

BULLETIN NO. 5

Date: November 21, 2018

East Hampton Town Hall & Police Dept.

East Hampton, CT

1. The bid due dates has not changed, all bids are due November 28, 2018.
2. Attachments:
 - a. Architects Addendum #2
 - b. RFI's: The following RFI's have been answered:

RFI #	Subject
B116	smoke control sequence of operations
B120	Alternate #5
B152	Site Lighting
B165	Communication Backbone Cabling
B173	bullet resistant doors.
B176	DDC service contract proposal
B178	HVAC Questions
B179	Flooring Questions
B180	Flooring Questions
B181	detention hardware
B182	AV Questions
B184	Wall Type 36R
B185	Grab Bars and sectional doors

End of Bulletin #5

Addendum #2

Date:	November 20, 2018	Prepared By:	Chris Legiadre
Project Name:	Town of East Hampton Town Hall and Police Department	Title/Role:	Project Manager
Project Number:	17041c	Email Address:	clegiadre@amentaemma.com

This addendum is issued to show corrections, revisions and clarifications to the Bidding Documents for the Town of East Hampton – Town Hall and Police Department project, dated October 12, 2018.

Clarifications

- **REMOVE** word “OBSCURE” from glazing indicated in detail 30/A2.10. Utilize glazing type indicated within Intus Code.

Modifications to the Drawings

Sheet A1.03a:

1. **REVISE** wall construction between rooms 205B and 205C.

Sheet A2.03:

2. **UPDATE** guardrail extents at North side of Sallyport retaining wall as per details 28 & 30.

Sheet A2.03a:

1. **ADD** sheet to clarify guardrail and handrail extents for revised Sallyport retaining wall and stair extents.

Sheet A5.02 & A5.04:

1. **UPDATE** specification section references and general notes for stair elements as per RFI B151.
2. guardrail extents at North side of Sallyport retaining wall as per details 28 & 30.

Sheet FP1.01, FP1.02 & FP1.03:

1. **MODIFY** drawings to clarify intent for pre-action system at Town Hall as it relates to Alternate #5.

Sheet P1.00, P1.02 & P1.03

1. **MODIFY** rain-water leading pipe routing.

Sheet H1.03:

1. **MODIFY** duct layout.

Sheet HP1.03:

1. **MODIFY** hydronic piping layout.

Sheet E0.01

1. **MODIFY** mechanical equipment circuiting schedule.

Sheet SE1.00:

1. **MODIFY** site lighting layout.

Sheet EL1.02:

1. **MODIFY** lighting layout.

Sheet EP1.02 & EP1.03:

1. **MODIFY** receptacle layout.

Sheet ES1.01:

1. **ADD** power for mechanical equipment.

Sheet E3.02

1. **MODIFY** Fire Alarm Riser diagram.

Sheet TC1.02 & TC1.03:

1. **MODIFY** data layout.

Modifications to the Specifications

Section 08 14 16 – Flush Wood Doors

1. **ADD** information for bullet resistant Door Type J.

Section 21 32 13 – Electric-Drive, Vertical Turbine Fire Pumps

1. **ADD** section in its entirety.

Section 23 31 13 – Metal Ducts

1. **ADD** field quality control notes.

Section 23 09 93.11 – Sequence of HVAC Operations

1. **REVISE** notes for heating hot water primary pumps, cabinet unit heaters and unit heaters.

Section 26 09 13 -

1. **DELETE** section in its entirety.

Section 26 80 00 – Photovoltaic System

1. **REVISE** design requirements and information related to PV system.

Section 28 46 21.11 – Addressable Fire-Alarm Systems

1. **REVISE** information relative to firefighter's smoke control system.

Attachments:

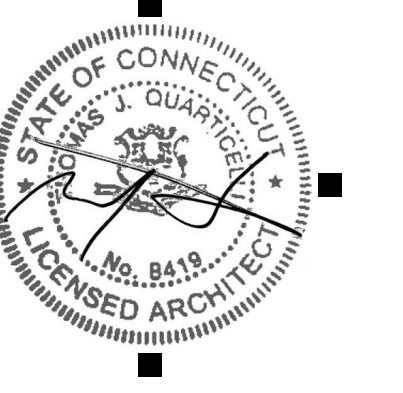
DRAWINGS:

- A1.02a, A2.03, A2.03a, A5.02, A5.04, FP1.01, FP1.02, FP1.03, FP3.00, P1.00, P1.02, P1.03, P1.04, H1.02, HP1.03, E0.01, SE1.00, EL1.02, EP1.02, EP1.03, ES1.01, E3.02, TC1.02, TC1.03

SPECIFICATIONS:

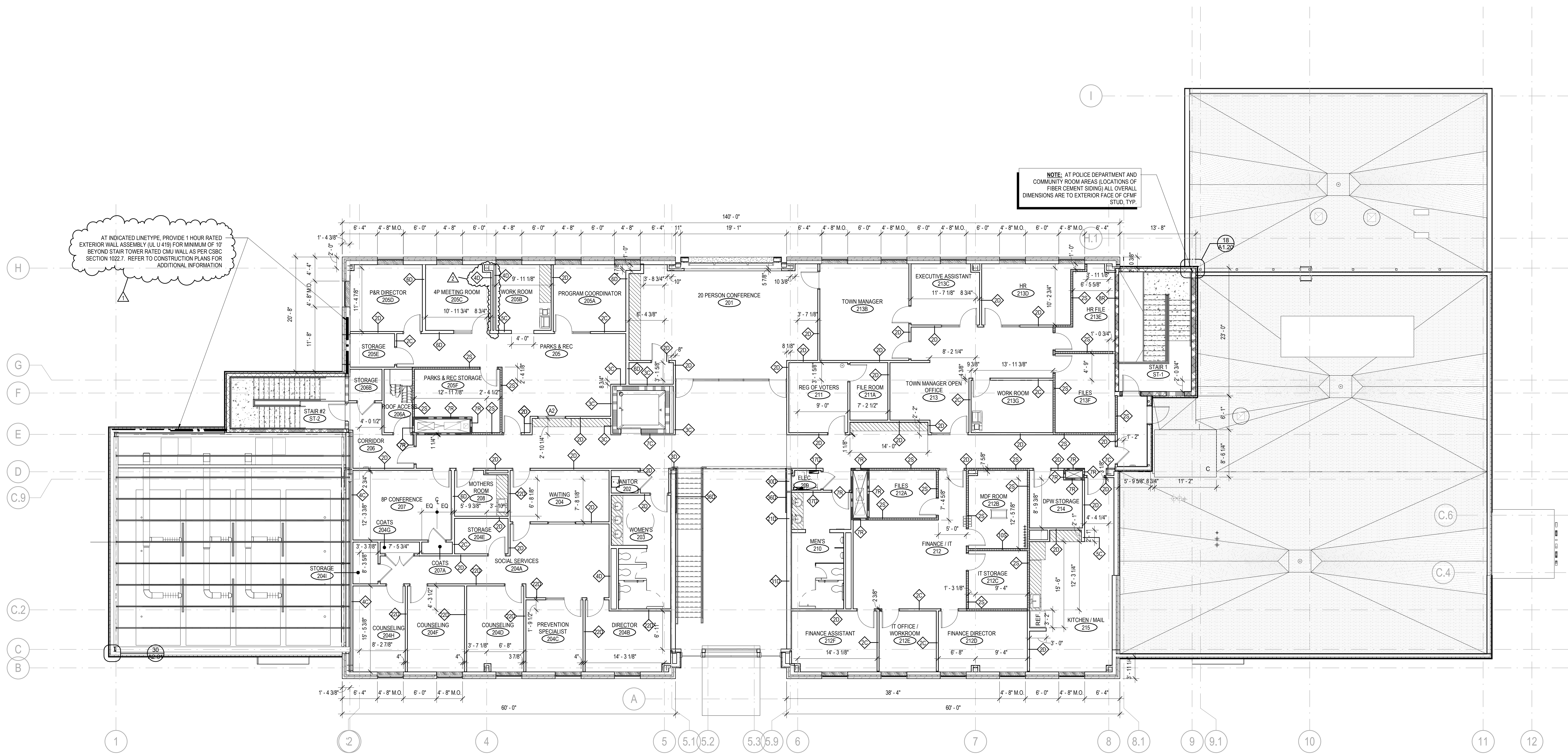
- 08 14 16 – Flush Wood Doors
- 21 32 13 – Electric-Drive, Vertical Turbine Fire Pumps
- 23 09 93.11 – Sequence of Operations for HVAC
- 23 31 13 – Metal Ducts
- 26 80 00 – Photovoltaic System
- 28 46 21.11 – Addressable Fire-Alarm Systems

End of Addendum



TOWN OF EAST HAMPTON
TOWN HALL AND POLICE DEPARTMENT
EDGEWATER HILL
EAST HAMPTON, CT

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AT INDICATED LINETYPE, PROVIDE 1 HOUR RATED EXTERIOR WALL ASSEMBLY (UL U 419) FOR MINIMUM OF 10' BEYOND STAIR TOWER RATED CMU WALL AS PER CSBC SECTION 1102.7. REFER TO CONSTRUCTION PLANS FOR ADDITIONAL INFORMATION

NOTE: AT POLICE DEPARTMENT AND COMMUNITY ROOM AREAS, LOCATIONS OF FIBER CEMENT SIDING ALL OVERALL DIMENSIONS ARE TO EXTERIOR FACE OF CFMF STUD, TYP.

NOTE: PROVIDE HIGH IMPACT GYPSUM BOARD AT ALL CORRIDOR WALLS, 09 29 00

KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	MEL
CHECKED	CDL
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FILE REFERENCE	C:\Users\cdl\AMENTA\EMMA\Documents\17041c\EH Town Hall and PD-CENTRAL-2018-BIDDING_chrislegadre4215.rvt

HISTORY OF SUBMISSIONS

No.	Date	Description
1	10.26.2018	PLAN REVIEW REVISIONS
2	11.5.2018	MAIN BID - ADDENDUM #2

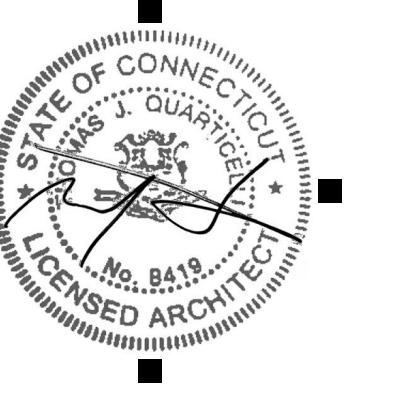
BIDDING DOCUMENTS

SHEET TITLE

DIMENSIONING PLAN - 2ND FLOOR

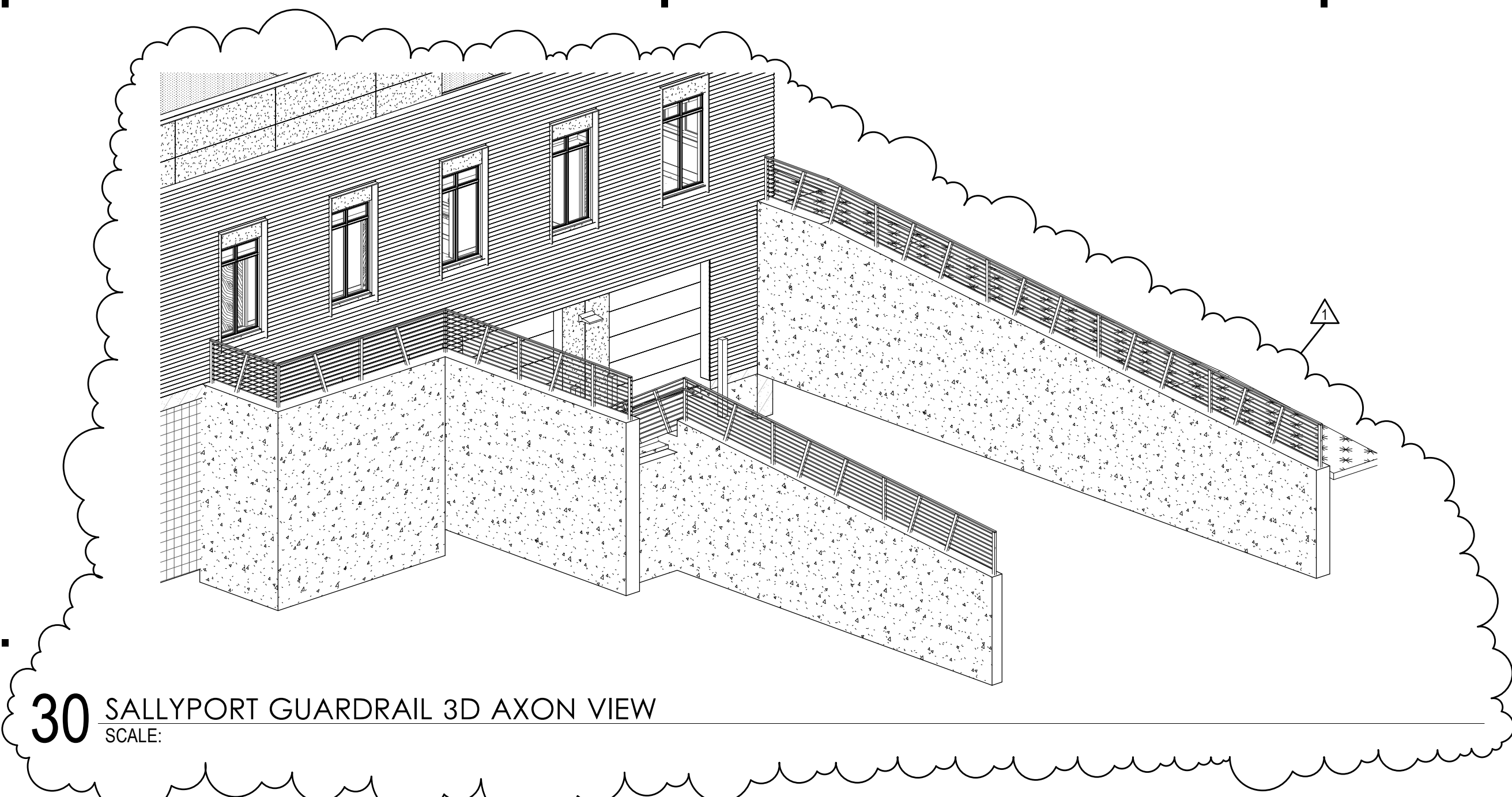
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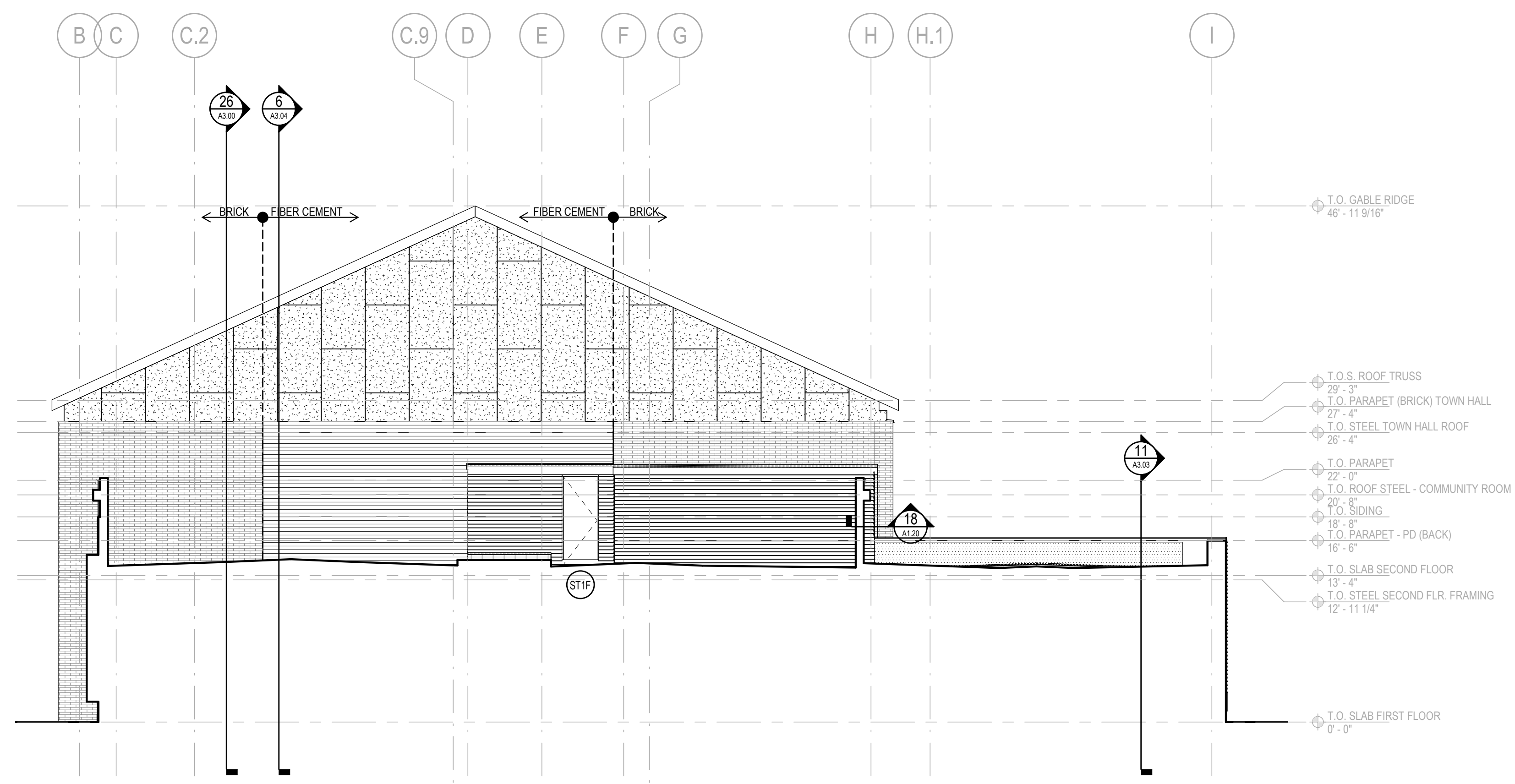


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EAST HAMPTON, CT

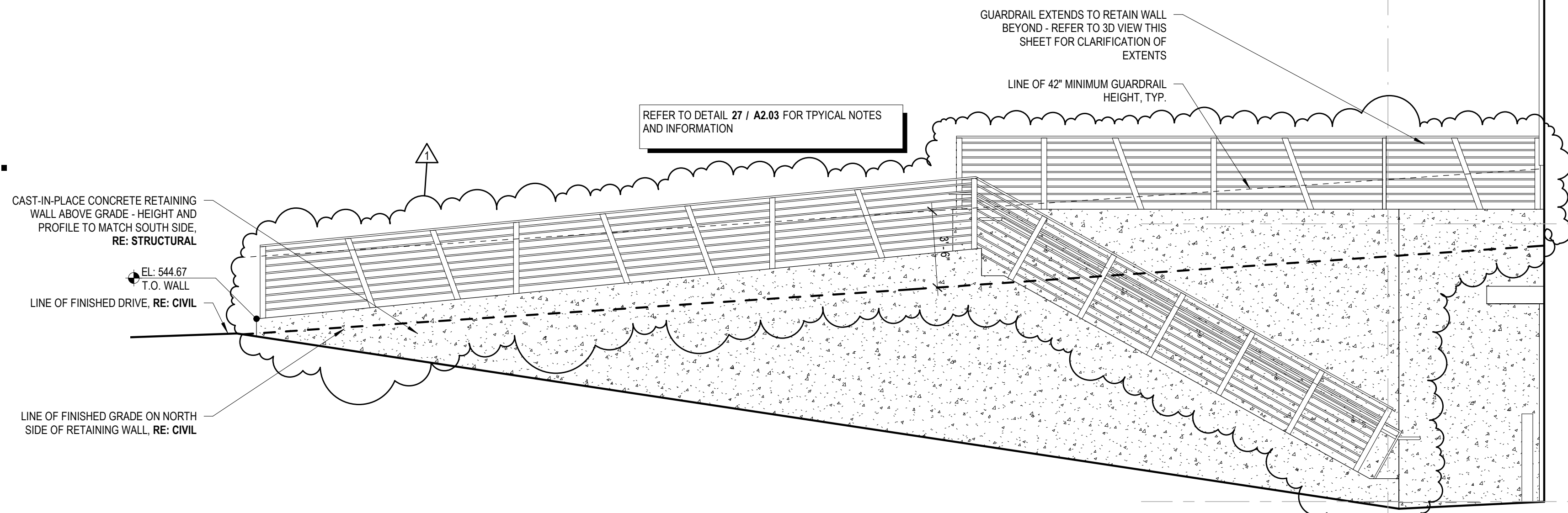
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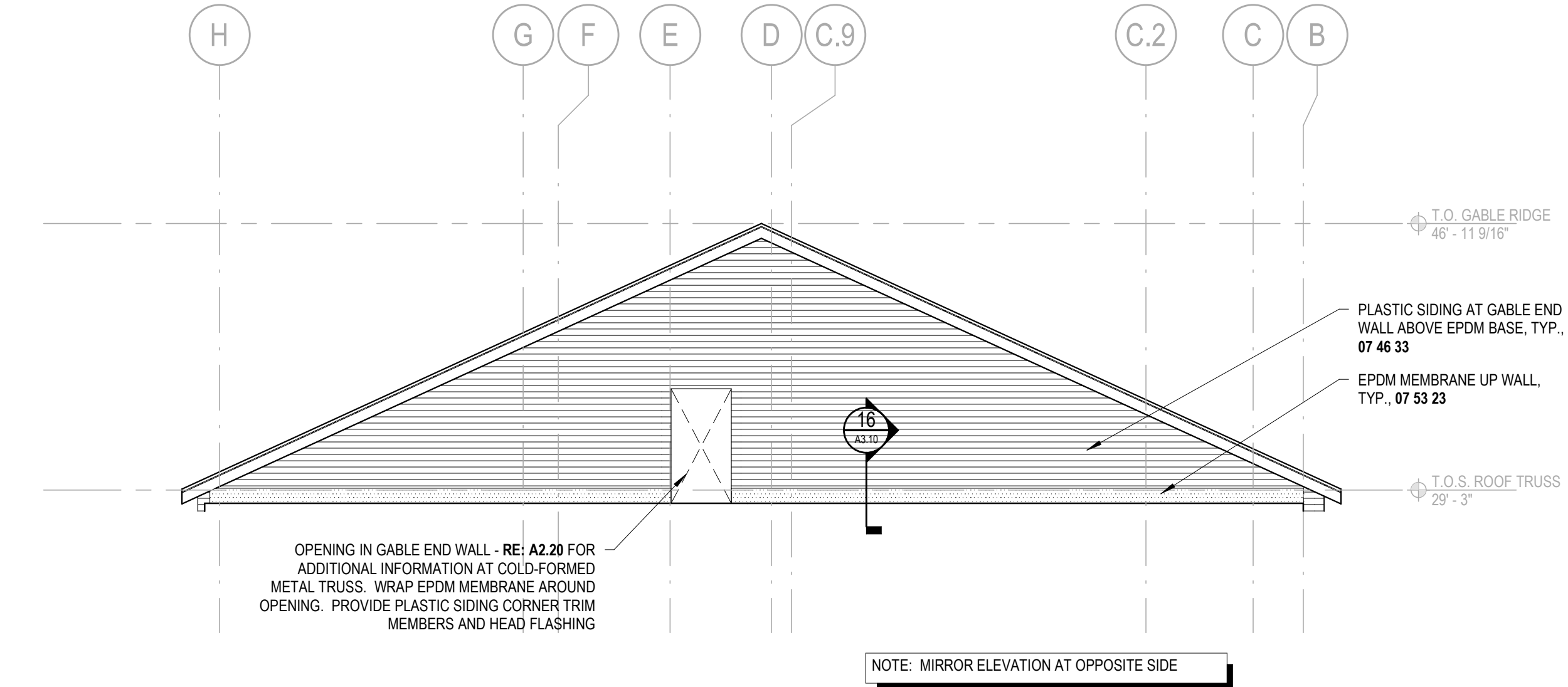
30 SALLYPORT GUARDRAIL 3D AXON VIEW
SCALE:



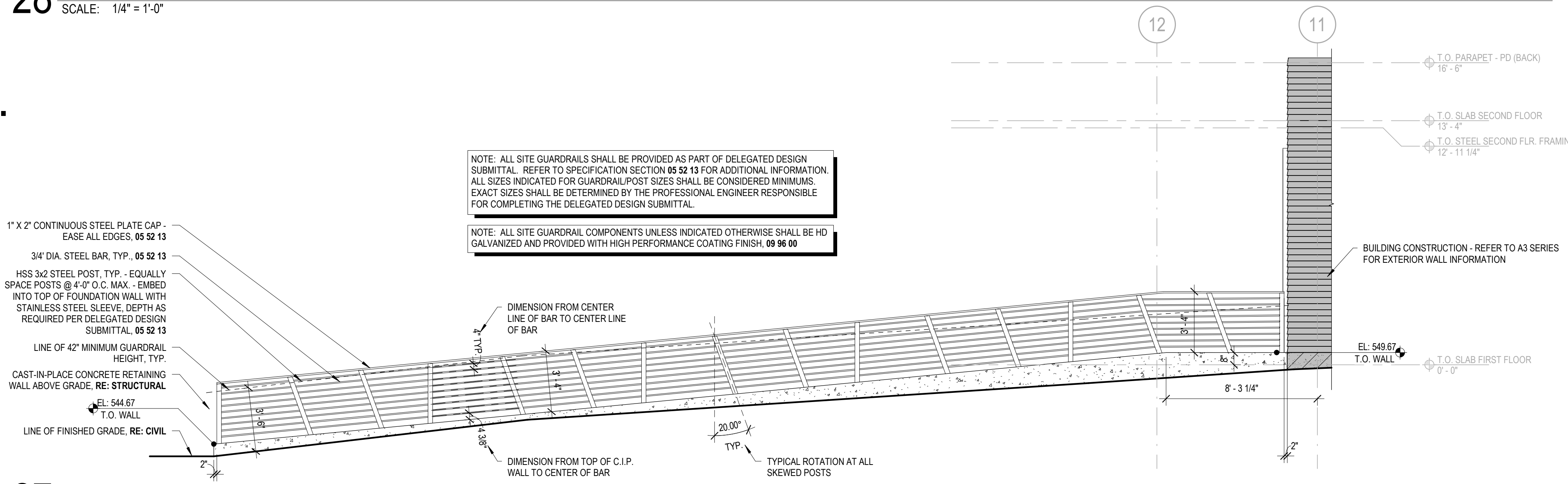
14 WEST GABLE ELEVATION ABOVE PD ROOF
SCALE: 1/8" = 1'-0"



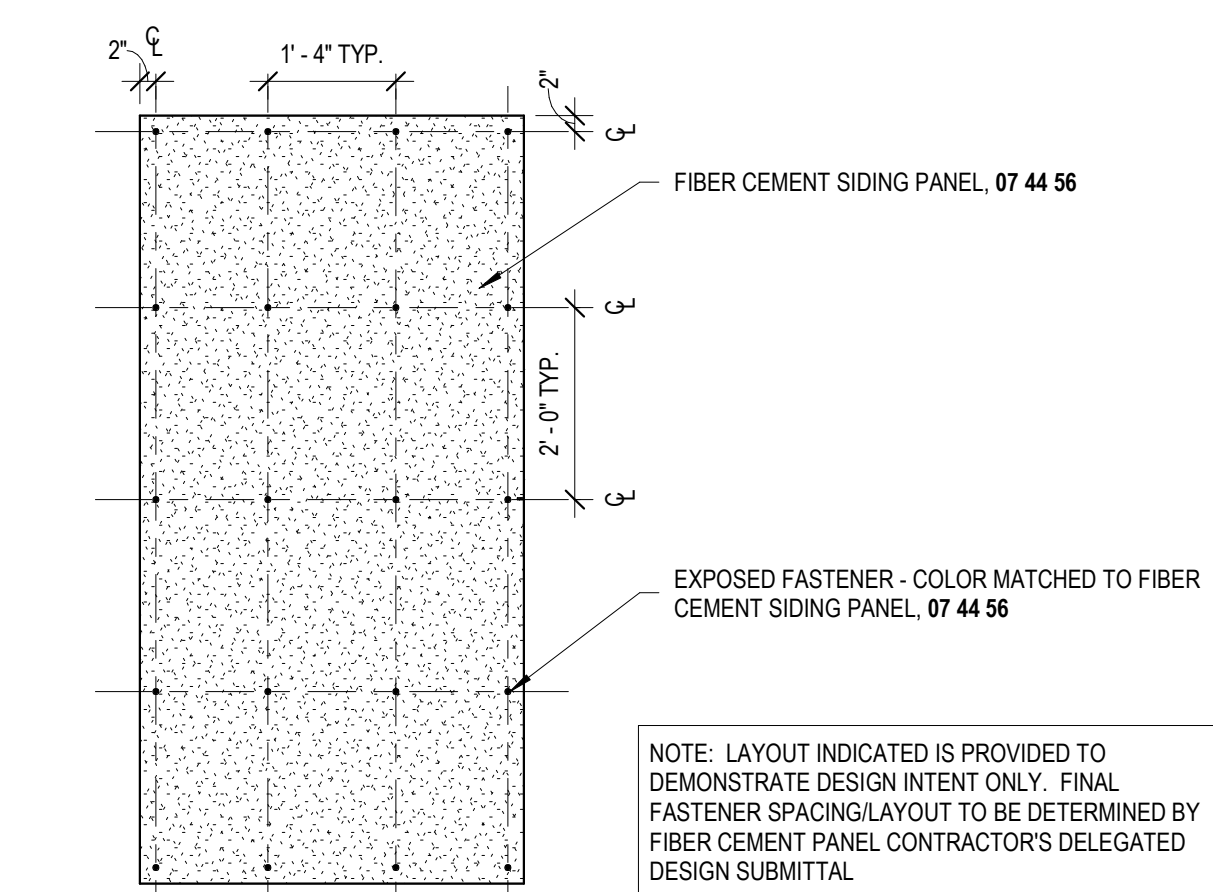
28 SALLYPORT RETAINING WALL/GUARDRAIL ELEVATION - NORTH
SCALE: 1/4" = 1'-0"



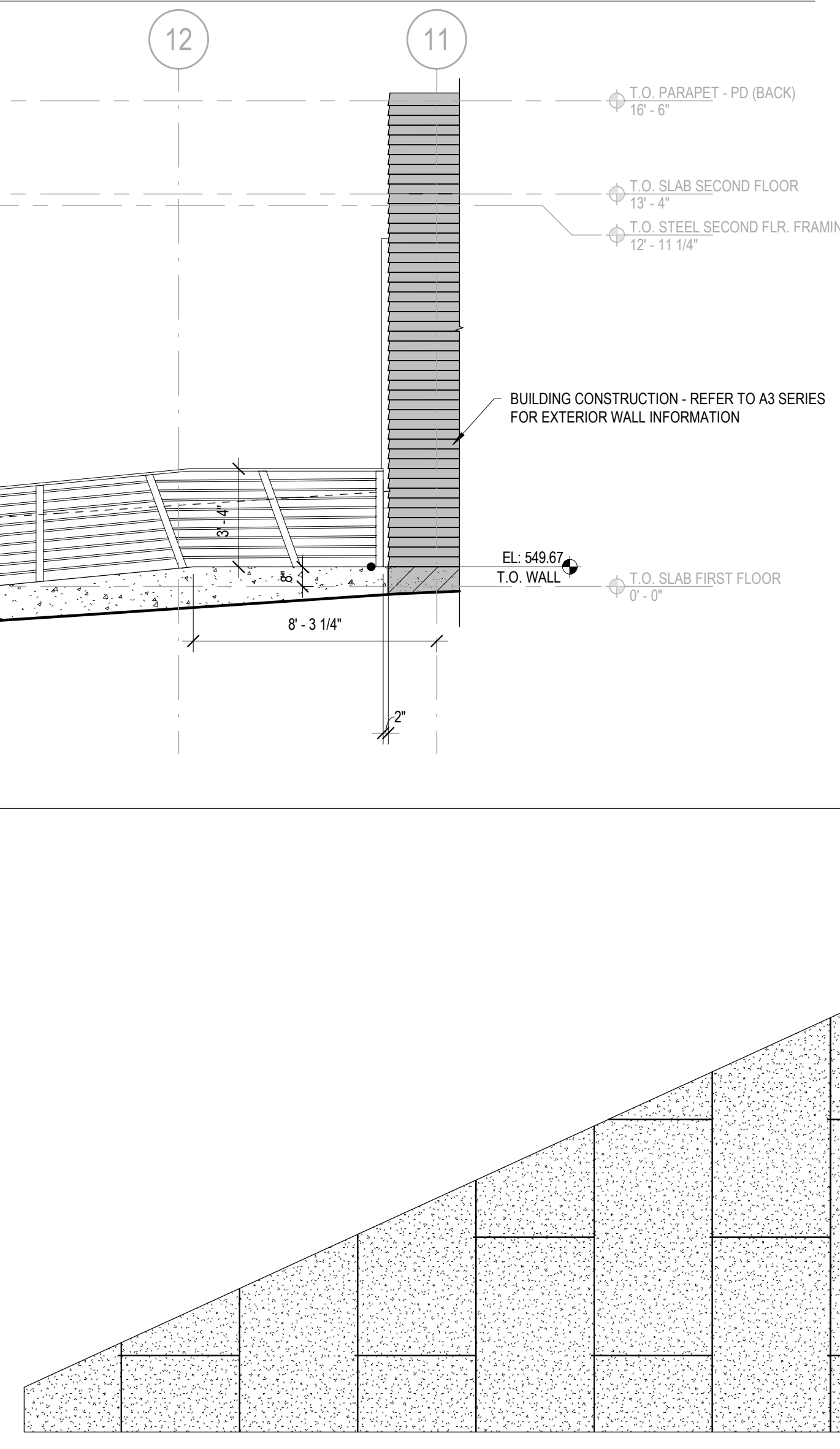
8 TYPICAL EXTERIOR ELEVATION BETWEEN GABLE END WALLS
SCALE: 1/8" = 1'-0"



27 SALLYPORT RETAINING WALL/GUARDRAIL ELEVATION - SOUTH
SCALE: 1/4" = 1'-0"

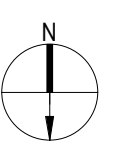


26 TYPICAL EXPOSED FASTENER LAYOUT - FULL FIBER CEMENT PANEL
SCALE: 1/2" = 1'-0"



16 FIBER CEMENT PANEL LAYOUT @ EAST GABLE END
SCALE: 1/4" = 1'-0"

KEY PLAN



PROJECT DATA

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HISTORY OF SUBMISSIONS

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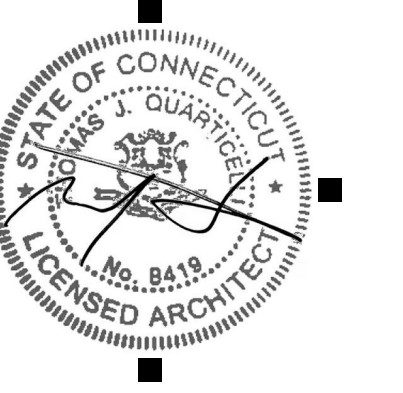
BIDDING DOCUMENTS

SHEET TITLE

EXTERIOR ELEVATIONS,
SALLYPORT GUARDRAIL
ELEVATIONS

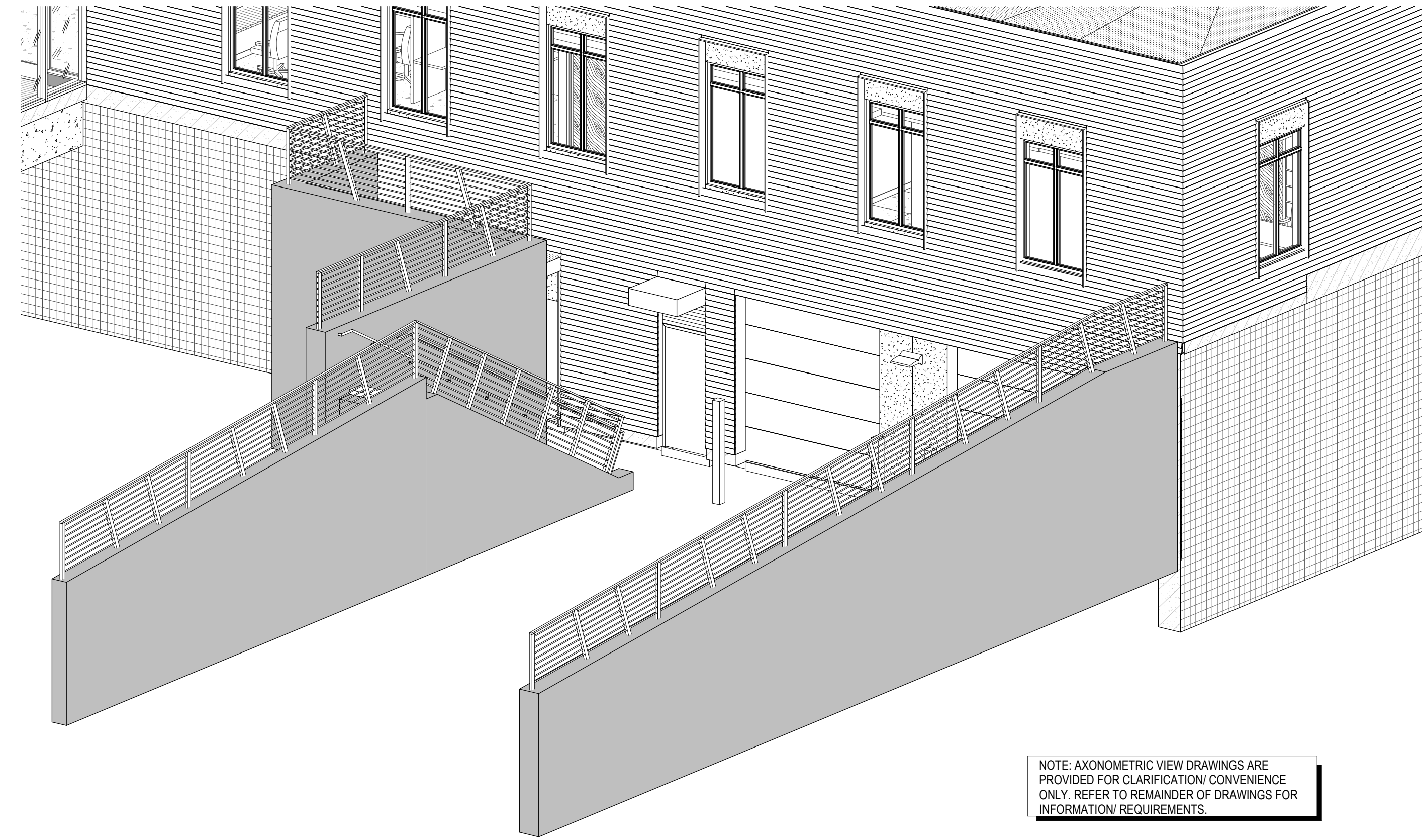
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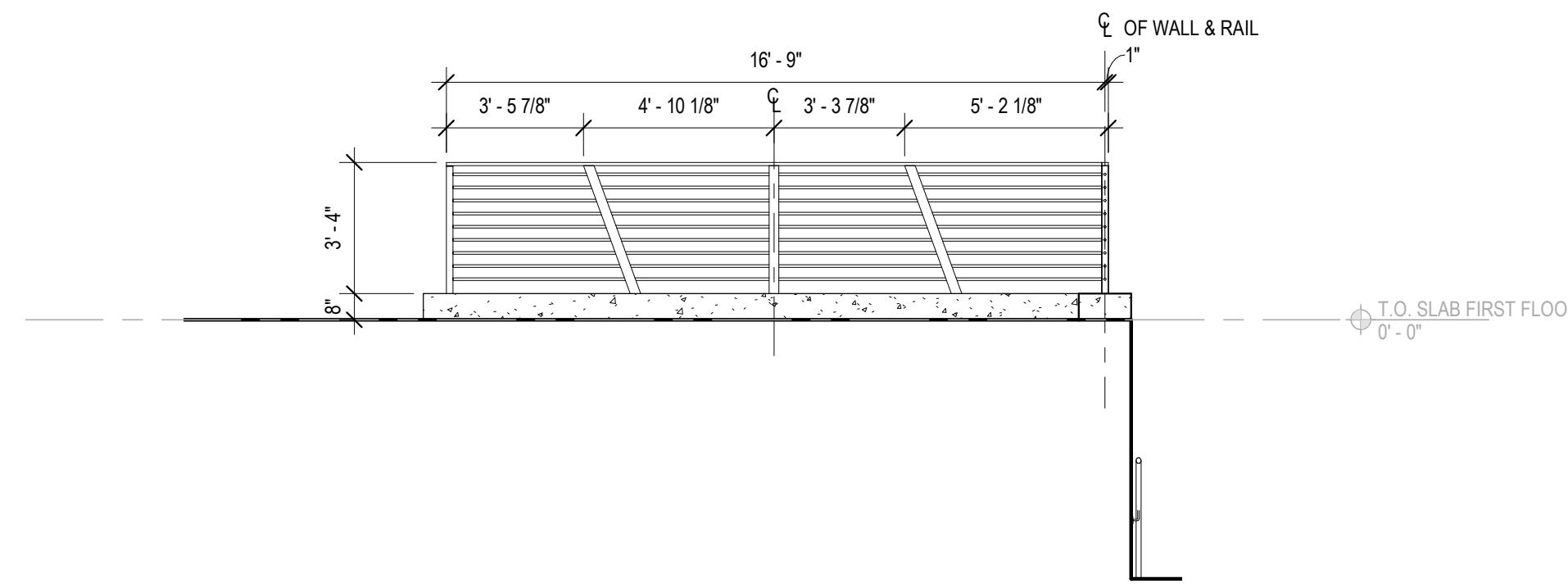
TOWN OF EAST HAMPTON
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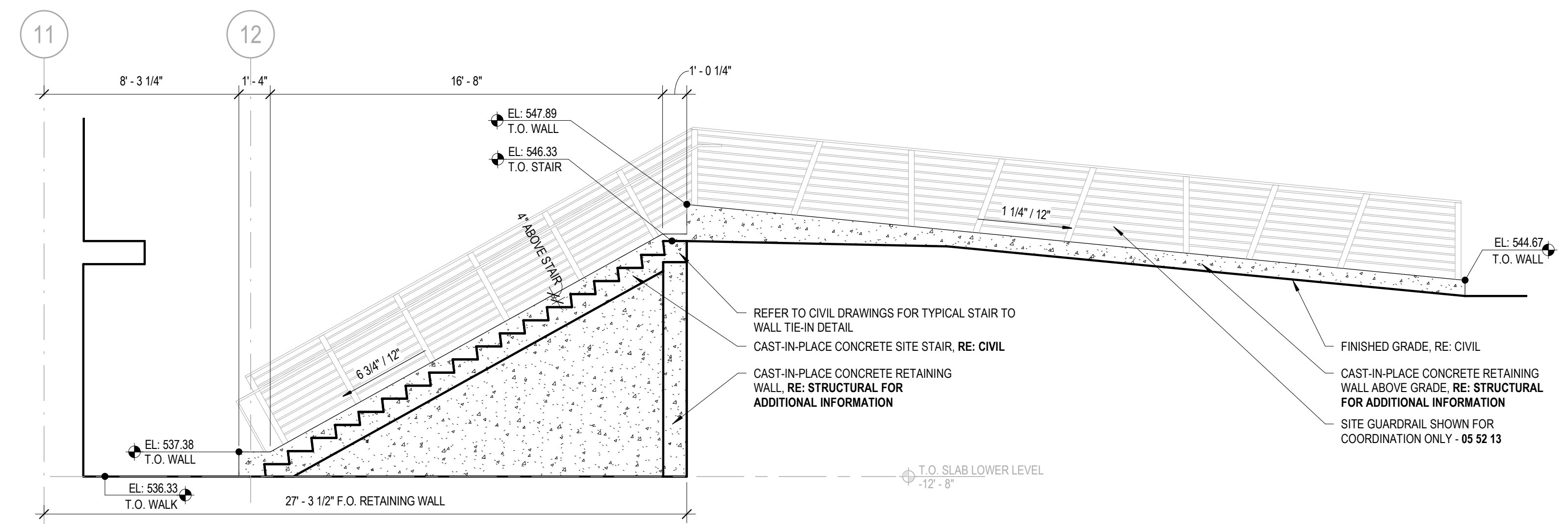


NOTE: AXONOMETRIC VIEW DRAWINGS ARE PROVIDED FOR CLARIFICATION CONVENIENCE ONLY. REFER TO REMAINDER OF DRAWINGS FOR INFORMATION REQUIREMENTS.

