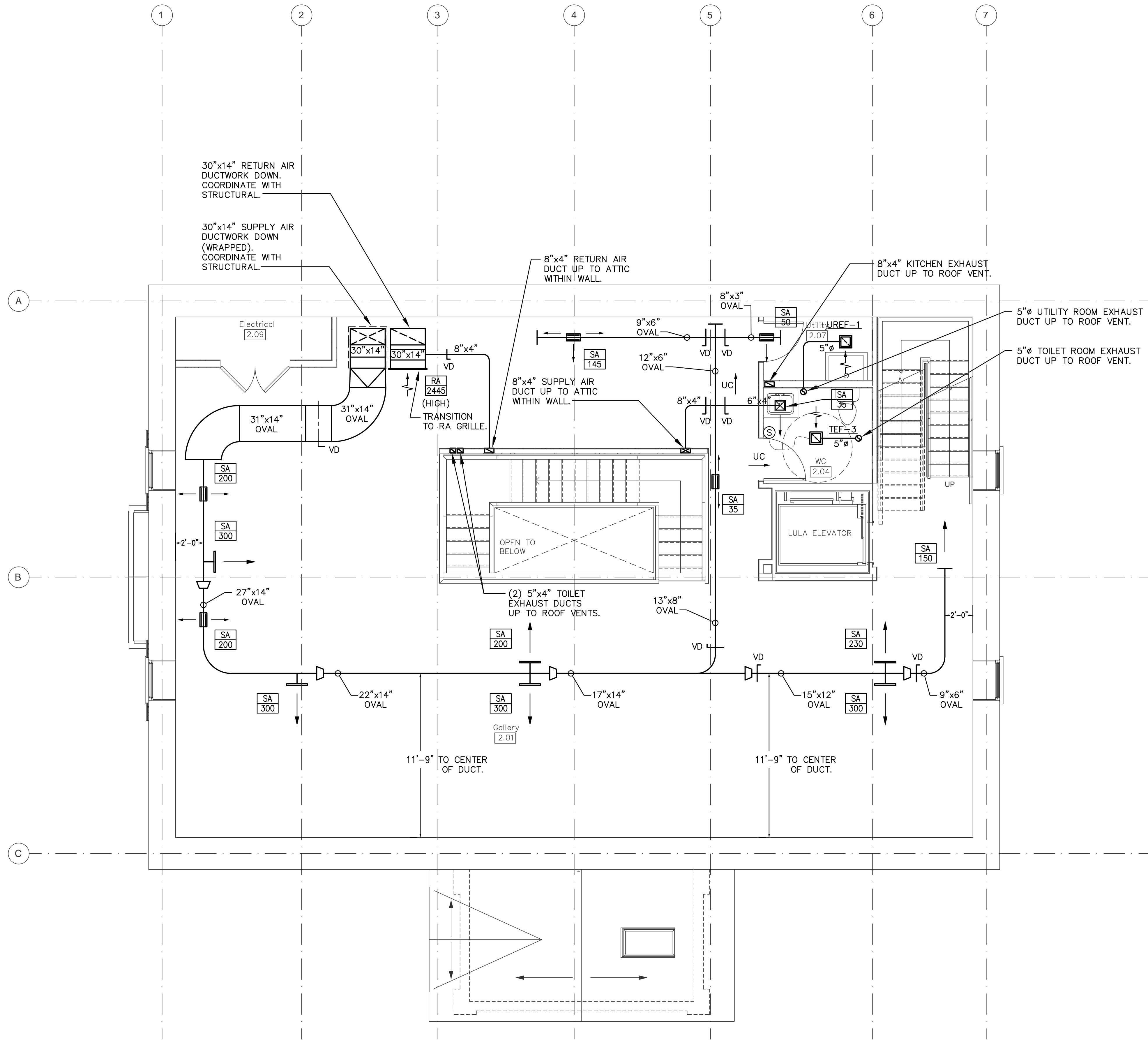
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NO.	DATE	NOTES



3-28-2019

HVAC FIRST FLOOR PLAN

H1



SECOND FLOOR PLAN
SCALE: 1/4"=1'-0"

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ADA Associates, Inc.
Consulting Engineers
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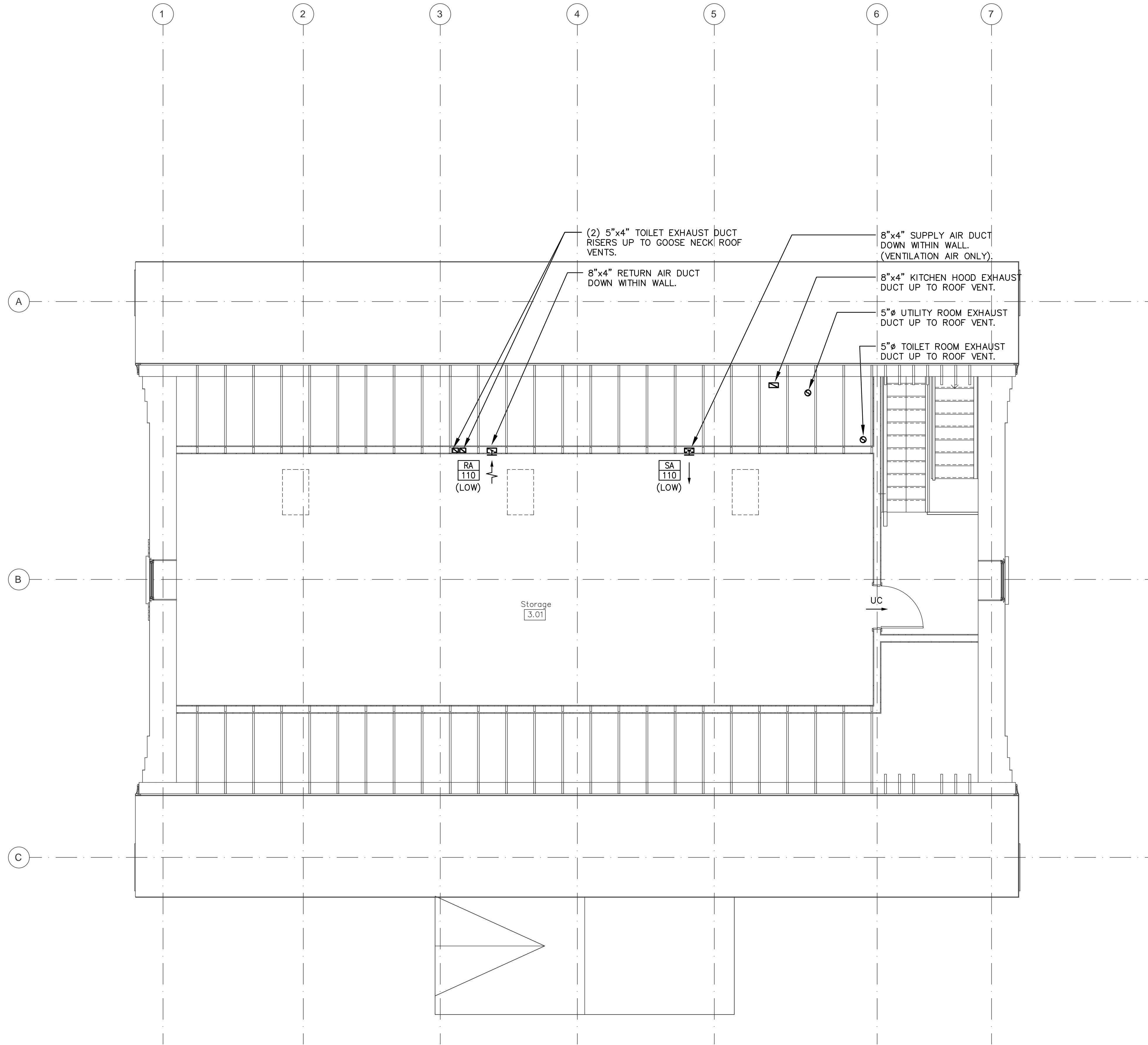
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HVAC SECOND FLOOR PLAN

H2



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



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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
 2 Old Elm St, North Billerica MA. 01862

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PROJ. NO. M8709
 DATE: 03/28/2019
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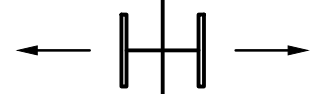
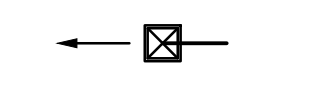
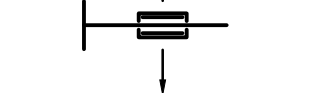
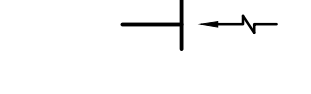
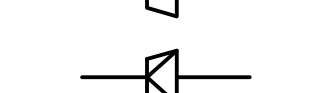
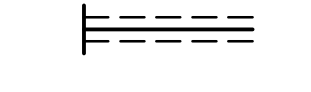



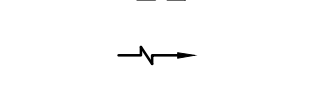

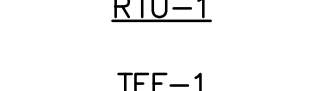
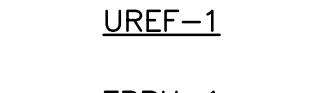
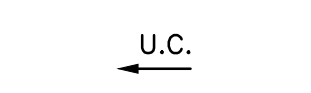
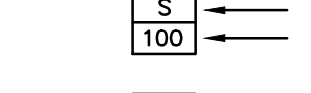
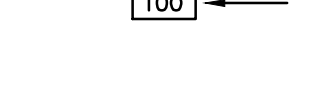



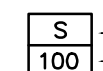
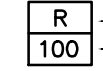
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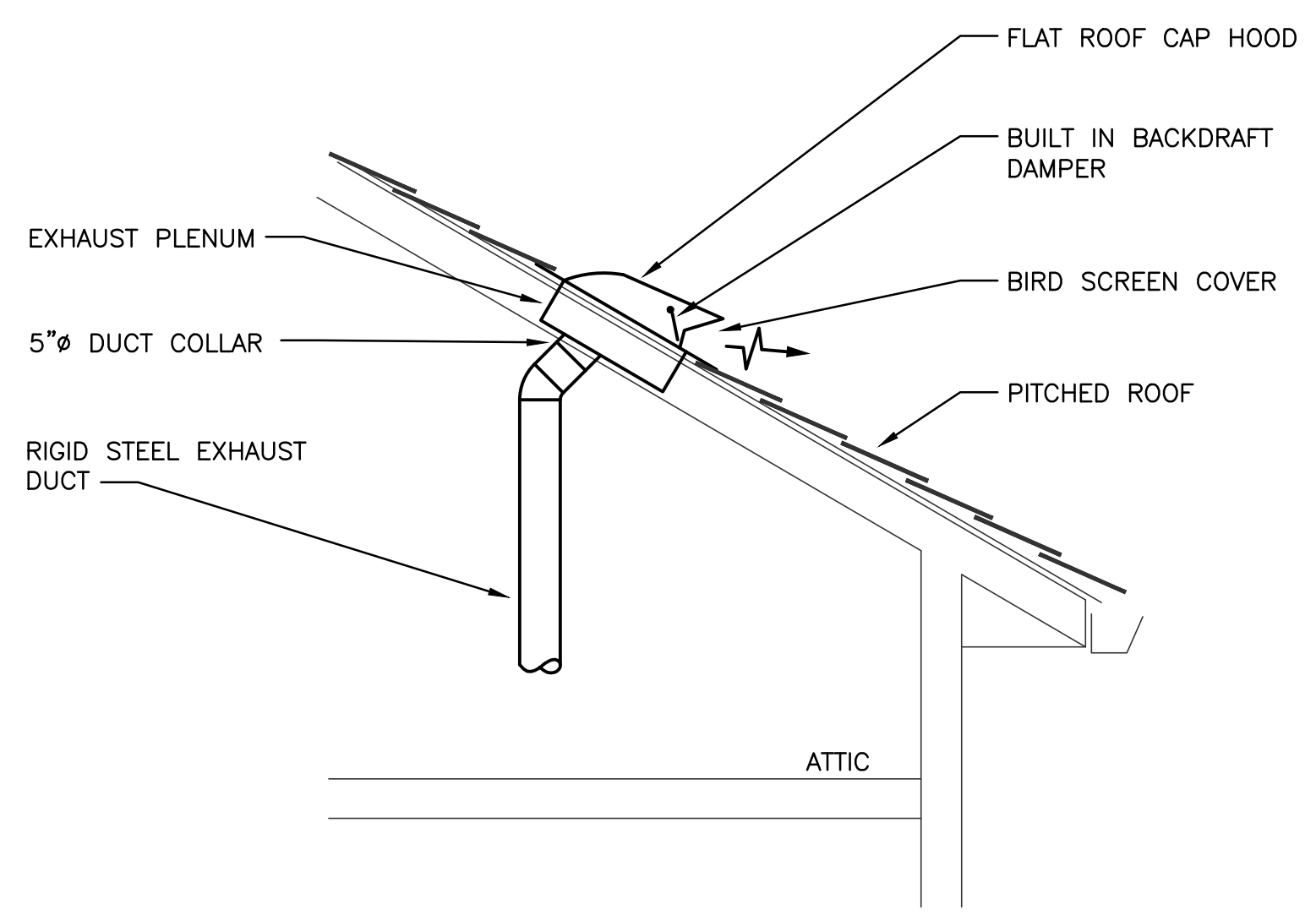
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HVAC ATTIC FLOOR PLAN

