ADDENDUM

Date August 30, 2024

To Prospective Bidders

Re Addendum No. 2 to the For Bidding documents for:

NGRC Building 255 Renovation
Bangor, Maine
Project No. 23245

This Addendum forms a part of the Contract Documents and modifies the original For Bidding Documents dated August 13, 2024 and Addendum 1 dated August 20, 2024.

This Addendum consists of thirteen pages, Specification Sections Table of Contents, 004113, 010000, 028213, 054000, 072100, 080671, 084523, 090561, 230900, 231000, 284621.11 and Drawings listed on page thirteen.

Harriman

Mark D. Lee, AIA LEED AP
Principal, Architect, CEO

QUESTIONS AND ANSWERS

Q1. Please provide information on Finish Schedule for items that say "TBD" for product sizes, etc.

A1. TBD indicates that the Architect and Owner will select colors from the approved and submitted product manufacture's full range.

Q2. What is the new Rock Wool insulation they have specified in the interior stud cavities of the walls shown in the screen shot from the Plans below?

A2. See revised drawings issued with this Addendum.

Q3. Is it ComfortBoard and not ComfortBatts?

A3. BATTS.

Q4. R-30 Mineral Wool Batts are 7-1/4" thick and will not fit in 3-5/8" or 6" Metal Stud Cavities as shown in the plans.

A4. See revised drawings issued with this Addendum.

Q5. Neither Mineral Wool Board nor Mineral Wool Batts are listed in the Thermal Insulation Specifications.

A5. See revised drawings issued with this Addendum.

Q6. The only Batt Insulation listed is in the Thermal Insulation Specifications is Fiberglass Batt Insulation.

A6. See revised drawings issued with this Addendum.

Q7. Drawing XD202 West Elevation A2 indicates this is part of Alternate 1. Shouldn't the EIFS/Cornice removal be part of Base Bid work?

A7. See revised drawings issued with this Addendum.

Q8. Is the removal of the foundation insulation indicated to be Base Bid or Alternate?

A8. See revised drawings issued with this Addendum.

Q9. I don't see a detail for the new exterior HVAC pads.

A9. Refer to civil details for exterior concrete pads.

Q10. When we excavate the existing building foundation for new waterproofing we will need to remove some existing concrete door slabs. Do these have foundations? What is the detail for the new slabs at these locations?

A10. Waterproofing the existing building has been removed. See revised drawings issued with this Addendum.

Q11. Specification section 260010 paragraph 3.4 DEVELOPMENT OF FACILITY EPM PROGRAM. Is this done by the Owner's Commissioning Agent or are you asking the electrical contractors to include it? All the EC's I've talked to are excluding it. I believe this should be handled by the Owner?

A11. Yes, the EPM may be excluded from EC's bid.

Q12. Detail A2/A35-1. There is a steel channel that refers to structural but I don't see any reference to this on the structural drawings.

A12. The platform framing will be cold form metal framing see specifications.

Q13. Is MC cable allowed to be used as branch circuit wiring, and fire alarm wiring in concealed locations not exposed to physical damage?

A13. MC cable is not permitted for fire alarm wiring per the specification. MC cable may only be permitted for the final 6 feet of connection to light fixtures and/or mechanical equipment.

Q14. Transformer Pad. There are 2 different sizes on the schedule. Please verify which size is required for this project.

A14. Transformer pad shall be 9'x9' as indicated on the site-civil plan.

Q15. Do you have specifications for the Translucent Panels? We would really need this in order to get an accurate price from Kalwall.

A15. See revised specification 084523, issued with this Addendum. Basis of design: Kalwall or equal, 4" panel, with U-factor 0.08, color white.

Q16. After reading the specifications for the exterior aluminum windows, we are not clear what type of glass is required. Please clarify the specifications for the glass.

A16. Provide glass as specified in Specification Section 085110, Part 2, Paragraph 2.4. Glazing.

Q17. Please confirm if the glass required for BL1 and BL2 (interior) is 1/4" clear tempered.

A17. The glass for the B1 and B2 interior lites should be clear and tempered.

Q18. On the contractor bid form it lists Install PV panels on Addition as an alternate. What are these PV panels?

A18. PV panels will be Owner supplied, contractor installed. See array description on E20-2.

Q19. Is a mock up required for the exterior windows and the translucent panels? If so, what size do these need to be?

A19. A mockup of the translucent panel is not required. However, mockups are required for the windows per specification section: 085110 1.5 H.

Q20. Drawing A35-1 has the railing details. It calls out in multiple locations "SS Railing Post" and "SS Pipe Rail". It also calls out "Galvanized Railing System". Are these railing to be Stainless Steel or Galvanized?

A20. The wall and minimalist floor mount railings associated with the ramp and stairs for the platform in Main Band Rehearsal Room 213 are to be stainless steel. The exterior sectional railing system with wire mesh infill panels shall be galvanized and painted.

Q21. The existing sewer from building 255 calls out to be cut and capped on drawing C-10-2. This is incorrect this need to be routed to a manhole. Please provide details on where this should go.

A21. The intent is to remove the existing sewer line and reconnect (as shown on the plumbing drawings) to "New Sewer Manhole 1".

Q22. Manhole 647 has ductile iron force main going into it. This requires relocation, please provide line size.

A22. CB 647 is a catch basin. Assuming you meant manhole 617, there is an 8" "blue pipe" which is PVC.

Q23. During our conversation with Paul, Juniper Ridge requested information from the engineers on the contaminated soil. There will be approximately 3500 yards of material removed from site not including any water that is found. Do we have plans if juniper ridge will not take the contaminated soil? Suggested plans were on site incinerator or there may be an option to burn at a local pavement plant.

A23. The Owner is actively working with Juniper Ridge to accept the contaminated soil.

Q24. Abandon Fuel line. Can we get some details on this line? Has it been cleaned? Can the engineer provide details on how they want to cap the line?

A24. The state of the existing fuel line is unknown. Coordinate environmental impacts with Haley Ward prior to removal.

Q25. Thrust Blocks- thrust blocks require 64 sq feet of undisturbed soil for a 16" line and 16 sq feet for an 8" line. In order to do the work all adjacent soil will need to be disturbed. Also, these lines intersect. Please provide a thrust block detail to meet these conditions.

A25. It is unclear the exact orientation of the pipes. The thrust block detail will be developed for each specific arrangement of pipe as needed, based on the detail on sheet C50-1.

Q26. In order to do the work on the northeast side of the existing building the fence will need to be removed during construction. Please provide a detail for a temporary fence system.

A26. The Contractor must coordinate with the Owner while doing work that affects the fence. At the close or each day, a secure fence must be in place.

Q27. Regarding Specification section “00 73 46” why are there two separate wage rate forms? Please direct us on which scale to use.

A27. Use the building wage rates and not the earthwork rates.

Q28. There is a conflict with new water main relocation. There must be 6’ of undisturbed soil on backside of each thrust block. With the current limiting factors such as fence, NUE,NUC, and existing water main servicing current building, and having to keep 6’ of vertical separation as well from electrical doesn’t seem plausible. The 8” and 16” mains will need adequate separation as well due to thrust blocks, and thrust blocks will be required at changing direction tee’s, bends, crosses, tapping sleeves, and dead ends totaling 11.

A28. Thrust protection resistance will have to be coordinated with the client, engineer, and water district in the field with alternative thrust restraints on a case-by-case basis.

Q29. The sewer main that runs from south to north into MH 617 that is going to be removed, it denotes the size as 8” coming out of structure but at north end it shows it being 10”, please clarify.

A29. Lines have been changed to 10". See revised drawings issued with this Addendum.

Q30. SMH #639 C 10-3 says its 4" pvc pipe coming from SMH #639 to SMH 3617 but C 10-1 says it's ductile iron. Can you clarify this conflict. Unfortunately there is no picture in C10-3.

A30. The evidence at each structure indicates it is a PVC pipe, not a ductile iron pipe. See updated notation on C10-2 included with this Addendum.

Q31. Sewer specs section 333000 subsection 3.6 C-1 requires concrete poured over wye connections. Is this what they really want?

A31. Pre-manufactured water-tight fittings, gaskets, and connection brackets/straps should be used for connecting to existing pipes. Therefore, concrete encasement is not necessary.

Q32. There is also an unidentified blue pipe the enters SMH #617. On C 10-3 there is a note about this pipe and that it "gushed at interval". This pipe is totally not on the plans and the note asked if it is pumped from somewhere

A32. This pipe is the 8" pvc pipe that is being intercepted at the new sewer manhole NSMH 4. See revised drawings issued with this Addendum.

Q33. Alternate Bid Item #2- Install PV Panels on Addition. I cannot find any spec or drawing on that. Can we get some further information on this? Is this a design/build PV array?

A33. PV panels will be Owner supplied, contractor installed. See array description on E20-2.

Q34. Can you provide further details on the existing electrical service entrance and the intention of getting power to the new pad mount transformer?

A34. Versant WO#1903481. See updated one line diagram issued with this Addendum.

Q35. Can you provide a narrative of how the new service entrance is to be built from the existing electrical infrastructure?

A35. See revised drawings issued with this Addendum.

Q36. Can you please confirm what the existing floor finishes are in the Yellow area below? They are not shown on the H10-1 Drawing.

A36. The existing flooring in both of the latrine and shower areas (112A-B, 114, 114A-B) appears to be ceramic tile. The rest of the highlighted spaces (111 & 115) are VCT.

Q37. Dwg A05-1 Base Bid - are only the "door slabs" being removed and the frames remaining? Or do only the doors noted #2 get demolished? They show dashed so it a bit confusing.

A37. Sheet A05-1 shows only the demolition associated with the addition in existing rooms 116, 124 and 127. Existing door slabs, frames, and hardware to remain unless specifically tagged and noted.

Q38. Dwg A05-2 - are all the doors and frames being removed? If all the existing walls CMU with wrap around metal frames? Or are the frames grouted into the walls? Notes 2 vs Note 13 is confusing.

A38. Sheet A05-2 (reissued) shows demolition work associated with Add Alt. 1. Keynote #2 indicates the doors that will be removed completely as part of that scope. Some of these openings will be infilled, others will receive a new door and/or frame. Keynote #13 indicates doors and frames to be removed for replacement if the Owner accepts Add Alt. 3.

Q39. Are all the walls CMU?

A39. No. Existing walls are a mix of load bearing CMU, CMU with furring or tile finish, and metal stud with drywall.

Q40. Dwg M05-1 and M06-1 Alt 1 - do any of the existing pipes or ductwork contain ACM?

A40. Refer to H10-1.

Q41. The Bangor Water District indicated that their records are showing the 8" water main in conflict is abandoned. Can this be confirmed?

A41. See updated plans reflecting the abandoned water main issued with this Addendum.

Q42. What are the EXC1, EXC2 and EXC3 that indicate to be reinstalled?

A42. These are existing acoustic ceiling tiles and specialty acoustic clouds that will be reinstalled after the minimal removal required for abatement, new sprinkler and new Mechanical Scope of Work. The Contractor is responsible for replacing in kind any ceiling materials damaged during scope of work. The Owner will provide specifications.

Q43. What is the existing flooring in the two rooms in yellow below? The A05-2 Alt Plan calls for the flooring to be removed. Are we to assume it is the same as Room 134?

A43. Existing flooring in both 135 and 137 appears to be ceramic tile.

Q44. Regarding the connections in relationship to the channels and the CMU walls for the Vault on S30-1 and A1,3,5 / S60-2: a. Do the channels sit on the CMU, and the plates are notched around the channels? b. Or, do all these parts get shipped in individual pieces for complete field assembly?

A44. Plates are installed first and then channels and angles are welded to plates. Ceiling plates are to be installed after channels are installed.

Q45. Please provide part numbers for Basis of design GRID that "actually" Meets BABA requirements.

A45. The Basis of Design for ceilings is listed on the drawings as Armstrong. The Contractor is responsible for providing corresponding BABAA certificates for all components, products and assemblies during submission.

Q46. Please confirm that Certainteed does NOT meet BABA requirements and should not be part of this specification section

A46. The Contractor is responsible for providing corresponding BABAA certificates for all components, products and assemblies during submission.

Q47. Most locations on the prints are just drawn as triangles. On the legend page they show two locations with a triangle, but neither is exactly the same symbol used on the prints. One triangle location gets 2 data and a voice, and the other one gets 2 data. Since all the symbols are the same should we assume 2 data or 2 data and a voice for each triangle?

A47. Each location with a triangle that is otherwise not labeled must have (2) Cat6 drops with a Green cable and jack for Voice, and a Blue cable and jack for Data.

Q48. See note 6 on E20-3. It doesn't tell us (or at least we can't see it called out) how many locations or cables in each room; just a list of rooms and that the existing locations need a box and conduit. Are you able to provide any insight on this? Can you call out the number of locations by room number?

A48. All the locations in the room numbers that are called out in the note have Cabling and connectivity already installed. These drops are concurrently located with the old cabling that will need to be removed as part of this project. Once the old cabling is removed the new faceplates and jacks will be installed in the existing box/conduit with labeling completed and cables re-tested.

Q49. As with the electrical service entrance, can you please provide a one-line diagram and a narrative of how the new communications service entrance is to be run. Further details, or a zoom in on the utility plan would be appreciated too.

A49. See revised drawings issued with this Addendum.

Q50. Typically, Versant requires an 8'x8' transformer pad (see attached spec sheet). Which transformer pad should we price?

A50. Transformer pad shall be 9'x9' as indicated on the site-civil plan.

Q51. There is an open triangle on the Legend Drawing E00-1 that is noted it is a voice/data drop: Is this representing to install 2 cat6 cables at each one of these icons?

A51. Each location with a triangle that is otherwise not labeled must have (2) Cat6 drops with a Green cable and jack for Voice, and a Blue cable and jack for Data.

Q51. Drawing E70-1 showing faceplates depicts a wall plate with 2 data & one voice; 2 data; 2 data for a WAP; and 1 voice for wall phone. How are we to determine which of these wall plates gets what as the icon is the same with the exception of the wall phone & the WAP?

A52. See revised drawing issued with this Addendum.

Q53. Specs 271500 2.5 B 1 says faceplates should be stainless steel. Are we to provide stainless steel faceplates all throughout Building 255?

A53. Yes.

Q54. Specs 271500 2.4 G 2 says we are to provide color coded boots on the patch cords- what is meant by this?

A54. Patch cords are to have boots, not just plain RJ45 connectors. The boot color must match the cabling color.

Q55. What is going to happen to the newly installed cat6 voice and data cabling at each open triangle icon? This is the existing cat6 cabling hanging out of a junction box with a cat6 connector on it.

A55. The recent project to upgrade the IT rooms and cabling was halted just before cutting over to the new infrastructure when this project was given the go ahead. The requirement is to complete that work under this new project.

Q56. Drawing C40-1 mention 3 conduits installed in 2011 having Power, Telephone and Comms-these 3 conduits will have to be rerouted as they're in the way of the new addition. What is in those conduits for cabling and what will be done with the cables in those conduits?

A56. C40-1 shows these 3 conduits being re-routed around the new building addition. Refer to E20-3 for what is contained inside these conduits. The old communications cabling in this run must be removed and replaced with new 12-strand single mode fiber to the guard shack.

Q57. There is quite a lot of fiber & copper backbone cabling that enters this building from a couple of different locations and it was not relocated over to the new IT Room during the last project at this building. There is no mention of it on these drawings- what is happening with all of that backbone cabling and is there a riser diagram showing all of it and capturing what to do with it?

A57. The old backbone cabling is terminated in the old TR (139) which is immediately adjacent to the new TR (138B). These terminations are to remain, except for the new cable being installed as part of this project. The backbone cables are to then be extended to the new TR 138B and landed in the existing fiber optic patch panel in the racks there.

Q58. What brand and type is the existing FACP?

A58. Gamewell-FCI 7100.

Q59. Who is the servicing contractor for the existing fire alarms?

A59. Eastern Fire.

Q60. Where can we find the Radon below grade detail? Will there just be pits where the Radon drops are shown? If so, how far down into pit will the perforated pipe extend? If not, please provide drawing showing below grade Radon.

A60. Detail is added to P50-2, see revised drawing issued with this Addendum.

Q61. The roof drains shown on drawing P10-2 in room 113 gym & lockers and room 116 Band drill pad, are these to be new roof drains? Demo drawings do not show them being removed.

A61. Piping Shall remain, new roof drains installed and connected to existing piping.

Q62. Are we to complete spray fireproofing in the existing structure and perimeter steel as we are in the addition? If so, we will need the structural drawings with steel sizes for that building as well.

A62. No. The existing structure does require spray fireproofing.

Q63. It looks like the spec section 072700 for AVB calls for locations where EFIS "would not be used" but it appears that the drawings show the entire project as EFIS, so no there isn't any AVB. Could you please confirm?
A63. See revised specification issued with this Addendum.

Q64. It is called for waterproofing on frost wall conditions. Is that needed?
A64. Waterproofing is only required on new frost walls and foundations.

Q65. There is a layer of filter fabric on the foundation detail and is drawn to be a stand-alone item. This is an item that comes attached to the drainage mat specified already. If adding another layer, it is going to defeat the purpose of the filter fabric/drainage mat.
A65. The foundation shall be supported on crushed stone wrapped in fabric as shown. See revised civil drawings, issued with this Addendum, for additional information.

Q66. Can the bid be extended in any way?
A66. No.

Q67. Due to the holiday weekend can the bid date be extended ?
A67. No.

Q68. Is it possible that the ABI-1 alternate be awarded and not the base bid ?
A68. No.

Q69. Is it possible to award the alternate ABI-1 to a different contractor than the base bid ?
A69. No.

Q70. Please confirm this project requires BABA ?
A70. Yes.

Q71. Where can we find the Radon below grade detail? Will there just be pits where the Radon drops are shown? If so how far down into pit will the perforated pipe extend? If not please provide drawing showing below grade Radon.
A71. See revised drawings issued with this Addendum.

Q72. The roof drains shown on drawing P10-2 in room 113 gym & lockers and room 116 Band drill pad, are these to be new roof drains? Demo drawings do not show them being removed.
A72. Existing piping is to remain. New roof drains to connect to existing.

Q73. 230900 does not appear to by the typical Army Guard Niagara specification. Please clarify.
A73. Refer to revised specification issued with this Addendum.

Q74. Typically, the Army Guard 230900 specification requires 100% colored conduit. However, this specification lists that free-air cable in concealed locations is acceptable. Is this the case?
A74. Refer to revised specification issued with this Addendum.

Q75. 230900 states "cabinet unit heaters, unit heaters, terminal heating units, and the like shall have "stand-alone" control" please verify that is the Armys intent.

A75. Refer to revised specification issued with this Addendum. Please refer to sequence of operations and points lists on drawing M50-4 for additional information.

Q76. Duct Liner – In specification section 230713 Duct Insulation it states that the 1st 10 feet of supply & return shall have 1" liner. Does this apply to ducted indoor units and ERVs as well as RTUs?

A76. This does not apply to ducted indoor units and ERVs. Please refer to the mechanical duct plans, they indicate which ducts require duct liner.

Q77. Flex Duct – In specification section 233113-2.3 C it mentions fabric-core flex duct but there is not a fabric core duct listed. Could you provide a spec on fabric-core flex duct?

A77. The spec section calls out to use either semi-rigid flexible aluminum type (insulated or bare), or fabric-core type (insulated). Please use Semi-Rigid Flexible Aluminum Ductwork since the specification lists insulated and bare versions of this product.

Q78. On page XP200 there are descriptions of wall types. EXT. TYPE A3, and A5 list a 3-1/2" MTL stud 16 o.c. and EXT. TYPE A4 with a 6 " MTL stud wall. The noted rockwool batt is to be of R30 which is a 10 " wide batt. Is there an alternative for these new exterior walls and is there also an appropriate STC rating which is not shown?

A78. See revised drawings issued with this Addendum.

Q79. Above descriptions also conflict with Keynote legend of wall type, A10-3, (4) in as much it is described as a 3-1/2" MTL furring wall on interior using a 3" SAB leaving a 1/2 space toward CMU. What STC and/or "R" rating will this BATT need?

A79. No. The stud should be a 3 5/8" LGMF held off the CMU wall with clips ½". Per the Comcheck, the cavity should be filled with a minimum of R-14 batt insulation. Per specification, the batt should be mineral wool.

Q80. Keynote legend of wall type, A10-3, (5) is described to have a 2-1/2" MTL furring wall and refers that this type is similar to A40-1 type F. So is this type of wall getting a normal fiberglass batt to fit the void?

A80. All exterior wall assembly batt insulation should be mineral wool per specifications.

Q81. In Addendum 1 pg. XP302 calls for the exterior walls (Section A1/B1) to have an interior furring of 6"MTL stud wall. Is this correct?

A81. Section A1/B1 reference wall type A3 on XP200, which has an interior 3 5/8" metal stud wall.

Q82. Can we remove the level 4 Nicet from the specs in division 28. There will be a huge price increase if we keep one on site during the duration of the project. Along with there being very few in the state.

A82. The requirement has been adjusted to a technician with 8 years of experience. See revised specification issued with this Addendum.

Q83. Duct Liner – The round runouts to the supply grilles on M10-4 appear to be internally lined like the rest of the ductwork serving this space. Should that duct be dual wall or just acoustically lined? Please provide a spec for the round duct liner or dual wall duct you choose.

A83. Contractor shall use Acousti-k27 double wall insulated ductwork with 1" thick insulation manufactured by McGill Airflow Corporation. This shall apply to round runouts to supply grilles indicated on drawing M10-4.

Q84. More of an informative comment than a question, but I am hearing from a majority of subs/suppliers that they will not have appropriate time to submit a bid by next Thursday given the fact that the addendum most likely be until Friday and with Monday a holiday it doesn't work for them.

A84. Bid opening shall remain as September 5th.

Q85. For Builders Risk insurance requirements, they need to know the construction type for the existing building being renovated.

A85. Type 3B, see G01-1

Q86. The way that the fire alarm spec reads, it requires NICET Level 4 supervision for installation. Certain suppliers are not quoting this, and one that may is telling us that the cost of just having that technician on site as required would be over 1 million dollars. Can this requirement be changed to not require such restrictive levels of oversight on the installation?

A86. The requirement has been adjusted to a technician with 8 years of experience. See revised specification issued with this Addendum.

Q87. The Section 260526 Grounding and Bonding for Electrical Systems spec calls for grounding in accordance with a Lightning Protection System (UL 96 and NFPA 780). Is a LPS required for this project?

A87. Lighting protection system is not required here.

Q88. The one-line diagram on sheet E50-1 shows 3 panels, P1, P2, and P7, that are not found on the prints or in the panel schedules. Can you please provide further information?

A88. See revised drawing E20-3 issued with this Addendum.

Q89. There is reference to the RPF environmental report Dated May 15, 2024. We cannot seem to locate this in the bid docs. Could you please provide this report?

A89. Refer to spec section 028213 for additional information.

Q90. Drawing H10-1 indicates that "Hazardous material removal key notes" "H01" identifies room 109 (ACM black mastic) and goes on to say, "and throughout building to be removed'. Can you clarify why room 109 is specifically called out in the keynotes, while the legend calls it out in multiple locations throughout the building?

A90. Refer to spec section 028213 for additional information.

Q91. Drawing H10-1 identifies 3,800 LF of asbestos pipe and fittings in corridor 100 and room 138. This is an extremely large quantity for the identified areas. The RPF survey report may help answer this question if the report provides quantity breakdowns for the hall and room 138. Can you please clarify?

A91. Refer to spec section 028213 for additional information.

CHANGES TO SPECIFICATIONS

1. TABLE OF CONTENTS
   a. Revised and reissued with this addendum.

2. SECTION 004113 – CONTRACTOR BID FORM
   a. Revised and reissued with this Addendum.

3. SECTION 010000 – ADMINISTRATIVE PROCEDURES
   a. Revised and reissued with this Addendum.

4. SECTION 028213 – ASBESTOS ABATEMENT & RELATED WORK
   a. Issued with this Addendum.

5. SECTION 054000 -COLD-FORMED METAL FRAMING
   a. Revised and reissued with this Addendum.

6. SECTION 072100 – THERMAL INSULATION
   a. Revised and reissued with this Addendum.

7. SECTION 080671 – DOOR HARDWARE SCHEDULE
   a. Revised and reissued with this Addendum.

8. SECTION 084523 – FIBERGLASS-SANDWICH-PANEL ASSEMBLIES
   a. Issued with this Addendum.

9. SECTION 090561 – MOISTURE VAPOR EMISSION CONTROL
   a. Revised and reissued with this Addendum.

10. SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC
    a. Revised and reissued with this Addendum.

11. SECTION 231000 – EXISTING INTEGRATED AUTOMATION NETWORK SERVER
    a. Revised and reissued with this Addendum.

12. SECTION 284621.11 – ADDRESSABLE FIRE-ALARM SYSTEMS
    a. Revised and reissued with this Addendum.

DRAWINGS REVISED AND REISSUED WITH THIS ADDENDUM, DATED 08-30-2024:

1. DRAWING C10-2- SITE DEMOLITION PLAN
2. DRAWING C40-1- SITE UTILITY PLAN
3. DRAWING C50-2- SITE AND STORMWATER DETAILS
4. DRAWING S10-1 -RENOVATION FOUNDATION PLAN
5. DRAWING S30-2 – ADDITION ROOF FRAMING PLANS
6. DRAWING S40-2 – BRACE FRAME ELEVATIONS AND DETAILS
7. DRAWING S60-1 – TYPICAL FRAMING DETAILS
8. DRAWING S60-3 – TYPICAL FRAMING DETAILS
9. DRAWING XD201 – EXTERIOR ELEVATIONS DEMOLITION SOUTH AND EAST ELEVATIONS
10. DRAWING XD202 – EXTERIOR ELEVATIONS DEMOLITION NORTH AND WEST ELEVATION
11. DRAWING XP100 – BELOW GRADE WATERPROOFING PLAN
12. DRAWING XP200 – EXTERIOR WALL ASSEMBLY CROSS SECTIONS
13. DRAWING XP302 – WALL SECTIONS
14. DRAWING XP303 – WALL SECTIONS
15. DRAWING XP501 – DETAILS- ROOF AND CORNICE
16. DRAWING XP502 – DETAILS
17. DRAWING XP701 – EXTERIOR INSULATION FINISH SYSTEM CLADDING DETAILS
18. DRAWING A05-2 – DEMOLITION FLOOR PLAN (ADD ALT. 1)
19. DRAWING A10-3 – ADDITION FLOOR PLAN
20. DRAWING A60-1 – DOOR & BORROWED LITE SCHEDULE & TYPES
21. DRAWING I61-1 – ROOM FINISH SCHEDULE & MATERIALS LIST
22. DRAWING I70-1 – RENOVATION REFLECTED CEILING PLAN (ADD ALT. 1)
23. DRAWING I70-2 – ADDITION REFLECTED CEILING PLAN
24. DRAWING I71-1 – RENOVATION MATERIALS FLOOR PLAN (ADD ALT. 1)
25. DRAWING I71-2 – ADDITION MATERIALS FLOOR PLAN
26. DRAWING I83-2 – CASEWORK DETAILS
27. DRAWING P00-2 – DESIGN CALCULATIONS
28. DRAWING P50-2 – DETAILS
29. DRAWING M10-4 – ROOFTOP DUCTWORK ADDITION
30. DRAWING M50-4 – CONTROL POINT LISTS
31. DRAWING E10-2 – FIRST FLOOR ADDITION LIGHTING – BASE BID
32. DRAWING E20-3 – FIRST FLOOR RENOVATION POWER – ADD ALT 1
33. DRAWING E30-1 – FIRST FLOOR RENOVATION SYSTEMS – BASE BID
34. DRAWING E30-2 – FIRST FLOOR ADDITION SYSTEMS – BASE BID
35. DRAWING E50-1 – ELECTRICAL DIAGRAMS
36. DRAWING E60-1 – ELECTRICAL SCHEDULES SHEET 1
37. DRAWING E60-2 – ELECTRICAL SCHEDULES SHEET 2
38. DRAWING E70-1 – ELECTRICAL DETAILS

NGRC BUILDING 255
RENOVATION
BANGOR, MAINE

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00 41 13
Contractor Bid Form

NGRC Building 255 Renovation Project BGS# 3612

Bid Form submitted by: *paper documents only to address below*

Bid Administrator:

Sara Thompson Sara.Thompson@maine.gov
Directorate of Facilities Engineering
194 Winthrop Street, Bldg. 7, Camp Keyes
Augusta, Maine 04330

Bidder:

Signature: _____

Printed name and title: _____

Company name: _____

Mailing address: _____

City, state, zip code: _____

Phone number: _____

Email address: _____

State of incorporation, if a corporation: _____

List of all partners, if a partnership: _____

The Bidder agrees, if the Owner offers to award the contract, to provide any and all bonds and certificates of insurance, as well as Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers if required by the Owner, and to sign the designated Construction Contract within twelve calendar days after the date of notification of such acceptance, except if the twelfth day falls on a State of Maine government holiday or other closure day, or a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the first available business day following the holiday, other closure day, Saturday, or Sunday.

As a guarantee thereof, the Bidder submits, together with this bid, a bid bond or other acceptable instrument as and if required by the Bid Documents.

00 41 13
Contractor Bid Form

1. The Bidder, having carefully examined the *NGRC Building 255 Renovation Project* Project Manual dated *13 August 2024*, prepared by *Harriman Associates*, as well as Specifications, Drawings, and any Addenda, the form of contract, and the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the **Base Bid** amount of:

   $ _____ .00

2. Allowances *are included* on this project.
   Allowance #1 - Remove and store furniture for project duration. $ *75,000.00*
   Include this figure in the total for Alternate Bid Item #1

3. Alternate Bids *are included* on this project.
   Alternate Bids are as shown below
   Any dollar amount line below that is left blank by the Bidder shall be read as a bid of **$0.00**.

   1 Bldg. 255 Renovation $ _____ .00

   2 Install PV Panels on Addition. Panels provided by Owner. $ _____ .00

   3 Replace all doors versus existing to remain. $ _____ .00

   4 Replace combination locking device on arms room vault door $ _____ .00

4. Bid security *is required* on this project.
   If noted above as required, or if the Base Bid amount exceeds $125,000.00, the Bidder shall include with this bid form a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with this completed bid form submitted to the Owner.

5. Filed Sub-bids *are not required* on this project.
   If noted above as required, the Bidder shall include with this bid form a list of each Filed Sub-bidder selected by the Bidder on the form provided (section 00 41 13F).

SECTION 010000

ADMINISTRATIVE PROCEDURES

PART 1 GENERAL

1.01 CONTRACT REQUIREMENTS

A. Scope of Work:

1. The base bid for this project consists of the construction of a 6,701 SF concrete masonry addition (Base Bid) as well as the complete facility renovation (Alternate Bid Item #1) of a 21,366 SF Army National Guard Armory. The addition will contain multiple rehearsal and practice rooms as well as all the required infrastructure to support the 195th US Army Band. The renovation includes Hazmat removal, repair of the building envelope, modernization of the facility HVAC system to include the Building Automated Control System, modernization of latrines, existing office spaces, installation of a fire suppression and mass notification system, bringing the facility up to current code standards and the replacement of interior finishes.

2. All tasks to be completed as part of this contract shall be done in accordance with Plans and Specifications.

B. Contract Method

1. Basis of award of this Contract will be in accordance with Section 1 Instructions to Bidder, Paragraph 2.

2. Contract type: State of Maine – Section 2-E, Contract for Minor Public Improvements.

3. The project will be constructed under a single lump sum contract.

C. Work Sequence

1. Work of the Contract and related provisions are as described in the Contract Documents.

D. Contractor Use of Premises

1. Work of this Contract includes coordinating the work with the daily operations of the Owner.

2. Limited use of premises for Work and construction operations only, to allow for Owner occupancy, work by other Contractors, and public access (Base bid). **Base Bid includes the installation of a fire suppression and mass notification system in Bldg.255.**

3. Limit access to Owner's site, hours of operations are 7:00 A.M. - 4:00 P.M. If Contractor would like to work on a federal or state holiday he/she must request permission from Owner three working days in advance. The Owner reserves the right to accept or reject Contractor's request.

4. Coordinate use of premises under direction of Owner.

5. The Contractor shall be responsible for his/her security in Construction Area until substantial completion. The contractor shall coordinate security of Building with Owner.

6. Upon awarding of Alternate Bid Item #1 the Owner shall vacate the primary facility (Bldg. 255), the Owner shall provide construction cores for facility access and the contractor shall have full access to the facility except for the active Telecom room for which access will be allowed with prior notification to the Owner.

7. Winter Conditions: Contractor is required to provide access to their work site and ensure that snow removal operations do not impede the operations of the training site.

8. Upon award of Alternate Bid Item #1, once the facility heating system is removed, contractor shall be required to provide temporary heat to Bldg. 255 to prevent damage from freezing to interior spaces at their expense.

9. The existing Telecom room shall remain functional during the duration of this project until its functions are switched over to the new Telesom Room 138B. The switchover and demolition of any abandoned cabling is the contractor's responsibility.

10. Prior to demolition of any existing fiber and cabling that leaves the facility the contractor shall confirm with the owner that cabling is no longer necessary.

11. Upon the award of Alternate Bid Item #1 contractor shall make provisions to provide temporary heat to protect the interior building infrastructure from freezing once the primary heating plant is removed until its replacement as dictated by the project

E. Owner Occupancy

1. Owner will occupy surrounding areas during entire period of construction (Base Bid Only), to conduct Owner's normal operations. The Contractor shall cooperate with Owner to minimize conflict to the Owner's operations.

F. Owner-furnished Products: Not Used

G. Schedule of Allowances: Allowance #1 -Remove and store furniture for project duration. $75,000.00

H. Additive Alternate:

Alternate Bid Item #1 -Renovation of Bldg. 255
Alternate Bid Item #2- Install PV Panels on Addition. Panels provided by Owner.
Alternate Bid Item #3- Replace all doors versus Existing to Remain.
Alternate Bid Item #4- Replace combination locking device on arms room vault door.

I. Unit Prices: Not Used

J. Applications for Payment:

1. Submit one (1) electronic copy of each application under procedures of Section 3-A Article 24, on "Requisition for Payment", Form B.G.S. 00 62 76, Application for Payment revised 12 May 2023 and Form 00 62 76.01 Continuation Sheet revised 12 May 2023.

K. Coordination:

1. Work of this Contract includes coordination of the entire Work of the Project.

2. Coordinate work with all utilities. Interruption of services shall be coordinated with the Owner to minimize the disruption of operations within the facility.

3. Notify an appropriate official at the facility at least three days in advance of the need to move furnishings, equipment, materials, etc. from areas to be affected by the construction.

4. Control on-site activities to minimize the disruption of the occupants.

5. Coordinate the work of equipment and material suppliers and subcontractors.

6. Plan for the timely delivery of materials and supplies to the job site and for their temporary storage on site.

7. Maintain the project site in a neat condition.

8. Assist the Owner as required in the review of construction.

12. Maintain up to date progress records and as-built drawings.

13. Contractor responsible for obtaining all required permits from **the City of**

Bangor and any **Authority Having Jurisdiction (AHJ)** which requires one. Provide Owner with copies of all required permits.

L. CONFLICTS

1. Contractor shall notify Owner in writing of any real or apparent conflicts in the Contract Documents and, except in cases of emergency, await Owner's determination before proceeding.

2. The **Owner's Project Manager** shall resolve conflicts that arise during construction.

3. If two or more solutions are indicated in the Contract Documents, the Contractor shall assume the cost of the more expensive solution unless otherwise directed by the Owner.

M. Field Engineering

1. The Contractor shall be responsible for all field engineering as required.

N. Field Testing and Inspections:

1. The Contractor shall carry all costs for material testing and inspections required by the Contract Documents. The Contractor shall hire only Consultant approved and Owner approved independent testing agencies to perform all testing and inspections.

O. Reference Standards

1. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

2. The date of the standard is that in effect as of the Bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is given.

2. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

P. Additional Items:

1. Contractor shall carry a price in their base bid for the removal and storage of all office furniture and storage equipment for the duration of Alternate Bid Item #1 when awarded. If office furniture is replaced as part of this project, contractor shall carry a price for its disposal.

1.02 SCHEDULING AND PHASING OF WORK

A. Substantial Completion: Work of the Contract must be Substantially Completed by **15 June 2026** so that the Owner can have full use of interior space. Final completion of all Work of this Contract shall be by **30 July 2026.**

1. Except as otherwise specified, Substantial Completion is hereby defined to mean a stage of completion sufficient for the Owner to have full beneficial use and occupancy of the structure involved, less only minor corrections and repairs that can be performed without undue annoyance to building occupants which shall be documented on the "punch list" as specified hereinafter. Beneficial use and occupancy means removal of all debris, interior and exterior scaffolding, surplus equipment and material and cleaning as required under the Contract completed.

2. Normal building operations will continue throughout the length of the Project (Base Bid Only). The successful Contractor shall develop a schedule of work that is respectful of the Owner's needs but with a mutual understanding that temporary relocation of personnel within the building will be required. Upon award of Alternate Bid Item #1 all personnel and equipment shall be removed form Bldg. 255.

3. Within ten (10) working days following issuance of a Letter to Proceed, and notwithstanding any delay in execution of a formal Contract Agreement, the Contractor shall prepare a proposed Phasing and Progress Schedule. The final Schedule shall be as mutually agreed to by the Owner and Contractor, and within the following guidelines:

4. The Owner's business operations must continue throughout the entire construction period (Base Bid only).

5. Work within the building interior must comply with the Owner's requirements for continued use and occupancy (Base Bid Only).

6. Applicable egress codes must be complied with during the construction period. Building entrances and exit ways must be kept open at all times.

B. Final Completion of all Work of this Contract shall be by **30 July 2026.**

1. Except as otherwise specified, Final Completion is when the Work of the Contract has been completed in accordance with the terms and conditions of the contract documents with no “punch list” items open and is ready for final payment.

C. Expiration date of this Contract is **30 August 2026**.

1. Except as otherwise specified, Expiration Date is hereby defined to mean the date when all engagements of the parties have ended, except to those which arise from the non-fulfillment of obligations created during its existence, such as warranties.

1.03 REGULATORY REQUIREMENTS

A. Conform to Local, State and Federal codes.

1.04 PROJECT MEETINGS

A. Requirements:

1. Contractor shall, upon acceptance of a Contract and before commencing Work, contact the Owner and request a pre-construction conference as required in 00 72 13, Section 3-A, Article 2.

B. Pre-construction Conference

1. The OWNER will administer pre-construction conference for execution of Owner-Contractor Agreement and exchange of preliminary submittals.

B. Progress Meetings

1. The Contractor shall schedule and administer Project meetings throughout progress of the Work, called meetings, and pre-installation conferences.

2. The Contractor shall make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Owner, participants, and those affected by decisions made at meetings.

3. Attendance: Job superintendent, major Subcontractors and suppliers, Owner and those appropriate to agenda topics for each meeting.

4. Suggested Agenda: Review of Work progress, status of progress schedule and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

1.05 SUBMITTALS

A. Procedures

1. In all submittals always refer to project number **23SR24-400-D.**

2. Refer to schedule of Contractor Deliverables provided by Owner/Designer.

3. Transmit each item under OWNER-accepted form. Identify Project, Contractor, Subcontractor, major supplier; identify pertinent drawing sheet and detail number, and Specification Section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and OWNER review stamps.