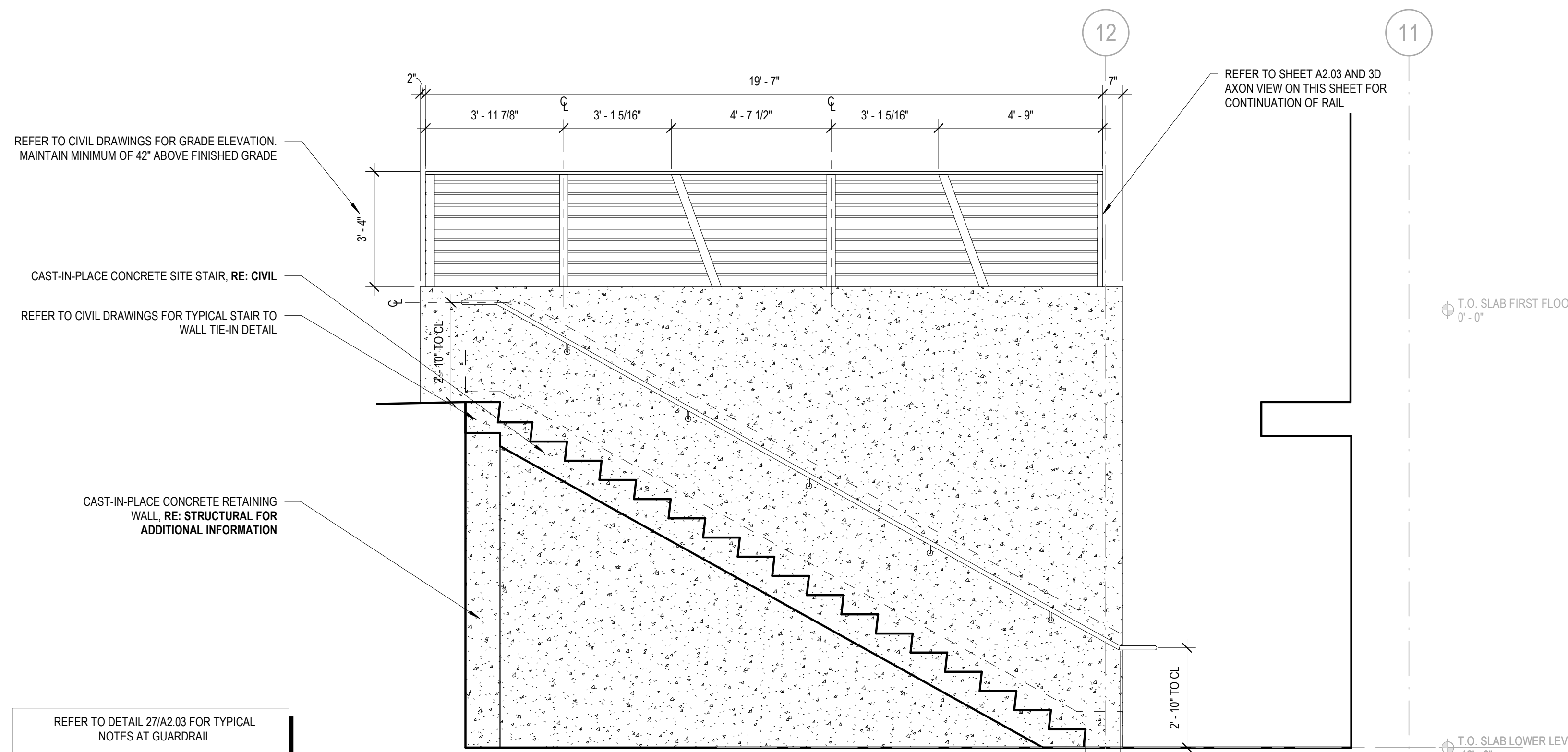
14 SALLYPORT RETAINING WALL/SITE STAIR AXON
SCALE: 1/4" = 1'-0"



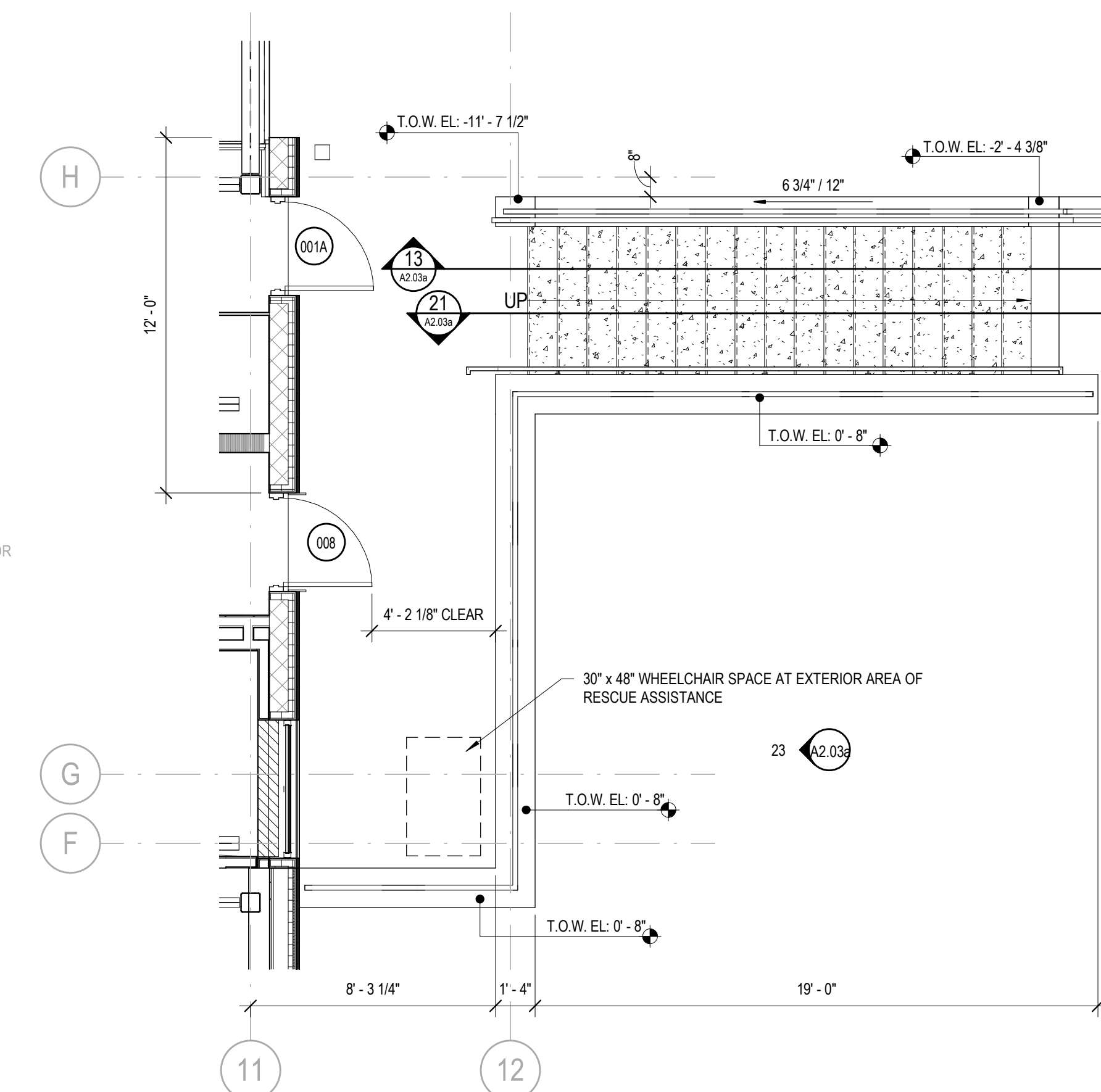
23 SITE GUARDRAIL ELEVATION - WEST
SCALE: 1/4" = 1'-0"



13 SECTION @ SITE STAIR LOOKING SOUTH
SCALE: 1/4" = 1'-0"

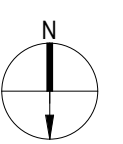


21 SECTION/ELEVATION @ SALLYPORT STAIR
SCALE: 3/8" = 1'-0"



6 ENLARGED FLOOR PLAN @ SALLYPORT SITE STAIR
SCALE: 1/4" = 1'-0"

KEY PLAN



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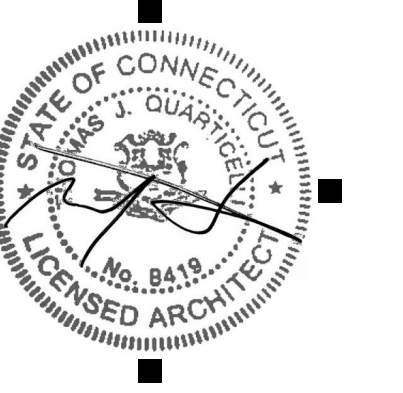
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HISTORY OF SUBMISSIONS		
No.	Date	Description
1	11.3.2018	MAIN BID - ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

SALLYPORT GUARDRAIL PLANS AND ELEVATIONS

A2.03a



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HISTORY OF SUBMISSIONS

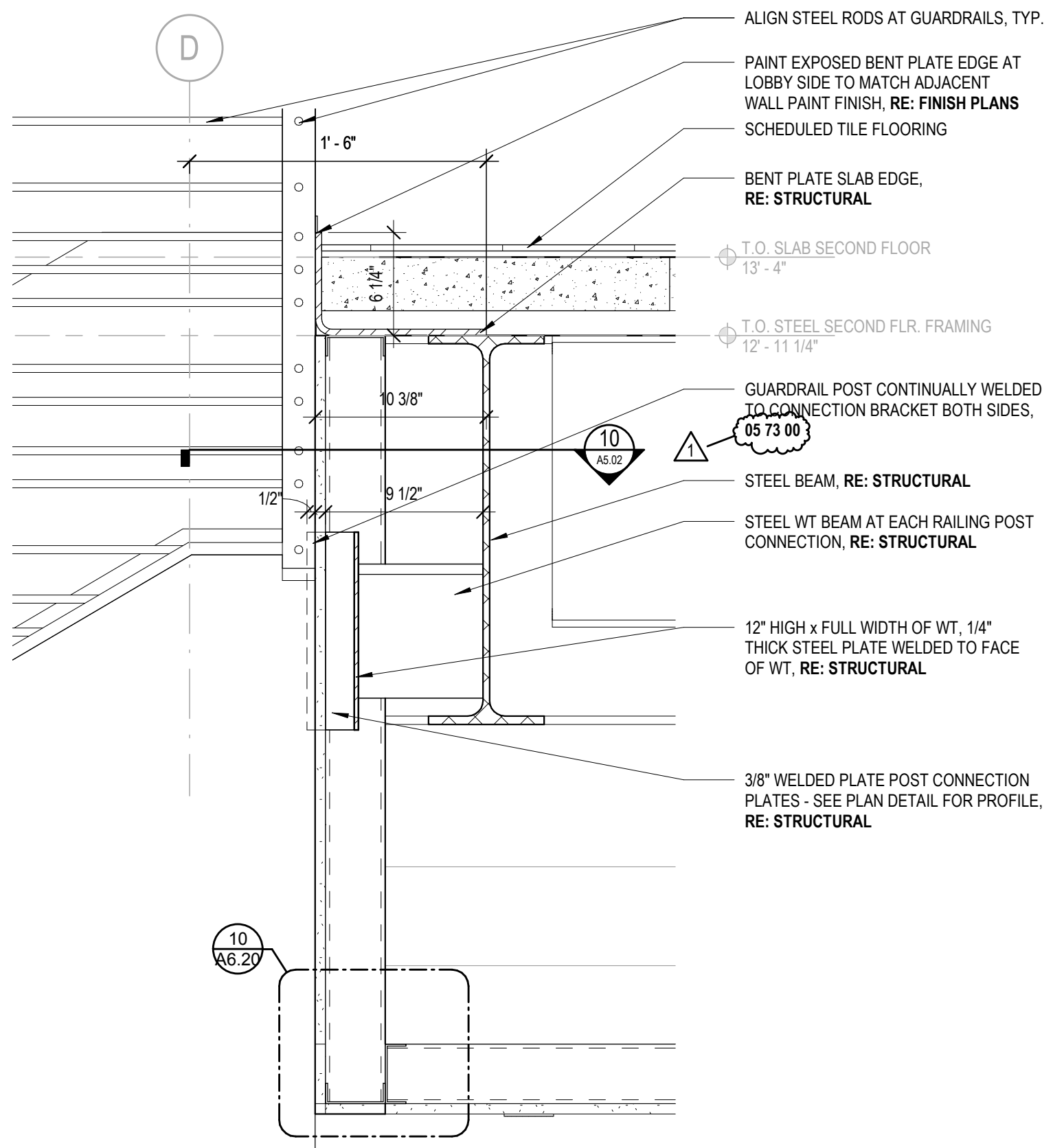
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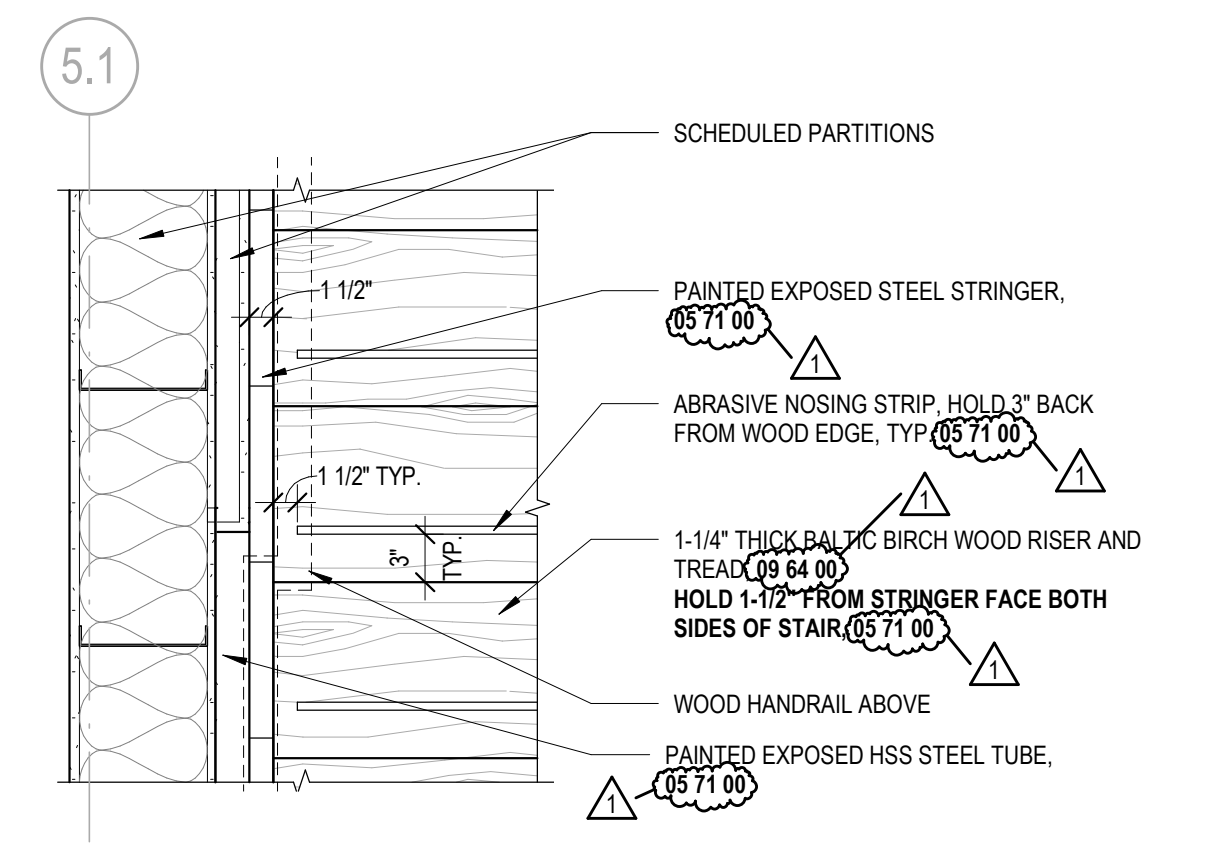
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MAIN LOBBY STAIR ENLARGED PLANS AND SECTIONS

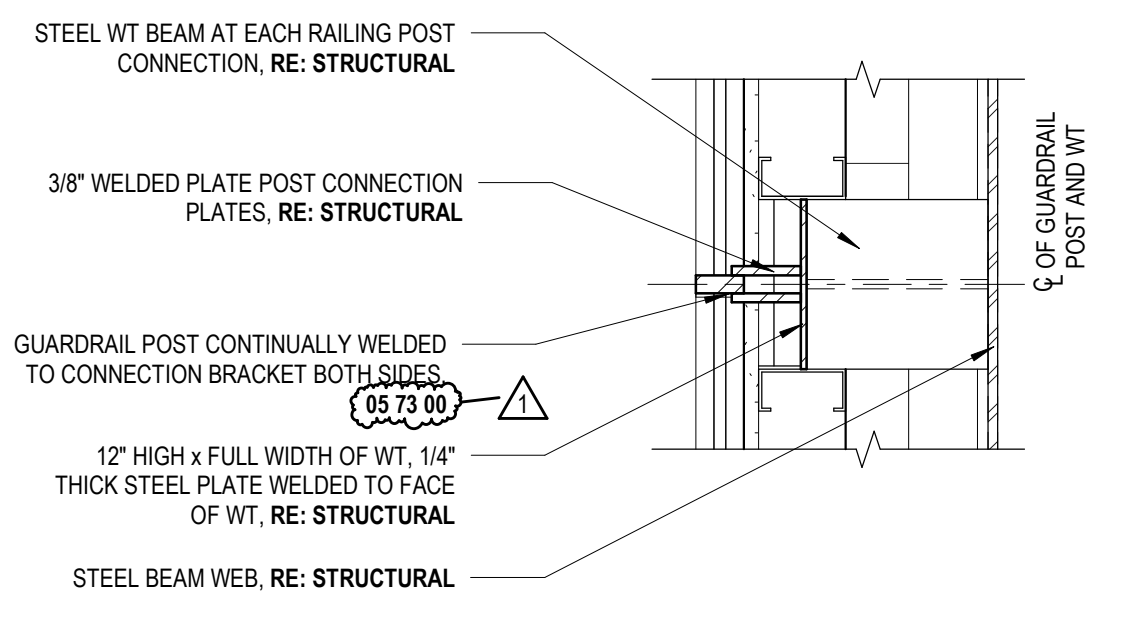
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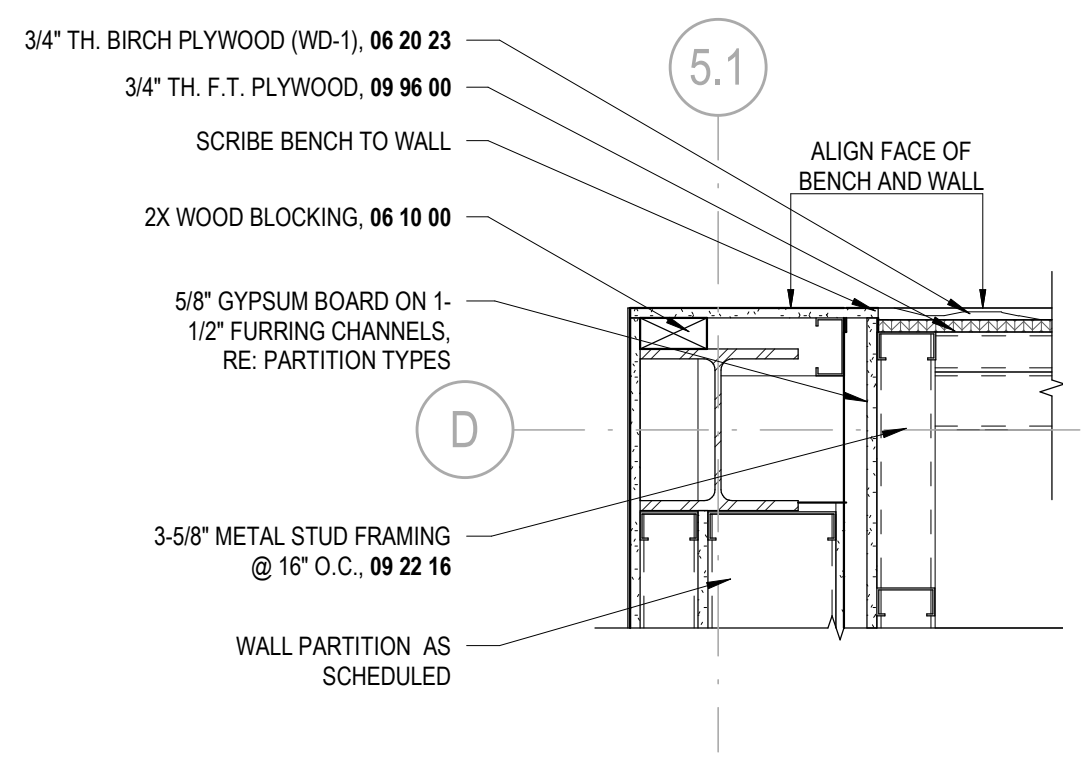
29 SLAB EDGE DETAIL @ LOBBY SOFFIT
SCALE: 1 1/2" = 1'-0"



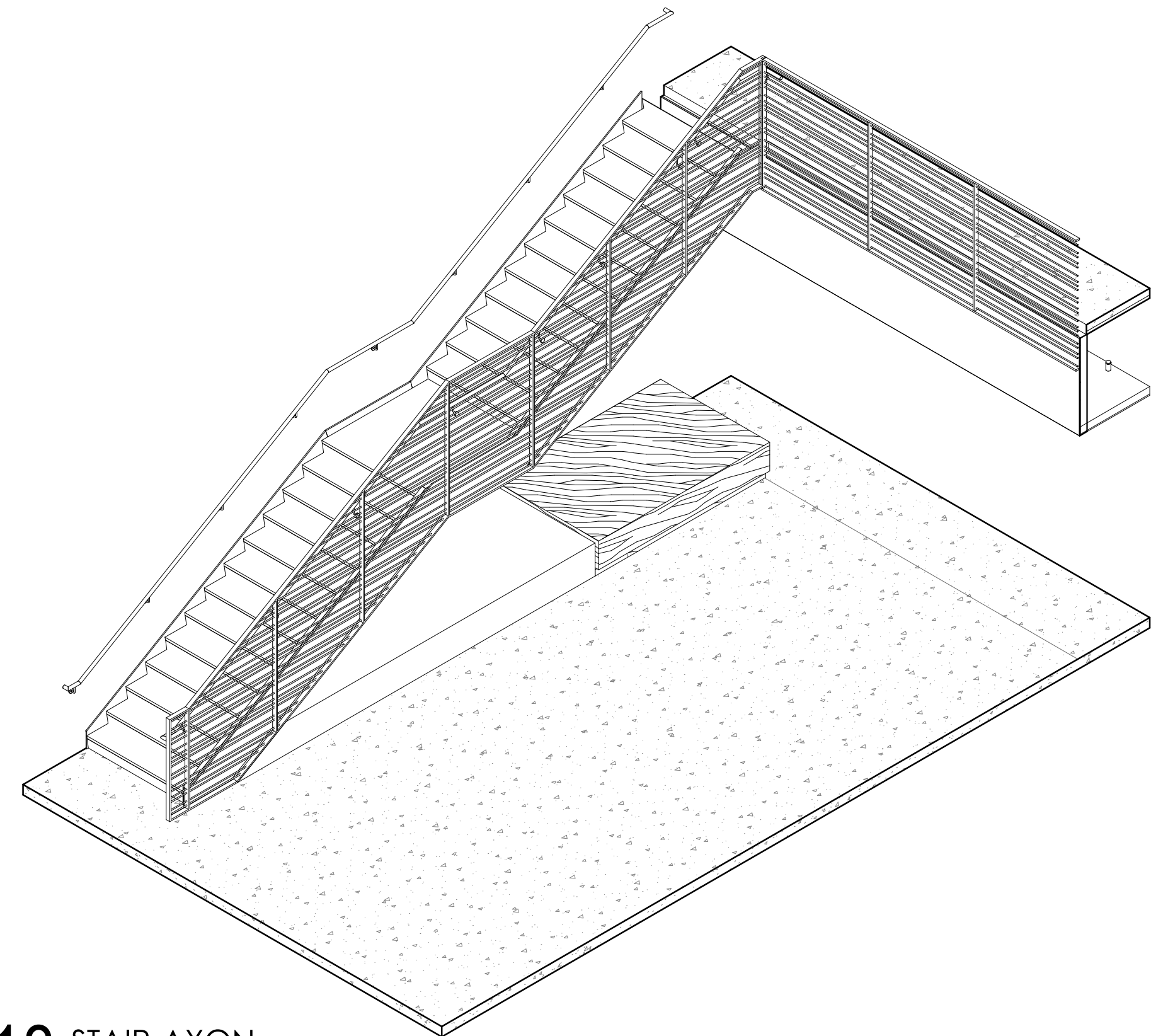
20 ENLARGED PLAN DETAIL @ STAIR LANDING
SCALE: 1" = 1'-0"



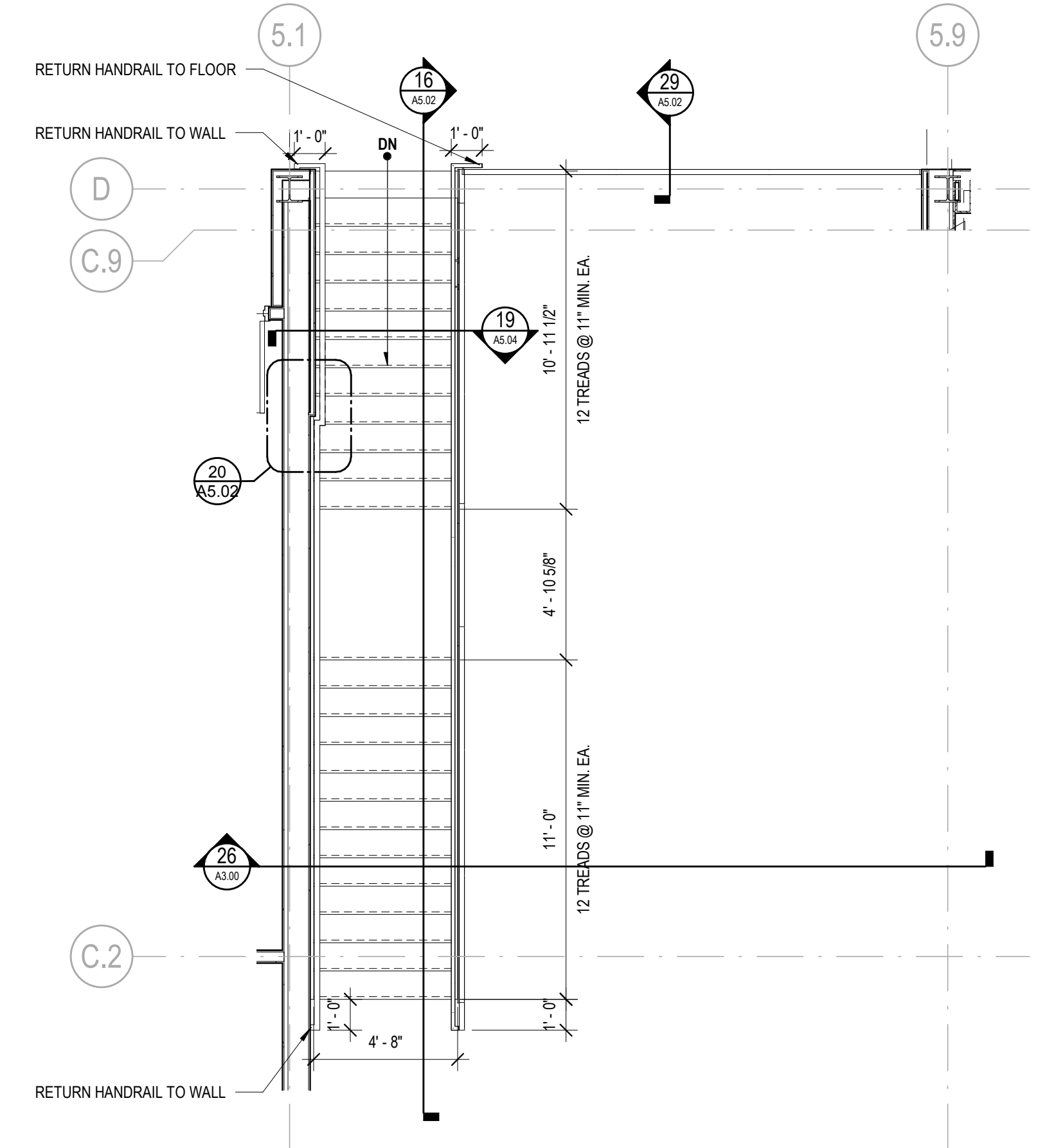
10 SECTION DETAIL @ GUARDRAIL ATTACHMENT
SCALE: 1 1/2" = 1'-0"



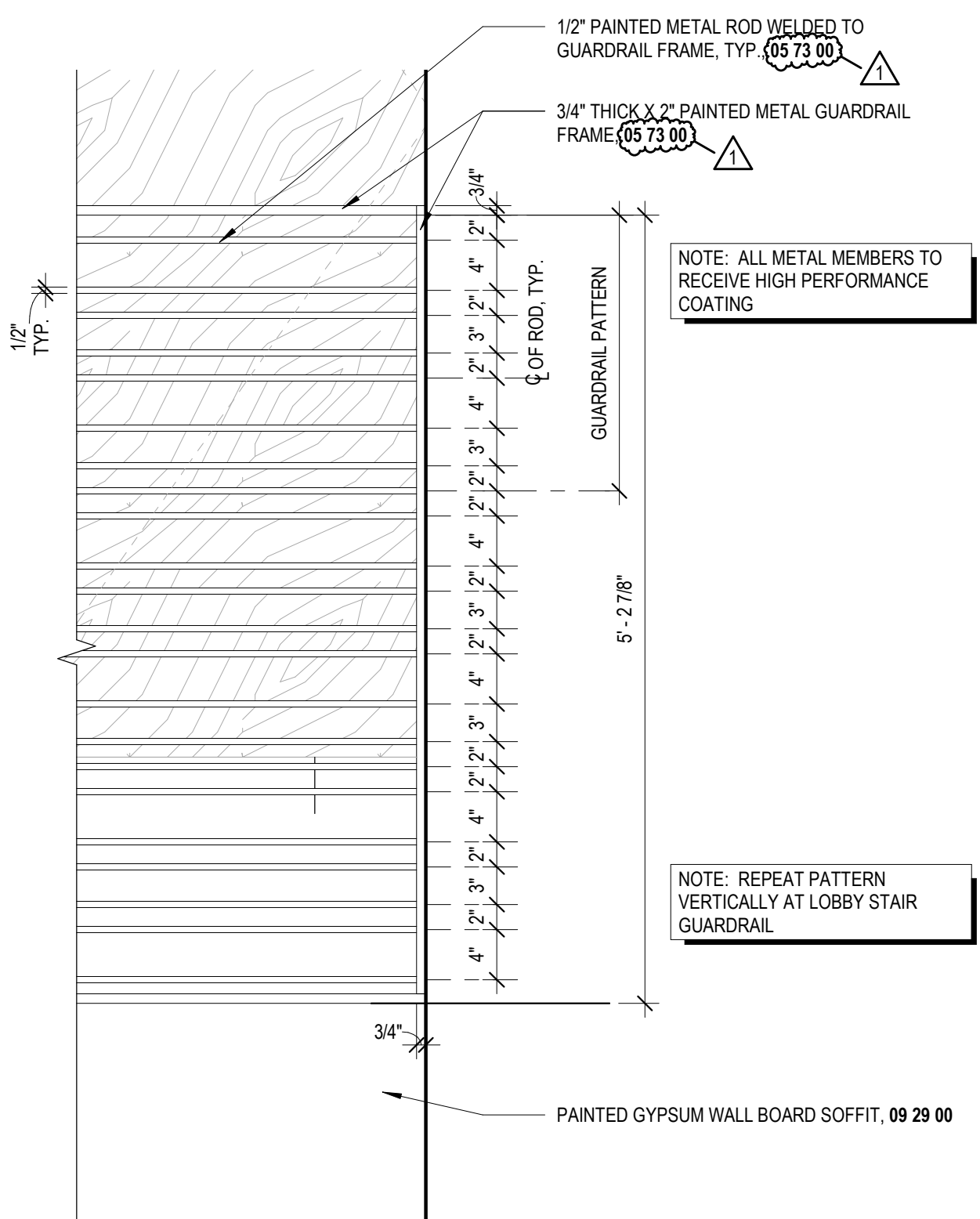
5 ENLARGED PLAN DETAIL @ COLUMN D/5.2
SCALE: 1" = 1'-0"



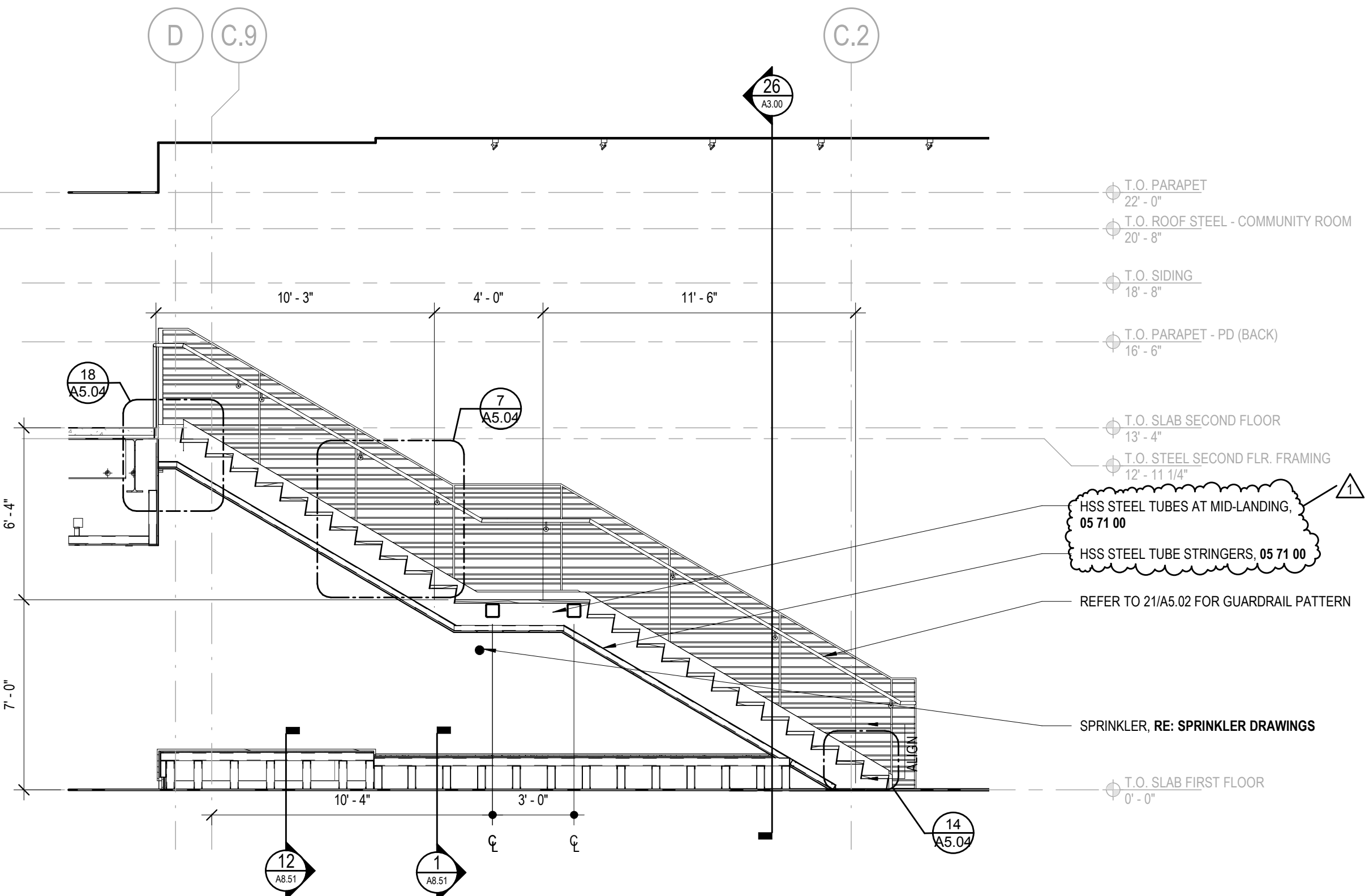
18 STAIR AXON
SCALE:



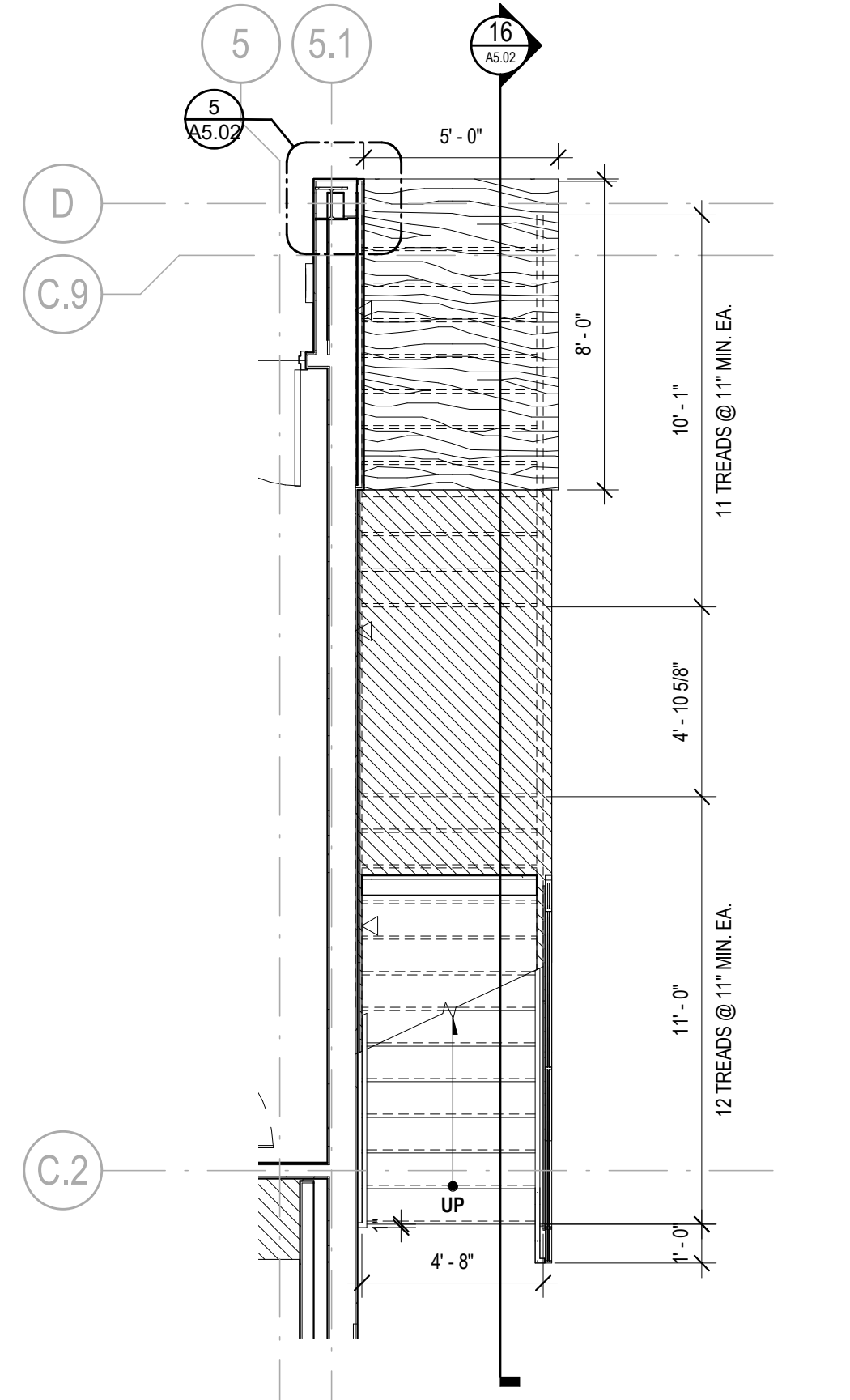
8 LOBBY STAIR ENLARGED PLAN - 2ND FLOOR
SCALE: 1/4" = 1'-0"



21 LOBBY GUARDRAIL PATTERN
SCALE: 1" = 1'-0"

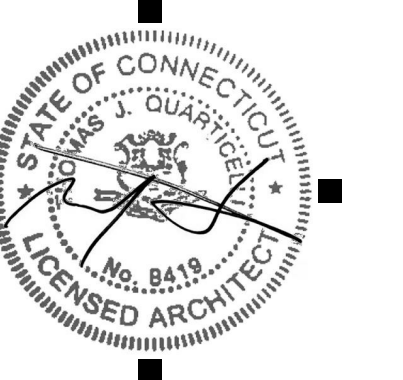


16 SECTION @ LOBBY STAIR
SCALE: 1/4" = 1'-0"



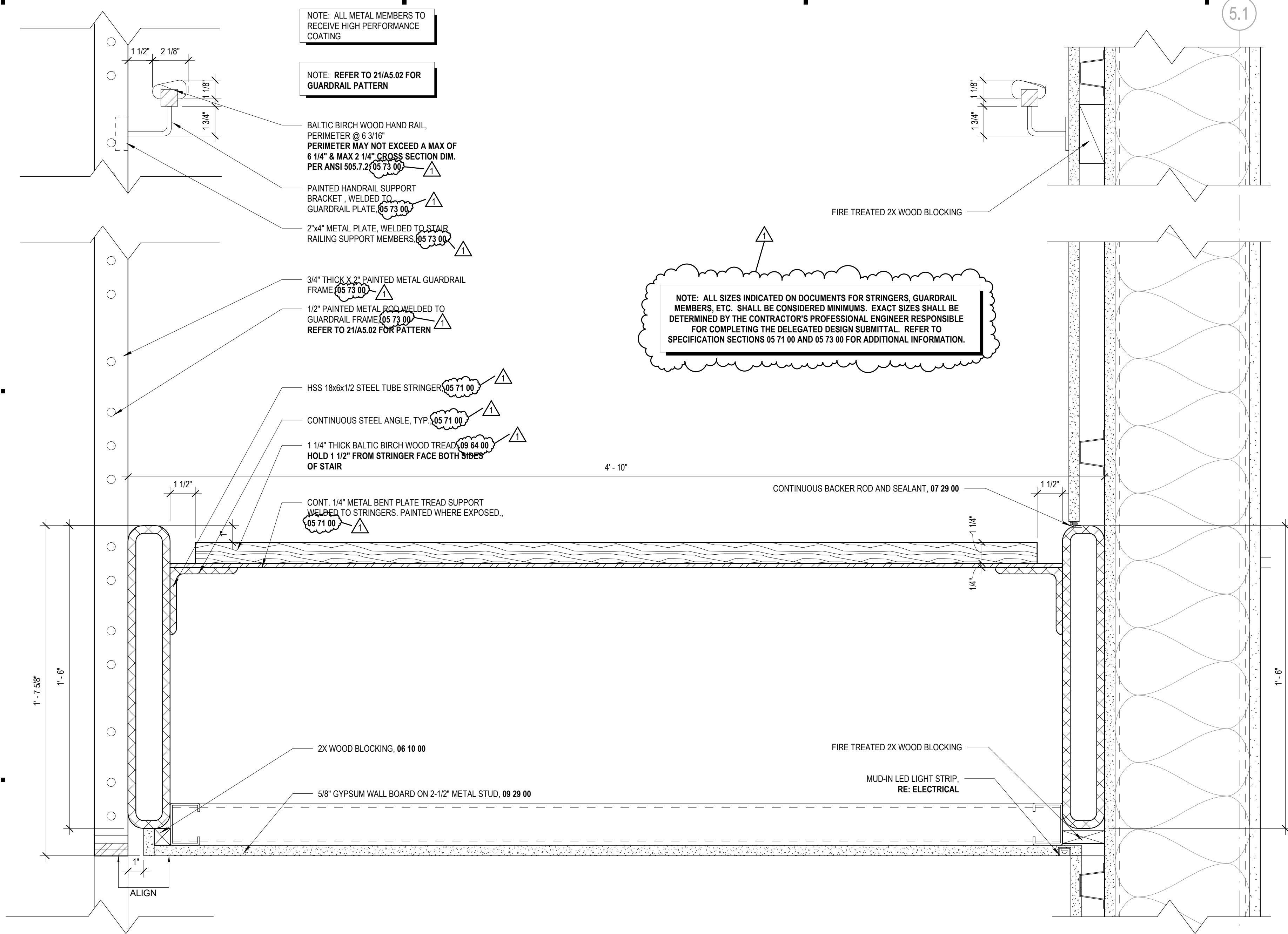
6 LOBBY STAIR ENLARGED PLAN - 1ST FLOOR
SCALE: 1/4" = 1'-0"