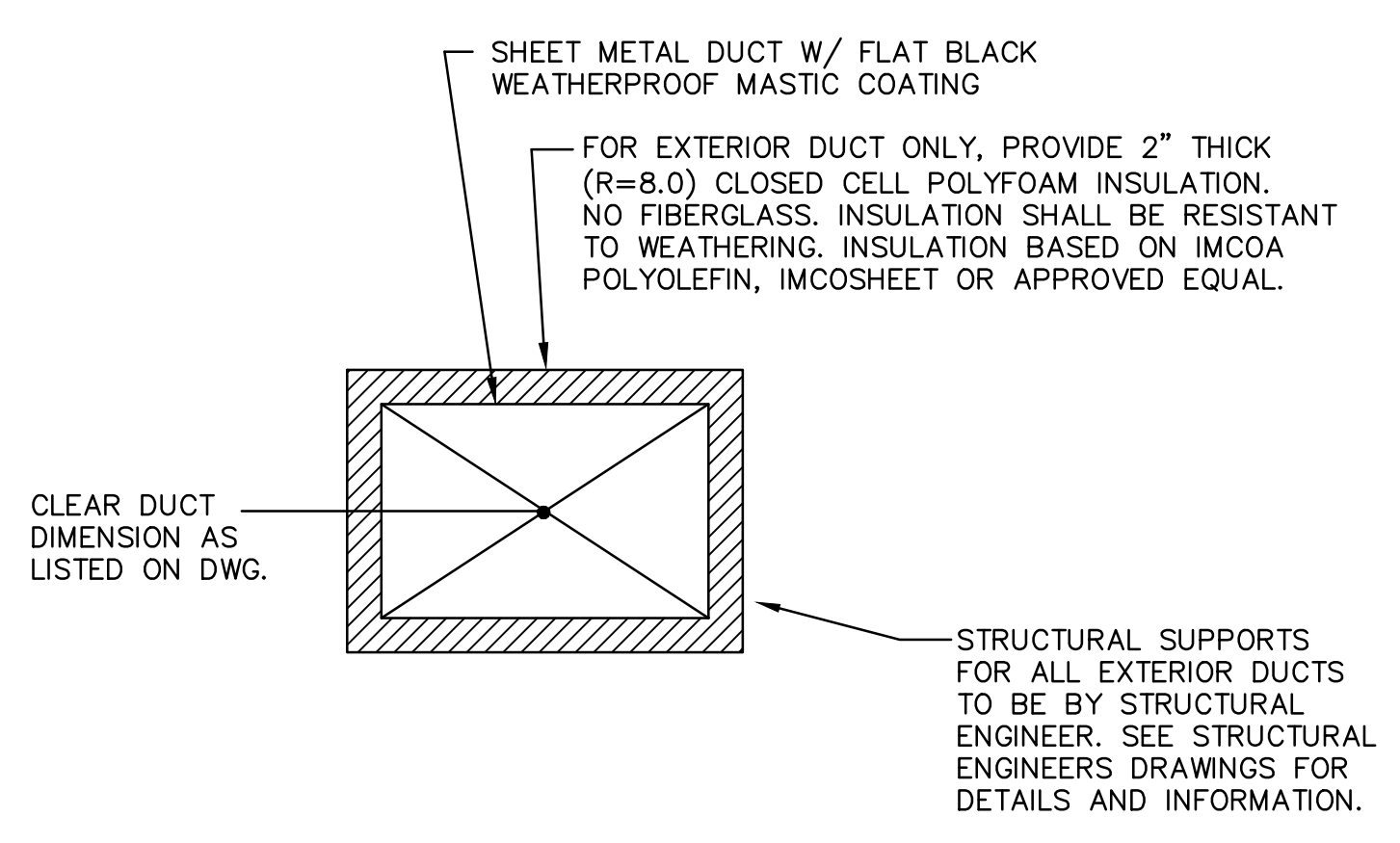
H3

HVAC LEGEND

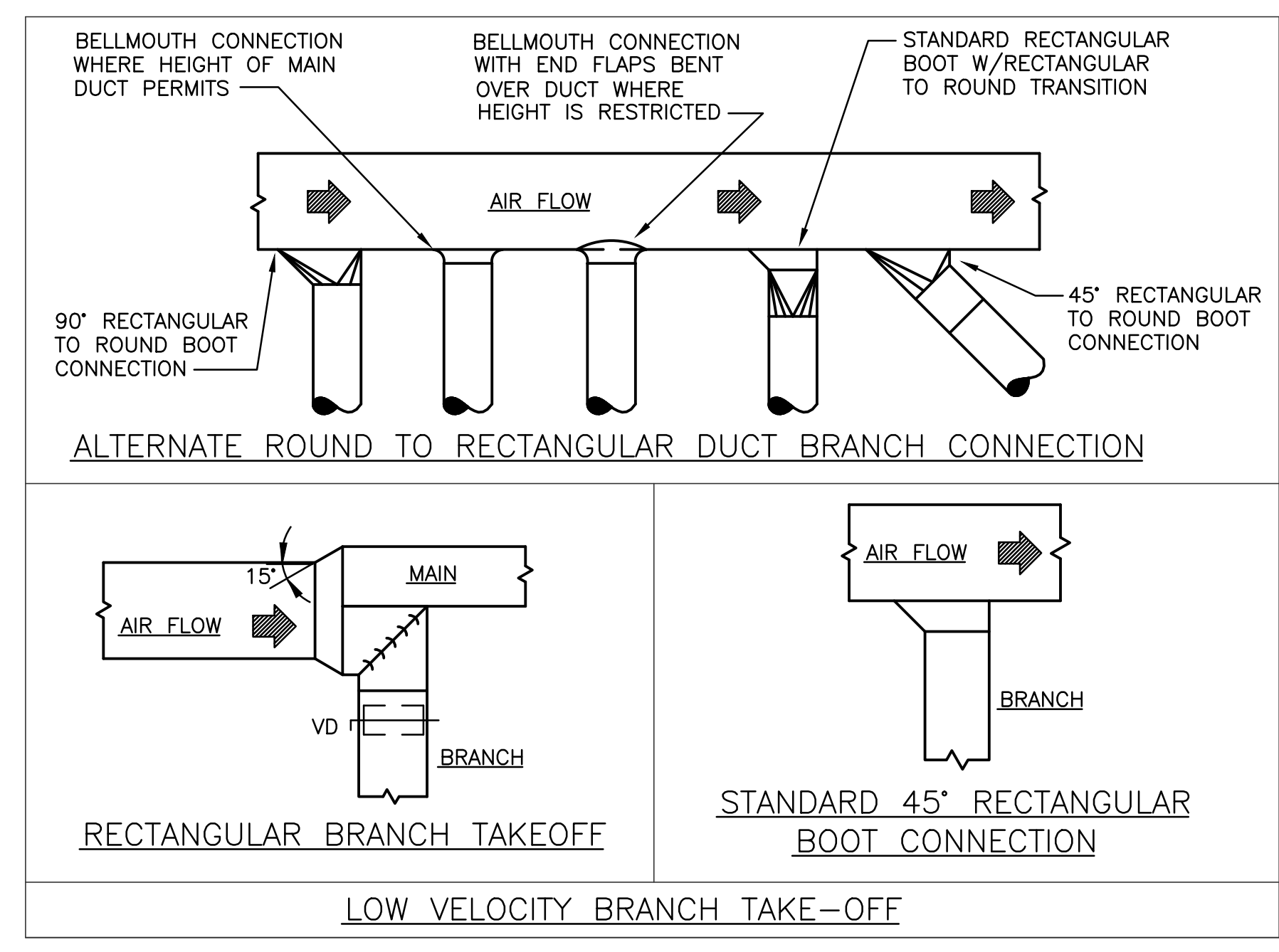
-  WALL MOUNTED THERMOSTAT
-  WALL MOUNTED ON/OFF CONTROL SWITCH (BY ELECTRICAL)
-  OVAL DUCT WITH SIDEWALL SUPPLY AIR DIFFUSERS
-  SURFACE MOUNTED CEILING SUPPLY AIR DIFFUSER
-  BOTTOM OF OVAL DUCT SUPPLY AIR DIFFUSER
-  SIDEWALL RETURN AIR GRILLE
-  DUCT TRANSITION
-  DUCT TRANSITION TO OVAL
-  DUCT WRAPPING (DASHED LINES)
-  ELBOW WITH TURNING VANES.
-  RADIUS ELBOW
-  VOLUME/BALANCING DAMPER
-  ACCESS PANEL IN CEILING
-  EXHAUST OR RETURN AIR
-  SUPPLY AIR
-  G.C. GENERAL CONTRACTOR
-  RTU-1 ROOFTOP UNIT
-  TEF-1 TOILET EXHAUST FAN
-  UREF-1 UTILITY ROOM EXHAUST FAN
-  EBBH-1 ELECTRIC BASEBOARD HEATER
-  U.C. UNDERCUT DOOR BY 1" FOR AIR TRANSFER
-  SUPPLY DIFFUSER OR GRILLE TYPE CFM
-  RETURN GRILLE TYPE CFM



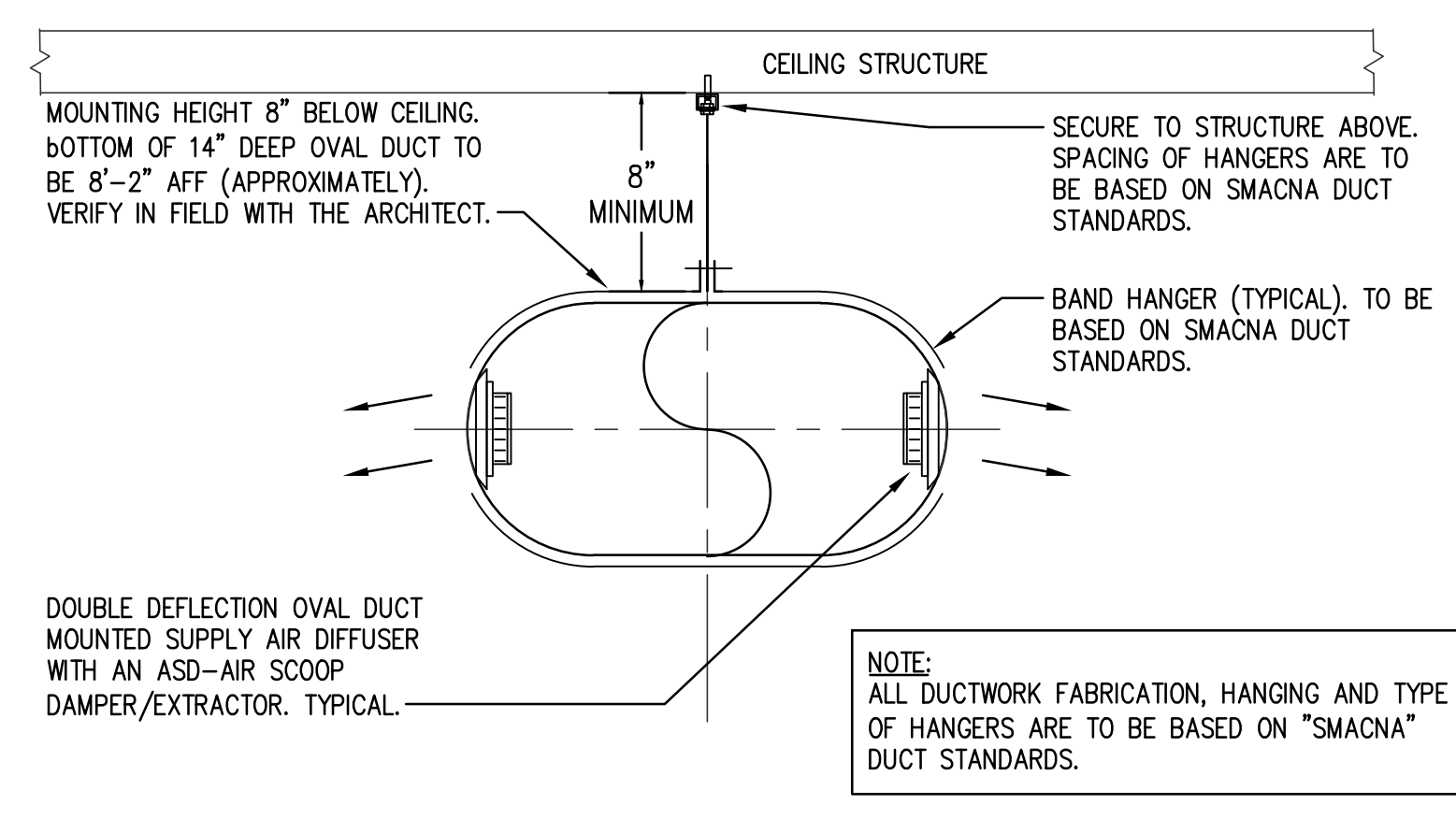
EXHAUST DUCT AND KITCHEN HOOD EXHAUST DUCT ROOF TERMINATION DETAIL
NTS



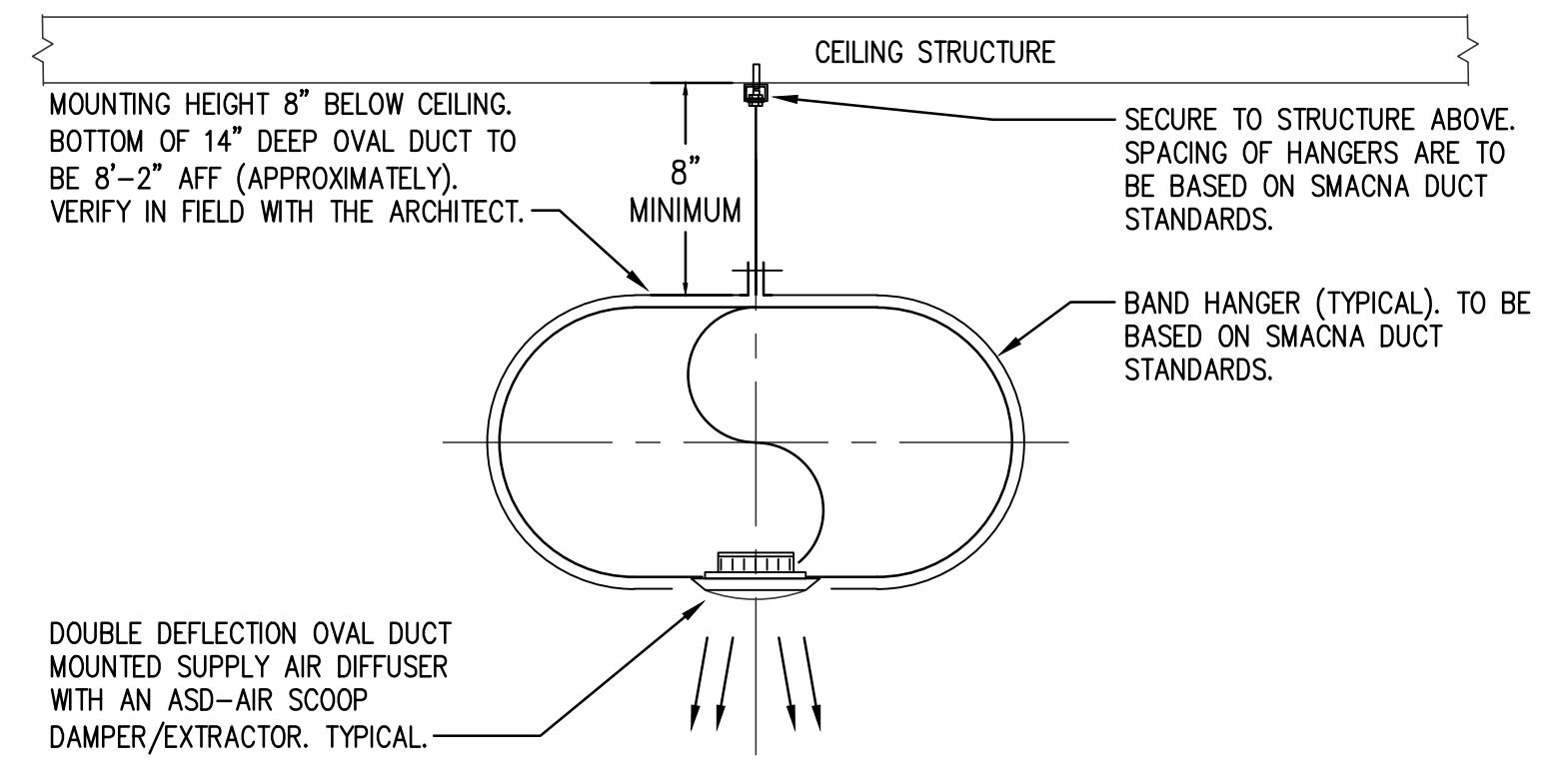
EXTERIOR DUCTWORK INSULATION DETAIL
NTS



LOW VELOCITY BRANCH TAKE-OFF



OVAL DUCTWORK SIDEWALL DIFFUSER TAKE-OFF DETAIL
NOT TO SCALE



OVAL DUCTWORK WITH BOTTOM DIFFUSER TAKE-OFF DETAIL
NOT TO SCALE

CAVENEY
ARCHITECTURE + CONSTRUCTION

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

HVAC CONSULTING ENGINEERS

ADA Associates, Inc.
Consulting Engineers
271 Main Street, Suite 306
Stonham, Ma. 02180-0004
781-279-2800 (Fax) 781-279-3556
(E-mail) ADAENGINE@aol.com

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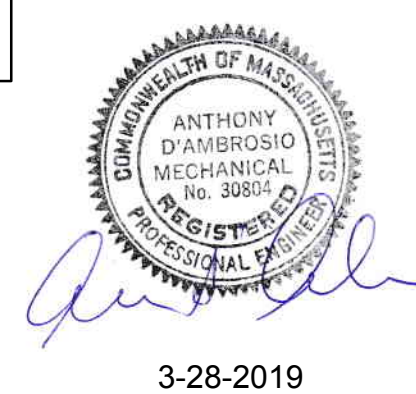
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NO.	DATE	NOTES

HVAC DETAILS AND LEGEND

H4



3-28-2019

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.