4. Submit initial Progress Schedules and Contract Schedule Of Values in duplicate within 10 days after date of Owner - Contractor Agreement. After review by DESIGNER revise and resubmit as required. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.

5. Submittals can be delivered electronically to both the Designer and Owner. If submitting by e-mail, submit to the Designer for approval, and the Owner for review at the address below:

Designer: AJandreau@harriman.com

Owner: paul.r.lapointe.nfg@army.mil

5. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

6. Submittal Sheets:
a. Transmit each item under "Transmittal of Shop Drawings, Equipment Data, Material Samples, or Manufacturer's Certificates of Compliance" in a format acceptable to the Owner.
b. Identify Project, Contractor, Subcontractor, major supplier.
c. Identify drawing sheet and detail number, and Specification Section number, as appropriate.
d. Identify deviations from Contract Documents.
e. Identify products submitted comply with the Build America, Buy America Act

7. Designer submittal actions shall be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor, or separate contractors, while allowing time in the Designer's professional judgement to permit adequate review.

8. After DESIGNER review of submittal, revise and resubmit as required identifying changes made since previous submittal.

9. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

B. Quality Assurance; Substitutions, in accordance with Section 01 00 00, para. 1.08 (E).

C. Construction Progress Schedule

1. Within ten (10) working days following issuance of a Notice to Proceed, the Contractor shall provide an Initial Construction Progress Schedule to the Owner

2. Show submittal dates required for Shop Drawings, Product Data, and Samples, and product delivery dates, including those furnished by Owner and those under Allowances as applicable.

D. Schedule Of Values

1. Submit typed schedule on Form 00 62 76.01 Continuation Sheet revised 12 May 2023.

2 Include in each line item a directly proportional amount of Contractor's overhead and profit.

3. Revise schedule to list change orders, for each application for payment.

E. Shop Drawings

1. Shop drawings will be submitted to Owner, in accordance with para. 1.05 of this Section.

F. Product Data

1. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.

2. Submit the number of copies, which Contractor requires, plus two copies, which will be retained by OWNER.

3. Provide data certifying that each product complies with the provisions contained in the THE INFRASTRUCTURE INVESTMENT AND JOBS ACT (“IIJA”), see Special Conditions 00 73 00, Section 14.

G. Manufacturer’s Instructions

1. Submit two copies each, of Manufacturer's Instructions.

H. Samples Not Used

I. Field Samples Not Used

K. Background Check Requirements:

1. Anyone allowed into the facility by the contracted vendor's personnel is considered to be a representative of the contractor and is required to have a prior approved background check before gaining access into the facility.

2. All Contractors/vendors must be in possession of a valid (not suspended, revoked, or

expired) official government issued photo credential (i.e. driver‘s license, state issued identification card, etc.) and be screened through National Crime Information Center prior to being issued a Contractor Badge.

3. The Contractor shall supply a list of personnel who may be either involved in the work effort or be present at the facility to the Owner. The list shall be supplied to Owner within two weeks after the award of the contract or two weeks prior to the beginning of the contract work, whichever comes first. Owner will provide Contractor with an excel spreadsheet to fill in with required employee information.

4. The required employee information shall include: Company name, first name, middle initial, last name, suffix, maiden name(s), date of birth, gender, Driver License Number and State, Social Security Number, and Address with street, city and state for each person.

5. Results from the NCIC background check are controlled under the Privacy Act of 1974 and not permitted to be given to anyone not acting in a Security Force capacity. No details of the background check will be revealed other than a pass/fail or suspended/revoked.

6. The Department retains the right to screen and restrict from the facility, personnel employed by or who represent the contractor, who do not receive a satisfactory/passing background check.

7. The Department will provide to the Contractor the names of those personnel that are acceptable for access to facilities and those who are not acceptable for unescorted access.

8. Contractors/vendors with acceptable background checks will be issued Contractor Badges for that individual’s unescorted entry. The badges will be issued for the duration of the contract, or service agreement, not to exceed two years.

1.06 QUALITY CONTROL

A. Quality Control, General

1. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Workmanship

1. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

2. Perform work by persons qualified to produce workmanship of specified quality.

3. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

C. Manufacturers' Instructions

1. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Owner before proceeding.

D. Manufacturers' Certificates

1. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, those products that meet or exceed specified requirements.

1.07 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

A. Electricity

1. The Contractor shall be allowed to hook to existing electrical panel in building, for temporary power. The Contractor will not disrupt power at building. The Owner will only pay for cost of electricity.

2. The Contractor shall provide all temporary electrical panels.

3. The Contractor shall be responsible to fix any damages, caused by modifications for temporary services.

B. Lighting

1. The Contractor shall provide source of lighting.

C. Temporary Heat

1. The Contractor shall prove temporary heat and equipment in interior spaces:
   a. The Contractor shall not use electrical heating units if the Owner is supplying electrical power to the Contractor.

   b. The Contractor shall be completely responsible for providing all equipment and labor required to comply with this section.

   c. The Contractor shall utilize the services of a qualified Heating subcontractor for providing Temporary Heat. These services shall be paid for by the Contractor.

   d. At no time shall any part of the building served by the boiler be allowed to be without heat if called upon by the building control system.

2. Temporary heating system work shall be performed under the direct supervision of individuals properly licensed to perform the necessary work.

3. All temporary work shall be provided in conformity with all applicable codes, State laws, and requirements of the utility company.

4. The Contractor shall pay the costs of all fuel required for temporary heating until Substantial Completion, unless specified otherwise.

5. Utilizing the Permanent Heat Distribution System for Temporary Heat:

a. The Contractor may, with the approval of the Owner, elect to utilize the permanent heat distribution system for temporary heat.

b. If the permanent heat distribution system cannot be utilized or if work requires a shutdown of the existing system the Contractor shall make arrangements, acceptable to the Owner, to comply with this requirement at no additional cost to the Owner.

c. The Contractor shall furnish and pay the costs of any materials and equipment which are not part of the permanent heating system and which may be required to operate the permanent heat distribution system on a temporary basis.

6. Unit heaters, if used, shall be of the smokeless type and be installed and operated in such a way that finished work will not be damaged. "Salamanders" shall not be used.

7. Providing temporary heating service and equipment for exterior work:

a. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices.

b. Unit heaters, if used, shall be of the smokeless type and be installed and operated in such a way that finished work will not be damaged. "Salamanders" shall not be used.

D. Water

1. The Contractor shall be allowed to hook to existing water in building, for temporary water supply. The Contractor will pay for cost of water usage for dust control and compaction [large amounts of water].

E. Sanitary Facilities

1. The Contractor shall provide their Sanitary Facilities.

F. Barriers

1. Provide as required to prevent public entry to construction areas, to provide for

Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.

G. The Contractor will provide:

1. Office Trailer: Contractor shall coordinate with Owner for space within the facility to conduct his/her daily business.

2. Storage Sheds for Tools, Materials, and Equipment: Weather tight, with adequate space for organized storage and access, and lighting for inspection of stored materials.

3. His/her own on-site telephone, if so required for the conduct of his/her business.

4. Protected storage, if necessary.

5. Temporary barricades to separate the Contract Site areas from the Owner's area or public area

6. Portable latrines.

H. Protection And Restoration

1. The Contractor shall be responsible for all damages to furnishings, equipment, supplies, existing construction, including finished surfaces, caused by Work of Contract.

2. The Contractor shall be fully responsible for maintaining weather-tight integrity of the roofing system and wall systems, including permanent and temporary flashings, during the entire construction period.

3. The Contractor's responsibilities shall include the cost to repair damage to the existing building's structure, finishes and contents associated with the Contractor's failure to maintain the watertight integrity of the roofing system and wall system, whether permanent or temporary, at no additional cost to the Owner.

4. The Contractor shall protect paved areas and lawns around the Building from damage associated with the construction. Costs to repair major damage to paved areas and lawns will be deducted from Contractor's final payment to cover Owner's expenses to repair damage. The Owner will determine if damages to lawns are minor or major.

I. Security

1. Provide security program and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, and theft. Coordinate with Owner's security program.

J. Water Control See Attachment A, Section 01 35 43 Environmental Protection.

K. Cleaning during Construction

1. Throughout the construction period the Contractor shall be responsible for maintaining building and site areas affected by the Work in a standard of cleanliness.

a. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing protection of materials.

b. Completely remove all scrap, debris, waste material and other items not required for construction from the site at least once a week.

c. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

2. Conduct daily inspection, more often if necessary, to verify that requirements for cleanliness are being satisfied.

3. Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

3. Use only those cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

4. Foreign Object Debris (FOD): Construction site is adjacent to an active military and commercial flight line. At no time will trash or debris be left loose on the site. All rash and debris shall be contained so as to not allow it to blow onto the flight line.

L. Removal

1. Materials to be removed, including all components and accessories, become property of the Contractor and shall be promptly removed from the Contract Site and legally disposed of at Contractor's expense.

2. Remove all debris, rubbish, surplus materials and equipment immediately from the Project Site and legally dispose of at Contractor's expense.

3. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

4. Clean and repair damage caused by installation or use of temporary facilities. Restore existing facilities used during construction to specified, or to original, condition.

5. Do not assume that local landfill facilities will accept construction debris, even if paid for.

1.08 MATERIAL AND EQUIPMENT

A. Products

1. Products include material, equipment, and systems.

2. Comply with Specifications and referenced standards as minimum requirements.

3. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

4. Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

5. Materials and equipment must comply with the provisions contained in the THE INFRASTRUCTURE INVESTMENT AND JOBS ACT (“IIJA”), see Special Conditions 00 73 00, Section 14. Provide certification document at project completion.

6. Purchased products must meet the Federal sustainability procurement requirements and the State sustainable procurement preferences. See Special Conditions 00 73 00, Section 17 for specific requirements.

7. ACBM (ASBESTOS CONTAINING BUILDING MAT'LS) NOT ALLOWED, materials containing asbestos in any manner or quantity are not allowed on this Project. If such materials are installed they shall be removed and replaced at no additional cost to the Owner.

B. Transportation and Handling

1. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

2. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

3. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Storage and Protection

1. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

2. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

3. Products Specified by Reference Standards or by Description Only: Any product meeting those standards.

4. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named.

D. Products List

1. Within 15 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

E. Substitutions

1. Substitutions shall be submitted a minimum of 72 hours prior to bid date, any substitutions not submitted 72 hours prior to bid date shall not be permitted.

2. Do not assume that "or Equal" or terms of similar meaning indicate automatic approval of substitute products.

3. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

4. Request constitutes a representation that the Contractor:

a. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

b. Will provide the same warranty for substitution as for specified product.

c. Waives claims for additional costs, which may subsequently become apparent.

5. The OWNER will determine acceptability of proposed substitution, and will notify the Contractor of acceptance or rejection in writing within a reasonable time.

1.09 CONTRACT CLOSEOUT

A. Closeout Procedures

1. When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for OWNER's

inspection.

2. When the Owner considers the Work of this contract has reached Substantial Completion, the Contractor and Owner shall sign a Certificate of Substantial Completion (Section 00 65 16). Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. This Certificate of Substantial Completion will be prepared by the Architect/Engineer as stated in Specification 00 72 13, Section 37.4. When the Certificate of Substantial Completion has been signed by the Owner and the Contractor, the completed Certificate of Substantial Completion shall set the date for Substantial Completion of the work or a designated portion of the work.

3. When the Contractor considers the Work of this contract has reached final completion, the Contractor shall submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for OWNER's inspection. This written notification shall be submitted to the Owner 7 calendar days prior to the proposed inspection date. Per Specification 00 72 13, Section 36.4, the Contractor shall not call for final inspection of any portion of the Work that is not complete and permanently installed. The Contractor may be found liable for the expenses of individuals called to final inspection meetings prematurely.

4. Contractor must provide certificate of compliance that materials and equipment comply with the provision of the THE INFRASTRUCTURE INVESTMENT AND JOBS ACT (“IIJA”). See 00 73 00 Special Conditions Section 14 for additional requirements.

5. Contractor must provide certificate of compliance that purchased products comply with the Sustainable Procurement requirements. See 00 73 00 Special Conditions Section 17 for specific requirements.

6. In addition to submittals required by the conditions of the Contract, provide release of all liens, claims and submit final requisition.

7. The Contractor’s failures to comply with Closeout Procedures, if the Closeout Documentation Requirements are not completed by the Substantial Completion Date. The Owner reserves the right to recover the costs to complete the Closeout Documentation Requirements from the Schedule of Values item Closeout Documentation Line Item. The Owner reserves the right to hire an Architect/Engineer to complete the required Contract Closeout Documentation.

8. Liquidated Damages: The minimum liquidated damages for this project shall be applied as described under Section 00 72 13 General Conditions, paragraph 37.5 and based on the Substantial Completion Date. The work to be performed under this

contract shall be Substantially Completed on or before Liquidated Damages: The minimum liquidated damages for this project shall be applied as described under Section 00 72 13 General Conditions, paragraph 37.5 and based on the Substantial Completion Date. The work to be performed under this contract shall be Substantially Completed on or before **15 June 2026, SAME as 1.02.A ABOVE.**

9. **Under this contract $1,500 dollars per day shall be charged as liquidated damages for work required beyond the Substantial Completion date. This changes to $1,500 plus $250 for each $2,000,000 over $10,000,000 in the event the project contact project amount exceeds $10,000,000 upon award of Alternate Bid Item #1** .

B. Final Cleaning

1. Execute prior to final inspection.

2. Clean site; sweep hard surfaced areas, rake clean other surfaces.

3. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site. Owner will be responsible for cleaning after acceptance.

C. Project Record Documents

1. Store documents separate from those used for construction.

2. Keep documents current; do not permanently conceal any work until Owner has inspected and required information has been recorded.

3. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

PART 2 PRODUCTS **Not Used**

PART 3 EXECUTION

3.01 FINAL CLEANING

A. Execute final cleaning before final project assessment.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

D. Replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from site.

3.02 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer seven days before start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation before start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Division 23 that equipment or system has been properly installed and is functioning correctly.

3.03 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks before date of Substantial Completion.

B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at equipment location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

E. Required instruction time for each item of equipment and system is specified in individual sections.

3.04 TESTING, ADJUSTING AND BALANCING

A. Contractor will appoint and employ services of independent firm, acceptable to Owner, to perform testing, adjusting and balancing. Contractor shall pay for services.

B. Independent firm will perform services as specified in Division 23.

C. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

3.05 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

3.06 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Reviewed Shop Drawings, Product Data, and Samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates used.

3. Changes made by Addenda and modifications.

F. As builds (Red-Lines): Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish main floor datum.

2. Measured horizontal and vertical locations of underground utilities and a appurtenances, referenced to permanent surface improvements.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Field changes of dimension and detail.

5. Details not on original Contract drawings.

G. Submit documents to Owner with claim for final Application for Payment.

3.07 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11-inch (A4) text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and Maintenance Instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

a. Significant design criteria.
b. List of equipment.
c. Parts list for each component.
d. Operating instructions.
c. Maintenance instructions for equipment and systems.
e. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project Documents and Certificates, including the following:

a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.
d. Originals of warranties and bonds.

4. Contractor shall provide the O&M Manual in digital form. All sections of the electronic form of the O&M Manual shall be searchable, excluding drawings and warranties. Every effort should be made to have the “Technical Data” section searchable as well, with the understanding this may not be possible in some instances.

3.08 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes 15 days before final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required before final submission.

D. Submit two sets of revised final volumes in final form within 10 days after receipt from Owner.

E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

G. Include color coded wiring diagrams as installed.

H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.

I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

J. Include servicing and lubrication schedule, and list of lubricants required.

K. Include manufacturer's printed operation and maintenance instructions.

L. Include sequence of operation by controls manufacturer.

M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

N. Include control diagrams by controls manufacturer as installed.

O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.

P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage..

R. Include test and balancing reports as specified in Section 01 95 00.

S. Additional Requirements: As specified in individual product specification sections.

T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

3.09 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt before final payment.

3.10 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

F. Submit before final Application for Payment.

G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Make other submittals within ten days after Date of Substantial Completion, before final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

END OF SECTION

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on page two prior to initiating this form.)	DATE:	TRANSMITTAL NO

SECTION I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor.)

TO:	**FROM:**	**DFE PROJECT NUMBER**	**CHECK ONE:** ☐ THIS IS A NEW SUBMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL NO. ____
SPECIFICATION SEC NO. (Cover only one section with each transmittal)	**PROJECT TITLE AND LOCATION:**		

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCURE NO. c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT		FOR CONTR-ACTOR USE CODE g.	VARIATION (See instr. #6) h.	FOR DFE USE CODE i.
				SPEC PARA NO. e.	DRAWING SHEET NO. f.			
							☐	
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REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in strict compliance with the contract drawings and specifications except as otherwise stated. _____ SIGNATURE OF THE CONTRACTOR NAME:

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE OF APPROVING AUTHORITY	DATE

DFE SUBMITTAL FORM, AUG 2010 SHEET 1 of 1

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the DFE Project Number, will form a serial number for identifying each submittal. For example: 23SR10-470-D-T1

3. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. A separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column (Section I, Column h) when a submittal is not in accordance with the plans and specifications. Also, a written statement to that effect shall be included in the space provided for "Remarks".

7. The form is a self-transmittal, i.e. letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in Section I, Column c.

9. Directorate of Facilities Engineering approving authority will assign action codes as indicated below in space provided in Section I, Column i to each item submitted. In addition, they will ensure enclosures are indicated and attached to the form prior to return to the Contractor. The Contractor will assign action codes as indicated below in Section I, Column g to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A – Approved as submitted
B – Approved, except as noted on drawings
C – Approved, except as noted on drawings. Refer to attached sheet resubmission required.
D – Will be returned by separate correspondence.
E – Disapproved (See Attached)
F – Receipt acknowledged.
FX – Receipt acknowledged, does not comply as noted with contract requirements.
G – Other (Specify)

10. Approval of items does not relieve the Contractor from complying with all the requirements of the contract plans and specifications

SECTION 028213 - ASBESTOS ABATEMENT & RELATED WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Other Abatement Specification Sections, apply to the work of each of the Specification Sections.

B. This section addresses abatement of asbestos-containing material (ACM) only.

1.2 PROJECT SCOPE-OF-WORK

A. General: Furnish all labor, materials, equipment and perform all work required to safely remove, and otherwise abate as indicated herein, transport, and legally dispose of all asbestos-containing materials (ACM) identified in Table 1 and the attached RPF written inspection report (240165). The scope-of-work includes the removal, transport, and disposal of designated ACM at the **MEARNG B255 Band building**, located at ***28 Hayes Street in Bangor, Maine***. All work is to be completed in accordance with the schedules stated herein, in the Contract Documents, and as designated by the Army (Owner). It is essential that all work be phased and scheduled as required to facilitate Owner's renovation and upgrade work. All work is to be completed in strict accordance with applicable local, Maine (State), and federal codes and regulations and the requirements stated in this specification and Contract Documents.

B. Table 1 below includes the listing of ACM to be removed, packaged, transported, and disposed of in accordance with the Contract Documents (also reference attached RPF written inspection report (240165).

TABLE 1

Building Material	Location	Approximate Quantity	EPA Category
Black Mastic	Throughout Building	7,500 sf	Category I Nonfriable
Black Floor Tiles	Rooms 116, 117 and 118 along with inside each door way	4,150 sf	Category I Nonfriable
Pipe & Fitting Insulation	Room 138 and main corridor, above ceiling	3,800 lf	Friable ACM

sf- square feet
lf- linear feet
** All quantities are estimates and must be field verified by the bidding contractor(s)*

C. Reference full inspection reports (attached to this specification) for discussions and additional information and limitations of Owner survey. Quantities listed in Table 1 are approximate only and Contractor shall remove all ACM in the work areas inside MEARNG B 255. - Prior to the start of the asbestos abatement activity, if any materials are presumed or assumed to contain asbestos the asbestos abatement contractor shall provide the building owner or building owner's agent with a

bulk sampling disclosure listing which materials identified for abatement have not been sampled and the cost of sampling those materials.

D. The work areas have other regulated or hazardous materials present that are not covered in the Section including but not limited to polychlorinated biphenyl (PCB)-containing materials, mercury, lead paint, guano, mold contamination, other hazardous materials, and universal waste. Contractor's OSHA-competent person shall also inspect the workplace for other potential hazardous building material during the work. If encountered during the work immediately notify Owner's Representative. Use only qualified, trained workers to properly remove, package, transport, and dispose (or recycle) of such material in strict compliance with all local, State, and Federal requirements.

E. At all times, comply with all requirements of the Workmen's Compensation laws of the state of Maine and provide certificate of insurance to Owner. Contractor shall also maintain in full force and effect:

a) Comprehensive General Liability insurance written on occurrence form, including complete operations and asbestos coverage, personal injury liability coverage, broad form property damage liability coverage, and contractual liability coverage insuring the agreements contained herein. Minimum limits of liability carried on such insurance shall be $1,000,000 each occurrence, combined single limit for bodily injury and property damage.

b) Pollution liability coverage, including asbestos specific coverage, with minimum limits of liability carried on such insurance shall be $1,000,000 each occurrence, combined single limit for bodily injury and property damage.

c) Automobile liability insurance for owned, non-owned, and hired vehicles. The minimum limit of liability carried on such insurance shall be $250,000 each accident, combined single limit for bodily injury and property damage.

1.3 WORK SCHEDULES

A. All work shall be completed in accordance with the schedule requirements as indicated by the Owner and as stated in the Contract Documents.

B. All work shall be strictly coordinated and scheduled by the Contractor as indicated by and approved by Owner, the Owner's industrial hygiene consultant (IH Consultant), and General Contractor Work is to be phased as required to facilitate Owner operations, general occupancy of the site, and general construction activity. Contractor must provide proposed daily schedules to Owner and IH Consultant for each phase of work and each Owner work request. Adequate advance notice shall be provided to Owner and the IH Consultant prior to any schedule changes. Start and completion dates for the work and specific phasing requirements not otherwise specified herein shall be submitted to Owner and IH Consultant for approval. Contractor shall update all State and EPA notifications and permits as needed for schedule modifications.

1.4 CONTRACTOR ESTIMATES

A. Estimates: Contractor shall conduct necessary field measurements and site review as deemed necessary by Contractor to delineate the scope of work and site conditions prior to submittal of bid. Contractor shall note on bid any discrepancies between Contractor field measurements and listings

of work stated herein. It is the responsibility of the Contractor to verify all project information and site conditions as necessary to satisfy the Contractor as to the requirements of the work for each specific phase of the project. The Contractor must notify Owner and the IH Consultant of any conflicting information or clarifications required for the preparation of any bids, estimates, and submittal documentation. Unless otherwise stated by Owner, the Contractor is responsible for the removal of all designated ACM at Owner facility, so designated by the Owner.

1.5 EXISTING CONDITIONS

A. Prior to commencement of work, inspect areas in which work will be performed. Prepare a listing and photographs of damage to structure, surfaces, finishes, insulations, and equipment that could be misconstrued as damage resulting from the work. Contractor is responsible for all damages to equipment, furnishings, finishes and building surfaces in the work area and adjacent caused by the Contractor during the course of abatement and general housecleaning. Contractor is responsible for completing all repairs to damaged items/surfaces caused by the work. In addition, Contractor must fully repair all tape, adhesive, and other staining and damage to meet or exceed existing conditions.

1.6 POTENTIAL ASBESTOS HAZARD

A. The work site contains ACM. Review all site survey reports and conduct ongoing inspections of the work areas to identity potential hazardous material that may be encountered. Provide OSHA competent person to supervise and review work procedures and conduct ongoing work area inspections. Properly train all affected personnel at the job site based on the hazards and hazardous material to be encountered, impacted, or disturbed including but not limited to ACM.

B. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating potential health hazards to workmen and building occupants. Apprise all employers at site, workers, supervisory personnel, subcontractors, and consultants who will be at the job site of the seriousness of the hazards, other possible site hazards, and of proper work procedures that must be followed.

C. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos fibers and dust. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state, and local agencies.

D. Complete, and coordinate with Owner's Representative as applicable, all communication of hazards in strict accordance with 29 CFR 1926.1101 (k) and other applicable OSHA and State regulations. The contractor shall coordinate with Owner's Representative to review all existing inspection records and testing results as needed. Ensure that complete inspections of the space and affected materials have been completed of copies of inspection reports have been provided to the Owner, Contractor site supervisor and other affected contractors and subcontractors at the site as applicable. All site personnel working in areas containing ACM shall be apprised of the locations, types, and quantities of ACM present and all such personnel shall be provided a minimum of asbestos awareness level training (for non-asbestos contractors) or additional training as indicated herein. In the event that other suspect material is encountered (or previously inaccessible spaces are accessed) that are not identified in the inspection report as having been properly inventoried and testing, then immediately cease work that would impact such materials and notify Owner's Representative such that proper testing and inspection can be performed.

1.7 CONTRACTOR USE OF PREMISES

A. General: The Contractor shall limit his use of the site to the work indicated, so as to allow for Owner operations and general construction activity. Confine operations at the site to the specified work areas of the Specification. Take all precautions necessary to protect the site, buildings, any occupants, and surrounding areas from work-related hazards during the construction period. Maintain building in a safe and structurally sound condition throughout the work. Maintain access to the public and other trades in designated areas (for example, stairwells) as indicated herein and as otherwise noted by Owner. Provide additional barriers and site security as needed to accommodate such access. Use care to prevent damages to existing surfaces during installation of solid barriers, critical barriers, and primary isolation barriers.

B. Install solid barriers to prevent unauthorized access and visibility from adjacent, public, or Owner-occupied areas as designated by Owner and using materials and construction methods approved by Owner. Contractor shall work in cooperation with and coordinate all work with Owner and the IH Consultant.

1.8 STOP WORK

A. The Contractor's Site Supervisor will stop work and will not proceed until corrective measures are implemented in the event that any of the below occur:

- Airborne fiber concentrations outside the work area exceed 0.010 f/cc
- Airborne fiber concentrations inside the work area exceed 0.10 f/cc
- Loss of integrity of any critical barrier
- Failure to work in accordance with state and federal regulations or this plan
- Visible emissions created
- Other potential safety and health emergencies and changes as warranted.

B. Complete all corrective work with no change in the Contract Price if high airborne fiber counts or other conditions resulting in stop work were caused by Contractor activities or compliance deficiencies.

1.9 PROJECT COORDINATION

A. Site Supervisor: Provide a full-time Site Supervisor who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Contractor's Representative responsible for compliance with the specification and all applicable federal, state, and local regulations, particularly those relating to asbestos-containing materials.

1. Experience and Training: The Site Supervisor must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures and have had a minimum of five (5) years on-the-job training in similar asbestos abatement procedures.

2. Accreditation/Qualifications: The Site Supervisor is to be (1) a Competent Person as required by OSHA in 29 CFR 1926, and (2) accredited and certified in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C; and (3) licensed in accordance with current State requirements.

B. Project Manager: Provide a qualified and experienced project manager to perform administrative and project management responsibilities and to serve as Contractor management point of contact in addition to the project supervisor.

C. Pre-Construction Conference: An initial progress meeting, recognized as "Pre-Construction Conference" will be convened by Owner with Contractor prior to the start of work for each phase. This meeting will be held to review the scope-of-work, scheduling, coordination, and contractor plan of action and submittals and other applicable items.

D. Daily Log: Maintain at the work area a daily log documenting the dates and time of but not limited to, the following items:

1. Visitations; authorized and unauthorized
2. Daily sign-in sheet for all personnel entering and leaving the work area (name, certification, expirations).
3. Special or unusual events, i.e., barrier breaching, equipment failures, accidents
4. Documentation of the following:

    a) Supervisor's daily inspections and exposure monitoring test results
    b) Work progress each day for each work area
    c) Removal of waste material (number and type of containers) from each work area
    d) Removal of waste from site including a copy of the accompanying waste shipment record
    e) Decontamination of work area and equipment
    f) Final inspection and air clearance results, and
    g) Documentation of containment removal and final general housecleaning activity

5. Complete and maintain daily log in accordance with applicable State and federal record keeping requirements. Provide access to logs to Owner and IH Consultant at all times and provide copies of logs with the submittal package in accordance with the construction submittal requirements.

1.10 STANDARDS

A. Applicability of Standards: It is the Contractor's responsibility to complete all work in accordance with (or exceeding) all applicable industry standards and guidelines. Except where Contract Documents include more stringent requirements, all applicable construction industry standards have the same force and effect as if bound or copied directly into Contract Documents. Applicable construction standards are made a part of the Contract Documents by reference. Where compliance with an industry standard is required, comply with the most current standards in effect as of date of Contract Documents.

B. Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer to Owner and IH Consultant any requirements that are different or conflicting; outline the more stringent requirement before proceeding.

C. Comply with applicable standards including, but not limited to, American National Standards Institute (ANSI) standards and American Society for Testing and Materials (ASTM) standards.

1.11 CODES, REGULATIONS, AND STANDARDS

A. Adhere to work practices and procedures set forth in applicable codes, regulations and standards related to work. Obtain permits, licenses, inspections, and similar documentation, as well as payments and similar requirements associated with codes, regulations, and standards. Update permits, as necessary.

B. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold Owner and IH Consultant harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of himself, his employees, or his subcontractors.

C. All work performed under this contract shall comply with applicable provisions, including most current versions, and not limited to the listed and all other applicable local, state, and federal codes and regulations.

D. Federal Requirements: which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:

OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, including but not limited to:

1. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules
2. 29 CFR 1910.1001 and 29 CFR Part 1926.1101
3. Respiratory Protection: Title 29, Part 1910, Section 134 of the CFR
4. Construction Industry: Title 29, Part 1926, of the CFR and all related Subparts
5. Access to Employee Exposure and Medical Records: 29 CFR, Part 1910, Section 1020
6. Hazard Communication: Title 29, Part 1910, Section 1200 of the CFR
7. Specifications for Accident Prevention Signs and Tags: 29 CFR Part 1910, Sec. 145

DOT: U. S. Department of Transportation, including but not limited to:

1. Hazardous Material Regulations: Title 49, Part 171-180 CFR

EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:

1. Asbestos Abatement Projects; Worker Protection Rule: Title 40 Part 763, Sub-part G
2. Asbestos School Hazard Abatement Reauthorization Act (ASHARA)
3. Asbestos Containing Materials in Schools Final Rule 40 CFR Part 763, Sub-part E
4. National Emission Standard for Hazardous Air Pollutants (NESHAPS); National Emission Standard for Asbestos, 40 CFR Part 61, Sub-part A, and Sub-part M (Revised Sub-part B)

E. Local Requirements: Abide by all local requirement that govern asbestos abatement work or hauling and disposal of asbestos waste materials.

F. Maine Department of Environmental Protection: which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include but are not limited to the following:

1. Chapter 425 Asbestos Management Regulations

1.12 DEFINITIONS

A. General Definitions: Definitions contained in this Section are not necessarily complete but are general to the extent that they are not defined more explicitly elsewhere in the Contract Documents.

1. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by Owner's representative", "requested by the "IH Consultant", and similar phrases. However, no implied meaning shall be interpreted to extend the IH Consultant's responsibility into the Contractor's area of construction supervision.

2. Approve: The term "approved," where used in conjunction with the Owner or the IH Consultant's action on the Contractor's submittals, applications, and requests, is limited to the responsibilities and duties of the IH Consultant as indicated in the Contract Documents. Such approval or acceptances do not express or claim any certification of completeness, compliance, or approval of programs and documentation, including but not limited to review of analytical results, historical information, and interpretations. Such approval shall not release the Contractor from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.

3. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

4. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."

5. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

6. Installer: An "Installer" is an entity engaged by the Contractor, either as an employee, subcontractor, or sub- subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

7. IH Consultant: This is the entity employed or engaged as industrial hygiene consultant as described in the Contract Documents. All references to Owner's Consultant, Air Monitoring Consultant, or Consultant with regard to asbestos abatement in the Contract Documents in all cases refer to the IH Consultant. The IH Consultant will represent Owner during abatement and until final payment is due. The Owner representative may also constitute other persons representing Owner, other than the IH Consultant or consultant, as indicated by Owner. Owner's instructions to the Contractor will be made directly to the Contractor or forwarded through the IH Consultant.

8. Site Supervisor: This is the Contractor's Representative at the work site. This person will be the Competent Person required by OSHA in 29 CFR 1926 and licensed Site Supervisor/Foreman as required by the State. Provide licensed supervisor at each individual work site during work.

B. Definitions - Asbestos Abatement:

1. Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).

2. Adequately Wet: Means sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from the asbestos-containing material, then that material has not been adequately wetted. The absence of visible emissions is not sufficient evidence, or measure, of a material being adequately wet.

3. Air Monitoring: The process of measuring the fiber content of a specific volume of air.

4. Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.

5. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

6. Asbestos-Containing Material (ACM): Any material containing equal to or more than 1% of asbestos of any type or mixture of types.

7. Asbestos-Containing Building Material (ACM): Surfacing ACM, thermal system insulation ACM, or misc. ACM in or on interior structure or other parts of a building.

8. Asbestos-Containing Waste Material: Any material that is or is suspected of being or any material contaminated with a asbestos regardless of content percentage that is to be removed from a work area for disposal. May also be referred to as “asbestos waste.”

9. Asbestos debris: Pieces of ACM or ACM that can be identified by color, texture, or composition, or means dust, if an accredited inspector determines the dust to be ACM or reasonably likely to have asbestos fibers present under conditions present and based on work operations.

10. Authorized Visitor: Owner, the IH Consultant, testing lab personnel, emergency personnel or a representative of any federal, state, and local regulatory or other agency having authority over the project.

11. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

12. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

13. Category I Non-Friable ACM: means ACM packings, gaskets, resilient floor covering, and asphalt roofing products containing equal to or more than 1% asbestos. Also see definition for Regulated ACM.

14. Category II Non-Friable ACM: means any non-friable ACM, except for Category I Non-Friable ACM.

15. Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.

16. Critical Barrier: Polyethylene sheeting, typically 6-mil polyethylene sheeting, over windows, doors, and air passageways separating the work area from non-work area portions of the building. Critical barriers remain in place until clearance testing or inspections are completed and results meet clearance test criteria.

17. Demolition: The wrecking or taking out of any building component, system, finish, or assembly of a facility together with any related handling operations.

18. Disposal Bag: A properly labeled 6 mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.

19. Contractor: The contractor engaged by Owner to perform asbestos related activities must be licensed by the State, as applicable, and in accordance with Maine Department of Environmental Protection Chapter 425 Asbestos Management Regulations. All workers and site supervisors engaging in asbestos activity must also be trained and licensed in accordance with current State regulations and 40 CFR Part 763 (AHERA).

20. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

    a. Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in-situ asbestos matrix.
    b. Penetrating encapsulant: an encapsulant that is absorbed by the in-situ asbestos matrix without leaving a discrete surface layer.

21. Encapsulation: Treatment of asbestos-containing materials, with an encapsulant and application of appropriate post removal encapsulant on substrate and containment barriers.

22. Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

23. Excursion Limit: Ensure that no employee is exposed to airborne concentrations of asbestos in excess of 1.0 fibers per cubic centimeter of air (1.0 f/cc) as averaged over a sampling period of thirty (30) minutes, as determined by PCM analysis in accordance with NIOSH Method 7400 and as indicated in 29 CFR Part 1926. Also referred to as the short-term exposure limit, (STEL).

24. Friable Asbestos Material: Material that contains equal to or more than 1.0% asbestos and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. This also includes materials which, when subjected to removal methods and other disturbances, may release fibers and dust due to the abatement actions.

25. Glovebags: Glovebags for removal of insulation in accordance with 29 CFR Part 1926.

26. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

27. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

28. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

29. Permissible exposure limit (PEL): the Contractor shall ensure that no employee is exposed to an airborne fiber concentration of asbestos in excess of 0.1 f/cc of air as an eight (8) hour time-weighted average (TWA) in accordance with 29 CFR Part 1926.

30. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

31. Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans re-circulated air or generates a constant air flow from adjacent areas into the Work Area.

32. Regulated ACM (RACM): RACM means friable ACM, Category I Non-friable ACM that has been rendered friable, Category I ACM that will be or has been subjected to sanding, cutting, grinding, or abrading (abrasive action), or Category II Non-friable ACM that has a high probability of becoming, or has become, crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of renovation or demolition operations. Grinding means breaking into small pieces or fragments.

33. Repair: Returning damaged ACM or ACM to an undamaged condition or to an intact state so as to prevent fiber release.

34. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

35. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

36. Visible Emissions: Any emissions, coming from RACM, ACM, ACM, asbestos debris or asbestos waste material, which is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

37. Waste Shipment Record: Means the shipping document, required to be originated and signed by the waste generator, used to track, and substantiate the disposition of Asbestos waste.

38. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using clothes, mops, or other cleaning utensils which have been dampened with

amended water and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

39. Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

1.13 NOTICES

A. U.S. Environmental Protection Agency: Send proper written notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact - Reno/Demo Clerk - at least 10 working days prior to beginning any work which will directly or indirectly result in disturbance of asbestos-containing materials. Post notifications at job site.

B. State and Local Agencies: Send written notification as required by state and local regulations prior to beginning any work on asbestos-containing materials. At least 10 working days prior to the start of work, submit appropriate notification to the Maine Department of Environmental Protection. Post notifications at job site.

C. Permits: Obtain all local, state, and federal permits necessary to conduct the work of this specification. Obtain water permits as necessary for release of any water originating from the Work. Notify all local emergency agencies of the abatement work to be completed as required. All asbestos containing waste is to be transported by an entity maintaining a current "DOT Common Hauler Permit" specifically for asbestos-containing materials, as required for transporting of waste asbestos-containing materials to a disposal site.

D. Licenses: Maintain current licenses as required by applicable state and local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract. Post all company, supervisor, and worker licenses at work area entrance.

E. Posting and Filing of Regulations: Post all notices required by applicable federal, state, and local regulations. Maintain at least one (1) copy of applicable federal, state, and local regulations and standards at each job site. Post copies of the specification at the job site.

F. Coordinate with Owner and local fire department authorities the notification and handling of heat and smoke detectors in the work areas, including sealing of detectors during work and removal of seals at the completion of work or shifts.

1.14 SUBMITTAL REQUIREMENTS

A. Submittal Schedule: The Contractor will provide submittals as specified herein including (1) Preconstruction Submittal Documentation prior to start of work and (2) Project Closeout Submittals within 25 days upon completion of on-site work. Submit ongoing submittals as required herein and as specified by the Owner and IH Consultant. Provide at the job site a copy of all current submittal packages and related documentation. Ongoing submittals will also be submitted during the work as required to update the Pre-construction and Closeout submittals including, but not limited to:

1. Schedule or phasing changes, including description and explanations as applicable.

2. Proposed alternative work methods. Requests for revisions in work procedures must be approved by the Owner and IH Consultant.

3. Updated notifications and permitting.

4. Changes to licenses and training records for all personnel at the site

5. Other changes or revisions to the submittals.

B. Submittal Preparation

1. Package and furnish to Owner and IH Consultant each submittal appropriately. Submittal packages shall be in a neat and orderly fashion, will include an index, and shall be compiled in the order requested herein. Clearly mark and label all sections of the submittal documents.

2. In the event that a submittal package does not meet the requirements herein the submittal may not be accepted, and the Contractor will make necessary revisions and re-submit the submittal documents.

3. By "approval" or acceptance of submittals, Owner and IH Consultant do not express or claim any certification of completeness, compliance, or approval of programs and documentation, not limited to review of analytical results, historical information, regulatory compliance, and interpretations. Contractor is solely responsible for compliance with Specification and regulatory requirements associated with the work and submittal documentation.