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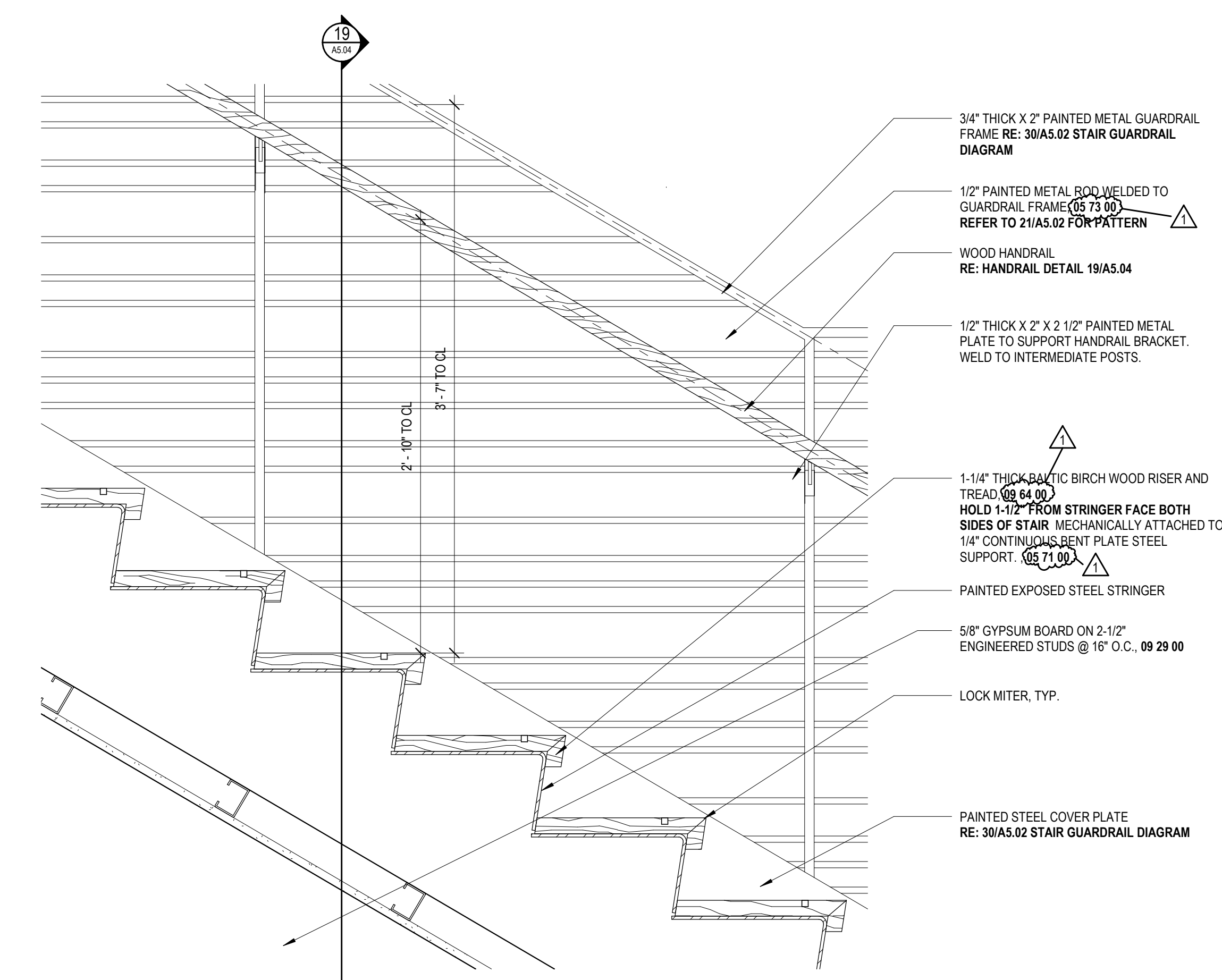


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TOWN HALL AND POLICE DEPARTMENT
EDGEWATER HILL
EAST HAMPTON, CT

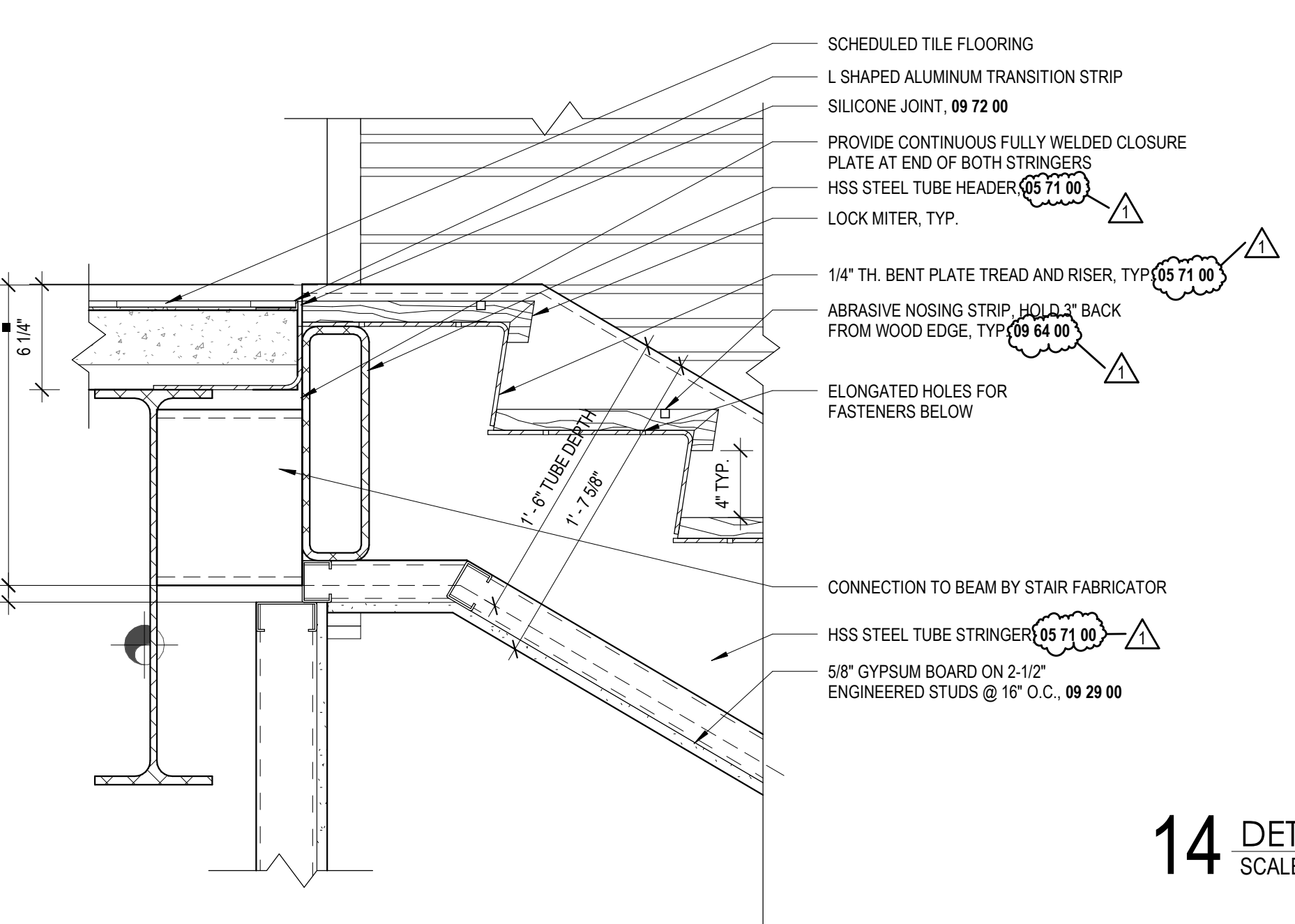
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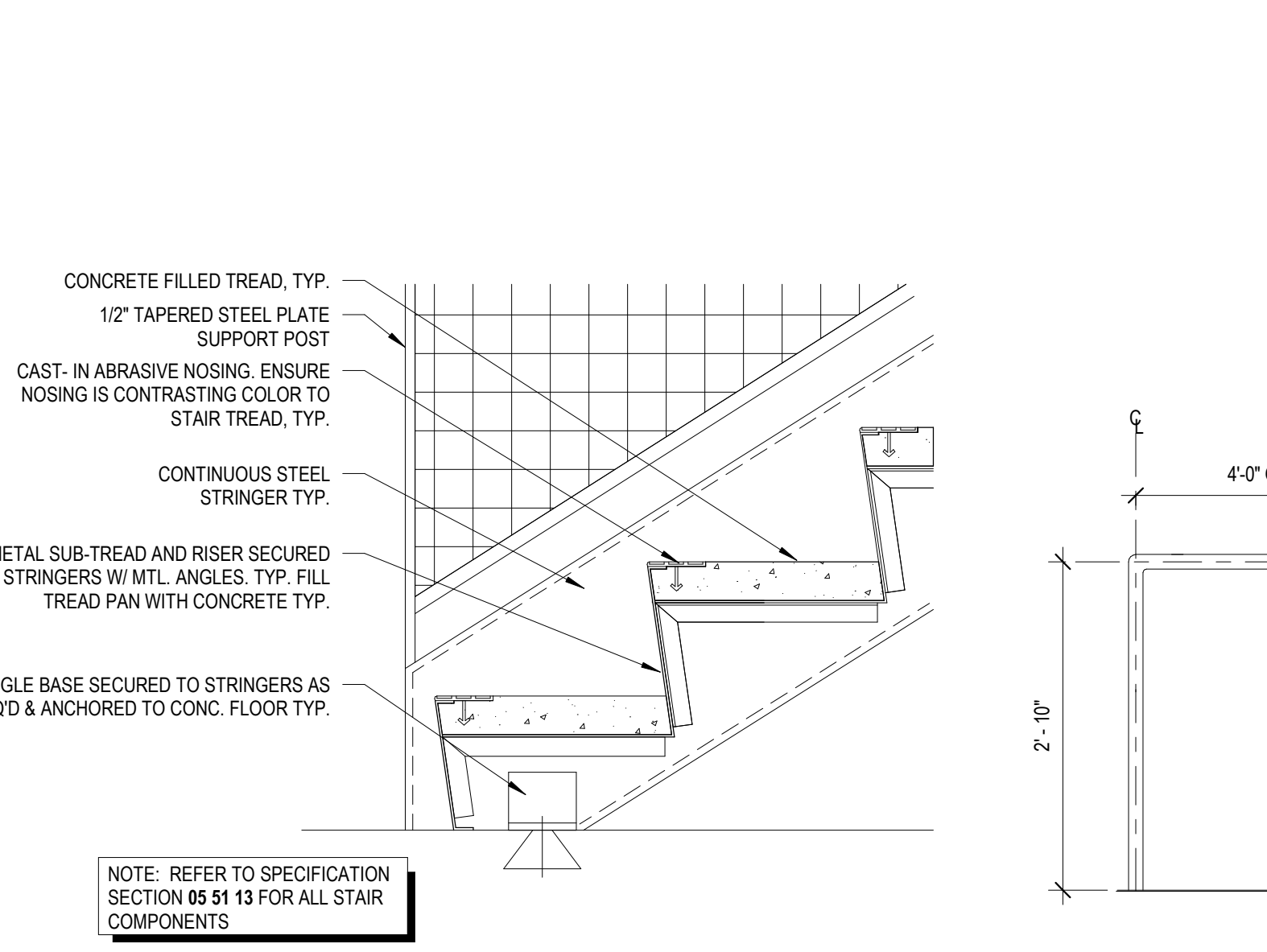
7 DETAIL @ LOBBY STAIR GUARDRAIL/HANDRAIL
SCALE: 1 1/2" = 1'-0"



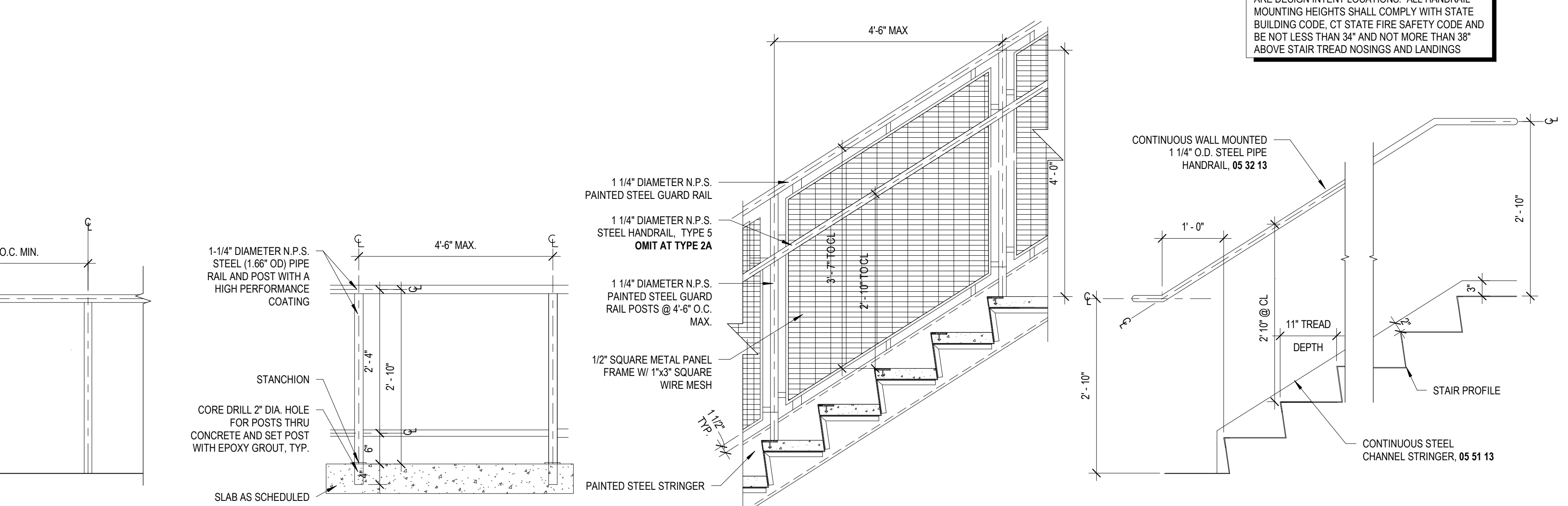
19 DETAIL @ LOBBY STAIR STRINGER- HANDRAIL/ GUARDRAIL
SCALE: 3" = 1'-0"



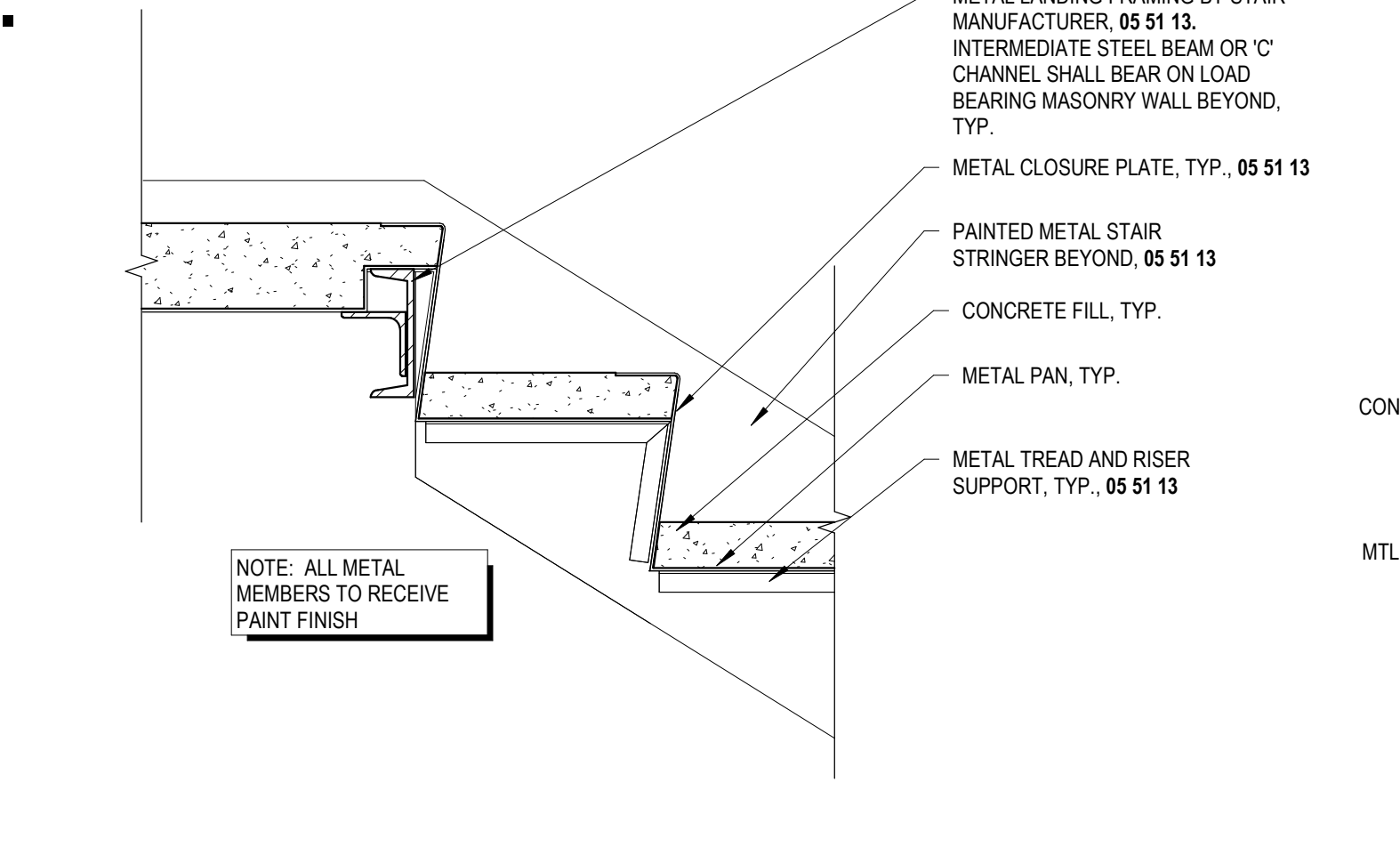
14 DETAIL @ BOTTOM OF LOBBY STAIR
SCALE: 1 1/2" = 1'-0"



10 HANDRAIL/GUARDRAIL DETAIL
SCALE: 1 1/2" = 1'-0"



18 DETAIL AT TOP OF LOBBY STAIR
SCALE: 1 1/2" = 1'-0"



17 DETAIL @ TOP OF EGRESS STAIRS
SCALE: 1 1/2" = 1'-0"

13 STAIR BASE DETAIL
SCALE: 1 1/2" = 1'-0"

9 HANDRAIL/ GUARDRAIL ELEVATIONS
SCALE: 3/4" = 1'-0"

KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c	
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CHECKED	CDL	
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HISTORY OF SUBMISSIONS		
No.	Date	Description
1	11.20.2018	MAIN BID - ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

STAIR DETAILS

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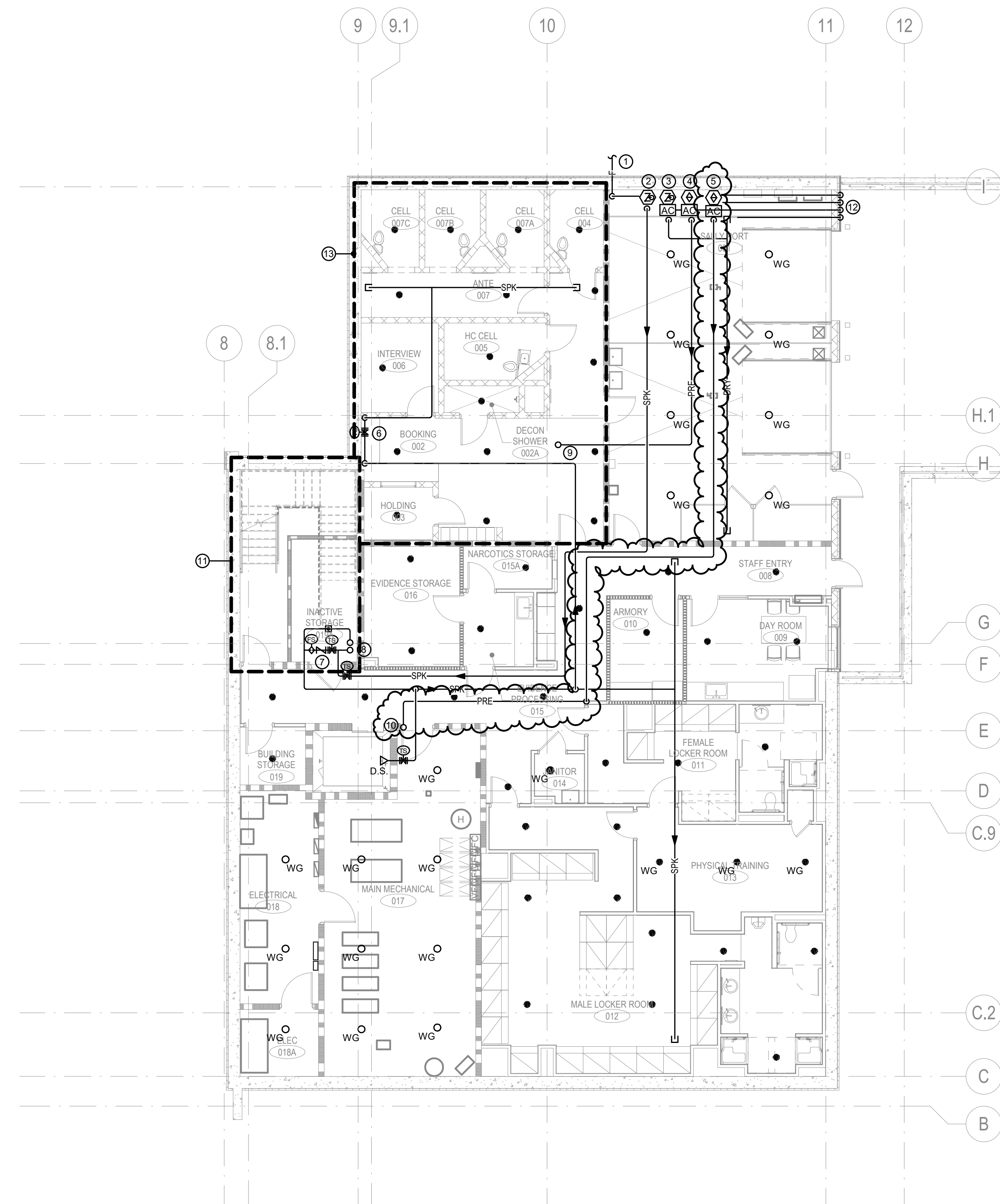
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

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206 West Newberry Road
Bloomfield, CT 06002
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KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
CURRENT SUBMISSION DATE 10.12.2018
DRAWN JIM
CHECKED MT
SCALE 1/8" = 1'-0"
FILE REFERENCE E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_gaeb_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

FIRE PROTECTION GENERAL NOTES:

1. THIS DRAWING DEPICTS A PROPOSED FIRE PROTECTION SYSTEM LAYOUT WHICH IS INDICATED FOR COORDINATION PURPOSES ONLY. THIS DOES NOT RELIEVE THE CONTRACTOR FROM COMPLYING WITH NFPA, STATE, & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION.
2. REFER TO THE FIRE PROTECTION SPECIFICATIONS FOR DESIGN CRITERIA AND INSTALLATION REQUIREMENTS.
3. FIRE PROTECTION SYSTEM CONTRACTOR SHALL COORDINATE LOCATIONS OF SPRINKLERS AND PIPING WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA.
4. THIS CONTRACT INCLUDES A PERFORMANCE SPECIFICATION FOR THE ENTIRE FIRE PROTECTION SYSTEM.
5. PROVIDE ALL PIPING, SUPPORTS, AND EQUIPMENT FOR A COMPLETE FULL COVERAGE SYSTEM IN CONFORMANCE WITH NFPA, STATE & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
6. PROVIDE CHROME PLATED ESCUTCHEONS AT EXPOSED PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
7. ALL NEW SPRINKLER HEADS SHALL BE RATED BASED ON AMBIENT TEMPERATURE CONDITIONS FOR EACH PROTECTED SPACE.
8. USE UPRIGHT SPRINKLER HEADS IN AREAS WITHOUT CEILINGS AND WHERE SPRINKLER PIPING MUST BE RUN EXPOSED. USE CONCEALED PENDENT SPRINKLER HEADS IN AREAS WITH FINISHED AND/OR ACCESSIBLE CEILINGS.
9. PROVIDE WIRE GUARDS FOR UPRIGHT SPRINKLER HEADS IN EXPOSED CEILINGS.
10. REFER TO ARCHITECT'S DWGS FOR COORDINATION WITH EXTERIOR BUILDING MOUNTED DEVICES.

FIRE PROTECTION DRAWING NOTES:

- 1 BURIED 6" FIRE SERVICE FROM 5'-0" OUTSIDE OF THE BUILDING.
- 2 WET ALARM CHECK VALVE ASSEMBLY.
- 3 DRY ALARM CHECK VALVE ASSEMBLY.
- 4 POLICE STATION PRE-ACTION SYSTEM.
- 5 TOWN HALL PRE-ACTION SYSTEM (ADD ALTERNATE #5. DO NOT INCLUDE IN BASE BID).
- 6 ISOLATION VALVE IN VALVE CABINET FOR SECURITY AREA SPRINKLERS.
- 7 LOWER LEVEL SPK ZONE VALVE ASSEMBLY.
- 8 6" SPK & 2" DRAIN RISER.
- 9 POLICE STATION PRE-ACTION SPK MAIN UP.
- 10 TOWN HALL PRE-ACTION SPK MAIN UP. (ADD ALTERNATE #5. DO NOT INCLUDE IN BASE BID).
- 11 PROVIDE COMPLETE SPK COVERAGE AT STAIRWELL.
- 12 EXTEND SPRINKLER SYSTEM TEST DRAINS TO BUILDING EXTERIOR.
- 13 PROVIDE INSTITUTIONAL SECURITY TYPE SPK HEADS IN THIS AREA.

BIDDING DOCUMENTS

SHEET TITLE

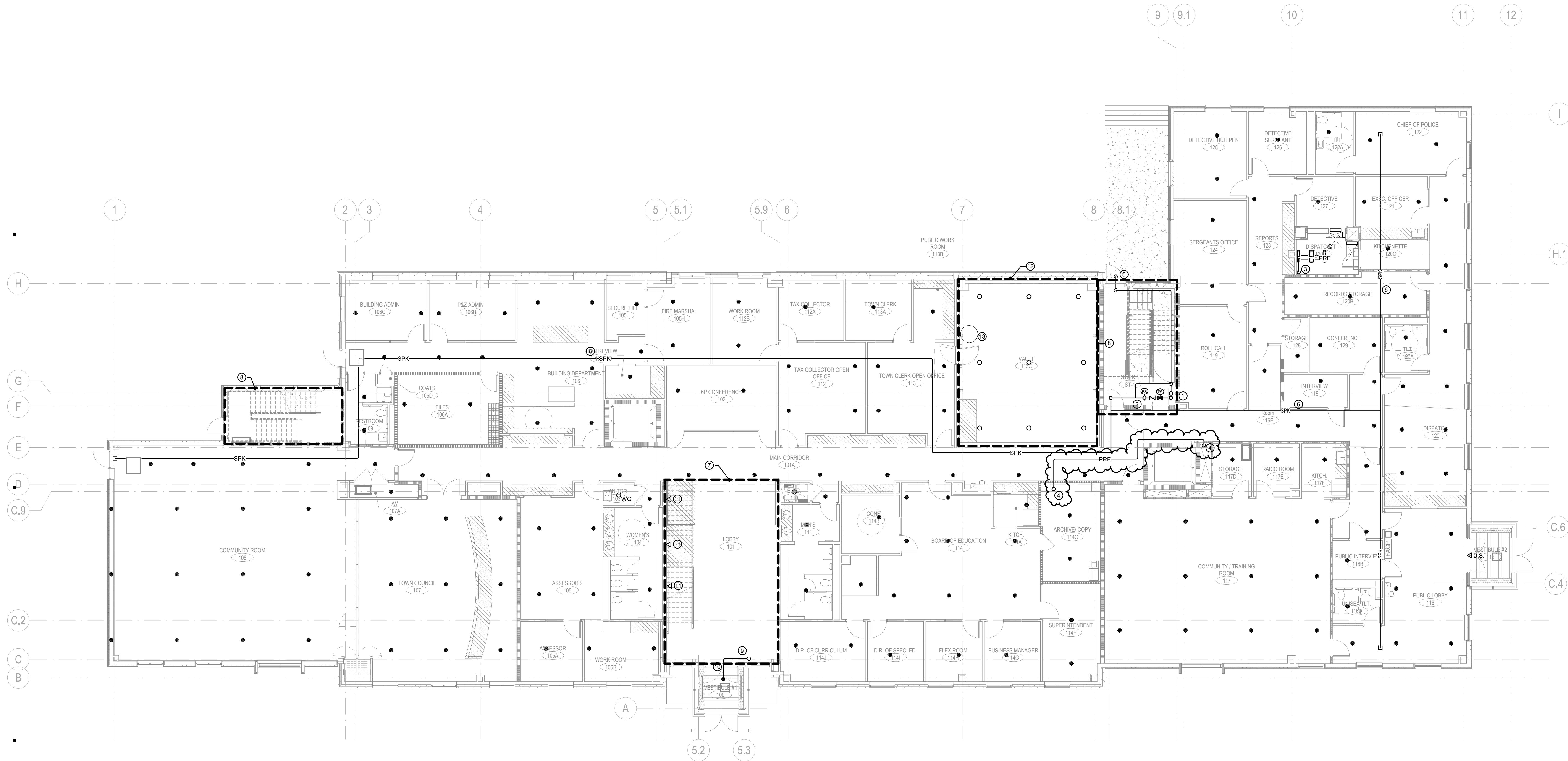
FIRE PROTECTION PLAN - LOWER LEVEL

FP1.01

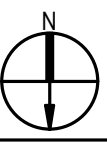
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

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KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
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DRAWN JIM
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SCALE 1/8" = 1'-0"
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HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/2018	ADDENDUM #2

FIRE PROTECTION GENERAL NOTES:

- THIS DRAWING DEPICTS A PROPOSED FIRE PROTECTION SYSTEM LAYOUT WHICH IS INDICATED FOR COORDINATION PURPOSES ONLY. THIS DOES NOT RELIEVE THE CONTRACTOR FROM COMPLYING WITH NFPA, STATE, & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION.
- REFER TO THE FIRE PROTECTION SPECIFICATIONS FOR DESIGN CRITERIA AND INSTALLATION REQUIREMENTS.
- FIRE PROTECTION SYSTEM CONTRACTOR SHALL COORDINATE LOCATIONS OF SPRINKLERS AND PIPING WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA.
- THIS CONTRACT INCLUDES A PERFORMANCE SPECIFICATION FOR THE ENTIRE FIRE PROTECTION SYSTEM.
- PROVIDE ALL PIPING, SUPPORTS, AND EQUIPMENT FOR A COMPLETE FULL COVERAGE SYSTEM IN CONFORMANCE WITH NFPA, STATE & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
- PROVIDE CHROME PLATED ESCUTCHEONS AT EXPOSED PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
- ALL NEW SPRINKLER HEADS SHALL BE RATED BASED ON AMBIENT TEMPERATURE CONDITIONS FOR EACH PROTECTED SPACE.
- USE UPRIGHT SPRINKLER HEADS IN AREAS WITHOUT CEILINGS AND WHERE SPRINKLER PIPING MUST BE RUN EXPOSED. USE CONCEALED PENDENT SPRINKLER HEADS IN AREAS WITH FINISHED AND/OR ACCESSIBLE CEILINGS.
- PROVIDE WIRE GUARDS FOR UPRIGHT SPRINKLER HEADS IN EXPOSED CEILINGS.
- REFER TO ARCHITECT'S DWGS FOR COORDINATION WITH EXTERIOR BUILDING MOUNTED DEVICES.

FIRE PROTECTION DRAWING NOTES:

- 6" SPK RISER & 2" DRAIN RISER.
- MAIN LEVEL SPK ZONE VALVE ASSEMBLY.
- DISPATCH 1" PRE-ACTION SPK MAIN.
- TOWN HALL PRE-ACTION SPK RISER. (ADD ALTERNATE #5, DO NOT INCLUDE IN BASE BID).
- 2" DRAIN RISER TERMINATION.
- 4" SPK MAIN.
- PROVIDE CLOSELY SPACED SPRINKLERS AROUND FLOOR OPENING.
- PROVIDE COMPLETE SPRINKLER COVERAGE AT STAIRWELL.
- 1-1/2" SPK PIPE UP IN ARCHITECTURAL PIPE ENCLOSURE.
- 1-1/2" SPK PIPE THROUGH STEEL BEAM PENETRATION. COORDINATE WITH STRUCTURAL DRAWINGS.
- SIDEWALL HEADS FOR COVERAGE BELOW STAIR. COORDINATE LOCATION WITH ARCHITECT'S STAIR DETAILS.
- PROVIDE "SAPPHIRE" FIRE SUPPRESSION SYSTEM FOR VAULT. REFER TO SPECIFICATIONS FOR SYSTEM INFORMATION. PROVIDE UPRIGHT HEAD SPK COVERAGE ABOVE VAULT.
- PROPOSED LOCATION FOR SAPPHIRE SYSTEM AGENT CONTAINER.

BIDDING DOCUMENTS

SHEET TITLE

FIRE PROTECTION PLAN - FIRST FLOOR

FP1.02

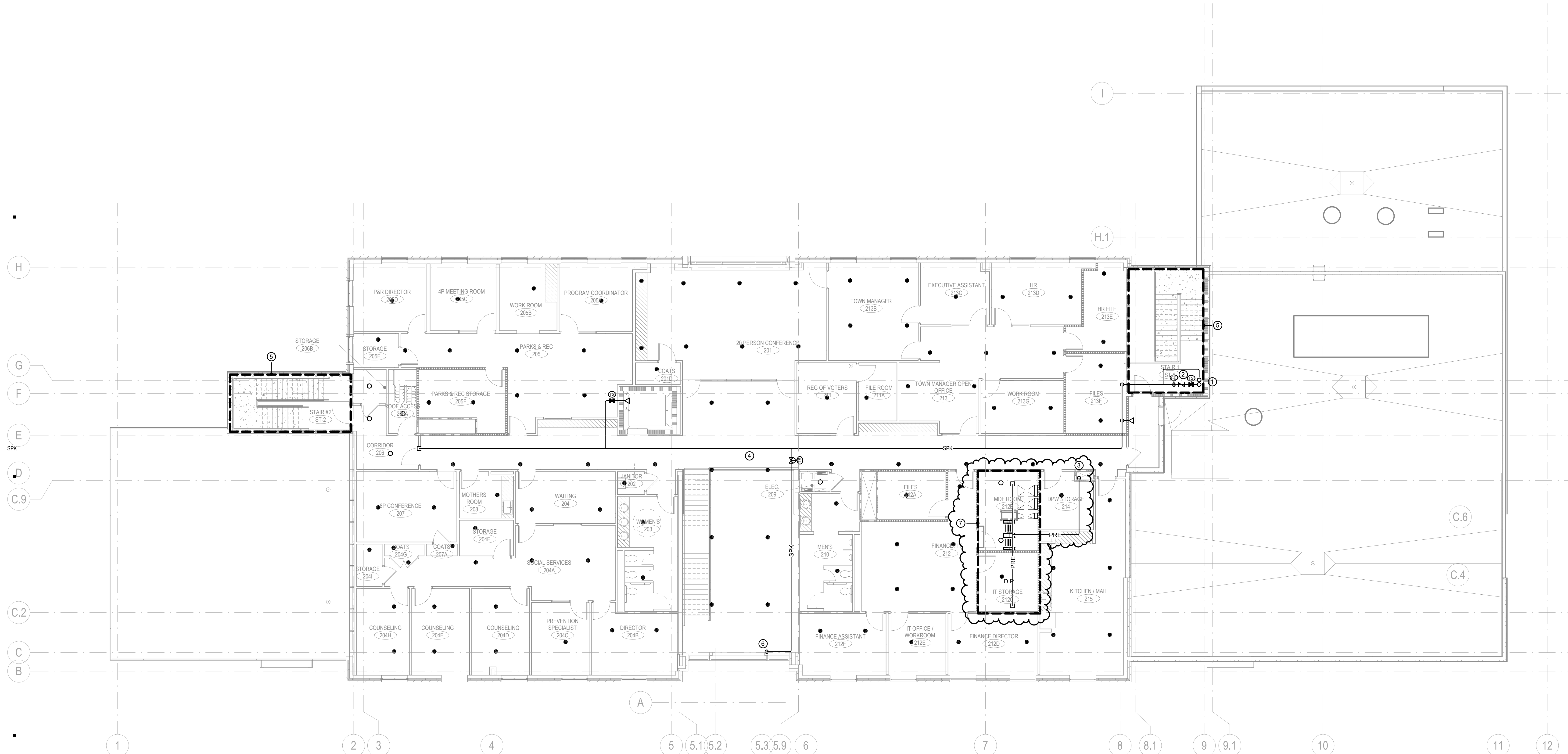
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

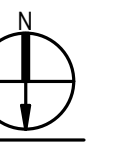
CONSULTANTS



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KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
CURRENT SUBMISSION DATE 10.12.2018
DRAWN JIM
CHECKED MT
SCALE 1/8" = 1'-0"
FILE REFERENCE E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_ga06_bvh.rvt

HISTORY OF SUBMISSIONS

No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

FIRE PROTECTION GENERAL NOTES:

1. THIS DRAWING DEPICTS A PROPOSED FIRE PROTECTION SYSTEM LAYOUT WHICH IS INDICATED FOR COORDINATION PURPOSES ONLY. THIS DOES NOT RELIEVE THE CONTRACTOR FROM COMPLYING WITH NFPA, STATE, & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION.
2. REFER TO THE FIRE PROTECTION SPECIFICATIONS FOR DESIGN CRITERIA AND INSTALLATION REQUIREMENTS.
3. FIRE PROTECTION SYSTEM CONTRACTOR SHALL COORDINATE LOCATIONS OF SPRINKLERS AND PIPING WITH HVAC DUCTS, EQUIPMENT, BEAMS, COLUMNS, LIGHTS, AND ANY OTHER OBSTRUCTIONS IN ACCORDANCE WITH NFPA.
4. THIS CONTRACT INCLUDES A PERFORMANCE SPECIFICATION FOR THE ENTIRE FIRE PROTECTION SYSTEM.
5. PROVIDE ALL PIPING, SUPPORTS, AND EQUIPMENT FOR A COMPLETE FULL COVERAGE SYSTEM IN CONFORMANCE WITH NFPA, STATE & LOCAL CODES, THE OWNER'S INSURANCE COMPANY, AND THE AUTHORITY HAVING JURISDICTION. ADVISE ARCHITECT OF ANY CONFLICTS WHICH MUST BE RESOLVED PRIOR TO INSTALLATION.
6. PROVIDE CHROME PLATED ESCUTCHEONS AT EXPOSED PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
7. ALL NEW SPRINKLER HEADS SHALL BE RATED BASED ON AMBIENT TEMPERATURE CONDITIONS FOR EACH PROTECTED SPACE.
8. USE UPRIGHT SPRINKLER HEADS IN AREAS WITHOUT CEILINGS AND WHERE SPRINKLER PIPING MUST BE RUN EXPOSED. USE CONCEALED PENDENT SPRINKLER HEADS IN AREAS WITH FINISHED AND/OR ACCESSIBLE CEILINGS.
9. PROVIDE WIRE GUARDS FOR UPRIGHT SPRINKLER HEADS IN EXPOSED CEILINGS.
10. REFER TO ARCHITECT'S DWGS FOR COORDINATION WITH EXTERIOR BUILDING MOUNTED DEVICES.

FIRE PROTECTION DRAWING NOTES:

- ① 6" SPK & 2" DRAIN RISER.
- ② UPPER LEVEL SPK ZONE VALVE ASSEMBLY.
- ③ MDF ROOM PRE-ACTION SPK SYSTEM MAIN. (ADD ALTERNATE #5. DO NOT INCLUDE IN BASE BID).
- ④ 4" SPK MAIN.
- ⑤ PROVIDE COMPLETE SPK COVERAGE AT STAIRWELL.
- ⑥ 1-1/2" SPK PIPING DN. IN ENCLOSURE TO VESTIBULE SPK HEAD. ALL PIPE JOINTS SHALL BE WET PACKED WITH GUN APPLIED INSULATION.
- ⑦ BASE BID FOR THIS AREA SHALL INCLUDE WET SPK SYSTEM PIPING & HEADS.

BIDDING DOCUMENTS

SHEET TITLE

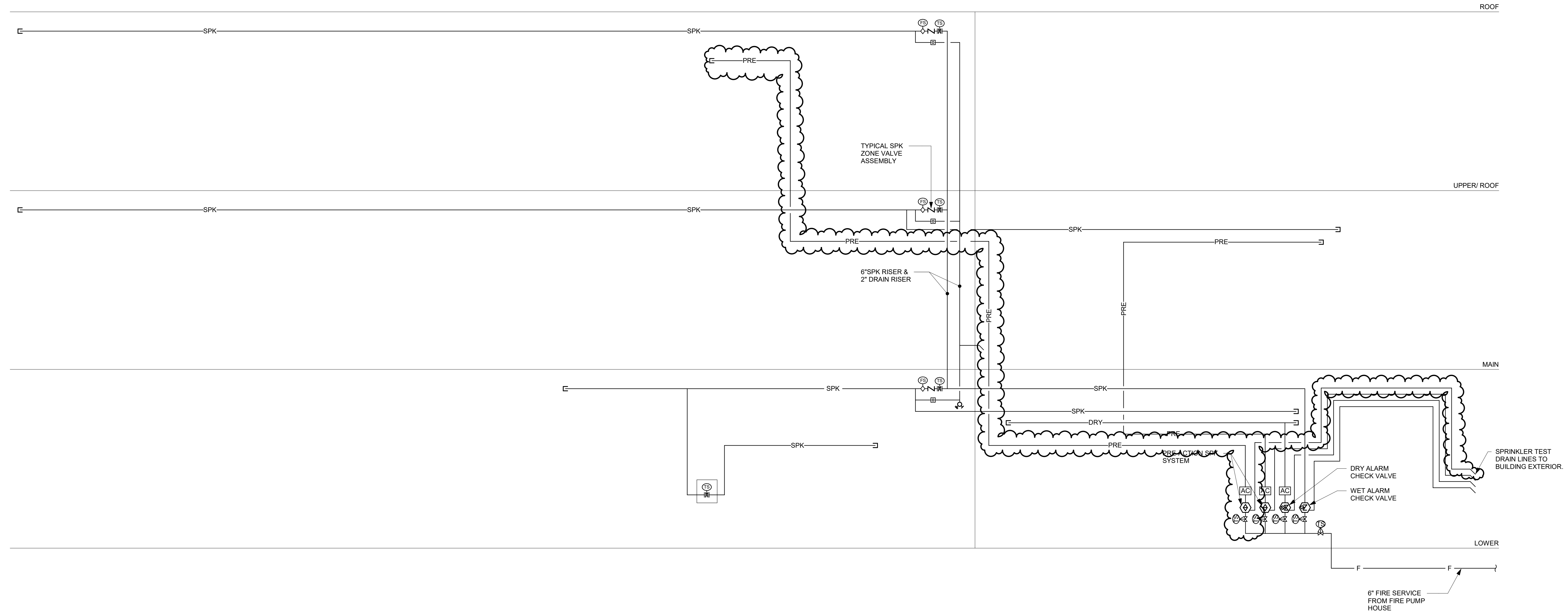
FIRE PROTECTION PLAN - SECOND FLOOR

FP1.03

TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

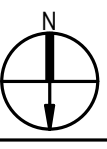
CONSULTANTS



GENERAL DRAWING NOTES

- VALVES SHOWN ON RISER DIAGRAM ARE SHOWN FOR SCHEMATIC PURPOSES ONLY. REFER TO FLOOR PLANS FOR ACTUAL LOCATION OF VALVES.
- UPPER LEVEL PRE-ACTION SPK SYSTEM SHALL BE BID AS ADD/ALTERNATE #5. DO NOT INCLUDE IN BASE BID.

KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
 CURRENT SUBMISSION DATE 10.12.2018
 DRAWN Author
 CHECKED Checker
 SCALE NOT TO SCALE
 FILE REFERENCE E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_gsmc_bvh.rvt

HISTORY OF SUBMISSIONS

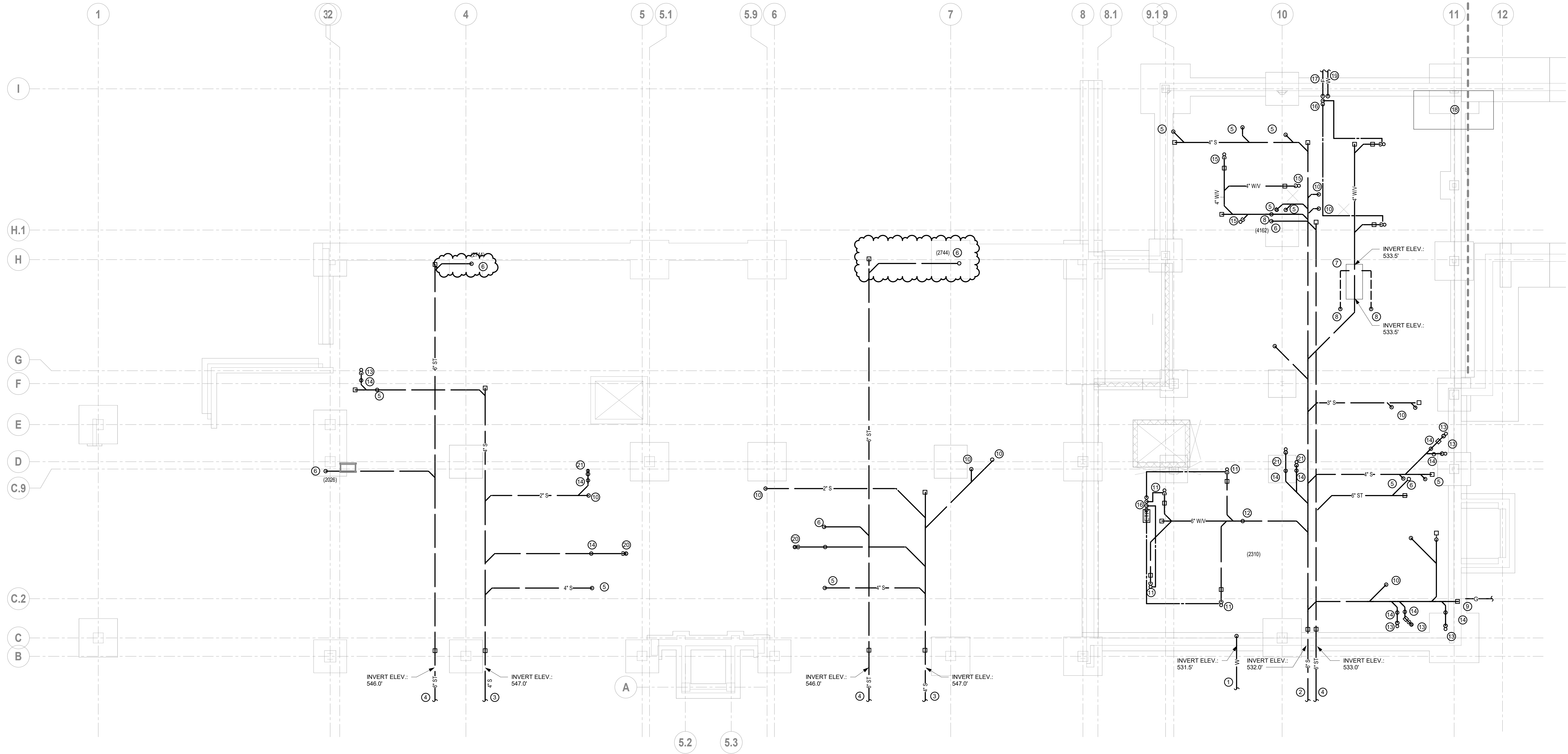
Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

FIRE PROTECTION RISER DIAGRAM

FP3.00



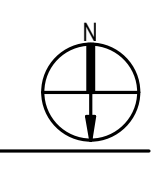
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS

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KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	MT
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SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_gsm_bvhis.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

- PLUMBING DRAWING NOTES:**
- ① 4" WATER SERVICE FROM 5'-0" OUTSIDE OF BUILDING.
 - ② 6" S TO 5'-0" OUTSIDE OF BUILDING.
 - ③ 4" S TO 5'-0" OUTSIDE OF BUILDING.
 - ④ 6" ST TO 5'-0" OUTSIDE OF BUILDING.
 - ⑤ 4" S UP.
 - ⑥ 6" ST UP.
 - ⑦ BURIED OIL/WATER SEPARATOR & STORAGE TANK. PROVIDE 4" INLET & 4" OUTLET AND (2) 2" VENTS.
 - ⑧ 2" V UP.
 - ⑨ GAS SERVICE MAIN UP. SEE CIVIL DRAWINGS FOR CONTINUATION OF GAS SERVICE PIPING.
 - ⑩ 2" W UP.
 - ⑪ 4" W UP TO F.D. INCREASE TO 6" W.W.
 - ⑫ 3" V UP.
 - ⑬ 2" W UP TO FLOOR/SHOWER DRAIN.
 - ⑭ 1-1/2" V UP.
 - ⑮ 3" W UP TO F.D. INCREASE TO 4" W.W.
 - ⑯ 1/2" TRAP PRIMER DISTRIBUTION LINES UP. EXTEND TO F.D. TRAPS.
 - ⑰ 6" FIRE SERVICE FROM FIRE PUMP HOUSE SHOWN FOR REFERENCE ONLY. REFER TO F.P. DRAWINGS.
 - ⑱ EXCAVATION IN THIS AREA FOR SNOW MELT PIPING FROM MANIFOLDS TO CONCRETE RAMP SLAB.
 - ⑲ 4" CW MAKE-UP FOR F.P. TANK.
 - ⑳ 3" W UP.
 - ㉑ 3" W UP TO F.D. / MOP SINK.

BIDDING DOCUMENTS

SHEET TITLE

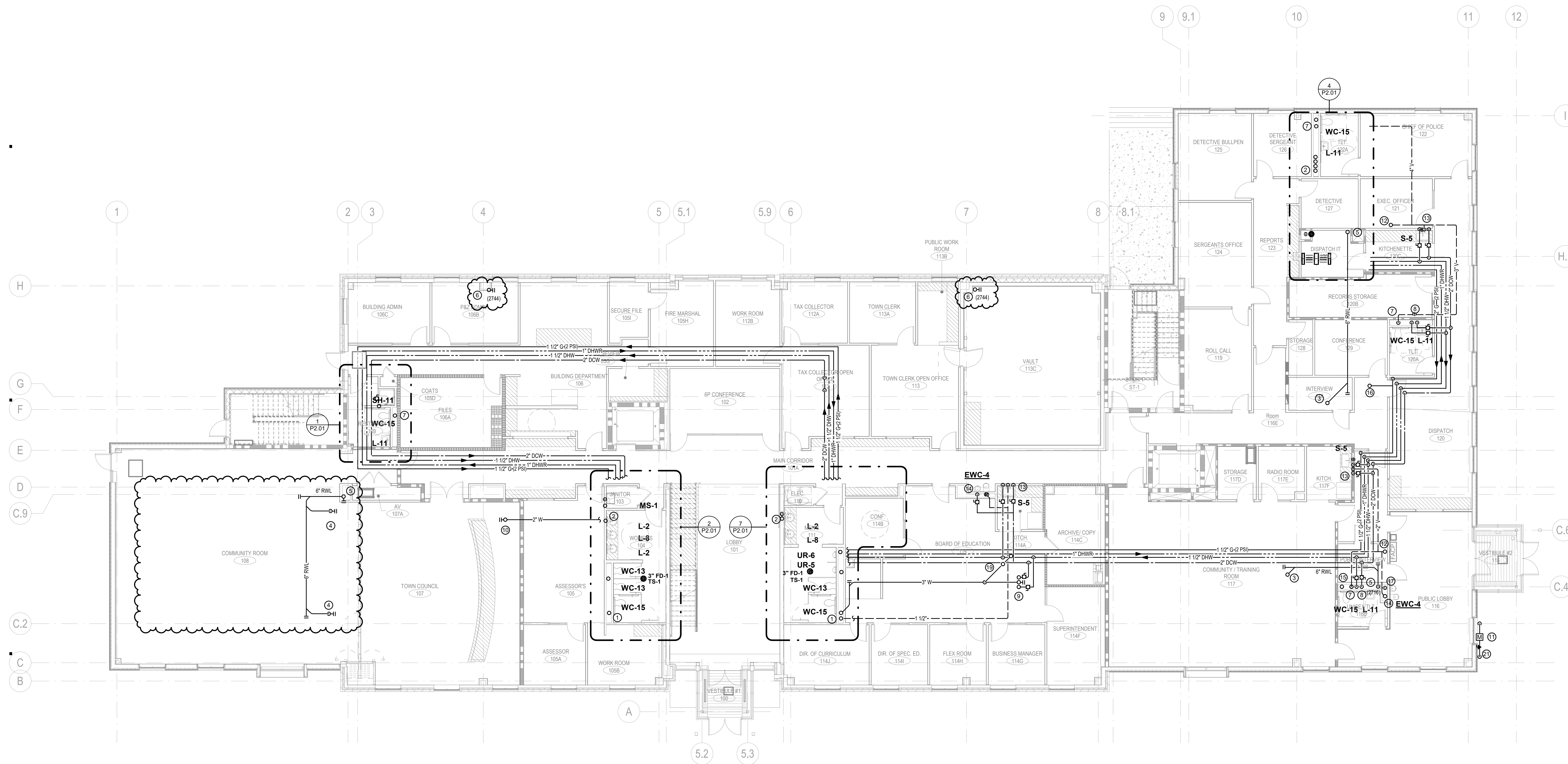
PLUMBING PLAN - UNDERGROUND

P1.00

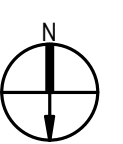
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
CURRENT SUBMISSION DATE 10.12.2018
DRAWN JIM
CHECKED MT
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HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

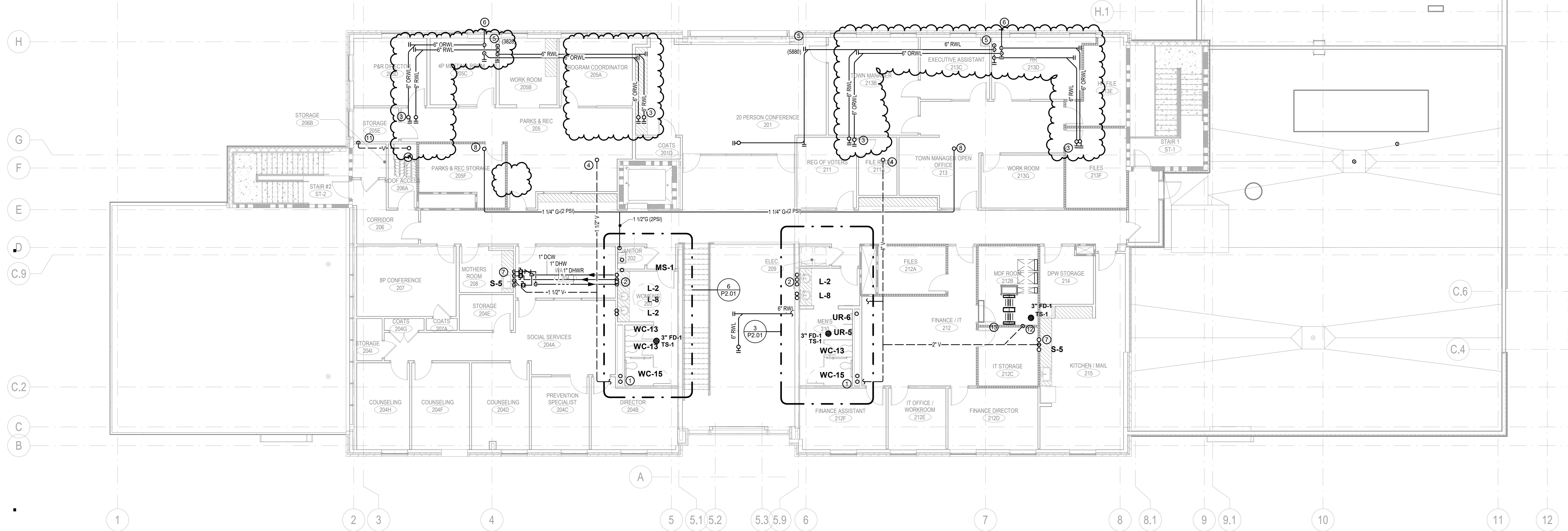
PLUMBING PLAN - FIRST FLOOR

- PLUMBING DRAWING NOTES:**
- ① 4" S & 4" V STACKS.
 - ② 2" CW, 1-1/2" HW, 1" HW RISERS.
 - ③ 6" RWL UP TO R.D.
 - ④ 4" RWL UP TO R.D.
 - ⑤ 6" RWL DN.
 - ⑥ 6" RWL UP & DN.
 - ⑦ 4" S DN, 2" V UP. EXTEND 4" S & 2" V IN CHASE TO FIXTURES.
 - ⑧ 1 1/2" CW, 1/2" HW, DROP. EXTEND IN CHASE TO FIXTURES.
 - ⑨ 2" W, 1/2" H&C UP TO SINK.
 - ⑩ 2" W. UP TO SINK.
 - ⑪ GAS METER / REGULATOR ASSEMBLY BY UTILITY CO. PROVIDE GAS MAIN SHUTOFF VALVE ON SERVICE MAIN.
 - ⑫ 4" V. UP THROUGH ROOF.
 - ⑬ AT SINK PROVIDE 2" W, 1 1/2" V, 1/2" CW.
 - ⑭ AT EWC PROVIDE 1 1/2" W, 1 1/2" V, 1/2" CW.
 - ⑮ 1" GAS REGULATOR VENT UP THROUGH ROOF & DN.
 - ⑯ 1 1/4" GAS (2PS) UP TO RTU.
 - ⑰ 4" V. DN.
 - ⑱ 3" W. DN TO F.D.
 - ⑲ 1-1/2" V. UP.
 - ⑳ 3" W DN TO BURIED.
 - ㉑ 3" GAS (2PS) DN.

TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

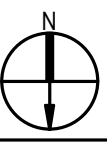
EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



- PLUMBING DRAWING NOTES:**
- ① 4" S & 4" V STACKS.
 - ② 2" CW, 1-1/2" HW, 1" HWR.
 - ③ 6" RWL, 6" ORWL UP TO R.D.
 - ④ 4" V UP THROUGH ROOF.
 - ⑤ 6" RWL DN.
 - ⑥ 6" ORWL TERMINATION LOCATION. COORDINATE EXACT LOCATION & ELEVATION WITH ARCHITECT.
 - ⑦ AT SINK PROVIDE 2" W., 1 1/2" V., 1 1/2" H&C W.
 - ⑧ 1 1/4" G (2 PSI) UP TO RTU.
 - ⑨ NOT USED
 - ⑩ NOT USED
 - ⑪ 2" V. DN.
 - ⑫ 1-1/2" V. DN.
 - ⑬ PROVIDE 1-1/4" COND DRAIN & TRAP AT ACU. EXTEND TO F.D. THROUGH AIR GAP.

KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	JJM
CHECKED	MT
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_jjim_bvh.rvt

HISTORY OF SUBMISSIONS

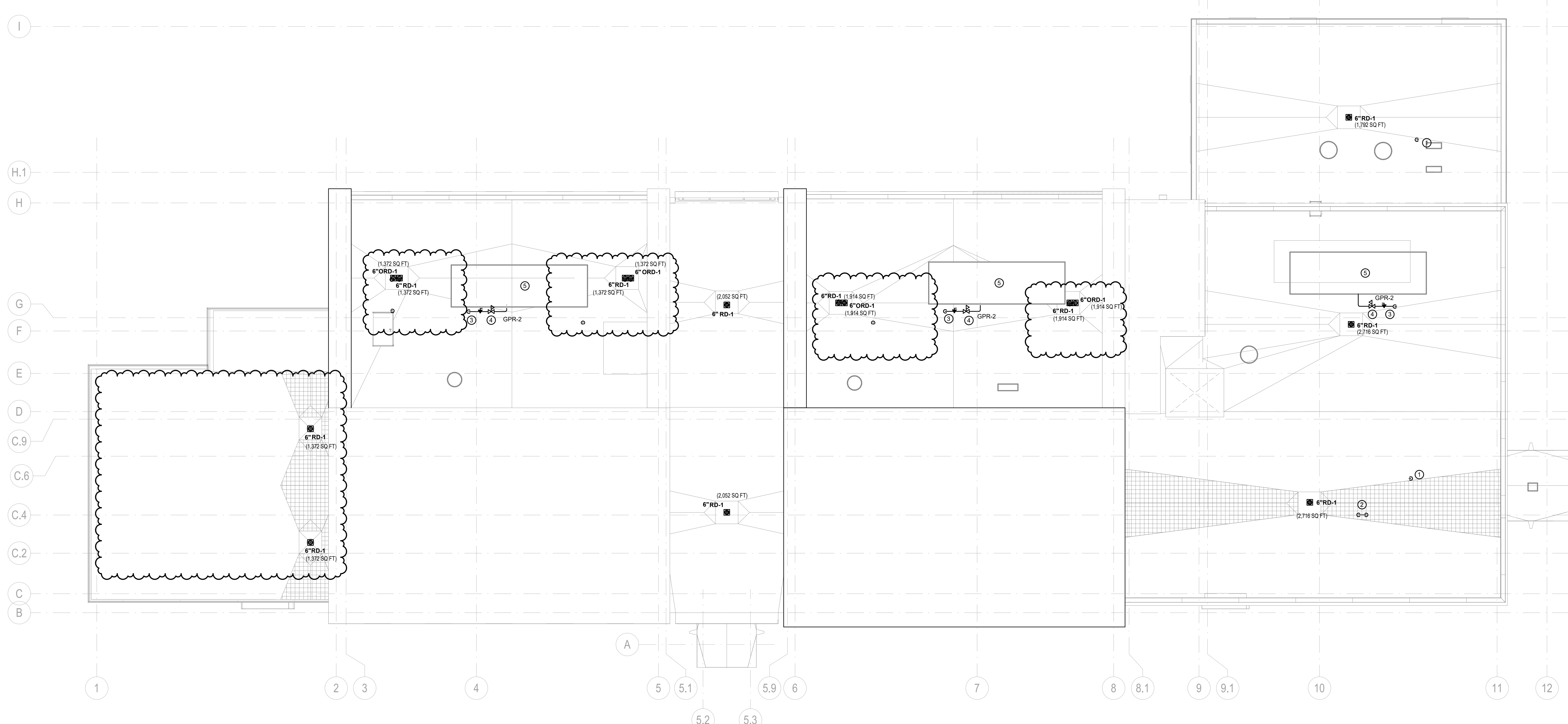
Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

PLUMBING PLAN - SECOND FLOOR

P1.03



TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

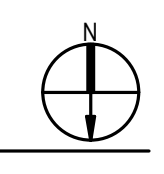
EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



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KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	JJM
CHECKED	MT
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_jjim_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

- PLUMBING DRAWING NOTES:**
- ① 4" V THROUGH ROOF.
 - ② 1" GAS REGULATOR VENT. TERMINATE WITH GOOSENECK AND INSECT SCREEN.
 - ③ 1 1/4" G (2 PSI) DN.
 - ④ 2 PSI TO 14" W.C. GAS REGULATOR. TERMINATE REGULATOR VENT WITH GOOSENECK AND INSECT SCREEN. EXTEND 1 1/2" GAS TO RTU.
 - ⑤ PROVIDE 1-1/2" COND. DRAIN & TRAP AT RTU. SPILL TO ROOF THROUGH AIR GAP.

BIDDING DOCUMENTS

SHEET TITLE

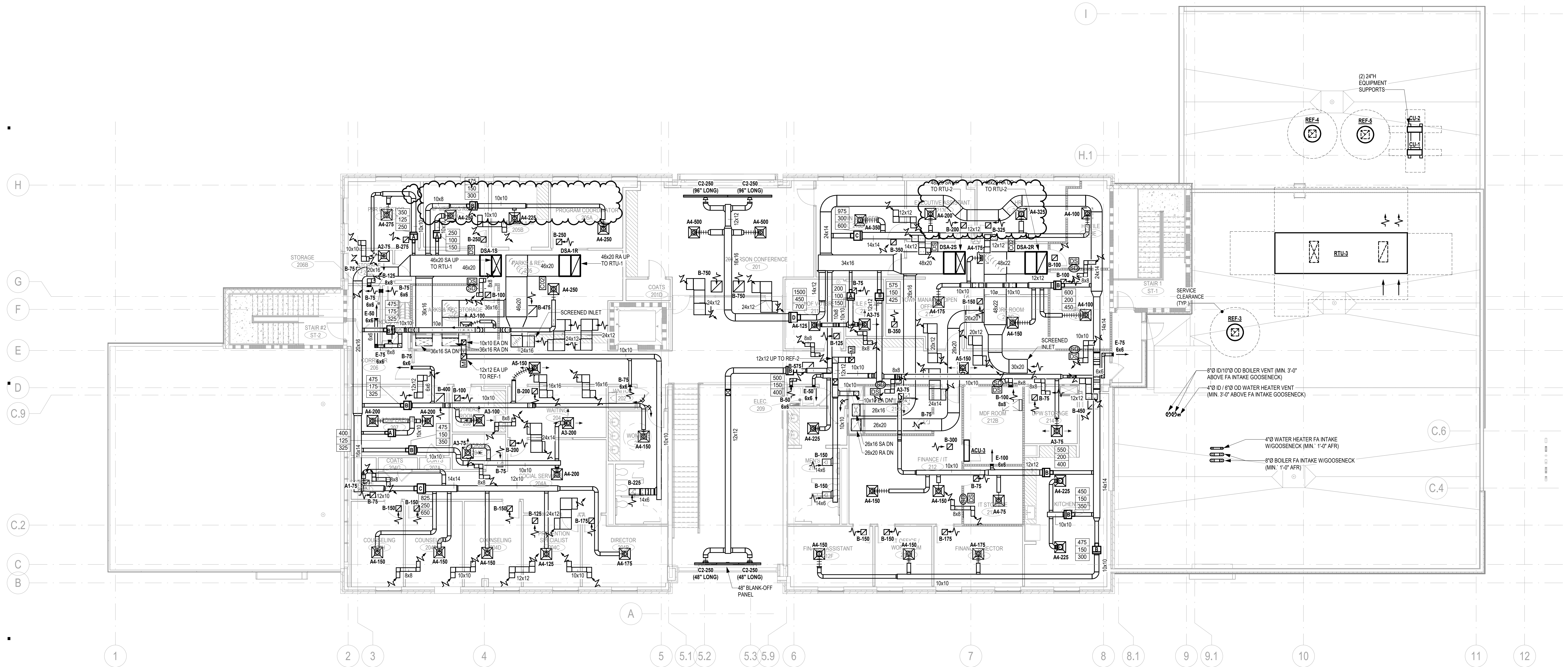
PLUMBING PLAN - ROOF

P1.04

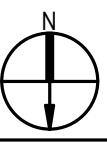
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2016
DRAWN	NRC
CHECKED	MEL
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2016_jan6_bvh.rvt

HISTORY OF SUBMISSIONS

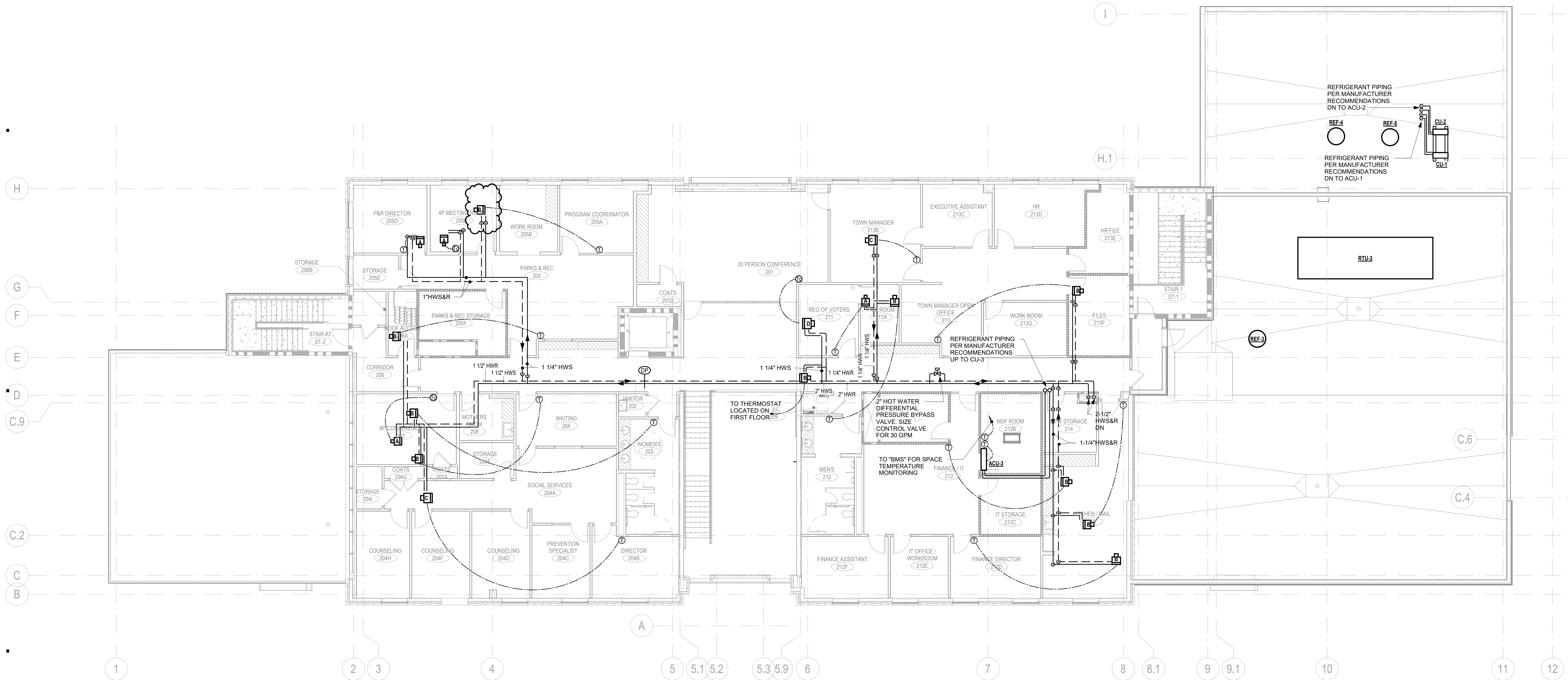
Revision		
No.	Date	Revision Description
1	11/16/16	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

HVAC PLAN - SECOND FLOOR

H1.03



TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

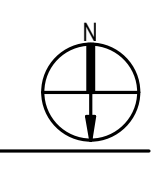
EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



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KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	NRC
CHECKED	MEL
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_gaeb_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

HYDRONIC PIPING PLAN - SECOND FLOOR

HP1.03

MECHANICAL EQUIPMENT SCHEDULE				
TAG ID	VOLTS	PHASE	NOTES	
ACU-1	208 V	1	[2], [3]	
ACU-2	208 V	1	[2], [3]	
ACU-3	208 V	1	[2], [3]	
B-1	120 V	1	[1]	
B-2	120 V	1	[1]	
CU-1	208 V	1	[2], [3]	
CU-2	208 V	1	[2], [3]	
CU-3	208 V	1	[2], [3]	
CUH-1	120 V	1	[1]	
CUH-2	120 V	1	[1]	
CUH-3	120 V	1	[1]	
CUH-4	120 V	1	[1]	
CUH-5	120 V	1	[1]	
ECUH-1	208 V	3	[2]	
ECUH-2	208 V	3	[2]	
EF-1	120 V	1	[1]	
EF-2	480 V	3	[2]	
EUH-1	208 V	3	[2]	
EUH-2	208 V	3	[2]	
GMH-1	120 V	1	[1]	
GWH-1	120 V	1	[1]	
HWP-1	480 V	3	[2]	
HWP-2	480 V	3	[2]	
HWP-3	480 V	3	[2]	
HWRP-1	120 V	1	[1]	
JP-1	480 V	3	[2], [4]	
REF-1	120 V	1	[1]	
REF-2	120 V	1	[1]	
REF-3	120 V	1	[1]	
REF-4	208 V	3	[2]	
REF-5	120 V	1	[1]	
RTU-1	480 V	3	[2]	
RTU-2	480 V	3	[2]	
RTU-3	480 V	3	[2]	
SMP-1	480 V	3	[2]	
SMP-2	480 V	3	[2]	
UH-1	120 V	1	[1]	
UH-2	120 V	1	[1]	
UH-3	120 V	1	[1]	

MECHANICAL EQUIPMENT SCHEDULE NOTES

- [1] SEE FLOOR PLANS FOR CIRCUITING.
- [2] SEE MECHANICAL EQUIPMENT CIRCUITING SCHEDULE.
- [3] POWER FEED FOR ACU SHALL BE FROM ASSOCIATED CU. 3 WIRE CABLE TO BE SUPPLIED BY MANUFACTURER. PROVIDE 20A TOGGLE SWITCH FOR ACU.
- [4] POWER FEED FOR JP-1 SHALL BE FROM EFF-1. WIRING TO BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR PER MANUFACTURER'S INSTRUCTIONS.

MECHANICAL EQUIPMENT CIRCUITING SCHEDULE

TAG ID	PHASE	VOLTS	PANEL	C/B	CIRCUIT NUMBER(S)	LOAD	BRANCH CIRCUIT SIZE	SW/FUSE SIZE
CU-1 & ACU-1	1	208 V	SLM-2	30 A	7.9	4500 VA	(2) #10 & (1) #10IG IN 3/4"	30A/30A
CU-2 & ACU-2	1	208 V	SLM-2	30 A	4.6	4500 VA	(2) #10 & (1) #10IG IN 3/4"	30A/30A
CU-3 & ACU-3	1	208 V	SLM-2	30 A	3.5	4500 VA	(2) #10 & (1) #10IG IN 3/4"	30A/30A
ECUH-1	3	208 V	SLM-B	30 A	5.7, 9	5000 VA	(3) #10 & (1) #10IG IN 3/4"	30A/20A
ECUH-2	3	208 V	SLM-B	30 A	6.8, 10	5000 VA	(3) #10 & (1) #10IG IN 3/4"	30A/20A
EF-1	1	120 V	SL-FP	20 A	6	500 VA	(2) #12 & (1) #12IG IN 3/4"	20A TOGGLE
EF-1 & JP-1	3	480 V	UTILITY TX	400 A	1.3, 5	54500 VA	(3) #1/0 & (1) #1/0 IN 2"	-
EUH-1	3	208 V	SLM-2	20 A	8.10, 12	3300 VA	(3) #12 & (1) #12IG IN 3/4"	30A/20A
EUH-2	3	208 V	SL-FP	40 A	3.5, 7	3000 VA	(3) #8 & (1) #8IG IN 1"	40A/30A
HWP-1	3	480 V	SHM-B	50 A	17, 50	17500 VA	(3) #6 & (1) #6IG IN 1"	60A/50A
HWP-2	3	480 V	SHM-B	50 A	2.4, 6	17500 VA	(3) #6 & (1) #6IG IN 1"	60A/50A
REF-4	3	208 V	SLM-2	20 A	19.21, 23	864 VA	(3) #12 & (1) #12IG IN 3/4"	30A/30A
RTU-2	3	480 V	SHSWBD	100 A	8.10, 12	55000 VA	(3) #1 & (1) #4IG IN 1 1/2"	100A/100A
RTU-3	3	480 V	SHSWBD	100 A	7.9, 11	55000 VA	(3) #1 & (1) #4IG IN 1 1/2"	100A/100A
SMP-1	3	480 V	SHM-B	20 A	19.21, 23	5500 VA	(3) #1 & (1) #4IG IN 1 1/2"	100A/100A
SMP-2	3	480 V	SHM-B	20 A	7.9, 11	6500 VA	(3) #12 & (1) #12IG IN 3/4"	30A/12A
SMP-2	3	480 V	SHM-B	20 A	8.10, 12	6500 VA	(3) #12 & (1) #12IG IN 3/4"	30A/12A

FLOOR BOX SCHEDULE

TAG ID	BOX			COVER			DEVICES # GANGS			NOTES
	APPROX. SIZE	# GANG	MATERIAL	SHAPE	TYPE	MATERIAL	POWER	TELECOM	AUDIO VISUAL	
FB-A	8 1/8" x 4 1/2" x 4 1/16"	4	STEEL	RECT.	FLUSH	CAST ALUM.	2	1	1	

POKE-THRU SCHEDULE

TAG ID	BOX			COVER			DEVICES # GANGS			NOTES
	APPROX. SIZE	# GANG	MATERIAL	SHAPE	TYPE	MATERIAL	POWER	TELECOM	AUDIO VISUAL	
PT-A	8"	5	STEEL	ROUND	FLUSH	CAST ALUM.	2	1	2	

LUMINAIRE SCHEDULE

GENERAL NOTES:
 1. LMFT = LUMENS PER LINEAR FOOT. WFT = WATTAGE PER LINEAR FOOT.
 2. ALL LUMINAIRES ARE TO BE 80+ CRI UNLESS OTHERWISE NOTED.
 3. LED DRIVERS TO BE RUN AT 700 MILLIAMPS UNLESS NOTED.
 4. VERIFY MAXIMUM DISTANCE FOR REMOTE DRIVERS WITH MANUFACTURER.
 5. ALL ACCEPTABLE EQUIVALENTS SUBMITTED ARE TO PROVIDE LIGHTING CALCULATIONS TO DEMONSTRATE EQUIVALENT LUMINAIRE PERFORMANCE.
 6. LUMINAIRE EQUIVALENTS TO MEET SPECIFIED BASIS OF DESIGN FIXTURE LUMEN AND WATTAGE PERFORMANCE.
 7. PROVIDE 0-10V DIMMING DRIVERS WITH FOR ALL LUMINAIRES UNLESS OTHERWISE NOTED.

TYPE	MANUFACTURER	ALTERNATE MANUFACTURER 1	ALTERNATE MANUFACTURER 2	ALTERNATE MANUFACTURER 3	FIXTURE DESCRIPTION	LAMPING			
						VOLTS	OUTPUT	KELVIN	LOAD
A	METALUX 22SR-LD2-29-C-UNV-L835-CD1-U	COLUMBIA 'LCAT' SERIES.	FLUXWERX 'TR1' SERIES	LEDALITE '4222' SERIES	2X2 RECESSED, LED TROFFER WITH ALUMINUM CONSTRUCTION AND ACRYLIC LENS. SHALLOW HOUSING WITH A MAXIMUM HEIGHT OF 5".	277 V	2900 LUMENS	3500 K	23 VA
AE	METALUX 22SR-LD2-29-C-UNV-L835-CD1-U	COLUMBIA 'LCAT' SERIES.	FLUXWERX 'TR1' SERIES	LEDALITE '4222' SERIES	SAME AS LUMINAIRE TYPE 'A' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	2900 LUMENS	3500 K	23 VA
B	METALUX 24SR-LD2-39-C-UNV-L835CD1LU	COLUMBIA 'LCAT' SERIES.	FLUXWERX 'TR1' SERIES	DAY-BRITE 'FSS' SERIES	2X4 RECESSED, LED TROFFER WITH ALUMINUM CONSTRUCTION AND ACRYLIC LENS. SHALLOW HOUSING WITH A MAXIMUM HEIGHT OF 5".	277 V	4000 LUMENS	3500 K	32 VA
BL	PEMCO 'CAV4' SERIES	HUBBELL OUTDOOR 'FRESNO' SERIES.		BASIS OF DESIGN FIXTURE - H.E. WILLIAMS OSABR-L20-840-AC-DT-FINISH-XX-DRV-U NV W/ OP CENTER @ 38" AFG. DAY-BRITE 'FSS' SERIES	REFER TO SITE DRAWINGS FOR INFORMATION.	277 V	932 LUMENS	4000 K	25 VA
C	METALUX 4SLSTP2035DD-UNV	COLUMBIA 'MPS' SERIES.	LITHONIA 'MNSL' SERIES	LITHONIA 'MNSL' SERIES	3' X 4' WALL MOUNTED LED LUMINAIRE WITH STEEL CONSTRUCTION	277 V	2410 LUMENS	3500 K	21 VA
C1	METALUX 4V12-LD4-4-DR-UNV-L835-CD1-U	COLUMBIA 'LXEM' SERIES.	LITHONIA 'FEM' SERIES	LITHONIA 'FEM' SERIES	4' LED LUMINAIRE. PROVIDE FULL METAL INTERIOR WITH FIBERGLASS HOUSING. INCLUDE POLYURETHANE SEAL TO PROVIDE A CONTINUOUS SEAMLESS SEAL FOR DIFFUSER. WET LOCATION LISTED.	277 V	4423 LUMENS	3500 K	38 VA
C2	NOVAFLEX DESIGN 160 SERIES	KLUS LIGHTING 'WP-K-1820' SERIES	OPTIC ARTS 'FLEXID' SERIES	O-TRAN LED 'SW245.0' SERIES	SURFACE MOUNTED EXTRUDED RIBBON TAPE LUMINAIRE. SEE FLOOR PLANS FOR LENGTHS. FIELD CUTTABLE EVERY 2". PROVIDE 0.5" TALL EXTRUDED ALUMINUM CHANNEL WITH LENS.	277 V	407 LMFT & 5W/FT		
C-8	METALUX 8SLSTP8035DD-UNV	COLUMBIA 'MPS' SERIES.	LITHONIA 'MNSL' SERIES	DAY-BRITE 'FSS' SERIES	3' X 8' WALL MOUNTED LED LUMINAIRE WITH STEEL CONSTRUCTION.	277 V	8064 LUMENS	3500 K	71 VA
C-8E	METALUX 8SLSTP8035DD-UNV	COLUMBIA 'MPS' SERIES.	LITHONIA 'MNSL' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'C-8' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	8064 LUMENS	3500 K	71 VA
CE	METALUX 4SLSTP2035DD-UNV	COLUMBIA 'MPS' SERIES.	LITHONIA 'MNSL' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'C' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	2410 LUMENS	3500 K	21 VA
D	ALPHABET NL4-RD-XTM19-10LM-35K-83-D60-277-DIM10-NC-WH-WH	PATHWAY LIGHTING 'C4SL' SERIES	GOTHAM 'EVO' SERIES	SPECTRUM LIGHTING 'SR4M0' SERIES	4" ROUND, RECESSED, LED, DOWNLIGHT WITH STEEL CONSTRUCTION. WET LOCATION LISTED.	277 V	698 LUMENS	3500 K	10 VA
D2	ALPHABET 60BRA-6-XTM19-13LM-35K-83-DA60-UNV-DIM10-NC-S	PATHWAY LIGHTING 'C4SL' SERIES	GOTHAM 'EVO' SERIES	LIGHTOLIER 'C4' SERIES	4" ROUND, CYLINDER, LED, DOWNLIGHT WITH ALUMINUM CONSTRUCTION.	277 V	1105 LUMENS	3500 K	16 VA
D2E	ALPHABET 60BRA-6-XTM19-13LM-35K-83-DA60-UNV-DIM10-NC-S	PATHWAY LIGHTING 'C4SL' SERIES	GOTHAM 'EVO' SERIES	LIGHTOLIER 'C4' SERIES	SAME AS LUMINAIRE TYPE 'D1' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	1105 LUMENS	3500 K	16 VA
D2W	ALPHABET NL4-RW-XTM19-20LM-35K-83-WW-277-DIM10-NC-XX-X	LIGHTHEADED LIGHTING 'WALL WASH' SERIES	GOTHAM 'EVO' SERIES	SPECTRUM LIGHTING 'SR4M0' SERIES	4" ROUND, LED, RECESSED WALL WASH DOWNLIGHT.	277 V	1680 LUMENS	3500 K	16 VA
DE	ALPHABET NL4-RD-XTM19-10LM-35K-83-D60-277-DIM10-NC-WH-WH	LIGHTHEADED LIGHTING 'AQUA' SERIES	GOTHAM 'EVO' SERIES	SPECTRUM LIGHTING 'SR4M0' SERIES	SAME AS LUMINAIRE TYPE 'D' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	698 LUMENS	3500 K	25 VA
E	ALPHABET 624-RD-XTM19-07LM-35K-83-D90-xx-DIM10-xx-WH	LITON LIGHTING 'LR2LH2' SERIES	GOTHAM 'ICO' SERIES	LIGHTOLIER 'C2L' SERIES	2" ROUND, RECESSED, LED, DOWNLIGHT WITH STEEL CONSTRUCTION.	277 V	397 LUMENS	3500 K	7 VA
EE	ALPHABET 624-RD-XTM19-07LM-35K-83-D90-xx-DIM10-xx-WH	LITON LIGHTING 'LR2LH2' SERIES	GOTHAM 'ICO' SERIES	LIGHTOLIER 'C2L' SERIES	SAME AS LUMINAIRE TYPE 'E' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	397 LUMENS	3500 K	7 VA
F-2	NEO-RAY S122DR-S675D835-x-2FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	2' X 2' RECESSED LED LUMINAIRE. ALUMINUM CONSTRUCTION WITH SATIN FLUSH DIFFUSER.	277 V	1350 LUMENS	3500 K	13 VA
F-2E	NEO-RAY S122DR-S675D835-x-2FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-2' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	1350 LUMENS	3500 K	13 VA
F-2F	NEO-RAY S122DR-S675D835-x-2FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-2' EXCEPT INSTALLED IN GYP CEILING.	277 V	1350 LUMENS	3500 K	13 VA
F-2FE	NEO-RAY S122DR-S675D835-x-2FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-2F' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	1350 LUMENS	3500 K	13 VA
F-4E	NEO-RAY S122DR-S675D835-x-4FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-2' EXCEPT 4" IN LENGTH.	277 V	3460 LUMENS	3500 K	35 VA
F-4E	NEO-RAY S122DR-S675D835-x-4FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-4' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	3460 LUMENS	3500 K	35 VA
F-6	NEO-RAY S122DR-S675D835-x-6FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 R' SERIES	SAME AS LUMINAIRE TYPE 'F-2' EXCEPT 6" IN LENGTH.	277 V	4050 LUMENS	3500 K	42 VA
G-3	AMERLUX HHP-PM-3-ASX10-1-18-XX-120-277-XX-WVF-35-0-10V	BETACALCO 'BOX / 75 101X' SERIES	LF ILLUMINATION 'PNH' SERIES	SPECTRUM LIGHTING 'RCC618' SERIES	LED, STRAIGHT, 3 HEAD, MULTIPLE PENDANT LUMINAIRE. PROVIDE VERY WIDE FLOOD, 60 DEGREE BEAM SPREAD. PROVIDE 2" POINT AIRCRAFT CABLE MOUNTING.	277 V	4107 LUMENS	3500 K	54 VA
G-3E	AMERLUX HHP-PM-3-ASX10-1-18-XX-120-277-XX-WVF-35-0-10V	BETACALCO 'BOX / 75 101X' SERIES	LF ILLUMINATION 'PNH' SERIES	SPECTRUM LIGHTING 'RCC618' SERIES	SAME AS LUMINAIRE TYPE 'G3' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	4107 LUMENS	3500 K	54 VA
G-4	AMERLUX HHP-PM-4-ASX10-1-18-XX-120-277-XX-WVF-35-0-10V	BETACALCO 'BOX / 75 101X' SERIES	LF ILLUMINATION 'PNH' SERIES	SPECTRUM LIGHTING 'RCC624' SERIES	LED, STRAIGHT, 4 HEAD, MULTIPLE PENDANT LUMINAIRE. PROVIDE VERY WIDE FLOOD, 60 DEGREE BEAM SPREAD. PROVIDE 2" POINT AIRCRAFT CABLE MOUNTING.	277 V	5476 LUMENS	3500 K	72 VA
G-4E	AMERLUX HHP-PM-4-ASX10-1-18-XX-120-277-XX-WVF-35-0-10V	BETACALCO 'BOX / 75 101X' SERIES	LF ILLUMINATION 'PNH' SERIES	SPECTRUM LIGHTING 'RCC624' SERIES	SAME AS LUMINAIRE TYPE 'G4' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	5476 LUMENS	3500 K	72 VA
H	NEO-RAY S122DR-S675D835-x-4FO-xx-UDD-F-W	AXIS 'SCULPT' SERIES.	MARK 'S2L' SERIES	FINELITE 'HP-2 SM' SERIES	2" SURFACE MOUNTED LUMINAIRE. ALUMINUM CONSTRUCTION WITH FLUSH SATIN LENS. PROVIDE ALL NECESSARY COMPONENTS IN ORDER TO CREATE STRAIGHT CONTINUOUS RUNS.	277 V	2646 LUMENS	3500 K	26 VA
I	LIGMAN ULA-60002-55WLED-W-30-120/277V-F-DIM	ARCLUCE LIGHTING 'KRIO' SERIES	LUMENPULSE 'LOIRO' SERIES	INSIGHT 'MIG' SERIES	4' LINEAR INGROUND LUMINAIRE WITH ALUMINUM CONSTRUCTION.	277 V	3949 LUMENS	3500 K	56 VA
IE	LIGMAN LA-60002-W-W30	ARCLUCE LIGHTING 'KRIO' SERIES	INSIGHT 'MIG' SERIES	INSIGHT 'MIG' SERIES	SAME AS LUMINAIRE TYPE 'I' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	3949 LUMENS	3500 K	56 VA
J	PRUDENTIAL B10-3TD-FLSH-LED35-MO-XX-TMW-AWL-D1W-SC-UNV-XX-DM10	AXIS 'WW PERFECT' SERIES	LUMENWERX 'AXLWAD' SERIES	INSIGHT 'CSX' SERIES	2' X 4' SURFACE MOUNTED LUMINAIRE. ALUMINUM CONSTRUCTION WITH AN ASYMMETRIC WALL WASH DISTRIBUTION.	277 V	1820 LUMENS	3500 K	20 VA
K	HALO HU30BSC48P	AFX LIGHTING 'NOBLE PRO' SERIES	WAC 'BA' SERIES	H.E. WILLIAMS '1SF' SERIES	2" UNDERCABINET LIGHT. PROVIDE ALL NECESSARY CONNECTORS AND ACCESSORIES TO DAISY CHAIN FIXTURES.	277 V	1253 LUMENS	3500 K	21 VA
M	BRUCK 115-550-xx-xx-TRACK	SUNLITE '07034-SU' SERIES	TECH LIGHTING '700TDSOCCP' SERIES	SPECTRUM LIGHTING 'DSP1INC' SERIES	DECORATIVE TRACK MOUNTED LIGHT FIXTURE. COORDINATE EXACT CABLE LENGTH IN FIELD. PROVIDE 7W, 800 LUMEN, DECORATIVE, LED, LIGHT BULB.	277 V	800 LUMENS	3000 K	7 VA
ME	BRUCK 115-550-xx-xx-TRACK	SUNLITE '07034-SU' SERIES	TECH LIGHTING '700TDSOCCP' SERIES	SPECTRUM LIGHTING 'DSP1INC' SERIES	SAME AS LUMINAIRE TYPE 'M' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	800 LUMENS	3000 K	7 VA
N	LIGHTNET LIGHTING 'MP10WD-835E-D700-UJW-W	SUNLITE 'AIP11861' SERIES	SPECTRUM LIGHTING 'DSP1INC' SERIES	SPECTRUM LIGHTING 'DSP1INC' SERIES	DECORATIVE, ROUND, DIRECT / INDIRECT PENDANT MOUNTED LIGHT FIXTURE. PROVIDE OPAL DIFFUSER OPTION. CABLE PENDANT LENGTH DETERMINED BY ARCHITECT.	277 V	834 LUMENS	3500 K	64 VA
O	ALPHABET NJR-RF-XTM19-10LM-35K-83-HE90-xx-DIM10-NC-WH-WH	PATHWAY LIGHTING 'SFK' SERIES	GOTHAM 'EVO' SERIES	SPECTRUM LIGHTING 'SGBELEDOS' SERIES	6" ROUND, RECESSED, LED, DOWNLIGHT WITH STEEL CONSTRUCTION. WET LOCATION LISTED.	277 V	757 LUMENS	3500 K	10 VA
P1	METALUX 8TSLNLED-LD5-61SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	CHAIN HUNG 8' INDUSTRIAL WRAP LUMINAIRE. STEEL HOUSING, ACRYLIC LENS, WHITE FINISH.	277 V	6371 LUMENS	3500 K	50 VA
P1E	METALUX 8TSLNLED-LD5-61SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'P1' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	6371 LUMENS	3500 K	50 VA
P2	METALUX 4SNLED-LD4-33SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'P1' EXCEPT 4" IN LENGTH.	277 V	3495 LUMENS	3500 K	28 VA
P2E	METALUX 4SNLED-LD4-33SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'P2' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	3495 LUMENS	3500 K	28 VA
P3	METALUX 4SNLED-LD4-33SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'P2' EXCEPT 20V. PROVIDE WET LOCATION LISTING.	120 V	3495 LUMENS	3500 K	28 VA
P3E	METALUX 4SNLED-LD4-33SL-LW-UNV-L835-CD1-U	COLUMBIA 'MPS' SERIES.	LITHONIA 'ZL1D' SERIES	DAY-BRITE 'FSS' SERIES	SAME AS LUMINAIRE TYPE 'P3' EXCEPT WITH COLD WEATHER BATTERY BACKUP OPTION.	120 V	3495 LUMENS	3500 K	28 VA
Q	FAIL SAFE FMR-D-24-2LD4-3LO-35-UNV-80/86-EED-1	CERTOLUX 'VRF' SERIES	L.C. DOANE 'FGH' SERIES	KENALL LIGHTING 'RMC'D' SERIES	COLD ROLLED STEEL CONSTRUCTION WITH WELDED CORNERS. PROVIDE TAMPER-RESISTANT SCREWS AND STEEL DOOR. 0.125 CLEAR POLYCARBONATE LENS.	277 V	2880 LUMENS	3500 K	37 VA
QE	FAIL SAFE FMR-D-24-2LD4-3LO-35-UNV-80/86-EED-1	CERTOLUX 'VRF' SERIES	L.C. DOANE 'FGH' SERIES	KENALL LIGHTING 'RMC'D' SERIES	SAME AS LUMINAIRE TYPE 'Q' EXCEPT CONNECTED TO EMERGENCY CIRCUIT.	277 V	2880 LUMENS	3500 K	37 VA
R	FAIL SAFE FCC-N-4-LD4-1SD-35-UNV-80/86-xx-xx	CERTOLUX 'VRF' SERIES	L.C. DOANE 'SCA' SERIES	KENALL LIGHTING 'CC' SERIES	COLD ROLLED STEEL CONSTRUCTION WITH WELDED CORNERS. PROVIDE TAMPER-RESISTANT SCREWS AND STEEL DOOR. 0.125 CLEAR POLYCARBONATE INNER LENS AND 0.250 CLEAR POLYCARBONATE ENVIRONMENTAL SIDE LENS.	277 V	3172 LUMENS	3500 K	3