- 14. Low Pressure Ductwork shall consist of galvanized steel sheets and or galvanized steel single 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 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 sequences shall be as follows:
 - a. Packaged Rooftop Unit: 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 information.
 - b. Toilet Exhaust Fans: 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).
 - c. Utility Room Exhaust Fan: Utility Room exhaust fan to be controlled by an on/off wall mounted switch.
 - d. Elevator Machine Room Ventilation Fan: 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. Set for 70°F (adjustable setting).
 - e. Electric Baseboard Heater: 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 date of completion and acceptance.
- 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 stored and protected.
- 19. Contractor shall submit shop drawings for approval to the Architect prior to the ordering of any equipment.
- 20. Contractor shall furnish to the Owner, three (3) copies of Maintenance and Operations Manuals.
- 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:

TEF-1 TOILET EXHAUST FAN: PANASONIC WHISPERGREEN SELECT CEILING MOUNTED
TEF-2 EXHAUST FAN, MODEL# FV-05-11VKS1, 100 CFM AT .25" SP, .7 SONES, 120/1/60,
TEF-3 14.0 WATTS. WITH BUILT-IN PICK-A-FLOW AIR FLOW SELECTOR WITH TIME DELAY. PROVIDE WALL ON/OFF SWITCH.

UTILITY ROOM EXHAUST FAN:

UREF-1 UTILITY ROOM EXHAUST FAN: PANASONIC WHISPERGREEN SELECT CEILING MOUNTED EXHAUST FAN, MODEL# FV-05-11VKS1, 100 CFM AT .25" SP, .7 SONES, 120/1/60, 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:

EVF-1 ELEVATOR MACHINE ROOM VENTILATION FAN: PANASONIC WHISPERGREEN 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:

EBBH-1 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):

RTU-1 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 DETERMINED 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.



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

HVAC 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) ADRENGINE@aol.com

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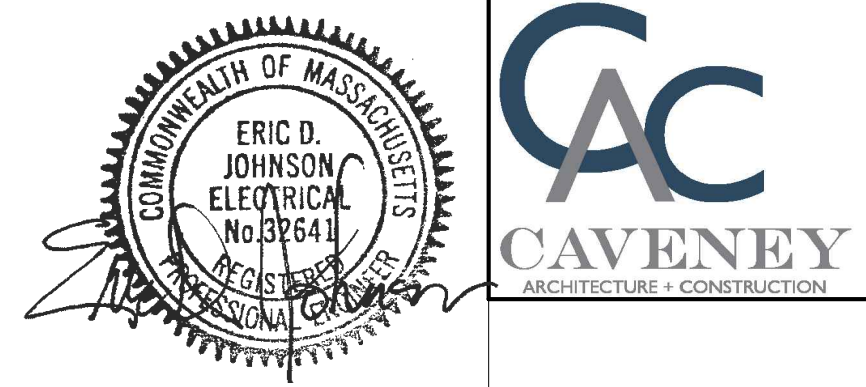
REVISIONS		
NO.	DATE	NOTES



3-28-2019

HVAC EQUIPMENT SCHEDULES AND SPECIFICATIONS

H5



CAVENEY
architecture + construction, inc.
128 WARREN ST. ■ LOWELL, MA 01852
info@cavenevarch.com
978 - 770 - 0518

JOHNSON ENGINEERING AND DESIGN, INC.
ELECTRICAL, PLUMBING & FIRE PROTECTION CONSULTING ENGINEERS
5 ELM STREET
SUITE 14
DANVERS, MA 01923
TEL: 978-646-9001
FAX: 978-646-9002
www.johnsonengineering.biz

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

ISSUED FOR PERMIT

PROJ. NO. 1807-01
DATE: 03/28/2018
DRAWN BY: M/G

REVISIONS
NO. DATE NOTES

ONE-LINE DIAGRAM, SCHEDULES & DETAILS

E2

LIGHTING FIXTURE SCHEDULE									
TYPE	DESCRIPTION	MOUNTING	VOLTAGE	LAMP	LAMP WATTS	MANUFACTURER	CATALOG NUMBER		
A	4' LED UTILITY STRIP FIXTURE	SURFACE	120	LED	36	SIMKAR	CHLED-4-50-35		
B	3 SCONCE BATHROOM VANITY FIXTURE	SURFACE	120	LED			TBD		
C	EXTERIOR SURFACE MOUNTED LIGHT	SURFACE	120				TBD		
D	DECORATIVE PENDANT FIXTURE	PENDANT	120				TBD		
E	LED DUAL HEAD EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY - WHITE	SURFACE	120	LED	4W	EMERGLITE	EL-2LED		
E1	LED DUAL HEAD EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY - BLACK	SURFACE	120	LED	4W	EMERGLITE	B-EL-2LED		
E2	LED EMERGENCY LIGHT WITH INTERNAL BACKUP BATTERY BLACK - WEATHERPROOF	SURFACE	120	LED	4W	EMERGLITE	B4-LUX-SD-CW (WIDE BEAM)		
T	WHITE 8' LINEAR TRACK FOR USE WITH HAMPTON BAY H SERIES HEADS	SURFACE	120	/	2400W MAX	HAMPTON BAY	MODEL # 804329 INTERNET #303241589 STORE SKU #1002635643		
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 CRI(90) SPOT LIGHT BULB, 5000K DAYLIGHT, E26 MEDIUM SCREW BASE	TRACK HEAD	120	PAR20 LED	8W	TORCHSTAR	ZD1PAR20H-0-8W50		
X	LED EXIT SIGN WITH RED LENS AND INTERNAL BATTERY BACKUP	WALL/CEILING	120	LED	2W	EMERGLITE	ELXN400-RN		
X1	LED EXIT SIGN WITH INTERNAL BACKUP BATTERY WEATHERPROOF	SURFACE	120	LED	2W	EMERGLITE	WW-SVXN-1-R-CW		
Y	LED ELEVATOR PIT LIGHT & MACHINE RM LIGHT WITH WIREGUARD	WALL OR CEILING	120	LED	14W	LDPI LIGHTING	LEVP14U53		

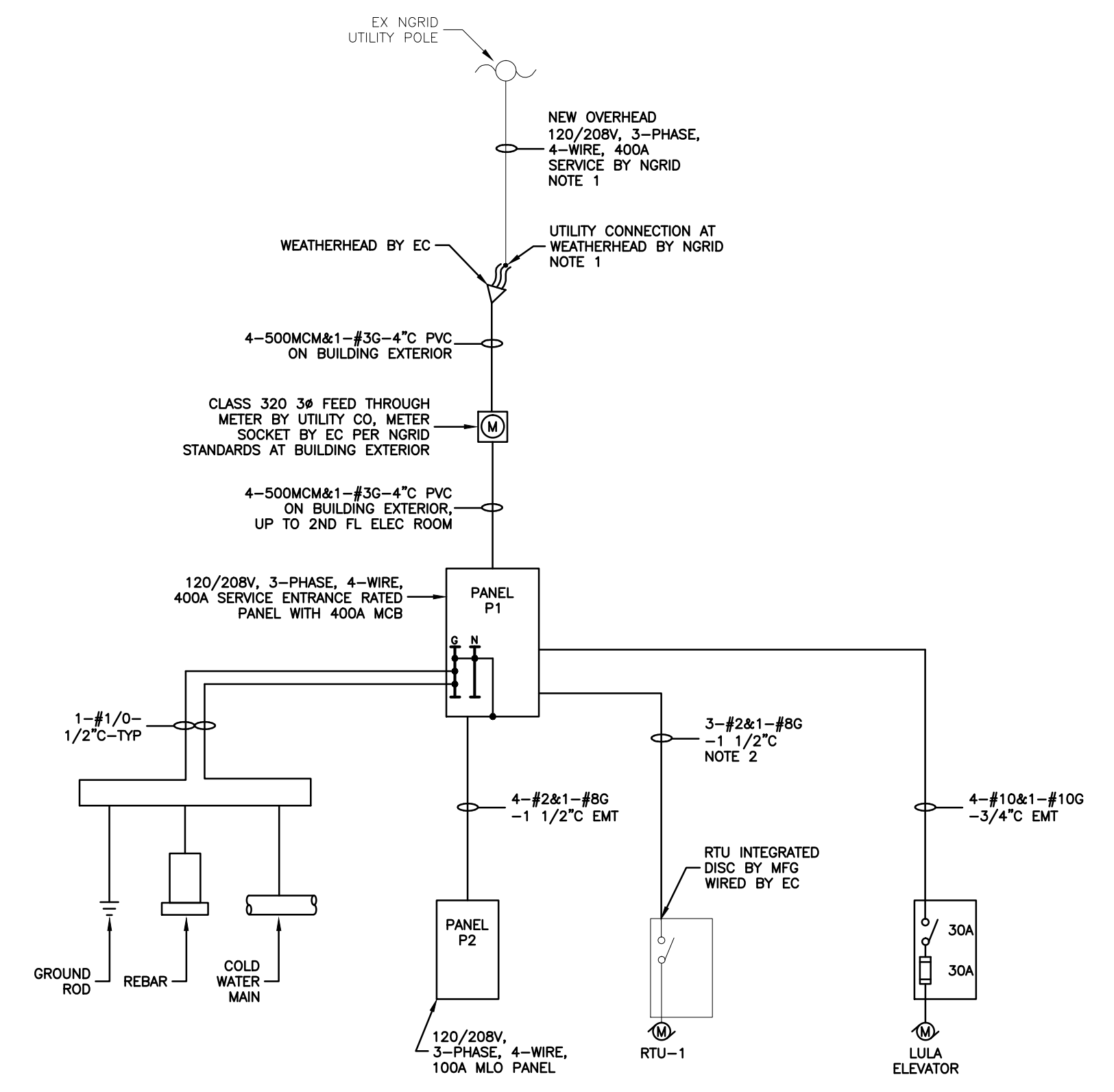
NOTES:
1. EC SHALL VERIFY ALL FIXTURES SELECTIONS AND QUANTITIES WITH THE OWNER/ARCHITECT PRIOR TO PURCHASE.
2. EC SHALL VERIFY ALL FIXTURE AND SWITCH LOCATIONS WITH THE OWNER/ARCHITECT PRIOR TO ROUGH IN.

PANEL DESIGNATION: P1											
LOCATION:		2ND FL ELEC RM		VOLTAGE: 120 / 208		POLES: 42					
NEW/EXISTING:		NEW		PHASE: 3		MCB TRIP AMP: 400		AIC RATING KA: 22			
SURFACE/FLUSH:		SURFACE		WIRE: 4		BUS AMP: 400					
NOTE	CKT NO.	POLE	TRIP AMP	DESCRIPTION OF LOAD	KVA	KVA	DESCRIPTION OF LOAD	TRIP AMP	POLE	CKT NO.	NOTE
	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 BATHROOMS GFI	0.4	0.6	1ST FL UTILITY ROOMS GFI	20	1	14	
	15	1	20	OFFICE 106 RECP	1.2	0.6	WATER LOCK EXHIBIT GFI	20	1	16	
	17	1	20	ELEVATOR CAB LTG	0.4	1.0	KITCHEN & HALL RECP	20	1	18	
	19	1	20	ELEVATOR PIT GFI & 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	-	-	-	-	-	-	-	-	-	24
	25	2	30	PLUMB WATER HEATER WC103	4.2	1.0	GALLERY RECP	20	1	26	
	27	-	-	-	-	0.9	FP AIR COMP	20	1	28	
	29	2	30	PLUMB WATER HEATER WC104	4.2	2.5	EBBH-1 ELEC BASEBOARD HTR	20	2	30	
	31	-	-	-	-	-	-	-	-	-	32
	33	2	30	PLUMB WATER HEATER WC204	4.2		SPACE				34
	35	-	-	-	-	-	SPACE				36
	37	2	30	PLUMB WATER HEATER KITCHEN	4.2	4.2	PLUMB WATER HEATER UTILITY 207	30	2	38	
	39	-	-	-	-	-	-	-	-	-	40
	1	41	1	20 DISHWASHER	1.4	0.2	1ST FLOOR TOILETS ELEC FLUSH	20	1	42	1
				TOTAL CONNECTED KVA		101.8					
				TOTAL CONNECTED AMPS @ 125%		353.2					

NOTE: 1. EC SHALL PROVIDE GFCI CIRCUIT BREAKER.
2. EC SHALL VERIFY ELECTRICAL REQUIREMENTS PER MANUFACTURER SPECS PRIOR TO PURCHASE AND ROUGH-IN.