C. Preconstruction Submittal Documentation

1. Provide the following Preconstruction Submittal Documentation prior to the start of each phase of work:

   a) Notifications: Copies of EPA, State, and local notifications.

   b) Waste Hauler and Landfill Permits and notifications. Submit names, address, and licenses/permits for the waste hauler(s) and disposal facilities.

   c) Names, addresses, experience, and references for any subcontractors the Contractor proposes to utilize for Work. Indicate if any asbestos workers or supervisors to be used for Work are subcontracted labor.

   d) Names and 24-hour phone numbers/pagers for Project Supervisor and other key personnel for the Contractor. Post emergency contact information at Decontamination Unit entrance.

   e) List of personnel to be on-site. Copies of all company, supervisor, and worker licenses, training and certifications required in accordance with this Specification.

   f) Notarized Certifications: Submit notarized certification signed by an officer of the Contract stating that exposure measurements, respiratory protection programs, medical surveillance, worker training, and recordkeeping has and will be completed and maintained during the Work for all involved personnel in accordance with 29 CFR Part 1926 and other applicable State and federal regulations.

g) Certify the dates for primary and secondary HEPA filter changes for all negative air units.

h) Level of respiratory protection anticipated for each operation required by the project. Include supporting documentation of previous exposure monitoring on a sufficient number similar project and operations in accordance with OSHA requirements.

i) Detailed schedule and phasing, containment layouts, and summary of approach; detail of any special work procedures or methods to be used if not included or addressed in the abatement specification.

j) Safety Data Sheets: for all materials to be used on-site not limited to encapsulants, spray adhesives, and other related work material. Note: It is Contractor's responsibility to notify all other contractors and parties in accordance with applicable OSHA hazard communication regulations.

k) Contingency Plan: Prepare a site-specific contingency plan for emergencies including fire, accident, power failure, pressure differential system failure, supplied air system failure, or any other event that may require modification or abridgement of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. The emergency contingency plan must be in accordance (meet or exceed the requirements of) with applicable OSHA requirements.

l) Other submittals required by the Contract Documents or as indicated by Owner.

D. Closeout Submittals

1. The following Closeout Submittals will be provided upon substantial completion of Work - each phase and prior to final completion of each phase of work.

a) Copies of all daily logs in accordance with Section 1.9 Project Coordination of this specification;

b) A copy of each waste shipment record, hazardous waste manifest, and chain-of-custody form, signed by the transporter and disposal facility operator, indicating that waste was packaged and disposed of properly. Include a description of any temporary storage facilities used including, dates, times, and locations of temporary storage. Note: In accordance with NESHAPS, submit all waste shipment documentation within 35 days from transport of waste from the site (provide interim submittals during the work as needed to comply with federal regulations). Note: copies of waste shipment records in progress shall also be provided to IH Consultant and Owner immediately upon removal of waste from site.

c) Complete copy of all revisions and changes to the Pre-Construction Submittals.

d) Copy of other written construction documents such as Change Orders and work modifications issued in printed form during construction. Mark these documents and a site drawing to show the work completed and to show substantial variations in actual work performed in comparison with the text of the Specifications and modifications.

1.15 AIR MONITORING

A. Ambient Area Air Monitoring: IH Consultant will monitor ambient area airborne fiber counts in and around the Work Area. The purpose of this air monitoring will be to detect airborne asbestos concentrations that may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers and to monitor concentrations outside the containment or work area perimeter.

B. Clearance Air Monitoring: Refer to Work Area Clearance section of this specification.

C. If any air sample taken outside of the Work Area exceeds 0.010 f/cc, immediately and automatically stop all work except corrective action necessary to address elevated concentrations if it is determined that the elevated concentration is or may likely be the result a deficiency of the Contractor's work; initiate the following actions:

    a) Erect additional critical barriers to isolate the affected area
    b) Install HEPA filtration negative air units in affected area
    c) Decontaminate the affected area in accordance with appropriate cleaning procedures.
    d) Require that respiratory protection and personal protective equipment be used in affected area until area is cleared for re-occupancy in accordance with the work area clearance requirements.

    Complete corrective work with no change in the Contract Price or Sum if high airborne fiber counts were caused by Contractor activities.

D. Analytical Methods: Owner reserves the right to use either phase contrast microscopy (PCM) and/or transmission electron microscopy (TEM) to analyze air samples. PCM analysis will be performed using the NIOSH 7400 method at the job site or at an off-site laboratory. TEM may also be used as Owner deems necessary for ambient area air samples using the analysis method as determined by IH Consultant. Also see Work Area Clearance section.

E. Schedule of Air Samples

    1. Prior to the start of work: The IH Consultant will collect air samples to establish a base line before start of work. Base line is an action level expressed in fibers per cubic centimeter that is twenty-five percent greater than the largest of the following:

        a) Average of the PCM samples collected outside each Work Area
        b) Average of the PCM samples collected outside the building
        c) And 0.010 f/cc

    2. Daily: From start of work involving Temporary Enclosures through the work of Project Decontamination, IH Consultant will be collecting samples during the Work, including but not necessarily limited to:

        a) At HEPA Exhaust areas
        b) Non-work-area portions of the building
        c) At entrance to the Decontamination Unit
        d) Outside the building
        e) Clearance sampling: See the Air Clearance Requirements.

F. Laboratory Testing:

1. Owner will employ the services of a testing laboratory to perform laboratory analyses of the air samples. Samples will be sent overnight on a daily basis, so that verbal reports on air samples can be obtained within 24 hours. Results of all air monitoring tests will be available at the job site on a daily basis.

G. OSHA Monitoring and Additional Testing:

1. Additional Testing: The Contractor may conduct his own air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to Owner.

2. OSHA Compliance and Ambient Area Monitoring: Contractor must provide for collection and laboratory analysis services of Contractor's OSHA personal exposure samples, including daily TWA and STEL monitoring for asbestos and other contaminants resulting from the Work, including but not limited to carbon monoxide, volatile organic compounds, and chemical exposures.

1.16 TEMPORARY FACILITIES

A. General: Provide temporary connection to existing building utilities or provide temporary facilities as required to complete work. Owner must approve all connections to utilities and facility components. Provide temporary portable water and power sources for all exterior work as indicated and coordinated with Owner, as applicable. If there are no electricity or water sources available at the site. The Contractor must provide temporary power and water during the abatement period. Coordinate activities with the Owner.

B. Water Service:

1. Temporary Water Service Connection: Provide hot and cold water to the Work Area. Provide a qualified and experienced licensed plumber as necessary to complete all water service work in conformance with applicable building codes and regulations.

2. All connections to the Owner's water system shall include back-flow protection. Monitor for leaks and repair or replace as needed.

3. Water Hoses: Employ suitable heavy-duty abrasion-resistant hoses to provide water into each work area and to each Decontamination Unit.

C. Electrical Service:

1. General: Provide a qualified and experienced licensed electrician to complete all electrical service work. Comply with applicable OSHA, NEMA, NECA, UL and other industry standards and governing regulations for materials and layout of temporary electric service. Provide adequate temporary power to the Work Area sized and equipped to accommodate all electrical equipment required for completion of the work and related testing and inspections. Provide temporary electrical panel as needed sized and equipped to accommodate all electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical system. Protect with circuit breaker or fused disconnect. Locate temporary panel

outside of the work area and in a location acceptable to Owner. Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI).

2. Lamps and Light Fixtures: Provide appropriate temporary work area lighting. Protect lamps with guard cages or tempered glass enclosures where fixtures are exposed to breakage by construction operations.

D. First Aid: Comply with governing regulations and recognized recommendations within the construction industry. Provide appropriate first aid supplies.

E. Fire Extinguishers: Provide appropriate fire extinguishers for temporary offices, storage, work areas and other portions of the site occupied or used by Contractor for the work.

F. Execution: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work. Coordinate all such work with Owner. Require that tradesmen be licensed as required by local authorities. Relocate, modify, and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

1.17 PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

A. Continuously monitor and record the pressure differential between the Work Area and the building outside of the Work Area. Maintain accurate records of time and locations of testing on-site and in daily logs.

2. HEPA Filtered Fan Units: Supply the required number of HEPA filtered fan units to the site in accordance with these specifications. Units must meet the requirements of all applicable regulations and standards.

1.18 WORKER PROTECTION

A. Comply with respiratory protection requirements as specified in this specification and applicable regulations. Provide worker protection as required by the most stringent OSHA and/or EPA regulations and industry standards applicable to the work. The following procedures are minimum requirements to be adhered to regardless of fiber concentrations in the Work Area.

B. Worker Training

1. AHERA Accreditation: All workers are to be accredited as Abatement Workers as required by the AHERA regulation 40 CFR 763 Appendix C to Subpart E, April 30, 1987. All training must be current including current annual refresher training.

2. Train all supervisors and workers in accordance with EPA NESHAPs and 29 CFR Part 1926 (OSHA) for asbestos and other hazards anticipated during the work. All workers and supervisors must be licensed and certified as required by applicable State regulations.

C. Medical Examinations: Provide medical examinations for all workers who will enter the Work Area for any reason in accordance with OSHA requirements as set forth in 29 CFR 1926 and 29 CFR 1910.20.

D. Protective Clothing

1. Coveralls: Provide cloth full-body coveralls and hats and require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Room of the Personnel Decontamination Unit. Dispose of used coverall as asbestos waste.

2. Other: Provide other personal protective equipment as required by OSHA regulations and industry standards, not limited to hard hats, eye protection (goggles), gloves, fall safety, and footwear.

E. Entering Work Area: Each time Work Area is entered, remove all street clothes in the changing (clean) room of the personnel decontamination unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots. Only properly licensed/certified personnel shall enter the decontamination unit and work area. All personnel entering the work area must post their State license at the decontamination unit entrance.

F. Decontamination Procedures: Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:

1. HEPA vacuum all gross debris from the protective clothing prior to entering the equipment room of the decontamination unit. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.

2. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:

3. Carefully wash face piece of respirator inside and out. Each worker leaving the work area must shower completely with soap and water. Rinse thoroughly. Proceed from shower to clean room and change into street clothes or into new disposable work items.

G. Within Work Area: Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. Maintain proper use of personnel protective equipment.

H. Respiratory Protection: Provide sufficient respiratory protection in accordance with applicable OSHA requirements in addition to ANSI and NIOSH standards. Select proper level of protection based on personnel exposure monitoring and the applicable OSHA Permissible Exposure Limits. Require that respiratory protection be used at all times that there is any possibility of disturbance of asbestos-containing materials whether intentional or accidental.

1. Instruct and train each worker for proper respirator use in accordance with OSHA and other applicable industry standards. Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, until the area has been cleared for re-occupancy.

2. Provide and complete all necessary fit testing for respiratory protection in strict accordance with applicable OSHA regulations.

3. In the event that applicable OSHA PEL's (8-hour TWA and 30-minute STEL) are exceeded, stop work. Do not recommence work until work procedures, including use of engineering controls, are modified to maintain exposures within the acceptable PEL's.

I. Complete all lock-out and tag-out of power and air handling systems within the Work Area in accordance with OSHA regulations. Coordinate all lock-out and tag-out with Owner.

1.19 TEMPORARY ENCLOSURES

A. Work areas are to be considered contaminated during the work and shall be completely isolated from other locations such that asbestos fibers cannot pass through or beyond the perimeters of the work area and into non work areas. Should areas beyond the work area become contaminated with asbestos as a result of the Contractor's work, the Contractor shall be responsible for cleaning non-work areas as required. All costs including cleaning, decontaminating, monitoring, and testing shall be borne by the contractor.

B. Contractor shall construct temporary containment enclosures in each work area. Prior to proceeding with ACM abatement coordinate and complete inspections of the work area with the IH Consultant. Proceed with work sequentially as listed or indicated.

C. Disable ventilating systems or any other system bringing air into or out of the Work Area. Disable system by disconnecting wires, removing circuit breakers, by lockable switch or other positive means that will prevent accidental premature restarting of equipment as approved by Owner.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Provide new or used materials and equipment that are undamaged and in serviceable condition. Provide only materials and equipment that are recognized as being suitable for the intended use and in strict compliance with appropriate standards. Do not bring products, materials, and equipment to the Owner's site or Owner work areas that are damaged or contain construction or potential contaminated debris.

B. Warning Signs, Caution Signs and Demarcation: Provide all demarcation, warning signs, caution signs, and other postings required for the work and in accordance with State and federal codes and regulations.

C. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, in 6.0 mil thickness, clear or black as indicated.

D. Duct Tape: Provide duct tape in 3" widths with an adhesive, which is formulated to stick aggressively to sheet polyethylene.

E. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

F. Foam Pack: Provide foam pack for sealing small crevices and cracks at critical barriers as required. All foam pack must be approved by Owner and local authorities, not limited to the Fire Department.

G. Scaffolding: Provide all scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions. Equip rungs of all metal

ladders, etc. with an abrasive non-slip surface. Provide a nonskid surface on all scaffold surfaces subject to foot traffic.

H. First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

I. Fire Extinguishers: Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

J. Wetting Materials: For wetting prior to disturbance of ACM use amended water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

K. Encapsulant: Provide suitable encapsulant material intended by manufacturer for the treatment of asbestos and ACM. Provide SDS and manufacture information for products to be used. Ensure that all encapsulant to be applied is suitable for the substrate and condition thereof and is compatible with replacement materials to be installed by Contractor or Owner following the Work.

L. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags labeled as required by applicable sections of this Specification and federal and state regulations.

M. Fiberboard Drums of Equivalent: Provide sufficient quantity of fiberboard drums or equivalent (as determined by IH Consultant) for packaging of wire mesh and other contaminated materials with sharp or rough edges.

N. Disposal Bag/Container Labels and Signs: Provide leak-tight waste bags or containers for disposal of asbestos-containing materials with labels in accordance with OSHA, EPA, and the latest revisions to the US Department of Transportation requirements, not limited to material identification number (#NA2212), material packaging group (PGIII), and labels. Warning labels will also include:

Legend: DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

1. In accordance with NESHAPS, label each waste bag with the name of the waste generator and address where the material was generated. Include the Contractor name and address on each label also. Attach label in a sufficient manner such that they are properly sealed to or on the containers.

2. Label all waste bags, containers, and transport vehicles as required by applicable U.S. Department of Transportation Rules and Regulations.

O. Coveralls: Provide disposable full-body coveralls and head cover in accordance with State and federal regulations. Provide a sufficient number for all required changes, for all workers in the Work Area. Provide sufficient number for use by IH Consultant.

P. Other PPE: Provide other personal protective equipment as required by OSHA regulations and industry standards, not limited to hard hats, eye protectives, gloves, and footwear.

Q. Respiratory Protection: Provide respiratory protection in strict accordance with ANSI Z88.2 - 1992 "Practices for Respiratory Protection" and 29 CFR 1926 and 1910.134. The respirators will be sanitized and maintained in accordance with manufacturer's specifications and recommendations. Provide sufficient respiratory protection based on applicable ANSI and NIOSH standards. Select proper level of protection based on personnel exposure monitoring and the applicable OSHA Permissible Exposure Limits. Use only respirators and filter that are NIOSH-approved for use with asbestos and other atmospheres anticipated during the work.

R. Solvents: Provide appropriate solvent materials to aid in the removal of flooring materials and mastics. Such solvent materials should be "low-odor" rated and all SDS's shall be submitted to the Owner for review prior to storing or using such materials at the job site. Contractor is solely responsible for all environmental and worker protection precautions required for the safe use, clean-up, and disposal of such materials. Additional air testing (area and personal exposure monitoring) must be completed by the Contractor (at no additional cost to the Owner) depending on the solvents to be used and as necessary to ensure a safe environment for site workers and adjacent public. Coordinate with Owner as necessary to assure compatibility with replacement materials prior to installation of solvents and coordinate special cleaning efforts with Owner for replacement issues in accordance with manufacturer’s guidelines and flooring industry standards. Contractor shall sufficiently wash and clean all floor areas where solvent is used. Conduct necessary wash, dry, and air change sequences to eliminate residual solvent odors and residual. Note: Charcoal pre-filters will be required on all HEPA exhaust/filter equipment during use of solvents.

S. Construction Materials: Provide other construction materials such as plywood, strapping, studs, other related abatement materials, etc., as required to complete the work in accordance with this Specification.

T. All necessary testing and monitoring equipment as applicable to complete work, including but not limited to gas detection equipment, manometers, exposure sampling equipment.

2.2 WATER SERVICE

A. Provide water service as necessary to complete Work in accordance with applicable local, state, and federal building codes and regulations.

2.3 ELECTRICAL SERVICE

A. Provide electric service as necessary to complete Work in accordance with applicable local, state, and federal building codes and regulations.

2.4 PRESSURE DIFFERENTIAL AND FILTRATION

A. General: Supply the required number of HEPA filtered negative air fan units to the site in accordance with this Specification, industry standards, and applicable State and federal requirements. Use fan units that are intended for asbestos abatement as stated by the manufacturer. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles or equivalent when tested in accordance with Military Standard Number 282 and Army Instruction Manual

136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.

B. Pre-filters: which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required.

C. Provide appropriate charcoal pre-filters during all work involving use of solvents to minimize odors. Allow HEPA units to run for a sufficient period of time after use of solvents to allow for adequate number of air changes and filtration to adequately dilute odors.

D. Safety and Warning Devices: Provide units with the appropriate safety and warning devices including but not limited to missing or failure of HEPA filter, automatic shut down in the event of filter rupture or blockage, operating status indicator lights, and audible alarms.

2.6 AUXILIARY GENERATOR

A. Provide adequate, suitable alternative power with a capacity adequate to power a minimum of 50% of the HEPA filtered fan units in operation at any time during the work as needed for emergency use and backup.

PART 3 – EXECUTION

3.1 TEMPORARY ENCLOSURES

A. Control Access: Isolate the Work Area to prevent entry by building occupants and Army personnel into Work Area. Notify the Owner of all doors and other openings that must be secured to isolate Work Area. Maintain safety access to stairwells and building exits. Construct work area containments and isolation barriers as required allowing for Owner operations and as approved by Owner.

1. Secured Access: Arrange Work Area so that the only access into Work Area is through securable doors to personnel and equipment decontamination units.

2. Solid Construction Barriers: Provide solid construction barriers as indicated by Owner to prohibit unauthorized access and visibility by building occupants and Army personnel. At a minimum provide solid barriers as necessary to isolate all work areas with abatement activity from portions of the building to maintain normal Owner operations.

3. Provide Warning Signs at each door and barrier leading to Work Area reading as follows:

Legend: DANGER
KEEP OUT
BEYOND THIS POINT
CONSTRUCTION WORK
IN PROGRESS

4. Immediately inside door (leading to Work Area) and outside all accessible critical barriers post a manufactured asbestos danger sign, approximately 20 inches by 14 inch, displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

LEGEND: DANGER

ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

B. Critical Barriers: Completely separate the Work Area from other portions of the building and the outside by closing and sealing all openings with sheet plastic barriers at least 6 mil in thickness, or by sealing cracks leading out of Work Area with duct tape or equivalent methods. Seal the perimeter of all sheet plastic barriers with duct tape, spray adhesive or other mechanical supports, as necessary. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, roof exhausts, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting and other fixtures, as applicable, to avoid melting or burning of sheeting, as applicable. Coordinate with Owner to provide adequate ventilation to space and equipment that requires air ventilation.

C. Pressure and Circulation in the Work Area and Decontamination Units

1. Isolate the Work Area from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area.

2. Relative Pressure in Work Area: Continuously maintain the work area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.02 inches of water. Accomplish the pressure differential by exhausting a sufficient number of HEPA negative air filtered fan units from the work area. Provide sufficient ventilation for a minimum of 8 air changes per hour and sufficient air movement throughout entire containment area.

3. Vent HEPA negative air ventilation units to outside of building. Ensure adequate security and weather tight seals at each exhaust point.

4. Provide a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the building or outside. Provide continuous manometer measurements and printouts for all work performed adjacent to occupied spaces if such spaces are occupied during the work.

5. Start fan units before beginning work involving disturbance of ACM or debris and run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete and the air clearance criteria has been met.

6. At completion of abatement work, allow fan units to run as specified under Project Decontamination requirements, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air.

D. Pre-Clean and Other Preparation Work Area:

1. Complete the following after installation of (1) critical barriers, (2) pressure differential/air filtration systems, and (3) decontamination facilities as indicated below and in other Specification Sections.

    a) Pre-clean all work area surfaces, fixtures, and equipment using HEPA vacuums and wet wiping.
    b) Seal non-removable fixtures and equipment with polyethylene sheeting. Provide a minimum of 12" of overlap, sealed with spray adhesive and duct tape on both flap ends, on all joints in the barriers. Do not damage materials and items to be covered.

2. Provide and install transparent inspection windows in the containment barriers as indicated by the IH Consultant. Maintain inspection window clean of debris to allow for inspection of work in progress.

3. Complete other preparation work as necessary to allow for complete precleaning and allow for installation of containment barriers.

E. Primary Barrier:

1. Do not install primary barriers until all work area surfaces have been pre-cleaned using wet cleaning and HEPA vacuuming.

2. Protect building and other surfaces in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry, or high airborne fiber levels by covering with a primary barrier as described below. Coordinate with Owner to provide adequate ventilation to space and equipment that requires air ventilation.

3. Primary Barrier Sheet Plastic: Protect floor surfaces with a minimum of 2 layers of 6-mil plastic sheeting on floors. Provide additional floor protection as required to prevent damage to carpets and other existing flooring surfaces to remain after construction. Protect all existing wall, ceiling, fixed equipment, and other building surfaces with a minimum of 1 layer of 6-mil plastic sheeting in addition to critical barrier systems.

4. Provide a minimum of 12" of overlap, sealed (poly-to-poly) with spray adhesive and duct tape on both flap ends, on all joints in the barriers. Extend floor sheeting up adjoining walls a minimum of 18 inches. Do not place seams at, or within 18" of any wall, ceiling, or floor joints. Stagger all joints by at least 18 inches. Wall and vertical surface poly shall extend over floor sheeting such that floor sheeting extends up the wall and is covered by the wall sheeting overlap.

5. Protect all existing building surfaces and fixed equipment/items, also including non-ACM insulations in the work areas, with a minimum of 2 layers of 6-mil plastic sheet as required to maintain existing conditions and to prevent contamination, water damage, or other damages due to the work. Provide a minimum of 12" of overlap, sealed with spray adhesive and duct tape on both flap ends, on all joints in the barriers.

F. Seal all ducts and equipment with primary barriers. Isolate and shut down air systems in work area during abatement. Isolate all exterior intakes sufficiently from HEPA exhaust points. Ventilation units and ductwork shall be fully sealed with polyethylene sheeting.

G. Stop Work: If the Critical or Primary Barrier fails or is breached in any manner stop work immediately and repair the breach as required. Do not start work until authorized by the IH

Consultant. Any contamination and/or suspect contamination, as determined by Owner and the IH Consultant, resulting from a breach in the barriers or other neglect by the Contractor shall be thoroughly abated in accordance with this Specification at no additional cost to Owner.

H. Decontamination Units

1. Provide personnel and equipment decontamination facilities in accordance with State of Maine and OSHA regulations and require that the personnel decontamination unit be the only means of ingress and egress for the Work Area (for personnel, waste, equipment, and other related items). Provide portable shower units, with continuous dedicated water source, sufficient for personnel decontamination in accordance with State and OSHA regulations, and cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. The clean room will be a minimum of 24 square feet for work areas involving 3 or fewer workers entering the regulated area per work shift and a minimum of 32 square feet for all other projects.

2. Water from the shower shall either be filtered through a minimum of a 2-stage filtration assembly equipped with a 50-micron primary filter and a 5-micron final filter or containerized for disposal as asbestos waste. Do not discharge filtered water unless testing and permitting has been completed as applicable in accordance with State and local requirements.

3. Clean debris and residue from inside of Decontamination Units on an ongoing basis.

4. Post an asbestos warning sign at the entrance of the decontamination unit.

5. Secure door to entrance of decontamination unit at the completion or each shift.

I. Containment Locations

1. Construct and install containment barriers around each work area as coordinated and indicated by Owner and IH Consultant. Do not allow containment location and installation to inhibit access and adequate airflow to all other areas of the building and mechanical equipment. Coordinate with Owner the isolation of mechanical equipment in the work area.

3.3 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. Inspections: Prior to commencing with ACM removal or other ACM disturbance, each individual work area must pass an inspection by the IH Consultant. If deficiencies are observed, immediate correct in a manner satisfactory to IH Consultant.

B. Maintain all work area isolation and controls during work of this section. The Contractor shall conduct ongoing inspections of the work area, adjacent areas, and surrounding areas beneath, as applicable, for containment breaches, leaks or other containment failures. In the event breeches or potential breeches are identified, immediately repair the containment barriers as needed and complete all clean up and decontamination work.

C. Wet Removal and Waste Packaging - General:

1. Thoroughly wet ACM to be removed or otherwise disturbed prior to disturbance, stripping and/or tooling to reduce fiber dispersal into the air. Maintain materials as adequately wetted during Work and as required by NESHAPS. Accomplish wetting by a fine spray (mist) of

amended water. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water to penetrate material and seams thoroughly. Spray material repeatedly during the work process to maintain a continuously wet condition.

2. Where necessary, carefully remove ACM while simultaneously spraying amended water to minimize dispersal of asbestos fibers into the air. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels. Do not allow ACM to dry out. As it is removed, simultaneously pack material into appropriate asbestos waste disposal bags/containers. For waste bags, twist neck of waste bags, bend over and seal with minimum three wraps of duct tape. Clean outside of packaging and move packaged waste to the equipment decontamination unit for further cleaning and waste re-packaging. Once in equipment decontamination unit and cleaned, repackage waste in 2nd waste bag and seal as indicated above.

3. Continuously clean excess water using wet wiping and HEPA vacuuming such that excess water build up on the floor and other containment surfaces does not occur and so that water does not leak or migrate outside of the work area.

4. Use work procedures that result in 8-hour TWA and STEL airborne fiber counts less than the required limits established by OSHA and as described herein. If airborne fiber counts exceed this level immediately mist the area with amended water to lower fiber counts and revise work practices and engineering controls to maintain level within the required limits.

D. Contractor may encounter, and shall investigate all areas of the building, as directed by the Owner, to identify, concealed ACM insulation and miscellaneous ACM. Provide full access and selective controlled demolition, as necessary, to identify and fully remove all ACM within the scope of work determined by the Owner. Remove as ACM all co-mingled debris or building materials where ACM is embedded or has come in contact with such material and decontamination is not feasible.

E. Other Safety: As applicable, comply with all appropriate safety procedures during Work in accordance with industry standards and all applicable OSHA regulations including but not limited to: confined space work safety procedures in accordance with 29CFR Part 1910.146; proper personal protective equipment; worker safety training and written programs per current OSHA requirements; fall protection; lockout tag out; and take precautions to avoid burns and heat stress when working in areas of hot equipment and excessive heat as applicable.

F. Gross Removal of Pipe and Fitting Insulation

1. Coordinate shut-off and lock-out/tag-out of systems with the Owner, if necessary to control potential hazards (i.e. steam – heat). Conduct removal work within full containment barriers. Cut bands holding preformed insulation, slit jackets at seams, remove, and hand-place into a disposal bag. Remove job-molded fitting insulation in chunks and hand-place to the bottom of the waste bag. Do not drop any material or allow material or water to fall on to the floor or other lower surfaces. Remove any residue on substrate with stiff-bristle-nylon hand brush. Place all waste directly into a waste bag by hand.

2. Remove any fiberglass insulation in contact with the ACM and damaged fiberglass insulation in the general vicinity of damaged ACM as asbestos contaminated waste. All other non-ACM insulation shall be precleaned, sealed in primary barriers and left in place unless otherwise designated by Owner. Cut back (and remove as asbestos waste) all fiberglass insulation within 4” of ACM insulation removed.

G. Glovebag Removal of Pipe and Pipe Fitting Insulation

1. Glovebags shall be used to remove pipe and pipe fitting insulation. Conduct glovebag removal within negative pressure enclosures or full containment barriers as indicated in Section 3.2. Glovebags will be used in strict accordance with 29 CFR 1926.1101 (OSHA) and other applicable regulations. Conduct work in negative pressure enclosure. Install polyethylene sheeting drop cloths beneath pipe areas to be worked and along all foot traffic areas in the work area. After the negative pressure enclosure in constructed, install glovebags in accordance with manufacturer's instructions and regulatory requirements.

2. Once completely sealed around the pipe to be worked, inspect glovebag for adequate seals and using proper smoke testing. Allow amended water to saturate material to substrate and ensure ACM remains adequately wetted. Cut bands holding preformed insulation, slit jackets at seams, remove, and hand-place in a disposal bag or bottom of glovebag as applicable. Provide dedicated water supply to each glovebag during the entire removal and cleaning operation within the glovebag. Remove job-molded fitting insulation in chunks and hand place to the bottom of the glovebag. Spray amended water continuously such that ACM is adequately wetted. Do not drop any material or allow material or water to fall out of the glovebag or to fall to the floor. Remove any residue on pipe or fitting with stiff-bristle-nylon hand brush. Once all cleaning is complete, twist the glovebag with the debris at the bottom of the glovebag and seal with duct tape. Remove the glovebag, bend the top over, and then reseal the neck with duct tape.

H. Floor Tile and Mastics

1. Ensure ACM, carpet and associated materials (if present over ACM) remain adequately wetted. Remove carpet covering ACM, as applicable, within negative pressure enclosure as indicated in Section 3.2. Carpet that has been in contact with ACM may be disposed of as general construction waste as long as no ACM or suspect debris is attached to carpet. Carpet that has ACM or suspect debris adhered to it shall be packaged and disposed of as asbestos waste. Remove cove base material in areas of flooring abatement and carpet removal (cove base mastic to remain). The ACM will be removed by hand scrapers and will not be allowed to dry out during removal and packaging. Do not render the materials friable and use care not to break ACM into small fragments during removal. Friable removal requires full containment barriers on all wall, floor, and ceiling surfaces. Mechanical or bead blasting methods are prohibited unless specifically approved in writing by Owner and Owner’s IH Consultant. As removed, the ACM will be simultaneously packed while still wet into corrugated boxes or burlap bags and then sealed shut. The boxes/bags will then be sealed and placed into proper disposal bags. The necks of the disposal bags will be twisted, bent over and sealed with minimum three wraps of duct tape. Caution will be used to protect the bags and wrapping from tears and rips due to sharp edges.

2. Coordinate with Owner as necessary to assure compatibility with replacement materials prior to installation of solvents and coordinate special cleaning efforts with Owner for replacement issues in accordance with manufacturer’s guidelines and flooring industry standards. Mastic on concrete shall be removed using a suitable solvent and manual scraping/brushing, wet wiping, and HEPA vacuums. Do not use solvents on any wood or other porous substrates. Do not allow solvent to leak out of the work area or seep into floor or wall cracks, and take precautions to prevent solvent from entering cracks and/or crevices in the concrete and wall/floor joints. All waste will be packaged into appropriate waste containers. Residue on the floor will be removed with stiff-bristle-nylon hand brush. This work will be repeated until all visible debris has been

removed from substrate. In areas with solvent use, as requested by the Owner, leave adequate air filtration and pressure differential systems in continuous operation for at least 24 hours after the air clearance criteria has been met to allow for ventilation of odors.

3. For wood substrate with ACM mastic, remove wood substrate layer that has mastic applied to it. Fully remove the substrate layer in contact with mastic, mastic and associated debris using wet methods, brushes, and HEPA vacuums. Do not use solvents on wood substrate. Do not leave any sharp protrusions, not limited to nails and screws in the floor. Provide temporary floor work surface as needed to ensure safety.

4. As applicable and possible, provide adequate inspection of the building spaces below areas of floor removal to detect, prevent and correct damage from liquids that escape the work area. Adequately wash all floor substrates and other building surfaces following abatement and clearance testing using an appropriate cleaner and water as needed to clean residual film and minimize residual odor. Do not damage remaining finishes and substrates and do not use excessive water. Package waste as asbestos waste.

3.4 INITIAL CLEAN-UP WORK

A. Once gross removal, glovebag removal, is completed, clean all visible debris on the substrate and containment barriers using HEPA vacuums, scrub brushes, and wet-wiping. Do not allow materials to dry out. As material is removed and clean-up is completed, simultaneously pack wetted material into proper waste disposal bags or package as noted above. For waste bags, twist the neck of the bags, bend the neck over, and seal with a minimum of three wraps of duct tape. Clean the outside of the bags with wet wiping and HEPA vacuum and move to the wash down station in the Equipment Decontamination Unit. Once washed clean, place the clean disposal bags into a second asbestos disposal bag and seal the bag in the same manner as the first. Bags will then be transported from the work area to the asbestos waste dumpster. Note: Waste dumpster must remain labeled and locked at all times when loading is complete or idle.

B. Label waste dumpsters in accordance with 29 CFR 1910.145: Legend

DANGER
ASBESTOS DUST HAZARD
CANCER & LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

C. Change all filters on the pressure differential systems and properly dispose of as asbestos waste. Maintain adequate filtration and pressure differential during all filter changes.

3.5 PROJECT DECONTAMINATION

A. Work of This Section includes the decontamination of air and surfaces in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to ACM in the space.

1. First Cleaning

a) Carry out a first cleaning of all surfaces of the work area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp- or wet-cleaning and mopping,

and HEPA vacuuming. Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from the substrate and other work area surfaces.

b) At the completion of the above cleaning Contractor Supervisor shall visually inspect all work area surfaces. Re-clean if any dust, debris, etc. is found. Inspect the area and if any debris or dust is found, repeat the cleaning. Continue this process until no debris dust or other material is found while sweeping of all surfaces with forced air equipment (important: forced air sweeping to be used only in full containment work areas).

c) Remove and replace all negative air unit pre-filters, dispose of used filters as asbestos waste.

2. Second and Third Cleaning

a) At the completion of the first cleaning and Contractor inspection, carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning. For containments with multiple layers of polyethylene sheeting on floors, remove top layers of sheeting on the floor leaving one layer of the primary barrier remaining. Clean newly exposed areas as outlined above and dispose of removed sheeting as asbestos waste.

b) Carry out a third cleaning of all surfaces in the same manner as the first cleaning. Change filters on pressure differential systems and properly dispose of as asbestos waste. Allow for sufficient settling period prior to clearance testing. Complete additional cleaning as required and until no visible dust or debris is present.

B. Visual Inspection: After completion of above cleaning and Contractor's own visual inspection, The IH Consultant shall perform a visual inspection for debris from any sources, residue on surfaces, dust or other matter in the Work Area to confirm the Contractor's inspection findings.

1. For full containment work areas, during visual inspection sweep entire work area including walls, ceilings, ledges, floors, and other surfaces in the room with exhaust from forced air equipment (leaf blower with approximately 1 horsepower electric motor or equivalent).

2. IH Consultant Visual inspection is complete when the area is visually clean, and no debris, residue, dust or other material is found. If any debris, residue, dust or other matter is found repeat Contractor cleaning and the IH Consultant Visual Inspection.

3. Encapsulation of substrate: After successful final visual inspection, perform encapsulation of substrate as approved by Owner using suitable encapsulant material. Coordinate with Owner to ensure compatibility with replacement materials and fire retardant ratings for the surfaces to be encapsulated. Do not allow overspray to damage other surfaces, materials and equipment in the work area and do not allow overspray and build up or pooling of encapsulant.

C. Clearance Testing: Air clearance sampling will be conducted by the IH Consultant. See Work Area Clearance section. Air clearance testing will not be completed until the work area passes visual inspection, has had adequate air changes, and sufficient time for surfaces to adequately dry.

D. Removal of Work Area Isolation: Complete only after the work area clearance sections have been met and verified by the IH Consultant. Remove all Primary Barrier sheeting and equipment decontamination unit(s), leaving only: critical barriers, personnel decontamination unit, and operational pressure differential/air filtration systems. Properly dispose of sheeting as asbestos-

waste. Use care to prevent damage to building surfaces and materials during teardown. All damages to surfaces and materials shall be repaired by Contractor unless otherwise noted and agreed to in writing by Owner.

1. Re-inspect all work area surfaces and adjacent areas for any dust and debris that may have originated from the work. Clean all surfaces using HEPA-vacuums and wet-wiping as required and until all surfaces are clean of visible debris. Shut down and remove the Pressure Differential System. Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6 mil polyethylene sheet and duct tape to form a tight seal at intake end before being moved from Work Area.

2. Remove personnel decontamination unit. Remove the critical barriers and properly dispose of as asbestos-waste. Clean all surfaces using HEPA-vacuums and wet-wiping as required and until all surfaces are clean of visible debris.

E. Final Cleaning: This cleaning is now being applied to existing room conditions. Take care to avoid watermarks or other damages. Wet-wipe and HEPA vacuum surfaces in the work area until clean and free from dust and debris. Complete final cleaning in accordance with the project close-out requirements. Accompanied by Owner, Contractor Site Supervisor shall complete a final post-abatement inspection of all surfaces and re-clean and conduct repairs as necessary.

3.6 WORK AREA CLEARANCE

A. Contractor Release Criteria: The Work Area shall be considered cleared when the Work Area meets the final visual inspection criteria described in the project decontamination section and airborne fiber structure concentrations have been reduced to the level specified below and pursuant to applicable State and federal asbestos regulations. Contractor must provide at least 48 hours advance notice to the IH Consultant for any clearance testing or other inspections required.

B. Clearance Air Monitoring: Air clearance samples will be collected by the IH Consultant. In full containment areas air clearance sampling will be conducted using aggressive sampling techniques in accordance with state and federal regulations.

C. Analytical Method: The number and volume of air samples taken and analytical methods used by the IH Consultant based on conditions of work and the various State and federal requirements. Phase Contrast Microscopy (PCM) and Transmission Electron Microscopy (TEM) may be used for analysis of clearance samples collected to confirm completion of abatement of ACM in accordance with applicable State and federal regulations. Other analytical methods may also be used as determined by IH Consultant based on conditions of the work and other factors.

D. PCM Air Clearance Testing: Decontamination of Work Areas requiring PCM air clearance testing only is complete when every Work Area clearance sample collected has total fiber concentrations below the 0.010 f/cc. If any sample does not meet the clearance criteria, the decontamination is incomplete and Contractor shall repeat final cleaning. The Contractor shall be responsible for all costs for each subsequent and additional round of testing and analysis required until the clearance criteria is met.

E. TEM Air Clearance Testing: For work areas requiring TEM analysis, air clearance testing will be completed in the work area after completion of all cleaning work in accordance with 40 CFR Part 763 and other applicable industry standards and guidelines.

1. TEM Release Criteria: Decontamination of the work site is complete if either of the following condition is met if the average concentration of asbestos on the five or more inside Work Area Clearance samples does not exceed the filter background level of 70 structures per square millimeter of filter area.

2. If these conditions are not met then the decontamination is incomplete and the Contractor shall repeat final cleaning procedures. The Contractor shall be responsible for all costs for each subsequent and additional round of TEM analysis required until the clearance criteria is met.

3.7 DISPOSAL OF ASBESTOS-CONTAINING WASTE MATERIAL

A. General: Asbestos-containing waste materials and debris which is packaged in accordance with the provisions of this Specification may be disposed of at designated sanitary landfills when certain precautions are taken not limited to: notice to appropriate EPA Regional Offices and notice and permit from appropriate State and local agencies are completed. Waste disposal site(s) must be properly licensed, permitted, and qualified to accept and handle Asbestos waste in accordance with all applicable local, State, and federal codes and regulations.