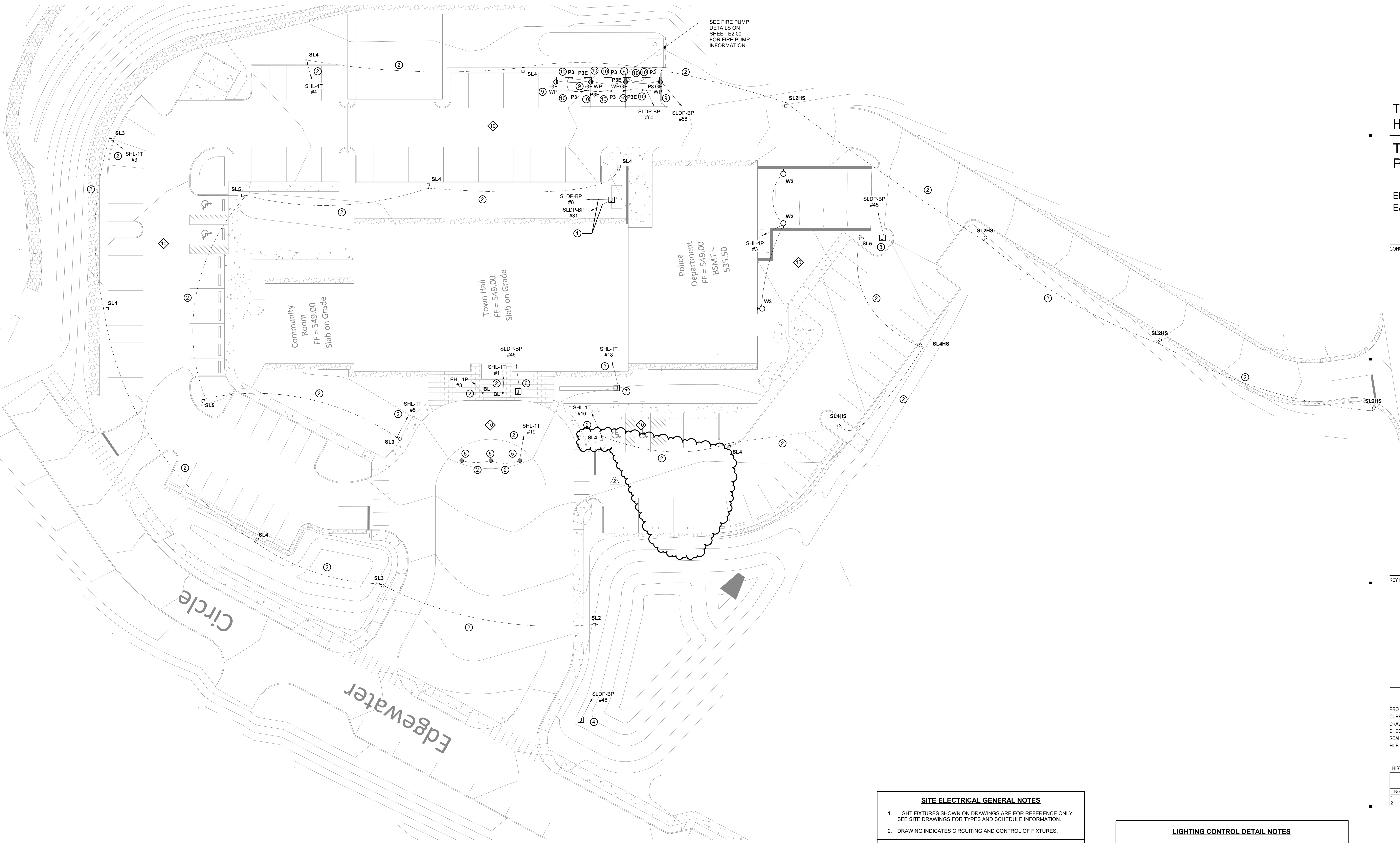
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

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1 SITE ELECTRICAL PLAN
SCALE: 1" = 20'-0"

KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10/12/2018
DRAWN	MCL
CHECKED	REL
SCALE	As Indicated
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_10.mep_bvh.rvt

HISTORY OF SUBMISSIONS

No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/18	ADDENDUM #2

SITE ELECTRICAL GENERAL NOTES

1. LIGHT FIXTURES SHOWN ON DRAWINGS ARE FOR REFERENCE ONLY. SEE SITE DRAWINGS FOR TYPES AND SCHEDULE INFORMATION.
2. DRAWING INDICATES CIRCUITING AND CONTROL OF FIXTURES.

SITE ELECTRICAL DRAWING NOTES

- ① POWER FOR GENERATOR ACCESSORY POWER. SEE ES1.01 AND RISER DIAGRAM FOR MORE INFORMATION. COORDINATE EXACT LOCATION IN FIELD.
- ② PROVIDE (2) #8 & (1) #10 GND IN 1" C. PROVIDE (2) #12 FOR 0-10V DIMMING.
- ③ NOT USED
- ④ DEDICATED HOME RUN FOR CLOCK ON SITE. LOCATION TO BE DETERMINED.
- ⑤ FLAG POLE LIGHTING.
- ⑥ PROVIDE (2) 1" TO PEDESTAL FOR PUSH PLATE AND CARD READER.
- ⑦ PROVIDE POWER FOR SIGN LIGHTING WITHIN BENCH.
- ⑧ PROVIDE POWER FOR GATE CONTROLLER.
- ⑨ RECEPTACLES LOCATED ON CARPORT COLUMNS.
- ⑩ LUMINAIRES LOCATED WITHIN CARPORT.

LIGHTING CONTROL DETAIL NOTES

- ① REFER TO "TYPICAL OFFICE LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ② REFER TO "TYPICAL CORRIDOR LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ③ REFER TO "TYPICAL OPEN OFFICE LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ④ REFER TO "TYPICAL CONFERENCE ROOM LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑤ REFER TO "TYPICAL OPEN AREA LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑥ REFER TO "TYPICAL STORAGE / SUPPORT LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑦ REFER TO "TYPICAL MEPT LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑧ REFER TO "TYPICAL RESTROOM / LOCKER ROOM LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑨ REFER TO "TYPICAL STAIRWELL LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- ⑩ REFER TO "TYPICAL EXTERIOR / SITE LIGHTING CONTROL DETAIL" ON SHEET E4.02 FOR ADDITIONAL INFORMATION.

BIDDING DOCUMENTS

SHEET TITLE

SITE ELECTRICAL PLAN

SE1.00

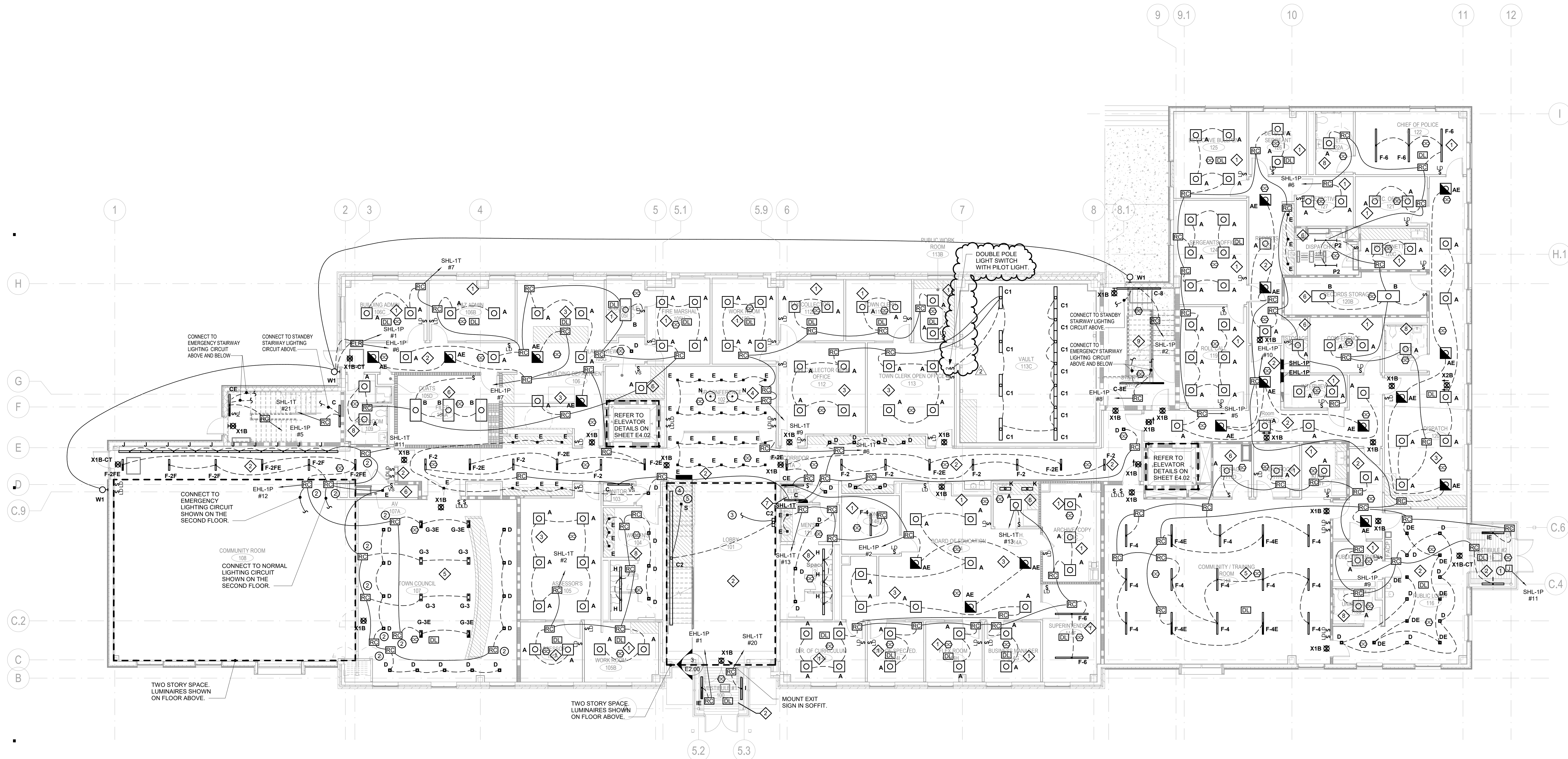
TOWN OF EAST HAMPTON
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EDGEWATER HILL
EAST HAMPTON, CT

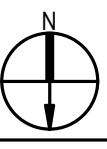
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KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	MCL
CHECKED	REL
SCALE	As Indicated
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_pset_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/18	ADDENDUM #2

LIGHTING DRAWING NOTES

- POWER FOR ILLUMINATED SIGN. COORDINATE EXACT LOCATION IN FIELD.
- LOCATE ROOM CONTROLLERS WITHIN AV 107A. COORDINATE EXACT LOCATION IN FIELD.
- CONNECT CIRCUIT TO ABOVE LIGHTING CIRCUITS WITHIN LOBBY.
- C2 FIXTURE SHALL BE 3 SECTION. SEE 'STAIR LIGHTING DETAIL' ON SHEET E2.00 FOR MORE INFORMATION. COORDINATE EXACT LOCATION AND MOUNTING WITH ARCHITECT.
- MOUNT LUMINAIRE TYPE 'S' IN GYP UNDERNEATH STAIR. COORDINATE EXACT LOCATION IN FIELD.

LIGHTING DRAWING NOTES

- LOCATE ALL ROOM CONTROLLERS ABOVE GRID CEILING WITHIN ROOM ABOVE WALL CONTROL STATION.

LIGHTING CONTROL DETAIL NOTES

- REFER TO 'TYPICAL OFFICE LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL CORRIDOR LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL OPEN OFFICE LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL CONFERENCE ROOM LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL OPEN AREA LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL STORAGE / SUPPORT LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL MEPT LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL RESTROOM / LOCKER ROOM LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL STARWELL LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.
- REFER TO 'TYPICAL EXTERIOR / SITE LIGHTING CONTROL DETAIL' ON SHEET E4.02 FOR ADDITIONAL INFORMATION.

BIDDING DOCUMENTS

SHEET TITLE

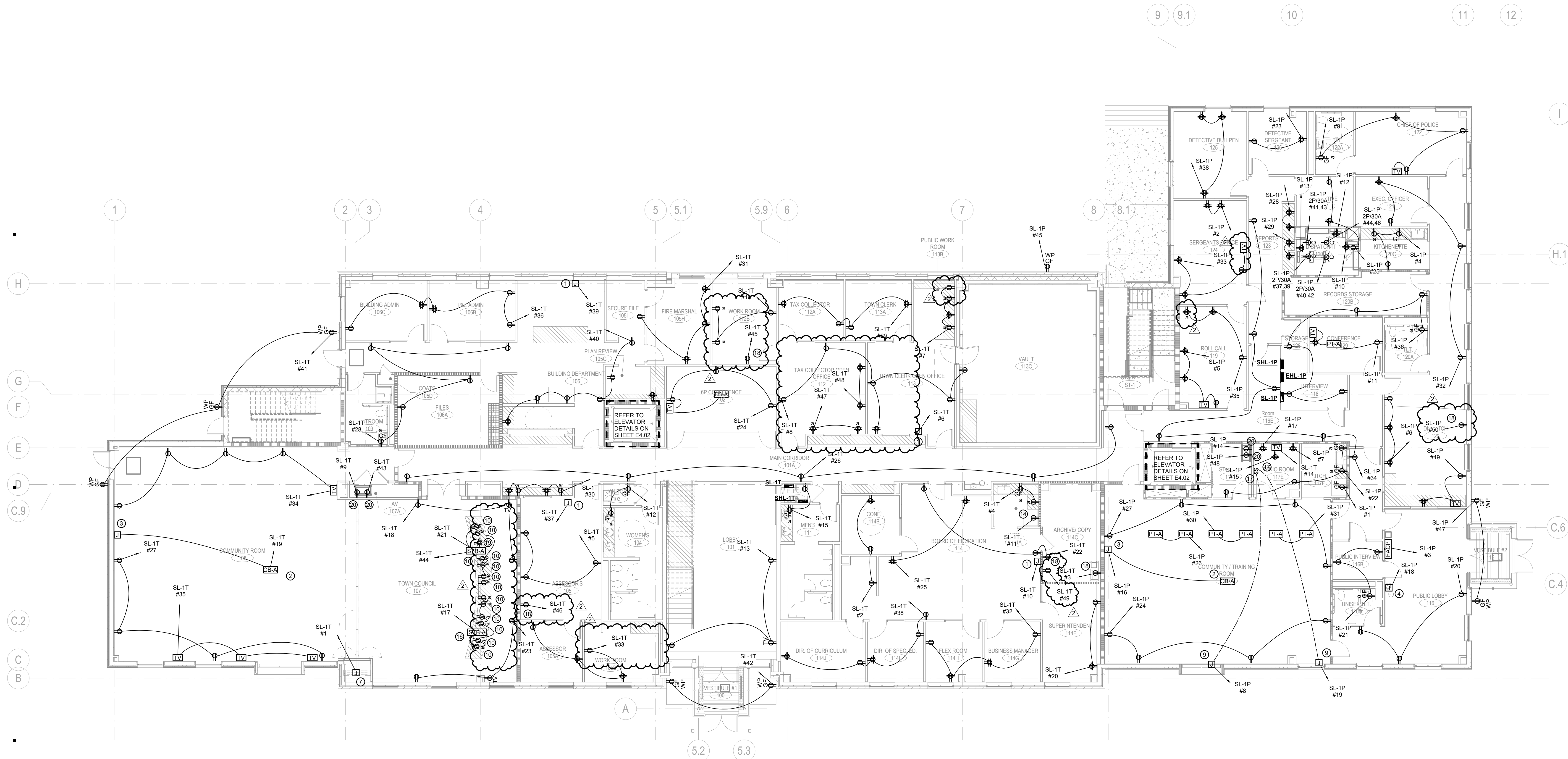
ELECTRICAL LIGHTING
PLAN - FIRST FLOOR

EL1.02

TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

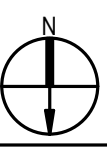
CONSULTANTS



KEY PLAN

ELECTRICAL POWER DRAWING NOTES:

- ① POWER FOR FURNITURE FEED.
- ② POWER FOR CEILING MOUNTED PROJECTOR.
- ③ POWER FOR MOTORIZED PROJECTOR SCREEN.
- ④ POWER FOR WATER COOLER.
- ⑤ POWER FOR LOCKER SYSTEMS. COORDINATE EXACT LOCATION IN FIELD.
- ⑥ POWER FOR RANGE HOOD. COORDINATE EXACT LOCATION IN FIELD.
- ⑦ POWER FOR MOTORIZED PARTITION. COORDINATE EXACT LOCATION IN FIELD.
- ⑧ POWER FOR MOTORIZED OVERHEAD DOOR OPERATOR. PROVIDE CONTROL CABLING FOR OPERATORS. COORDINATE EXACT LOCATION IN FIELD.
- ⑨ POWER FOR OVERHEAD STORM DOORS. COORDINATE EXACT LOCATION IN FIELD.
- ⑩ RECEPTACLE LOCATED WITHIN BACKBOARD OF COMMUNITY ROOM DESK ABOVE THE DESKTOP. COORDINATE EXACT LOCATION WITH ARCHITECT. POWER FROM STUB-UP CIRCUIT AS SHOWN ON FLOOR PLAN.
- ⑪ PROVIDE WIRING AND ALL NECESSARY COMPONENTS IN ORDER TO CONNECT LOCKER SYSTEMS. COORDINATE EXACT LOCATION IN FIELD.
- ⑫ PROVIDE WIRING AND ALL NECESSARY COMPONENTS IN ORDER TO CONNECT FURNITURE SYSTEMS. COORDINATE EXACT LOCATION IN FIELD.
- ⑬ PROVIDE POWER FOR WATER CLOSETS. COORDINATE EXACT LOCATION IN FIELD.
- ⑭ PROVIDE POWER FOR REFRIGERATOR. COORDINATE EXACT LOCATION IN FIELD.
- ⑮ DEDICATED RECEPTACLE FOR I.T. RACK. COORDINATE EXACT LOCATION WITH MANUFACTURER.
- ⑯ POWER FOR COMMUNITY ROOM DESK. COORDINATE EXACT LOCATION WITH MANUFACTURER.
- ⑰ CONTROL STATION FOR OVERHEAD STORM DOOR.
- ⑱ POWER FOR COPIER. COORDINATE EXACT LOCATION IN FIELD.
- ⑲ RECEPTACLE LOCATED WITHIN BACKBOARD OF COMMUNITY ROOM DESK BELOW THE DESKTOP. COORDINATE EXACT LOCATION WITH ARCHITECT. POWER FROM STUB-UP CIRCUIT AS SHOWN ON FLOOR PLAN.
- ⑳ DEDICATED RECEPTACLE FOR I.T. RACK. COORDINATE EXACT LOCATION IN FIELD.
- ㉑ LOCKERS ARE INCLUDED IN ALTERNATE #10. IF ALTERNATE #10 IS ACCEPTED PROVIDE POWER FOR ELECTRIFIED LOCKER SYSTEMS.



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	MCL
CHECKED	REL
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_pwr_bvh.rvt

HISTORY OF SUBMISSIONS

No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/2018	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

ELECTRICAL POWER PLAN
- FIRST FLOOR

EP1.02

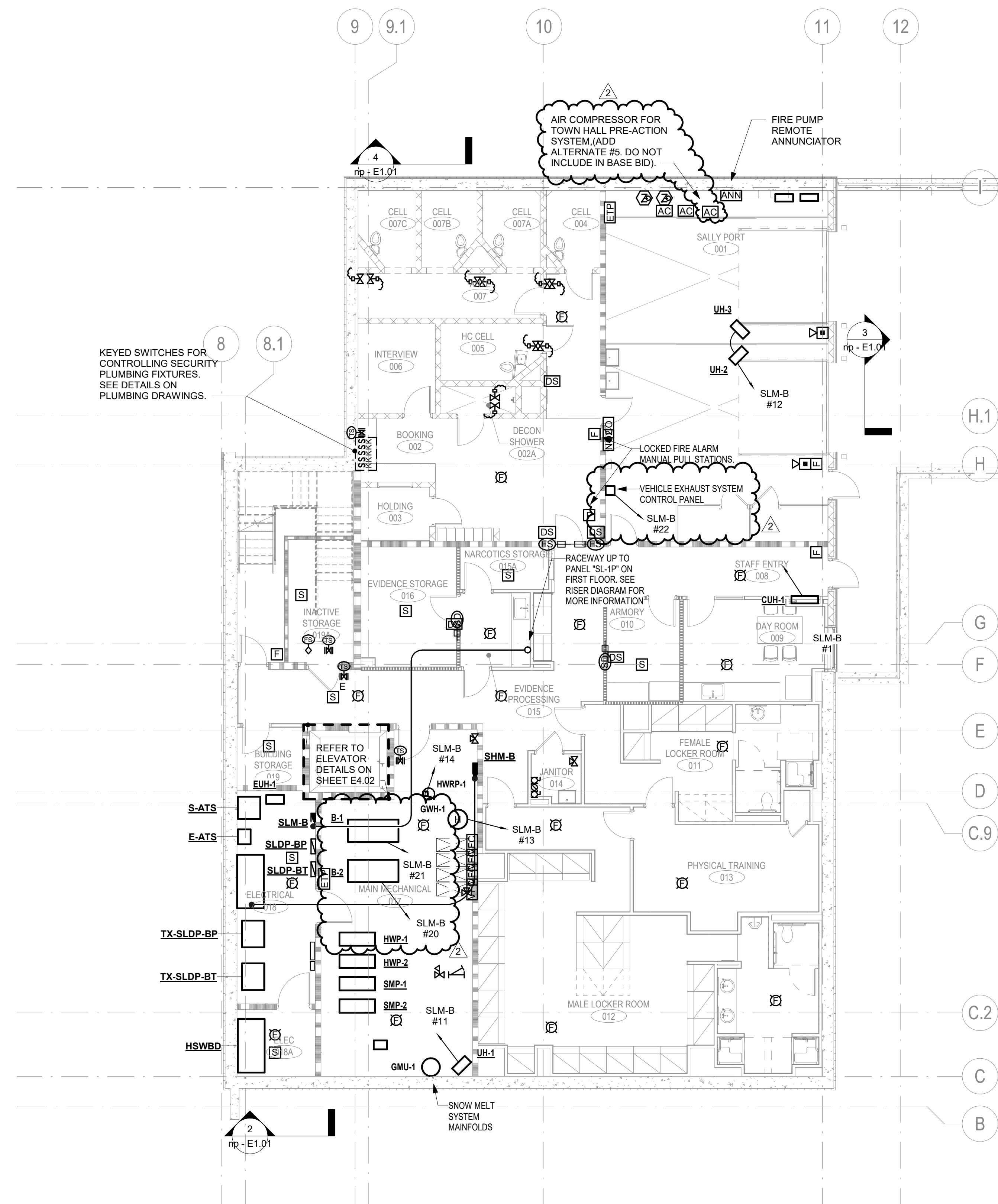
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

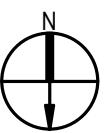
CONSULTANTS



206 West Newberry Road
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KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
CURRENT SUBMISSION DATE 10.12.2018
DRAWN MCL
CHECKED REL
SCALE 1/8" = 1'-0"
FILE REFERENCE E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_pset_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/11/2018	ADDENDUM #1
2	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

ELECTRICAL SPECIAL
SYSTEMS PLAN - LOWER
LEVEL

ES1.01

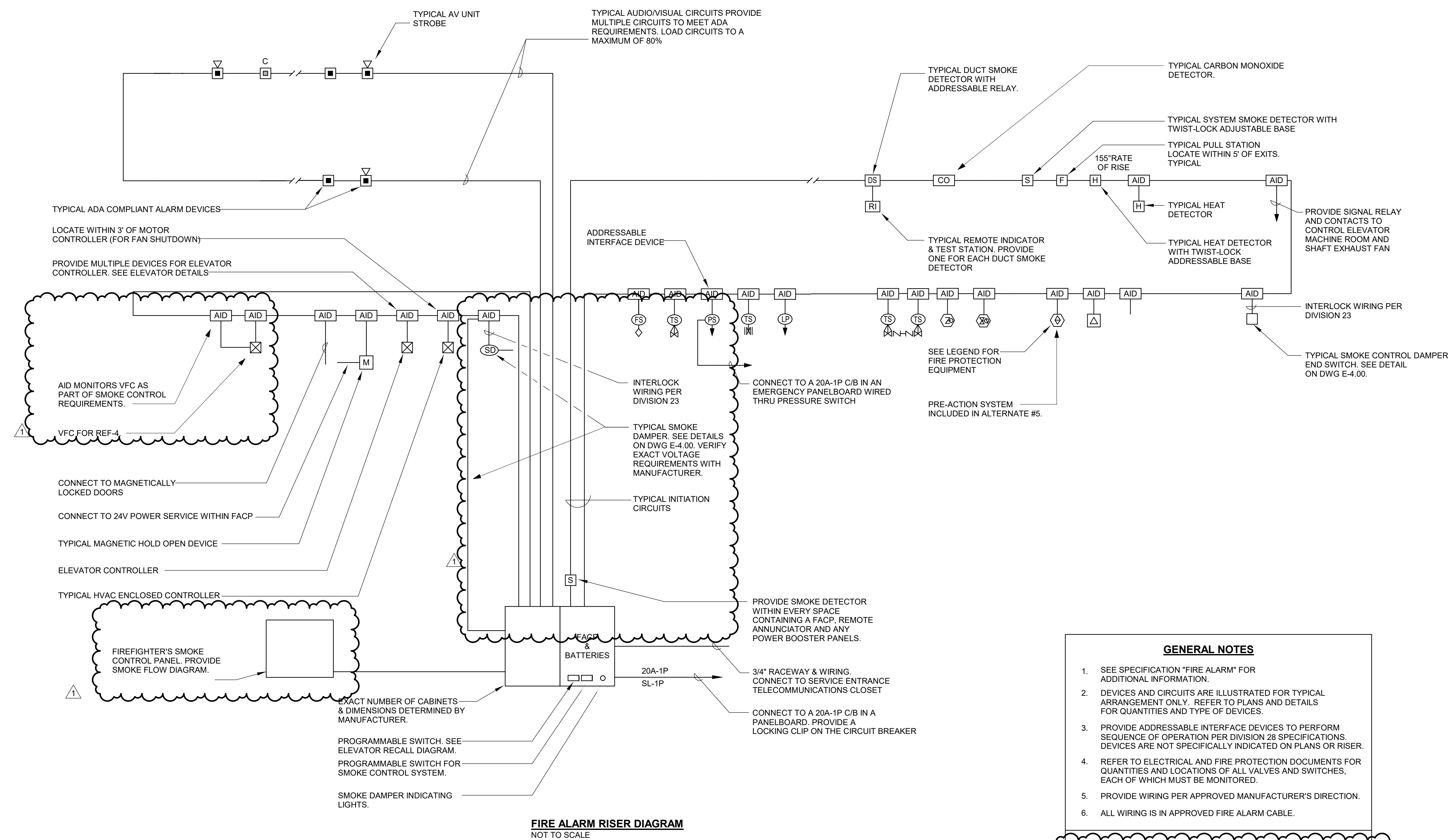
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

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- GENERAL NOTES**
- SEE SPECIFICATION "FIRE ALARM" FOR ADDITIONAL INFORMATION.
 - DEVICES AND CIRCUITS ARE ILLUSTRATED FOR TYPICAL ARRANGEMENT ONLY. REFER TO PLANS AND DETAILS FOR QUANTITIES AND TYPE OF DEVICES.
 - PROVIDE ADDRESSABLE INTERFACE DEVICES TO PERFORM SEQUENCE OF OPERATION PER DIVISION 28 SPECIFICATIONS. DEVICES ARE NOT SPECIFICALLY INDICATED ON PLANS OR RISER.
 - REFER TO ELECTRICAL AND FIRE PROTECTION DOCUMENTS FOR QUANTITIES AND LOCATIONS OF ALL VALVES AND SWITCHES, EACH OF WHICH MUST BE MONITORED.
 - PROVIDE WIRING PER APPROVED MANUFACTURER'S DIRECTION.
 - ALL WIRING IS IN APPROVED FIRE ALARM CABLE.
- SMOKE CONTROL SEQUENCE OF OPERATION:**
- PROVIDE H-D-A IN FIREFIGHTER'S SMOKE CONTROL SYSTEM TO CONTROL REF-4, RTU-3 TO SHUT DOWN UPON ACTIVATION OF RESPECTIVE DUCT SMOKE DETECTOR. RTU-3 TO STAY ON IF DUCT SMOKE DETECTOR ASSOCIATED WITH REF-4 IS ACTIVATED. EVEN IF RTU-3 DUCT SMOKE DETECTOR IS ACTIVATED. SEE ALSO SPECIFICATION SECTION 230993-11.

KEY PLAN



PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10/12/2016
DRAWN	MCL
CHECKED	REL
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FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2016_psmc_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/16	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

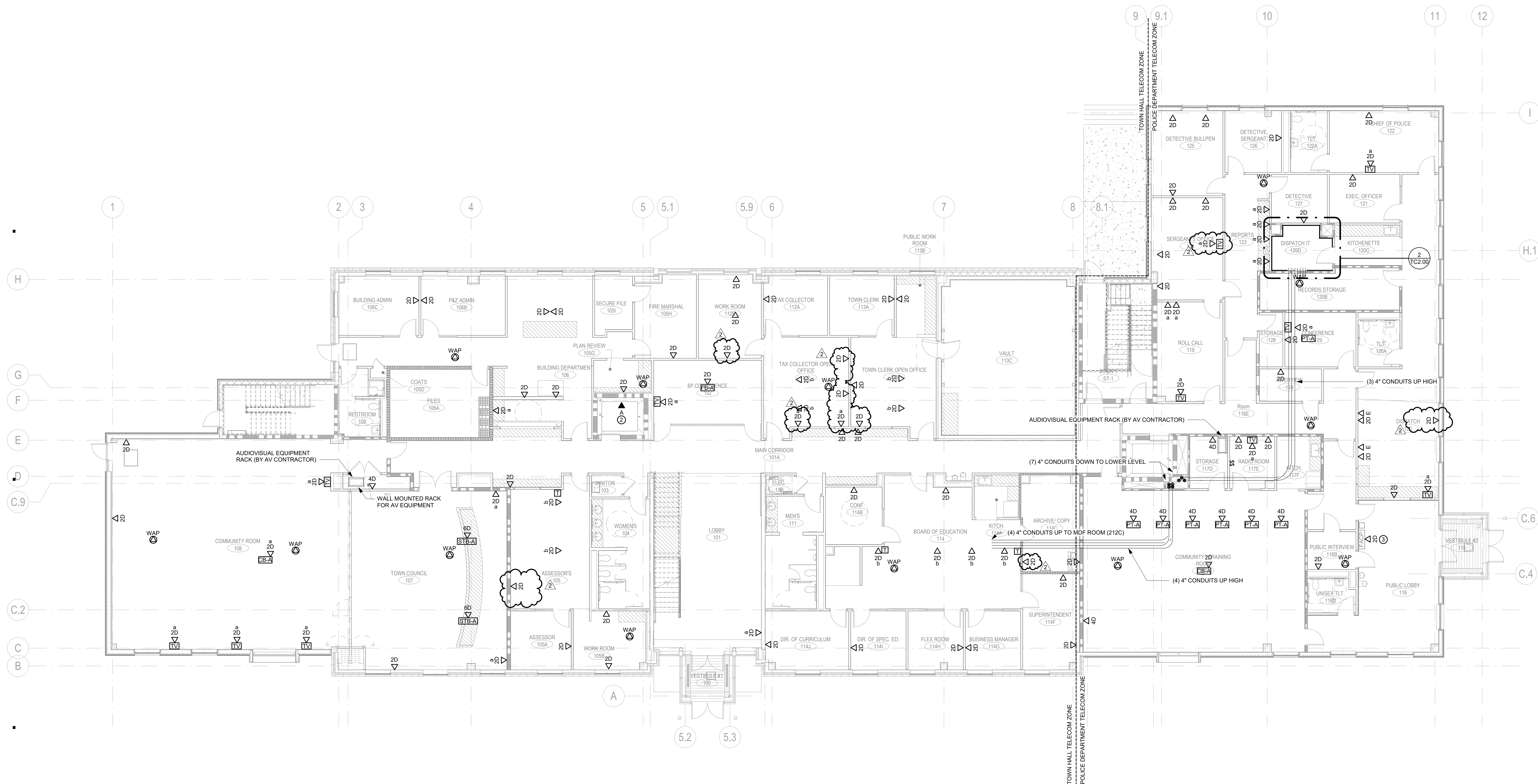
ELECTRICAL FIRE ALARM
RISER DIAGRAM

E3.02

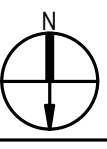
TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



KEY PLAN



PROJECT DATA

PROJECT NUMBER 17041c
CURRENT SUBMISSION DATE 10.12.2018
DRAWN GTG
CHECKED FDZ
SCALE 1/8" = 1'-0"
FILE REFERENCE E:\Revit Local Files\MEP_EAST HAMPTON_TH+PD_2018_jean_bvh.rvt

HISTORY OF SUBMISSIONS

No.	Date	Revision Description
1	11/15/2018	ADDENDUM #1
2	11/16/2018	ADDENDUM #2

COMMUNICATIONS DRAWING NOTES:

- PROVIDE CONNECTION FOR BMS EQUIPMENT. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.
- PROVIDE CONNECTION FOR ELEVATOR. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.
- PROVIDE CONNECTION FOR FIRE ALARM CONTROL PANEL. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.

BIDDING DOCUMENTS

SHEET TITLE

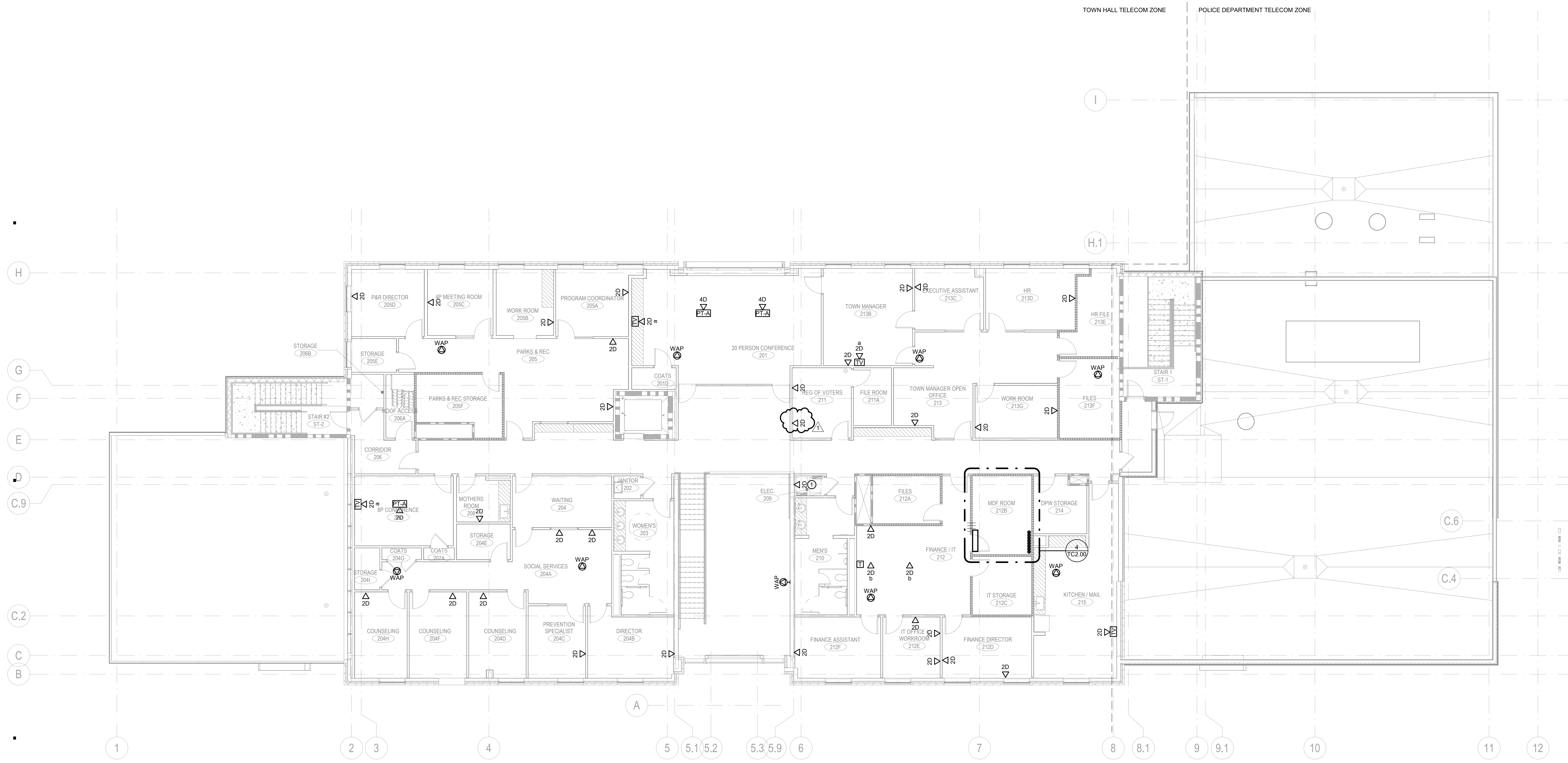
COMMUNICATIONS PLAN - FIRST FLOOR

TC1.02

TOWN OF EAST HAMPTON
TOWN HALL AND POLICE STATION

EDGEWATER HILL
EAST HAMPTON, CT

CONSULTANTS



KEY PLAN

- COMMUNICATIONS DRAWING NOTES:**
- 1 PROVIDE CONNECTION FOR BMS EQUIPMENT. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.
 - 2 PROVIDE CONNECTION FOR ELEVATOR. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.
 - 3 PROVIDE CONNECTION FOR FIRE ALARM CONTROL PANEL. COORDINATE WITH TRADE CONTRACTOR FOR EXACT MOUNTING LOCATIONS.

PROJECT DATA

PROJECT NUMBER	17041c
CURRENT SUBMISSION DATE	10.12.2018
DRAWN	GTG
CHECKED	FDZ
SCALE	1/8" = 1'-0"
FILE REFERENCE	E:\Revit Local Files\MEP_EAST HAMPTON_TH-PD_2018_psm_bvh.rvt

HISTORY OF SUBMISSIONS

Revision		
No.	Date	Revision Description
1	11/16/18	ADDENDUM #2

BIDDING DOCUMENTS

SHEET TITLE

COMMUNICATIONS PLAN - SECOND FLOOR

TC1.03

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Solid-core wood veneer-faced doors for transparent finish.
2. **Bullet Resistant solid-core wood veneer-faced doors for transparent finish.**
3. Factory finishing flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.
5. Light frames and glazing installed in wood doors.

- B. Related Requirements:

1. Section 064023 "Interior Architectural Woodwork" for wood door frames.
2. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door louvers.
5. Door trim for openings.
6. Door frame construction.
7. Factory-machining criteria.
8. Factory- finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.

9. Doors to be factory finished and application requirements.
10. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Louver blade and frame sections, 6 inches long, for each material and finish specified.
4. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Provide labels and certificates from AWI certification program indicating that doors comply with requirements of grades specified.
 - a. Contractor shall register the Work under this Section with the AWI Quality Certification Program at www.awiqcp.org or by calling 855-345-0991.
2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.4 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Doors:

1. Basis-of-Design: Subject to compliance with requirements, provide Marshfield Door Systems Cendura Series doors.
2. Performance Grade:
 - a. ANSI/WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.
 - b. ANSI/WDMA I.S. 1A Extra Heavy Duty: Public toilets, janitor's closets, assembly spaces and exits.
 - c. ANSI/WDMA I.S. 1A Standard Duty: Closets (not including janitor's closets) and private toilets.
3. Architectural Woodwork Standards Grade: Custom.
4. Faces: Single-ply wood veneer not less than 1/50 inch thick.
 - a. Species: Select white birch to match interior wall paneling.
 - b. Cut: To match Baltic birch plywood interior wall paneling.
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: [Center-] Running match.
 - e. Pair and Set Match: Provide for doors hung in same opening.
 - f. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
5. Exposed Vertical Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: 550 lbf in accordance with WDMA T.M. 10.
6. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-1 particleboard.
 - 1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

- 2) Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."
 - b. Glued wood stave.
 - c. WDMA I.S. 10 structural composite lumber.
 - 1) Screw Withdrawal, Door Face: 700 lbf.
 - 2) Screw Withdrawal, Vertical Door Edge: 550 lbf.
 - d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
 - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.
8. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

B. Bullet Resistant Wood Doors:

1. **Basis-of-Design:** Subject to compliance with requirements, provide products by one of the following:
 - a. TSS Bulletproof
 - b. Armortex
 - c. Ceco Door, Assa Abloy
2. **Bullet Resistance rating:** UL 752, Ballistic Level 3.