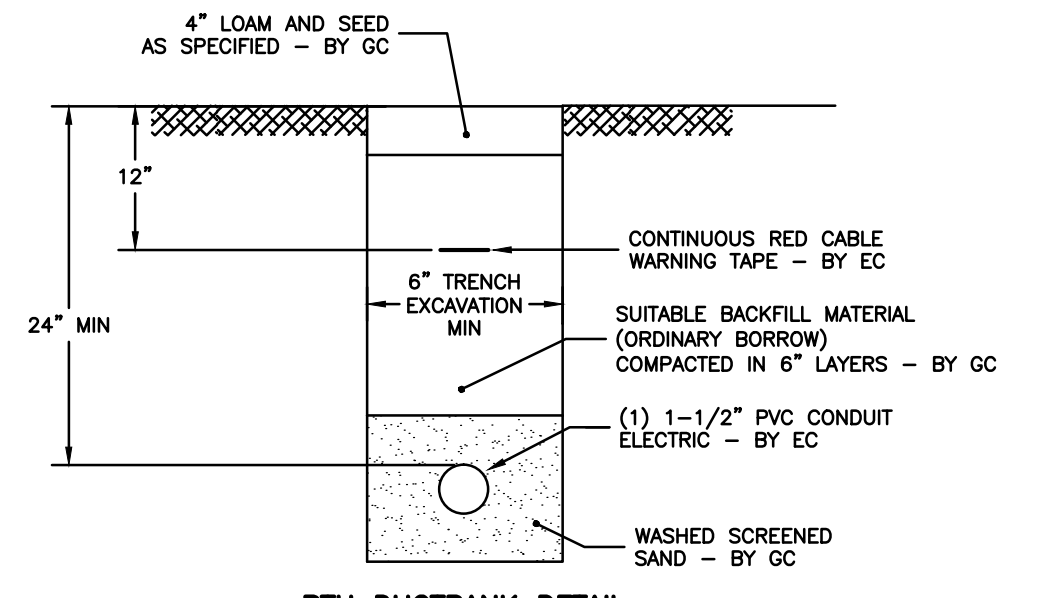
PANEL DESIGNATION: P2											
LOCATION:		2ND FL ELEC RM		VOLTAGE: 120 / 208		MAIN LUG ONLY: YES		POLES: 42			
NEW/EXISTING:		NEW		PHASE: 3		BUS AMP: 100		AIC RATING KA: 22			
SURFACE/FLUSH:		SURFACE		WIRE: 4		BUS AMP: 100					
NOTE	CKT NO.	POLE	TRIP AMP	DESCRIPTION OF LOAD	KVA	KVA	DESCRIPTION OF LOAD	TRIP AMP	POLE	CKT NO.	NOTE
	1	1	20	DEDICATED EXTERIOR GFI	0.2	1.0	1ST FLOOR LIGHTING	20	1	2	
	3	1	20	EXHAUST FAN TEF-1.2.3	0.1	1.0	1ST FLOOR LIGHTING	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 ROOMS GFI	1.2	0.2	EXTERIOR & VESTIBULE LIGHTING	20	1	8	1
	9	1	20	2ND FL MUSEUM 201 RECP	1.2	1.2	EXTERIOR GFI	20	1	10	
	11	1	20	2ND FL MUSEUM 201 RECP	1.2	0.8	ELEC RM 210 GFI	20	1	12	
	13	1	20	ATTIC GFI	1.2	0.2	DEDICATED ATTIC GFI	20	1	14	
	15	1	20	UREF-1 & EVF-1	0.1	0.2	DEDICATED ATTIC GFI	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 GFI	0.4	1.5	RECEPTION HEATER RECP	20	1	20	
	21	1	20	KITCHEN COUNTER GFI	0.4	0.4	VESTIBULE GFI	20	1	22	
	1	23	1	20 MICROWAVE ABOVE STOVE	1.5	0.9	2ND FLOOR LIGHTING	20	1	24	
	1	25	1	20 FRIDGE	1.0	1.1	2ND FLOOR LIGHTING	20	1	26	
	1	27	1	20 KITCHEN STOVE HOOD	1.4		SPARE	20	1	28	
	1	29	1	20 FIRE SPRINKLER BELL	0.2		SPARE	20	1	30	
				31			SPARE				32
				33			SPARE				34
				35			SPARE				36
				37			SPACE				38
				39			SPACE				40
				41			SPACE				42
				TOTAL CONNECTED KVA		20.9					
				TOTAL CONNECTED AMPS @ 125%		72.5					

NOTE: 1. EC SHALL PROVIDE GFCI CIRCUIT BREAKER.

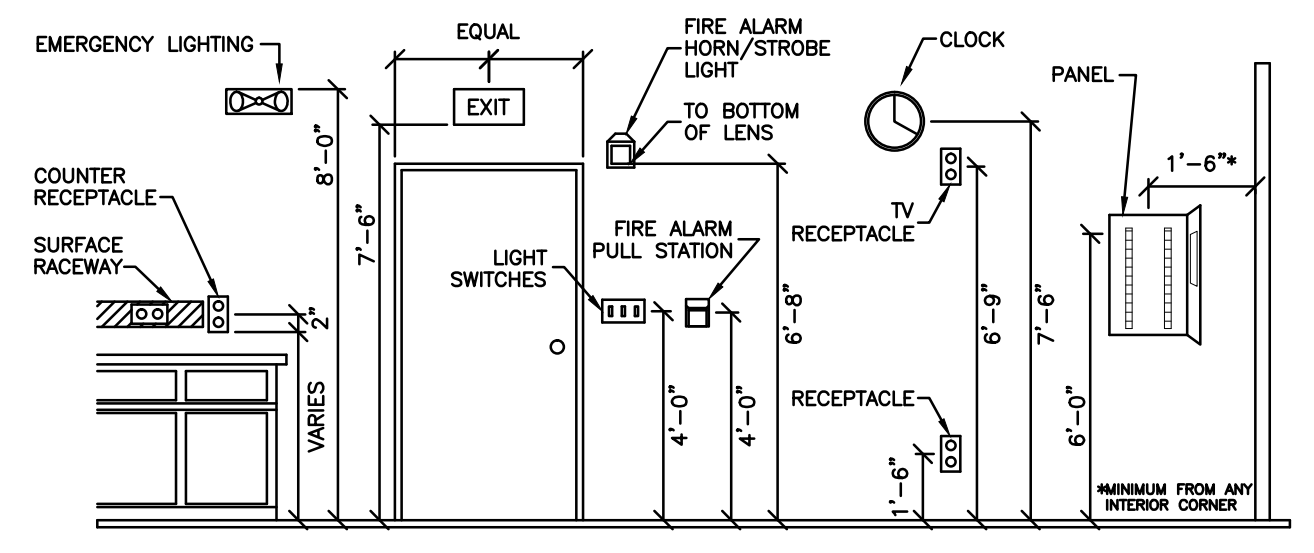


ONE-LINE DIAGRAM
SCALE: NTS

NOTES:
1. EC SHALL PROVIDE COORDINATION WITH NGRID FOR INSTALLATION OF THE MAIN ELECTRICAL SERVICES, NGRID WORK REQUEST#: 2889108.
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.

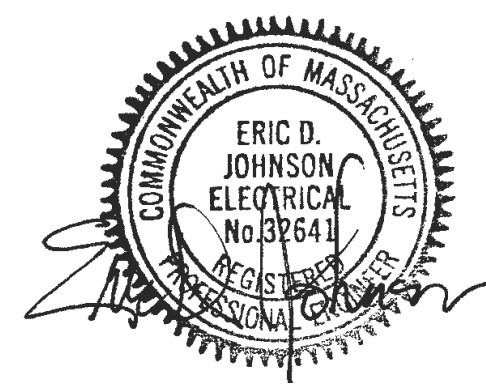


RTU DUCTBANK DETAIL
SECTION A-A
SCALE: NTS



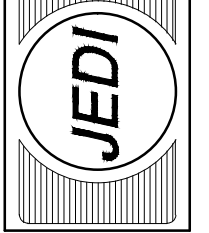
MOUNTING HEIGHT DETAIL
SCALE: NTS

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.



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128 WARREN ST ■ LOWELL, MA 01852
info@caveneyarch.com
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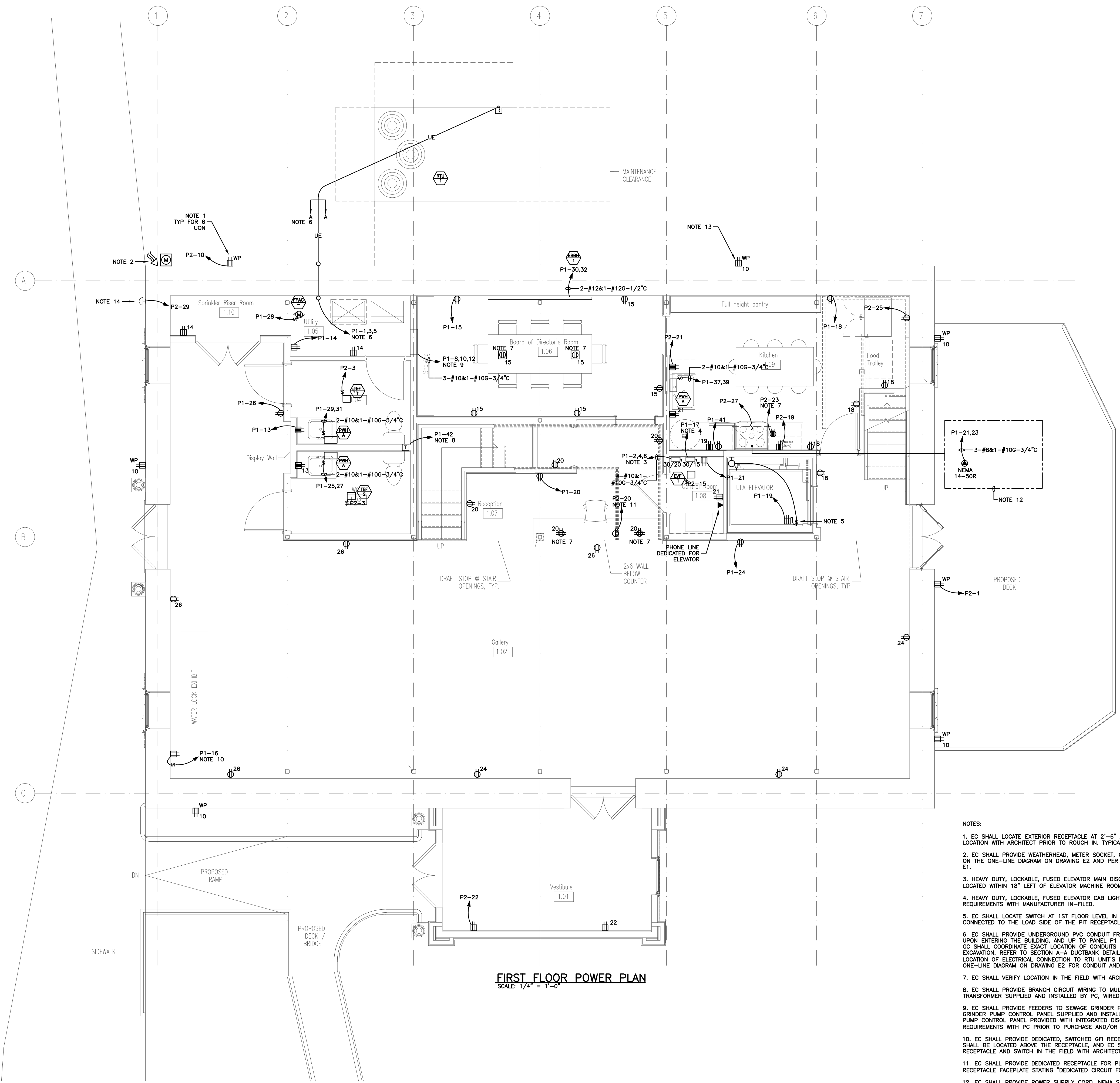
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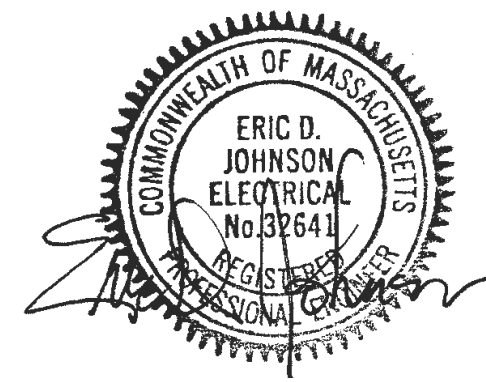
REVISIONS		
NO.	DATE	NOTES

FIRST FLOOR POWER PLAN

E3



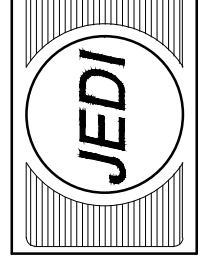
- NOTES:
- EC SHALL LOCATE EXTERIOR RECEPTACLE AT 2'-6" ABOVE FINISHED GRADE/DECK. COORDINATE LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. TYPICAL FOR 6.
 - EC SHALL PROVIDE WEATHERHEAD, METER SOCKET, CONDUIT AND SECONDARY FEEDERS AS SHOWN ON THE ONE-LINE DIAGRAM ON DRAWING E2 AND PER THE ELECTRICAL SPECIFICATIONS ON DRAWING E1.
 - HEAVY DUTY, LOCKABLE, FUSED ELEVATOR MAIN DISCONNECT SWITCH WITH AUXILIARY CONTACT LOCATED WITHIN 18" LEFT OF ELEVATOR MACHINE ROOM DOOR.
 - HEAVY DUTY, LOCKABLE, FUSED ELEVATOR CAB LIGHTING DISCONNECT SWITCH. VERIFY ELEVATOR REQUIREMENTS WITH MANUFACTURER IN-FILED.
 - EC SHALL LOCATE SWITCH AT 1ST FLOOR LEVEL IN HOISWAY. PIT LIGHTING SHALL NOT BE CONNECTED TO THE LOAD SIDE OF THE PIT RECEPTACLE.
 - 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 ELECTRICAL 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.
 - EC SHALL VERIFY LOCATION IN THE FIELD WITH ARCHITECT PRIOR TO ROUGH-IN.
 - EC SHALL PROVIDE BRANCH CIRCUIT WIRING TO MULTI-UNIT TRANSFORMER FOR ELECTRONIC FLUSH TRANSFORMER SUPPLIED AND INSTALLED BY EC. ALL LOW VOLTAGE WIRING BY PC.
 - EC SHALL PROVIDE FEEDERS TO SEWAGE GRINDER PUMP CONTROL PANEL AS SHOWN. SEWAGE GRINDER PUMP CONTROL PANEL SUPPLIED AND INSTALLED BY EC. WIRING 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.
 - 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.
 - EC SHALL PROVIDE DEDICATED RECEPTACLE FOR PLUG-IN HEATER. EC SHALL PROVIDE LABEL ON RECEPTACLE FACEPLATE STATING "DEDICATED CIRCUIT FOR HEATER"
 - 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.
 - EC SHALL LOCATE ONE (1) EXTERIOR RECEPTACLE AT 1'-0" ABOVE FINISHED GRADE. UNIQUE FOR THIS LOCATION ONLY.
 - EC SHALL PROVIDE 120V POWER TO FIRE SPRINKLER BELL, PROVIDED BY FIRE PROTECTION CONTRACTOR. COORDINATE LOCATION IN THE FILED WITH FPC PRIOR TO ROUGH-IN.