B. Disposal: Comply with the following sections during all phases of this work: worker protection requirements and respiratory protection requirements. All waste is to be hauled by a waste hauler with all required licenses and permits from all state and local authority with jurisdiction.

1. Carefully load all containerized asbestos-containing waste material on sealed and lined trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the materials.

2. All ACM and asbestos materials removed are to be properly containerized in one of the following: (1) Two 6 mil disposal bags, or (2) Two 6 mil disposal bags and a fiberboard drum, or (3) equivalent method as approved by Owner and State. Do not store disposal bagged material outside of the work area. Take bags or drums from the work area directly to a sealed truck or dumpster. Glove bags shall not be used as waste disposal bags.

3. Owner will provide a designated location for placement of proper waste dumpster. Line waste dumpster with a minimum of 2 layers of 6 mil polyethylene sheeting and such that a minimum total of 20 mils of lining exists (including waste bags). Waste dumpster(s) will not be allowed to remain at the job site for longer than 72 hours upon completion of each phase (work area) of work by the Contractor. Do not transport disposal bagged materials on open trucks. During loading and unloading, properly demarcate and label dumpster on all 4 sides. Dumpster shall be sealed, labeled and locked during all non-loading periods.

4. In accordance with NESHAPs and State regulations, advise the landfill operator or processor in advance of transport, of the quantity of material to be delivered. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, leave in truck and clean entire truck and contents using procedures set forth herein. Retain receipts from landfill or processor for materials disposed of. At completion of hauling and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to Owner and IH Consultant.

5. Provide copy of waste shipment record (complete to date) to Owner and IH Consultant prior to removing waste from the site. Provide final copy of completed waste shipment record to Owner and IH Consultant within 25 days of removing waste from the site.

3.8 ASBESTOS PROJECT CLOSEOUT

A. Contractor shall achieve Substantial Completion and then Final Completion as indicated below prior to requesting final payment.

B. General cleaning during and after construction is required as needed to maintain general housekeeping and as otherwise required herein. Complete all final, general house-keeping and cleaning in the work areas in accordance with 29 CFR Part 1910 and 29 CFR Part 1926, as applicable. Remove temporary protection and facilities installed for protection or security of the work during construction. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

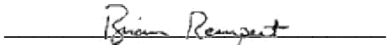
C. Conduct all other related work, non-asbestos work, and general construction activity in accordance with the Contract Documents and Owner’s written request.

D. Substantial Completion consists of the following: (1) all work area abatement, decontamination and related site work is complete; (2) interim submittal requirements are submitted; (3) final visual inspection and air clearance requirements have been met in each work area; (4) removal of containment barriers and Contractor equipment is complete; (5) all general cleaning has been performed as indicated herein; (6) other work tasks and administrative requirements have been completed in accordance with the contract documents and specification; and (7) post-abatement site inspection and review with Owner has been performed.

E. Final Completion consists of the following: (1) Substantial Completion met; (2) completion of all Closeout Submittal requirements; and (3) complete, to Owner’s satisfaction, any remaining punch-list items identified during the post-abatement site inspection with Owner.

Allan D. Mercier
Maine Licensed Designer #DC-0307, Exp. 2/28/25

Brian Rempert CIH, CSP



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SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Non-load-bearing wall framing, at exterior.
2. **Framing for interior platform. Delegated Design required. (ADDENDUM NO. 2, 8-30-2024)**

B. Regulatory Requirements: Comply with the Build America, Buy America Act (BABAA), section 70914 of Public Law No. 117-58, §§70901-52.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 055000 - METAL FABRICATIONS for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 072700 - AIR BARRIERS for sill sealer gaskets.
3. Section 092110 - GYPSUM BOARD ASSEMBLIES for interior non-load-bearing, metal-stud framing, with height limitations, and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design cold-formed metal framing, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Structural Drawings or required by Code.

2. Deflection Limits: Design framing systems to withstand design loads within deflections greater than the following:

    a. Non-Load-Bearing Framing:

        1) Horizontal deflection of L/240 of the wall height for EIFS systems.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load, plus superimposed dead load, deflection of primary building structure.
5. Design non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3. Shop drawings shall be signed and sealed by a qualified professional engineer.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Welding certificates.

E. Qualification Data: For professional engineer.

F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips.
7. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional structural engineer who is legally qualified to practice in the **State of Maine** ~~jurisdiction where Project is located~~ and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent. **(ADDENDUM NO. 2, 8-30-2024)**

C. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

D. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. California Expanded Metals Co. (CEMCO).
2. ClarkDietrich Building Systems.
3. Consolidated Fabricators Corp.
4. Marino\WARE.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90 (Z275).

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90 (Z275).

2.3 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (18 gauge).
2. Flange Width: 1-3/8 inches min.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, threaded carbon-steel bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Acceptable Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hilti, Inc.; Kwik-Bolt 3.
b. ITW Red Head; TruBolt Wedge Anchor.
c. Powers Fasteners; Power-Stud.
d. Simpson; Strong Bolt.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content (95% by weight) paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

1. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Duncan Galvanizing; ZiRP.
b. ZRC Worldwide; Galvilite Galvanizing Repair.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

1. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Dayton Superior; 1107 Advantage Grout.
b. Euclid Chemical; NS Grout.
c. Laticrete; L&M Duragrout.
d. Sika; SikaGrout 212.

D. Shims: Load bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sill sealer gaskets, specified in Section 072700 - AIR BARRIERS, to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 072100 - THERMAL INSULATION, in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

I. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Rigid insulation for under slab rigid insulation at the Addition
   2. Rigid insulation at perimeter foundation walls for the Existing Building and the Addition.
   3. Concrete faced insulated sheathing and accessories for insulating exposed concrete foundation walls the Existing Building and the Addition.
   4. Fiberglass batt insulation for metal framed walls and perimeter walls cavities for both the Existing Building and the Addition.
   5. Sheet vapor retarder for insulated perimeter walls for both the Existing Building and the Addition.

B. Regulatory Requirements: Comply with the Build America, Buy America Act (BABAA), section 70914 of Public Law No. 117-58, §§70901-52.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 033000 - CAST-IN-PLACE CONCRETE for underslab vapor barrier.
   2. Section 072419 - EXTERIOR INSULATION AND FINISH SYSTEM (EIFS) for rigid insulation as part of EIFS.
   3. Section 072700 - AIR BARRIERS for air and vapor barrier membrane.
   4. Section 075400 - THERMOPLASTIC MEMBRANE ROOFING for roofing insulation.
   5. Section 092110 - GYPSUM BOARD ASSEMBLIES for acoustic insulation in gypsum board assemblies.
   6. Division 22 - PLUMBING for plumbing insulation.
   7. Division 23 - HEATING, VENTILATING, AND AIR CONDITIONING for mechanical insulation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Include installation instructions, performance criteria, and product limitations.

B. Qualification Data: For Installer of spray-applied products and Testing Agency.

C. Research Reports: For rigid plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Installer Qualifications: A qualified installer who has been trained by and is acceptable to spray insulation manufacturer to install manufacturer's products.

C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

D. Fire Test Performance for Insulation in Cavity Wall: Passes NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

E. Testing Agency Qualifications: An independent agency qualified as a “Certified Infrared Thermographer” per ASNT SNT-TC-1A guidelines, Level I certification minimum.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store in a dry and secure location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic and spray polyurethane foam insulation as follows:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver materials to Project site before installation time.
   3. Complete installation and concealment of materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 RIGID INSULATION AT FOUNDATION WALL AND UNDER SLAB

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. DuPont (formerly Dow Chemical); Styrofoam ST-100 Series XPS (gray color).
   2. Kingspan; Greenguard LG XPS series.
   3. Owens Corning; Foamular NGX XPS (Next Generation Extruded) series, Basis of Design.

B. Extruded-Polystyrene (XPS) Board Insulation: ASTM C 578, square edged of type, density, and compressive strength indicated below:
   1. For below grade, Type VII, 2.2-lb/cu. ft. minimum density and 60-psi minimum compressive strength per ASTM D 1621.
   2. R-Value: Minimum 5 per one inch.

2.2 RIGID INSULATION AT INTERIOR MASS MASONRY WALLS

A. Extruded-Polystyrene (XPS) Board Insulation: ASTM C 578, square edged of type, density, and compressive strength indicated below:
   1. Type VII, 2.2-lb/cu. ft. minimum density and 40-psi minimum compressive strength per ASTM D 1621.

2.3 CAVITY WALL INSULATION, MINERAL-WOOL BOARD

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johns Manville (JM); Clad Stone 45.
2. Owens Corning; Thermafiber RainBarrier 45.
3. Rockwool (formerly Roxul); Cavityrock DD.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 4 lb/cu. ft., thermal resistivity (R-value) of 4.0 deg F x h x sq. ft./Btu x in. at 75 deg F minimum. (ADDENDUM NO. 2, 8-30-2024)

2.4 CONCRETE FACED INSULATED PERIMETER WALL PANELS

A. Manufacturers: WallGUARD Concrete Faced Insulated Perimeter Wall Panels by T. Clear Corporation or APPROVED EQUAL.
   1. Extruded polystyrene board, ASTM C578, Type IV, rigid, closed cell, with integral high
   2. density skin, with integral 5/16 inch thick latex-modified concrete facing.
   3. Board Size: 2 x 4 feet x [2-5/16] [3-5/16] inches thick.
   4. Edges: Tongue-and-groove sides, square ends.
   5. Thermal Resistance: Long term aged R-value of 5 per inch, tested to ASTM C518.
   6. Foam compressive strength: Minimum 35 PSI, tested to ASTM D1621.

2.5 Accessories: Metal cap flashing: 24 gage galvanized steel J-channel; 2-1/4 inches wide, 4 inch long leg and 2-1/4 inch short leg; prefinished, color to be selected by Architect

2.6 THERMAL BATT INSULATION, MINERAL WOOL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Johns Manville; TempControl Mineral Wool.
2. Owens Corning; Thermafiber UltraBatt FF.
3. Rockwool (formerly Roxul); ComfortBatt.

B. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Thermal Resistivity (R-value): ASTM C 518, 3.7 per inch.

~~D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:~~

~~1. CertainTeed Corporation.~~
~~2. Johns Manville.~~
~~3. Knauf Insulation.~~
~~4. Owens Corning.~~

~~E. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. GreenGuard certified as formaldehyde free and low chemical emissions.~~

~~F. Glass-Fiber Blanket, Polypropylene-Scrim-Kraft-Faced: ASTM C 665, Type II (nonreflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier). GreenGuard certified as formaldehyde free and low chemical emissions.~~

~~G. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier). GreenGuard certified as formaldehyde free and low chemical emissions.~~

~~H. Glass-Fiber Blanket, Foil Faced: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil-scrim, foil-scrim-kraft, or foil-scrim-polyethylene. GreenGuard certified as formaldehyde free and low chemical emissions.~~ **(ADDENDUM NO. 2, 8-30-2024)**

2.7 SHEET VAPOR RETARDER

A. Manufacturers: Certainteed MemBrain or APPROVED EQUAL

B. Polyimide film vapor retarder for use with unfaced, vapor permeable glass fiber and mineral wool insulation in wall and ceiling cavities. Material has a permeance of 1 perm or less when tested to ASTM E 86, dry cup method and increases to greater than 10 perms using the wet cup method.
   1. Water Vapor Permeance:
      a. ASTM E 86, dry cup method: 1.0 perms (57ng/Pa*s*m2).
      b. ASTM E 86, wet cup method: 10.0 perms (1144ng/Pa*s*m2).
   2. Fire Hazard Classification: ASTM E 84:
      a. Maximum Flame Spread Index; 20.
      b. b. Maximum Smoke Developed Index; 55.

2.8 SPRAYED-FOAM INSULATION, AT GAPS AND VOIDS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. DuPont (formerly Dow Chemical); GreatStuff Pro.
   2. ICP Building Solutions Group: Handi-Foam E84 Low GWP.

B. Sprayed-Foam Insulation: Water-cure closed cell polyurethane containing no urea-formaldehyde and no CFCs.

1. Minimum density of 2.0 lb/cu. ft., thermal resistivity (R-value) of 6.0 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Fire Resistance: ASTM E 84 or UL 723, Flame Spread 75 max., and Smoke Developed 450 max.

2.9 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Non-solvent-based adhesive, compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

B. Insulation Fasteners:
1. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
1. Fill gaps with compatible insulating material.

D. Spray Polyurethane Foam: Comply with recommendations of the American Chemistry Council, “Health and Safety Product Stewardship Workbook for High-Pressure Application of Spray Polyurethane Foam (SPF).”
1. Spray Polyurethane Foam: Spray insulation no greater than 1-1/2 inch thickness per layer. Allow each layer to fully cure before spraying additional thickness.
2. Contain and fully ventilate the area being sprayed with negative air machines, venting directly to the exterior. Do not operate permanent building HVAC system during installation. Continue ventilation during curing process.

3. Install spray polyurethane foam insulation with uniform full thickness and with density which will not displace adjacent materials.
4. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.4 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical surfaces, set rigid insulation units according to manufacturer's written instructions.
1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.
2. Anchor Installation: Install board insulation on substrates by adhesively attached, spindle-type insulation anchors.
3. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

B. On horizontal surfaces, loosely lay rigid insulation units over vapor retarder sheet, according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
1. If not otherwise indicated, extend insulation a minimum of 36 inches in from exterior walls.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports.

B. Repair or replace work where test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 080671 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 DESCRIPTION OF WORK

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Work:
1. Section 281000 - ELECTRONIC ACCESS CONTROL & INTRUSION DETECTION
2. Section 081110 - HOLLOW METAL DOORS AND FRAMES
3. Section 081177 - BULLET-RESISTANT STEEL DOORS

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

C. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.6 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to PART 3 – EXECUTION for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the Owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 087100 – DOOR HARDWARE.

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. McKinney (MK)
2. Markar (MR)
3. Securitron (SU)
4. Rockwood (RO)
5. Corbin Russwin (RU)
6. Rixson (RF)
7. Pemko (PE)
8. SARGENT (SA)
9. Falcon (FA)

D. Vault Specialty Hardware Manufactures: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Dibold, Incorporated
2. Overly Door Company.
3. SentrySafe; Schwab Corp.

Hardware Sets						
Set: 1.0						
Doors: Secure Entry – Exterior – Insulated HM Double Door – Ballistic Rating						
100.1						
2	Continuous Hinge	FM300 CTP	630	MR	087100	
2	Electric Power Transfer	EL-CEPT	630	SU	087100	
1	Concealed Vert Rod Exit, Nightlatch	ED5860 K157ET M92 MELR CT7SB	630	RU	087100	
1	Concealed Vert Rod Exit, Exit Only	ED5860 EO M92 MELR	630	RU	087100	
2	Pull	P12	630	RU	087100	
1	Surface Closer w/ integral stop & coordinator	DC6210 A13	689	RU	087100	
1	Overhead Automatic Door Operator (ADO).	8200		FA	087100	
2	Astragal	18041CSB TKSP		PE	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
2	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
2	Door Wiring Harness	QC Series (hinge to device)		MK	087100	
2	Frame Wiring Harness	QC Series (jamb to J-box)		MK	087100	
1	Wiring Diagrams (as required)	Elevation & Point-to-Point		SA	087100	
2	Position Switch (concealed)	DPS Series (coord w/ Div 28)		SU	087100	
1	Power Supply (relays as req'd)	AQL4-R8E1 (coord w/ Div 28)		SU	087100	
2	Automatic Door Actuator, Slim Style	8310-819S		FA	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	

Notes:

1. Card / fob readers provided by others.
2. Door assembly to meet or exceed UL 752 Ballistic Level 3
3. Power loss fail secure. Provide exterior keyed access.
4. Fire alarm initiates fail safe.
5. Free egress at all times.

6. Request to exit integral to exit device push rail. Monitored by EAC system.
7. ADO leaf as noted on the drawings.
8. ADO for entry able to be activated only after Electronic lock releases.

Set: 2.0

Doors: Vestibule Exit Passage – Interior – HM Double Door

100.2

2	Continuous Hinge	FM300	630	MR	087100	
1	Concealed Vert Rod Exit, Nightlatch	ED5860 N955ET CT7SB	630	RU	087100	
1	Concealed Vert Rod Exit, Exit Only	ED5860 EO	630	RU	087100	
1	Surface Closer w/ integral stop & coordinator	DC6210 A13	689	RU	087100	
1	Overhead Automatic Door Operator (ADO)	8200		FA	087100	
2	Automatic Door Actuator, Slim Style	8310-819S		FA	087100	
2	Astragal	18041CSB TKSP		PE	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
2	Sweep	3452CNB TKSP		PE	087100	

Note:
1. ADO leaf as noted on the drawings.

Set: 3.0

Doors: Exit – Exterior – Insulated HM Single Door

101.2, 100.3

1	Continuous Hinge	FM300	630	MR	087100	
1	Rim Exit Device, Storeroom	ED5200 N959 ET M51 CT7SB	630	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer w/ integral stop	DC6210 A13	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	

Set: 4.0						
Doors: Entrance – Exterior – Insulated HM Single door						
1	Continuous Hinge	FM300	630	MR	087100	
1	Rim Exit Device, Entrance/classroom	ED5200 N959 ET M51 CT7SB. Function 55-08		RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer w/ integral stop	DC6210 A13	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Set: 5.0						
Doors: Secure Entry – Exterior – Insulated HM Single Door – Ballistic Rating						
1	Continuous Hinge	FM300 CTP	630	MR	087100	
1	Electric Power Transfer	EL-CEPT	630	SU	087100	
1	Access Cont Rim Exit (FSE)	ED5200(A)N N9605ET	630	RU	281500	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer w/ integral stop	DC6210 A13	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	315CN		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
1	Door Wiring Harness	QC Series (hinge to device)		MK	087100	
1	Frame Wiring Harness	QC Series (jamb to J-box)		MK	087100	
1	Wiring Diagrams (as required)	Elevation & Point-to-Point		SA	087100	

1	Position Switch (concealed)	DPS Series (coord w/ Div 28)		SU	087100	
1	Power Supply (relays as req'd)	AQL4-R8E1 (coord w/ Div 28)		SU	087100	

Notes:
1. Card / fob readers provided by others.
2. Door assembly to meet or exceed UL 752 Ballistic Level 3
3. Power loss fail secure. Provide exterior keyed access.
4. Fire alarm initiates fail safe.
5. Free egress at all times.
6. Request to exit integral to exit device push rail. Monitored by EAC system.

Set: 6.0

Doors: Exit Only – Exterior – Insulated HM Single Door

116.2, 211.3

1	Continuous Hinge	FM300	630	MR	087100	
1	Rim Exit Device, flush exterior	ED5200 N959 ET M51 CT7SB	630	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer w/ integral stop	DC6210 A13	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	

Set: 7.0

Doors: Classroom – Interior – Single HM Door

118.2

3	180 Degree Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US26D	MK	087100	
1	Exit Device, Rim Classroom	ED5200 (A or M51) N955ET CT7SB. Function 55-08	630	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	

1	Door Stop	404 Wall	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
Set: 8.0						
Doors: Exit Passage – Interior – Single HM Door						
101.1, 111.1, 111.3, 121.1, 134.3						
3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK	087100	
1	Push Pull	111x73C/73CL	US32D-MS	RO	087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Mop Plate	K1050 6" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
3	Silencer (typical)	608		RO	087100	
1	Head & Jamb Seal (adhesive), as noted.	S88		PE	087100	
1	Kick Down Door Stop	461		RO	087100	
Note: 1. Substitute silencers for head & jamb seal and exclude kickdown door stop at 111.3 door.						
Set: 9.0						
Doors: Exit Only – Exterior – Insulated HM Double Door						
113.1						
6	Hinge (heavy weight)	T4A3786 (qty, size, nrp per spec)	US26D	MK	087100	
2	Rim Exit Device, flush exterior	ED5200 N959 ET M51 CT7SB. Function 00-01	630	RU	087100	
2	Surface Closer w/ integral stop	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	

Set: 10.0						
Doors: Entrance – Exterior – Insulated HM Double Door						
213.2						
6	Hinge (heavy weight)	T4A3786 (qty, size, nrp per spec)	US26D	MK	087100	
2	Rim Exit Device, Entrance/storeroom	ED5200 N959 ET M51 CT7SB. Function 59-09	630	RU	087100	
2	Surface Closer w/ integral stop	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Set: 11.0						
Doors: Double Egress Passage – Interior – HM Double Door						
203						
6	Hinge, Full Mortise, double egress configuration	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
2	Push Bar & Pull	BF15747 T3HD	US32D-MS	RO	087100	
2	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Door Stop	(1) 404 Wall and (1) 441CU Floor	US26D	RO	087100	
2	Kick Down Door Stop	461		RO	087100	
2	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Set: 12.0						
Doors: Entrance – Exterior – Insulated HM Double Door						
201A						

6	Hinge (heavy weight)	T4A3786 (qty, size, nrp per spec)	US26D	MK	087100	
2	Rim Exit Device, Entrance/Classroom	ED5200 N959 ET M51 CT7SB. Function 55-08	630	RU	087100	
2	Surface Closer w/ integral stop	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Set: 13.0						
Doors: Storeroom – Interior – HM Double Door – 45 Minute Firing Rating						
204.1						
6	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
2	Flush Bolt (manual)	555	US26D	RO	087100	
1	Storeroom Lock	ML2057 NSA CT7SB	626	RU	087100	
1	Strike Box & Latch Plate (inactive leaf)			RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Surface Overhead Stop	9-X36	630	RF	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Kick Down Door Stop	461		RO	087100	
1	Astragal (flat bar)	357SS (WD); 357SP (HM)		PE	087100	
1	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
Set: 14.0						
Doors: Storeroom – Interior – HM Single Door – 45 Minute Firing Rating						

204.2						
3	Hinge, Full Mortise	TA2314 (qty, size, nrp per spec)	US32D	MK	087100	
1	Storeroom Lock	ML2057 NSA CT7SB	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Sweep	315CN		PE	087100	
1	Threshold (coord w/ details)	271A FHSL14SS		PE	087100	
Set: 15.0						
Doors: Passage – Interior – HM Single Door						
112A, 112B, 114						
3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK	087100	
1	Deadbolt	DL4122 CT7SB	626	RU	087100	
2	Final Core	7 PIN SFIC	26		087100	
1	Push Pull	111x73C/73CL	US32D-MS	RO	087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Mop Plate	K1050 6" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
1	Kick Down Door Stop	461		RO	087100	
3	Silencer	608		RO	087100	
Set: 16.0						
Doors: Storeroom – Interior – HM Single Door						
103, 104B, 111B, 116A, 119, 136, 139, 142, 201B, 204A, 204B						
3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Storeroom Lock	CLX3357 NZD CT7SB	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surface Closer	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	

1	Door Stop	404 Wall	US26D	RO	087100	
1	Kick Down Door Stop	461		RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	

Note:
1. Door assembly smoke and fire ratings as noted in drawing set door schedule.
2. Provide second 8” kick plate at doors 201B and 136.
3. Provide integral stop in closer for doors 111B, 116A, 139 in lieu of wall door stop.

Set: 17.0

Doors: Classroom – Interior – HM Single Door

117, 123, 140.1, 140.2

3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Classroom Lock	ML2057 NSA CT7SB	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	

Set: 18.0

Doors: Passage – Interior – Single HM Door

137, 205, 206, 207, 208

3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Passage Lever Set	CLX3310 NZD	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	

Note:
1. See drawing set door schedule for acoustic rating minimum requirements.

Set: 19.0

Doors: Entrance – Exterior – Insulated HM Double Door

141

6	Hinge (heavy weight)	T4A3786 (qty, size, nrp per spec)	US26D	MK	087100	
1	Entrance/Storeroom	ML2024 NSA CT7SB	630	RU	087100	

1	Strike Box & Latch Plate (inactive leaf)			RU	087100	
2	Surface Closer w/ integral stop	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Rain Guard (head mount)	346C DOW + 4"		PE	087100	
1	Sweep	3452CNB TKSP		PE	087100	
1	Threshold (as required, coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Set: 20.0						
Doors: Office – Interior – Single HM Door						
102A, 102B, 102C, 103, 104A, 104B, 105, 106, 107.1, 107.2, 108, 109, 125, 126, 127, 131, 132, 133.1, 133.2, 134.1, 209, 212.1, 212.2, 212.3						
3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Entrance Lock	CLX3351 NZD CT7SB	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Door Stop	404 Wall (typical), 441CU Floor (as noted)	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
1	Threshold (coord w/ details)	27_x292AFGPK FHSL14SS		PE	087100	
Note: 1. Threshold as required at door location 209 2. Secure side as noted in drawing set door schedule 3. Provide floor stops at doors 125, 212.2, 212.3. All other to be wall stops.						
Set: 21.0						
Doors: Classroom – Interior – HM Double Door						
116.1, 118.1, 122.1						
6	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
2	Flush Bolt (manual)	555	US26D	RO	087100	
1	Classroom Lock	CLX3355 NZD CT7SB	626	RU	087100	

1	Strike Box & Latch Plate (inactive leaf)			RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
2	Surface Closer w/integral stop & coordinator	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Astragal (flat bar)	357SS (WD); 357SP (HM)		PE	087100	
1	Astragal (adhesive, edge mount)	S771		PE	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
Note: 1. Door assembly fire rating as noted in drawing set door schedule.						
Set: 22.0						
Doors: Classroom – Interior – HM Double Door – Acoustic						
210.1, 211.1, 213.1						
6	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
2	Flush Bolt (manual)	555	US26D	RO	087100	
1	Classroom Lock	CLX3355 NZD CT7SB	626	RU	087100	
1	Strike Box & Latch Plate (inactive leaf)			RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
2	Surface Closer, w/ integral stop & coordinator	DC6210 A3 / DC6200 A10	689	RU	087100	
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
2	Kick Down Door Stop	461		RO		
1	Astragal (flat bar)	357SS (WD); 357SP (HM)		PE	087100	
1	Astragal (adhesive, edge mount, acoustic rated)	S771		PE	087100	
2	Acoustic Full Mortise Automatic Door Bottom	STC411		PE		
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
Set: 23.0						
Doors: Privacy – Interior – Single HM Door						

120, 135						
3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Privacy Lock w/ Indicator. Exterior Key Override Access	ML2060 NSA V20	626	RU	087100	
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
3	Silencer	608		RO	087100	
1	Coat Hook	RM811	US26D	RO	087100	
Set: 24.0						
Doors: Closet – Interior – HM Double Door						
209A						
6	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
2	Flush Bolt (manual)	555	US26D	RO	087100	
1	Classroom Lock	CLX3355 NZD CT7SB	626	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Surf Overhead Stop	10-X36	652	RF	087100	
1	Door Stop	404 Wall	US26D	RO	087100	
6	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Dust Proof Strike	570	US26D	RO	087100	
Set: 25.0						
Doors: Classroom – Interior – HM Single Door						
124B						
3	Hinge, Full Mortise	TA2714 (qty, size, nrp per spec)	US26D	MK	087100	
1	Classroom Lock	ML2055 NSA CT7SB	626	RU	087100	
1	Surface Closer w/ integral stop	DC6210 A3 / DC6200 A10	689	RU	087100	
1	Final Core	7 PIN SFIC	26		087100	
1	Door Stop	404 Wall; 441CU Floor (or per spec)	US26D	RO	087100	
1	Head & Jamb Seal (adhesive)	S88		PE	087100	
Set: 26.0						

Doors: Vestibule Exit Passage – Interior – HM Double Door						
201						
2	Continuous Hinge	FM300	630	MR	087100	
1	Concealed Vert Rod Exit, Nightlatch	ED5860 N955ET CT7SB	630	RU	087100	
1	Concealed Vert Rod Exit, Exit Only	ED5860 EO	630	RU	087100	
2	Surface Closer w/ integral stop	DC6210 A13	689	RU	087100	
2	Astragal	18041CSB TKSP		PE	087100	
1	Head & Jamb Gasketing	2891APK x 290APK TKPS		PE	087100	
2	Sweep	3452CNB TKSP		PE	087100	
Set: 27.0						
Doors: Existing Vault Door Upgrades						
110						
3	Roller-thrust-bearing hinges of design, size, and weight required for smooth operation of door and to allow full, clear door opening.		Note: provide minimum of (3) hinges. Hinge count to be determined by weight of existing door per hinge manufacturer specifications.			
3	Hinge cover					
5	Door bolts. Permanently lubricated, not less than 11/16 inches in diameter, and fabricated from nickel-plated steel.		On each vertical side of door, provide five door bolts that engage frame when extended. Bolts automatically retract when handle is operated and automatically extend when door closes.			
1	Handle: Manufacturer's standard.					
1	Combination Lock: UL 768, Group 1R, three-wheel, mechanical type, capable of not less than one million possible combinations.					
1	Relocking Device: UL 140 separate relocking device that automatically deadlocks door bolts when lock is subjected to mechanical attack.					
1	Escape Mechanism: Provide emergency operation of lock from vault side of door.					
1	Door Closer: Automatic with 180-degree, hold-open position.		Include electromagnetic system and sensor that releases door on detection of heat or smoke.			
1	Sill: Reinforced formed- or flat-steel plate.					
1	Trim: Stainless-steel, chromium-plated, or other trim standard with door manufacturer.					
Note: All new components must comply with:						

- NFPA 232, tested according to UL 155, and listed and labeled for fire-resistance ratings indicated by a qualified testing agency. Class V.
- Fire-Resistance Rating: UL 155, Class 350, 1 hour.

END OF SECTION 080671

SECTION 084523 - FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Aluminum-framed assemblies glazed with fiberglass sandwich panels (translucent) window wall.

B. Regulatory Requirements: Comply with the Build America, Buy America Act (BABAA), section 70914 of Public Law No. 117-58, §§70901-52.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 079200 - JOINT SEALANTS for sealants installed at perimeters of assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide fiberglass sandwich panel assemblies, including anchorage, capable of withstanding, without failure, the effects of the following:
   1. Structural loads.
   2. Thermal movements.
   3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   4. Dimensional tolerances of building frame and other adjacent construction.
   5. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferred to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
      d. Noise or vibration created by wind and thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.

B. Structural-Test Performance: Provide glazed aluminum curtain-wall systems tested according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.

3. Test Duration: As required by design wind velocity but not less than 10 seconds.

C. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to 1/60 of clear span.

D. Thermal Movements: Provide glazed aluminum curtain-wall systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for assemblies.

B. Shop Drawings: For assemblies. Include plans, elevations, sections, details, and attachments to other work.
1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For each type of exposed finish required, in manufacturer's standard sizes.

D. Samples for Verification: Submit 12 by 12 inch sample panel assemblies, for each color selected.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.

F. Maintenance Data: For assemblies to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to the manufacturer.
1. Engineering Responsibility: Preparation of data for structured panel assemblies including shop drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

B. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

C. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

D. NFRC Certification: Provide fiberglass sandwich panels that are certified for U-factors indicated according to NFRC 100 and listed in its "National Fenestration Council Incorporated - Certified Products Directory."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures related to glazed aluminum curtain-wall systems including, but not limited to, the following:
   1. Review structural load limitations.
   2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review required testing, inspecting, and certifying procedures.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain-wall systems by field measurements before fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain-wall systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

B. Special Fiberglass-Sandwich-Panel Warranty: Manufacturer's standard form in which manufacturer agrees to replace panels that exhibit defects in materials or workmanship.
   1. Defects include, but are not limited to, the following:
      a. Delamination of coating, if any, from exterior face sheet.
      b. Discoloration of exterior face sheet of more than 8.0 units Delta E when measured according ASTM D 2244.
      c. Delamination of panel face sheets from panel cores.
   2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
   2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Kalwall Corporation.
   2. Or approved equal.

2.2 ALUMINUM FRAME SYSTEMS

A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
   3. Extruded Structural Pipe and Tubes: ASTM B 429.

B. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.

C. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.040 inch thick.

D. Frame-System Gaskets: Manufacturer's standard.

E. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.
   1. At closures, retaining caps, or battens, use ASTM A 193/A 193M, 300 series stainless-steel screws.
   2. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

G. Anchor Bolts: ASTM A 307, Grade A, hot-dip zinc coating, ASTM A 153/A 153M, Class C or mechanically deposited zinc coating, ASTM B 695, Class 50.

H. Frame System Fabrication:
   1. Fabricate components before finishing.
   2. Fabricate components that, when assembled, have the following characteristics:
      a. Profiles that are sharp, straight, and free of defects or deformations.
      b. Accurately fitted joints with ends coped or mitered.
      c. Internal guttering systems or other means to drain water passing joints, condensation occurring within components, and moisture migrating within the assembly to exterior.
   3. Fabricate sill closures with weep holes and for installation as continuous component.
   4. Reinforce components as required to receive fastener threads.

5. Weld components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.3 FIBERGLASS SANDWICH PANELS

A. Panel Construction: Assembly of uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core and complying with requirements applicable to panel materials in ICBO ES AC04, "Sandwich Panels."
   1. Face-Sheet, Self-Ignition Temperature: 650 deg F or more per ASTM D 1929.
   2. Face-Sheet Burning Extent: 1 inch or less per ASTM D 635.
   3. Face-Sheet, Smoke-Developed Index: 450 or less per ASTM E 84.
   4. Interior Face-Sheet, Flame-Spread Index: Not more than 25 per ASTM E 84.
   5. U-Value: 0.08.
   6. Light Transmission: Based on color selections.

B. Panel Thickness: 4 inches.

C. Grid Core: Mechanically interlocked extruded-aluminum I-beams, with a minimum flange width of 7/16 inch.
   1. Extruded Aluminum: ASTM B 221, in alloy and temper recommended in writing by manufacturer.
   2. Grid Pattern: As indicated on Drawings.

D. Face Sheets:
   1. Exterior Color: White.
   2. Interior Color: White.

E. Fiberglass-Sandwich-Panel Adhesive: ASTM D 2559.

F. Panel Fabrication: Factory assemble and seal panels.

2.4 ACCESSORY MATERIALS

A. Isolation Coating (Bituminous Paint): ASTM D 1187, VOC compliant, cold-applied asphalt-mastic paint, containing no asbestos, formulated for 30-milthickness per coat.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
   4. Rigidly secure nonmovement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Weld aluminum components in concealed locations.Protect glazing surfaces from welding.
   7. Seal joints watertight, unless otherwise indicated.

B. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action recommended in writing by manufacturer for this purpose.

C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.

D. Install components to drain water passing joints, condensation occurring within aluminum members and panels, and moisture migrating within assembly to exterior.

E. Install components plumb and true in alignment with established lines and elevations.

F. Erection Tolerances: Install assemblies to comply with the following maximum tolerances:
   1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
   2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION 084523

SECTION 090561 - MOISTURE VAPOR EMISSION CONTROL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.
   2. The Moisture Vapor Emission-Control System is required under the following types of flooring:
      a. Resilient flooring.
      b. Entry mats.
   3. Field testing as required by the flooring manufacturer's requirements for moisture content in concrete necessary to receive finish floor warranties shall be required.

B. Regulatory Requirements: Comply with the Build America, Buy America Act (BABAA), section 70914 of Public Law No. 117-58, §§70901-52.

C. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 096510 - RESILIENT FLOORING AND ACCESSORIES for moisture requirements.
   2. Section 096800 - CARPETING for moisture requirements.

1.3 DEFINITIONS

A. MVE: Moisture vapor emission.

B. MVER: Moisture vapor emission rate.

1.4 PERFORMANCE REQUIREMENTS

A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
   1. MVER: Maximum 15 lb of water/1000 sq. ft. when tested according to ASTM F1869.
   2. Relative Humidity: Maximum 90 percent when tested according to ASTM F2170 using in situ probes.
   3. Insensitivity to alkaline environment up to pH 14, when tested according to ASTM D 1308.

B. Water-Vapor Transmission: Through MVE-control system, maximum 0.06 perm when tested according to ASTM E96/E96M.

C. Tensile Bond Strength: For MVE-control system, greater than 200 psi with failure in the concrete according to ASTM D7234.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Qualification Data: For Installer and manufacturer.

C. Product Test Reports: For each MVE-control system.

D. Preinstallation testing reports.

E. Field quality-control reports.

F. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

C. Source Limitations: Obtain moisture vapor emission control system from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
   1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F and not more than 85 deg F at least 48 hours before use.
   2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F or more than 85 deg F and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
   3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during

installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace systems that deteriorate during the specified warranty period, including finish floor coverings.
   1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Koester American Corporation; Koester VAP 1 2000 System.
   2. Laticrete International Inc.; NXT Vapor Reduction Coating.
   3. Or approved equal.

2.2 MVE-CONTROL SYSTEM

A. MVE-Control System: ASTM F3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
   1. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
   2. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.

2.3 ACCESSORIES

A. Patching and Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000-psi compressive strength after 28 days when tested according to ASTM C109/C109M.

B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.

C. Cementitious Underlayment (Blotter Layer): MVE-control system manufacturer's hydraulic cement-based underlayment, self-leveling type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.

1. Prepare written report listing conditions detrimental to performance.
2. Verify compatibility with and suitability of substrates.
3. Begin coating application only after minimum concrete curing and drying period recommended by manufacturer has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of system indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Preinstallation Testing as Required for Finish Flooring Warranties. Coordinate with Section 096510 - RESILIENT FLOORING AND ACCESSORIES and Section 096800 - CARPETING for moisture requirements. Testing Agency: Engage a qualified testing agency to perform tests.
   1. Alkalinity Testing: Perform pH testing according to ASTM F710.
   2. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F1869.
      b. Internal Relative Humidity Test: Using in situ probes, ASTM F2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
   3. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. area of MVE-control system to prepared concrete substrate and test according to ASTM D7234.
      a. Proceed with installation only where tensile bond strength is greater than 200 psi with failure in the concrete.

B. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
   1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
   2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
      a. Acid etching is not acceptable.
   3. After shot blasting, repair damaged and deteriorated concrete according to MVE-control system manufacturer's written instructions.
   4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
   5. Fill surface depressions and irregularities with patching and leveling material.
   6. Fill surface cracks, grooves, control joints, and other nonmoving joints in excess of 1/32 inch with crack-filling material.
   7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
   8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.

C. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

3.3 INSTALLATION

A. Install MVE-control system according to ASTM F3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fisheyes, and voids.
   1. Install primers as required to comply with manufacturer's written instructions.

B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.

C. Apply system, including component coats, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.

D. Cure MVE-control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.

E. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.

F. Install cementitious underlayment (blotter layer) over cured membrane 1/8 inch thick or in thickness required to maintain warranty.
   1. Provide uniform, level surface, with feathered edges where required to match adjacent floor elevations.

G. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform installation inspections.

B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE-control system is installed without deficiencies.
   1. Verify that surface preparation meets requirements.
   2. Verify that component coats and complete MVE-control-system film thicknesses comply with manufacturer's written instructions.
   3. Verify that MVE-control-system components and installation areas that evidence deficiencies are repaired according to manufacturer's written instructions.

C. MVE-control system will be considered defective if it does not pass inspections.

3.5 PROTECTION

A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.
   1. Protect each coat during specified cure period and at least 24 hours from traffic, active rain, topical water, and contaminants.

B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION 090561

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

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.