2.5 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Flush rectangular beads.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated on Drawings.
- D. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Flat.

- E. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
 - 1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

2.6 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
- C. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.

2.7 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 2. Finish faces, all four edges, edges of cutouts, and mortises.
 - 3. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
 - 1. Finish: ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
 - 2. Staining: Match Architect's sample.
 - 3. Effect: Open-grain finish to match interior wall panels.
 - 4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.
 - 1) For factory-finished items, use filler matching finish of items being installed.
3. Install fire-rated doors and frames in accordance with NFPA 80.
4. Install smoke- and draft-control doors in accordance with NFPA 105.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Provide inspection of installed Work through AWI's Quality Certification Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCAWI's "Architectural Woodwork Standards" for the specified grade.
2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 213213 - ELECTRIC-DRIVE, VERTICAL-TURBINE FIRE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes electric-drive, vertical-turbine fire pumps and the following:
 - 1. Full-service fire-pump controllers and automatic transfer switches.
 - 2. Fire-pump accessories and specialties.
 - 3. Pressure-maintenance pumps, controllers, accessories, and specialties.
 - 4. Alarm panels.
 - 5. Flowmeter systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Pump, Equipment, Accessory, Specialty, and Piping Pressure Rating: 175-psig minimum working-pressure rating, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, certified pump performance curves with each selection point indicated, operating characteristics, and furnished accessories and specialties for each fire pump and pressure-maintenance pump.
- B. Shop Drawings: For fire pumps and drivers, fire-pump controllers, fire-pump accessories and specialties, pressure-maintenance pumps, pressure-maintenance-pump controllers, and pressure-maintenance-pump accessories and specialties and underground water storage tanks. Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that fire pumps and drivers and fire-pump controllers, pressure-maintenance pumps, accessories, and specialties will withstand seismic forces defined in Division 21 Section "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

- a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of fire pump and fire-pump controller, signed by product manufacturer.
 - E. Source quality-control test reports.
 - F. Field quality-control test reports.
 - G. Operation and Maintenance Data: For fire pumps and drivers, pressure-maintenance pumps, controllers, accessories and specialties, alarm panels, and flowmeter systems to include in emergency, operation, and maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Source Limitations: Obtain fire pumps, pressure-maintenance pumps, and controllers through one source from a single manufacturer for each type of equipment.
 - B. Product Options: Drawings indicate size, profiles, and dimensional requirements of fire pumps, pressure-maintenance pumps, and controllers and are based on specific systems indicated. Refer to Division 01 Section "Product Requirements."
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - D. Comply with standards of authorities having jurisdiction pertaining to materials, hose threads, and installation.
 - E. Comply with NFPA 20, "Stationary Pumps for Fire Protection," for fire pumps, drivers, controllers, accessories, and their installation.
 - F. The fire pump system shall be guaranteed in writing by the manufacturer for a period of 18 months from the final commissioning of the pump on-site or 12 months from the final completion of the project (whichever is later) against defect in design, material, or construction.
- 1.6 COORDINATION
- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 VERTICAL-TURBINE FIRE PUMPS

- A. The fire-pumping system shall be designed to deliver **750** GPM when operating at 85 PSI using a 50 HP Motor. The pump shall also deliver not less than 150% of rated capacity at a pressure not less than 65% of rated pressure. Motor and pump speed shall not exceed 1750 RPM. Supply power to the system shall be 460 Volts, 3-phase, 60 Hertz. Pump is to be a Peerless Model 10MAF-5, **50** HP pit mounted vertical turbine type for Fire Pump service. Constructed in accordance with NFPA-20, UL 448 and approved by U.L. and F.M.
- B. The water supply for the fire pump shall be from an Underground concrete tank of 50,000 gallons.
- C. The total installed length of the pump from bottom of baseplate to bottom of suction inlet manifold shall be 20 feet. The pump discharge head assembly shall be cast iron and fitted with a discharge connection machined to ANSI 125 rating dimensions. The pump discharge head shall provide rigid mounting support for the complete pump assembly and for the vertical hollow shaft motor. The pump line shaft bearings shall be water lubricated by the water being pumped.
- D. Pump column pipe shall be in sections not longer than 10 feet each. Pump bowl assemblies shall include cast iron enameled bowls, cast bronze impellers and bowl lateral seal rings. Pump bowl assemblies shall be submerged as recommended in NFPA Pamphlet 20. Each pump shall be installed with a cast or fabricated nonferrous metal strainer having a free area of not less than four times the suction inlet area. Strainer openings shall be sized to restrict the passage of objects one-half inch sphere size.
- E. The pump driver shall be a vertical hollow shaft induction motor of horsepower shown on drawings. The motor locked rotor current shall not exceed the values stated in NFPA Pamphlet 20. The motor shall be constructed so that the total hydraulic and static thrust of the pump's rotating assembly can be carried by the motor thrust bearings. The motor shall mount directly on the pump discharge head assembly with a registered fit for correct shaft alignment. The motor shall be equipped with a top drive coupling and nut for axial adjustment of the pump impellers and shall have a non-reverse ratchet to prevent pump back-spin.
- F. The pump manufacturer shall furnish piping accessory items for the pump installation which will adapt the pump connections to the fire protection system and test connections as follows: Fire pump fittings which are subjected to pump discharge pressure shall be ANSI 125-pound rating.
- G. Bowls:
1. ASTM A48 Class 30 cast iron, designed for maximum efficiency and long life. Pump shall consist of suction nozzle, bow assembly and discharge case for connecting to the discharge column pipe.
- H. Impellers:
1. ASTM B584-636 bronze, enclosed type with non-overloading characteristics. All water passages shall be smooth surfaces. Impellers shall be fastened to pump shaft by means of ASTM AS62A I 655 collets or ASTM A582-303SS keys.

- I. Bowl Wear Ring:
 - 1. ASTM B144 bronze secured to the bowl with a pressed fit and shall be renewable.
- J. Pump Shaft:
 - 1. Shall be ASTM AS82, Grade 416 stainless steel. Line shaft shall be the same.
 - 2. Coordinate required length of shaft with drawings.
- K. Bottom Bearing:
 - 1. ASTM 8505, alloy 836 bronze sleeve type fully enclosed in bearing shell provided with large grease reservoir. Bearing shall be packed with non-soluble grease or approved equal. A sand collar of ASTM B505-836 bronze shall be provided.
- L. Intermediate Bearing:
 - 1. Furnish at each bowl assembly and shall be ASTM B505, alloy 836 bronze.
- M. Line Shaft Bearing:
 - 1. Synthetic rubber, water lubricated bearings shall be used. The bearing shall be held in an ASTM A48, Class 30 cast iron spider cast integral with pipe coupling and fitted with a bronze bearing retaining ring. Bearings shall have a maximum spacing of 10'0".
- N. Stuffing Box:
 - 1. An ASTM A48, Class 30 cast iron stuffing box shall be provided containing an ASTM B505-836, bronze bearing, graphite impregnated backing with a bleed-off connection and grease lubricating connection to a lantern ring. A bronze, split type packing gland shall be employed. Separator rings shall be furnished between each ring of packing to prolong packing life.
- O. Column Pipe:
 - 1. Shall be ASTM A53 steel pipe having screwed coupled connections. Coordinate required length with drawings and provide required supports.
- P. Discharge Head and Motor Stand:
 - 1. Shall be ASTM A48 Class 30 cast iron, one-piece construction with a circular-mounting base. The top of the discharge head shall be machined with a rabbet fit to facilitate alignment of the motor and pump shaft. The height of the discharge head shall permit coupling the line shaft to the motor drive shaft above the stuffing box. The outlet flange shall be 125 pound ANSI standard flat face.
- Q. Strainer:
 - 1. Bronze basket or cone type strainer is to be provided. The bowls and head shall be hydrostatically tested to twice the shut-off head, but not less than 250 PSI. The pump shall be given a complete laboratory performance test, recording not less than 5 points including shut-off head, dully point and 150% of rated capacity point at a head not less than 65% of rated head. Shut-off head shall not exceed 140% of rated head.
- R. Motor:
 - 1. Motor shall be vertical hollow shaft squirrel cage induction type with non-reverse ratchet and thrust bearings with minimum 2 year bearing life (10-year average) and momentary up-thrust protection.

Motor shall be 50 HP 1750 RPM 460 volts 3 phase, 60 cycle ODP and not exceeding 600 volts. Enclosure shall be weather-protected type 1. The motor shall have a 1.15 service factor, Class B insulation with NEMA design B at design point. The motor locked rotor current shall not exceed the values as stated in NFPA 20.

S. Manufacturers:

1. A-C Pump; ITT Industries.
2. Aurora Pump; Pentair Pump Group.
3. Fairbanks Morse; Pentair Pump Group.
4. Patterson Pump Company.
5. Reddy-Buffaloes Pump Co.
6. Sterling Peerless Pump; Sterling Fluid Systems Group.

2.3 AUTOMATIC FIRE PUMP MOTOR CONTROLLER

- A. The fire pump controller shall be a UL/FM labeled combination manual and automatic type. Provide controller with floor mounted start/stop push buttons, 0-300# pressure transducer, minimum run timer Eaton FT90-40D Reduced Voltage soft start or equal by Firetrol FTA1930/950.
- B. The enclosure NEMA 2 floor mounted and meeting the requirements of the most recently mandated edition of NFPA 20 and shall be listed by Underwriters Laboratories and approved by Factory Mutual.
- C. The withstand rating of the controller shall not be less than 100,000 RMS Symmetrical at 460 volts.
- D. The controller shall include a motor rated combination isolating disconnect switch/circuit breaker, mechanically interlocked and operated with a single, externally mounted handle. When moving the handle from OFF to ON, the interlocking mechanism shall sequence the isolating disconnect switch ON first and then the circuit breaker. When the handle is moved from ON to OFF, the mechanism shall sequence the circuit breaker open first, and then the isolating disconnect switch. The isolating disconnect switch and circuit breaker shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated defeater mechanism.
- E. The controller shall have a minimum running period timer set for ten minutes. Terminals shall be provided to field convert the controller from automatic to manual shutdown.
- F. The controller shall have externally-mounted, individual visual indicators for POWER AVAILABLE, LOW PRESSURE, LOCAL START, REMOTE START, DELUGE VALVE OPEN, PHASE FAILURE, PHASE REVERSAL, INTERLOCK ON, PUMP RUNNING, LOW ROOM TEMPERATURE, and RUN TIMER ON. The controller shall be supplied with duplicate individual PHASE FAILURE, PHASE REVERSAL, PUMP RUNNING, and LOW ROOM TEMPERATURE alarm contacts.
- G. The controller shall have a USB port for recording pressure.
- H. The power transfer switch shall be designed for use with Generator set emergency power source. The power transfer switch shall include a motor rated disconnect/isolating switch capable of interrupting the motor locked rotor current. The disconnect/isolating switch shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated defeater mechanism.
- I. The transfer switch circuitry shall be capable of sensing both the normal power source and the emergency source. The normal power source pick up shall be set at 90% nominal voltage and 95% nominal frequency. All voltage sensing, frequency sensing, and time delays shall be field adjustable. The transfer signal shall be delayed for one second, delaying the transfer and engine start signals so as to override momentary normal power outages.

- J. The transfer switch shall have TRANSFER SWITCH NORMAL, TRANSFER SWITCH EMERGENCY, and EMERGENCY ISOLATING SWITCH OFF pilot lights, TEST, and SILENCE ALARM pushbuttons mounted on the flange of the enclosure. The transfer switch shall be electrically operated and mechanically held, and shall be capable of being operated by a manual transfer mechanism located on the switch.
- K. The transfer switch must be manufactured by the fire pump controller manufacturer and be in the same enclosure and rated for fire service. The maximum width on the fire pump controller shall be 64".

2.4 FIRE-PUMP ACCESSORIES AND SPECIALTIES

- A. Match fire-pump suction and discharge ratings as required for fire-pump capacity rating. Include the following:
 - 1. 1-1/2" automatic air release valve
 - 2. 3-1/2" Discharge pressure gauge
 - 3. 3/4" casing relief valve pilot operated
 - 4. Manifold type hose valve header, 125# flanges with chains and caps, including UL/FM butterfly isolation valve with tamper switch complete with wiring to alarm panel
 - 5. 2 brass 2.5" hose gate valve, NST angle
 - 6. 6" **750** GPM grooved UL/FM flow meter by Global Vision or approved equal, piped back to tank.
 - 7. Piping for the jockey pump, which includes two (2) OS&Y gate valves and a check valve, with necessary tees, elbows, and pipe tapings.
 - 8. Mounting of all named equipment on an open 10" I-Beam structural steel base.
 - 9. All pressure-sensing lines are to be piped in hard type "L" copper or brass IPS piping in Accordance with NFPA 20 guidelines.
 - 10. Wiring between drivers and their controllers is to be in rigid conduit which is countersunk and run through the centers of the inner support members of the skid in accordance with OSHA safety recommendations and to provide the owner with a professionally "finished" appearance to pump house.
 - 11. UL/FM system wafer check valve, UL/FM system butterfly valve complete with tamper switch and wiring to alarm panel by contractor.
 - 12. A water level control system shall be provided and piped installed in the field. Piping shall be installed in the pumps house with final connections by installing contractor. JTC05/10 sensor system with 4 levels for high water, fill valve off, fill valve on, low water level, with additional indication of tank level. A control panel shall be furnished in NEMA 4X in red, with a clear cover mounted in the pump house with local alarms and all remote alarm contacts to duplicate local alarms. Levels to be selected by Engineer.

2.5 PRESSURE-MAINTENANCE PUMPS

- A. The jockey pump is to be a Vertical Submersible Turbine jockey pump with mechanical seal. Designed for 7 GPM at 100 PSI, complete with a 3450 RPM, 3/4 HP motor vertical, and submersible motor. Motor voltage and phase are to be same available power supply same the main fire pump. Grundfos Model 7S07-15 or equivalent. The jockey pump and fire pump shall be of the same manufacturer.
- B. The jockey pump controller is to be UL Listed, complete with pressure transducer, run period timer, fusible disconnect, Hand-Off-Automatic selector switch and a pressure switch in a wall mounted NEMA 2 enclosure. Provide Eaton full voltage jockey pump controller to match available power supply same as the main fire pump or equivalent.
- C. Provide the following items:
 - 1. Running period timer
 - 2. Control circuit transformer
 - 3. Pump operating pilot light

4. Power available pilot light
5. Digital display of pressure

D. Controllers: UL 508; factory-assembled, -wired, and -tested, across-the-line type for combined automatic and manual operation.

2.6 UNDERGROUND WATER TANK

A. Description: Fiberglass Reinforced Plastic (FRP) Tank:

1. Manufacturers:
 - a. Xerxes Corporation or approved equal.

B. Tank Design - Fiberglass reinforced plastic (FRP) tanks:

1. The tank size, fittings and accessories shall be as shown on the drawings.
2. Tank shall be manufactured with structural ribs which are fabricated as in integral part of the tank wall.
3. Tank shall be manufactured with a laminate consisting of resin and glass fiber reinforcement only. No sand/silica fillers or resin extenders shall be used.
4. Tank shall be vented to atmospheric pressure.
5. Tank shall be capable of handling liquids with specific gravity up to 1.1
6. Tank shall be compatible with liquids identified in the manufacturer's standard limited warranty.

C. Loading Conditions - Tank shall meet the following design criteria:

1. Internal Load - Tank shall be designed to withstand a 5-psig (35 kPa) air-pressure test with a 5:1 safety factor.
2. Surface Loads - Tank shall be designed to withstand surface H-20 and HS-20 axle loads when properly installed according to manufacturer's current Installation Manual and Operating Guidelines.
3. External Hydrostatic Pressure - Tank shall be designed for 7 feet (2.1 m) of overburden over the top of the tank, the hole fully flooded, and a safety factor of 5:1 against general buckling.

D. Fire Protection Standby Water Storage Applications:

1. Governing Standards, as applicable:
 - a. ANSI/AWWA D120 - Thermosetting Fiberglass-Reinforced Plastic Tanks.
 - b. American Concrete Institute (ACI) standard ACI 318, Building Code Requirements for Structural Concrete.
 - c. NFPA 22: Standard for Water Tanks for Private Fire Protection.
 - d. NFPA 1142: Standard for Water Supplies for Suburban and Rural Fire Fighting.
 - e. Tank manufacturer shall be recognized by Underwriters Laboratories (UL) as a manufacturer of tanks listed to the UL-1316 standard.
2. Tank Design: Single-Wall or Double-Wall vessel as specified and shown on the Drawings.
 - a. Interstitial Space (Double-Wall Tanks only):
 - 1) The interstitial space between the primary and secondary walls shall be constructed with a glass reinforcement material such as Parabeam, which provides a structural bond between the two tank walls, while creating a defined interstice that allows for free flow of liquid.

- 2) A tank top fitting shall be provided to allow for a monitoring sensor to be installed at the bottom of the interstice.
 - 3) The interstice of the tank shall be designed to withstand 20-psig (138 kPa) pressure.
3. Tank Accessories - Fire Protection Standby Water Storage Applications:
- a. Tank Anchoring:
 - 1) Anchor straps shall be as supplied by tank manufacturer and designed for a maximum load of 25,000 lbs (11340 kg).
 - 2) Galvanized turnbuckles shall be supplied by the tank manufacturer.
 - 3) Prefabricated concrete anchors shall be supplied by the tank manufacturer, designed to the ACI 318 standard, manufactured with 4,000 psi concrete and shall have adjustable anchor points.
 - b. Access Openings:
 - 1) All access openings shall have a diameter of 24 inches or 30 inches, complete with riser, lid and necessary hardware.
 - c. Attached Access Risers:
 - 1) Attached access risers shall be PVC or FRP as supplied by tank manufacturer.
 - 2) Attached access risers shall be 24-inch or 30-inch-diameter
 - 3) Access risers shall be attached to access openings during installation utilizing adhesive or FRP bonding kits as supplied by the tank manufacturer.
 - d. Piping and Fittings:
 - 1) Tank shall be equipped with factory-installed threaded fittings, or pipe stubs.
 - 2) PVC piping shall at a minimum meet the requirements of ANSI Schedule 40.
 - 3) All flanged nozzles shall be flanged and flat-faced, and conform to Class 150 bolting patterns as specified in ANSI/ASME/ B16.5.
 - 4) Carbon steel and stainless steel NPT fittings shall withstand a minimum of 150 foot-pounds (203 NM) of torque and 1,000 foot-pounds (1356 NM) of bending, both with a 2:1 safety factor.
 - e. Manway Openings:
 - 1) The standard manway shall be flanged, 22 inches (559 mm) I.D. and complete with gaskets, bolts and cover.
 - 2) Manway openings shall be designed to withstand 5-psig (35 kPa) test pressure with a 5:1 safety factor.
 - f. Ladders:
 - 1) Ladders shall be the standard FRP ladder as supplied by tank manufacturer.
 - g. Pump Platforms:
 - 1) FRP pump platforms shall be supplied by tank manufacturer.
 - h. Internal Piping
 - 1) All internal piping shall be supplied by tank manufacturer.
 - 2) All FRP nozzles for fire pump supply shall have an anti-vortex plate factory installed.

- i. Suction/Fill tubes:
 - 1) Vertical draft/fill tubes shall be a minimum of PVC SCH 40 or FRP.
 - 2) Vertical draft /fill tubes shall be factory installed.
 - 3) Vertical draft /fill tubes shall terminate 4 inches (102 mm) above the bottom of tank.
 - 4) Vertical draft tubes shall have anti-vortex plate factory installed.

2.7 PRESSURE GAGES

- A. Description: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with range of [0- to 250-psig] [0- to 300-psig] minimum. Include caption "WATER" on dial face.
 - 1. Manufacturers:
 - a. AGF Manufacturing Co.
 - b. AMETEK, Inc.; U.S. Gauge.
 - c. Brecco Corporation.
 - d. Dresser Equipment Group; Instruments Div.
 - e. Marsh Bellofram.
 - f. WIKA Instrument Corporation.

2.8 GROUT

- A. Description: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

2.9 SOURCE QUALITY CONTROL

- A. Test and inspect fire pumps with their controllers according to NFPA 20 for certified shop tests.
- B. Verification of Performance: Rate fire pumps according to requirements indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, concrete bases, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of fire pumps.
- B. Examine roughing-in for fire-suppression piping to verify actual locations of piping connections before fire-pump installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONCRETE BASES

- A. Install concrete bases of dimensions indicated for fire pumps, pressure-maintenance pumps, and controllers. Refer to Division 21 Section "Common Work Results for Fire Suppression."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Cast-in-place concrete materials and placement requirements are specified in Division 03.

3.3 INSTALLATION

- A. Install and align fire pump, pressure-maintenance pump, and controller according to NFPA 20.
- B. Install pumps and controllers to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- C. Set pumps on concrete bases. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.
 - 1. Support pump baseplate on rectangular metal blocks and shims or on metal wedges having small taper, at points near anchor bolts, to provide 3/4- to 1-1/2-inch gap between pump base and concrete base for grouting.
 - 2. Adjust metal supports or wedges until pump and driver shafts are aligned. Verify that coupling faces and pump suction and discharge flanges are level and plumb.
- D. Install discharge piping equal to or greater than diameter of fire-pump nozzles.
- E. Install valves that are same size as piping connecting fire pumps, bypasses, test headers, and other piping systems.
- F. Install pressure gage on fire-pump discharges at pressure-gage tapping.
- G. Support pumps and piping separately so weight of piping does not rest on pumps.
- H. Install piping accessories, hangers and supports, anchors, valves, meters and gages, and equipment supports.
- I. Install flowmeters and sensors where indicated. Install flowmeter-system components and make connections according to manufacturer's written instructions.
- J. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
- K. Install underground water storage tank according to the tank manufacturer's installation manual and operating guidelines in effect at the time of installation.

3.4 ALIGNMENT

- A. Align fire-pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
- B. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
- C. Align piping connections.
- D. Align pump and driver shafts for angular and parallel alignment according to HI 2.4 and to tolerances specified by manufacturer.

3.5 CONNECTIONS

- A. Piping installation requirements are specified in Division 21 Section "Water-Based Fire-Suppression Systems" Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to pumps and equipment to allow service and maintenance.
- C. Connect water supply and discharge piping to fire pumps. Connect water supply and discharge piping to pressure-maintenance pumps.
- D. Connect relief-valve discharge to point of disposal.
- E. Connect flowmeter-system sensors and meters according to manufacturer's written instructions.
- F. Connect controllers to pumps.
- G. Connect fire-pump controllers to building fire-alarm system. Refer to Division 28 Section "Fire Detection and Alarm."
- H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform field tests for each fire pump when installation is complete. Comply with operating instructions and procedures in NFPA 20 to demonstrate compliance with requirements. Where possible, field correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as indicated, then retest to demonstrate compliance. Verify that each fire pump performs as indicated.
- C. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Final Checks before Startup: Perform the following preventive-maintenance operations and checks:
 - a. Lubricate oil-lubrication-type bearings.
 - b. Remove grease-lubrication-type bearing covers, flush bearings with kerosene, and clean thoroughly. Fill with new lubricant according to manufacturer's written instructions.
 - c. Disconnect coupling and check electric motor for proper rotation. Rotation shall match direction of rotation marked on pump casing.
 - d. Verify that pump is free to rotate by hand. If pump is bound or if it drags even slightly, do not operate until cause of trouble is determined and corrected.

3. Starting procedure for pumps is as follows:
 - a. Prime pump by opening suction valve and closing drains, and prepare pump for operation.
 - b. Open sealing-liquid supply valves if pump is so fitted.
 - c. Start motor.
 - d. Open discharge valve slowly.
 - e. Observe leakage from stuffing boxes and adjust sealing-liquid valve for proper flow to ensure lubrication of packing. Do not tighten gland immediately but let packing run in before reducing leakage through stuffing boxes.
 - f. Check general mechanical operation of pump and motor.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Fire hoses are for field-acceptance tests only and are not property of Owner.
6. Underground water storage tank shall be tested according to the tank manufacturer's installation manual and operating guidelines in effect at the time of installation.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire pumps, drivers, controllers, and pressure-maintenance pumps. Refer to Division 01 for additional requirements.

END OF SECTION 213213

10/12/2018

SECTION 230993.11 - SEQUENCE OF OPERATIONS FOR HVAC DDC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. BMS: Building Management System.

1.4 COMMON REQUIREMENTS

- A. The following items are common requirements that apply unless noted otherwise:
 - 1. All setpoints shall be program adjustable at the operator workstation.
 - 2. All high and low limits shall be alarmed.
 - 3. All hydronic proof of flow shall be via differential pressure sensors.
 - 4. All fan proof of operation shall be by current sensors.
 - 5. All unit smoke detection, and emergency shutdown shall be done by hardwired interlock and shall not rely on control system programming.
 - 6. All dampers shall have open and close status indication through end switches or integral actuator feature.
 - 7. For all rooftop units, provide optimum morning warm-up. Prior to normal occupancy, the DDC system shall initiate optimum warm-up mode to bring spaces to normal operating conditions. When space setpoints are achieved, the system through the DDC shall switch to normal occupied mode. Optimal start program shall "learn" from previous days and shall fine tune based on outside air temperature.

1.5 HEATING HOT WATER BOILER PLANT

- A. General Description:
 - 1. Two hot water boilers (B-1 and B-2) with a main primary pump (HWP-1) and standby primary pump (HWP-2) on VFDs will provide heating hot water for: cabinet unit heaters, unit heaters, VAV boxes and snow melt system. The boilers are 100% redundant, in case of a unit failure.
- B. Fail Safe Mode:
 - 1. Where wired to the BMS system, all outputs will be wired to normally closed relays so that upon failure of the BMS system, the boilers and hot water pumps will be enabled.

C. Operation:

1. The hot water plant shall be available for system operation at all times.
2. When the hot water plant is enabled:
 - a. The heating hot water primary loop pump will be enabled.
 - b. The boilers will be enabled to operate based upon an outdoor reset schedule.
3. When the hot water plant is disabled:
 - a. Both boilers are disabled and after a 5-minute delay, the primary heating hot water pumps HWP-1 and HWP-2 will be disabled.
4. Hot Water Reset Schedule:
 - a. The BMS will enable the boilers to maintain the following heating supply water temperature in the primary hot water loop:
 - 1) OAT at 20 deg. F; heating water setpoint at 150 deg. F.
 - 2) OAT at 55 deg. F; heating water setpoint at 120 deg. F.
 - 3) Heating water setpoint limited to a maximum of 150 deg. F and a minimum of 120 deg. F.
 - 4) All setpoints are field adjustable via BMS graphics.
 - a) These setpoints will be sent to the boiler controls located in the "Master" boiler via the network connection and the boiler controls will stage the boilers as needed (including modulation) to maintain the setpoint.
5. Heating Hot Water Primary Pumps (HWP-1 and HWP-2):
 - a. The lead primary pump will be enabled when the hot water plant is enabled.
 - b. The speed of the pumps via the VFD will be modulated to maintain a differential pressure setpoint in the piping system (initially set at 15 psi, to be determined by the Balancing Contractor, field adjustable).
 - c. A minimum speed will also be set (with the Balancer) to maintain a minimum flow through the boilers at all times.
 - d. Whenever the VFC is at minimum speed and all differential pressure sensors are above setpoint, the bypass valve shall modulate open to maintain setpoint at the lowest differential pressure sensor.**
 - e. Upon failure of the lead pump, as determined by Hz feedback of the VFD not matching speed command or measured differential pressure less than 5 psi, the lead pump will be disabled and the lag pump will be enabled.
 - f. Once a week, the lead pump will be changed to the pump with the lowest amount of actual run time.
6. Points List:
 - a. Pump VFDs:
 - 1) Hardwired control for:
 - a) Start/Stop.
 - b) Speed command (0-10 vDC).
 - c) Frequency feedback (Hz).
 - b. Boilers:

- 1) Supply Water Temperature.
- 2) Return Water Temperature.
- 3) Hardwired control for:
 - a) Start/Stop.
 - b) Alarm relays.

7. Alarms:

- a. Boiler 1: Alarm output from Boiler 1 controls (warning).
 - b. Boiler 2: Alarm output from Boiler 2 controls (warning).
 - c. Both boilers in alarm (critical).
 - d. Pump 1 Failure: Warning.
 - e. Pump 2 Failure: Warning.
 - f. Lead Pump Failure: Warning.
 - g. Lag Pump Failure: Warning.
 - h. Both Lead and Lag Pump Fail: Critical.
 - i. Heating Hot Water Plant Issue: OAT less than 50 deg. F and heating hot water temperature less than 95 deg. F.
 - j. Heating Hot Water Pump Issue: OAT less than 50 deg. F and primary loop pressure less than 5 psi.
8. All fossil fuel burners in the mechanical room will be provided with a safety shutoff switch located outside of the mechanical room.

1.6 VAV BOXES WITH HOT WATER REHEAT

A. General:

1. VAV box with damper and velocity pressure sensor.
2. BACnet VAV box controller with damper mode.
3. Wall sensor (with CO₂ where shown).
4. Hot water reheat valve.

B. Control Mode: The unit will be indexed to occupied mode based upon the floor/building schedule. Every VAV box associated with a particular HVAC unit will switch to occupied mode at the same time the rooftop unit is switched to occupied mode (or started for any reason). In addition, all VAV boxes associated with an HVAC unit will switch to occupied mode whenever the supply duct static pressure for the unit is greater than 0.50" wg.

C. Setpoints: Each VAV box will have the following setpoints (shown on the graphics pages and adjustable with the proper password level):

1. Unoccupied heating (default 58 deg. F).
2. Occupied heating (default: 70 deg. F).
3. Occupied cooling (default 74 deg. F).
4. Unoccupied cooling (default 80 deg. F).

D. Emergency Modes: If the associated rooftop unit is placed into an emergency mode (see rooftop sequence - these modes are entered manually only), the VAV box will be overridden as follows for as BACnet as the emergency mode is effective:

1. Pressurize: All VAV box dampers to full open.
2. Purge: All VAV box dampers to full open.
3. Shutdown: All VAV boxes dampers to full closed.

E. Unoccupied Mode:

1. The VAV box damper will close.
 2. If the space temperature drops below the unoccupied heating setpoint, the hot water valve will open and the damper will move to the reheat CFM setpoint (with no airflow, this will be 100% open).
 3. If the RTU is not operating, the reheat coil will not provide heat to the space (no air movement through coil). See the RTU unit sequence for RTU unoccupied heating.
 4. If the space temperature rises above the unoccupied cooling setpoint, the damper will modulate open to the maximum CFM position (100% open with no airflow). If the RTU unit is not operating, the VAV box will provide no cooling to the space (no air movement). See the RTU unit sequence for RTU unoccupied cooling.
- F. Occupied Mode: The unit will operate to maintain the space occupied heating and cooling setpoints.
1. The VAV box has a software input that will receive the supply air temperature from the RTU unit via the network. If the rooftop unit is making warm air (above 75 deg. F), the VAV damper will be indexed to the heating mode. The RTU will be set for supply air tempering (see VAV rooftops) and the damper will modulate based open to its heating CFM setpoint when the room air temperature is below the heating setpoint.
 2. If the rooftop unit is not making warm air (below 75 deg. F), the VAV damper will be indexed to the cooling mode, and the VAV box damper will modulate open to its maximum cooling CFM setpoint when the room air temperature is above the cooling setpoint and modulate to its minimum CFM setpoint when the room air temperature setpoint falls below the cooling setpoint.
 3. If the VAV box is in the cooling mode, and the space temperature drops below the heating setpoint, the VAV box damper will control to the reheat CFM setpoint and modulate the reheat valve open.
 - a. For VAV boxes without a CO₂ sensor, the VAV box will have a minimum CFM setting that will apply whenever the VAV box is in the occupied mode.
 - b. For VAV boxes with a CO₂ sensor, the minimum CFM setpoint will vary based upon the CO₂ level in the room (if the sensor is included for that VAV box).
 - 1) If the CO₂ level is at or below the low CO₂ level (1000 - adj.), the box min. flow setpoint will be at the "Min. CFM Setpoint - Low CO₂ Level" setting.
 - 2) As the CO₂ level rises above the minimum CO₂ level setpoint, the box min. flow setpoint will modulate up until at the "Max. - CFM Setpoint High CO₂ Level." It will be at the "Max. - CFM Setpoint High CO₂ Level" when the CO₂ level is 150 ppm (adj.) above the CO₂ setpoint.
 4. Alarms: An alarm will be generated at the BMS front end for a VAV box if:
 - a. Loss of communication with a VAV box (warning).
 - b. Space temperature sensor failure (warning).
 - c. Invalid setpoints (heating higher than cooling for example) (warning).
 - d. Damper failure.
 - e. Reheat control valve failure.
 - f. CO₂ level is above 1500 ppm (adj.); when CO₂ sensor is associated with VAV box.
- G. BMS Monitoring: The BMS system will monitor the following:
1. Supply air temperature from VAV box (after reheat coil): Monitor and trend.
 2. Space Temperature: Monitor and trend.
 3. CFM Setpoint and Measured CFM: Monitor and trend.
- H. Points List:
1. System graphic.
 2. Room/area served.
 3. Air damper position as percent open.

4. Control valve position as percent open.
5. Space CO₂. (where shown)

1.7 VAV ROOFTOP UNITS

A. General: Variable Air Volume Rooftop Units (RTU-1, RTU-2 and RTU-3) will have:

1. Factory installed control package with:

- a. Factory installed BACnet communication card.
- b. Factory installed return air, outside air, mixed air, and supply air temperature sensors.
- c. Factory installed return air and outside air humidity sensors (enthalpy).
- d. Factory installed supply duct static pressure sensor.
- e. Factory installed indoor/outdoor differential pressure sensor.
- f. Factory installed building static pressure sensor.
- g. Field provided and installed return air duct CO₂ sensor.
- h. Field wired emergency shutdown terminals.
- i. Field provided and installed filter pressure drop sensors.
- j. Field provided and installed supply air humidity sensors.

B. Sequence of Operation:

1. In general, the unit will operate based upon its factory-installed controls, based upon setpoints provided over the BACnet network from the BMS system. The RTU will be setup for:

- a. DAC (Discharge Air Control) Profile.

C. Emergency Shutdown:

1. Emergency shutdown terminals on the units will be wired in series to normally closed contacts in the following devices, so that in any one of these devices goes into the alarm, the RTU will go into emergency shutdown mode:

- a. Fire alarm module.
- b. Duct smoke detector auxiliary contacts.

2. Activation of the unit E-Stop (Emergency Stop) terminals and will override all other inputs to the RTU and turn the unit off.

D. The rooftop unit will receive the following setpoints from the BMS system:

1. ApplicMode: To command unit to the following modes:

- a. Off (not used).
- b. Heating mode.
- c. Cooling mode.
- d. Auto mode (not used).
- e. Fan only mode.

2. BldgStaticSP: Building static pressure setpoint.
3. DACISP: Discharge air temperature setpoint (cooling mode).
4. DAHtSP: Discharge air temperature setpoint (heating mode).
5. DuctStaticSP: Duct static pressure setpoint.
6. EmergOverride: Emergency override (manual command from BMS graphics only, not used in control logic): To command unit to the following modes:

- a. Normal, Pressure Bldg, Purge Bldg, or Shutdown.
7. Min. OA damper position.
 8. Occupied/Unoccupied mode command.
 9. NOTE: Upon loss of communications with the BMS system, the RTU will automatically default to the settings set into the RTU controls. Thus at the commissioning stage, reasonable setpoints should be entered into the RTU keypad (by ATC contractor) to allow operation of the unit if there is a communications failure.
 10. Points List: The BMS system will monitor the following outputs from the RTU over the BACnet network and monitor points labeled as VIA BMS through a DDC Controller Mounted inside the unit.
 - a. RTU Supply Fan ON-OFF Status.
 - b. RTU Supply Fan VFD Command.
 - c. RTU Supply Fan VFD Fault.
 - d. RTU Return Fan ON-OFF Status.
 - e. RTU Return Fan VFD Command.
 - f. RTU Return Fan VFD Fault.
 - g. Relief/Exhaust Damper Command/Status.
 - h. Space Static Pressure.
 - i. Space Static Pressure Setpoint.
 - j. Outside Air Damper Command.
 - k. Outside Air Damper Status.
 - l. Discharge Air Static Pressure.
 - m. Discharge Air Pressure: Low Pressure Alarm Setpoint and Alarm Status.
 - n. Discharge Air Pressure: High Pressure Alarm Setpoint, and Alarm Status.
 - o. Discharge Air Static Pressure High/Low Alarm (via BMS).
 - p. Return Air Temperature.
 - q. Return Air Relative Humidity.
 - r. Mixed Air Temperature.
 - s. Discharge Air Temperature.
 - t. Discharge Air Relative Humidity (via BMS).
 - u. Space Temperature (via BMS).
 - v. Return Air CO₂.
 - w. Heat Command.
 - x. Cooling Command.
 - y. Fire Alarm Shutdown (E-STOP).
 - z. Unit Low Temperature Shutdown.
 11. The BMS system will calculate for all the VAV boxes associated with a particular RTU the following values (note: all include/exclude parameters are entered from the graphics on the BMS page, and at startup all these parameters will be set to "include"). These include/exclude parameters allow the building operators to fine-tune the building operation:
 - a. Average Space Temperature:
 - 1) Any space temperature can be included or excluded in this calculation.
 - b. Average "Distance from Setpoint" equal to space temperature less active setpoint for each VAV box, averaged.
 - 1) Any VAV box can be included or excluded in this calculation.
 - c. Average Maximum Damper Position:
 - 1) Any VAV box can be included or excluded in this calculation.
 - d. Highest Maximum Damper Position:

- 1) Any VAV box can be included or excluded in this calculation.
- e. Highest Space Temperature:
 - 1) Any VAV box can be included or excluded in this calculation.
- f. Lowest Space Temperature:
 - 1) Any VAV box can be included or excluded in this calculation.
12. The RTU will be switched between the occupied mode and unoccupied mode based upon the floor/RTU/building schedule:
 - a. Unoccupied Mode:
 - 1) The RTU mode is switched to HVAC_OFF and Man_Occ_Mode=Off.
 - 2) The MIN_OA_FLOW/Damper position is set to 0.
 - 3) This will turn the unit off and close the outside air dampers.
 - 4) If the average low space temperature falls below 58 deg. F, the BMS will:
 - a) Switch the VAV boxes for this rooftop to occupied mode.
 - b) Switch the unit to Man_Occ_Mode=ON and Application Mode=HVAC_Heat.
 - c) The supply air setpoint for heating will follow the normal daytime logic.
 - d) Leave the MIN_OA_FLOW/Min_Damper_Position set to 0.
 - e) When the average low space temperature rises 5 deg. F above the enable setpoint, the RTU will be return to the unoccupied Mode.
 - 5) If the average high space temperature rises above 80 deg. F (adj. per RTU) and the average low temperature is above 70 deg. F, the BMS will:
 - a) Switch the VAV boxes for this rooftop to occupied mode.
 - b) Switch the unit to Man_Occ_Mode=ON and Application Mode=HVAC_Cool.
 - c) The supply air setpoint for cooling will follow the normal daytime logic.
 - d) Leave the MIN_OA_FLOW/Min_Damper_Position set to 0. (Note: Unit will still economize if required.)
 - e) When the average high space temperature falls 5 F below the enable setpoint, the RTU will be return to the unoccupied mode.
 - b. Warm-Up Mode:
 - 1) The warm-up mode applies to:
 - a) Modulating gas heat.
 - c. The RTU will be enabled upon an optimum start logic module, with 'self-learning" capability to determine the minutes per degree it takes to heat the building. The optimum start module will start the unit early enough to bring the average space temperature to a target space temperature (70 deg. F heating, adjustable) at the actual occupancy time. When the unit heats, the logic will NOT use the RTU morning warm-up logic (which drives the fan to 100%), but will use the air tempering feature and the supply air.
 - d. Setpoint will be set based upon the occupied discharge air heating setpoint reset schedule. During this mode the fan will continue to modulate based upon duct static pressure.
 - e. During warm-up, the MIN_OA_FLOW/MIN_OA_DAMPER_POS parameter will be set to 0 so that the warm-up with occur without bringing in outside air.

f. Occupied Mode:

1) At the actual start time for the occupied mode, or based upon a request for a timed override from the BMS front end regardless of the status of the warm-up cycle, the unit will be switched to occupied mode as follows:

- a) Man_Occ_Command will be set to occupied.
- b) Minimum outside air volume control will be as follows:

- NOTE: If required for economizer operation the RTU will automatically open the outside air damper more than the minimum shown below for free cooling.
- Modulate the MIN_OA_DAMPER setpoint sent to the RTU based upon a reset schedule as follows (each rooftop will have its own schedule, adjustable from the graphics) based upon the return air CO₂.
- CO2 Level OA Flow:
 - 850 ppm min./min. OA flow in RTU schedule.
 - 1150 ppm min./max. OA flow in RTU schedule.
- Duct Static Pressure Control:
 - Each RTU will have a minimum duct static pressure setpoint (default 0.5" wg, adjustable) and a maximum duct static pressure setpoint (default 2.0" wg, adj.).
 - Whenever the RTU fan is off, the active duct static pressure will be set to the minimum setpoint.
 - If the fan is on, the BMS will change the active duct static pressure setpoint once every 15 minutes based upon the maximum damper position as follows:

Maximum Damper Position	Change
Greater than 95% (adj.)	Add 0.1" wg to active SP
Less than 80% (adj.)	Subtract 0.1" wg from active SP

- The active duct static pressure setpoint will always stay between the minimum and maximum limits.
- The BMS will send the active duct static pressure setpoint to the RTU unit (DuctStatSP) and the rooftop unit controls will modulate the VFD to maintain this setpoint.
- Building Pressurization Control:
 - Each RTU will have a fixed building static pressure setpoint, adjustable from the BMS graphics (default: 0.05" wg). This value will be passed to the RTU via the BACnet network (BldgStatSP) and the RTU controls will control the exhaust damper to maintain this setpoint.
- Heat/Cool Control:
 - The BMS system will monitor the average distance from setpoint for each RTU. If this value falls below -1 deg. F (adj.), the unit will switch the heating mode (ApplMode=Heat). When this value rises above 0 deg. F (adj. per RTU) above this setpoint, the unit will switch to cooling mode (AppliMode=Cool).

- The heat/cool control is weighted towards cooling.
 - Supply Air Temperature Setpoint: Heating Mode:
 - The BMS system will calculate a desired supply air temperature for the rooftop unit when it is in heating mode based upon the average distance from setpoint in a reset schedule (adjustable) as follows:

-2 deg. F	85 deg. F
-4 deg. F	95 deg. F
 - NOTE: If the RTU is in cooling, this setpoint is ignored by the RTU.
 - This setpoint is passed to the RTU as DAHtSP.
 - The RTU controls will then operate the unit to maintain this supply air temperature setpoint, including modulating gas heat.
 - Supply Air Temperature Setpoint Cooling Mode:
 - The BMS system will calculate a desired supply air temperature for the RTU when it is in cooling mode based upon the average distance from setpoint in a reset schedule (adjustable per RTU) as follows:

<u>Average Distance from Setpoint</u>		<u>Cooling SAT Setpoint</u>
0 deg. F		68 deg. F
2 deg. F		55 deg. F
 - NOTE: If the RTU is in heating, this setpoint is ignored by the RTU.
 - This setpoint is passed to the RTU as DACISP.
 - The RTU controls will then operate the unit to maintain this supply air temperature setpoint, including operating the economizer and staging the compressors as needed.
- E. BMS Monitoring: The BMS system will monitor all the points listed above from the RTU via the BACnet network following and take the defined actions:
1. Loss of Communications: Critical alarm.
 2. Any Emergency Mode: Critical alarm.
 3. The RTU alarm message does not equal 'normal', or the common alarm point is TRUE, generate a warning.
 4. If the ApplMode (output) does not match ApplMode (input) (warning).
 5. Duct CO₂ Sensor reads above 1400 ppm or below 200 ppm to indicate CO₂ sensor failure.

1.8 STANDALONE MINI-SPLIT SYSTEMS (ACU/CU-1, 2, 3)

- A. Each mini-split system will be controlled by its own, factory provided controls, including thermostat and will operate with setpoints and schedules entered into the mini-split control system.
- B. The BMS will monitor the space temperature in each room served by these units and alarm upon a high or low temperature condition (adj. setpoints).
- C. ACU-1/CU-1 and ACU-2/CU-2 are 100% redundant, in case of a unit failure.

1.9 EXHAUST FAN CONTROL

- A. Each of the following roof exhaust fans will have a time of day schedule and will be turned on during occupied mode and turned off during unoccupied mode. The motorized damper will be commanded to open and an end switch on the damper motor will start the fan once the damper is actually open.
 - 1. REF-1, REF-2, REF-3
- B. All of these fans will be monitored with an current sensor and an alarm will be generated if:
 - 1. Fan draws current when it is disabled.
 - 2. Fan does not draw current when it is enabled.
- C. Points List:
 - 1. Unit identification.
 - 2. Fan status.
 - 3. Damper end switch status.