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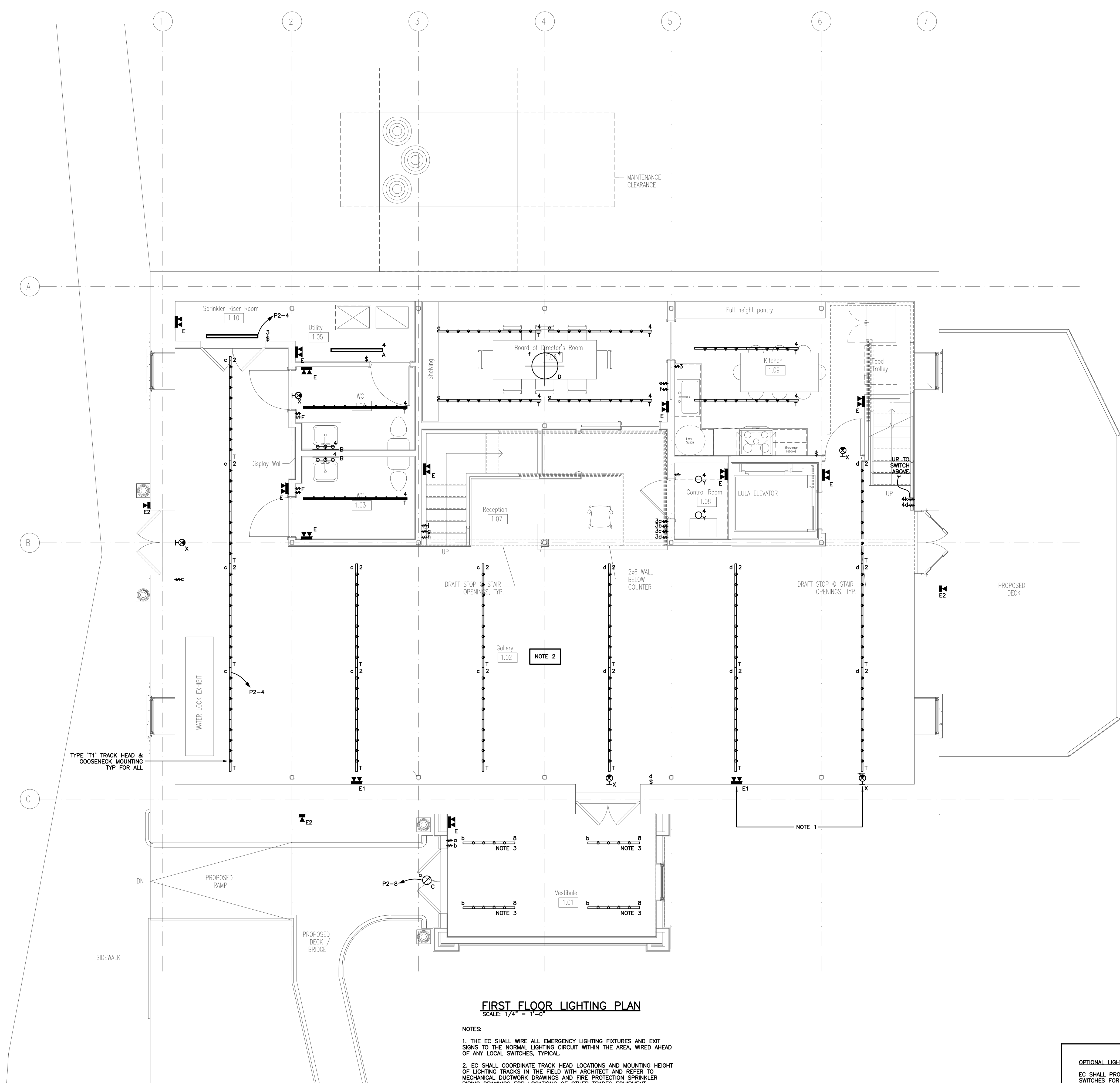
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FIRST FLOOR
 LIGHTING PLAN

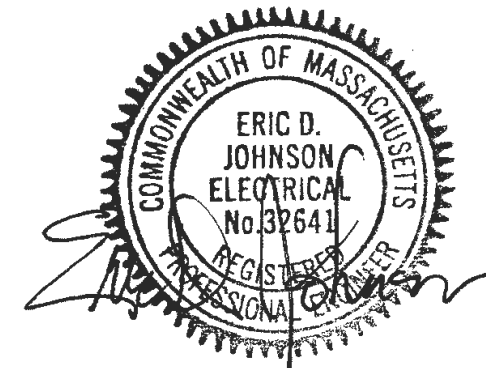
E4



FIRST FLOOR LIGHTING PLAN
 SCALE: 1/4" = 1'-0"

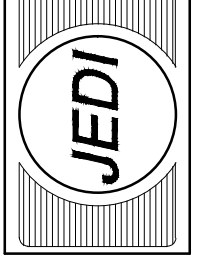
- NOTES:
1. THE EC SHALL WIRE ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS TO THE NORMAL LIGHTING CIRCUIT WITHIN THE AREA, WIRED AHEAD OF ANY LOCAL SWITCHES, TYPICAL.
 2. EC SHALL COORDINATE TRACK HEAD LOCATIONS AND MOUNTING HEIGHT OF LIGHTING TRACKS IN THE FIELD WITH ARCHITECT AND REFER TO MECHANICAL 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'.

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).



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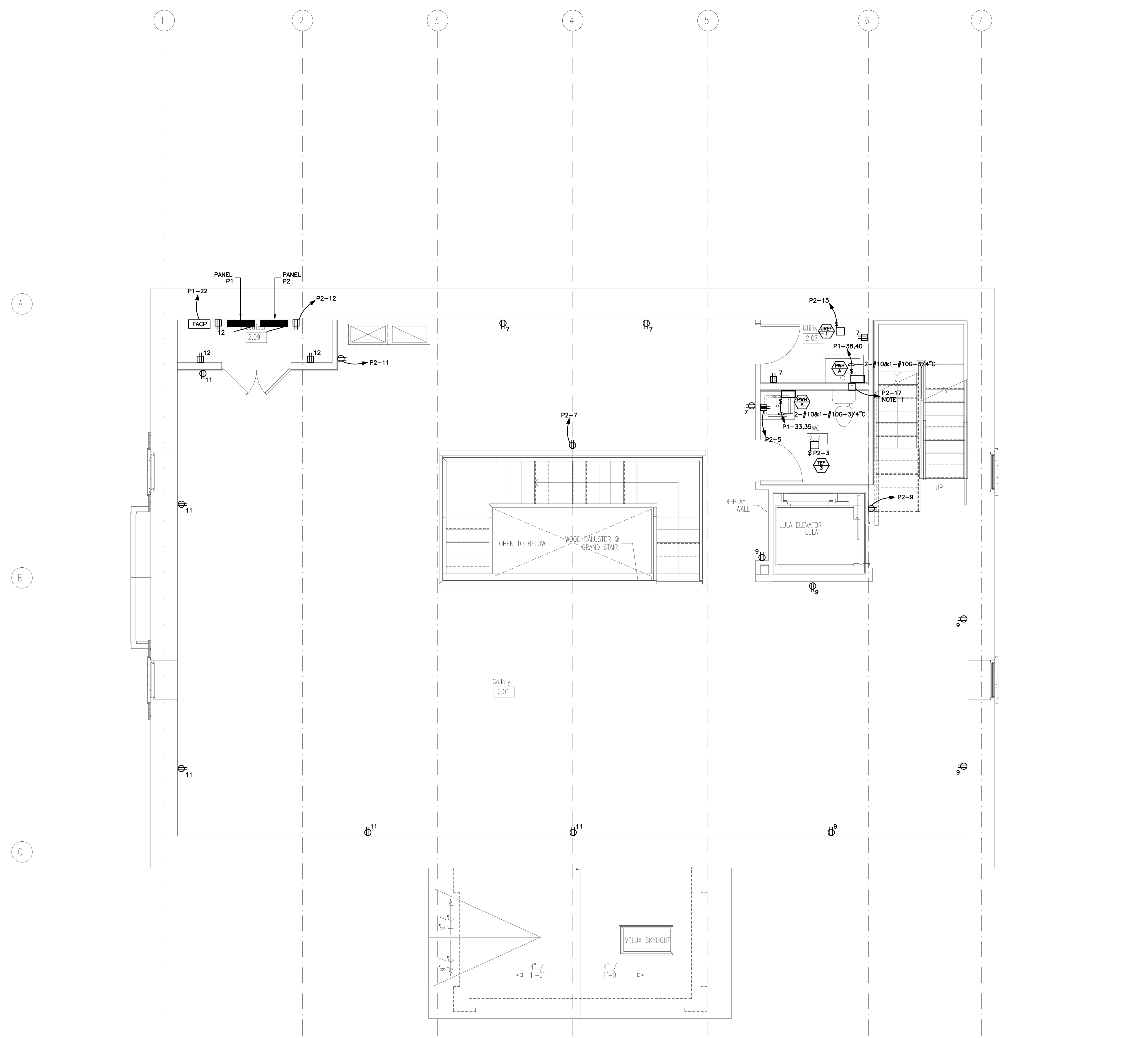
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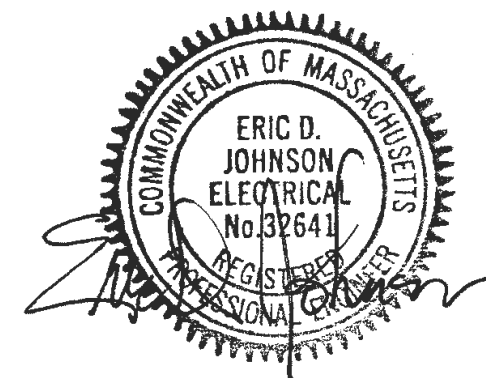
SECOND FLOOR POWER PLAN

E5



SECOND FLOOR POWER PLAN
 SCALE: 1/4" = 1'-0"

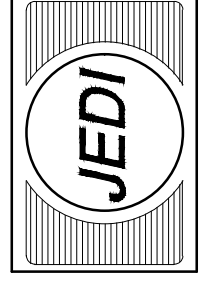
NOTES:
 1. EC SHALL PROVIDE BRANCH CIRCUIT WIRING TO TRANSFORMER FOR ELECTRONIC FLUSH. TRANSFORMER SUPPLIED AND INSTALLED BY PC. WIRED BY EC. ALL LOW VOLTAGE WIRING BY PC.



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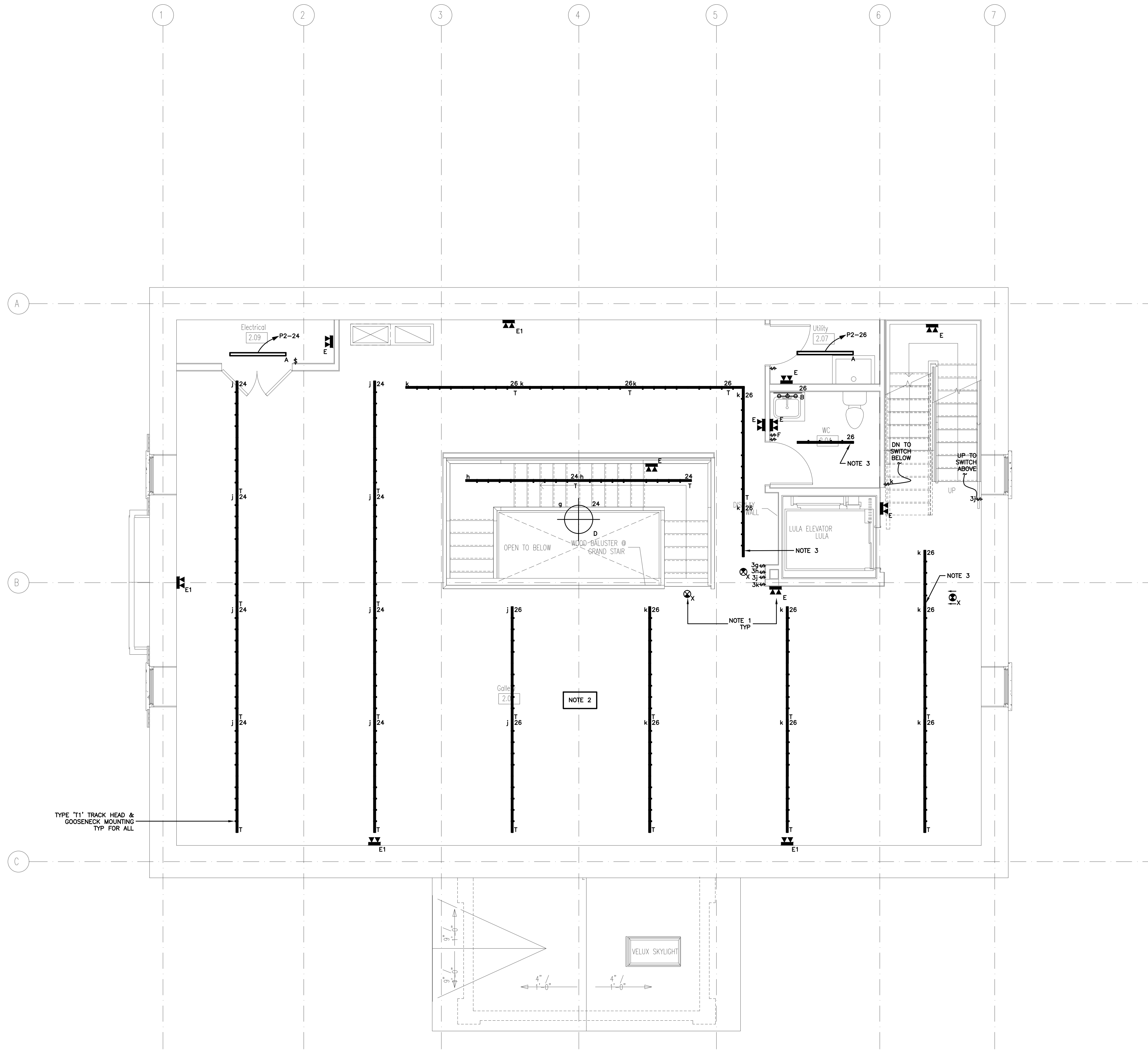
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SECOND FLOOR
 LIGHTING PLAN

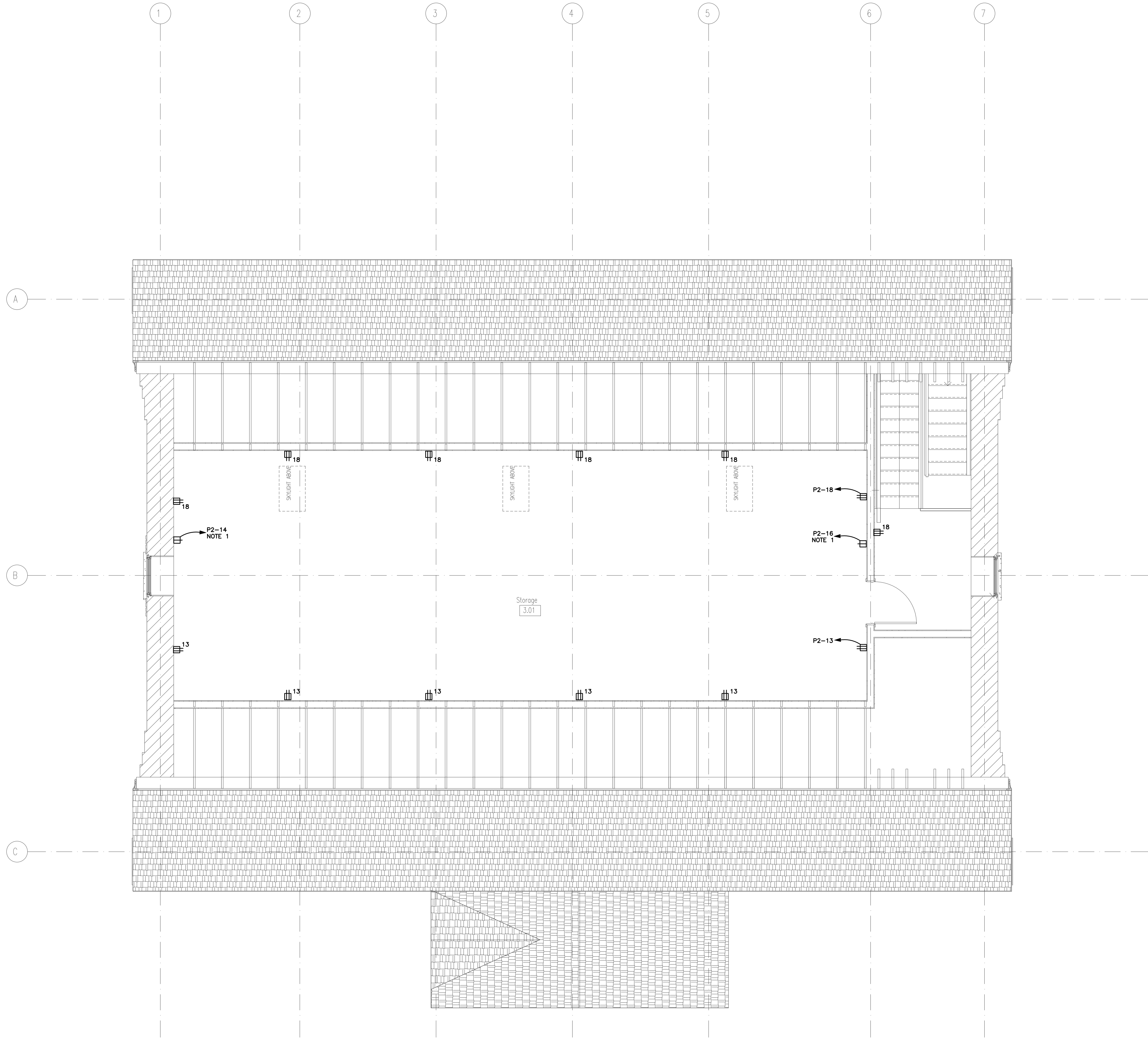
E6



SECOND FLOOR LIGHTING PLAN
 SCALE: 1/4" = 1'-0"

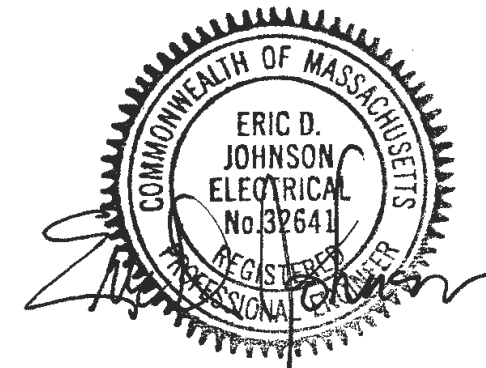
- NOTES:
1. THE EC SHALL WIRE ALL EMERGENCY LIGHTING FIXTURES AND EXIT SIGNS TO THE NORMAL LIGHTING CIRCUIT WITHIN THE AREA, WIRED AHEAD OF ANY LOCAL SWITCHES, TYPICAL.
 2. EC SHALL COORDINATE TRACK HEAD LOCATIONS AND MOUNTING HEIGHT OF LIGHTING TRACKS IN THE FIELD WITH ARCHITECT AND REFER TO MECHANICAL 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'.