B. MEMORANDUM OF USE POLICY FOR MEARNG Components, dated 10 August 2016

1.2 RELATED SECTIONS

A. Section 018110– Total Building Commissioning

B. Section 231000 – Integrated Automation Network Server.

C. Section 260533 – Raceways and Boxes for Electrical Systems

D. Section 271100 – Communication Equipment Room Fittings.

1.3 SUMMARY

A. The intent of this specification is to provide an open source Building Automation Control System (BACS) based on the latest version of NiagaraN4 approved by the National Guard Bureau (NGB), Niagara N4.7 and a network of freely programmable interoperable open protocol BACnet digital controllers. The Interoperable BACnet controllers shall be fully programmable via the embedded Niagara Workbench tool requiring only a web browser or workbench software to complete the programming process. Controllers that are not programmable or configurable directly within Niagara N4.7 (hereinafter referred to as Niagara N4) are unacceptable. **The Controls Contractor shall be directly hired by the General Contractor and shall report directly to General Contractor**. All information, submittals and RFIs from the Controls Contractor shall be submitted directly through the General Contractor.

B. Products requiring a licensed, non-embedded, or off site programming tool are not acceptable with the exception of variable refrigerant volume system controls. Open source as referred to herein shall mean that the Niagara N4 Network Area Controller and the Interoperable Digital BACnet Controller (IDC) products are available from multiple Contractor and vendor sources, affording the owner freedom of choice and competitive bidding for the initial installation of the BACS and future system expansions and modifications not limited by Contractor, vendor or networking protocol. No territorially restricted OEM brands, single vendor or “branch only” products are acceptable. All products must be available for purchase by any qualified Contractor that the owner chooses to do the installation and any further expansion or modifications. No non-

Niagara programming is acceptable.

C. All Java Application Control Engines (JACE) and Controllers shall be fully programmable or configurable from within any vendor's version of the Niagara N4 Platform. Controllers that require a separate programming tool are not acceptable.

D. Contractor must be an authorized and approved representative of the product which they propose to install.

E. **NA**

F. Furnish all labor, materials, equipment, and service necessary for a complete and operating Building Automation Control System (BACS), utilizing Direct Digital Controls as shown on the drawings and as described herein. Drawings are diagrammatic only.

G. All labor, material, equipment and software not specifically referred to herein or on the plans, that is required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.

H. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s).

SYSTEM DESCRIPTION

1.4

A. The entire Building Automation Control System shall be comprised of a network of interoperable, stand-alone digital controllers communicating via BACnet™ communication protocols to a Network Area Controller (JACE) through a Network Router. Temperature Control System products shall be by approved manufacturers. Equivalent BACnet™ products must be approved in writing by the consulting Engineer and be submitted for approval ten (10) days after receipt of Letter of Intent.

B. The Building Automation Control Systems (BACS) consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and perform functions specified

C. The Building Automation Control System shall be comprised of Network Area Controllers or Java Application Control Engines (JACE) within each facility. The JACE shall connect to the Owner's local or wide area network, depending on configuration. The controllers must be located adjacent to the equipment they monitor or control and must be sized for the task assigned to them. The system must utilize distributed processing architecture and one controller must be provided for each major piece of equipment or system controlled or monitored and contain at least 10% spare I/O. Access to the system, either locally in each building, or remotely from a central site or sites, shall be accomplished through standard Web browsers, via the local area network. Each JACE shall communicate to Open Protocol controllers and other open protocol systems/devices provided under "Related Sections".

D. The BACS Installation shall be integrated into the existing Niagara N4 Supervisor located at Camp Chamberlain in Augusta, Maine. The Niagara Supervisor provides the

communication between the JACE and web browsers. See Section 231010.

E. The BACS as provided in this Division shall be based on a hierarchical architecture incorporating the Niagara N4 Framework™. Systems not developed on the Niagara N4. Framework™ platform are unacceptable.

F. JACE controllers shall be provided with a Network Router, a Uninterruptable Power Supply (UPS) and surge protection devices. UPS shall be an "On-Line Double Conversion UPS; OPTI-UPS model DS1000B (1000VA/700W) with Generator mode or equal.

G. The BACS must monitor and control equipment as called for by the equipment "Sequence of Operation" and points list.

H. The BACS shall provide full graphic software capable of complete system operation for up to 34 simultaneous Thin-Client workstations.

I. The BACS shall provide full graphic operator interface to include the following graphics as a minimum:

1. Home page to include a minimum of up to ten critical points, i.e. Outside Air Temperature, Outside Air Relative Humidity, Enthalpy, KWH, KW, BTU, therms, gallons, etc., as selected by the owner.
2. Graphic floor plans accurately depicting rooms, walls, hallways, and showing accurate locations of space sensors and major mechanical equipment.
3. Detail graphics for each mechanical system to include, but not be limited to; RTUs (rooftop units), ERUs (energy recovery units), CHP's (combined heat & power modules), Heat pumps and VRV's (variable refrigerant volume), AHUs (air handling units), Exhaust Fans, Freeze Protection, Domestic Water Heating Systems, Energy Monitoring, etc. and associated controls.
4. The BACS shall provide data link access to electronically formatted information for the following:

    a. Corresponding system drawings, shop drawings, technical literature, and sequences of operations directly from each system graphic
    b. Project control as-built documentation; to include all BACS drawings and diagrams converted to Adobe Acrobat.pdf filers.
    c. Temperature Control System (TCS) Bill of Material for each system, i.e. AHU, RTU, FCU, Boiler etc.
    d. Technical literature specification data sheets for all components listed in the BACS Bill of Material.

5. The BACS shall provide automated alarming software capable of sending messages to email compatible cellular telephones and pagers via the owner's e-mail service. The email alarm paging system shall be able to segregate users, time schedules, and equipment, and be capable of being programmed by the owner. Currently, these features may not be currently active due to communications restrictions, but must be provided for possible future use.
6. The Contractor must provide the appropriate quantity of legal copies of all software and utilities used during system commissioning and installation. The Owner must be named the license holder for all software associated with any and all

incremental work in the project.

7. System Performance:

   a. Software requirements are Niagara N4 as previously specified in this document.
   b. Peripheral device performance requirements are specified/detailed in the sequence of operations, and/or drawings for this project; per each individual piece of equipment of system.

1.5 SUBMITTALS

A. One digital copy of shop drawings of the components and devices for the entire control system must be submitted and must consist of a complete list of equipment and materials, including manufacturers catalog data sheets and installation instructions for all controllers, valves, dampers, sensors, routers, etc. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations, and any other details required to demonstrate that the system has been coordinated and will properly function as a system. Terminal identification for all control wiring shall be shown on the shop drawings. A complete written Sequence of Operation shall also be included with the submittal package. Division 26 Contractors supplying products and systems, as part of their packages must provide catalog data sheets, wiring diagrams, and point lists to the Division 23 Contractor for proper coordination of work.

B. Submittal shall also include a trunk cable schematic diagram depicting operator workstations, control panel locations and a description of the communication type, media, and protocol. This shall include coordination of electrical branch circuit quantity and location for HVAC control and operator workstations as well as coordination of required network communications for HVAC control and operator workstations. Though the Division 23 and 26 Contractors shall provide these diagrams for their portions of work, the Systems Integrator shall be responsible for integrating those diagrams into the overall trunk cable schematic diagrams for the entire Wide Area Network (WAN) and/or Local Area Network (LAN) utilized by the BACS. Submittal shall also include a complete point list of all points to be connected to the BACS. Division 23 and 26 Contractors shall provide necessary point lists, protocol documentation, and factory support information for systems provided in their respective divisions but integrated into the BACS.

   1. The network infrastructure shall conform to the published guidelines for wire type, length, number of nodes per channel, termination, and other relevant wiring and infrastructure criteria as published. The number of nodes per channel shall be no more than 80% of the defined segment (logical or physical) limit in order to provide future system expansion with minimal infrastructure modifications.

C. Submittal shall also include a complete point list of all points to be connected/integrated to the BACS. Division 23 and 26 Contractors shall provide necessary point lists, protocol documentation, and factory support information for systems provided in their respective divisions but integrated into the BACS.

D. Submittal shall also include an example of each of the equipment, tables, energy graphs, etc. graphics developed for the Graphic User Interface including a flowchart (site map) indicating how the graphics are to be linked to one another for system navigation. An equipment list coordinated with available points per item of equipment shall be submitted and confirmed by both the AE and the owner that the equipment complies with the design intent.

E. Provide certificate of compliance that materials and equipment comply with the provisions of the Buy American Act. See 007300 "Special Conditions," Par. 15, for additional requirements.

F. Upon completion of the work, provide a complete set of 'as-built' drawings that will reside in the file structure of the Niagara N4 Supervisor. Eight 11"x17" bound paper copies of the 'as-built' drawings must be provided. Division 23 and 26 Contractors shall provide as-builts for their portions of work. The Division 23 Contractor shall be responsible for as-builts pertaining to overall BACS architecture and network diagrams.

1.6 SPECIFICATION NOMENCLATURE

A. Acronyms used in this specification are as follows:

1. Direct Digital Control System (DDC)
2. Building Automation Control System (BACS)
3. Graphical User Interface (GUI)
4. Interoperable BACnet Controller (IBC)
5. Interoperable Digital Controller (IDC)
6. Local Area Network (LAN)
7. Network Area Controller (NAC) or Java Application Control Engine (JACE)
8. Object Oriented Technology (OOT)
9. Product Interoperability Compliance Statement (PICS)
10. Power Measurement Interface (PMI)
11. Portable Operator's Terminal (POT)
12. Temperature Control System (TCS)
13. Wide Area Network (WAN)
14. Web Browser Interface (WBI)

1.7 DIVISION OF WORK

A. The Division 23 Contractors shall be responsible for all controllers (IDC and IBC), control devices, control panels, controller programming, controller programming software, controller input/output and power wiring and controller network wiring.

B. The Division 23 Contractor shall be responsible for the Network Area Controller(s) (JACE), software and programming of the JACE, graphical user interface software (GUI), development of all graphical screens, Web browser pages, setup of schedules, logs and alarms, network management and connection of the JACE to the local or wide area network and Niagara Supervisor.

1.8 RELATED WORK SPECIFIED ELSEWHERE

A. Division 26, Electrical:

1. Providing motor starters and disconnect switches (unless otherwise noted).
2. Power wiring and conduit (unless otherwise noted).
3. Provision, installation and wiring of smoke detectors (unless otherwise noted).
4. Other equipment and wiring as specified in Division 26.

1.9 AGENCY AND CODE APPROVALS

A. All products of the BACS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Systems or products not currently offering the following approvals are not acceptable.

1. UL-916; Energy Management Systems
2. C-UL listed to Canadian Standards Association C22.2 No. 205-M1983 “signal Equipment”
3. CE
4. FCC, Part 15, Subpart J, Class A Computing Devices

1.10 SOFTWARE LICENSE AGREEMENT

A. The Owner shall agree to the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.

B. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s). Any and all required IDs and passwords for access to any component or software program shall be provided to the owner.

C. The Owner, or his appointed agent, shall receive ownership of all job specific software configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and /or configured for use within Niagara N4 Framework (Niagara) based controllers and/or servers and any related LAN / WAN / Intranet and all connected routers and devices.

1.11 DELIVERY, STORAGE AND HANDLING

A. Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

1.12 QUALITY ASSURANCE

A. Proven Experience: Provide a list of no less than ten similar projects which utilize a Niagara N4 Platform. These projects must be on-line and functional such that the

Owner's Representative would observe a direct digital control system in full operation. The Contractor must be a direct, wholly owned branch of a national control's manufacturer, or a representative not a wholesale distributor.

B. Quality of Compliance: Control systems shall be installed by trained control mechanics regularly employed in installation and calibration of BACS equipment by the manufacturer of the proposed equipment to be installed.

C. Contractor Requirements:

1. Longevity: The BACS Contractor shall have a minimum of ten years' experience installing, and servicing computerized building systems utilizing a Niagara N4 Platform. All subcontractors utilized by the BACS Contractor shall have a minimum of five-year experience within their appropriate trades.
2. Past Projects: The BACS Contractor shall have completed a minimum of five projects which utilized the Niagara N4 Platform within the last three years that are at least equal in dollar value and scope to this project. A list of similar projects, dollar volume, scope, contact name and contact number shall be provided by the BACS Contractor if asked for by the Owner.
3. Personnel, Coverage and Response Capabilities: The BACS Contractor shall have a minimum of ten full time electronic service personnel and one factory trained DDC control technician within a 150 mile radius of the project location. One full time electronic service personnel and one DDC control technicians must work within a 150-mile radius of the project location.
4. The BACS Contractor shall have an established 24-hour emergency service organization. A dedicated telephone number shall be provided to the Owner for requesting emergency service. The BACS Contractor shall guarantee that within a maximum of four hours, the electronic service technicians shall be on site
5. The Potential Low Bidder shall submit a qualifications statement demonstrating how the above Contractor requirements shall be achieved. This contractor shall be directed to provide this statement to the Owner in the Letter of Intent to Award. If after review of the qualificatons statement the Owner does not feel the BACS contractor meets these requirements then the Potential Low Bidder must select another BACS contractor and submit a qualifications statement for that contractor that meets the requirements of this specification.
6. Contractor and subcontractors performing work shall be required to fingerprinting and formal background checks sufficient to satisfy current Department of Defense security clearances for Contractor's or subcontractors performing work in secure areas.

1.13 JOB CONDITIONS

A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to ensure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

PART 2 – PRODUCTS

2.1 GENERAL

A. The Building Automation Control System (BACS) shall be comprised of a network of interoperable, stand-alone digital controllers, a computer system, graphical user interface software, printers, network devices, valves, dampers, sensors, and other devices as specified herein.

B. The installed system shall provide secure password access to all features, functions and data contained in the overall BACS.

2.2 ACCEPTABLE MANUFACTURERS

A. Basis-of-Design: Honeywell / Tridium Niagara N4. Subject to compliance with requirements, provide the product named. System must operate on an open licensed JACE, no appliance may be used. All instances of Niagara N4 must operate with the Brand ID set to “none”, and compatibility modes set for “all”. All instances of Niagara N4 must be capable of being programmed within any vendor’s version of the Niagara N4 Workbench. All Unitary Controllers must be Programmable or Configurable directly within any vendor’s version of the Niagara N4 workbench, no additionally required software is acceptable.

1. Honeywell WEBS
2. Siemens Talon

2.3 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate ANSI/ASHRAE Standard 135-2001 BACnet™ technology, MODBUS™, OPC, and other open and non-proprietary communication protocols into one open, interoperable system.

B. The supplied computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI /ASHRAE™ Standard 135-2001 and BACnet to assure interoperability between all system components is required. For each BACnet device, the device supplier must provide a PICS document showing the installed device’s BACnet compatibility. Minimum compliance is Level 3; with the ability to support data read and write functionality. Physical connection of Open Protocol devices must be via Ethernet, and/or RS-485 and/or RS-232.C.

C. All components and controllers supplied under this Division shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.

D. The supplied system must incorporate the ability to access all data using standard Web browsers without requiring proprietary operator interface and configuration programs. Systems requiring proprietary database and user interface programs shall not be acceptable.

E. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal

Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.

1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 30 seconds for local network connected user interfaces.

2.4 NETWORKS

A. The Local Area Network (LAN) shall be a 100 Megabit/sec Ethernet network supporting BACnet, Java, XML, HTTP, and SOAP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (JACEs), user workstations and, if specified, a local server.

B. Local area network minimum physical and media access requirements:

1. Ethernet; IEEE standard 802.3
2. Cable; 100 Base-T, UTP-8 wire, category 6.
3. Minimum throughput; 100 Mbps.

2.5 NETWORK ACCESS

A. Remote Access.

1. The BACS JACE will be installed on the owners network, the contractor shall request up to (2) network drop’s at designated locations for LAN connectivity.

2.6 NETWORK AREA CONTROLLER (JACE)

A. The Contractor shall supply one or more Network Area Controllers (JACE) as part of this contract. Number of area controllers required is dependent on the type and quantity of devices provided under Divisions 23 and 26. It is the responsibility of the Contractor to coordinate with the Division 23 and 26 Contractors to determine the quantity and type of devices.

B. The Network Area Controller (JACE) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the JACE. It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of BACnet controller data
7. Network Management functions for BACnet based devices
8. The Network Area Controller shall provide the following hardware features as a minimum:

a. One Ethernet Port – 10/100 Mbps

b. One RS-232 port
c. One RS-485 port if BACnet controllers are used.
d. Battery Backup
e. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
f. The JACE must be capable of operation over a temperature range of 32 to 122°F
g. The JACE must be capable of withstanding storage temperatures of between 0 and 158°F
h. The JACE must be capable of operation over a humidity range of 5 to 95% RH, non- condensing

9. The JACE shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the JACE shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.
10. The JACE shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 34 simultaneous users.
11. Event Alarm Notification and actions

    a. The JACE shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
    b. The JACE shall be able to route any alarm condition to any defined user location whether connected to a local network, or remote via dial-up telephone connection or wide-area network.
    c. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including, but not limited to:

        1) In alarm
        2) Return to normal
        3) Fault condition
        4) Provide for the creation of a minimum of eight alarm classes for the purpose of routing types and/or classes of alarms, i.e.: security, HVAC, Fire, etc.
        5) Provide timed (schedule) routing of alarms by class, object, group, or node.
        6) Provide alarm generation from binary object “runtime” and/or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

12. Controller and network failures shall be treated as alarms and annunciated.
13. Alarms shall be annunciated in any of the following manners as defined by the user:

    a. Screen message text
    b. Email of the complete alarm message to multiple recipients via the owner’s e-mail service. Provide the ability to route and email alarms based on:

        1) Day of week
        2) Time of day
        3) Recipient

4) Pagers via paging services that initiate a page on receipt of email message via the owner's e-mail service
5) Graphic with flashing alarm object(s)
6) Printed message, routed directly to a dedicated alarm printer

14. The following shall be recorded by the JACE for each alarm (at a minimum):

    a. Time and date
    b. Location (building, floor, zone, office number, etc.)
    c. Equipment (air handler #, access way, etc.)
    d. Acknowledge time, date, and user who issued acknowledgement.
    e. Number of occurrences since last acknowledgement.

15. Alarm actions may be initiated by user defined programmable objects created for that purpose.
16. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
17. A log of all alarms shall be maintained by the JACE and/or a server (if configured in the system) and shall be available for review by the user.
18. Provide a "query" feature to allow review of specific alarms by user defined parameters.
19. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
20. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

2.7 DATA COLLECTION AND STORAGE

A. The JACE shall have the ability to collect data for any property of any object and store this data for future use.

B. The data collection shall be performed by log objects, resident in the JACE that shall have, at a minimum, the following configurable properties:

1. Designating the log as interval or deviation.
2. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.
3. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.
4. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.
5. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.
6. All log data shall be stored in a relational database in the JACE and the data shall be accessed from a server (if the system is so configured) or a standard Web browser.
7. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.
8. All log data shall be available to the user in the following data formats:

    a. HTML

b. XML
c. Plain Text
d. Comma or tab separated values
e. PDF

9. Systems that do not provide log data in HTML and XML formats at a minimum shall not be acceptable.
10. The JACE shall have the ability to archive its log data either locally (to itself), or remotely to a server or other JACE on the network. Provide the ability to configure the following archiving properties, at a minimum:

a. Archive on time of day
b. Archive on user-defined number of data stores in the log (buffer size)
c. Archive when log has reached its user-defined capacity of data stores
d. Provide ability to clear logs once archived

2.8 AUDIT LOG

A. Provide and maintain an Audit Log that tracks all activities performed on the JACE. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally (to the JACE), to another JACE on the network, or to a server. For each log entry, provide the following data:

1. Time and date
2. User ID
3. Change or activity: i.e., Change set point, add or delete objects, commands, etc.

2.9 DATABASE BACKUP AND STORAGE

A. The JACE shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.

B. Copies of the current database and, at the most recently saved database shall be stored in the JACE. The age of the most recently saved database is dependent on the user-defined database save interval.

C. The JACE database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

2.10 ADVANCED UNITARY CONTROLLER

A. The controller platform shall be designed specifically to control HVAC – ventilation, filtration, heating, cooling, humidification, and distribution. Equipment includes but is not limited to: constant volume air handlers, VAV air handlers, packaged RTU, heat pumps, unit vents, fan coils, natural convection units, and radiant panels. The controller platform shall provide options and advanced system functions, programmable and configurable using Niagara N4 Framework™, that allow standard and customizable control solutions.

B. Minimum Requirements:

1. The controller shall be capable of either integrating with other devices or stand-alone operation.
2. The controller shall have an FTT transformer-coupled communications port interface for common mode-noise rejection and DC isolation.
3. The controller shall have an internal time clock with the ability to automatically revert from a master time clock on failure.

a. Operating Range: 24 hour, 365 day, multi-year calendar including day of week and configuration for automatic day-light savings time adjustment to occur on configured start and stop dates.
b. Accuracy: ±1 minute per month at 77° F (25° C).
c. Power Failure Backup: 24 hours at 32° to 122° F (0° to 50° C).

1) The controller shall have Significant Event Notification, Periodic Update capability, and Failure Detect when network inputs fail to be detected within their configurable time frame.
2) The controller shall have an internal DC power supply to power external sensors.
3) The controller shall have a visual indication (LED) of the status of the devise:

a) Controller operating normally.
b) Controller in process of download.
c) Controller in manual mode under control of software tool.
d) Controller lost its configuration.
e) No power to controller, low voltage, or controller damage.
f) Processor and/or controller are not operating.

4) The minimum controller Environmental ratings

a) Operating Temperature Ambient Rating: -40° to 150° F (-40° to 65.5° C).
b) Storage Temperature Ambient Rating: -40° to 150° F (-40° to 65.5° C).
c) Relative Humidity: 5% to 95% non-condensing.

5) The controller shall have the additional approval requirements, listings, and approvals:

a) UL/cUL (E87741) listed under UL916 (Standard for Open Energy Management Equipment) with plenum rating.
b) CSA (LR95329-3) Listed
c) Meets FCC Part 15, Subpart B, Class B (radiated emissions) requirements.
d) Meets Canadian standard C108.8 (radiated emissions).
e) Conforms to the following requirements per European Consortium standards:
f) EN 61000-6-1; 2001 (EU Immunity)
g) EN 61000-6-3; 2001 (EU Emissions)

6) The controller housing shall be UL plenum rated mounting to either a panel or DIN rail (standard EN50022; 7.5mm x 35mm).
7) The controller shall have sufficient on-board inputs and outputs to support the application.

   a) Analog outputs (AO) shall be capable of being configured to support 0-10 V, 2-10 V or 4-20 mA devices.
   b) Triac outputs shall be capable of switching 30 Volts at 500 mA.
   c) Input and Output wiring terminal strips shall be removable from the controller without disconnecting wiring. Input and Output wiring terminals shall be designated with color coded labels.
   d) Universal inputs shall be capable of being configured as binary inputs, resistive inputs, voltage inputs (0-10 VDC), or current inputs (4-20 mA).

8) The controller shall provide for “user defined” Network Variables (NV) for customized configurations and naming using Niagara N4 Framework™.

   a) The controller shall support 62 Network Variables with a byte count of 31 per variable.
   b) The controller shall support 1,922 separate data values.

9) The controller shall provide “continuous” automated loop tuning with an Adaptive Integral Algorithm Control Loop.
10) The controller platform shall have standard HVAC application programs that are modifiable to support both the traditional and specialized “sequence of operations” as outlined in the contract documents.

    a) Discharge air control and low limit
    b) Pressure-dependent dual duct without flow mixing.
    c) Variable air volume with return flow tracking.
    d) Economizer with differential enthalpy.
    e) Minimum air flow coordinated with CO2.
    f) Unit ventilator cycle (1, 2, 3) 2-pipe.
    g) Unit ventilator cycle (1, 2, 3) 2-pipe with face/bypass.

2.11 GRAPHICAL USER INTERFACE SOFTWARE

A. Operating System:

1. The Workstation with GUI shall run on Microsoft Windows 10 or the current approved Maine Army National Guard Microsoft product.
2. The GUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimal knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, hypertext buttons to drawings or files designated by the Owner,

forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

3. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and functions:

   a. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of, a graphic background the GUI shall support the use of scanned pictures.
   b. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.
   c. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.
   d. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

      1) Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
      2) Holidays shall be set by using a graphical calendar without requiring any keyboard entry from the operator.
      3) Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No text entry shall be required.
      4) Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No text entry shall be required.

4. System Configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:

   a. Create, delete, or modify control strategies.
   b. Add or delete objects to the system.
   c. Tune control loops through the adjustment of control loop parameters.
   d. Enable or disable control strategies.
   e. Generate hard copy records or control strategies on a printer.
   f. Select points to be alarmable and define the alarm state.
   g. Select points to be trended over a period of time and initiate the recording of values automatically.

5. On-Line Help. Provide a context sensitive on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for the currently displayed screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.
6. Security. Each operator shall be required to log on to the system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator

password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off the system if no keyboard or mouse activity is detected for a specified time. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

7. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
8. Alarm Console

    a. The system shall be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console may be enabled or disabled by the system administrator.
    b. When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and knowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

9. Hypertext links shall be provided to access as-built drawings or related building documents designated by the Owner for the buildings being controlled by the Niagara N4 platform. Installer shall coordinate with Owner to obtain server address locations and hypertext link protocols. Drawings and other documents not used for operation of the Niagara N4 platform will be accessed using a hypertext method.

2.12 WEB BROWSER CLIENTS

A. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer™, Microsoft Edge ™, or Google Chrome™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.

B. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the BACS, shall not be acceptable.

C. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Graphical User Interface (if used). Systems that require different graphic views, different means of graphic generation, or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.

D. The Web browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
2. Graphical screens developed for the GUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the GUI shall be supported by the Web browser interface.
3. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
4. Storage of the graphical screens shall be in the Network Area Controller (JACE), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
5. Real-time values displayed on a Web page shall update automatically without requiring a manual
"refresh" of the Web page.
6. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:

    a. Modify common application objects, such as schedules, calendars, and set points in a graphical manner.

        1) Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
        2) Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

            a) Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop- up menu. No text entry shall be required. View logs and charts View and acknowledge alarms Setup and execute SQL queries on log and archive information.

        3) The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to set a specific homepage for each user. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.
        4) Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.13 SYSTEM CONFIGURATION TOOL

A. The Workstation Graphical User Interface software (GUI) shall provide the ability to perform system programming and graphic display engineering as part of a complete software package. Access to the programming functions and features of the GUI shall be through password access as assigned by the system administrator.

B. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created

by selecting the desired control objects from the library, dragging or pasting them on the screen, and by linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. GUI screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide “real-time” data updates. Any real- time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface displays shall not be acceptable.

C. Programming Methods

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user’s application. Objects shall be linked by a graphical linking scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects shall maintain their connections to other objects regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification. Links will vary in color depending on the type of link; i.e., internal, external, hardware, etc.
2. Configuration of each object will be done through the object’s property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.
3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.
4. All programming shall be done in real-time. Systems requiring the uploading, editing, and downloading of database objects shall not be allowed.
5. The system shall support object duplication within a customer’s database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

2.14 LIBRARY

A. A standard library of objects shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

B. The objects in this library shall be capable of being copied and pasted into the user’s database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.

C. In addition to the standard libraries specified here, the supplier of the system shall maintain an on-line accessible (over the Internet) library, available to all registered users to provide new or updated objects and applications as they are developed.

D. All control objects shall conform to the control objects specified in the BACnet specification.

The library shall include applications or objects for the following functions, at a minimum: See Sequence of Operations on mechanical drawings.

1. Scheduling Object. The schedule must conform to the schedule object as defined in the BACnet specification, providing 7-day plus holiday & temporary scheduling features and a minimum of 10 on/off events per day. Data entry to be by graphical sliders to speed creation and selection of on- off events.
2. Calendar Object.. The calendar must conform to the calendar object as defined in the BACnet specification, providing 12-month calendar features to allow for holiday or special event data entry. Data entry to be by graphical “point-and-click” selection. This object must be “linkable” to any or all scheduling objects for effective event control.
3. Duty Cycling Object. Provide a universal duty cycle object to allow repetitive on/off time control of equipment as an energy conserving measure. Any number of these objects may be created to control equipment at varying intervals
4. Temperature Override Object. Provide a temperature override object that is capable of overriding equipment turned off by other energy saving programs (scheduling, duty cycling etc.) to maintain occupant comfort or for equipment freeze protection.
5. Start-Stop Time Optimization Object. Provide a start-stop time optimization object to provide the capability of starting equipment just early enough to bring space conditions to desired conditions by the scheduled occupancy time. Also, allow equipment to be stopped before the scheduled un- occupancy time just far enough ahead to take advantage of the building’s “flywheel” effect for energy savings. Provide automatic tuning of all start / stop time object properties based on the previous day’s performance.
6. Demand Limiting Object. Provide a comprehensive demand-limiting object that is capable of controlling demand for any selected energy utility (electric, oil, and gas). The object shall provide the capability of monitoring a demand value and predicting (by use of a sliding window prediction algorithm) the demand at the end of the user defined interval period (1-60 minutes). This object shall also accommodate a utility meter time sync pulse for fixed interval demand control. Upon a prediction that will exceed the user defined demand limit (supply a minimum of 6 per day), the demand limiting object shall issue shed commands to either turn off user specified loads or modify equipment set points to effect the desired energy reduction. If the list of sheddable equipment is not enough to reduce the demand to below the set point, a message s h a l l be displayed on the users screen (as an alarm) instructing the user to take manual actions to maintain the desired demand. The shed lists are specified by the user and shall be selectable to be shed in either a fixed or rotating order to control which equipment is shed the most often. Upon suitable reductions in demand, the demand-limiting object shall restore the equipment that was shed in the reverse order in which it was shed. Each sheddable object shall have a minimum and maximum shed time property to effect both equipment protection and occupant comfort.
7. The library shall include control objects for the following functions. All control objects shall conform to the objects as specified in the BACnet specification.

    a. Analog Input Object - Minimum requirement is to comply with the BACnet standard for data sharing. Allow high, low and failure limits to be assigned

for alarming. Also, provide a time delay filter property to prevent nuisance alarms caused by temporary excursions above or below the user defined alarm limits.

b. Analog Output Object - Minimum requirement is to comply with the BACnet standard for data sharing.
c. Binary Input Object - Minimum requirement is to comply with the BACnet standard for data sharing. The user must be able to specify either input condition for alarming. This object must also include the capability to record equipment run-time by counting the amount of time the hardware input is in an “on” condition. The user must be able to specify either input condition as the “on” condition.
d. Binary Output Object - Minimum requirement is to comply with the BACnet standard for data sharing. Properties to enable minimum on and off times for equipment protection as well as interstart delay must be provided. The BACnet Command Prioritization priority scheme shall be incorporated to allow multiple control applications to execute commands on this object with the highest priority command being invoked. Provide sixteen levels of priority as a minimum. Systems not employing the BACnet method of contention resolution shall not be acceptable.
e. PID Control Loop Object - Minimum requirement is to comply with the BACnet standard for data sharing. Each individual property must be adjustable as well as to be disabled to allow proportional control only, or proportional with integral control, as well as proportional, integral and derivative control.
f. Comparison Object - Allow a minimum of two analog objects to be compared to select either the highest, lowest, or equality between the two linked inputs. Also, allow limits to be applied to the output value for alarm generation.
g. Math Object - Allow a minimum of four analog objects to be tested for the minimum or maximum, or the sum, difference, or average of linked objects. Also, allow limits to be applied to the output value for alarm generation.
h. Custom Programming Objects - Provide a blank object template for the creation of new custom objects to meet specific user application requirements. This object must provide a simple BASIC-like programming language that is used to define object behavior. Provide a library of functions including math and logic functions, string manipulation, and e-mail as a minimum. Also, provide a comprehensive on-line debug tool to allow complete testing of the new object. Allow new objects to be stored in the library for re-use.
i. Interlock Object - Provide an interlock object that provides a means of coordination of objects within a piece of equipment such as an Air Handler or other similar types of equipment. An example is to link the return fan to the supply fan such that when the supply fan is started, the return fan object is also started automatically without the user having to issue separate commands or to link each object to a schedule object. In addition, the control loops, damper objects, and alarm monitoring (such as return air, supply air, and mixed air temperature objects) will be inhibited from alarming during a user-defined period after startup to allow for stabilization. When the air handler is stopped, the interlocked return fan is also stopped, the outside air damper is closed, and other related objects

within the air handler unit are inhibited from alarming thereby eliminating nuisance alarms during the off period.

j. Temperature Override Object - Provide an object whose purpose is to provide the capability of overriding a binary output to an “On” state in the event a user specified high or low limit value is exceeded. This object is to be linked to the desired binary output object as well as to an analog object for temperature monitoring, to cause the override to be enabled. This object will execute a Start command at the Temperature Override level of start/stop command priority unless changed by the user.

k. Global Settings Object - Provide an object or objects whose purpose is to provide the capability of globally changing set points during seasonal changes such as summer, fall, winter and spring.

l. Composite Object - Provide a container object that allows a collection of objects representing an application to be encapsulated to protect the application from tampering, or to more easily represent large applications. This object must have the ability to allow the user to select the appropriate parameters of the “contained” application that are represented on the graphical shell of this container.

8. The object library shall include objects to support the integration of devices connected to the Network Area Controller (JACE). At a minimum, provide the following as part of the standard library included with the programming software:

a. For BACnet devices, provide the following objects at a minimum:

1) Analog In
2) Analog Out
3) Analog Value
4) Binary In
5) Binary Out
6) Binary Value
7) Multi-State In
8) Multi-State Out
9) Multi-State Value
10) Schedule Export
11) Calendar Export
12) Trend Export
13) Device
14) For each BACnet object, provide the ability to assign the object a BACnet device and object instance number.
15) For BACnet devices, provide the following support at a minimum

a) Segmentation
b) Segmented Request
c) Segmented Response
d) Application Services
e) Read Property
f) Read Property Multiple
g) Write Property
h) Who-has
i) I-have

j) Who-is
k) I-am
l) Media Types
m) Ethernet
n) BACnet IP Annex J
o) MSTP
p) BACnet Broadcast Management Device (BBMD) function
q) Routing.

2.15 DDE DEVICE INTEGRATION

A. The Network Area Controller shall support the integration of device data via Dynamic Data Exchange (DDE), over the Ethernet Network. The Network Area Controller shall act as a DDE client to another software application that functions as a DDE server.

B. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of these devices into the BACS. Objects provided shall include at a minimum:

1. DDE Generic AI Object
2. DDE Generic AO Object
3. DDE Generic BO Object
4. DDE Generic BI Object

2.16 MODBUS SYSTEM INTEGRATION

A. The Network Area Controller shall support the integration of device data from Modbus RTU, ASCII, or TCP control system devices. The connection to the Modbus system shall be via an RS-232, RS485, or Ethernet IP as required by the device.

B. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of the Modbus system data into the FPMS. Objects provided shall include at a minimum:

1. Read/Write Modbus AI Registers
2. Read/Write Modbus AO Registers
3. Read/Write Modbus BI Registers
4. Read/Write Modbus BO Registers
5. All scheduling, alarming, logging and global supervisory control functions, of the Modbus system devices, shall be performed by the Network Area Controller.
6. The BACS supplier shall provide a Modbus system communications driver. The equipment system vendor that provided the equipment utilizing Modbus shall provide documentation of the system's Modbus interface and shall provide factory support at no charge during system commissioning

2.17 OPC SYSTEM INTEGRATION

A. The Network Area Controller shall act as an OPC client and shall support the integration of device data from OPC servers. The connection to the OPC server shall

be Ethernet IP as required by the device. The OPC client shall support third party OPC servers compatible with the Data Access 1.0 and 2.0 specifications.

B. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of the OPC system data into the BAS. Objects provided shall include at a minimum:

1. Read/Write OPC AI Object
2. Read/Write OPC AO Object
3. Read/Write OPC BI Object
4. Read/Write OPC BO Object
5. Read/Write OPC Date/Time Input Object
6. Read/Write OPC Date/Time Output Object
7. Read/Write OPC String Input Object
8. Read/Write OPC String Output Object
9. All scheduling, alarming, logging and global supervisory control functions, of the OPC system devices, shall be performed by the Network Area Controller.
10. The BACS supplier shall provide an OPC client communications driver. The equipment system vendor that provided the equipment utilizing OPC shall provide documentation of the system's OPC server interface and shall provide factory support at no charge during system commissioning.

2.18 OTHER CONTROL SYSTEM HARDWARE

A. Alternate device manufacturers will be considered with the approval of the engineer.

B. All wall mounted devices shall have white finish, unless noted otherwise, to match electrical wiring devices and cover plates see Section 262726 "Wiring Devices".

C. Space Thermostats: Temperature sensing modules mounted on the wall in occupied spaces. Optional set point, indication, and override switches must be provided as specified.

1. Sensor shall contain digital display and user function keys along with temperature sensor. Sensor shall function as occupant control unit. It shall allow occupant to raise and lower set point and activate terminal unit for unoccupied override use all within limits as programmed by building operator.
2. Provide means for occupant to view room set point, and room temperature at each controller. Override time may be set and viewed in 0.1 hour increments. Override time countdown shall be automatic, but may be reset to zero using function keys on unit. Display shall be blank in unoccupied mode unless a function button is pressed.
3. Space temperature sensors shall be accurate to plus or minus 0.5 deg. F at 77 deg. F.
4. Blank, wall mounted space temperature sensors with unoccupied override button, without set point adjustment or LCD readout shall be utilized as required when no occupant interaction is needed or desired and where indicated on the drawings.

D. Duct Mount, Pipe Mount, and Outside Air Temperature Sensors:

1. Outside air sensors shall include an integral sun shield.
2. Temperature sensors shall have an accuracy of plus or minus 1.0 deg. F. over operating range.
3. Duct sensors shall have sensor approximately in center of the duct, and shall have selectable lengths of 6, 12, and 18 inches.
4. Multipoint averaging element sensors shall be provided where specified, and shall have a minimum of one foot of sensor length for each square foot of duct area (provide multiple sensors if necessary).
5. Pipe mount sensors shall have copper, or stainless steel separable wells.
6. Outside Air Sensor (OAS) to be located on north side of building in a location that is not exposed to direct sunlight.

E. Current Switches: Solid state, split core, current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point shall be provided where specified. Current switches shall include an integral LED for indication of trip condition.

1. Sensing range 0.5 – 250 Amps.
2. Output 0.3 A @ 200 VAC/VDC / 0.15 A @ 300 VAC/VDC
3. Operating frequency 40 Hz -1 kHz.
4. Operating Temperature 5-104 deg. F -15 – 40 deg. C), Operating Humidity 0-95% non- condensing
5. Approvals CE, UL.

F. Current Sensors: Solid state, split core linear current sensors shall be provided where specified.

1. Linear output of 0-5 VDC, 0-10 VDC, or 4-20 mA.
2. Scale sensors so that average operating current is between 20-80% full scale.
3. Accuracy plus or minus 1.0% (5-100% full scale)
4. Operating frequency 50-600 Hz.
5. Operating Temperature 5-104 deg. F (-15 – 40 deg. C), Operating Humidity 0-95% non- condensing
6. Approvals CE, UL.

G. Water Flow Meters: Water flow meters shall be axial turbine style flow meters which translate liquid motion into electronic output signals proportional to the flow sensed.

1. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag.
2. Flow meters shall be ‘insertion’ type complete with ‘hot-tap’ isolation valves to enable sensor
removal without water supply system shutdown.
3. Accuracy shall be + 2% of actual reading from 0.4 to 20 feet per second flow velocities.

H. Thermal Mass Flow Meters:

1. Sensor shall utilize hybrid analog/digital sensing circuitry to measure thermal mass flow rate of natural gas.
2. Sensor shall be constructed of 316 Stainless Steel.
3. Accuracy: +/- 2% of reading. Able to be field calibrated.

4. Sensor shall be factory installed in 1/2” thru 4” pipe with flow straighteners factory installed.
5. 24v input power.
6. Operating range of -40 to 200 deg F and up to 500 psi.
7. Outputs available:
   a. Analog 4-20 mA 24 VDC pulse output.
   b. Optional flow display module displays instantaneous rate and totalized flow.
   c. Network Interface: MODBUS with RS-485 connection for BACnet/IP.

I. Fuel Oil Flow Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
2. AMCO 15. (Basis of design)
3. Honeywell.
4. Meter shall utilize an oscillating piston to measure fuel oil flow rate.
5. Accuracy: +/- 1% of reading.
6. Resolution of 0.01 gallons.
7. Calibrated with #2 fuel oil at 70 deg F.
8. Meter shall have cast iron body with 1/2” threaded connections.
9. Chamber shall be brass with aluminum piston.
10. A stainless steel screen shall be provided on the inlet.
11. Maximum operating range up to 266 deg F and up to 225 psi.
12. Optional Inductive Pulse output unit: 2-wire, 5-15 VDC for connection to BACS.
13. Analog flow display module.

J. Low Temperature Limit Switches. Safety low limit shall be manual reset twenty foot limited fill type responsive to the coolest section of its length.

1. Low limit set point shall be adjustable between 20 and 60 deg. F. (-5 and 15 deg. C.)
2. Switch enclosure shall be dustproof and moisture-proof.
3. Switch shall break control circuit on temperature fall. Contact ratings shall be 10.2 FLA at 120 VAC, and 6.5 FLA at 240 VAC.
4. Ambient Temperature range -20 to 125 deg. F. (-11 to 52 deg. C.)
5. Operating Temperature Range 20 to 60 deg. F. (-5 to 15 deg. C.

K. High Temperature Limit Switches. Safety high limit (fire stats) shall be manual reset type.

1. High limit set point shall be adjustable between 100 and 240 deg. F. (38 and 116 deg. C.)
2. Switch enclosure shall be dustproof and moisture-proof.
3. Switch shall break control circuit on temperature fall. Contact ratings shall be 10 FLA at 120 VAC, and 5 FLA at 240 VAC.
4. Ambient Temperature range -20 to 190 deg. F. (-28 to 88 deg. C.) at case, and 350 deg. F (177 deg. C.) at the sensor.
5. Operating Temperature Range 100 to 240 deg. F. (38 to 116 deg. C.

L. Carbon Dioxide Sensors (General Occupancy Areas)

1. Carbon Dioxide sensors shall be 0-10 Vdc, 2-10 Vdc, or 4-20 mA linear analog output type, with corrosion free gold-plated non-dispersive infrared sensing,

designed for duct or wall mounting.
2. Sensor shall incorporate internal diagnostics for power, sensor, analog output checking, and automatic background calibration algorithm for reduced maintenance. Sensor range shall be 0- 2000 PPM with +/- 75 PPM accuracy at full scale.
3. Sensor shall have an LCD display that displays the sensor reading and status.

M. Nitrogen Monoxide and Nitrogen Dioxide Sensors (Garage/Work Bay) - Not Applicable

1. Nitrogen sensors shall be 0-10 Vdc, 2-10 Vdc, or 4-20 mA linear analog output type, with solid- state infrared sensing, designed for wall mounting.
2. Sensor shall incorporate internal diagnostics for power, sensor, analog output checking, and automatic background calibration algorithm for reduced maintenance. Sensor range shall be 0-10 PPM with +/- 10% accuracy at full scale.
3. Where specified, sensor shall have an LCD display that displays the sensor reading and status.

MI. Carbon Monoxide Sensors (Garage/Work Bay) - Not Applicable

1. Carbon Monoxide sensors shall be 0-10 Vdc, 2-10 Vdc, or 4-20 mA linear analog output type, with solid-state or electromechanical infrared sensing, designed for wall mounting.
2. Sensor shall incorporate internal diagnostics for power, sensor, analog output checking, and automatic background calibration algorithm for reduced maintenance. Sensor range shall be 0- 100 or 0-200 PPM with +/- 5% accuracy at full scale.
3. Where specified, sensor shall have an LCD display that displays the sensor reading and status.

MII. Volitile Organic Compound (VOC) Sensor (Garage/Work Bay) - Not Applicable

1. VOC sensors shall be 0 4-20 mA linear analog output type, with solid-state or electromechanical infrared sensing, designed for wall mounting.
2. Sensor shall incorporate internal diagnostics for power, sensor, analog output checking, and automatic background calibration algorithm for reduced maintenance. Sensor range shall be 0- 100 or 0-200 PPM with +/- 5% accuracy at full scale.
3. Where specified, sensor shall have an LCD display that displays the sensor reading and status.

MIII. Refrigerant Sensors (General Occupancy)

1. Basis of Design: Bacharach MGS-250 Series
2. Refrigerant sensors shall have 0-10 Vdc, 2-10 Vdc, or 4-20 mA linear analog output, with non- dispersive infrared sensing, audible alarm, and alphanumeric LED display of sensor reading and status designed wall mounting.
3. 24 VAC/VDC input power supply.
4. Sensor shall be factory calibrated for detection of R-410A and incorporate internal diagnostics for power, sensor, analog output checking, and automatic background calibration algorithm for reduced maintenance. Sensor range shall

be 0-3500 PPM with +/- 75 PPM accuracy at full scale. Adjustable high limit alarm from 500-900 ppm.

5. Sensor shall be capable of output to BMS control system.

Q. Differential Pressure Sensors

1. Sensor shall have four field selectable ranges: 0.1, 0.24, 0.5, 1.0 in w.c. for low pressure models, and 1.0, 2.5, 5, 10 for high pressure models.
2. Sensor shall provide zero calibration via pushbutton or digital input.
3. Sensor shall have field selectable outputs of 0-5 VDC, 0-10 VDC, and 4-20 mA
4. Where specified, sensor shall have and LCD display that displays measured value.
5. Sensor overpressure rating shall be 3 PSID proof, and 5 PSID burst.
6. Sensor accuracy shall be plus or minus 1% FS selected range.

R. Humidity Sensors.

1. Humidity transducer shall be accurate to +/- (2%, 3%, 5% choose desired accuracy) between 20- 95% RH NIST traceable calibration.
2. Sensors shall have a field selectable output of 0-10 Vdc, 0-5 Vdc, or 4-20 mA.
3. Sensors shall provide field calibration option using non-interacting zero and span potentiometers, and/or toggle switches that increment or decrement the RH value in steps of 0.5% RH.
4. Accuracy of the sensor shall not be adversely affected by condensation.

S. Enthalpy Sensors.

1. (Option 1 – Changeover type – Select one) Duct mounted enthalpy sensor shall include a temperature sensor and a humidity sensor constructed to close an electrical contact upon a drop in enthalpy (total heat) to enable economizer modes of operation where specified.
2. (Option 2 – Proportional analog signal– Select one) Provide duct mounted sensor including solid state temperature and humidity sensors with electronics which shall output a 4-20 ma signal input to the controller upon a varying enthalpy (total heat) to enable economizer modes of operation when outside air enthalpy is suitable for free cooling.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

        1) Honeywell
        2) Siemens Building Technologies

T. Annular Pitot Tube Flow Meter. Annular pitot tube shall be averaging type differential pressure sensors with four total head pressure ports and one static port made of austenitic stainless steel.

1. Sensor shall have an accuracy of ±.25% of full flow and a repeatability of ±.05% of measured value.
2. Transmitter shall be electronic and shall produce a linear output of 0-10 Vdc, 0-5 Vdc, or 4 to 20 mA dc corresponding to the required flow span.
3. The transmitter shall include non-interacting zero and span adjustments.

U. Emergency Shutdown Stations

1. Wall-mounted, ADA compliant, UL listed, emergency button station with 120v or 24v SPST contacts. Stainless steel back plate with molded polycarbonate housing. Basis of design: Safety Technology International, Inc. Series 2000 Stopper Station.
2. Activation: Push button to activate, turn to reset.
3. Text: Stations shall be provided with the following custom label, “HVAC SYSTEM SHUTDOWN”
4. Finish: Yellow.
5. Cover: Top hinged, clear polycarbonate cover mounts over station to prevent accidental activation equal to STI Mini Stopper 2. PROVIDE audio alarm (Tamper Alarm) on COVER
6. Indicator light located above station shall illuminate on all emergency shutdown stations when one station has been activated to alert occupants.

V. Window Sash Sensors - Not Applicable

1. Window switches shall consist of a fixed earth magnet in operable window sash with magnetic activating contact housed in window frame equal to GE Security 1075.
2. Switching voltage of 120v or 24 VDC.

W. Standard Automatic Control Dampers. Provide all automatic control dampers not specified to be integral with other equipment.

1. Frames shall be 5 inches wide and of no less than 16-gauge galvanized steel. Inter-blade linkage shall be within the frame and out of the air stream.
2. Blades shall not be over 8 inches wide or less than 16-gauge galvanized steel triple V type for rigidity.
3. Bearings shall be acetyl, oilite, nylon or ball-bearing with ½ inch diameter plated steel shafts.
4. Dampers shall be suitable for temperature ranges of -40 to 180F.
5. All proportional control dampers shall be opposed or parallel blade type as hereinafter specified and all two-position dampers shall be parallel blade types.
6. Dampers shall be sized to meet flow requirements of the application.
7. Maximum leakage for dampers in excess of sixteen inches square shall be 30 CFM per square foot at static pressure of 1 inch of WC. Testing and ratings to be in accordance with AMCA Standard 500.

X. Low Leakage Automatic Control Dampers. Provide all automatic control dampers not specified to be integral with other equipment.

1. Frames shall be 5 inches wide and of no less than 16-gauge galvanized steel. Inter-blade linkage shall be within the frame and out of the air stream.
2. Blades shall not be over 8 inches wide or less than 16-gauge galvanized steel triple V type for rigidity.
3. Bearings shall be acetyl, oilite, nylon or ball-bearing with ½ inch diameter plated steel shafts.
4. Dampers shall be suitable for temperature ranges of -40 to 180F.
5. All proportional control dampers shall be opposed or parallel blade type as hereinafter specified and all two-position dampers shall be parallel blade types.

6. Dampers shall be sized to meet flow requirements of the application. The sheet metal Contractor shall furnish and install baffles to fit the damper to duct size. Baffles shall not exceed 6". Dampers with dimensions of 24 inches and less shall be rated for 3,000 fpm velocity and shall withstand a maximum system pressure of 5.0 in. w.c. Dampers with dimensions of 36 inches and less shall be rated for 2,500 fpm velocity and shall withstand a maximum system pressure of 4.0 in. w.c. Dampers with dimensions of 48 inches and less shall be rated for 2,000 fpm velocity and shall withstand a maximum system pressure of 2.5 in. w.c.
7. Side seals shall be stainless steel of the tight-seal spring type.
8. Dampers shall be minimum leakage type to conserve energy and the temperature control manufacturer shall submit leakage data for all low leakage control dampers with the temperature control submittal.
9. Maximum leakage for low leakage dampers in excess of sixteen inches square shall be 8 CFM per square foot at static pressure of 1 inch of WC.
10. Low leakage damper blade edges shall be fitted with replaceable, snap-on, inflatable seals to limit damper leakage.
11. Testing and ratings shall be in accordance with AMCA Standard 500.
12. Damper blade width shall be no greater than 8 inches, and dampers over 48 inches wide by 74 inches high shall be sectionalized. Testing and ratings to be in accordance with AMCA Standard 500.

Y. Round Motorized Dampers. Round dampers shall be provided where specified and shall be factory mounted in a section of round duct a minimum of 12 inches long, but no less than one inch longer than the duct diameter.

1. Duct shall be sleeve type spiral duct crimped on the downstream end, 24 gage galvanized minimum except duct over 12 inches in diameter shall be 22 gage.
2. Duct shall have an integral galvanized steel actuator mounting plate and a ½ inch zinc-coated steel blade shaft extending a minimum of 2 inches beyond the actuator mounting plate.
3. Shaft bearings shall be flanged bronze oilite pressed into the frame.
4. The blade shall be a minimum 16 gage galvanized steel, and damper frame shall be provided with closed-cell neoprene seals with silicone rubber bead. Damper shall be designed for a 2500 ft/min approach velocity and a 4 inch minimum static pressure.
5. Damper shall be suitable for operation from 32 to 130F temperatures.
6. Damper and actuator combination shall be designed for leakage rates less than 13 cfm per square foot at one inch w.c. differential and 25 cfm at four inches w.c. Actuator shall have an external declutch lever to allow manual blade positioning during equipment and power malfunctions.

Z. Control Valves: (Globe Type) Control valves shall be 2-way or 3-way pattern as shown constructed for tight shutoff and shall operate satisfactory against system pressures and differentials.

1. Two-position valves shall be line size.
2. Proportional control valves shall be sized for a nominal pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Manufacturer's specified maximum differential pressure shall not be exceeded in order to prevent cavitation.
3. Two-way proportional valves shall have equal percentage flow characteristics.

Three-way valves shall have equal percentage flow characteristics straight through, and linear through the bypass. Rangeability shall be 50:1 or greater.

4. Provide valve position indicator and a method to operate valves manually during system start-up, or actuator power loss or failure on all valves.
5. Leakage rate shall be no more than ANSI Class III (for heating) or ANSI Class IV (for cooling).
6. Valves 1/2 inch through 3 inches shall be screwed pattern except where solder connections are specified for valves 1/2 or 3/4 inches.
7. Three-way valve bypass ports shall be of Cv to provide constant flow through the control loop.
8. Two-way valves shall close off against the net differential pressure resulting from the maximum head pressure of the system pumps less all loop pressure losses. Three-way valves shall close off against the difference in head pressure between the controlled load and the bypass line.
9. Valves 2-1/2 inch and larger shall be flanged and ANSI/ASME-rated to withstand the pressures and temperatures specified.
10. Valves shall have stainless-steel stems and spring loaded Teflon packing with replaceable discs.

AA. Control Valves: (Characterized Ball Valves) Control valves 1/2 to 3 inches shall be 2-way or 3-way forged brass screwed pattern constructed for tight shutoff and shall operate satisfactory against system pressures and differentials.

1. Two-position valves shall be line size.
2. Proportional control valves shall be sized for a nominal pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Manufacturer's specified maximum differential pressure shall not be exceeded in order to prevent cavitation.
3. Two-way proportional valves shall have equal percentage flow characteristics. Three-way valves shall have equal percentage flow characteristics straight through and linear flow through the bypass.
4. Leakage rate shall be ANSI Class IV (no more than 0.01% of Cv).
5. Fluid temperature range shall be between -22 and +250 degrees F. water or glycol solutions up to 50%. Piping and valves shall be properly insulated to prevent formation of ice on moving parts.
6. Valves shall be rated for no less than 360 psig at 250 degrees F.
7. Provide a method to operate valves manually during system start-up, or actuator power loss or failure on all valves.
8. Two-way valves shall close off against 70 psi minimum, and three-way valves shall close off against 40 psi minimum.
9. Valves shall have stainless-steel or chemically nickel-plated brass stem and throttling port.
10. Actuator shall be available with NEMA 3R (IP54) rated enclosure suitable for outdoor installation.
11. Valves shall be tagged with Cv rating and model number.

BB. Control Valves: (Characterized Ball Valves) Control valves 4 to 6 inches shall be 2-way or 3-way cast iron ANSI Class 125 flanged connections as shown constructed for tight shutoff and shall operate satisfactory against system pressures and differentials.

1. Two-position valves shall be line size.
2. Proportional control valves shall be sized for a nominal pressure drop of 5.0 psi

at rated flow (except as may be noted on the drawings). Manufacturer's maximum differential pressure shall not be exceeded in order to prevent cavitation.

3. Two-way water valves shall have equal percentage flow characteristics. Three-way valves shall have equal percentage flow characteristics straight through and linear with 20% reduced flow through the bypass. Rangeability shall be 100:1 or greater.
4. A-port leakage rate shall be ANSI Class IV (no more than 0.01% of Cv) or better.
5. Fluid temperature range shall be between -22 and +250 degrees F. water or glycol solutions up to 50%. Piping and valves shall be properly insulated to prevent formation of ice on moving parts.
6. Valves shall be rated for no less than 240 psig at 250 degrees F.
7. Provide a method to operate valves manually during actuator power loss or failure.
8. Two-way valves shall close off against 70 psi minimum, and three-way valves shall close off against 40 psi minimum.
9. Valve ball and stem shall be 316 stainless-steel.
10. Actuator shall be available with NEMA 3R (IP54) rated enclosure suitable for outdoor installation.
11. Valves shall be tagged with Cv rating and model number.

BB. Butterfly Control Valves: Where specified, butterfly control valves 2” to 20" in size shall be cast iron body type for 2-way applications and constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Three-way applications shall consist of 2-way valves assembled to a "Tee" fitting with common actuators and operating linkage.

1. Valves shall have tapped lugs for standard flange connection, and meet ANSI/ASME requirements to withstand the pressures and temperatures encountered.
2. Valve shall have a corrosion, ultra-violet, and wear-resistant coating for outdoor applications.
3. Resilient-seated valves shall use food-grade elastomeric seats. Seat shall also function as the flange gaskets.
4. Valves shall be designed for isolation and the absence of downstream piping at rated differential pressure.
5. All valves shall be line size.
6. Proportional control valves shall be sized for a nominal pressure drop of 5.0 psid at rated flow (except as may be noted on the drawings) up to a maximum stroke of 60° disk rotation. Manufacturer's maximum fluid velocity shall not be exceeded in order to prevent cavitation.
7. Valves shall be rated for bubble tight shutoff at no less than 150 psi differential pressure for full cut valves, or 50 psi for undercut valves.
8. Valve disc shall be of corrosion-resistant construction appropriate for the controlled media such as nylon-coasted cast iron, aluminum bronze, or stainless steel.
9. Valve stems shall be stainless steel, with inboard top and bottom bearings, and an external corrosion resistant top bearing to absorb actuator side thrust.
10. Actuator mounting flange shall conform to ISO 5211 for actuator interchangeability.
11. Actuator shall be available with NEMA 4X (IP65) rated enclosure suitable for outdoor installation.
12. Valves shall be tagged with Cv rating and model number.

CC. Variable Frequency Drives.

1. Manufacturers:

    a. Cerrus Industrial.
    b. Eaton Corp.: Cutler-Hammer Products.
    c. Emerson Industrial Automation.
    d. General Electric Distribution & Control.
    e. Honeywell Building Controls.
    f. Yaskawa Electric America, Inc. (MagneTek Drives and Systems).
    g. Square D Co.

2. Variable frequency drives shall be UL listed and sized for the power and loads applied. Units shall be provided with main power disconnect and manual bypass starters allowing motor operation from the drive or across the line. This facilitates drive maintenance while the motor continues to operate.
3. Drives shall include built-in radio frequency interference (RFI) filters and be constructed to operate in equipment rooms and shall not be susceptible to electromagnetic disturbances typically encountered in such environments. Similarly, the drives must not excessively disturb the environment within which it is used.
4. All VFDs over 3 horsepower shall be provided with an AC choke.
5. VFDs shall be installed in strict conformance to the manufacturer's installation instructions, and
   shall be rated to operate over a temperature range of 14 to 104 F.
6. VFD automatic operation shall be suitable for an analog input signal compatible with the digital controller output.
7. Each VFD shall be fan cooled and have an integral keypad and alphanumeric display unit for user interface. The display shall indicate VFD status (RUN motor rotation, READY, STOP, ALARM, and FAULT), and shall indicate the VFD current control source (DDC input signal, keypad, or field bus control). In addition to the alphanumeric display, the display unit shall have three pilot lights to annunciate when the power is on (green), when the drive is running (green, blinks when stopping and ramping down), and when the drive was shut down due to a detected fault (red, fault condition presented on the alphanumeric display).
8. Three types of faults shall be monitored, "FAULT" shall shut the motor down, "FAULT Auto-reset" shall shut the motor down and try to restart it for a programmable number of tries, and "FAULT Trip" shall shut the motor down after a FAULT Auto-reset fails to restart the motor. Coded faults shall be automatically displayed for the following faults:

    a. Over current
    b. Over voltage
    c. Earth ground
    d. Emergency stop
    e. System (component failure)
    f. Under voltage
    g. Phase missing
    h. Heat sink under temperature
    i. Heat sink over temperature
    j. Motor stalled
    k. Motor over temperature

l. Motor under load
m. Cooling fan failure
n. Inverter bridge over temperature
o. Analog input control under current
p. Keypad failure
q. Other product unique monitored conditions
r. In addition to annunciating faults, at the time of fault occurrence the VFD shall capture and make available to the user certain system data for subsequent analysis during fault trouble shooting, including duration of operation (days, hours, minutes, seconds),output frequency, motor current, motor voltage, motor power, motor torque, DC voltage, unit temperature, run status, rotation direction, and any warnings. The last 30 fault occurrences shall be retained as well as the fault data listed in the previous sentence of each fault. New faults beyond 30 shall overwrite the oldest faults.

9. The display unit keypad shall allow setting operational parameters including minimum and maximum frequency, and acceleration and deceleration times. The display shall offer user monitoring of frequency, unit temperature, motor speed, current, torque, power, voltage, and temperature.

DD. Actuators, General. All automatically controlled devices, unless specified otherwise elsewhere, shall be provided with actuators sized to operate their appropriate loads with sufficient reserve power to provide smooth modulating action or two-position action and tight close-off. Valves shall be provided with actuators suitable for floating or analog signal control as required to match the controller output.

1. Spring Return Direct Coupled Actuators. Actuators shall have torque ratings of 44lb-in., 88 lb-in., or 175 lb-in. Actuators shall be modulating 90 seconds nominal timing or two-position 45 seconds nominal timing types with strokes for 90 degree rotation applications and designed for operation between -40 and 140 F.

a. Each torque rating group shall have optionally selected control types, floating control, 2- position 24 Vac, 2-position line voltage, or analog input which is switch selectable as 0- 10Vdc, 10-0 Vdc, 2-10 Vdc, or 10-2 Vdc.
b. Actuator spring return direction (open or closed) shall be easily reversed in the field, and actuators shall spring return in no greater than 20 seconds.
c. Actuators serving air stream dampers shall be powered-open type which return to a closed position when power is lost.
d. Actuators shall be direct connected (no linkages), and shall have integral position indication.
e. Actuators shall have NEMA 2 environmental protection rating, and UL approved and plenum rated per UL873.
f. Minimum design life of modulating actuators shall be for 1,500,000 repositions and 60,000 spring returns, except 2-position actuators shall be for 50,000 spring returns.
g. Each actuator shall be provided with a manual power-off positioning lever for manual positioning during power loss or system malfunctions, including a gear-train lock to prevent spring action.
h. Upon power restoration after gear lock, normal operation shall automatically recur.

2. Fast Acting Two Position Fire & Smoke Actuators. Fire/smoke damper actuators shall be direct connected (no linkages) two-position spring return types with stroke for 90 degree nominal rotation applications and designed for 60,000 full stroke cycles and normal operation between 0 and 130 F.

   a. Actuators control shall be compatible with SPST control switch and with torque ratings of 30 lb-in.
   b. Actuator timing shall be 25 seconds maximum in powered instances and shall spring- return in 15 seconds.
   c. Actuators shall be UL listed with UL873 plenum rating with die-cast aluminum housing with integral junction box and conduit knockouts, and designed to operate reliably in smoke control systems requiring UL555S ratings up to 350F.
   d. The actuator shall be designed to operate for 30 minutes during a one-time excursion to 350F.
   e. Actuator shall require no special cycling during long-term holding, and shall "hold" with
      no audible noise at a power consumption of approximately half of the driving power.
   f. Actuators shall be 24 volt or 120 volt with models for clockwise (add a B suffix) and counter-clockwise (add an A suffix) spring return.

EE. Control Cabinets: Furnish control cabinets of code gauge steel with locking doors for mounting all devices as shown. Provide engraved phenolic nameplates identifying all devices, located within the panel, mounted on the face of control panels. A complete set of 'as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel. Wiring diagrams showing the field controller communication routing on the building floorplan shall be provided at each JACE panel.

PART 3 - EXECUTION

3.1 EXECUTION

A. All work described in this section shall be performed by system integrators or Contractors that have a successful history in the design and installation of integrated control systems. The BACS Contractor shall have a minimum of ten years' experience installing, and servicing computerized building systems utilizing the Niagara N4 Platform. All subcontractors utilized by the BACS Contractor shall have a minimum of five years' experience within their appropriate trades.

B. Install system and materials in accordance with manufacturer's instructions, and as detailed on the project drawing set.

C. Drawings of the BACS network are diagrammatic only and any apparatus not shown, but required to make the system operative to the complete satisfaction of the Architect shall be furnished and installed without additional cost.

D. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by this Contractor in accordance with these specifications.

E. Equipment furnished by the HVAC Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by this Contractor.

3.2 WIRING

A. All electrical control wiring and power wiring to the control panels, JACE, computers and network components shall be the responsibility of the this Contractor.

B. The electrical Contractor (Div. 26) shall furnish all power wiring to electrical starters and motors.

C. All wiring shall be in accordance with the Project Electrical Specifications (Division 26), the National Electrical Code and any applicable local codes. All power wiring and BACS wiring shall be installed in either conduit or cable tray as specified in the Project Electrical Specifications (Division 26 and 27) and installed in a neat and workmanlike manner. No exposed conductors or cabling are permitted. Conduits shall be colored.

3.3 WARRANTY

A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of substantial completion.

B. Contractor shall provide certification from product manufacturer that the installer is licensed to process potential warranty claims on behalf of the manufacturer. If a product manufacturer warranty cannot be obtained by the installer, the installer shall provide a two-year warranty for equipment, materials and workmanship.

C. Within this period, upon notice by the Owner, any defects in the work provided under this section due to faulty materials, methods of installation or workmanship shall be promptly (within 48 hours after receipt of notice) repaired or replaced by this Contractor at no expense to the Owner.

3.4 NETWORK ACCESS

A. The Contractor shall meet the following requirements prior to the Owner allowing the Contractor to access the BACS IAW 3.4 E. (3) for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period:

1. Obtain Common Access Card (CAC) authorization from DOMs using the GKO State Employee System process.

    a. The specific employee for the Contractor will need a Federal employee sponsor.
    b. CAC authorization is for an individual not a company. Sharing of a CAC and the associated CAC PIN is forbidden and will result in termination of the CAC authorization.

1) Obtain a State CAC following the normal CAC issuing process at the DEERS/RAPIDS station.

   a) Finger printing, and
   b) Background check.

2) Complete the Deputy Chief of Staff Information Management (DCSIM) steps necessary to obtain an account on the MEARNG network:

   a) Information Assurance (IA) Training
   b) Acceptable Use Policy
   c) Computer Equipment

B. The **Controls Contractor** at their expense shall provide a new laptop computer for this project with an operating system meeting the MEARNG/DCSIM specifications. The laptop may remain in the Contractor's possession for the warranty period of the project. The new laptop is the property of the Owner. At the end of the warranty period or when requested by the Owner, the Contractor must return the laptop to the Owner.

C. The computer equipment shall be configured to the following DCISM standards:

1. In accordance with AR25-2: Section 4-5(a)(6), installation of non-Government-owned computing systems or devices without prior authorization of the appointed Designated Approving Authority (DAA) including but not limited to USB devices, external media, personal or Contractor-owned laptops, and Mobile Computer Devices (MCDs) is prohibited.
2. In accordance with AR25-2: Section 4-31(e), Contractor-owned and operated Information Systems (ISs) will meet all security requirements for Government-owned hardware and software when operating on the Army Enterprise Infrastructure (AEI), managing, storing, or processing Army or DOD data or information, or conducting official communications or business.
3. In accordance with AR25-2: Section 5-8(d), a DAA will be identified for each information system operating within or on behalf of the Department of the Army (DA), to include outsourced business processes supported by private sector IS and outsourced IT (for example, Government owned, Contractor Operated (GOCO) and Contractor Owned, Contractor Operated (COCO).

D. DCSIM will configure the laptop with software image to meet Army standards.

1. When all the above has been accomplished the Contractor will be given direct access when onsite at a MEARNG location. The CAC and user account privileges are granted on a per individual basis only, not a company. Sharing of a CAC and the associated CAC PIN is forbidden and will result in termination of the CAC authorization. The Contractor will be responsible for complying with all DCSIM automated patch updates and will be subject to automated compliance scans upon connection to the network.

E. Any computer used for BACS interface purposes is subject to the following limitations:

1. The computer that is provided for this use will only be used for accessing the system, server, computer or IT device on the MEARNG Domain.
2. This computer will operate on approved Virtual Local Area Networks (VLANS) designated by the MEARNG Network Manager.
3. **The computer will only connect to the Contractors system by connecting directly into the MEARNG infrastructure at a physical MEARNG facility. At no time will remote access or the creation of a virtual private network (VPN) connection from outside the MEARNG Domain from any computer or electronic device be allowed. This includes, but is not limited to: Remote Desktop Connections, VPN clients etc…**
4. All Contractor personnel accessing the BACS via the computer shall sign and abide by the Memorandum of Use Policy for MEARNG Components.

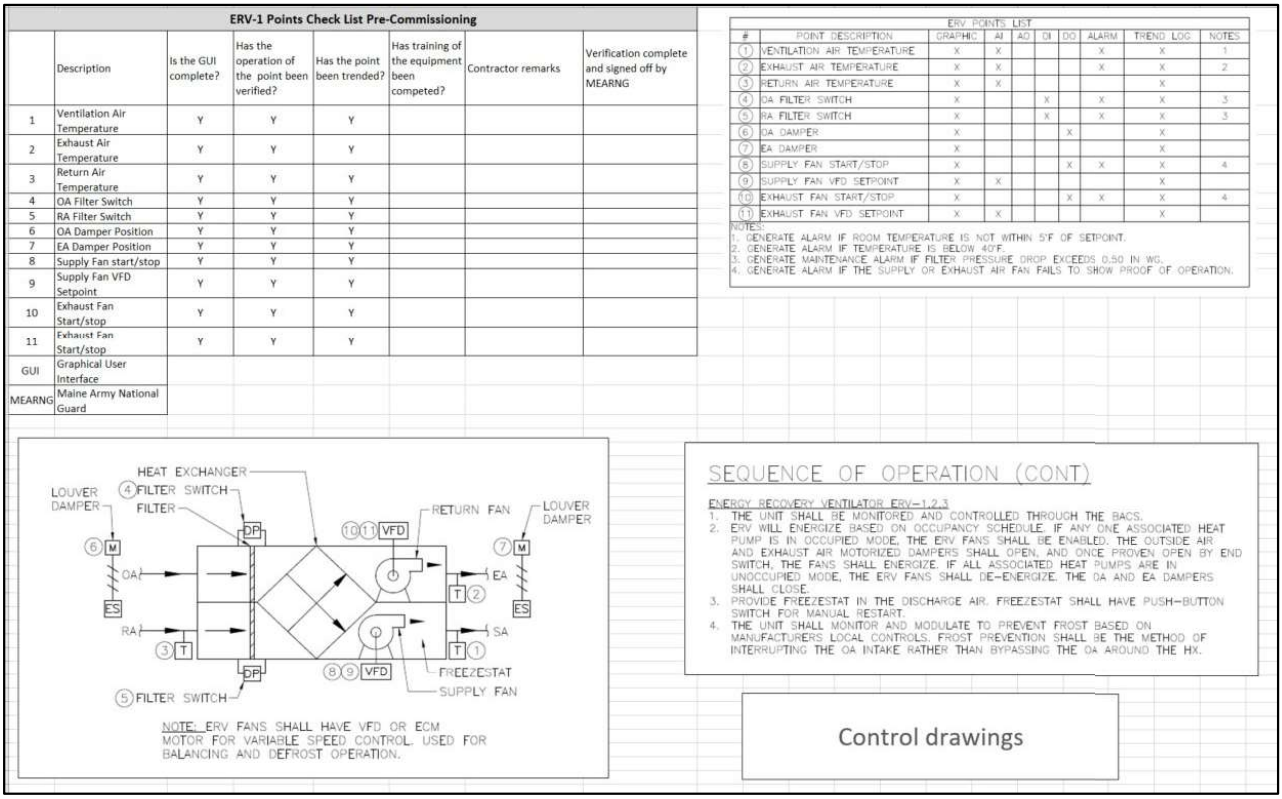
F. STAND-ALONE WORKSTATION - Not Applicable

1. Contractor shall provide a stand-alone work station consisting of the following items:
   a. A lap top computer in accordance with paragraph 3.4 (C-E) of this specification. **THIS COMPUTER IS IN ADDITION TO THE LAPTOP COMPUTER REQUIRED IN SECTION 3.4B**
   b. The computer shall be able to connect directly to the JACE and provide the same functionality as all other computer work stations as specified in this section with the notable exception that internet access will not be required to access and modify the parameters of the facility BACS.
   c. The GUI displayed on this system shall match those of all other workstations as specified in this section in both display and functionality. In the event the existing JACE cannot accommodate this feature it shall be replaced with an upgraded one than can.
   d. The work station shall be installed in a contractor provided cabinet, to be located adjacent to the cabinet containing the JACE.

3.5 ACCEPTANCE TESTING

A. Upon completion of the installation, this Contractor shall load all system software and start-up the system. This Contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with the plans and specifications. The functional testing should include verification that all points are operational, viewable on the graphical user inter face and trendable. Once this is complete, the sequence of operation testing of all the required HVAC and other equipment as indicated on the plans and specifications will be completed. **Once Contractor has determined the system is fully functional, they will certify in writing to the owner that the system has met the requirements in the plans and specifications and is ready for commissioning**.

B. The Contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation. It will also include verification that the graphical user interface represents the HVAC equipment and is fully functional. The point by point log will be certified by the Contractor and forwarded to the owner for review before the building commissioning is schedule. The log will be in excel sheet format. Provide a separate tab in the excel spread sheet for each piece of equipment that is required to be tested and include the points list, the equipment drawing and BACS shop drawing, the sequence of operations, the equipment schedule, and any other pertinent information related to the equipment. This log will be used to verify the system and determine the system is ready for commissioning see example below:



ERV-1 Points Check List Pre-Commissioning

	Description	Is the GUI complete?	Has the operation of the point been verified?	Has the point been trended?	Has training of the equipment been competed?	Contractor remarks	Verification complete and signed off by MEARNG
1	Ventilation Air Temperature	Y	Y	Y			
2	Exhaust Air Temperature	Y	Y	Y			
3	Return Air Temperature	Y	Y	Y			
4	OA Filter Switch	Y	Y	Y			
5	RA Filter Switch	Y	Y	Y			
6	OA Damper Position	Y	Y	Y			
7	EA Damper Position	Y	Y	Y			
8	Supply Fan start/stop	Y	Y	Y			
9	Supply Fan VFD Setpoint	Y	Y	Y			
10	Exhaust Fan Start/stop	Y	Y	Y			
11	Exhaust Fan Start/stop	Y	Y	Y			
GUI	Graphical User Interface						
MEARNG	Maine Army National Guard						

ERV POINTS LIST

#	POINT DESCRIPTION	GRAPHIC	AI	AO	DI	DO	ALARM	TREND LOG	NOTES
1	VENTILATION AIR TEMPERATURE	X	X				X	X	1
2	EXHAUST AIR TEMPERATURE	X	X				X	X	2
3	RETURN AIR TEMPERATURE	X	X					X	
4	OA FILTER SWITCH	X			X		X	X	3
5	RA FILTER SWITCH	X			X		X	X	3
6	OA DAMPER	X				X		X	
7	EA DAMPER	X						X	
8	SUPPLY FAN START/STOP	X				X	X	X	4
9	SUPPLY FAN VFD SETPOINT	X	X					X	
10	EXHAUST FAN START/STOP	X				X	X	X	4
11	EXHAUST FAN VFD SETPOINT	X	X					X	

NOTES:
1. GENERATE ALARM IF ROOM TEMPERATURE IS NOT WITHIN 5°F OF SETPOINT.
2. GENERATE ALARM IF TEMPERATURE IS BELOW 40°F.
3. GENERATE MAINTENANCE ALARM IF FILTER PRESSURE DROP EXCEEDS 0.50 IN WG.
4. GENERATE ALARM IF THE SUPPLY OR EXHAUST AIR FAN FAILS TO SHOW PROOF OF OPERATION.

SEQUENCE OF OPERATION (CONT)

ENERGY RECOVERY VENTILATOR ERV-1,2,3

1. THE UNIT SHALL BE MONITORED AND CONTROLLED THROUGH THE BACS.
2. ERV WILL ENERGIZE BASED ON OCCUPANCY SCHEDULE. IF ANY ONE ASSOCIATED HEAT PUMP IS IN OCCUPIED MODE, THE ERV FANS SHALL BE ENABLED. THE OUTSIDE AIR AND EXHAUST AIR MOTORIZED DAMPERS SHALL OPEN, AND ONCE PROVEN OPEN BY END SWITCH, THE FANS SHALL ENERGIZE. IF ALL ASSOCIATED HEAT PUMPS ARE IN UNOCCUPIED MODE, THE ERV FANS SHALL DE-ENERGIZE. THE OA AND EA DAMPERS SHALL CLOSE.
3. PROVIDE FREEZESTAT IN THE DISCHARGE AIR. FREEZESTAT SHALL HAVE PUSH-BUTTON SWITCH FOR MANUAL RESTART.
4. THE UNIT SHALL MONITOR AND MODULATE TO PREVENT FROST BASED ON MANUFACTURERS LOCAL CONTROLS. FROST PREVENTION SHALL BE THE METHOD OF INTERRUPTING THE OA INTAKE RATHER THAN BYPASSING THE OA AROUND THE HX.

Control drawings

C. Controls testing shall also include operation verification of smoke control sequence, emergency shutdown sequence and emergency and normal power sequence.

D. Upon completion of the performance tests described above, and the written certification has been provided by the contractor to the owner, a formal commissioning date will be scheduled. The commissioning agent will require a repeat of the tests, a graphical presentation of the point by point validation and functionality of the graphical user interface as described in the validation log above in presence of Owner's Representative. Properly schedule these tests so testing is complete at a time directed by the Owner or the Owner's Representative. This performance test and graphical presentation demonstration is not considered training. The Commissioning Agent will observe testing as required to verify systems have been installed and operate per the contract documents after the Contractor has certified the system

meets the contractual requirements have been met and is ready to schedule the formal commissioning of the system.

E. System Acceptance: Satisfactory completion is when this Contractor and the Division 26 Contractor have performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner and the Owner's Representative. Final system acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.6 OPERATOR INSTRUCTION, TRAINING

A. During system commissioning and at such time acceptable performance of the BACS hardware and software has been established this Contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

B. This Contractor shall provide 40 hours of instruction to the owner's designated personnel on the operation of the BACS and describe its intended use with respect to the programmed functions specified. Operator orientation of the systems shall include, but not be limited to; the overall operation program, equipment functions (both individually and as part of the total integrated system), commands, systems generation, advisories, and appropriate operator intervention required in responding to the System's operation.