1.10 CELL AREA SMOKE CONTROL EXHAUST SYSTEM

- A. In normal operating mode, roof exhaust fan (REF-4) shall operate at the lower specified airflow. The system shall operate 24/7.
- B. If smoke is detected by the duct smoke detector, the roof exhaust fan shall ramp up (via VFC) to the higher specified airflow to maintain a minimum of .05" W.C. pressure difference between the cell area and adjacent Staff Entry corridor. An alarm shall be generated.
- C. Control during the operation of the smoke control exhaust system shall continue to operate until manually reset at the smoke control system panel located in the Public Lobby.
- D. The fan will be monitored **by fire alarm system** with a current sensor and an alarm will be generated if:
 - 1. Fan does not draw current when enabled.
- E. **Special Inspection:**
 - 1. **In addition to the ordinary inspections and test requirements, the smoke control system shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition.**
- F. Points List:
 - 1. Unit identification.
 - 2. Fan status.
 - 3. Fan speed.
 - 4. VFC fault.
 - 5. Alarm condition.

1.11 SALLYPORT VEHICLE EXHAUST MONITORING SYSTEM

- A. General: The system will consist of a ventilation air duct with motorized damper, 2-speed roof exhaust fan (REF-5) with motorized damper, carbon monoxide and nitrogen dioxide sensors with control panel. The system will operate 24/7.

- B. In normal operating mode, motorized damper on the ventilation air duct shall open to allow min. CFM of outside air (as scheduled) and motorized damper on roof exhaust fan shall open to allow min. CFM of exhaust air (as scheduled).
- C. In emergency mode, when 25 ppm or more of carbon monoxide is detected at CO sensor or 1.25 ppm or more of nitrogen dioxide is detected at NO2 sensor, control panel shall command motorized damper on the ventilation air duct to modulate to allow max. CFM of outside air (as scheduled) and motorized damper on roof exhaust fan to modulate to allow max. CFM of exhaust air (as scheduled).
- D. When less than 25 ppm of carbon monoxide or 1.25 ppm of nitrogen dioxide is present, the reverse shall occur, and the system shall operate in normal mode.
- E. The fan will be monitored with a current sensor and an alarm will be generated if:
 - 1. Fan does not draw current when enabled.
 - 2. Motorized damper on ventilation air duct or roof exhaust fan is not open.
- F. BMS will generate alarm when:
 - 1. CO sensor measures above 25 ppm or NO2 sensor measures above 1.25 ppm for more than 15 minutes.
 - 2. CO sensor measures above 50 ppm or NO2 sensor measures 2.5 ppm for more than 5 minutes.
 - 3. CO sensor measures 200 ppm or NO2 sensor measures 10 ppm or greater.
- G. Points List:
 - 1. Unit identification.
 - 2. Fan status.
 - 3. Damper end switch status.

1.12 STANDALONE PUMP HOUSE EXHAUST FAN CONTROL

- A. In-line exhaust fan (EF-1) will have a reverse acting thermostat as an input to the fan directly. The fan shall be enabled when the space temperature rises above 80 deg. F. (adj.) The motorized damper on the exhaust duct and motorized damper on the outside air duct will be commanded to open. An end switch on each of the damper motors will start the fan once the dampers are actually open.
- B. The BMS will monitor the space temperature and alarm upon a high or low temperature condition (adj. setpoints).

1.13 UNIT HEATERS (HOT WATER)

- A. **Each unit heater will have a factory provided, unit-mounted thermostat, a strap on aquastat, and a two way control valve.**
- B. **Upon a fall in space temperature below the setting on the unit-mounted thermostat (65 deg. F, adj.), the fan will start, subject to the strap on aquastat.**
- C. **The normally open control valve shall open and cycle to satisfy space temperature.**
- D. There is no control or monitoring by the BMS system for these devices.

1.14 UNIT HEATERS (ELECTRIC)

- A. Each unit heater will have a factory provided, unit-mounted thermostat.
- B. Upon a fall in space temperature below the setting on the unit-mounted thermostat (65 deg. F, adj), the fan will start and electric heating shall be energized.
- C. There is no control or monitoring by the BMS system for these devices.

1.15 CABINET UNIT HEATERS (HOT WATER)

- A. Each cabinet unit heater will have a factory provided remote, wall-mounted thermostat, a field provided aquastat, and a two way control valve.**
- B. Upon a fall in space temperature below the setting on the wall thermostat (65 deg. F, adj.), the fan will start subject to a strap on aquastat.**
- C. The normally open control valve shall open and cycle to satisfy space temperature.**
- D. There is no control or monitoring by the BMS system for these devices.

1.16 CEILING UNIT HEATERS (ELECTRIC)

- A. Each ceiling unit heater will have a factory provided, unit mounted thermostat.
- B. Upon a fall in space temperature below the setting on the unit-mounted thermostat (65 deg. F, adj), the fan will start and electric heating shall be energized.
- C. There is no control or monitoring by the BMS system for these devices.

1.17 REMOTE SMOKE DAMPER

- A. Smoke Damper Control: Duct smoke detectors, when products of combustion are detected in airstream and/or upon signal from fire alarm system:
 - 1. Close smoke damper.
 - 2. Monitor smoke damper open and closed positions through damper end switches. In the event damper closes in a non-alarm condition, stop associated RTU supply and/or return fan.
- B. Points List
 - 1. Unit identification.
 - 2. Smoke damper position-open/closed.

1.18 SNOW MELTING SYSTEM (SMP-1 and SMP-2, GMU-1, HX-1)

- A. System Description:
 - 1. Hot water is provided from the building boiler (B-1/B-2). The boiler hot water is run through a plate frame heat exchanger (HX-1). The snow melt side of the system uses distribution pumps (SMP-1 and SMP-2) to deliver a 40% glycol hot water solution to all snow melt loops in the Sallyport ramp.

- B. System Operation: The snow melt system shall be provided with packaged controls, furnished by snow melt system vendor. See Specification Section "238317 Snow Melting Hydronic System" for additional information on packaged controls.
1. Packaged controls will monitor outside air and water temperature sensor, located in slab within snow melt area.
 2. Packaged controls shall send information to BMS via BACnet MS/TP.
 3. Upon signal from remote temperature sensor or manual over-ride at Operator workstation, snow melt system shall open boiler side control valve at snow melt system heat exchanger (HX- 1) to energize snow melt distribution pump (SMP-1/SMP-2) and increase snow melt supply glycol hot water temperature. Modulate three-way mixing valve to maintain consistent temperature difference between supply and return temperatures until the supply temperature reaches setpoint.
 4. System shall operate until slab temperature reaches setpoint and the moisture indicator is satisfied, or manually shut down through the BMS over-ride. When setpoint is reached, the control valve on the heat exchanger (HX-1) shall close and pump (SMP-1/SMP-2) shall de-energize.
- C. Snow Melt Hot Water Distribution Pumps (SMP-1 and SMP-2): Pumps shall operate on a run/stand-by sequence with automatic changeover, according to the following schedule:
1. Pumps shall be enabled at all times during snow melt heating season. Snow melt heating season shall enable at 40 deg. F. outside air temperature and lower (adj.).
 2. Start lag pump automatically upon failure of lead pump and signal alarm.
 3. Duty cycle lead/lag pumps based on run time.
- D. Glycol Make-Up Unit (GMU-1): Packaged pump shall cycle glycol mixture into glycol hot water solution.
- E. Points List:
1. System graphic.
 2. Manual over-ride on/off.
 3. Boiler side supply hot water temperature.
 4. Boiler side return hot water temperature.
 5. Boiler side hot water control valve command.
 6. Boiler side hot water control valve position.
 7. Snow melt side supply glycol hot water temperature.
 8. Snow melt side supply glycol hot water temperature setpoint.
 9. Snow melt side return glycol hot water temperature.
 10. Snow melt side supply glycol hot water temperature alarm.
 11. Snow melt pump operating status. (typ. of 2)
 12. Snow melt pump start/stop. (typ. of 2)
 13. Glycol make-up unit pump start/stop.
 14. Glycol make-up unit alarm.
 15. Low glycol alarm.
 16. Outside air temperature (global).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230993.11
10/12/2018

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round and flat-oval ducts and fittings.
 - 3. Sheet metal materials.
 - 4. Duct liner.
 - 5. Sealants and gaskets.
 - 6. Hangers and supports.

1.3 DEFINITIONS

- A. Outside Air: Air originating from outside of the building, from the primary environment surrounding the building. Outside air includes make-up air, combustion air, fresh air and other types of air.
- B. Conditioned Space: An area, room, ceiling space/plenum or space within the building structure being heated or cooled (by direct expansion or chilled water) or both, by equipment or appliance and is not subject to outdoor ambient conditions.
- C. Unconditioned Space: An area, room or space within the building structure not being conditioned and subject to outdoor ambient conditions. Above ceiling spaces in ducted return systems are considered unconditioned.
- D. Concealed Ducts: Ducts not visible within the room they are located, after the project is completed.
- E. Exposed Ducts: Ducts visible within the room they are located, after the project is completed.
- F. Ceiling Space/Plenum: An enclosed portion of the building structure, other than an occupiable space being conditioned, that is designed to allow air movement, and thereby serve as part of an air distribution system.
- G. Plenum: Part of duct system connected to diffusers, registers, grilles, louvers for air movement applications.
- H. Moist Exhaust: Exhaust air that carries a higher than ambient level of moisture/humidity in the stream.
 - 1. Examples (including, but not limited to): Shower areas.
- I. Primary Ductwork: Ductwork between the air moving device and the terminal unit (in VAV systems) or the air inlet/outlet (in CV system).

- J. Secondary Ductwork: In VAV systems, the ductwork between the terminal unit and the air inlet/outlet.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," ASCE/SEI 7, and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.5 SUBMITTALS

- A. Product Data: For each type of the following products:
1. Liners and adhesives.
 2. Sealants and gaskets.
 3. Seismic-restraint devices.
- B. Shop Drawings:
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Factory- and shop-fabricated ducts and fittings.
 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
 4. Elevation of top of ducts.
 5. Dimensions of main duct runs from building grid lines.
 6. Fittings.
 7. Reinforcement and spacing.
 8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.
 5. Design Calculations: Calculations for selecting hangers and supports.
- D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.

3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

E. Welding certificates.

F. Field quality-control reports.

G. Contractor Certification for Compliance that all ductwork has been fabricated and installed in accordance with the SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," including duct thickness, joining methods and reinforcing for the applicable pressure classifications.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports, AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports, and AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

E. Duct Cleaning: Qualify procedures and personnel with the National Air Duct Cleaners Association (NADCA) recommendations and industry standards for HVAC system cleaning.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lindab Inc.
 - b. EHG Duct.
 - c. McGill AirFlow LLC.
 - d. SEMCO Incorporated.
 - e. Sheet Metal Connectors, Inc.
 - f. Spiral Manufacturing Co., Inc.
 - B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
 - C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," and SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
 - D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," and SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
 - E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," and SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.
- F. Guy Wires: Comply with SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam."
- G. Cable, Stiffener and Anchor Rings: Comply with SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam."

2.4 DUCT LINER

- A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA Inc.
 - b. Armacell LLC.
 - c. Rubatex International, LLC
 - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 3. Butt transverse joints without gaps, and coat joint with adhesive.
 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
 7. Duct Velocities 1,800 FPM and Lower: Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
 9. Duct Velocities Greater Than 1,800 FPM: Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
 10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

E. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

H. Metal Stack Support and Guy System: Comply with SMACNA's "Guyed Steel Stacks – Welded Longseam and Spiral Lockseam."

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
 - C. Install round and flat-oval ducts in maximum practical lengths.
 - D. Install ducts with fewest possible joints.
 - E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
 - F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
 - G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
 - H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
 - 1. Exception: Where code required clearances are greater.
 - I. Route ducts to avoid passing through egress areas, egress stairwells, transformer vaults and electrical equipment rooms and enclosures.
 - J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
 - K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
 - L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."
 - M. Outside air plenums to louvers shall be sealed watertight and sloped to a single point with a drainage fitting connection.
 - N. Provide and locate sheet metal baffle plates in ductwork, units, mixing boxes, plenums, etc., as required to eliminate stratification. Affix baffles permanently in place after stratification problem has been eliminated.
 - O. Mount all duct-/unit-mounted smoke detectors in straight lengths of system airflow maintaining minimum distances from elbows and fittings in accordance with manufacturer's instructions and per "Fire Alarm" specification section. Coordinate the application and installation of duct smoke detector types for system air velocities involved per "Fire Alarm" specification section.
- 3.2 INSTALLATION OF EXPOSED DUCTWORK
- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
 - B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
 - C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test all duct sections.
 - b. Ducts with a Pressure Class Lower Than 3-Inch wg : Test all duct sections.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks after all system access doors are installed.
 - a. Include access doors/access door duct segments in leakage testing and calculations.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.
8. **Ductwork associated with holding cell smoke control system:**
 - a. **Test ductwork to 1.5 times the maximum design pressure.**
 - b. **Measured leakage shall not exceed 5% of design flow.**

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Where contaminants are discovered, re-clean and reinspect ducts.
3. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
4. Verification of Existing Coil Cleaning: Cleaning must restore coil pressure drop to within 5 percent of pressure drop measured when coil was first installed. If original pressure drop is not known, coil will be considered clean only if it is free of foreign matter and chemical residue, based on thorough visual inspection.
5. Verify cleanliness after mechanical cleaning and before application of treatment, including biocidal agents and protective coatings.

- D. Duct system will be considered defective if it does not pass tests and inspections.

- E. Prepare test and inspection reports.

3.8 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
1. SMACNA Duct Cleanliness Level for New Ductwork: B. Intermediate Level.
- B. Cleaning of new ductwork may be waived by the Engineer if in the sole judgment of the Engineer, appropriate precautions have been taken during construction to cover open ends of ducts and otherwise keep the ductwork clean.
- C. Use service openings for entry and inspection.
1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling to gain access during the cleaning process.
- D. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- E. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.
 7. Dedicated exhaust and ventilation components and makeup air systems.
- F. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 6. Provide drainage and cleanup for wash-down procedures.
 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.9 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

- A. Duct static pressure classifications shall be a minimum of the higher of either the fan developed static pressure or the scheduled value below.

Category	Connecting	Pressure Class ^{ab}	Seal Class ^a	Leakage Class ^a		Material ^f
				Rect.	Round	
Supply Air	Terminal ^c	2"	A	LC-16	LC-8	G
	AHU ^d	4"	A	LC-8	LC-4	G
Return Air	AHU ^d	4"	A	LC-8	LC-4	G
Exhaust Air	Class 1 & 2 ^e	2"	A	LC-16	LC-8	G
	Moisture	3"	A	LC-8	LC-4	A
Outside Air	Other	3"	A	LC-8	LC-4	G

1. Table Notes:

- a. Duct classifications according to the latest versions of SMACNA.
- b. Pressure class in inches water gauge (" w.g.).
- c. Terminal designation includes ducts connected to terminal units.
- d. "AHU" indicates all air handling equipment including rooftop units, moving primary and secondary air through the building.
- e. Air classifications as defined by ASHRAE 62.1.
 - 1) Ducts connected to fans exhausting Class 1 and 2 air.
- f. Material Designations: G = galvanized sheetmetal, A = aluminum.

B. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. Aluminum Ducts: Aluminum.

C. Liner:

1. Liner Schedule (Minimum Thickness):

	Conditioned Spaces	Unconditioned Spaces
Supply	1"	2"
Return	1"	2"
Exhaust	1"	1"
Moist Exhaust	Not Allowed	Not Allowed

2. Transfer Ducts: Flexible elastomeric, 1 inch thick.
3. Additional thickness of duct liner may be substituted for external insulation to match external insulation R-value specification.
4. Increase sheet metal dimensions to maintain specified clear opening duct dimensions.
5. Applications:
 - a. In Proximity of Fans: 15 ft. up or downstream in direction of outlets.

- b. Terminal Units: 10 ft. up or downstream in direction of outlets.
- c. Other Locations: As indicated.

D. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower and Secondary Ductwork:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower and Secondary Ductwork: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

E. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible, Chapter: "Fittings and Other Construction."
 - a. Rectangular Main to Rectangular Branch: Bell-mouth or 45-degree entry.
 - b. Rectangular Main to Round Branch: Bell-mouth.
 - c. Divided Supply Flow Branches Above 1,000 FPM and Primary Ductwork: Types 1, 2W, 4A and 4B are acceptable.
 - d. Divided Supply Flow Branches 1,000 FPM and Below and Secondary Ductwork: Types 1, 2W, 3, 4A and 4B are acceptable.
 - e. Divided Return Flow Branches Above 1,000 FPM: Types 1, 2W, 4A and 4B are acceptable.
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower and Secondary Ductwork: Conical tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

10/12/2018

SECTION 268000 - PHOTOVOLTAIC SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Description: A minimum **15** kW-DC (kilowatt) photovoltaic system made up of PV arrays designed to span in evenly distributed rows horizontally across the building roof. Building is located in East Hampton, Connecticut and will be new construction.
- B. Work Included: Provide design and install complete Photovoltaic System. The work of this section shall include, but not be limited to, the following:
1. Install PV Modules to independent steel structure and electrically connect in series and parallel as defined by construction documents.
 2. Balance of System Components including: Combination Box, DC Disconnect, Inverter and AC Disconnect.
 3. Electrical wiring, conduit and J-boxes
 4. Data Acquisition System including: Data logger and RS485 data connections.
 5. Weather Station including: pyranometer, anemometer wind vane, temp sensor)
 6. File Interconnect agreement with Utility Company and Interconnect Agreement scope shall also include applying for Connecticut Z-REC credits. Scope shall include, but not be limited to:
 - a. Fill out technical portion of the interconnect application to be filed by the Owner.
 - b. Provide manufacturer's data for inverter or generator performance.
 - c. Provide custom three-line diagrams according to utility review comments.
 - d. Coordinate design with the utility company requirements.
 - e. Provide site observation for testing and coordinate testing with the utility company.
 - f. Provide specification for testing/commissioning.
 - g. Provide testing sequences developed by the manufacturer.
 - h. Develop relay specification for utility interconnect protection.
 - i. Contractor shall pay for any fees required by utility company for application for PV solar power interconnection with utility grid power source.

1.3 SUBMITTALS

- A. Product Data
1. PV Module manufacturer's catalog data, MSDS, cut sheets, performance data and detailed shop drawings. Also, submit to Owner's insurance underwriter.
 2. Inverter manufacturer's catalog cut sheets, performance data and detailed drawings.
 3. Disconnect switch manufacturer's catalog cut sheets and detailed drawings.
 4. Complete list of materials and catalog cuts of all balance of system components being provided, including wire and terminations.
 5. Complete detailed 3-Line drawing and wiring diagram of the system.
 6. Provide letter on manufacturers letterhead signed by authorized personnel providing the location of fabrication of each major component or part.

7. Make best effort to supply components and parts with the highest available percentage of post-consumer recycled content.
 8. Provide certified percentage of recycled content contained in the product or part from post-consumer or post-industrial sources.
 9. Provide certified recyclability data for all major components or parts.
 10. Provide name and location of certified testing agency for major components and parts.
 11. Provide list of all components requiring fieldwork and or installation.
- B. Shop Drawings: Submit shop drawings showing complete information for fabrication and installation of PV system. Include installation manual and complete wiring diagram.
1. A complete scaled drawing showing the exact system layout including detailed shop drawings of all components and accessories being provided or required for operation as specified herein.
 2. Drawings shall include the functional relationship of various equipment and shall include weights, dimensions and heat dissipation of each unit.
 3. Complete point-to-point wiring diagrams for the PV system including narrative.
 4. Detailed description of equipment to be furnished
 5. Size and weight of individual shipping units
 6. Complete details and drawings showing all materials, which must be furnished in the field.
 7. Manufacturing schedule from receipt of order, including all shop drawings approvals, production span, factory tests, delivery, normal installation on site acceptance test and other testing.
 8. List of recommended spare parts.
 9. List of preventive maintenance routines.
 10. Submit Drawings, both hard-copy and AutoCAD 2000 or later version format, indicating fabrication details, components, assembly, dimensions, weights and loading, required clearances, and location, size, method of field assembly, and type of field connections. Indicate equipment, wiring & conduit entries required for a complete system.
 11. All shop drawings shall be prepared using AutoCAD 2011 (or later version if requested by the Owner/Architect/Engineer) and record as-built drawings shall be provided to Owner at substantial completion in both disk format and hard copy prints. Vendors shall provide a footprint layout for each PV system component in AutoCAD 2011 format. Vendor shall assist the BMS contractor by providing computer graphics, controls logic data, and all internal points. This information shall be used by the BMS contractor to develop screen graphics and system logic.
 12. Electrical Design Calculations: Signed and sealed by a qualified professional engineer.
 13. Submit complete design calculations for all assemblies and attachment systems. Indicate all design loads, including live loads, wind loads, and dead loads and including all stresses during shipment and erection and due to loads from construction procedures. Design calculations shall have the seal of the PV integrator's Professional Engineer, licensed to practice in the State of Connecticut. All shop drawings and calculations shall be submitted and approved prior to start of fabrication. Design calculations shall be based on requirements of "Design Requirements" specified herein.
 14. At time of original submission, the manufacturer shall submit for review two (2) copies of written instructions on the proper installation, operation and maintenance of all equipment and apparatus furnished under this Section. Provide six (6) additional copies upon shipment and two (2) copies on CD.
 15. At time of original submission, the manufacturer shall submit for review two (2) copies of the proposed factory acceptance test procedure and copies of a typical vendor start-up form.
 16. Product Data: Include data on features, components, ratings, and performance. Include the following:
 - a. Dimensioned outline plan and elevation drawings of PV system and other system components specified.
 - b. Time-current characteristic curves for protective devices included.
 17. Detail of independent steel support structure. Structure will be full standing and not penetrate roof or attach to building steel. Structure will allow for uninhibited rain water flow to roof drains.
 18. Certified Summary of Performance Tests: Demonstrate compliance with specified requirement to meet performance criteria.

19. Factory Test Reports: For units to be shipped for this Project, showing evidence of compliance with specified requirements.
20. Maintenance Data: For system components and for each PV system and accessories to include in maintenance manuals specified in Division 1. Include the following:
 - a. Detail operating instructions for both normal and abnormal conditions.
21. Manufacturer Seismic Qualification Certification: Submit certification that all equipment and components provided under this section will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:
 - a. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
22. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 QUALITY ASSURANCE

- A. Except as modified by governing codes and the Contract Documents comply with the latest applicable provisions and latest recommendations of the following:
 1. General:
 - a. National Electrical Code (NEC)
 - b. Authorities having jurisdiction.
 - c. IEEE 1547 - Standard for Interconnecting Distributed Resources with Electric Power Systems
 - d. ANSI/NFPA 70
 2. Inverter
 - a. National Electrical Code (NEC)
 - b. UL 1741 – Standard for Inverters, Converters, and Controllers for Use in Independent Power Systems
 - c. IEEE 929 – Recommended practice for utility interface of PV Systems.
 - d. IEEE 519 – Guide for harmonic control and Reactive Compensation of Static Power Controllers
 - e. FCC part 15
 - f. ANSI/NFPA 70
 3. PV Module
 - a. National Electrical Code (NEC)
 - b. IEC 1215 Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
 - c. CEC 503 European Solar Test Installation
 - d. IEEE 1262 PV Module Qualification for performance and reliability
 - e. UL 1703 (preferred) Flat-Plate Photovoltaic Modules and Panels
 - f. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Material used in Buildings.
 - g. ASTM C 1036 Standard Specification for Flat Glass
 - h. ASTM C 1048 Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

4. All balance of system components including combiner box, pipe/conduit, wire and incidental electrical products shall be UL listed and meet the requirements of the Town of **East Hampton** and the National Electrical Code as per the date of installation and the requirements of CL&P.
- B. Equipment suppliers shall have local representation and shall have been actively engaged in the assembly, installation and service of this equipment and specifically Building Integrated Photovoltaic (BIPV) systems for a period of not less than 5 years. Evidence of such experience shall be provided in the form of project lists with owner contact information.
- C. Equipment suppliers shall have full parts backup and a one-day service response availability for this equipment.
- D. Equipment Installers shall comply with all unions having jurisdiction. Certification through the National Joint Apprenticeship Training Committee (NJATC) and/or the North American Board of Certified Energy Practitioners (NABCEP) PV installer training programs is preferred.
- E. Comply with FM Global Property Loss Prevention Data Sheet 1-15, Roof Mounted Solar Photovoltaic Panels.

1.5 DESIGN CRITERIA

- A. The Contractor shall be responsible for the engineering design of all custom parts and equipment (if applicable), including mechanical and welded connections.
 1. Structural Criteria
 - a. The PV Panels are to comply with State of Connecticut Building Code.
 - b. Withstand their gravity loads.
 - c. Withstand all other superimposed loads, as indicated on Architectural drawings and all within the deflection limitations, governed by the design of the supporting structure.
 - d. ~~Exterior panels to~~ withstand pressure or suction wind load per requirements of the Town of **East Hampton**.
 - e. Allow for temperature expansion and/or contraction, without harmful affect to the glass, connections, joint seals, or adjoining construction.
 - f. Withstand seismic forces.

PART 2 - PRODUCTS

2.1 CRITERIA

- A. The photovoltaic system and accessories described herein shall be fully capable of operation as specified in the following environmental conditions:
 1. Maximum ambient temperature: 110°F
 2. Minimum ambient temperature: -20°F
 3. Height: PV array is located no more than 85 feet above grade. Please reference architect's structural engineer's specification for wind load requirements.

2.2 CONDUIT/WIRE/FITTINGS

- A. Provide rigid and/or flexible conduit as specified below along with all junction boxes, pull boxes, LBs, terminal strips, wire nuts, fittings and wires to meet the general project electrical specifications. As noted

above, all products for the Building integrated Photovoltaic system must be rated to withstand temperatures up to 180°F.

2.3 PHOTOVOLTAIC SYSTEM

A. General

1. Provide PV Modules as described herein. PV Module shall be compatible with the Balance of System (BOS) components and support system structure and be approvable by the Underwriter's Laboratory and the local authorities having jurisdiction.

B. Attachments and Supports

1. Provide support structure and bracket system.
2. Provide appropriate attachment hardware as approved by PV module manufacturer and consistent with structural and architectural requirements.
3. The assembly shall accommodate changes in dimension resulting from changes in temperature in any of its part, its supporting bracketry and without any reduction in the performance below the minimum levels required herein.
 - a. The surface temperature ranges shall be:
 - b. Heavyweight materials, light color -20 deg C to +50 deg C
 - c. Heavyweight materials, dark color -20 deg C to +65 deg C

C. PV Module Specifications

1. PV Module Basis-of-Design Specifications:
2. Phone Solar Diamond/ONYX poly, PS250P-20/4, UL1703.
 - a. The PV module electrical ratings are measured in Standard Test Conditions (STC), which are: 1kW/m² (93W/ft²) irradiance at an Air Mass of 1.5 spectrum and cell temperature at 25° C (77° F). These PV modules deliver the electrical characteristics within +/- 5% of the indicated values shown in Table 1.
 - 1) Table 1: PV Module Electrical Characteristics at STC
 - 2) Rated Power (W) 220w minimum
 - 3) Voltage at Rated Power (V) 30.2
 - 4) Current at Rated Power (A) 8.30
 - 5) Open Circuit Voltage (V) 37.8
 - 6) Maximum Series Fuse (A) 15
 - 7) Maximum System Voltage (V) 600
 - 8) Current Temp. Coeff. (+.07%/K)
 - 9) Voltage Temp.Coeff. (-.31%/K)
 - 10) Power Temp. Coeff.(-.44%/K)
 - b. A PV module may produce more current and/or voltage than reported at STC. Sunny, cool weather and reflection from snow or water can increase current and power output. Therefore, the values of I_{sc} and V_{oc} marked on the module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to PV output. An additional 1.25 multiplier may be required by the National Electrical Code (NEC) for sizing fuses and conductors as described in the NEC Section 690-8.
 - c. Underwriters Laboratories (UL) Listing Information: This product must meet or exceed the requirements set forth by UL1703 for PV Modules. This UL Standard covers flat-plate photovoltaic modules and panels intended for installation on buildings or to be freestanding.
 - 1) Fire Rating: The module is to be Class A fire rated.

3. Warranty

- a. All components must be capable of performing so that the entirety of the PV Module retains manufacturer 25 years limited power output warranty rating. Provide minimum 25 year product warrantee.

2.4 COMBINER BOX

- A. Provide fused Combiner Boxes as specified in the one-line diagrams of the construction document. Combiner boxes shall be in a NEMA 4X UI Listed enclosure with maximum 10 amp, 600VDC, rated UL Listed fuses.

2.5 INVERTERS (POWER CONDITIONING UNIT or PCU)

A. General Description

1. Provide DC-to-AC inverters as described herein. Inverters shall be compatible with the PV system array output and with the local utility company Power. The PV system and PCU shall be capable of completely automatic unattended operation including start-up, synchronization and disconnect.
2. The PCU shall be non-self-commutated suitable for meeting the specifications delineated herein. The KW capacity shall be as noted on the drawings. The inverters shall be capable of operating in parallel with other inverters.

B. Basis-of-Design Specifications

1. 100 kW AC Inverter

- a. Recommended Inverter Satcon Powergate Plus Commercial Solar, 480V AC or acceptable equivalent.

- 1) AC Power: 100 kW
- 2) Nominal AC Voltage: 422-528 V @ 480VAC
- 3) Nominal AC Frequency: 60 Hz
- 4) DC Input Voltage Range: 305-600 V
- 5) DC Max Input Current: 104 A
- 6) Ambient Temperature
- 7) Rating: -20 to +50°F
- 8) Enclosure Type: NEMA 3R
- 9) Warranty: 10 year
- 10) Compliance: IEEE-C62.41.2, IEEE-1547, UL 1741, CSA 107.1-01

2.6 DATA ACQUISITION SYSTEM AND INTERACTIVE GRAPHIC INTERFACE

A. Description

1. Provide a Data Acquisition System to collect, monitor, store and communicate data from the PV System and weather station to building server.

B. Specifications

1. Data Controller / Data Logger: Single controller unit compatible with all specified inverter manufacturers or multiple data loggers compatible with select inverters. PV contractor to ensure compatibility with all PV and weather equipment as well as communication software and educational interface.

- a. Grid Voltage: 90 to 260V, 50 to 60 Hz
- b. Power Consumption in Operation: 9 – 11w
- c. Power Consumption in Stand-by: 8w
- d. Carrier Frequency for Powerline Communication: 132.45 kHz
- e. Display: 4 x 16 characters LCD
- f. Ambient Temperature: 32°F to 104°F
- g. Protection Class: IP 40
- h. Fuse: Automatic overload protection, 65V 90mA
- i. Daily energy value stored: 1 Year
- j. Measurement Data Storage: 250 channels
- k. Communication System: RS 485 current-source bus line

PART 3 - EXECUTION

3.1 GENERAL

- A. Install and wire the entire PV system as shown on the drawings, as indicated in all of the various system components manufacturer's instructions and as required for a neat, workmanlike and fully integrated and operational system. Insure that all required and recommended clearances are maintained.
- B. Pre-installation Conference: Before beginning PV module and wiring installation, conduct a pre-installation conference at the project site with the manufacturer of the major components or their representatives, installer, Architect, Owner and other interested parties to review procedures schedules, and coordination of the installation with other elements of the Work.
- C. Establish a waste management program in conjunction with the Construction Management which is to be instituted during the duration of this project.

3.2 SAFETY PRECAUTIONS

- A. Before installing or wiring PV modules, read all safety instructions in the product manual and these specifications.
 - 1. Warning: Voltage is always present whenever PV modules are exposed to sunlight. PV module pigtailed pass direct current (DC) when the module is under load. Direct current will arc across gaps and may cause injury or death if improper connection or disconnection is made. Do not connect or disconnect modules when current from the modules or an external source is present.
 - 2. Caution: For protection against electrical shock, never work with PV array wiring under load! Disconnecting of PV system wires under load; PV wiring connections must not be disconnected while under load. PV connections must be isolated from the power supply while being assembled or disassembled. They can be placed in a no load state by switching off the DC / AC inverter or by breaking the AC circuit. Disconnecting or connecting wiring while under tension is permitted.
- B. Work with modules indoors or when exposed to sunlight cover all modules in the PV array with an opaque cloth or material before making or breaking electrical connections. The PV modules will produce voltage in the open circuit when exposed to daylight open circuit voltage (DC) is dangerous, never cross positive and negative wires when working with PV systems, doing so creates a dangerous DC arc.
- C. There are no user serviceable parts within the photovoltaic module. Do not attempt to repair any part of the module. Report damage and insure damaged module serial number and/or product identification number are reported to module supplier, project manager and architect.

- D. All installation work must be performed in compliance with the Town of **East Hampton** / National Electrical Code (NEC). The minimum bending radius for large cabling must be observed as stated in the Code.
- E. Installation, all wiring and commissioning procedures must be performed by Licensed Electricians qualified to perform such work with National Joint Apprenticeship and Training Committee NJATC and/or North American Board of Certified Energy Practitioners (NABCEP) certification and training.
- F. Remove all metallic jewelry prior to installing this product to reduce the chance of accidental exposure to live circuits.
- G. Use insulated tools to reduce your risk of electric shock.
- H. Do not stand on, drop, scratch or allow objects to fall on PV modules.
- I. If any of the layers of glass are broken, contact with any PV module surface or the frame can cause electric shock.
- J. Do not install or handle the modules if they are wet.
- K. Contact module supplier if maintenance is necessary.

3.3 PROJECT SITE WORK

- A. This section pertains to the scope of work required in mounting and wiring of the photovoltaic panels and the mounting and wiring of all Balance of System Components (BOS).
- B. Work Included: PV module installation & wiring and Combiner Box and Inverter installation and wiring
- C. Tools Required: safety helmet, safety goggles, protective strapping for working at heights above 6 feet, screwdrivers, wire cutters, wire strippers for stranded wire from 2 AWG to 12 AWG, AC and DC Electrical Meters with clamp on leads, drills, hole saws, wire snake, hands free flashlight, insulated 6000 volt gloves, ethyl alcohol, clean rags, wire grease, termination sealant, UL listed electrical tape in required colors (reference the Construction Documents).
 - 1. NOTE: Reference the Contract Documents for wiring schematic and 1-Line.
 - 2. CAUTION: For protection against electrical shock, never work with PV array wiring under load! Disconnecting of PV system wires under load; PV wiring connections must not be disconnected while under load. PV connections must be isolated from the power supply while being assembled or disassembled. They can be placed in a no load state by switching off the DC / AC inverter or by breaking the AC circuit. Disconnecting or connecting wiring while under tension is permitted.
- D. PV Module Mounting: See PV Manufacturer Specifications
 - 1. Cable Preparation: Strip cable insulation. Keep all components clean during installation and wiring, immerse stripped wire terminations in ethyl alcohol or industrial alcohol before connecting to terminal strips, connectors or wire nuts. Stick a safety tag stating; "DO NOT DISCONNECT UNDER LOAD" to cable ends during installation. (see manufacturer's instructions for proper tag installation)
 - 2. Crimping: Crimp as required any connectors using proper crimping tools and following manufacturer's requirements.
 - 3. Array Grounding; GROUND ALL NON-CURRENT CARRYING METAL PARTS OF THE PV ARRAY TO BUILDING STEEL/EARTH GROUND. To avoid electrical shock, ground the frame/mullion of the unit assembly before wiring the circuit. Reference the Construction Documents for grounding point location and conductor diameter; a grounding "lay-in" lug is also required. A thread-forming 10-32 stainless steel screw is required when using a self-drilling type

- screw to make the curtain wall unit mullion ground connection. A "continuous" bare copper wire must run across each floor through the "lay-in" lug screwed into each wall unit's lower horizontal mullion and then connect to building steel/earth ground.
4. **Combiner Box Mounting:** Mount Combiner Box in a central location relative to the PV array. Connect conduit to Combiner Box so only one penetration is needed for the positive and negative leads coming from the various sub-arrays or series strings. Connect ground wire first, then positive leads and negative leads last. Install fuses.
 5. **Series Connection:** Use continuous wire when practical; minimize splicing of PV module leads. Pass the negative lead from the first series module through the conduit to the J-box and terminate on terminal strip. From this point connect a "homerun" wire and pass it through rigid conduit run along the bottom mullions of the wall system to the point of parallel connection at the combiner box. Pass the positive wire of the lower module to the next series J-box and connect it to the negative wire of the next PV module. Continue this series wiring until all modules are connected in series with a positive and negative of each string safely protected from contact with each other. The last module in the series will have a positive lead to connect to the combiner box parallel connection point.
 6. **Parallel Connections:** The positive leads of each PV series string are to be connected to the fused connection points of the Combiner Box (See Combiner Box Wiring diagram for specific wiring detail). Connect the negative leads to the negative bus of the Combiner Box. Table 1 describes the maximum fuse size allowed. Please refer to the current version of the National Electrical Code Article 690 for additional fusing requirements.
- E. **Inverter/Power Conditioning Unit (PCU) Installation and wiring:** Read the inverter/PCU manufacturers installation directions before attempting any work.
1. **Ventilation and Clearances:** A minimum of 48" of clearance shall be maintained in front of the Inverter and Magnetic cabinet doors and in front of the Control cabinet door and 30" of clearance behind the enclosure. It is recommended that some space be maintained to the right of the enclosure. Reference the Contract Documents for exact inverter location.
 2. **Lifting and Moving:** Due to the size and weight of the inverter/PCU, it is recommended that it remain on the pallet it was shipped on until ready for installation.
 - a. **CAUTION:** Extra care must be used when moving the inverter/PCU and Isolation Transformer because the weight of the inverter is not evenly distributed within the enclosure.
 - b. Use existing slots for moving the Equipment with a forklift or palette jacks.
 3. **Wiring and Torque Specifications:** The required torque settings and acceptable wire sizes are to be used when making connections to the inverter/PCU.
 - a. Terminal Block or Bolt Torque Setting
 - b. AC Disconnect 180 in. lbs./15 ft. lbs
 - c. DC Compression Lugs 250 in. lbs./21 ft. lbs.
 - d. Ground 250 in. lbs./21 ft. lbs.
 4. **Mounting the Inverter/PCU:**
 - a. Drill or punch appropriate conduit knockouts. Be sure to avoid getting metal particles inside the wiring area of the inverter.
 - b. Remove inverter base plates to expose fork lift slots.
 - c. Move the inverter/PCU into place, mark mounting hole locations, move inverter/PCU away for drilling holes, install appropriate anchors in concrete pad, move inverter/PCU into place.
 - d. Secure the inverter/PCU to the foundation.
 - e. Torque anchor bolts to specification.
 - f. Install conduit hardware.
 - g. Pull wires through conduit and into the bottom of the Control cabinet.
 - h. Main Power Wire Connections.
 - i. Verify that all AC and DC disconnect switches are in the OFF position.

- j. Connect the grounding-electrode conductor from the grounding system to the terminal marked "Grounding Electrode".
- k. Connect the equipment-grounding conductor(s) from the DC PV circuits to the appropriate terminals on the ground bus in the inverter.
- l. Connect the equipment-grounding conductor(s) from the AC output circuits to the appropriate terminals on the ground bus in the inverter.
- m. Connect the PV+ and PV- wires. Be sure that the PV array is not energized when making these connections.
Note: Depending on your installation, The Town of **East Hampton** and the NEC may require that rather large AC and DC current carrying conductors be used. Multiple, smaller parallel conductors may be used to reduce bending radius requirements and ease installation. Refer to NEC for conductor sizing.
- n. Connect the AC Neutral phase conductor to the neutral output terminal.
Note: This terminal is isolated from ground in the inverter. Grounding of the AC output neutral conductor must be accomplished outside the inverter/PCU, usually at the service entrance equipment.
- o. Connect the three AC phase wires to terminals A, B and C. Be sure that the breaker is turned OFF at the sub-panel and to observe proper phasing when connecting these wires.
- p. Torque all wire terminations as required by the manufacturer's recommendations.
- q. Replace fork slot skirts.
Note: The inverter/PCU has auto phase detection capability. However, it is still important to maintain proper phasing when making the AC connections.

- 1) CAUTION: It is the responsibility of the installer to see to it that the input and output circuits are isolated from the enclosure, if required by sections 690.41 and 690.42 of the National Electrical Code, ANSI/NFPA 70, and to assure that the system is properly grounded.
- 2) CAUTION: Sections 690.41 and 690.42 of the National Electrical Code require that the PV array be earth grounded. The DC negative conductor input into the inverter is grounded internally in the inverter by the GFDI circuit. Do not ground the negative PV conductor at any other place on the DC circuits. The chassis of the inverter/PCU is also bonded to the PV ground bus bar.
- 3) CAUTION: The AC output circuit for the inverter/PCU should be sized for the maximum continuous output current rating and in compliance with NEC 2002.
- 4) WARNING: The PV array will produce high voltages when exposed to sunlight.
- 5) WARNING: To prevent electrical shock or other injury, verify that the AC and DC wires are not energized during installation.

3.4 INITIAL START UP AND ACCEPTANCE TEST/COMMISSIONING

- A. The contractor shall notify the Architect and Engineer in writing when the entire PV system is correctly installed and properly wired, and the field. Actual acceptance of the system will only take place after the system passes all parts of the Acceptance Test, work successfully during a 30 day conditioning and system rating period, and meets the contractual system peak power rating. The contractor is required to perform start-up and validation of the system in the field prior to Owner's site acceptance test.
- B. Upon completion of factory testing and submittal of factory test report that is approved by the Commissioning Engineer, Owner and Construction manager the vendor can begin pre-functional testing.
- C. Upon submission of pre-functional testing and approval of pre-functional testing form by Commissioning agent the vendor can then begin vendor start-up.
- D. Upon completion of successful vendor start-up the vendor can then schedule the functional test procedure that will be witnessed by the owner, commissioning engineer, and construction manager.
- E. Upon successful completion of the functional system test and sign-off from all parties involved the vendor can schedule any training sessions with site personnel that may be required.

- F. Testing Prior to Paralleling: Before start-up of the system is attempted, testing as outlined in the following subsections shall be completed satisfactorily. Results of all tests shall be documented and archived for future reference.
1. Installation Inspections
 - a. An in-depth inspection shall be conducted to ensure that the system is built in a workmanlike manner and consistent with industry practice and operational requirements. Torque verification of bolted connections should be performed randomly. Inspect that all bolted and similar connections include locking devices and be designed to prevent loosening over the design life of the PV system. ASTM A325 or A490 bolts do not require locking devices but shall be installed in accordance with the applicable standards in the AISC Manual of Steel Construction. Inspect all exposed surfaces that they are painted or otherwise suitably protected to survive outdoor environmental conditions for a 30-year design life. Include damage repair in inspection. Inspect that all outdoor enclosures are weatherproof and capable of surviving intact under the site environmental conditions specified. Check that all outdoor enclosure are equipped to prevent condensation. Check that all doors, covers, panels, and cable exits are gasketed or otherwise designed to limit the entrance of dirt and moisture. Inspection that all wiring is new, copper, and continuous for each wiring run; splices are not acceptable. Inspect that all exposed wiring shall be suitably sunlight and weather resistant and shall be factory marked (stamped) as such. Inspect that wires have identifying labels or markings on both ends. The labels or markings shall be permanent and durable. Labels or markings on exposed wiring shall be of type that is rated for withstanding the outdoor environment. Inspect that wiring is bundled, laced and otherwise laid in an orderly manner. Verify that all non-current carrying metal parts are solidly grounded and all equipment and system grounding is installed and functional per IEE Standard 80.
 2. Wires, Cables and Buses
 - a. Electrical cables and wires operated at or below 1000V (between the array junction boxes on the DC side and the utility interface point on the AC side) shall be tested for continuity and megger tested. All buses and cables operated above 1000V shall be meggered or hipot tested phase-to-phase and phase-to-ground after installation. Cable test results of less than 100 megaohms will not be accepted.
 3. Inverter/PCU
 - a. After the inverter/PCU and necessary accessory equipment/devices are installed in their final configuration, but prior to paralleling with the grid, perform a visual inspection of wiring, components, enclosure, etc., verify Start/Stop switch and other controls (as possible). Check for adequacy of grounding.
 4. Array I-V Curve
 - a. An I-V curve of each source circuit and entire array shall be performed.
 5. Pre-parallel Inspection
 - a. The Acceptance Test reports shall be received by the Utility prior to performing a pre-parallel inspection. Written verification of receipt of the test report shall be returned to the Architect.
- G. Initial Start-Up and System Rating: Prior to initial start-up tests, testing as described in the previous sections shall be satisfactorily completed.

1. Inverter/Power Conditioning Unit (PCU) Operational Tests
 - a. The tests shall demonstrate proper functional operation of control and protective features under normal and abnormal conditions. In some cases, one or more of these features can be handled by devices external to the inverter/PCU.
2. System Rating
 - a. System performance shall be monitored to collect data for the system rating. The AC system shall be rated at modified PVUSA Standard Test Conditions (STC) which are defined as follows:
 - b. 20°C ambient temperature, 2 m/s wind speed, and 1000 W/m² global plane-to-array irradiance.
 - c. AC System Power Output (measure at the point of interface).