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).



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

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

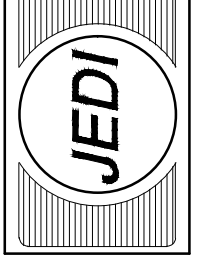


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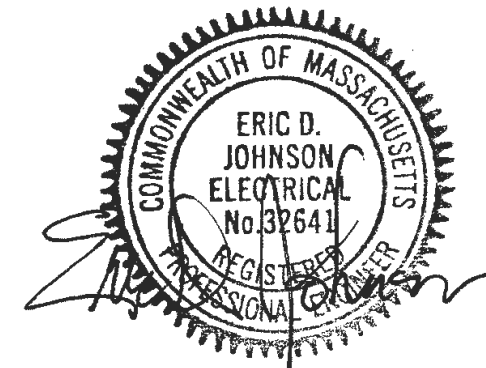
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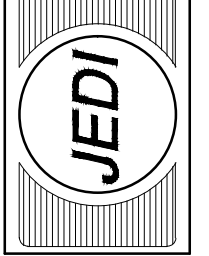
ATTIC POWER PLAN

E7



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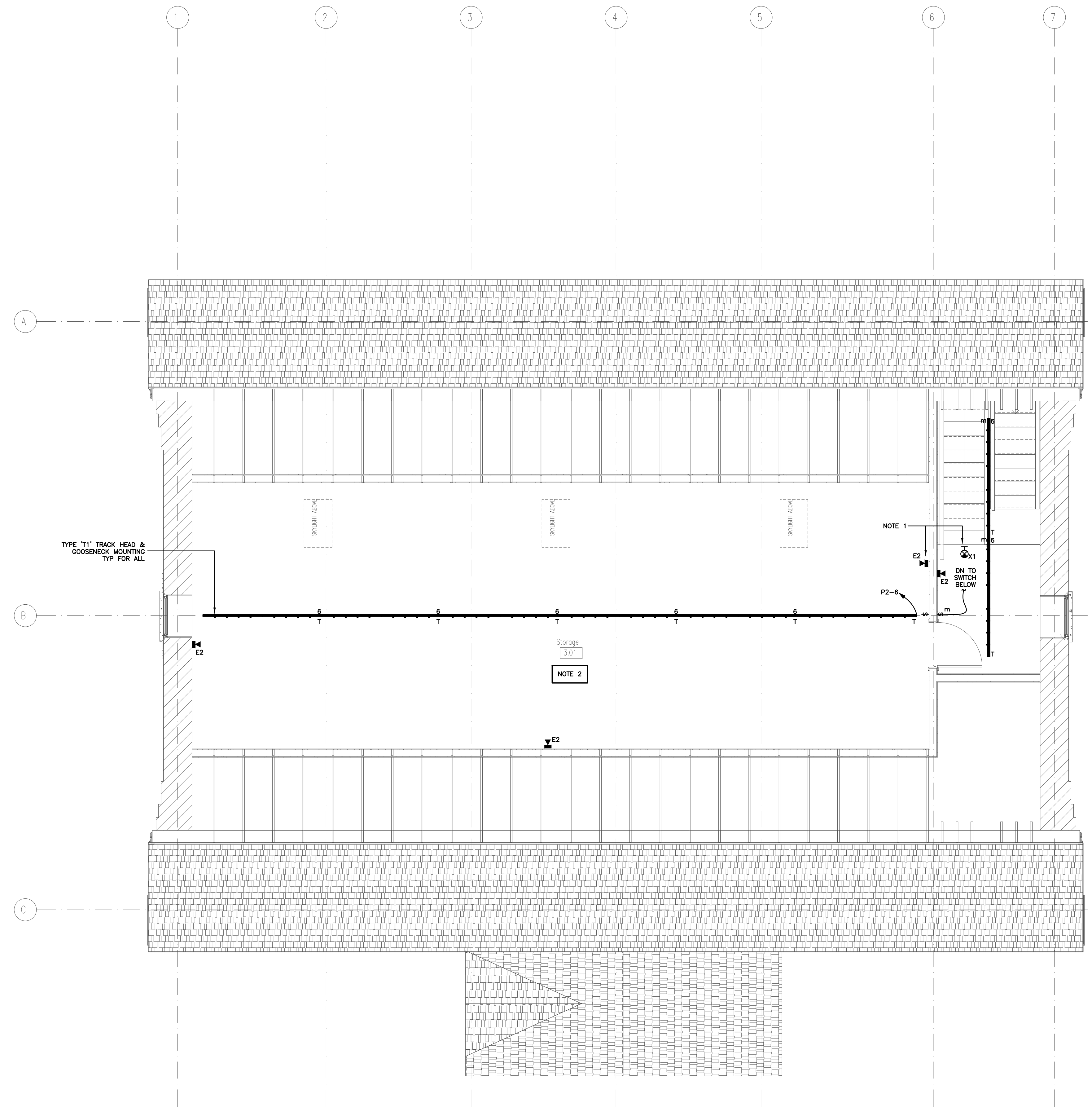
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ATTIC LIGHTING PLAN

E8

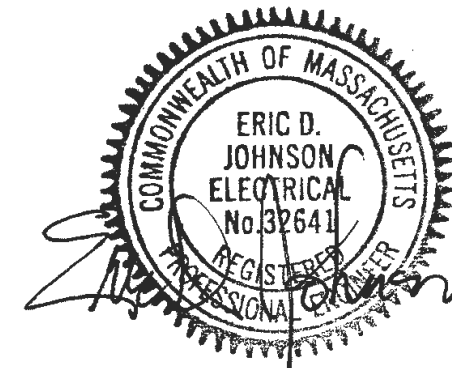


TYPE 'T1' TRACK HEAD & GOOSENECK MOUNTING TYP FOR ALL

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

- 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.

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).



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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 MARSHAL, 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 U.L. 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 NF2-100, 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 IN COLOR.
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 VALVE 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 OTHERS, WIRED BY EC.

E. WIRING

1. ALL FIRE ALARM WIRE AND CABLE SHALL BE U.L. 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 PROVIDED WITH FINAL COPIES OF ALL SHOP DRAWINGS.

G. TESTING

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

H. MANUFACTURERS

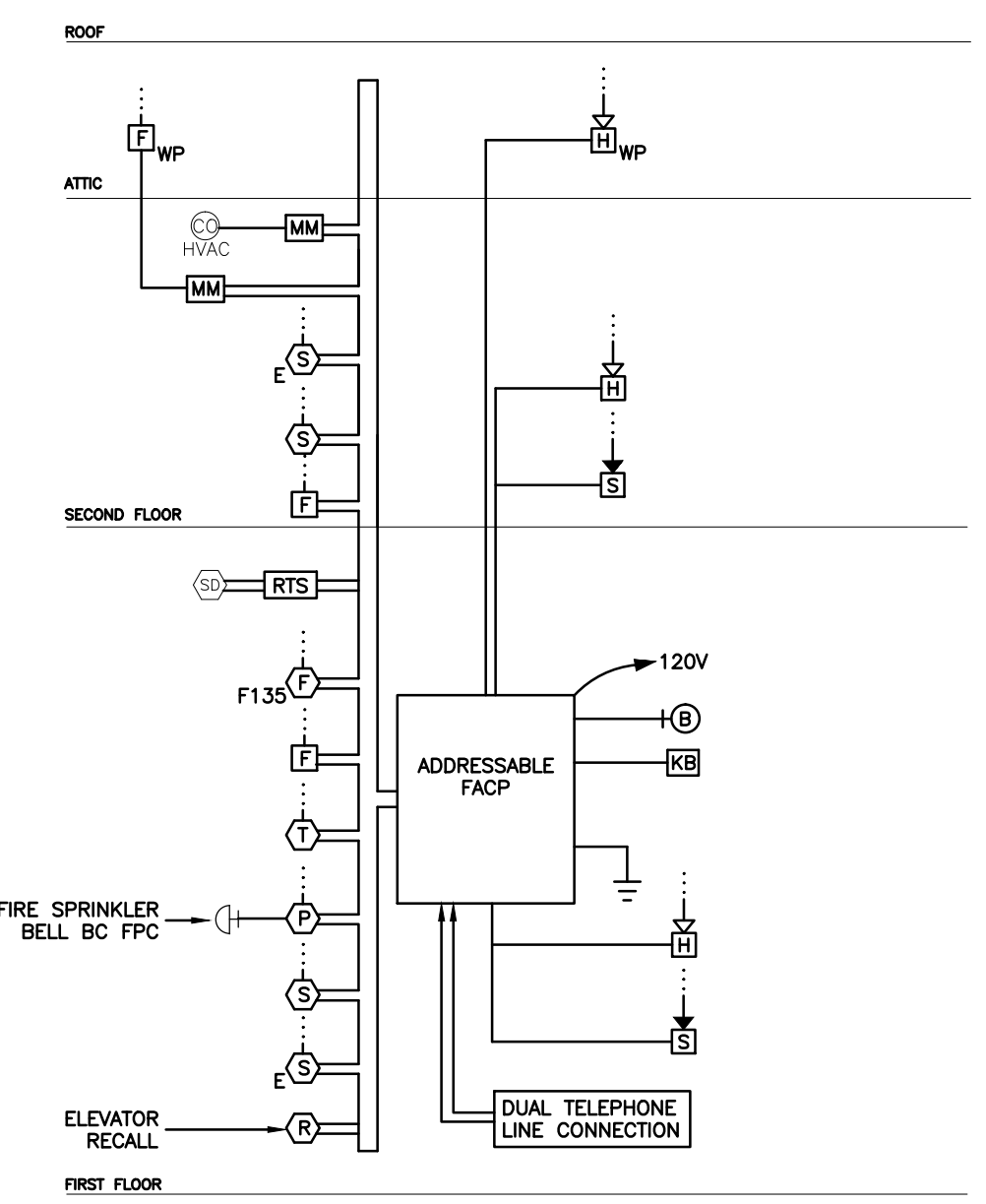
1. THE COMPLETE FIRE ALARM SYSTEM, DETECTION DEVICES AND MAIN FIRE ALARM PANEL SHALL BE MANUFACTURED BY NOTIFIER, AS SUPPLIED BY FIRE COMMAND SYSTEMS, INC CONTACT FIRE COMMAND SYSTEMS, INC. AT 978-401-9840 EXT 101). MAIN FIRE ALARM CONTROL PANEL SHALL BE NOTIFIER FIRE WARDEN SERIES, WITH NOTIFIER REMOTE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

FIRE ALARM NARRATIVE

1. BUILDING ADDRESS: 2 OLD ELM ST, NORTH BILLERICA, MA 01862
2. 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 U.L. LISTED AND MANUFACTURED BY A SINGLE EQUIPMENT SUPPLIER.
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 BUILDING'S MAIN ELECTRICAL CLOSET ON THE 1ST FLOOR AND A REMOTE ANNUNCIATOR WILL BE LOCATED AT THE BUILDING'S 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 AUTO DIALER TO A U.L. LISTED REMOTE SUPERVISING STATION.
5. AUTOMATIC SPRINKLER SYSTEM: THE BUILDING IS EQUIPPED WITH A COMPLETE AUTOMATIC SPRINKLER SYSTEM.
6. SITE ACCESS: OLD ELM ST.
7. LOCATION OF THE FACP: THE MAIN FIRE ALARM CONTROL PANEL SHALL BE LOCATED IN THE BUILDING'S MAIN ELECTRICAL CLOSET ON THE 1ST FLOOR AND A REMOTE ANNUNCIATOR WILL BE LOCATED AT THE BUILDING'S MAIN ENTRANCE.
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.
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 ANY ELEVATOR SMOKE DETECTOR OR ELEVATOR MACHINE ROOM SMOKE DETECTOR IS ACTIVATED.
F. TRANSMIT SIGNAL VIA AUTO DIALER TO A REMOTE SUPERVISING STATION.
9. THE CONTROL PANEL SHALL INDICATE THE DEVICE IN ALARM UNTIL MANUALLY RESET. THIS SHALL SILENCE THE PANEL BUZZER.
10. 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 ALARM TESTING.
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 10.18.2.1.1.