C. The training shall be as follows:

1. Initial Training: Can be scheduled once the BACS acceptance testing in section 3.5 above has been completed and signed off by the contractor that the system has met the requirements in the plans and specifications and is ready for commissioning.
2. The initial (4) hour session will be a class room introduction of how to use the manual and demonstration of the BACS via the internet at the owners facility. The operations manual shall be submitted at least two weeks prior to scheduling the training so that the owners' personnel can start to familiarize themselves with the system before classroom instruction begins. The contractor shall provide 5 hard copies of the manual.
3. Follow-Up Training: Will be scheduled at the owners convenience after the initial training and commissioning has taken place. This session will deal with more advanced topics such as set points, schedules, alarms, trending, trouble-shooting analysis, etc. This training will be scheduled in no less than (2) hour increments, at the request of the owner during the one year warranty period. These sessions shall cover topics as requested by the owner such as; how to add additional points, create and gather data for trends and analysis, graphic screen generation or modification of control routines.

3.7 BUILDING FIRE ALARM INTERFACING

A. General: Provide all controls for interfacing the building HVAC systems to the building fire alarm system. The building fire alarm system and smoke detectors are specified in Division 28.

B. The fire-alarm system, as described in Division 28, will send a signal to the DDC system to identify when the fire alarm system is in alarm.

C. Upon receipt of the fire alarm signal, the DDC system continues to operate HVAC equipment. It shall be automatically shut down only when activated by the smoke detector(s) located in the air handling unit. Both the supply fan and its related return fan shall be shut down by the same sensor.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Provide reports in writing for all testing to include:

1. Unit Operational Test. After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.
3. Calibration test electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.

B. Engage a factory-authorized service representative to perform startup service. Provide the factory/equipment service start up report for each piece of equipment.

C. Replace damaged or malfunctioning controls and equipment.

1. Start, test, and adjust control systems.
2. Demonstrate compliance with requirements, including calibration and testing, and control sequences.
3. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.
4. Provide report of any equipment/controls that have malfunctioned and have been replaced or repaired.

D. Verify DDC as follows:

1. Verify software including automatic restart, control sequences, scheduling, reset controls, and occupied/unoccupied cycles.
2. Verify operation of operator workstation.
3. Verify local control units including self-diagnostics.

3.9 SYSTEM ACCEPTANCE

A. The system installation shall be complete in all respects and tested for proper operation prior to commissioning and acceptance testing for the Owner's authorized representative. A letter shall be submitted to the Owner requesting system acceptance and commissioning of the system. This letter shall certify all controls are installed and the software programs have been completely exercised for proper equipment operation. Commissioning and acceptance testing will commence at a mutually agreeable time within 30 calendar days of the request. When the system has

been deemed satisfactory in whole or in part by the Owner's representative, the system will be accepted for beneficial use which will start the warranty period.

3.10 COMMISSIONING

A. Commissioning Agent will observe testing as required to verify systems have been installed and operate per the contract documents after the Contractor has certified the system meets the contractual requirements have been met and is ready to schedule the formal commissioning of the system.

END OF SECTION 23 09 00

SECTION 231000 – EXISTING INTEGRATED AUTOMATION NETWORK SERVER

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

A. Furnish all labor, materials, equipment, and service necessary for a complete and to connect to the existing operating Integrated Automation Network (IANS) utilizing Niagara N4.7 Supervisor® (NN4S). Niagara N4.7 is hereinafter referred to as Niagara N4. All labor, material, equipment and software not specifically referred to herein that are required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.

B. The State of Maine Military Bureau Directorate of facilities Engineering, hereinafter referred to as the Owner. Shall be the named license holder of all software associated with any and all incremental work on the project(s).

1.3 SYSTEM DESCRIPTION

A. The NN4S is a flexible network server used in applications where multiple Niagara N4 - based JACE controllers will be networked together (Soft JACE®, JACE-545®, JACE-403®, JACE-200®, JACE-600®, JACE-8000®, or JACE-XPR® series.). The NN4S serves real time graphical information displays to standard web-browser clients and also provides server-level functions such as: centralized data logging, archiving, alarming, real time graphical displays, master scheduling, system-wide database management, and integration with enterprise software applications. In addition, the NN4S provides a comprehensive, graphical engineering toolset for application development. Additionally, it provides an open automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be easily managed in real time over the Internet using a standard Web browser. Systems not developed on the Niagara N4 Framework platform are unacceptable.

B. The NN4S is used in applications with multiple JACEs. Key features that make it a valuable addition to multi-JACE projects include:

1. Provisioning of multi-JACE systems (automated updating and installation of software modules)
2. Support for integration with standard RDBMS (MS SQL, Oracle, DB2, etc)
3. Platform for enterprise applications (Vykon Energy Suite) and others in the future
4. Central database storage for attached JACEs
5. Archive destination / repository for log and alarm data
6. Central server of graphics and aggregated data (single IP address)

C. Contractor shall furnish all labor, materials, equipment, software and service necessary for a complete and to connect to existing operating Niagara NN4S as described herein.

D. All labor, material, equipment, and software not specifically referred to herein that are required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.

E. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s).

1.4 NETWORK CONNECTIONS

A. The NN4S system uses only TCP/IP for communications over the base Wide Area Network (WAN). Various assignable ports can be used with the system. There are at least two ports used one for HTTP sessions and a second for administration, by default the HTTP port is defined as 80 and the ADMIN is defined as 3011. However, these can be set to any port desired or directed.

B. Communications protocols can be used over TCP/IP; some of the more typical that may be used by the Automated Information System (AIS) include BACnet and Modbus. Use of these protocols allows for multiple options to integrate various third party building systems to communicate with the AIS. Physical interface with the AIS is through a standard IEEE 802.3 Ethernet RJ45 jack using 10 / 100 Megabit connection.

C. The AIS can make use of email system for communication of alarms to operators, if this feature is used all that is required is that an email account for the AIS be defined and the proper port to use identified. By default the system will use port 25. The AIS will send email only using SMTP and will not receive mail.

D. All equipment scheduled or specified to be provided that has the ability to connect to or from the INTERNET shall meet the latest DOD requirements. FAR part 4 - Telecommunications and shall be pre-approved by the Owner (DCSIM) as being on the DOD Approved Products List (disa.mil) or if not found on the list the equipment shall be evaluated on the Risk Management Framework and meet the FIPS 140-2. E. Contractor shall make no effort to connect to the INTERNET from any device connected to the MEARNG network.

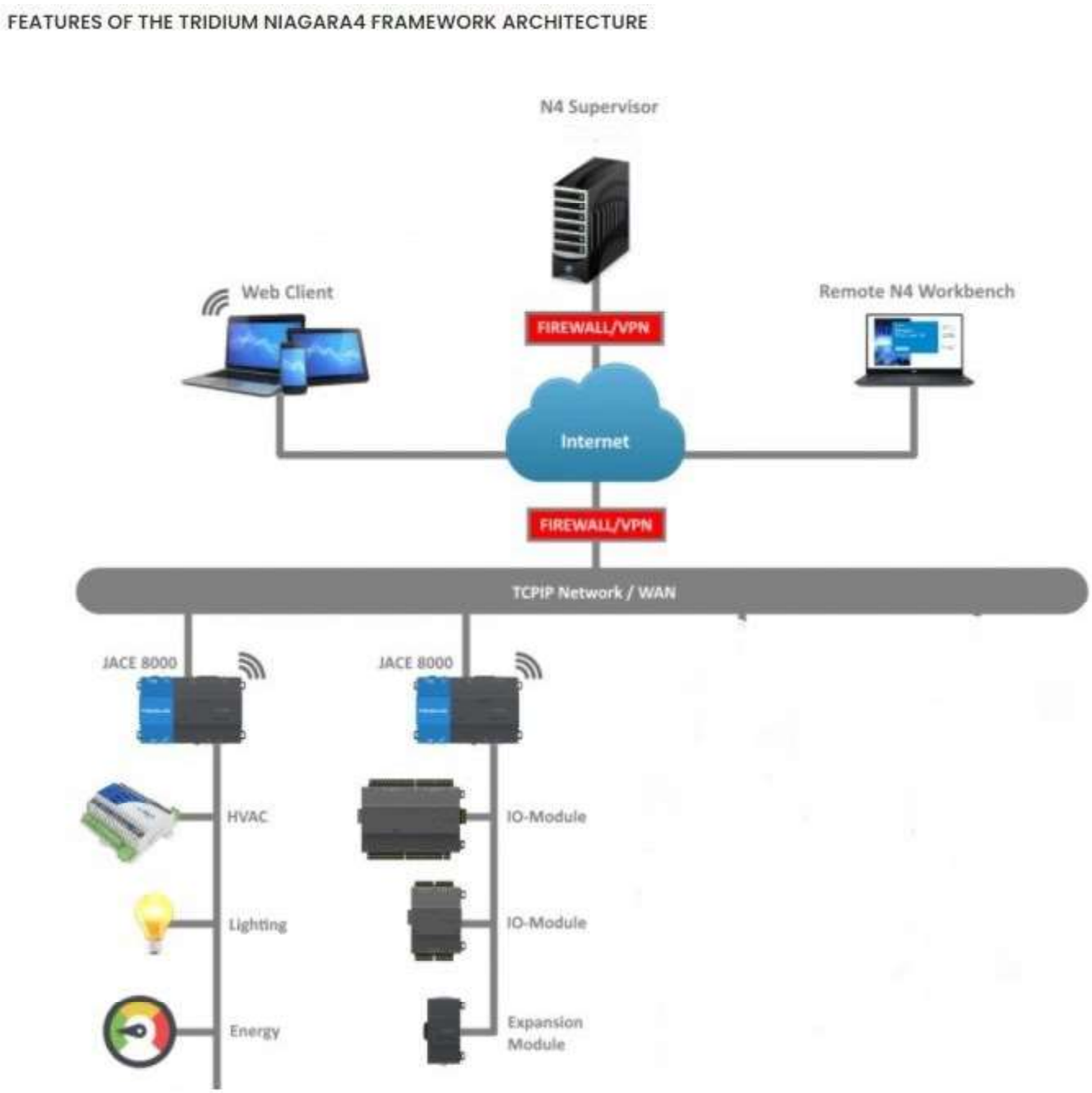


Figure 2.2 - System Architecture based on the N4S

E. The Embedded Hardware Platform in this example is the JACE-2. The Supervisor Station in this example is the N4 Supervisor and Work PlaceN4. Only the above mentioned devices will be placed on the base WAN.

1.5 FUNCTIONAL DESCRIPTION

A. The NN4S provides the capability to reduce base operating expenses and equipment life-cycle costs by central monitoring and controlling the facility HVAC and lighting, uninterruptible power supplies (UPS), backup power generators and fuel tanks, power distribution, and any other direct digitally controlled devices custom tailored to a customer's requirements. System graphical features are designed to save time and manage data more efficiently. Animated features provide for easy recognition of point conditions on graphics. Operators access the system from a standard web browser (Internet Explorer (IE), FireFox, or other browser) no additional software need be loaded on an operator's workstation. Operators can view and acknowledge alarms, manually adjust set points as well as start and stop any piece of equipment controlled anywhere in the system. A database service utility in the NN4S is responsible for periodic archiving of system databases, historical data and operator / system activity logs. Access to as-built documentation is available from any operator workstation that has access to the MEARNG network. With the NN4S, there are different types of controllers that may be connected to the Installation WAN. With various Operating Systems utilized. Covered by this SSAA:

1. N4 Supervisor Station (SS) – This is a single computer that will normally run on either Microsoft Windows 10 or the current approved Maine Army National Guard Microsoft product. Either operating system will work fine for this application.
2. Embedded Hardware Platform– This is an embedded controller that runs the NN4S on QNX or Windows 10 or the current approved Maine Army National Guard Microsoft product.
3. Java Application Control Engine (JACE) Controllers- These are dedicated host platforms that provide integrated control, supervision, and network management service for networks of building monitoring and control devices.
4. Workplace N4 - This is the engineering tool that is used to create applications by defining components and linking them together to create logic and displays.
5. Browser User Interface (BUI**) -** This indicates user access of a NN4S station using a standard web browser.

B. A user's Web Supervisor Personal Computer (PC), can use the Admin Tool to access all NN4S hosts, including remote hosts (JACE controllers). The Admin Tool allows you to start and stop stations, archive station databases, edit station startup and shutdown scripts, and perform station troubleshooting. In addition to these station-related operations, the Admin Tool allows you to perform operating system changes on each host. These changes include editing host name, TCP/IP networking properties, and setting the time, date, and time zone. A reboot feature allows you to start a remote host.

C. All of Niagara's NN4S products can co-exist on a Windows 10 or the current approved Maine Army National Guard Microsoft product infrastructure. Since all of the Win32-based controllers are built on the Windows platform, they appear in the Windows Network Neighborhood and can be browsed. These Win32-based devices can be members of the Windows domain or Active Directory. The tools and methods chosen for managing the NN4S environment depend not only on the network design, but

access to the network and tools that are available to take advantage of that access. Each management task may be more specifically suited to one network management tool than another.

D. This is a native daemon process. The daemon is used to boot stations and to manage platform configuration such as IP settings. On Windows platforms, the daemon is run in the background as a Window's service. On QNX it is run as a daemon process on startup. The most common way to access daemon functionality is through Workbench. A connection to the daemon is established via the “Open Platform” command which opens a Platform Session to the remote machine. Workbench provides a means for accomplishing platform tasks, such as the following:

1. Installing and backing up station databases
2. Launching and monitoring stations
3. Configuration of TCP/IP settings (QNX, Windows 7)
4. Installation and upgrades of the operating system (QNX only)
5. Installation and upgrades of the Java virtual machine (JVM)
6. Installation and upgrades of the Niagara N4 software
7. Installation of lexicons for localization
8. Installation of licenses

1.6 HARDWARE/SOFTWARE REQUIREMENTS

A. One of the most basic NN4S concepts is a host. In the case of NN4S, a host may be the desktop PC that you are familiar with on your regular office network or it may be a specialized piece of hardware such as Niagara’s JACE platform, which is designed specifically for integrating building automation control into an existing TCP/IP network. It is important to understand the distinction between a host and the station that resides on the host.

B. At the Enterprise level, the NN4S is scalable to handle even the largest of multi-site configurations. Each site will have its own JACE typical to the previous configurations, providing local energy monitoring and control. One site would also host the Supervisor PC for global management of data and administrative functions. The enterprise could be connected via the MEARNG WAN. By using the NN4S as the automation infrastructure, diverse systems from many sites are pulled together into one enterprise solution. The energy information system can utilize this infrastructure for data gathering and reporting, and ultimately close the loop for real-time control.

C. The NN4S can operate on Windows 10 servers, PC's, Niagara N4 JACE controllers and other Java-enabled platforms. NN4S uses enterprise-level software standards such as Java TM, TCP/IP, HTTP and XML to allow access to control system via a standard Web browser. The interface provides object-oriented application development and system administration.

1. N4 Supervisor: The term N4 Supervisor is applied to a station running on a workstation or server class machine. Supervisors are typically stations that provide support services to other stations within a system such as graphics, history, or alarm concentration. Supervisors by definition run a station, and may

potentially run the daemon or Workbench. The N4 Supervisor is a network PC acting as a server for multiple connected JACE stations. The N4 Supervisor has the following features:

a. Provisioning of the multi-JACE systems (tools for updating and installation of software modules)
b. Support for integration with standard RDBMS (MS SQL, Oracle, DB2, etc.)
c. Platform for enterprise applications (Vykon Energy Suite) and others in the future
d. Central database storage for attached JACEs
e. Archive destination/repository for log and alarm data
f. Central server of graphics and aggregated data (single IP address)

2. Workplace N4. This is the engineering tool that is used to create applications by defining components and linking them together to create logic and displays. It allows the user to develop comprehensive applications for control, monitoring, alarming, data logging, reporting, and real-time data visualization using a single graphical tool. Workplace N4 can run as a standalone application on a PC, can be bundled with an N4 Supervisor, or be served up to a browser from an embedded JACE platform.
3. Browser User Interface: The term “browser user interface” or “BUI” simply indicates user access of a Niagara N4 station (JACE controller or N4 Supervisor) using a standard web browser. The BUI interface provides remote administration and monitoring of building control systems on an intranet or over the Web.

1.7 SECURITY

A. System security enables you to control who has access to the system and to control what users can do within the system when access is granted. The security required for your NN4S system can be considered as follows:

1. Windows operating system security

B. The NN4S security model is based on requiring each user to log on to NN4S with a valid password. Each user is assigned or denied read and write permissions for two levels of configuration properties (operator and administrator) and four levels of commands (standard, alarm, emergency, and administrator) for each of the eight security groups. The security groups are independent of each other and their meaning is a local matter. Each node can be assigned to any combination of the eight groups. Security groups classify nodes into categories that are used to potentially limit access to portions of the control system for classes of users.

1.8 OPERATIONAL ADMINISTRATION

A. Sensitivity Level - The information category for the NFS N4 system is defined as "Sensitive Unclassified". The NFS system will process Logistical, Privacy Act, proprietary and administrative matters data up to the "Sensitive Unclassified" level.

(Additional detail may be previewed in the NFS N4 system SSAA Appendix D, Security Concept of Operations (CONOPS) document).

B. Security Modes of Operation - All systems identified herein operate at the System High security mode of operation. System high infers processing, transmission, storage, or data, while actually across different information categories, is handled as if it were in a single information category or processing domain. This means all personnel with access to the system must meet the following criteria.

1. All operators will be granted formal access to all information stored on the system. See Section 23 09 00 paragraph 1.2.C.6 for Contractor operator clearance requirements.
2. All operators are subject to the same access controls
3. All operators may not have the same need-to-know

C. Security and System Administration - NFS N4 Administrators maintain the servers and the workstations in designated DoD installation facilities, as well as the network hardware. The System or Network Administrator is responsible for the administration and operation of the Automated Information System (AIS) and ensures it operates in accordance with NFS N4 security policies and procedures. The System or Network administrator also implements changes to AISs, such as software upgrades, system patches, and configuration modifications. The IAM shall conduct periodic self-inspections to ensure compliance with this ISSP and other relevant directives.

1.9 SUBMITTALS

A. Four copies of shop drawings of the components and devices for the entire control system shall be submitted and shall consist of a complete list of equipment and materials, including manufacturers catalog data sheets and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations, and any other details required to demonstrate that the system has been coordinated and will properly function as a system.

1. Submittal shall include all information required per paragraph 1.4.D for all equipment that has the ability to connect to or from the INTERNET. If the equipment proposed does not meet this requirement there shall be no additional INTERNET connection provided.

B. Submittal shall also include a trunk cable schematic diagram depicting operator workstations, control panel locations and a description of the communication type, media, and protocol. Though the Division 23 and 26 contractors shall provide these diagrams for their portions of work, the Systems Integrator shall be responsible for integrating those diagrams into the overall trunk cable schematic diagrams for the entire Wide Area Network (WAN) and/or Local Area Network (LAN) utilized by the BACS.

1. The network infrastructure shall conform to the published guidelines for wire type, length, number of nodes per channel, termination, and other relevant wiring and infrastructure criteria as published. The number of nodes per channel shall be no

more than 80% of the defined segment (logical or physical) limit in order to provide future system expansion with minimal infrastructure modifications.

C. Submittal shall also include a complete point list of all points to be connected to the NN4S. Division 23 and 26 contractors shall provide necessary point lists, protocol documentation, and factory support information for systems provided in their respective divisions but integrated into the NN4S.

D. Submittal shall also include a copy of each graphic developed for the Graphic User Interface including a flowchart (site map) indicating how the graphics are to be linked to one another for system navigation. The graphics are intended to be 80% - 90% complete at this stage with the only remaining changes to be based on review comments from the A/E design team and/or Owner.

E. Upon completion of the work, provide a complete set of 'as-built' drawings and application software on compact disk. Drawings shall be provided as AutoCAD™ or Visio™ compatible files. Four copies of the 'as-built' drawings shall be provided in addition to the documents on compact disk. Division 23 and 26 contractors shall provide as-builts for their portions of work. The Division 23 contractor shall be responsible for as-builts pertaining to overall NN4S architecture and network diagrams. All as-built drawings shall also be installed into the NN4S server in a dedicated directory or as directed by the Owner.

1.10 SOFTWARE LICENSE AGREEMENT

A. The Owner shall agree to the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.

B. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s). In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use with the NAC, BACS, and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the owner.

C. The Owner, or his appointed agent, shall receive ownership of all job specific software configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and /or configured for use within Niagara N4 Framework (Niagara) based controllers and/or servers and any related LAN / WAN / Intranet and all connected routers and devices.

1.11 QUALITY ASSURANCE

A. Quality of Compliance: NN4S shall be installed by trained control mechanics regularly employed in installation and calibration of NN4S equipment by the manufacturer.

1.12 JOB CONDITIONS

A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to ensure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

APPENDIX A - SPECIFICATION NOMENCLATURE

Acronyms used in this specification are as follows:

ACRONYM	TERM
A	
AAFES	Army and Air Force Exchange Service
ACL	Access Control List
AIS	Automated Information System
ATO	Authority to Operate
AV	Anti-Virus
B	
BIA	Business Impact Analysis
BUI	Browser User Interface
C	
CA	Certification Authority (DITSCAP)
C&A	Certification and Accreditation
CC	Common Criteria
CCB	Configuration Control Board
CD	Compact Disc
CE	Civil Engineers
CIO	Chief Information Officer
CIRF	Computer Incident Response Form
CIRT	Computer Incident Response Team
CISM	Certified Information Security Manager
CISSP	Certified Information Systems Security Professional
CJCS	Chairman of the Joint Chiefs of Staff
CM	Configuration Management
CMB	Configuration Management Board
CNA	Computer Network Attack
CND	Computer Network Defense
CNDC	Computer Network Defense Course
CO	Commanding Officer
COMPUSEC	Computer Security
COMSEC	Communications Security
CONOPS	Concept of Operations
COTS	Commercial off-the-Shelf
COOP	Continuity of Operations
CSI	Certified Systems Integrator
CSM	Command Security Manager
CSU	Channel Service Unit
CT&E	Certification, Test and Evaluation
CTO	Computer Tasking Order
D	
DAA	Designated Approving Authority
DeCA	Defense Commissary Agency
DDCS	Direct Digital Control System
DISA	Defense Information Systems Agency
DISA/CISS	Defense Information Systems Agency/Center for Information System Security
DITSCAP	DOD Information Technology Security Certification and Accreditation

ACRONYM	TERM
	Process
DNS	Domain Name Service
DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DoS	Denial of Service
DSU	Digital Service Unit
E	
EMCS	Energy Management and Control System
EMSEC	Emission Security
EO	Executive Order
F	
FN	Foreign National
FOIA	Freedom of Information Act
FOUO	For Official Use Only
G	
GiG	Global Information Grid
GOTS	Government Off-the-Shelf
GSA	General Services Administration
GUI	Graphical User Interface
H	
HDD	Hard-drive
HTTP	Hypertext Transfer Protocol
HVAC	Heating, Ventilation, and Air Conditioning
HW	Hardware
I	
I&A	Identification and Authentication
IA	Information Assurance
IAM	Information Assurance Manager
IAO	Information Assurance Officer
IASO	Information Assurance Security Officer
IATO	Interim Approval to Operate
IAVA	Information Assurance Vulnerability Alert
IAVM	Information Assurance Vulnerability Management
IAW	In Accordance With
IBC	Interoperable BACnet Controller
ID	Identification
IDC	Interoperable Digital Controller
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
INFOCON	Information Operations Condition
INFOSEC	Information Security
IP	Internet Protocol
IPS	Intrusion Protection System
IS	Information System
ISLCM	Information System Life-Cycle Management
ISSO	Information System Security Officer
IT	Information Technology
ITSEC	Information Technology Security
J	
JACE	Java Application Control Engine
K	
KC	Key Controller

ACRONYM	TERM
KLCP	Key and Lock Control Program
L	
LAN	Local Area Network
LCM	Life Cycle Maintenance
M	
MAC	Mission Assurance Category
MACOM (MAJCOM)	Major Command
MCSE	Microsoft Certified Systems Engineer
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N	
NA	Network Administrator
NAC	Network Area Controller
NACIC	National Agency Check with Credit Check and written inquiries
NACLC	National Agency Check with Local Agency and Credit Checks
NN4S	NiagaraSupervisor®
NIPRNET	Unclassified but Sensitive Internet Protocol Router Network (formerly the Non-Classified Internet Protocol Router Network)
NIST	National Institute of Standards and Technology
NOC	Network Operations Center
NSA	National Security Agency
NSO	Network Security Officer
O	
O&M	Operations and Maintenance
ODAA	Official Designated Approval Authority
OIC	Officer in Charge
OOT	Object Oriented Technology
OPSEC	Operations Security
OS	Operating System
P	
PAO	Public Affairs Officer
PC	Personal Computer
PERSEC	Personnel Security
PHYSEC	Physical Security
PICS	Product Interoperability Compliance Statement
PIN	Personal Identification Number
PM	Program Manager
PMI	Power Measurement Interface
PMO	Program Management Office
POT	Portable Operator’s Terminal
PROSEC	Procedural Security
PSO	Physical Security Officer
PSP	Personnel Security Program
PW	Public Works
R	
RCIO	Regional Chief Information Officer
ROB	Rules of Behavior
ROM	Read Only Memory
RTOS	Real Time Operating System
S	
SA	System Administrator
SECDEF	Secretary of Defense
SETA	Security Education, Training, and Awareness

ACRONYM	TERM
SIR	Serious Incident Report
SIRT	Security Incident Response Team
SITREP	Situation Report
SM	Security Manager
SMTP	Simple Mail Transfer Protocol
SOFA	Status of Forces Agreement
SOP	Standard Operating Procedure
SRTM	Security Requirements Traceability Matrix
SS	Supervisor Station
SSAA	System Security Authorization Agreement
SSP	System Security Policy
SSBI	Single Scope Background Investigation
SSBI-PR	Single Scope Background Investigation Periodic Reinvestigation
ST&E	Security Test and Evaluation
STIG	Security Technical Implementation Guide
SU	Sensitive Unclassified
SW	Software
T	
TCP	Transmission Control Protocol
TCS	Temperature Control System
TTP	Tactics, Techniques, and Procedures
U	
UCMJ	Uniform Code of Military Justice
UI-SP	User Interface Station Pack
UPS	Uninterrupted Power Supply
UR	User Representative
URL	Universal Resource Locator
USERID	User Identification
V	
VPN	Virtual Private Network
W	
WAN	Wide Area Network
WBI	Web Browser Interface
WWW	World Wide Web

APPENDIX B - DEFINITIONS

Definitions of terms used in this specification are as follows.

Term	Definition
A	
Accreditation	A formal declaration by a designated approving authority of the IS is approved to operate in a particular security mode using a prescribed set of safeguards.
Accreditation Authority	Synonymous with designated approving authority (DAA).
Alarm	An indication—visual and/or audible—that alerts an operator at a Station of an abnormal or critical condition. Alarms can be assigned either to individual points or for system-wide conditions, such as a controller communications failure.
Approval to Operate	Synonymous with accreditation.
Authenticate	To verify the identity of a user, user device, or other entity, or the integrity of data stored, transmitted, or otherwise exposed to possible unauthorized modification in an automated information system, or to establish the validity of a transmitted message.
Authentication	Security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's identity or eligibility to receive specific categories of information or perform specific actions.
Availability	The state when data are in the place needed by the user, at the time the user needs them, and in the form needed by the user.
B	
BACnet	Building Automation and Control Network. A protocol standard developed by ASHRAE to allow open communications.
BACnet Device	A system on the BACnet network that can support BACnet Services and BACnet Objects.
BACnet Network	Network of computers that obey the BACnet protocol standard.
BACnet Objects	An abstract data structure used to represent information on the network. All BACnet objects are referenced by its object identifier which is unique within the BACnet device. When combined with the system-wide unique objects identifier of the BACnet Device, a BACnet object can be accessed from anywhere in the control system network.
BACnet Services	Application Layer services used to manage communication over the BACnet network.
BACstac	Software by Cimetrics that the server uses to communicate over the standard Ethernet LAN to comply with the BACnet standard.
C	
Category	Restrictive label that has been applied to both classified and unclassified data, thereby increasing the requirement for protection of, and restricting the access to, the data. Examples include sensitive compartmented information, proprietary information, and North Atlantic Treaty Organization information. Individuals are granted access to special category information only after being granted formal access authorization.

Term	Definition
Certification	Comprehensive evaluation of the technical and non-technical security features of an IS and other safeguards, made in support of the accreditation process, to establish the extent to which a particular design and implementation meets a set of specified security requirements.
Certification Authority	Individual responsible for making a technical judgment of the system's compliance with stated requirements by identifying and assessing the risks associated with operating the system, coordinating the certification activities, and consolidating the final certification and accreditation packages.
Computer	A machine capable of accepting data, performing calculations on, or otherwise manipulating that data, storing it, and producing new data.
Computer Facility	Physical resources that include structures or parts of structures that support or house computer resources. The physical area where the equipment is located.
Computer Security	Measures and controls that ensure confidentiality, integrity, and availability of the information processed and stored by a computer.
Confidentiality	Assurance that information is not disclosed to unauthorized entities or processes.
Command	The authority that a commander in the Armed Forces lawfully exercises over subordinates by virtue of rank or assignment. Command includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions. It also includes responsibility for health, welfare, morale, and discipline of assigned personnel. (Joint Pub 0-2)
Configuration Control	Process of controlling modifications to a telecommunications or information systems hardware, firmware, software, and documentation to ensure the system is protected against improper modifications prior to, during, and after system implementation.
Configuration Management	The management of security features and assurances through control of changes made to hardware, software, firmware, documentation, test, test fixtures, and test documentation of an IS throughout the development and operational life of the system.
Contingency Plan	A plan maintained for emergency response, backup operations, and post-disaster recovery for an IS, as a part of its security program, that will ensure the availability of critical resources and facilitate the continuity of operations in an emergency situation. Also known as the Continuity of Operations Plan (COOP).
Control Level	A security level (a number from 0 to 255) assigned to a point. Only operators who have been assigned a control level equal to, or higher than, a point's control level can control that point.
Controlled Access Protection	Log-in procedures, audit of security-relevant events, and resource isolation as prescribed for class C2 in DOD 5200.28–STD (DOD Trusted Computer System Evaluation Criteria), often referred to as the "Orange Book".

Term	Definition
Countermeasure	An action, device, procedure, technique, or other measure that reduces the vulnerability of an IS.
D	
Data Security	Protection of data from unauthorized (accidental or intentional) modification, destruction, or disclosure.
Designated Approving Authority (DAA)	Official with the authority to formally assume responsibility for operating an IS or network at an acceptable level of risk.
Discretionary Access Control (DAC)	Means of restricting access to objects based on the identity and need-to-know of users or groups to which the object belongs. Controls are discretionary in the sense that a subject with certain access permission is capable of passing that permission (directly or indirectly) to any other subject.
E	
Enclave	A total network made up of all the interconnected computer systems, communication systems, and network components within some logical boundary, usually a boundary device such as a router or firewall. (Replaced the term system-of systems.)
Event	A significant change in the status of an element of the system such as a point or piece of hardware. Some events have a low, high, or urgent priority, in which case they are further classified as alarms. Events can be viewed on displays and included in reports.
Event Archiving	Event Archiving allows you to archive events to disk or tape, where they may be retrieved if needed.
F	
Firewall	A system or group of systems that enforces an access control policy between two networks with the properties of allowing only authorized traffic to pass between the networks from inside and outside the controlled environment and is immune to penetration.
Firmware	Software that is permanently stored in a hardware device that allows reading and executing the software, but not writing or modifying it.
Foreign Exchange Personnel	Military members or civilian officials of a foreign defense establishment (that is, a DOD equivalent) who are assigned to a DOD component in accordance with the terms of an exchange agreement and who perform duties, prescribed by a position description, for the DOD component.
Foreign National	Non-U.S. citizens who normally reside in the country where employed, though they may not be citizens of that country, and who are employed by the U.S. Government or the Department of the Army to perform services or duties and are not considered a foreign official or representative of that nation.
G	
Global Information Grid (GiG)	DOD’s globally interconnected, end-to-end set of information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support personnel.
H	

Term	Definition
History	Point values stored to enable tracking and observation of long-term trends. Analog, status, and accumulator point PVs can be defined to have history collected for them. Three types of history collection are available: • Standard • Extended • Fast
I	
IA Product	Product or technology whose primary purpose is to provide security services (for example, confidentiality, authentication, integrity, access control, or non-repudiation of data); correct known vulnerabilities; or provide layered defense against various categories of non-authorized or malicious penetrations of information systems or networks. Examples include such products as data/network encryptors, firewalls, and intrusion detection devices.
Information System	Any equipment or interconnected system or subsystems of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data and that includes computer software, firmware, and hardware. Included are computers, word processing systems, networks, or other electronic information handling systems and associated equipment.
Information Assurance	The protection of systems and information in storage, processing, or transit from unauthorized access or modification; denial of service to unauthorized users; or the provision of service to authorized users. It also includes those measures necessary to detect, document, and counter such threats. This regulation designates IA as the security discipline that encompasses COMSEC, INFOSEC, and control of compromising emanations (TEMPEST).
Information Assurance Vulnerability Management (IAVM)	IAVM is the DOD program to identify and resolve identified vulnerabilities in operating systems. It requires the completion of four distinct phases to ensure compliance. These phases are: vulnerability identification, dissemination and acknowledgement; application of measures to affected systems to make them compliant; compliance reporting; compliance verification. This program includes alerts (IAVAs), bulletins (IAVBs), and technical advisories (TAs).
Information Technology (IT)	The hardware, firmware, and software used as a part of an information system to perform DOD information functions. This definition includes computers, telecommunications, automated information systems, and automatic data processing equipment. IT includes any assembly of hardware, software, or firmware configured to collect, create, communicate, compute, disseminate, process, store, or control data or information.
Integrity	The degree of protection for data from intentional or unintentional alteration or misuse.
Internet	A global collaboration of data networks that are connected to each other, using common protocols (for example, TCP/IP) to provide instant access to an almost indescribable wealth of information from computers around the world.

Term	Definition
Intranet	Similar to the Internet, but is accessible only by the organization's employees or others with authorization. Usually internal to a specific organization.
IS Security Incident	Any unexplained event that could result in the loss, corruption, or the denial of access to data, as well as any event that cannot be easily dismissed or explained as normal operations of the system. Also, an occurrence involving classified or sensitive information being processed by an IS where there may be: a deviation from the requirements of the governing security regulations; a suspected or confirmed compromise or unauthorized disclosure of the information; questionable data or information integrity (for example, unauthorized modification); unauthorized modification of data; or unavailable information for a period of time.
IS Serious Incident	Any event that poses grave danger to the Army's ability to conduct established information operations.
J	
K	
L	
Least Privilege	Principle that requires that each subject be granted the most restrictive set of privileges needed for the performance of authorized tasks. This also applies to system privileges that might not be needed to perform their assigned job. NOTE: Application of this principle limits the damage that can result from errors, and accidental and unauthorized use of an IS.
Limited Privileged Access	Privileged access with limited scope (for example, authority to change user access to data or system resources for a single information system or physically isolated network).
Local Area Network (LAN)	A system that allows microcomputers to share information and resources within a limited (local) area.
M	
Malicious Code	Software or firmware capable of performing an unauthorized function on an IS.
Malicious Software Code	Any software code intentionally created or introduced into a computer system for the distinct purpose of causing harm or loss to the computer system, its data, or other resources. Many users equate malicious code with computer viruses, which can lie dormant for long periods of time until the computer system executes the trigger that invokes the virus to execute. Within the last several years, the Internet has been the conduit of various types of computer viruses. However, there are other types of malicious codes used to cause havoc that are not as well publicized as the virus.
Mandatory Access Control	Means of restricting access to objects based on the sensitivity of the information contained in the objects and the formal authorization (that is, clearance, formal access approvals, and need-to-know) of subjects to access information of such sensitivity.

Term	Definition
Mode	A point parameter which determines whether or not the operator can control the point value. For example, in a status point, the mode determines whether the operator can control the output value, and in an analog point the mode determines the control of the set point. If the mode is set to manual, the operator can change the value.
N	
Need-to-Know	Approved access to, or knowledge or possession of, specific information required to carry out official duties.
Network	Communications medium and all components attached to that medium whose function is the transfer of information. Components may include IS, packet switches, telecommunications controllers, key distribution centers, and technical control devices.
Network Management	Activities to support the management and support of the network, including the engineering of changes to the network, maintenance of the network and its components, and user support activities.
Network Operations (NetOps)	The organizations and procedures required to monitor, manage, and control the Global Information Grid. Network operations incorporate Network Management, Information Assurance, and Information Dissemination Management.
Network Security	Protection of networks and their services from unauthorized modification, destruction, or disclosure. It provides assurance the network performs its critical functions correctly and there are no harmful side effects.
O	
Operations Security (OPSEC)	For the DOD components, OPSEC is a process of identifying critical information and subsequently analyzing friendly actions attendant to defense acquisition, defense activities, military operations, and other activities to: Identify those actions that may be observed by adversary intelligence systems; Determine what indicators hostile intelligence systems may obtain that could be interpreted or pieced together to derive critical information in time to be useful to adversaries; Select and execute measures that eliminate or reduce to an acceptable level the vulnerabilities of friendly actions to adversary exploitation.
Operator ID	A unique identification assigned to each operator. If operator-Based security is enabled, the operator must use this ID and a password to sign on to a Station.
Operator Password	A character string (not echoed on screen) used with the operator ID to sign on to Station.
P	
Password	Protected or private character string used to authenticate an identity or to authorize access to data.
Personal Computer (PC)	See information system.

Term	Definition
Privileged Access	Authorized access that provides a capability to alter the properties, behavior, or control of the information system or network. It includes, but is not limited to, any of the following types of access: “Super user,” “root,” or equivalent access, such as access to the control functions of the information system or network, administration of user accounts, and so forth; Access to change control parameters (for example, routing tables, path priorities, addresses) of routers, multiplexers, and other key information system or network equipment or software; Ability and authority to control and change program files, and other users’ access to data; Direct access (also called unmediated access) to functions at the operating-system level that would permit system controls to be bypassed or changed; Access and authority for installing, configuring, monitoring, or troubleshooting the security monitoring functions of information systems or networks (for example, network or system analyzers; intrusion detection software; firewalls) or in performance of cyber or network defense operations.
Q	
R	
Remote Terminal	A terminal that is not in the immediate vicinity of the IS it accesses. This is usually associated with a mainframe environment and the use of a terminal. Terminals usually cannot operate in a stand-alone mode.
Risk	The probability that a particular threat will exploit a particular vulnerability of an information system or telecommunications system.
Risk Assessment	Process of analyzing threats to and vulnerabilities of an information system, and determining potential adverse effects that the loss of information or capabilities of a system would have on national security and using the analysis as a basis for identifying appropriate and cost-effective countermeasures.
Risk Management	Process of identifying, assessing, and controlling risks arising from operational factors and threats and making decisions that balance risks and costs with mission benefits.
S	
Security Guard/Filter	IS trusted subsystem that enforces security policy on the data that passes through it.
Security Level	Access to NFS N4 functions is limited by the security level that has been assigned to each operator. NFS N4 has six security levels. An operator is assigned a security level and may perform functions at or below the security level that has been assigned to that operator.
Security Test and Evaluation (ST&E)	Examination and analysis of the safeguards required to protect an IS, as they have been applied in an operational environment, to determine the security posture of the system.