3.5 WARRANTY AND MAINTENANCE

- A. Provide a complete warranty of all components including replacement labor extending 5 years after date of System Start-up and Acceptance test / Commissioning. Provide service during the warranty period as outlined below. As an alternate with the initial proposal, provide a yearly maintenance contract for the PV system. The supplier must agree to the Standard Service Contract terms provided by the Owner. The Warranty Service and the proposal for a Yearly Service Contract shall be based upon the manufacturer's standards and as a minimum and must include the following:
- B. Insure that building maintenance staff is properly trained to operate and maintain the system.
- C. Although PV systems utilize solid-state technology and are virtually maintenance free, periodic inspections of the system is a prudent measure. Such inspections should occur on a quarterly basis in the first year of operation and bi-annually thereafter.
- D. Inspect all PV modules annually for safe electrical connections, sound mechanical connection and freedom from corrosion. Periodically clean the PV module surface with water and a soft cloth or sponge. Also conduct a visual inspection of all PV modules for breakage, de-lamination and insure mechanical connections are torqued and secured as required.
- E. Inspect all wiring connections and terminations for required torque settings at splice boxes, junction boxes, combiner box, switches, inverter/PCU and isolation transformer. Visually inspect conduit runs and connections.

3.6 TRAINING

- A. Initial Start-Up and System Rating: This Subcontractor shall be responsible for the training of Owner personnel for both the equipment and systems this contractor installs as well as responsible to participate in the training of all systems that interface with the work of other Subcontractors and Vendors. The Subcontractor shall, in addition to start up services, provide factory-trained specialists to supervise commissioning and instruct the Owner's operators during operating instruction periods.
- B. Training shall consist of a minimum of (2) 4-hour sessions of Owner instructions. Owner instruction sessions and demonstration sessions shall not be consecutive and are separate and apart from start-up and commissioning. Training shall consist of both classroom and in-the-field training. All training materials and a training curriculum unique to this project will be presented to the Owner 2 months in advance of the on-site training. Training will commence only after the approval of the curriculum and agenda by the Owner and the Commissioning Authority (CA). The Owner may wish to videotape the on-site training. The Subcontractor and their vendors agree to allow videotaping of instruction periods. Include in addition to the periods of training listed, periods to be present during owner instruction on the BMS.

- C. The Subcontractor shall commence no instruction period until all requirements of this section are met and the Owner has issued his written acceptance of the contractor's submitted agenda, starting time and Schedules.

- D. The Construction Manager (CM) shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

END OF SECTION 268000

10/12/2018

SECTION 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Fire-alarm control unit.
- 2. Manual fire-alarm boxes.
- 3. System smoke detectors.
- 4. Air-sampling smoke detectors.
- 5. Heat detectors.
- 6. Notification appliances.
- 7. Device guards.
- 8. Firefighters' smoke-control station.
- 9. Magnetic door holders.
- 10. Remote annunciator.
- 11. Graphic annunciator.
- 12. Addressable interface device.
- 13. Digital alarm communicator transmitter.

- B. Related Requirements:

- 1. Section 270513 "Conductors and Cables for Communications Systems" for cables and conductors for fire-alarm systems.
- 2. Section 260533 "Raceways and Boxes for Electrical Systems" for raceway applications.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. NICET: National Institute for Certification in Engineering Technologies.
- D. PC: Personal computer.
- E. VESDA: Very Early Smoke-Detection Apparatus.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.

2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
 - c. Locate detectors according to manufacturer's written recommendations.
 - d. Show air-sampling detector pipe routing.
13. Ductwork Coordination Drawings: Plans, sections, and elevations of ducts, drawn to scale, and coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
14. System riser diagram with all device types and cable and wire types and sizes.
15. Wiring Diagrams: Power, signal and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
16. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
17. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Data: Certificates, for fire-alarm control unit, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
 - g. Record copy of site-specific software.
 - h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
 - i. Manufacturer's required maintenance related to system warranty requirements.
 - j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors, Fire Detectors, and Addressable Interface Devices: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamperproofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
8. Filters for Air-Sampling Detectors: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
9. Air-Sampling Fan: Quantity equal to one for every five detectors, but no fewer than one unit of each type.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel licenses by the City and/or State.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for intended location and application.
- C. Manufacturer Qualifications: Source must be an authorized distributor of the specific manufacturer and authorized to see in project area.

1.9 PROJECT CONDITIONS

- A. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 2. Warranty Period: One year from date of Substantial Completion.

1.11 ADDITIONAL SCOPE TO BE INCLUDED IN BASE CONTRACT

- A. Furnish, install, wire (with 50 ft. of approved wiring and conduit), terminate and program the following in addition to those indicated on the drawings or implied in the control sequence:
 1. Smoke Detector with Base: Quantity equal to 5 percent of units installed, but not less than two units.
 2. Combination Audio/Visual Notification Appliance: Quantity equal to 5 percent of units installed, but not less than five units.
 3. Visual Notification Appliance: Quantity equal to 5 percent of units installed, but not less than ten units.
 4. Manual Fire alarm Box: Quantity equal to 5 percent of units installed, but not less than two units.

5. Addressable Interface Devices: quantity equal to 5 percent of units installed, but not less than ten units.
 6. Speaker: quantity equal to 5 percent of units installed, but not less than ten units.
- B. If units are not utilized before substantial completion of Project, then at the owner's option, either turn units over to owner or provide credit to owner for deletion of material and labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
1. Edwards System Technology, Inc.: EST2.
 2. NOTIFIER; a Honeywell company; AFP-200.
 3. Siemens Building Technologies, Inc.; Fire Safety Division; MXL.

2.2 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
1. Manual stations.
 2. Heat detectors.
 3. Smoke detectors.
 4. Duct smoke detectors.
 5. Air-sampling smoke-detection system (VESDA).
 6. Carbon monoxide detectors.
 7. Combustible gas detectors.
 8. Automatic sprinkler system water flow.
 9. Preaction system.
 10. Fire-extinguishing system operation.
 11. Fire standpipe system.
 12. Dry system pressure flow switch.
 13. Fire pump running.
- B. Fire-alarm signal shall initiate the following actions:
1. Continuously operate alarm notification appliances, including voice evacuation notices.

2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
9. Activate stairwell and elevator-shaft pressurization systems.
10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
11. Activate preaction system.
12. Recall elevators to primary or alternate recall floors.
13. Activate elevator power shunt trip.
14. Activate emergency lighting control.
15. Activate emergency shutoffs for gas, fuel and power supplies for equipment under kitchen hoods. Provide additional contactors and relays and pushbuttons to control and monitor hoods, valves, makeup fans and equipment.
16. Record events in the system memory.
17. Indicate device in alarm on the graphic annunciator.
18. Open smoke dampers in elevator shafts under smoke detector alarm condition in elevator lobbies.
19. Deactivate sound systems located in assembly spaces. Provide relays to interrupt power supply to each head-end system.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. High- or low-air-pressure switch of a dry-pipe or preaction sprinkler system.
3. Alert and Action signals of air-sampling detector system.
4. Elevator shunt-trip supervision.
5. Fire pump running.
6. Fire-pump loss of power.
7. Fire-pump power phase reversal.
8. Independent fire-detection and -suppression systems.
9. User disabling of zones or individual devices.
10. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.
10. Voice signal amplifier failure.
11. Hose cabinet door open.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
4. Transmit system status to building management system.
5. Display system status on graphic annunciator.

2.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.5 FIRE-ALARM CONTROL UNIT

- A. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
 2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, two line(s) of 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
- C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
1. Pathway Class Designations: NFPA 72, Class A.
 2. Pathway Survivability: Level 1.
 3. Install no more than 50 addressable devices on each signaling-line circuit.
 4. Serial Interfaces:
 - a. One dedicated RS 485 port for central-station operation using point ID DACT.
 - b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
 - c. One USB port for PC configuration.
 - d. One RS 232 port for VESDA HLI connection.
 - e. One RS 232 port for voice evacuation interface.

D. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Sound general alarm if the alarm is verified.
4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

E. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

F. Elevator Recall:

1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
 - a. Elevator lobby detectors except the lobby detector on the designated floor.
 - b. Smoke detector in elevator machine room.
 - c. Smoke detectors in elevator hoistway.
2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
3. A field-mounted relay actuated by the smoke detector or the fire alarm control unit signals the elevator controller and operates building notification appliances and annunciator.
4. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

G. Elevator Controls: Heat detector operation shuts down elevator power by operating a shunt trip in a circuit breaker feeding the elevator.

1. A field-mounted relay actuated by the heat detector or the fire alarm control unit closes the shunt trip circuit and operates building notification appliances and annunciator.

H. HVAC Controls: AUTO/OFF switch located in FACP allows for manual control of each air distribution unit 2,000 cfm and over in size.

I. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls and where indicated on the drawings shall be connected to fire-alarm system.

J. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

K. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

L. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, provided in a separate cabinet located in the fire command center or other remote location designated by the Fire Marshal as a special module that is part of fire-alarm control unit.

1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
 - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- M. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
 2. Power supply shall be from a circuit breaker with locking clip located in an emergency panelboard located as close to main service as possible.
- N. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Sealed, valve-regulated, recombinant lead acid sized based upon all strobes set at 75 cd.
 2. Battery and Charger Capacity: Comply with NFPA 72. Minimum 60 hours of standby, following by 10 minutes of alarm.
 3. Loads Not Served by Battery: Magnetic door handlers and smoke dampers.
- O. Surge Protection:
1. Install surge protection normal AC power for the FACP and its accessories. Comply with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" for auxiliary panel suppressors.
 2. Install surge protectors recommended by FACP manufacturer. Install on all system wiring external to the building housing the FACP.
- P. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- Q. Smoke Damper Supervision: Visible signal indication at fire alarm control unit to reflect open and closed position of dampers associated with smoke control system only. Provide multiple local addressable interface devices for each damper for control open and close and monitoring open and close independently. Provide appropriate UL relays and contactors for interface.

2.6 PREACTION SYSTEM

- A. Initiate Presignal Alarm: This function shall cause an audible and visual alarm and indication to be provided at the FACP. Activation of an initiation device connected as part of a preaction system shall be annunciated at the FACP only, without activation of the general evacuation alarm.

2.7 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Single-action mechanism, plastic-rod type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 2. Station Reset: Key-operated switch.
 3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.8 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
1. Comply with UL 268; operating at 24-V dc, nominal.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 4. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where noted or indicated.
 5. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition[and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Multiple levels of detection sensitivity for each sensor.
 - b. Sensitivity levels based on time of day.
- B. Photoelectric Smoke Detectors:
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

1. Multipurpose type, containing the following:
 - a. Integral Addressable Module: Arrange to communicate detector status (normal, alarm, or trouble) to the FACP.
 - b. Piezoelectric sounder rated at 88 dBA at 10 ft. according to UL 464.
 - c. Heat sensor, combination rate of rise and fixed temperature.

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit, or smoke damper control.
7. Low Velocity Detectors: Design as recommended by manufacturer for the specific air velocity and installation conditions where applied.

2.9 PROJECTED BEAM SMOKE DETECTORS

- A. Projected Beam Light Source and Receiver: Designed to accommodate small angular movements and continue to operate and not cause nuisance alarms.
 1. UL 268 listed, operating at 24-V dc, nominal.
 2. Adjustable Sensitivity: At least six sensitivity levels, settable at the receiver, measured at percent of obscuration.
 3. Two selectable alarm delay settings, allowing each to be associated with a corresponding sensitivity.
 4. Trouble signal delay, fixed at 20 seconds.
 5. Separate Color-Coded LEDs: Indicate normal, alarm, and trouble status with remote indicator panels. Include test switch.
- B. Detector Address: Accessible from fire-alarm control unit and able to identify the detector's location within the system and its sensitivity setting.
- C. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 1. Primary status.
 2. Device type.
 3. Present average value.
 4. Present sensitivity selected.
 5. Sensor range (normal, dirty, etc.).

2.10 CARBON MONOXIDE DETECTORS

- A. General: Carbon monoxide detector listed for connection to fire-alarm system.
1. Mounting: Adapter plate for outlet box mounting.
 2. Testable by introducing test carbon monoxide into the sensing cell.
 3. Detector shall provide alarm contacts and trouble contacts.
 4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
 5. Comply with UL 2075.
 6. Locate, mount, and wire according to manufacturer's written instructions.
 7. Provide means for addressable connection to fire-alarm system.
 8. Test button simulates an alarm condition.

2.11 MULTICRITERIA DETECTORS

- A. Provide combination of smoke detector with carbon monoxide detector wherever indicated on electrical plans. Carbon monoxide detectors shall be connected to the building fire alarm system control panel.
- B. Provide combination of heat detector with carbon monoxide detector whenever indicated on electrical plans. Carbon monoxide detectors shall be connected to the building fire alarm control panels.
- C. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
- D. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- E. Automatically adjusts its sensitivity by means of drift compensation and smoothing algorithms. The detector shall send trouble alarm if it is incapable of compensating for existing conditions.
- F. Test button tests all sensors in the detector.
- G. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
1. Primary status.
 2. Device type.
 3. Present sensitivity selected.
 4. Sensor range (normal, dirty, etc.).
- H. Sensors: The detector shall be comprised of four sensing elements including a smoke sensor, a carbon monoxide sensor, an infrared sensor, and a heat sensor.
1. Smoke sensor shall be photoelectric type as described in "System Smoke Detectors" Article.
 2. Carbon monoxide sensor shall be as described in "Carbon Monoxide Detectors" Article.
 3. Heat sensor shall be as described in "Heat Detectors" Article.
 4. Each sensor shall be separately listed according to requirements for its detector type.

2.12 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
1. Temperature sensors shall test for and communicate the sensitivity range of the device.

- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
1. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.
1. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Continuous Linear Heat-Detector System:
1. Detector Cable: Rated detection temperature 155 deg F. Listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.
 2. Control Unit: Two-zone or multizone unit as indicated. Provide same system power supply, supervision, and alarm features as specified for fire-alarm control unit.
 3. Signals to Fire-Alarm Control Unit: Any type of local system trouble shall be reported to fire-alarm control unit as a composite "trouble" signal. Alarms on each detection zone shall be individually reported to central fire-alarm control unit as separately identified zones.
 4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.13 AIR-SAMPLING SMOKE DETECTOR

- A. General Description:
1. Air-sampling smoke detector shall be laser based using a piping system and a fan to transport the particles of combustion to the detector.
 2. Provide two levels of alarm from each zone covered by the detector and two supervisory levels of alarm from each detector.
 3. The air being sampled shall pass through filters to remove dust particulates greater than 20 microns before entering the detection chamber.
 4. Detectors shall have the capability via RS 485 to connect up to 100 detectors in a network.
 5. Detectors shall communicate with the fire-alarm control unit via addressable, monitored dry contact closures, RS 485, and interface modules. Provide a minimum of six relays, individually programmable remotely for any function.
 6. Pipe airflow balancing calculations shall be performed using approved calculation software.
- B. Detector:
1. Detector, Filter, Aspirator, and Relays: Housed in a mounting box and arranged in such a way that air is drawn from the detection area and a sample passed through the dual-stage filter and detector by the aspirator.
 2. Obscuration Sensitivity Range: 0.005 - 6 percent obs/ft..
 3. Four independent, field-programmable, smoke-alarm thresholds per sensor pipe and a programmable scan time delay. The threshold set points shall be programmable.

- a. The four alarm thresholds may be used as follows:
 - 1) Alarm Level 1 (Alert): Activate a visual and an audible supervisory alarm.
 - 2) Alarm Level 2 (Action): Activate shutdown of electrical/HVAC equipment and activate a visual and an audible supervisory alarm.
 - 3) Alarm Level 3 (Fire 1): Activate building alarm systems and initiate call to fire response unit.
 - 4) Alarm Level 4 (Fire 2): Activate suppression system or other countermeasures.
 - b. Final Detection System Settings: Approved by [Architect] [Owner].
 - c. Initial Detection Alarm Settings:
 - 1) Alarm Level 1 (Alert): 0.08 percent obs/ft.
 - 2) Alarm Level 2 (Action): 1.0 percent obs/ft.
 - 3) Alarm Level 3 (Fire 1): 2.0 percent obs/ft.
 - 4) Alarm Level 4 (Fire 2): 4.0 percent obs/ft.
4. Power Supply:
- a. Regulated 24-V dc, monitored by the fire-alarm control unit, with battery backup.
 - b. Battery backup shall provide 24 hours' standby, followed by 30 minutes at maximum connected load.
5. Detector shall also transmit the following faults:
- a. Detector.
 - b. Airflow.
 - c. Filter.
 - d. System.
 - e. Zone.
 - f. Network.
 - g. Power.
6. Provide four in-line sample pipe inlets that shall contain a flow sensor for each pipe inlet. The detector shall be capable of identifying the pipe from which smoke was detected.
7. Aspirator: Air pump capable of allowing for multiple sampling pipe runs up to 650 feet in total, (four pipe runs per detector) with a transport time of less than 120 seconds from the farthest sample port.
8. Air-Sampling Flow Rates Outside Manufacturer's Specified Range: Result in a trouble alarm.
9. Provide software-programmable relays rated at 2 A at 30-V dc for alarm and fault conditions.
10. Provide built-in event and smoke logging; store smoke levels, alarm conditions, operator actions, and faults with date and time of each event. Each detector (zone) shall be capable of storing up to 18,000 events.
11. Urgent and Minor Faults. Minor faults shall be designated as trouble alarms. Urgent faults, which indicate the unit may not be able to detect smoke, shall be designated as supervisory alarms.
- C. Displays:
1. Include display module within each detector.
 2. Each display shall provide the following features at a minimum:
 - a. A bar-graph display.
 - b. Four independent, high-intensity alarm indicators (Alert, Action, Fire 1, and Fire 2), corresponding to the four alarm thresholds of the indicated sector.
 - c. Alarm threshold indicators for Alert, Action, and Fire 1.
 - d. LED indication that the first alarm sector is established.
 - e. Detector fault and airflow fault indicators.

- f. LED indicators shall be provided for faults originating in the particular zone (Zone Fault), faults produced by the overall smoke-detection system, and faults resulting from network wiring errors (Network Fault).
- g. Minor and urgent LED fault indicators.

D. Sampling Tubes:

- 1. Smooth bore with a nominal 1-inch OD and a 7/8-inch ID. Sampling pipe with between 5/8- and 1-inch ID can be used in specifically approved locations when recommended by manufacturer.
- 2. Pipe Material: CPVC and complying with UL 1887, "Safety Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics."
- 3. Joints in the sampling pipe shall be airtight. Use solvent cement approved by the pipe manufacturer on all joints except at entry to the detector.
- 4. Identify piping with labels reading: "Aspirating Smoke Detector Pipe - Do Not Paint or Disturb" along its entire length at regular intervals according to NFPA 72.
- 5. Support pipes at not more than 60-inch centers.
- 6. Fit end of each trunk or branch pipe with an end cap and drilled with a hole appropriately sized to achieve the performance as specified and as calculated by the system design.

E. Sampling Holes:

- 1. Sampling holes of 5/64 inch, or other sized holes per manufacturer's written instructions, shall be separated by not more than the maximum distance allowable for conventional smoke detectors. Intervals may vary according to calculations.
- 2. Follow manufacturer's written recommendations to determine the number and spacing of sampling points and the distance from sampling points to ceiling or roof structure and to forced ventilation systems.
- 3. Each sampling point shall be identified by an applied decal.

2.14 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

- 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Piezoelectric sounder, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 87 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol. Units shall be capable of producing various selectable tones and sounds.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.

1. Rated Light Output:

- a. 15/30/75 cd, field adjustable (batteries based upon 75 cd).
- b. 110/135/077 cd, field adjustable.

- 2. Mounting: Wall mounted unless otherwise indicated.
- 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
- 4. Flashing shall be in a temporal pattern, synchronized with other units, whenever more than two units are visible in any space.
- 5. Strobe Leads: Factory connected to screw terminals.

D. Voice/Tone Notification Appliances:

1. Comply with UL 1480.
2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
3. High-Range Units: Rated 2 to 15 W.
4. Low-Range Units: Rated 1 to 2 W.
5. Mounting: Flush, semirecessed or surface mounted and bidirectional.
6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.15 FIREFIGHTERS' SMOKE-CONTROL SYSTEM

A. Initiate Smoke-Management Sequence of Operation:

1. Comply with sequence of operation as described in Section 230993.11 "Sequence of Operations for HVAC DDC."
2. Fire-alarm system shall provide all interfaces and control points required to properly activate smoke-management systems.
3. First fire-alarm system initiating device to go into alarm condition shall activate the smoke-control functions.
4. Subsequent devices going into alarm condition shall have no effect on the smoke-control mode.

B. Addressable Relay Modules:

1. Provide address-setting means on the module. Store an internal identifying code for control panel use to identify the module type.
2. Allow the control panel to switch the relay contacts on command.
3. Have a minimum of two normally open and two normally closed contacts available for field wiring.
4. Listed for controlling HVAC fan motor controllers.

C. Firefighter's smoke-control system should be included as part of graphic annunciator.

2.16 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or 120-V ac.

B. Material and Finish: Match door hardware.

2.17 GRAPHIC ANNUNCIATOR

A. Graphic Annunciator Panel: Mounted in an aluminum frame with nonglare, minimum 3/16-inch- thick, clear acrylic cover over graphic representation of the facility. Detector locations shall be represented by red LED lamps. Normal system operation shall be indicated by a lighted, green LED. Trouble and supervisory alarms shall be represented by an amber LED.

1. Comply with UL 864.
2. Operating voltage shall be 24-V dc provided by a local 24-V power supply provided with the annunciator.

3. Include built-in voltage regulation, reverse polarity protection, RS 232/422 serial communications, and a lamp test switch.
 4. ~~[Surface] [Semiflush]~~ mounted in a NEMA 250, Type 1 cabinet, with key lock and no exposed screws or hinges.
 5. Graphic representation of the facility shall be a CAD drawing and each detector shall be represented by an LED in its actual location. CAD drawing shall be at 1/8-inch per foot scale or larger.
 6. The LED representing a detector shall flash two times per second while detector is an alarm.
- B. Graphic Annunciator Workstation: PC-based, with fire-alarm annunciator software with historical logging, report generation, and a graphic interface showing all alarm points in the system.

2.18 REMOTE ANNUNCIATOR

- A. ~~Description: Annunciator functions shall match those of fire alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire alarm control unit, including acknowledging, silencing, resetting, and testing.~~
1. ~~Mounting: Flush or surface cabinet, NEMA 250, Type 1. Provide flush where indicated.~~
- B. ~~Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.~~

2.19 ADDRESSABLE INTERFACE DEVICE

- A. General:
1. Include address-setting means on the module.
 2. Store an internal identifying code for control panel use to identify the module type.
 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- C. Integral Relay: Capable of providing a direct signal to elevator controller, motor controllers, dampers, circuit-breaker shunt trip, or other devices.
1. Allow the control panel to switch the relay contacts on command.
 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.
- D. Control Module:
1. Operate notification devices.
 2. Operate solenoids for use in sprinkler service.

2.20 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one telephone line and dial a preset number for a remote central station. When contact is made with central station, signals shall be transmitted. If service on either line is interrupted

for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
 - 1. Verification that both telephone lines are available.
 - 2. Programming device.
 - 3. LED display.
 - 4. Manual test report function and manual transmission clear indication.
 - 5. Communications failure with the central station or fire-alarm control unit.

- D. Digital data transmission shall include the following:
 - 1. Address of the alarm-initiating device.
 - 2. Address of the supervisory signal.
 - 3. Address of the trouble-initiating device.
 - 4. Loss of ac supply.
 - 5. Loss of power.
 - 6. Low battery.
 - 7. Abnormal test signal.
 - 8. Communication bus failure.

- E. Secondary Power: Integral rechargeable battery and automatic charger.

- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.21 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.

- B. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.

- C. Provide integration gateway using BACnet for connection to building automation system.

2.22 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by device manufacturer.
 - 2. Finish: Paint of color to match the protected device.

- B. Description: Sloped, perforated, 2-piece of size and shape for every manual station and smoke detector.
 - 1. Manufacturer: Chase Security.
 - 2. Enclosure: 16-gauge painted steel enclosure welded on all sides. Perforations are 3/16-inch diameter and 1/4-inch staggered centers.
 - 3. Base Frame: Factory-fabricated and furnished by the cover manufacturer. Mount on surface-mounted junction box. Raceway openings as required.
 - 4. Finishes: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
 - 1. Comply with requirements for seismic-restraint devices specified in Section 270548.16 "Seismic Controls for Communications Systems."
- C. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- D. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
 - 5. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 - 6. Luminaires: Locate detectors not closer than 12 inches from any part of a luminaire and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends. [Install remote test switch and indicating light in location as directed in field. Coordinate installation with Division 23. Provide a

permanent placard to clearly identify location of detector per NFPA 72. Provide one low velocity detector per each 36-inch width of transfer ducts. Locate test switch in same space as smoke detector.]

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- G. Transfer Duct and Plenum In-Duct Smoke Detectors: Comply with NFPA 72. Provide low velocity in-duct smoke detectors within transfer ducts and duct plenums. For transfer ducts up to 36 inches in width, provide one detector. For ducts up to 72 inches in width, provide two detectors at quarter points of the duct. For ducts greater than 72 inches in width, provide detectors 24 inches on center. Provide a permanent placard to clearly identify location of detector per NFPA 72. Provide one low velocity detector per each 36 inches in width of transfer ducts. Locate test switch in same space as smoke damper.
- H. Air-Sampling Smoke Detectors: If using multiple pipe runs, the runs shall be pneumatically balanced.
- I. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.
- J. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- K. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling or 80 inches above finished floor, whichever is lower. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- L. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated. Install bottom of strobe not less than 6 inches below the ceiling or 80 inches above finished floor, whichever is lower. Install devices not less than 24 inches below the ceiling in sleeping rooms.
- M. Provide adjustable 4-watt speakers and 177 candela strobes for all mechanical, electrical, and equipment rooms with noise producing machines.
- N. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- O. Fire-Alarm Control Unit: **[Surface-mounted]** **[Semi-recessed]**, with tops of cabinets not more than 72 inches above finished floor.
- P. Annunciator: Install with top of panel not more than 72 inches above the finished floor.
- Q. Program the system utilizing final room names and numbers as provided by Architect and Owner, which may be different from information shown on the Bid Documents.
- R. Program central graphic annunciation station to reflect all building backgrounds in this project including all devices and addresses, and connect to and provide fiber network connections for campus fire alarm network.
- S. The detectors shall be connected as a separate zone or zones to the fire alarm signaling system, but shall only activate a supervisory signal at the main control unit and any remote annunciators. The CO detection shall not activate the building evacuation alarm.
- T. Any room containing fuel-burning heating equipment and CO detection shall be provided with a sign at all entrances to the space indicating that CO detectors are located inside the space.

3.3 PATHWAYS

- A. Pathways shall be installed as specified in Division 26 Section "Raceways and Boxes for Electrical Systems," unless stated otherwise below.
- B. Exposed raceway shall be painted red enamel.
- C. Smoke control wiring regardless of voltage shall be fully enclosed within continuous raceway. MC not permitted.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.
 - 2. Provide appropriate UL relays and auxiliary contacts to interface with mechanical equipment locally.
 - 3. Magnetically held-open doors.
 - 4. Electronically locked doors and access gates.
 - 5. Provide control and monitoring of hood systems, makeup air systems, equipment under hoods, gas valves and emergency shutoffs.
 - 6. Alarm-initiating connection to elevator recall system and components.
 - 7. Alarm-initiating connection to activate emergency lighting control.
 - 8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 9. Supervisory connections at valve supervisory switches.
 - 10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 11. Supervisory connections at elevator shunt-trip breaker.
 - 12. Data communication circuits for connection to building management system.
 - 13. Data communication circuits for connection to mass notification system.
 - 14. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 15. Supervisory connections at fire-pump engine control panel.
- C. Coordinate all features of the fire alarm devices with HVAC systems, including interface with HVAC control systems, power and control wiring requirements. See Division 23 Section "Air Duct Accessories" and HVAC control sections for requirements and sequence of operations.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.
- C. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Architect/Engineer and authorities having jurisdiction. Proper planning and scheduling (five days) is required.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Provide additional factory-authorized technician site visits and field programming during field testing and twice for post occupancy programming adjustments and testing for owner-initiated changes and tailoring to actual conditions during the first six months.
- E. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- F. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- G. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- H. Prepare test and inspection reports.
- I. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- J. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.
- K. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

- L. Provide two site visits for post occupancy follow-up programming to fine tune sensitive, audio, visual, and any follow-up programming required within first year.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include **12** months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system. As a minimum and in addition to the requirements of other sections, provide two 8-hour days of owner-training sessions in addition to multiple start-up visits to properly support the contractor.

3.10 FIREMEN'S WATCH

- A. Provide a Firemen's Watch 24-hours per day for the time period when the existing building is unsupervised by the existing and/or new fire alarm system. As the new fire alarm system is installed and activated, the size of the Firemen's Watch can be decreased.
 - 1. Fire watch shall be acceptable to the City Fire Marshal.
 - 2. Coordinate with the owner other time periods requiring a Firemen's Watch.
 - 3. Submit with the Bid the proposed new fire alarm system phasing procedures.

END OF SECTION 284621.11
10/12/2018



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Project: 884 - East Hampton Town Hall and Police Station
140 East High Street
East Hampton, Connecticut 06424

smoke control sequence of operations

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/07/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/14/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
LINKED DRAWINGS:			
RECEIVED FROM:			
COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 10:43 AM on 11/07/2018

Section 230993.11-1.10 describes a smoke control sequence of operations. Listed below are associated questions:

1. Is the associated exhaust fan DDC controller required to be UL rated for smoke control (UL 864)?
2. Is the associated VAV DDC controllers required to be UL rated for smoke control (UL 864)?
3. Is the associated RTU factory furnished controllers required to be UL rated for smoke control (UL 864)?

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Thursday, November 15th, 2018 at 8:17AM EST
 A detection of smoke in the holding cell shall close the smoke damper located in the supply ductwork serving the holdingcells. The exhaust fan shall ramp up to maintain differential pressure as indicated in the specification 230993.11. The exhaust fan VFC shall receive a signal directly from the FACP in a smoke event. Therefore, the VAV, and RTU controllers are not required to have a UL 864 rating. The VFC and exhaust fan are required to have a UL 864 rating.

Attachments:

BY _____ DATE _____ COPIES TO _____



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Alternate #5

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/07/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/14/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 12:43 PM on 11/07/2018

Alternate #5 MDF Room Pre-action System states the base bid is to provide a complete wet type fire protection system as indicated on FP-103 2nd floor area. The alternate states to provide a pre-action to the Lower Level Sally Port as shown on FP1.02 & FP1.03 which are the 1st and 2nd floor areas. FP-103 shows a pre-action system for the MDF / IT rooms. And FP1.01 Lower Level shows a dry system for the Sally Port Area. Please clarify this alternate as there are conflicting statements and drawing references.

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Thursday, November 15th, 2018 at 8:24AM EST
Alternate intent will be clarified within Addendum #2 with updated drawings. Pre-action system indicated within Town Hall 2nd Floor spaces, including associated piping from second floor down to Pre-action entry within Sallyport 001 and test drains shall be provided as Add Alternate #5. Base bid pricing to include wet sprinkler coverage in MDF Room (212B) and IT Storage (212C).

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Phone: (860) 953-1477
Fax: (860) 953-1712

Project: 884 - East Hampton Town Hall and Police Station
140 East High Street
East Hampton, Connecticut 06424

Site Lighting

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/12/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/19/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
LINKED DRAWINGS:			
RECEIVED FROM:			
COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 07:50 AM on 11/12/2018

In review of the RFI Responses, specifically RFI#B029 – Site Lite SL1 and Revised Response per Addendum #2 – RFI#B082 as well as RFI#B029 Sketch I have a couple of Questions to clarify some discrepancies.

There is a discrepancy in counts between the SL1.0 Drawing and the SE1.00 Drawings:

- SL1.0 denotes (3) Type SL3 & SE1.0 denotes (4)
- SL1.0 denotes (8) Type SL4 & SE1.0 denotes (7)
- SL1.0 denotes (2) Type SL4HS & SE1.0 denotes (3)
- SL1.0 denotes (2) Type SL5 & SE1.0 denotes (3)

Are we using the Counts per SE1.0 included in Addendum 1 or are we using the counts denoted on SL1.0

Additionally RFI#B09 –Sketch Denotes (4) Type S2A & (1) Type S2 – High Lighted in Yellow – Are we doing something with these Lights?

Also in RFI#B029 Response it states that the Electrical Contractor is responsible for running (2) 3" Conduits between the SL1 Fixtures. Is this the Developers Electrical Contractor or it the Bidding Electrical Contractor?

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Tuesday, November 20th, 2018 at 2:41PM EST

- Counts listed for fixture types from SL1.0 are correct with the exception of type SL5 which should be 3 fixtures. SE1.00 does not include fixtures powered off of Developer's system.
- Nothing is required of the electrical contractor related to lights highlighted in yellow in the document included in RFI B029 response.
- Town Hall project electrical contractor is responsible for these conduits.

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East Hampton, Connecticut 06424

Communication Backbone Cabling

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/13/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/20/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
LINKED DRAWINGS:			
RECEIVED FROM:			
COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 12:24 PM on 11/13/2018

Section 271300 – Communication Backbone Cabling
2.3B Optical Fiber Cable – Calls for Single Mode 24 Strand Armored Cable
3.8.B.4b – Test & Inspections – Optical Fiber Cable Test References Multimode Backbone Link Measurements
Please clarify if the Back Bone Fiber is to be Single Mode or Multimode

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Monday, November 19th, 2018 at 4:11PM EST
Confirmed, optical fiber backbone to be single-mode fiber. Paragraph 3.8.B.4.b of Specification 271300 to be modified to state the following:

- b. Link End-to-End Attenuation Tests:
 1. Single-mode backbone link measurements: Test at 1310 and 1550 nm in 1 direction according to ANSI/TIA 568 C.3, Method B, One Reference Jumper.
 2. Attenuation test results shall be less than that calculated according to equation in ANSI/TIA 568 C.3.

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East Hampton, Connecticut 06424

bullet resistant doors.

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/14/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/21/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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RECEIVED FROM:			
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Question from Al Howat (Newfield Construction, Inc.) at 07:19 AM on 11/14/2018

I have reviewed all files sent to me on this project and cannot find anything on bullet resistant doors.

These are Door Type J, openings 116a, 116B, and 116D

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Monday, November 19th, 2018 at 8:30AM EST
Specification will be added within Addendum #2.

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DDC service contract proposal

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/14/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/21/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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Question from Al Howat (Newfield Construction, Inc.) at 08:42 AM on 11/14/2018

1. **DDC 1st year service contract agreement:** 23 09 00 – 1.13 A indicates requirements for a 1st year service contract agreement. Listed below are the associated questions.
1. Is the 1st year service agreement part of the Base Bid or should this be part of an alternate bid?
 2. If the 1st year service agreement is part of the Base Bid, list all other town wide building structures associated with this 1st year service agreement since Municipal Service contracts include all town wide buildings and in several cases school buildings as well?
 3. If the 1st year service contact is part of an alternate bid, we could not locate the 1st year DDC Service Contact alternate bid line item on the Bid-Proposal-Form.
 4. Associated specification section describes a (6) full day visits and a (1) full day on the 11th month. Is the (1) full day on the 11th month part of the (6) full day total or is it (6) days plus an additional day on the 11month?
2. **DDC service contract proposal:** 23 09 00 – 1.13 B indicates requirements for a service contract proposal. Listed below are the associated questions.
1. Is the service proposal part of the Base Bid or should this be part of an alternate bid?
 2. If the service proposal is part of the Base Bid, list all other town wide building structures associated with this service contract since Municipal Service contracts include all town wide buildings and in several cases school buildings as well?
 3. If the service contact is part of an alternate bid, we could not locate the DDC Service Contact alternate bid line item on the Bid-Proposal-Form.

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Tuesday, November 20th, 2018 at 3:57PM EST

- Question 1
1. Base Bid.
 2. Service contract agreement shall apply to this building and site only. Owner to provide information as necessary to coordinate service work.
 3. Not Applicable.
- Question 2
1. Base Bid.
 2. Service contract agreement shall apply to this building and site only. Owner to provide information as necessary to coordinate service work.
 3. Not Applicable.



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East Hampton, Connecticut 06424

HVAC Questions

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/14/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/22/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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Question from Al Howat (Newfield Construction, Inc.) at 07:45 PM on 11/14/2018

Listed below please find RFI regarding Division 23.

- Glycol System: Section 230993.11-1.18-E-15 call for low glycol alarm. Listed below are associated questions:
 - Is the design intent for a low glycol percentage alarm or low tank level alarm?
 - If the design intent is for a low glycol percentage alarm, a refractometer specification is required.
- Boiler Emergency Wiring: RFI-B107 indicates scope for boiler toggle switch and boiler emergency shut off switch. Is boiler toggle switch and boiler emergency shut off switch provided by division 26 or division 23-09-93?
- HVAC Plate Heat Exchanger: Drawing H4.02 indicates (2) control valve. One of the two controls valve is located on bypass. The other control valve is located on the heat exchange suction line. Listed below are the following questions:
 - Confirm if the bypass line is required?
 - If the bypass line is required, would it be acceptable to replace the (2) 2-way valve with a (1) 3-way modulating control valve?

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Monday, November 19th, 2018 at 10:15AM EST

- Glycol System: Low tank level alarm.
- Boiler Emergency Wiring: Boilers and Hot Water Heater emergency shut off switches are provided by Division 23. Refer to Specification Section #230900 2.6 & Specification Section #230993.11 1.5 C.8.
- HVAC Plate Heat Exchanger:
 - The by-pass line with control valve is not required.
 - Not Applicable.



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Flooring Questions

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/14/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/22/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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Question from Al Howat (Newfield Construction, Inc.) at 07:49 PM on 11/14/2018

1. Which Bid Package is responsible for Spec Section 096700 Fluid & Trowel Applied Flooring?
2. In Spec Section 096566 Resilient Athletic Flooring Line 3.5 A references game lines and marker paint. Are there any game lines or markings required?
3. Is there any wood flooring required from Spec Section 096400 Wood Flooring?
4. Are there any floor finishes at PH-1 Pump House?
5. In Spec Section 093013 Ceramic Tile Line 3.9 a-1. Is the cementitious backer panels required at all wall tile locations? If not what locations require the cementitious backer panels? Which Specification Sections is responsible to provide and install the cementitious backer panels? 093013 Ceramic Tile or 092900 Gypsum Board?

Official Response: Al Howat (Newfield Construction, Inc.) responded on Monday, November 19th, 2018 at 5:48PM EST
Spec Section 096700 Fluid & Trowel Applied Flooring is the responsibility of the flooring contractor.

Attachments:

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Thursday, November 15th, 2018 at 8:12AM EST

1. CMR to assign bid package to specification section 09 67 00.
2. No game lines and marker paint are anticipated at this time.
3. Yes, at lobby stair. Refer to A5 series for additional information.
4. Pump house slab shall be sealed concrete, SC-1.
5. Cementitious backer units are required at all wall tile surfaces unless located within showers. Refer to General Construction Notes on sheet G1.00 and partition types. Showers to receive waterproof panels in lieu of cementitious backer units as per detail 26/A7.02 and partition types. Cementitious backer units are specified in section 09 30 13. CMR to assign bid package to cementitious backer units.

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Flooring Questions

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/15/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/22/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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Question from Al Howat (Newfield Construction, Inc.) at 06:14 AM on 11/15/2018

1. In Spec Section 096566 Resilient Athletic Flooring Line 3.5 A references game lines and marker paint. Are there any game lines or markings required?
2. Is there any wood flooring required from Spec Section 096400 Wood Flooring?

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Thursday, November 15th, 2018 at 8:19AM EST
Refer to RFI 179.

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East Hampton, Connecticut 06424

Grab Bars and sectional doors

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/20/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/27/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
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RECEIVED FROM:			
COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 05:13 AM on 11/20/2018

- Are Swing Down Grab Bars required in the HC stalls? The keynote is #4 and it's not shown on any of the enlarged plans or elevations on drawing A7.01 & A7.02.
- Can you confirm the Sectional OHD's per spec 083613 have electric operators. Section 083613-1.2A indicates Manually Operated Sectional Doors.

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Tuesday, November 20th, 2018 at 8:10AM EST

- Swing Down grab bars are not required in the handicapped stalls.
- Sectional Doors are powered with electrical operators as per balance of specification section 083613. Revise language in subsection 1.2 - A to "power operated sectional doors". Refer to subsections 2.3- K and 2.10 for additional information related to operator.

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140 East High Street
East Hampton, Connecticut 06424

detention hardware

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/19/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/26/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
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COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 05:57 PM on 11/19/2018

I have had several detention hardware contractors asking about response to RFI B172. The question was about providing hardware sets. The regular door hardware has sets 1-27. However the detention hardware specification just indicates different pieces of hardware and not assigning them to any particular door. Examples:

1. Section 2.3 has 3 different types of door hinge. Which is correct and for which door?
2. Section 2.4 is for mechanical locks and 2.5 is for electromechanical locks. Which type of lock is to be used?
3. Specs missing for sliding door track/hangers.

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Tuesday, November 20th, 2018 at 4:05PM EST

1. Provide half-surface detention hinges at all swinging detention doors, Type L.
2. Electro-mechanical locks are to be provided at all cell doors. Provide mechanical deadlocks at door 003 Holding only.
3. See specification section 08 34 63, Detention Doors and Frames. The sliding door track is to be provided as part of the manufacturer's door system/frame are to be purchased as one unit/assembly. Door track/hangers are to be provided by the sliding door manufacturer as part of the sliding door system. Refer to A7.04 for additional information.

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140 East High Street
East Hampton, Connecticut 06424

AV Questions

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/20/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/27/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
LINKED DRAWINGS:			
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COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 05:03 AM on 11/20/2018

1. AV3.04; detail 2, Flows show TX-B with VGA, audio, usb and rj45, this would make the DM plate a DM-TX-C-2G-T. However the parts list on page 5 of 17 from the "27-41-00-Audio-Visual-Systems_Rev_1" shows the TX-B plate as a DM-TX-4K-100-C-1G. Please advise.

2. Same as above for AV3.03 for TX-B plates are shown with VGA. Please advise.

3. AV3.07; lower right hand side of flows show in wall section; however on page 6 of 17 from the "27-41-00-Audio-Visual-Systems_Rev_1" show this mount as ceiling. Please advise.

4. AV3.09; Town Council Table section calls out for MIC-A with a description of gooseneck mic. However the parts list on page 7 of 17 from the "27-41-00-Audio-Visual-Systems_Rev_1" shows the MIC-A is a table top mic. Please advise.

5. The CH32 Mute Button is being replaced with the TS005. Will this be ok?

Official Response: Chris Legiadre (Amenta Emma Architects, P.C) responded on Tuesday, November 20th, 2018 at 2:53PM EST

- 1. Confirmed TX-B Transmitter in Detail 2 on AV3.04 is to be Crestron DM-TX-4K-100-C-1G per specifications 274100 Paragraph 2.9.A.
- 2. Confirmed TX-B Transmitter in Detail 1 on AV3.03 is to be Crestron DM-TX-4K-100-C-1G per specifications 274100 Paragraph 2.9.A.
- 3. Per Detail 1 on AV2.06, Display type D (DISP-D) are to be ceiling mounted. Outlets serving displays are to be wall mounted.
- 4. Confirmed MIC-A Microphone in Detail 1 on AV3.09 is to be Clock Audio C004E-RF per specifications 274100 Paragraph 2.10.A.
- 5. Confirmed TS-005 is acceptable. Specification 274100 Paragraph 2.10.A, item MIC-A (accessory) to be modified from Clock Audio CH32 to Clock Audio TS-005.

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Project: 884 - East Hampton Town Hall and Police Station
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East Hampton, Connecticut 06424

Wall Type 36R

TO:	Chris Legiadre (Amenta Emma Architects, P.C)	FROM:	Al Howat (Newfield Construction, Inc.) 225 Newfield Ave Hartford, Connecticut
DATE INITIATED:	11/20/2018	STATUS:	Closed
LOCATION:		DUE DATE:	11/27/2018
PROJECT STAGE:		COST CODE:	
SUB JOB:		SCHEDULE IMPACT:	
COST IMPACT:		SPEC SECTION:	
DRAWING NUMBER:		REFERENCE:	
LINKED DRAWINGS:			
RECEIVED FROM:			
COPIES TO:	Glen LeConche (Town of East Hampton), Yegor Muravskiy (Newfield Construction, Inc.)		

Question from Al Howat (Newfield Construction, Inc.) at 05:10 AM on 11/20/2018

Detail 26/A3.02 shows Wall Type 36R which doesn't appear in the partition schedule. Please provide what the wall type is.

Official Response: Chris Legiadre (**Amenta Emma Architects, P.C**) responded on Tuesday, November 20th, 2018 at 8:14AM EST

Partition type 36R shall be 2-hour rated shaft-wall construction as indicated in detail 30/3.02. Refer to specification section 03 30 00_L for make-up and UL number.

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