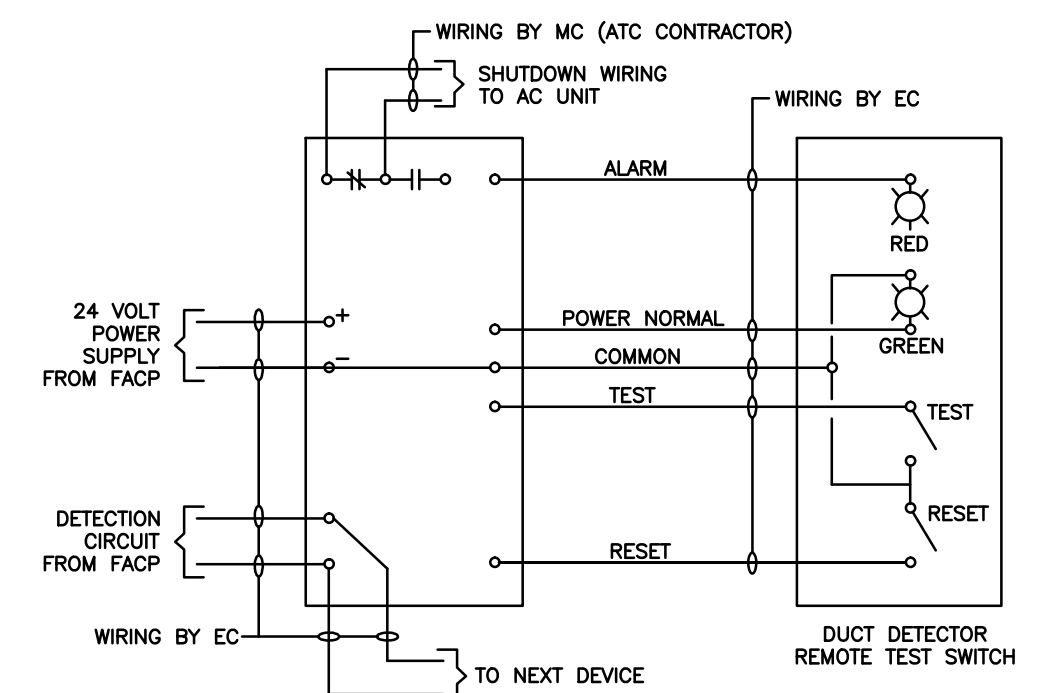
FIRE ALARM LEGEND

- [M] FIRE ALARM MANUAL PULL STATION
- [K] (75) FIRE ALARM HORN/STROBE UNIT (CANDELA RATING AS INDICATED (WHITE))
- [S] (15) FIRE ALARM STROBE ONLY (CANDELA RATING AS INDICATED (WHITE))
- [S] SMOKE DETECTOR, PHOTOELECTRIC TYPE
- [S] E SMOKE DETECTOR, PHOTOELECTRIC TYPE WITH ELEVATOR RECALL
- [F] 135 HEAT DETECTOR, FIXED TEMPERATURE TYPE, DEGREE AS NOTED IN FAHRENHEIT
- [F] -MM WP WEATHERPROOF MANUAL PULL STATION WITH ADDRESSABLE MONITOR MODULE LOCATED IN HEATED SPACE
- [SD] SMOKE DUCT DETECTOR, PHOTOELECTRIC TYPE
- [RTS] REMOTE TEST STATION
- [B] FIRE ALARM EXTERIOR BEACON
- [FACP] MAIN FIRE ALARM CONTROL PANEL
- [ANN] FIRE ALARM REMOTE ANNUNCIATOR PANEL
- [KB] KNOX BOX
- [R] FIRE ALARM REMOTE RELAY
- [T] MONITOR MODULE FOR SPRINK TAMPER SWITCH
- [P] MONITOR MODULE FOR SPRINK PRESSURE SWITCH
- WP INDICATES WEATHERPROOF DEVICE



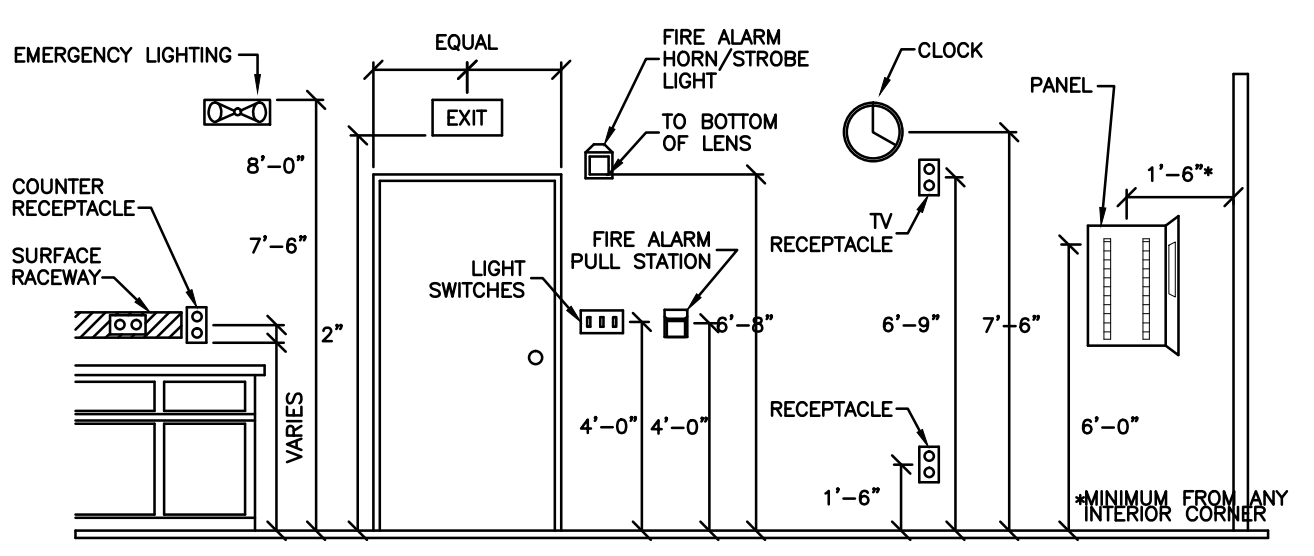
FIRE ALARM ONE-LINE DIAGRAM -- ADDRESSABLE
SCALE: NTS

NOTES:
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.



DUCT SMOKE DETECTOR WIRING DIAGRAM
SCALE: NTS

NOTES:
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.



MOUNTING HEIGHT DETAIL
SCALE: NTS

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.

ELECTRICAL, PLUMBING & FIRE PROTECTION CONSULTING ENGINEERS
JOHNSON ENGINEERING AND DESIGN, INC.
5 ELM STREET
SUITE 14
DANVERS, MA 01923
TEL: 978-646-9001
FAX: 978-646-9002
www.johnsonengineering.biz
JEDI
16-3220

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

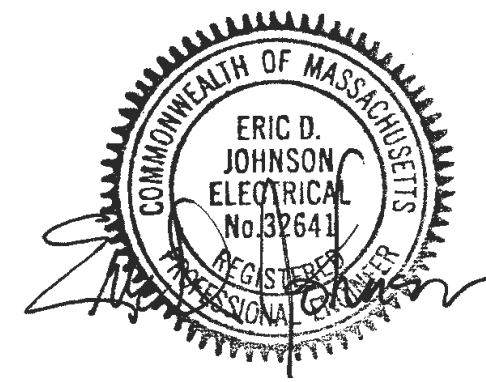
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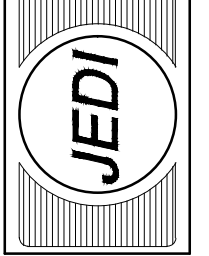
FIRE ALARM LEGEND, SPECIFICATIONS, DIAGRAMS & NARRATIVE

FA1



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

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 5 ELM STREET
 SUITE 14
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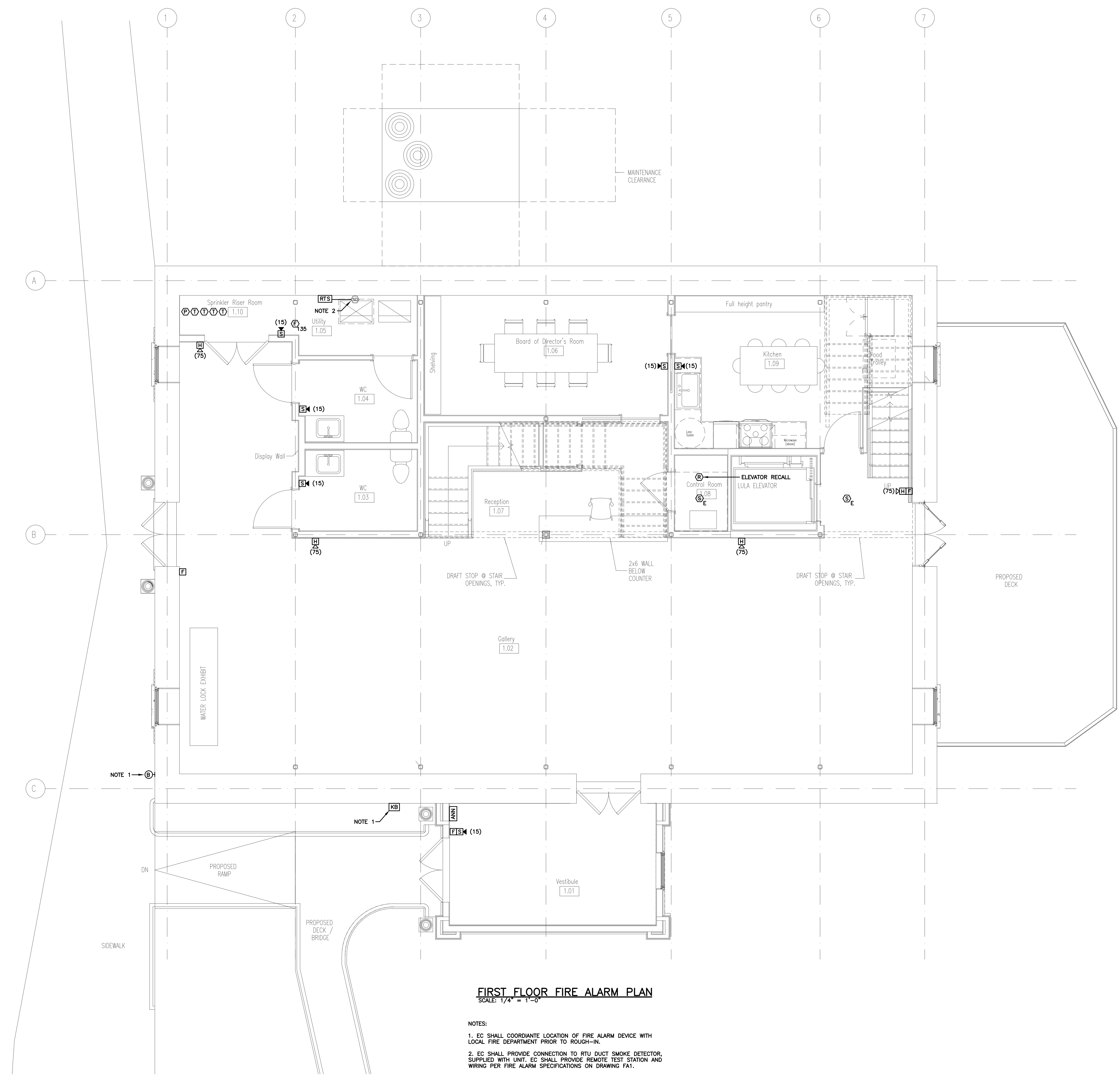
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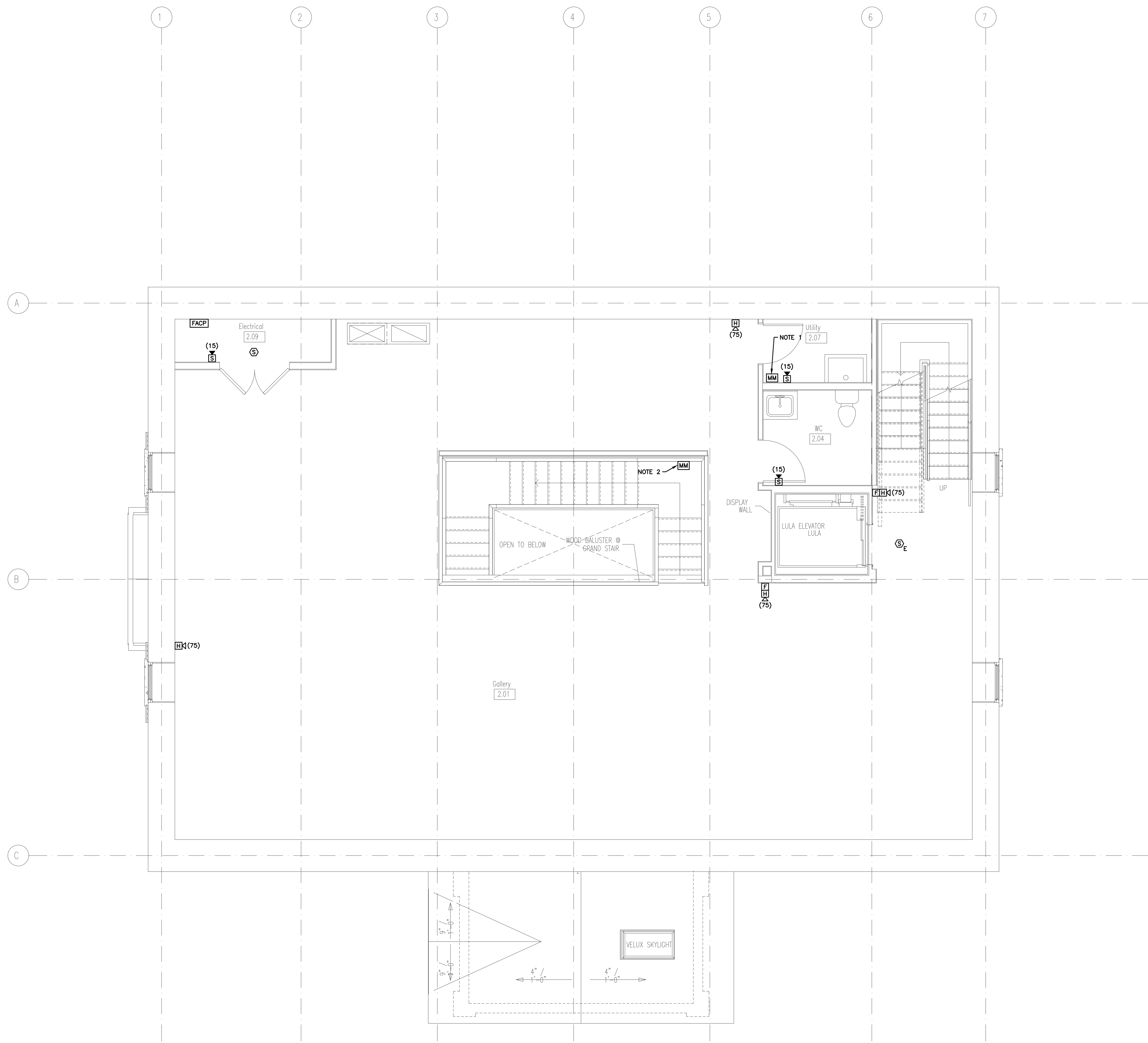
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 NO. DATE NOTES

FIRST FLOOR FIRE
 ALARM PLAN

FA2

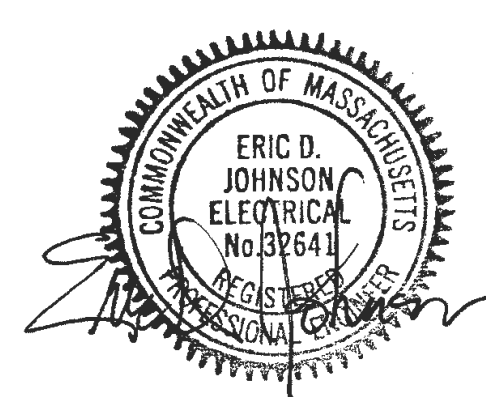




SECOND FLOOR FIRE ALARM PLAN

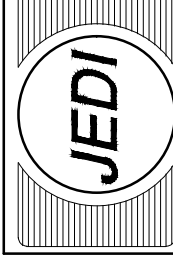
SCALE: 1/4" = 1'-0"

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



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

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 SUITE 14
 DANVERS, MA 01923
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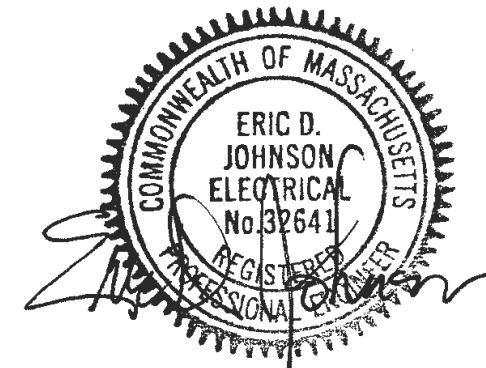
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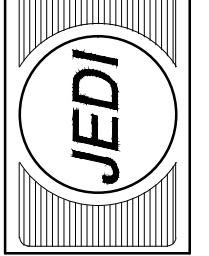
SECOND FLOOR
 FIRE ALARM PLAN

FA3



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

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 SUITE 14
 DANVERS, MA 01923
 TEL: 978-646-9001
 FAX: 978-646-9002
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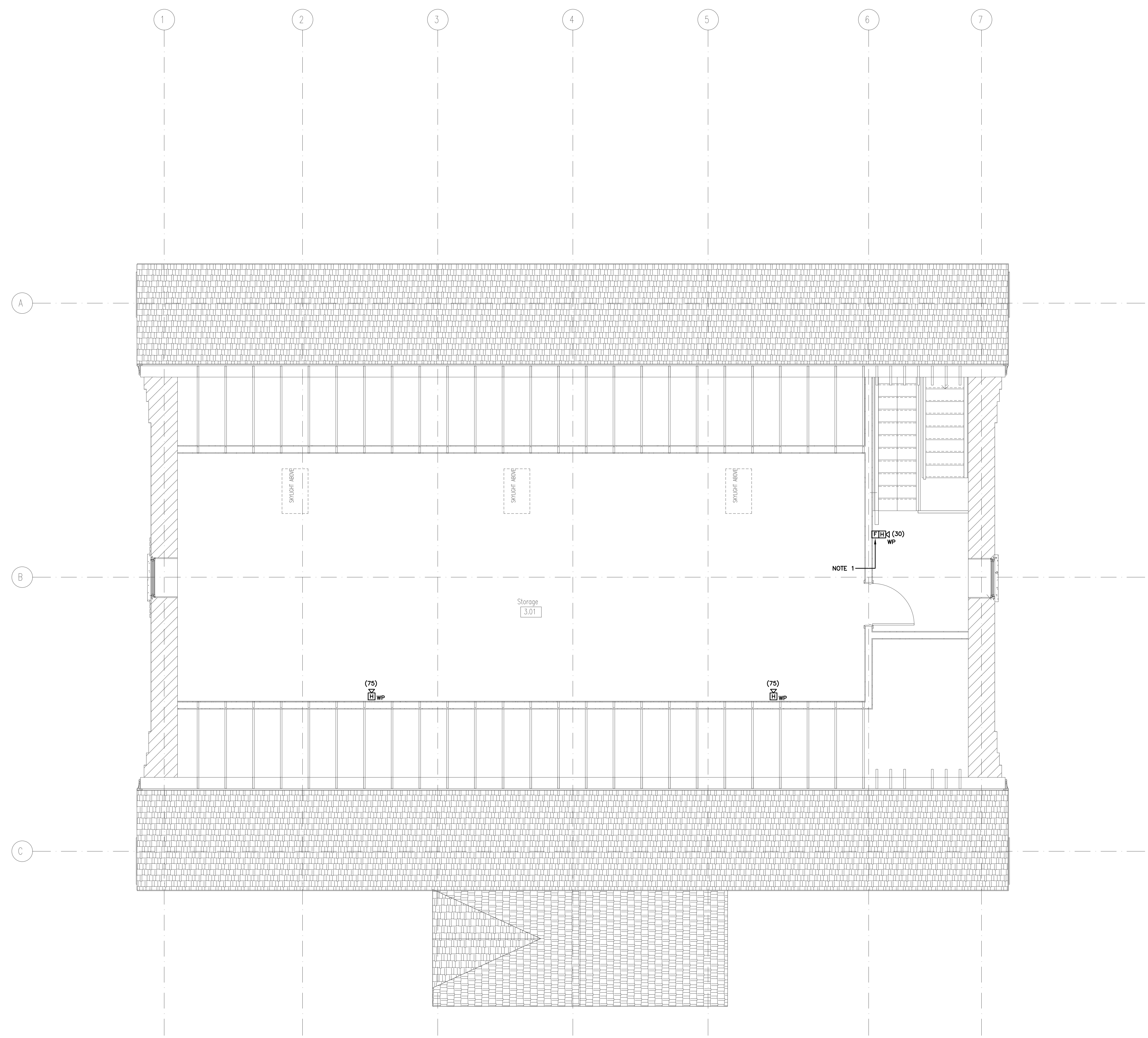
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REVISIONS

NO.	DATE	NOTES

ATTIC FIRE ALARM PLAN

FA4



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

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

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

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


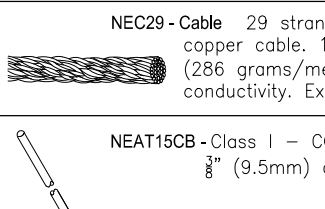
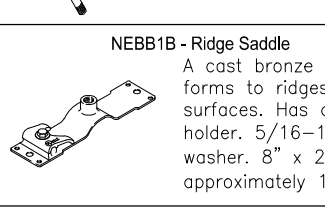
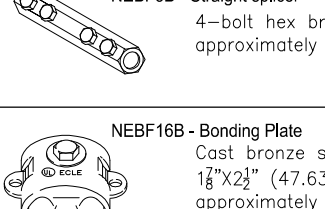
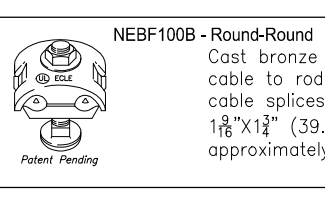

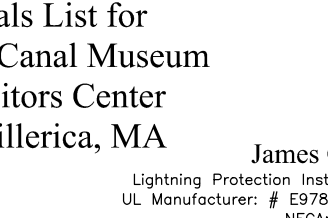
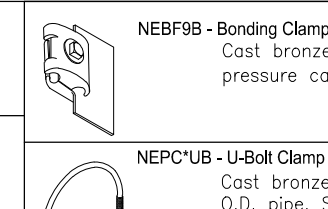
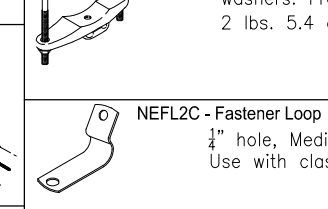
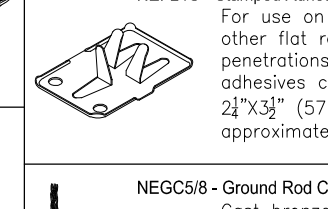
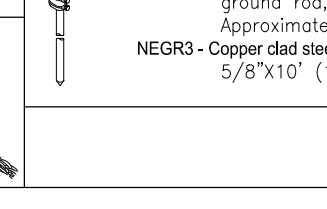

3.01 Installation: The installation shall be accomplished by an experienced installation company that is listed with Underwriters Laboratories for lightning protection installation. The installation company shall utilize Lightning Protection Institute Certified Master Installers. The company shall be 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.

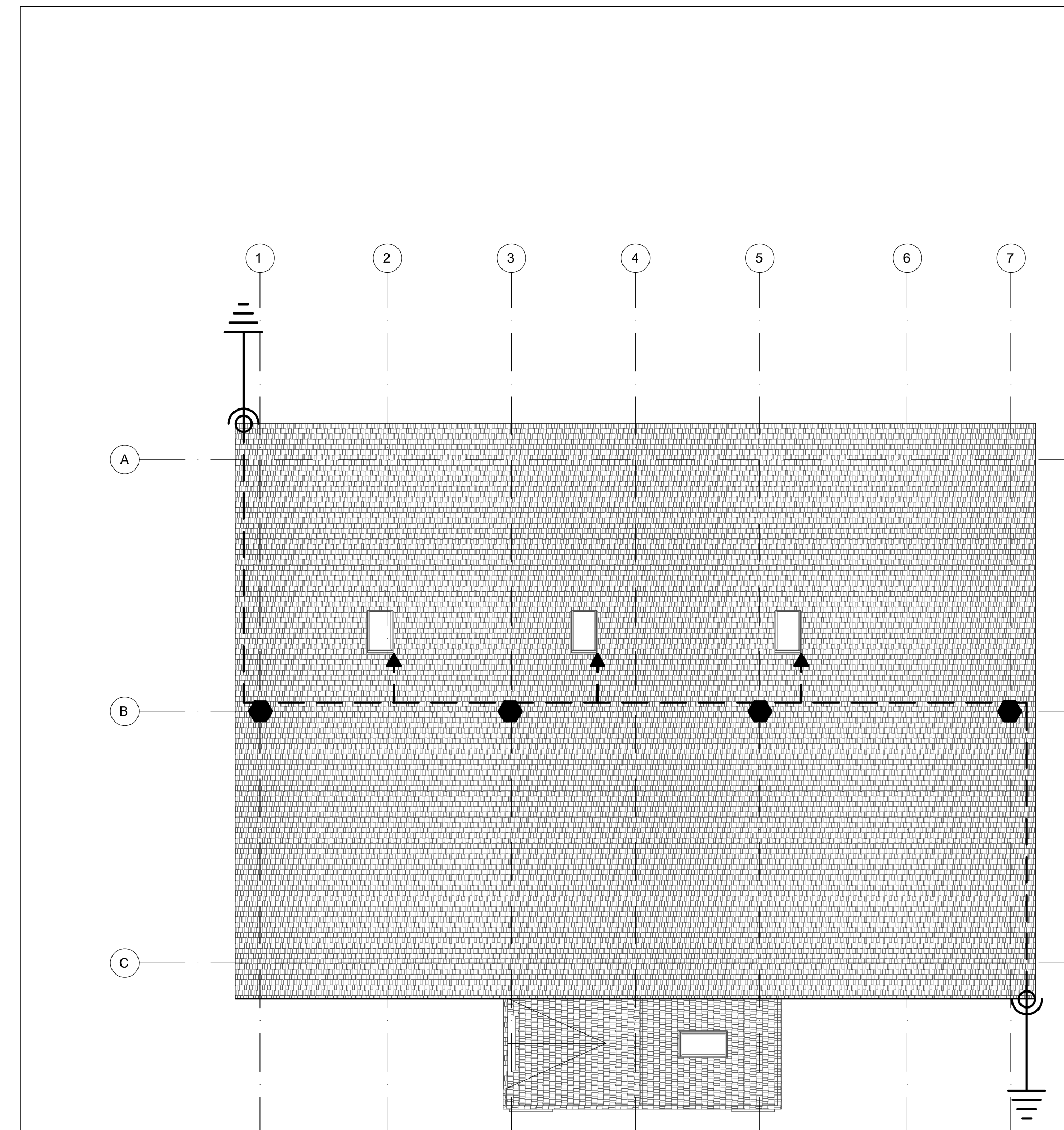
3.02 Coordination: The lightning protection installer will work with other trades to ensure a correct, neat and unobtrusive installation. The roofing contractor will be responsible for sealing and flashing all lightning protection roof penetrations as per the roof manufacturer's recommendations.

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.

Materials List for Middlesex Canal Museum And Visitors Center North Billerica, MA	
	<p>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.</p>
	<p>NEAT15CB - Class I - COPPER 1/8" x 1/8" (9.5mm x 9.5mm) (9.5mm diameter, threaded base, UL listed).</p>
	<p>NEBB1B - Ridge Saddle 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).</p>
	<p>NEBF3B - Straight Isolator 4-bolt hex brass. 3/4" x 1/2" (88.9mm x 19mm); approximately 6 oz. (170 grams).</p>
	<p>NEBF1B - Bonding Plate Cast bronze secondary bonding plate. 1 1/2" x 2" (47.6mm x 63.5mm); approximately 7.1 oz. (201 grams).</p>
	<p>NEBF10B - 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 1/8" x 1 1/4" (39.7mm x 44.45mm); approximately 7.6 oz. (215 grams).</p>
	<p>NEBF9B - Bonding Clamp Cast bronze, 1-1/4 square-inch bonding clamp with bolt pressure cable holder. Approximately 9 oz. (255 grams).</p>
	<p>NEFCUB - 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).</p>
	<p>NEFL2C - Fastener Loop 1" hole, Medium stamped copper loop. Use with class I conductors.</p>
	<p>NEFL4C - Stamped Adhesive Crmp 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 1/2" x 3/4" (57mm x 89mm); approximately 1.4 oz (40 grams).</p>
	<p>NEGCS8 - Ground Rod Clamp Cast bronze, cable to 5/8" (1.59cm) ground rod clamp. Approximately 9.3 oz. (264 grams).</p>
	<p>NEGR3 - Copper clad steel rod 5/8" x 10' (1.59cm x 3.05m)</p>



LIGHTNING PROTECTION ROOF PLAN
SCALE: 1/8" = 1'-0"

NOTES:
 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 UNDERWRITERS LABORATORIES INC.

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 ANGLE BEND OF 90 DEGREES OR GREATER.

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

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




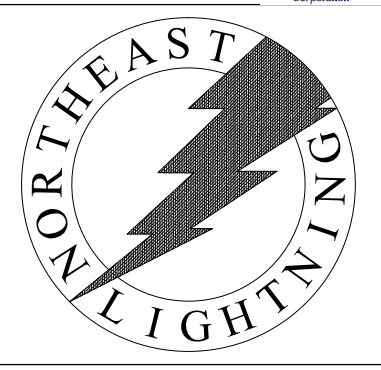

ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED EVERY 3'-0" MAX.

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

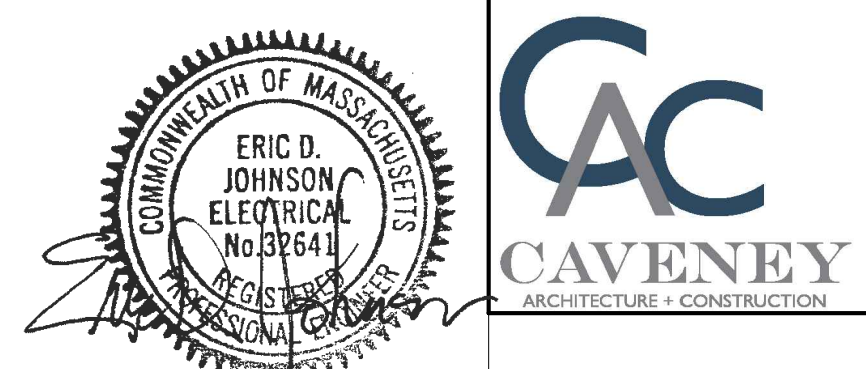
ACTUAL JOB SITE CONDITIONS MAY REQUIRE SLIGHT ALTERATIONS IN AIR TERMINAL, DOWN CONDUCTOR, AND GROUND ROD LOCATIONS.

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.

- LEGEND:**
- CONDUCTOR CABLE: - - - - -
 - AIR TERMINAL: ●
 - GROUND ELECTRODE: ⊚
 - DOWNLEAD EXPOSED ON WALL: ⊙
 - BOND: ▲

James G. Barnard
 Lightning Protection Institute Master Designer #1074
 UL Installation: # E83972 NECA # 15867



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

JOHNSON ENGINEERING AND DESIGN, INC.
 5 ELM STREET
 SUITE 14
 DANVERS, MA 01923
 TEL: 978-646-9001
 FAX: 978-646-9002
 www.johnsonengineering.biz

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

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DRAWN BY:	M/G	
REVISIONS		
NO.	DATE	NOTES

LIGHTNING PROTECTION LEGEND, SPECIFICATIONS, DETAILS & ROOF PLAN
LPI