Term	Definition
Sensitive Information	Any information the loss, misuse, or unauthorized access to or modification of which could adversely affect the national interest or the conduct of Federal programs, or the privacy to which individuals are entitled under Section 552a of Title 5, United States Code (The Privacy Act), but which has not been specifically authorized under criteria established by executive order or an Act of Congress to be kept secret in the interest of national defense or foreign policy. Sensitive Information includes information in routine DOD payroll, finance, logistics, and personnel management systems. Examples of sensitive information include, but are not limited to, the following categories: FOUO–in accordance with DOD 5400.7–R, information that may be withheld from mandatory public disclosure under the Freedom of Information Act (FOIA)-see definition above; Unclassified technical data—Data related to military or dual-use technology that is subject to approval, licenses, or authorization under the Arms Export Control Act and withheld from public disclosure in accordance with DOD 5230.25; Department of State Sensitive But Unclassified (SBU)-Information originating from the Department of State (DOS) that has been determined to be SBU under appropriate DOS information security polices; Foreign Government Information-Information originating from a foreign government that is not classified CONFIDENTIAL or higher but must be protected in accordance with DOD 5200.1–R; Privacy data—-Personal and private information (for example, individual medical information, home address and telephone number, social security number) as defined in the Privacy Act of 1974.
Social Engineering	Term used among crackers and security professionals for cracking techniques that rely on weaknesses in process rather than software; the aim is to trick people into revealing passwords or other information that compromises a target system's security. Classic scams include phoning up a user or helpdesk who has the required information and posing as a field service tech or a fellow employee with an urgent access problem.
SPAM	Unsolicited e-mail received on or from a network, usually the Internet, in the form of bulk mail obtained from e-mail distribution lists or discussion group lists.
System	The entire computer system, including input/output devices, the supervisor program or operating system, and other included software.
System Architecture (SA)	A description, including graphics, of systems and interconnections, providing for or supporting warfighting functions. It defines the physical connection, location, and identification of key nodes, circuits, networks, and warfighting platforms and specifies system and component performance parameters. It shows how multiple systems within a subject area link and interoperate and may describe the internal construction of operations of particular systems.

Term	Definition
System Audit	The process of auditing and spot checking to verify secure operation of a system and its support software. If irregularities are discovered, the audit process includes analysis and identification of the problem, performing corrective actions necessary to resolve the situation, tracking open items actively, and briefing management on identified security deficiencies
T	
Technical Vulnerability	A hardware, firmware, communication, or software weakness that leaves a computer processing system open for potential exploitation or damage, either externally or internally resulting in risk for the owner, user, or manager of the system.
Telecommunications	Preparation, transmission, communication, or related processing of information (writing, images, sounds, or other data) by electrical, electromagnetic, electromechanical, electro-optical, or electronic means.
Telecommunications and Information Systems Security	Protection afforded to telecommunications and information systems to prevent exploitation through interception, unauthorized electronic access, or related technical intelligence threats and to ensure authenticity. NOTE: Such protection results from the application of security measures (including crypto security, transmission security, emission security, and computer security) to systems that generate, store, process, transfer, or communicate information of use to an adversary, and also includes the physical protection of technical security materiel and technical security information.
Telecommunications System	Any system that transmits, receives, or otherwise communicates information by electrical, electromagnetic, electromechanical, or electro-optical means. A telecommunications system may include features normally associated with computers, in which case it must also meet the requirements for an IS.
Threat	Capabilities, intentions, and attack methods of adversaries to exploit, damage, or alter information or an information system. Also, any circumstance or event with the potential to cause harm to information or an information system.
Threat Agent	A means or method used to exploit a vulnerability in a system, operation, or facility.
Threat Analyst	Designated member of the intelligence staff of the supported command of the DAA who will provide the interface on behalf of DA with the DOD Intelligence Community, the G2, NETCOM/9th ASC, and the intelligence component of the 1st Information Operations Command (Land) to document foreign threats regarding computer network attack (CNA) and computer network exploitation (CNE) or other non-technical threats.
Time Bomb and Logic Bomb	Malicious code that can be triggered by a specific event or recur at a given time. A logic bomb is triggered by an event instead of a specific time. One example of a logic bomb would be a set of programmed instructions to search a company's payroll files, checking for the presence of the programmer's name. Once the programmer ceases employment, the logic bomb is triggered to cause damage to data or software.
Transmission Security	The component of COMSEC that consists of all measures designed to protect transmissions from interception and exploitation by means other than cryptographic analysis.

Term	Definition
Trojan Horse	A non-replicating program that appears to be legitimate, but is designed to have destructive effects on data residing in the computer onto which the program was loaded. These programs can perform various malicious activities, such as deleting files, changing system settings, allowing unauthorized remote access, and running malicious programs resulting in destruction or manipulation of data. Trojan horses require user intervention to propagate and install such as opening an e-mail attachment.
U	
User	Person or process accessing an IS by direct connections (for example, via terminals) or indirect connections.
User ID	Unique symbol or character string that is used by an IS to uniquely identify a specific user.
V	
Virus	A small program written to alter the way a computer operates without the permission or knowledge of the user. A virus is self replicating with a potentially malicious program segment that attaches or injects itself into an application program or other executable system component and leaves no external signs of its presence, and usually programmed to damage system programs, delete files, create a denial of service, or reformat the hard disk.
Vulnerability	Weakness in an information system, cryptographic system, or components of either (for example, system security procedures, hardware design, internal controls) that could be exploited.
Vulnerability Assessment	Systematic examination of an IS or product to determine the adequacy of security measures, identify security deficiencies, provide data from which to predict the effectiveness of proposed security measures, and confirm the adequacy of such measures after implementation.
W	
Wide Area Network (WAN)	A WAN covers a wider geographic area than a LAN, is an integrated voice or data network, often uses common carrier lines for the interconnection of its LANs, and consists of nodes connected over point-to-point channels. Commercial examples are Internet and public data. Government examples are NIPRNET and SIPRNET.
World Wide Web	The universe of accessible information available on many computers spread through the world and attached to that gigantic computer network called the Internet. The Web encompasses a body of software, a set of protocols, and a set of defined conventions for accessing the information on the Web. The Web uses hypertext and multimedia techniques to make the Web easy for anyone to roam, browse, and contribute to. The Web makes publishing information (that is, making that information public) as easy as creating a “homepage” and posting it on a server somewhere in the Internet. Also called WEB or W3.

Term	Definition
Worm	An independent program that replicates by copying itself from one system to another, usually over a network without the use of a host file. Like a virus, a worm may damage data directly, or it may degrade system performance by consuming system resources or even shutting a network down, but, in contrast to viruses, does not require the spreading of an infected host file. Usually the worm will release a document that already has the “worm” macro inside the document.

APPENDIX C - REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
2. ASHRAE 135: BACnet - A Data Communication Protocol for Building Automation and Control Networks, latest edition. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. and all current addenda and annexes.
3. Electronics Industries Alliance:

    a. EIA-709.1-A-99: Control Network Protocol Specification.
    b. EIA-709.3-99: Free-Topology Twisted-Pair Channel Specification.
    c. EIA-232: Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange.
    d. EIA-458: Standard Optical Fiber Material Classes and Preferred Sizes.
    e. EIA-485: Standard for Electrical Characteristics of Generator and Receivers for use in Balanced Digital Multipoint Systems.
    f. EIA-472: General and Sectional Specifications for Fiber Optic Cable.
    g. EIA-475: Generic and Sectional Specifications for Fiber Optic Connectors and all Sectional Specifications.
    h. EIA-573: Generic and Sectional Specifications for Field Portable Polishing Device for Preparation Optical Fiber and all Sectional Specifications.
    i. EIA-590: Standard for Physical Location and Protection of Below-Ground Fiber Optic Cable Plant and all Sectional Specifications.

4. Underwriters Laboratories:

    a. UL 916: Energy Management Systems.
    b. UUKL 864: UL Supervised Smoke Control if the BAS is used for smoke control.

5. NEMA Compliance:

    a. NEMA 250: Enclosure for Electrical Equipment.
    b. NEMA ICS 1: General Standards for Industrial Controls.

6. NFPA Compliance:

    a. NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.
    b. NFPA 70 National Electrical Code (NEC).

7. Institute of Electrical and Electronics Engineers (IEEE)

    a. IEEE 142: Recommended Practice for Grounding of Industrial and Commercial Power Systems.
    b. IEEE 802.3: CSMA/CD (Ethernet – Based) LAN.
    c. IEEE 802.4: Token Bus Working Group (ARCNET – Based) LAN.
    d. IEEE 519: Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.

8. FCC, Part 15, Subpart J, Class A Computing Devices

D. All installations shall be in compliance with the Department of Defense requirements

1. 22 USC 2751, Arms Export Control Act (http://www.gpoaccess.gov/uscode/index.html)
2. 5 USC 552a, The Privacy Act of 1974 (http://www.gpoaccess.gov/uscode/index.html)
3. Chairman of the Joint Chiefs of Staff Instruction 5221.01, Delegation of Authority to Commanders of Combatant Commands to Disclose Classified Military Information to Foreign Governments and International Organizations. (http://www.dtic.mil/cjcs_directives/)
4. Chairman of the Joint Chiefs of Staff Manual 6510.01, Defense-in-Depth: Information Assurance (IA) and Computer Network Defense (CND) (http://www.dtic.mil/cjcs_directives/)
5. Common Criteria for Information Technology Security Evaluation, Part 1: Introduction and general model; Part 2: Security functional requirements; Part 3: Security assurance requirements (http://niap.nist.gov/)
6. DD Form 254, DOD Contract Security Classification Specifications

DOD 5200.1-R, Information Security Program Regulation (**http://dod5000.dau.mil/**)

1. DOD 5000.2–R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs (http://dod5000.dau.mil/)
2. DOD 5200.2–R, Personnel Security Program (http://www.dtic.mil/whs/directives)
3. DOD 5200.8-R, Physical Security Program (http://www.dtic.mil/whs/directives)
4. DOD 5220.22–M, National Industrial Security Program Operating Manual (http://www.dtic.mil/whs/directives)
5. DOD 5220.22–M–SUP, National Industrial Security Program Operating Manual Supplement (http://www.dtic.mil/whs/directives)
6. DOD 5400.7–R, DOD Freedom of Information Act Program (http://www.dtic.mil/whs/directives)
7. DOD 5500.7–R, Joint Ethics Regulation, Acceptable Use Policies, and the Standards of Ethical Conduct (http://www.dtic.mil/whs/directives)
8. DOD 8510.1–M, Department of Defense Information Technology Security and Accreditation Process Application Manual (http://www.dtic.mil/whs/directives)

DOD 8570.1-M, Information Assurance Training, Certification, and Workforce Management Program Manual (**http://www.dtic.mil/whs/directives**)

1. DOD Directive 5000.1, The Defense Acquisition System. (http://www.dtic.mil/whs/directives)

DOD Directive 3020.26, *Defense Continuity Program* (**http://www.dtic.mil/whs/directives**)

DOD Directive 5200.1, DOD Information Security Program (**http://www.dtic.mil/whs/directives**)

DOD Directive 5220.22, DOD Industrial Security Program (http://www.dtic.mil/whs/directives)

1. DOD Directive 5220.6, Defense Industrial Personnel Security Clearance Review Program (http://www.dtic.mil/whs/directives)
2. DOD Directive 5230.25, Withholding of Unclassified Technical Data From Public Disclosure (http://www.dtic.mil/whs/directives)
3. DOD Directive 5230.9, Clearance of DOD Information for Public Release (http://www.dtic.mil/whs/directives)
4. DOD Directive 8500.1, Information Assurance (http://www.dtic.mil/whs/directives)
5. DOD Directive 8570.1, Information Assurance Training, Certification, and Workforce Management (http://www.dtic.mil/whs/directives)
6. DOD Instruction 5200.40, DOD Information Technology Security Certification and Accreditation Program (DITSCAP) (http://www.dtic.mil/whs/directives)
7. DOD Instruction 8580.1, Information Assurance (IA) in the Defense Acquisition System (http://www.dtic.mil/whs/directives)
8. DOD Instruction 8500.2, Information Assurance (IA) Implementation (http://iase.disa.mil/policy.html)
9. DOD Instruction 8551.1p, Ports, Protocols, and Services Management (PPSM) (http://www.dtic.mil/whs/directives)

DOD Manual 8510.1-M, DOD Information Technology Certification and Accreditation Process (DITSCAP) Application Manual

Domain Name System (DNS) STIG, Version 2, Release 2, 4 March 2005

Executive Order (EO) 12356, *National Security Information*, 6 April 1982

1. Executive Order 12958, National Security Information, Executive Office of the President, July 1995

Federal Information Processing Standard (FIPS) Publication 102, *Guideline for Computer Security Certification and Accreditation* (**http://www.itl.nist.gov/**)

FIPS Publication 87, Guidelines for Automated Data Processing (ADP) Contingency Planning (**http://www.itl.nist.gov/**)

1. FIPS Publication 140–2, Security Requirements for Cryptographic Modules (http://www.itl.nist.gov/)
2. Field Manual 100–14, Risk Management
3. Field Manual 100–6, Information Operations

Federal Preparedness Circular (FPC) 65, *Federal Executive Branch Continuity of Operations (COOP),* 15 June 2004 (NOTAL)

House of Representatives (H.R.) 2458, Federal Information Management Act (FISMA) of 2002, 7 January 2003 (Amended the E-Government Act of 2002)

1. National Security Directive 42, National Policy for the Security of National Security Telecommunications and Information Systems, Executive Office of the President, July 1990
2. NIST SP-800-37 Guide for the Security Certification and Accreditation of Federal Information Systems
3. NIST SP-800-53 Recommended Security Controls for Federal Information Systems
4. NSTISS No. 200, National Policy on Controlled Access Protection, National Security Telecommunications and Information Systems Security Committee, July 1987
5. NSTISSD 500, National Security Telecommunications and Information Systems Security Directive, *Information Systems Security (INFOSEC) Education, Training, and Awareness* (http://www.nstissc.gov)
6. NSTISSD 501, National Training Program for Information Systems Security (INFOSEC) Professionals (http://www.nstissc.gov)
7. NSTISSD 502, National Security Telecommunications and Automated Information Systems Security (http://www.nstissc.gov)
8. NSTISSI No. 4009, National Security Telecommunications and Information Systems Security Instruction, *National Information Systems Security Glossary* (http://www.nstissc.gov)
9. NSTISSI No. 4012, National Training Standard for Designated Approving Authority (DAA) (http://www.nstissc.gov)
10. NSTISSI No. 4015, National Training Standard for System Certifiers (http://www.nstissc.gov)
11. NSTISSI No. 7003, Protective Distribution Systems (http://www.nstissc.gov)
12. NSTISSP No. 5, National Policy for Incident Response and Vulnerability Reporting for National Security Systems (http://www.nstissc.gov)
13. NSTISSP No. 11, National Information Assurance Acquisition Policy (http://www.nstissc.gov)
14. NSTISSP No. 200, National Security Telecommunications and Information Systems Security Policy, *National Policy on Controlled Access Protection* (http://www.nstissc.gov)

OMB Circular A-123, Management Accountability and Control Office of Management and Budget, 21 June 1995

1. Office of Management and Budget Circular A–130, Management of Federal Information Resources (http://www.whitehouse.gov/)

OMB M-04-25, Reporting Instructions for the FISMA Act

Presidential Decision Directive (PDD) 63, *Protecting America's Critical Infrastructures*, May 1998

Public Law (P.L.) 93-579, 5 U.S.C. §552a, *Privacy Act of 1974,* 31 December 1975 (Amended by: P.L. 94-193, P.L. 97-365, P.L. 97-375, P.L. 97-452, P.L. 98-477, P.L. 98-497, P.L.100-503, and P.L. 101-56) (**http://www.gpoaccess.gov/nara/**)

P.L. 99-474, Computer Fraud and Abuse Act of 1986 (**http://www.gpoaccess.gov/nara/**)

1. P.L. 100–235, Computer Security Act of 1987 (http://www.gpoaccess.gov/nara/)
2. P.L. 107–314, Bob Stump National Defense Authorization Act for Fiscal Year 2003 (http://www.gpoaccess.gov/nara/)
3. P.L. 107-347, *E-Government Act of 2002* (http://www.gpoaccess.gov/nara/)
4. RCS CSIM–62, MDEP M54X Report
5. SF 328, Certificate Pertaining to Foreign Interests (available on GSA Web site at http://www.GSA.GOV/Forms)
6. UCMJ, Uniform Code of Military Justice

APPENDIX D

Acceptable Database Point Descriptors	
Point Name	Description/Function
General	
OATemp	Outside Air Temperature
OATemp**xxx**Enbl	Outside Air Temperature Enable Setpoint - **xxx** = Sequence (i.e. Econ, DX, Pmp, etc.)
OATemp_Hi	Outside Air Temperature High Value of Reset Schedule
OATemp_Lo	Outside Air Temperature Low Value of Reset Schedule
OARH	Outside Air Relative Humidity
OAEnth	Outside Air Enthalpy
OADwPnt	Outside Air Dewpoint
OAWetBlb	Outside Air Wet Bulb
Air Handling Unit (AHU) / Roof Top Unit (RTU) / Heating Ventilator (HV)	
DATemp	Discharge Air Temperature
DATemp_HLim	Discharge Air Temperature High Limit
DATemp_LLim	Discharge Air Temperature Low Limit
DATempStpt_Hi	Discharge Air Temperature Setpoint High Value of Reset Schedule
DATempStpt_Lo	Discharge Air Temperature Setpoint Low Value of Reset Schedule
DATempStpt_Rst	Discharge Air Temperature Setpoint Output of Reset Schedule
DATempStpt_Ovr	Discharge Air Temperature Setpoint Override of Reset Schedule
DATempStpt_Eff	Discharge Air Temperature Setpoint Effective Value
DATempLp_Tr	Discharge Air Temperature Loop Throttling Range - Tuning Parameter
DATempLp_I	Discharge Air Temperature Loop Integral Factor - Tuning Parameter
DATempLp_Dis	Discharge Air Temperature Loop Disable
DATempLp_Out	Discharge Air Temperature Loop Output
DARH	Discharge Air Relative Humidity
DARH_HLim	Discharge Air Relative Humidity High Limit
DARH_LLim	Discharge Air Relative Humidity Low Limit
DARHStpt	Discharge Air Relative Humidity Setpoint
DARHLp_Tr	Discharge Air Relative Humidity Loop Throttling Range - Tuning Parameter
DARHLp_I	Discharge Air Relative Humidity Loop Integral Factor - Tuning Parameter
DARHLp_Dis	Discharge Air Relative Humidity Loop Disable
DARHLp_Out	Discharge Air Relative Humidity Loop Output
DADctStc	Discharge Air Duct Static Pressure
DADctStcStpt_Auto	Discharge Air Dust Static Pressure Setpoint Output of Automated Sequence
DADctStcStpt_Ovr	Discharge Air Duct Static Pressure Setpoint Override of Automated Sequence
DADctStcStpt_Eff	Discharge Air Duct Static Pressure Setpoint Effective Value
DADctStcLp_Tr	Discharge Air Duct Static Pressure Loop Throttling Range - Tuning Parameter
DADctStcLp_I	Discharge Air Duct Static Pressure Loop Integral Factor - Tuning Parameter

DADctStcLp_Dis	Discharge Air Duct Static Pressure Loop Disable
DADctStcLp_Out	Discharge Air Duct Static Pressure Loop Output
RATemp	Return Air Temperature
RARH	Return Air Relative Humidity
RAEnth	Return Air Enthalpy
RACO2	Return Air Carbon Dioxide
MATemp	Mixed Air Temperature
MATemp_LLim	Mixed Air Temperature Low Limit
MATempLp_Tr	Mixed Air Temperature Loop Throttling Range - Tuning Parameter
MATempLp_I	Mixed Air Temperature Loop Integral Factor - Tuning Parameter
MATempLp_Dis	Mixed Air Temperature Loop Disable
MATempLp_Out	Mixed Air Temperature Loop Output
SF_Enbl	Supply Fan Enable
SF_SS	Supply Fan Start/Stop
SF_AM	Supply Fan Auto/Manual Mode
SF_Ovr	Supply Fan Manual Mode Command
SF_Sts	Supply Fan Status
SF_Alm	Supply Fan Alarm
SF_Spd	Supply Fan Speed
SF_Spd_Ovr	Supply Fan Speed Override
SF_RnTm	Supply Fan Run Time
RF_Enbl	Return Fan Enable
RF_SS	Return Fan Start/Stop
RF_AM	Return Fan Auto/Manual Mode
RF_Ovr	Return Fan Manual Mode Command
RF_Sts	Return Fan Status
RF_Alm	Return Fan Alarm
RF_Spd	Return Fan Speed
RF_Spd_Ovr	Return Fan Speed Override
RF_RnTm	Return Fan Run Time
EF_Enbl	Exhaust Fan Enable
EF_SS	Exhaust Fan Start/Stop
EF_AM	Exhaust Fan Auto/Manual Mode
EF_Ovr	Exhaust Fan Manual Mode Command
EF_Sts	Exhaust Fan Status
EF_Alm	Exhaust Fan Alarm
EF_Spd	Exhaust Fan Speed
EF_Spd_Ovr	Exhaust Fan Speed Override
EF_RnTm	Exhaust Fan Run Time
Econ_Enbl	Economizer Enable

Econ_Enbl_AM	Economizer Enable Auto/Manual Mode
Econ_Enbl_Ovr	Economizer Enable Manual Mode Command
Econ_LckOut	Economizer Enable Lockout Setpoint
Econ_Min	Economizer Minimum Position
Econ_Cmd	Economizer Command
Econ_Cmd_AM	Economizer Command Auto/Manual Mode
Econ_Cmd_Ovr	Economizer Command Manual Mode Command
DX_Enbl	Mechanical Cooling Enable
DX_Enbl_AM	Mechanical Cooling Enable Auto/Manual Mode
DX_Enbl_Ovr	Mechanical Cooling Enable Manual Mode Command
DX_Enbl_LckOut	Mechanical Cooling Enable Lockout Setpoint
DXStg**X**_SS	Mechanical Cooling Stage **X** Start/Stop
DXStg**X**_MinOn	Mechanical Cooling Stage **X** Minimum On Time
DXStg**X**_MinOff	Mechanical Cooling Stage **X** Minimum Off Time
DXStg_IntStgTm	Mechanical Cooling InterStage Delay
ClgVlv_Enbl	Cooling Valve Enable
ClgVlv_Enbl_AM	Cooling Valve Enable Auto/Manual Mode
ClgVlv_Enbl_Ovr	Cooling Valve Enable Manual Mode Command
ClgVlv_LckOut	Cooling Valve Lockout Setpoint
ClgVlv_Cmd	Cooling Valve Command
ClgVlv_Cmd_AM	Cooling Valve Command Auto/Manual Mode
ClgVlv_Cmd_Ovr	Cooling Valve Command Manual Mode Command
HtgVlv_Enbl	Heating Valve Enable
HtgVlv_Enbl_AM	Heating Valve Enable Auto/Manual Mode
HtgVlv_Enbl_Ovr	Heating Valve Enable Manual Mode Command
HtgVlv_LckOut	Heating Valve Lockout Setpoint
HtgVlv_Cmd	Heating Valve Command
HtgVlv_Cmd_AM	Heating Valve Command Auto/Manual Mode
HtgVlv_Cmd_Ovr	Heating Valve Command Manual Mode Command
Freeze	Freeze Stat Alarm
SDctSmk	Supply Duct Smoke Detector Alarm
RDctSmk	Return Duct Smoke Detector Alarm
Filter	Filter Alarm
OccMode_Sched	System Scheduled Occupied Command
OccMode_Ovr	System Occupied Command from Space Overrides
OccMode_Man	System Occupied Command Manual Override
OccMode_Eff	Effective Occupied Mode
MrngWrmUp	Morning Warmup Mode
MrngWrmUp_Stpt	Morning Warmup Mode Enable Setpoint
MrngClDwn	Morning Cooldown Mode

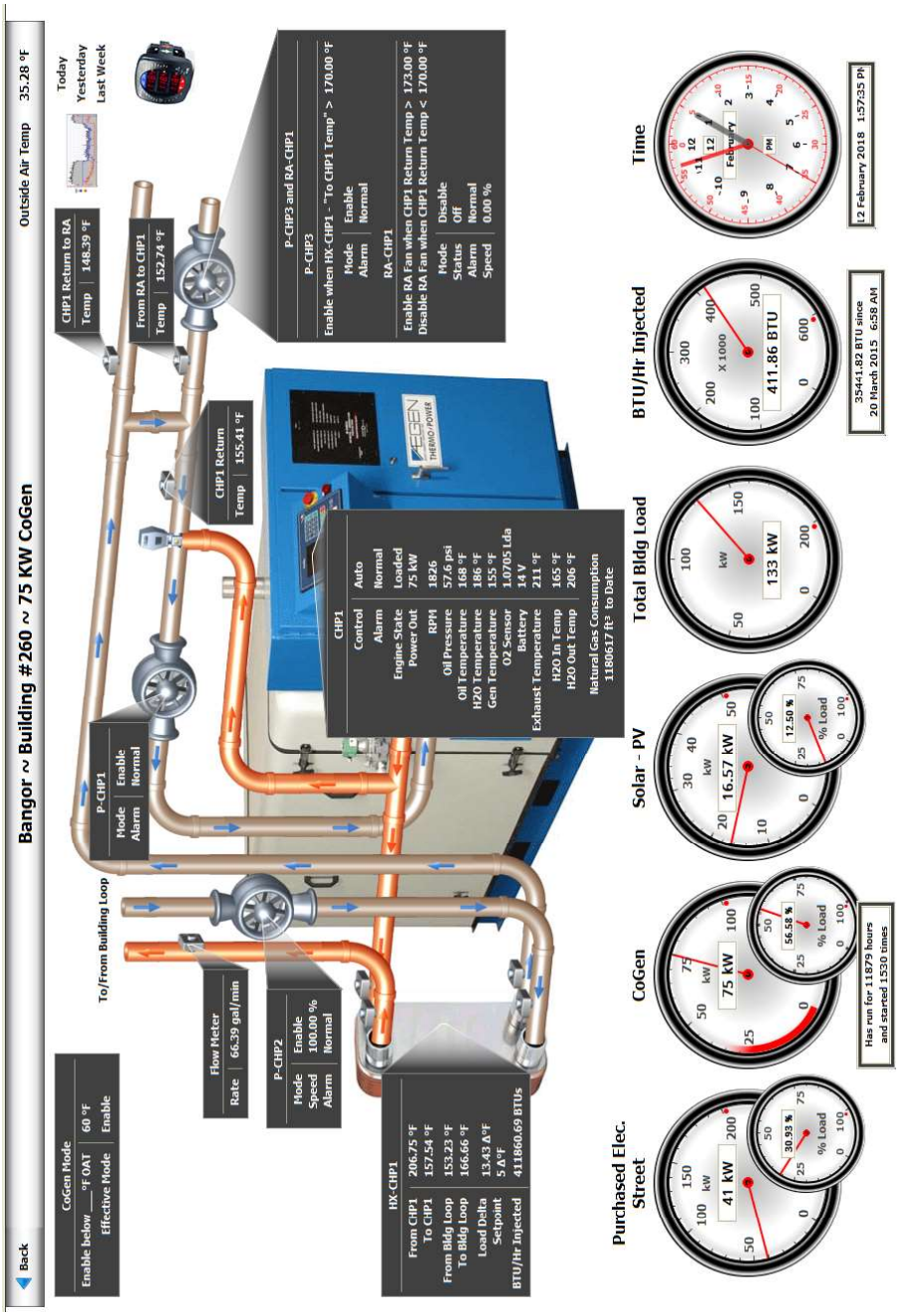
MrngClDwn_Stpt	Morning Cooldown Mode Enable Setpoint
Variable Air Volume (VAV)	
OccMode_Sched	System Scheduled Occupied Command
OccMode_Ovr	System Occupied Command from Space Overrides
OccMode_Man	System Occupied Command Manual Override
OccMode_Eff	Effective Occupied Mode
OccOvrTm	Occupancy Override Duration
SpcTemp	Space Temperature
OccHtgStpt	Space Temperature Occupied Heating Setpoint
OccClgStpt	Space Temperature Occupied Cooling Setpoint
UnoccHtgStpt	Space Temperature Unoccupied Heating Setpoint
UnoccClgStpt	Space Temperature Unoccupied Cooling Setpoint
HtgStptOffst	Space Temperature Heating Setpoint Offset
ClgStptOffst	Space Temperature Cooling Setpoint Offset
EffSpcStpt	Space Temperature Effective Setpoint
DATemp	Discharge Air Temperature (Outlet of VAV)
SATemp	Supplied Air Temperature (Inlet of VAV)
ClgMinCFM	Minimum Airflow for Cooling Mode
ClgMaxCFM	Maximum Airflow for cooling Mode
HtgMinCFM	Minimum Airflow for Heating Mode
HtgMaxCFM	Maximum Airflow for Heating Mode
AirFlowStpt	Calculated Airflow Setpoint
AirFlow	Measured Airflow
DmprPos	Damper Position
KFactMin	Calibration Factor at Minimum Airflow
KFactMax	Calibration Factor at Maximum Airflow
FrcDmprOpn	Force Damper to Full Open Position
FrcDmprCls	Force Damper to Full Closed Position
FrcDmprMax	Force Damper Control to Maximum Airflow Setpoint
FrcDmprMin	Force Damper Control to Minimum Airflow Setpoint
HtgVlv_Cmd	Heating Valve Command
HtgVlv_Cmd_AM	Heating Valve Command Auto/Manual Mode
HtgVlv_Cmd_Ovr	Heating Valve Command Manual Mode Command
Fin Tube Radiant Heat	
OccMode_Sched	System Scheduled Occupied Command
OccMode_Ovr	System Occupied Command from Space Overrides
OccMode_Man	System Occupied Command Manual Override
OccMode_Eff	Effective Occupied Mode
OccOvrTm	Occupancy Override Duration
SpcTemp	Space Temperature

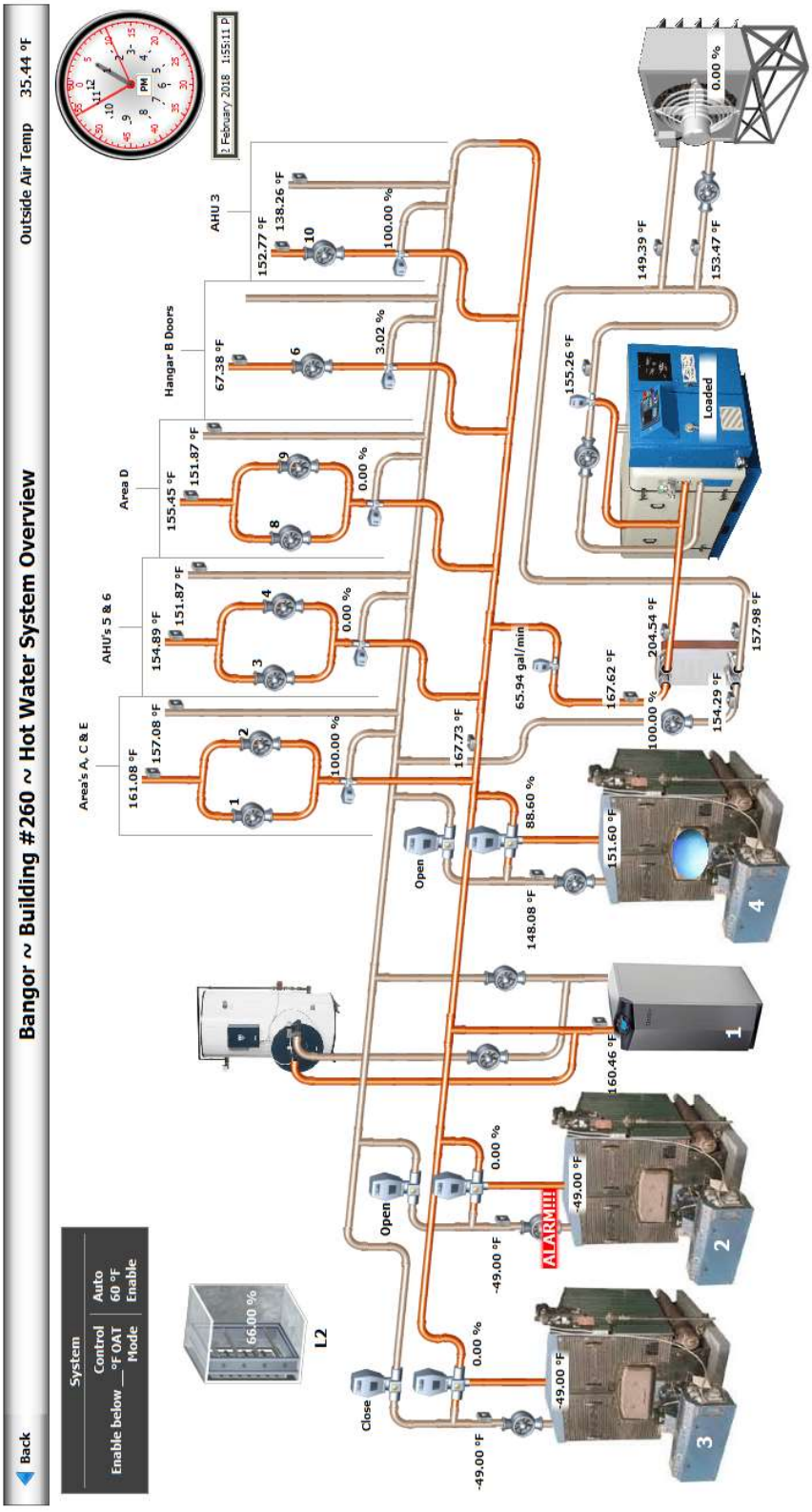
OccHtgStpt	Space Temperature Occupied Heating Setpoint
UnoccHtgStpt	Space Temperature Unoccupied Heating Setpoint
EffSpcStpt	Space Temperature Effective Setpoint
HtgVlv_Cmd	Heating Valve Command
HtgVlv_Cmd_AM	Heating Valve Command Auto/Manual Mode
HtgVlv_Cmd_Ovr	Heating Valve Command Manual Mode Command
Unit Heater (UH) / Cabinet Unit Heater (CUH)	
OccMode_Sched	System Scheduled Occupied Command
OccMode_Ovr	System Occupied Command from Space Overrides
OccMode_Man	System Occupied Command Manual Override
OccMode_Eff	Effective Occupied Mode
OccOvrTm	Occupancy Override Duration
SpcTemp	Space Temperature
OccHtgStpt	Space Temperature Occupied Heating Setpoint
UnoccHtgStpt	Space Temperature Unoccupied Heating Setpoint
EffSpcStpt	Space Temperature Effective Setpoint
HtgVlv_Cmd	Heating Valve Command
HtgVlv_Cmd_AM	Heating Valve Command Auto/Manual Mode
HtgVlv_Cmd_Ovr	Heating Valve Command Manual Mode Command
Hot Water Systems	
Blr**X**_Enbl	Boiler **X** Enable - To be used when control output is in series with other circuit
Blr**X**_LoEnbl	Boiler **X** Low Fire Enable
Blr**X**_HiEnbl	Boiler **X** High Fire Enable
Blr**X**_FlmFail	Boiler **X** Flame Failure Alarm
Blr**X**_Alm	Boiler **X** General Alarm
BlrLead	Current Lead Boiler
BlrLeadSwap	Trigger to Swap Lead Boiler

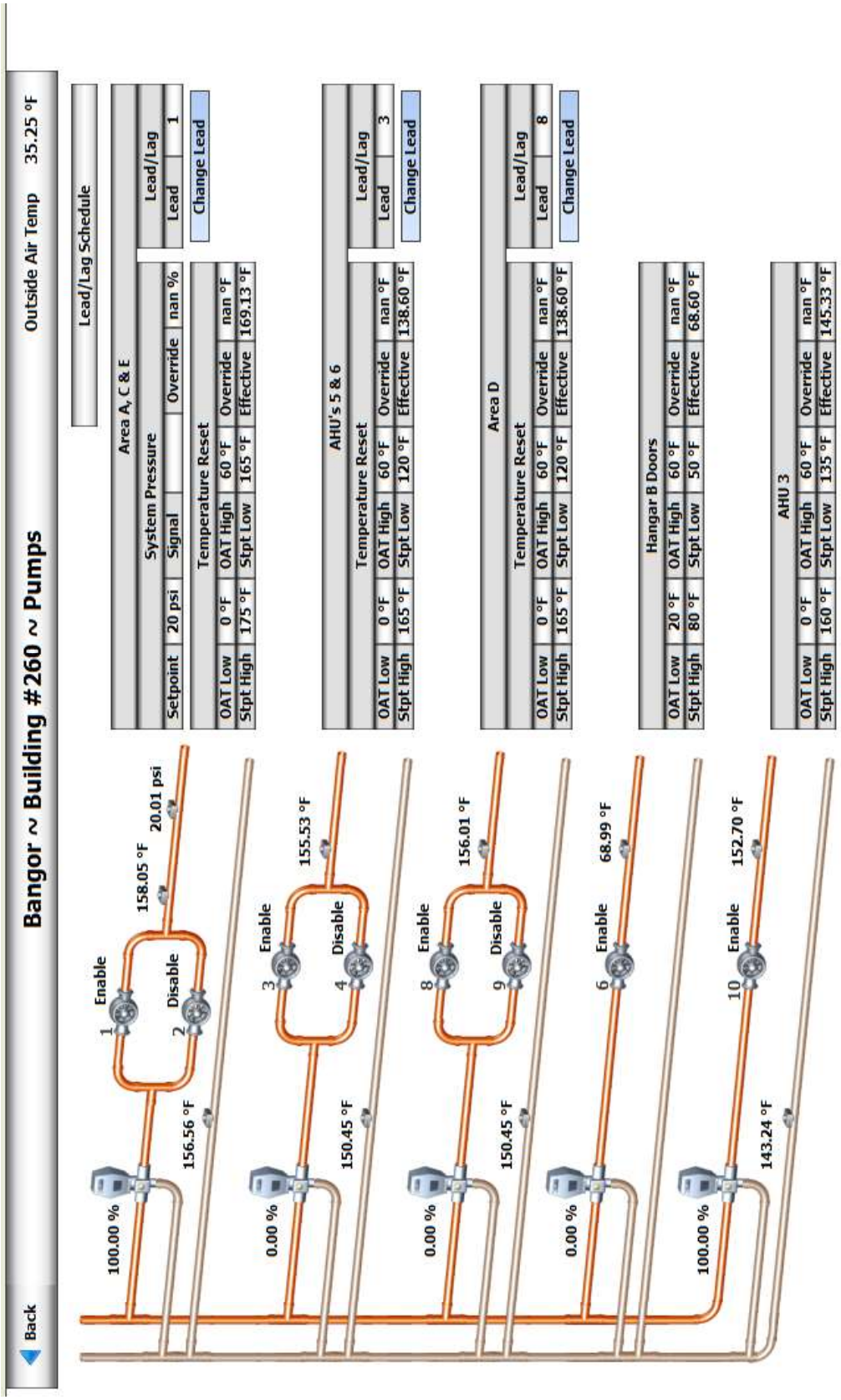
APPENDIX E - GRAPHICAL USER INTERFACE – EXAMPLES

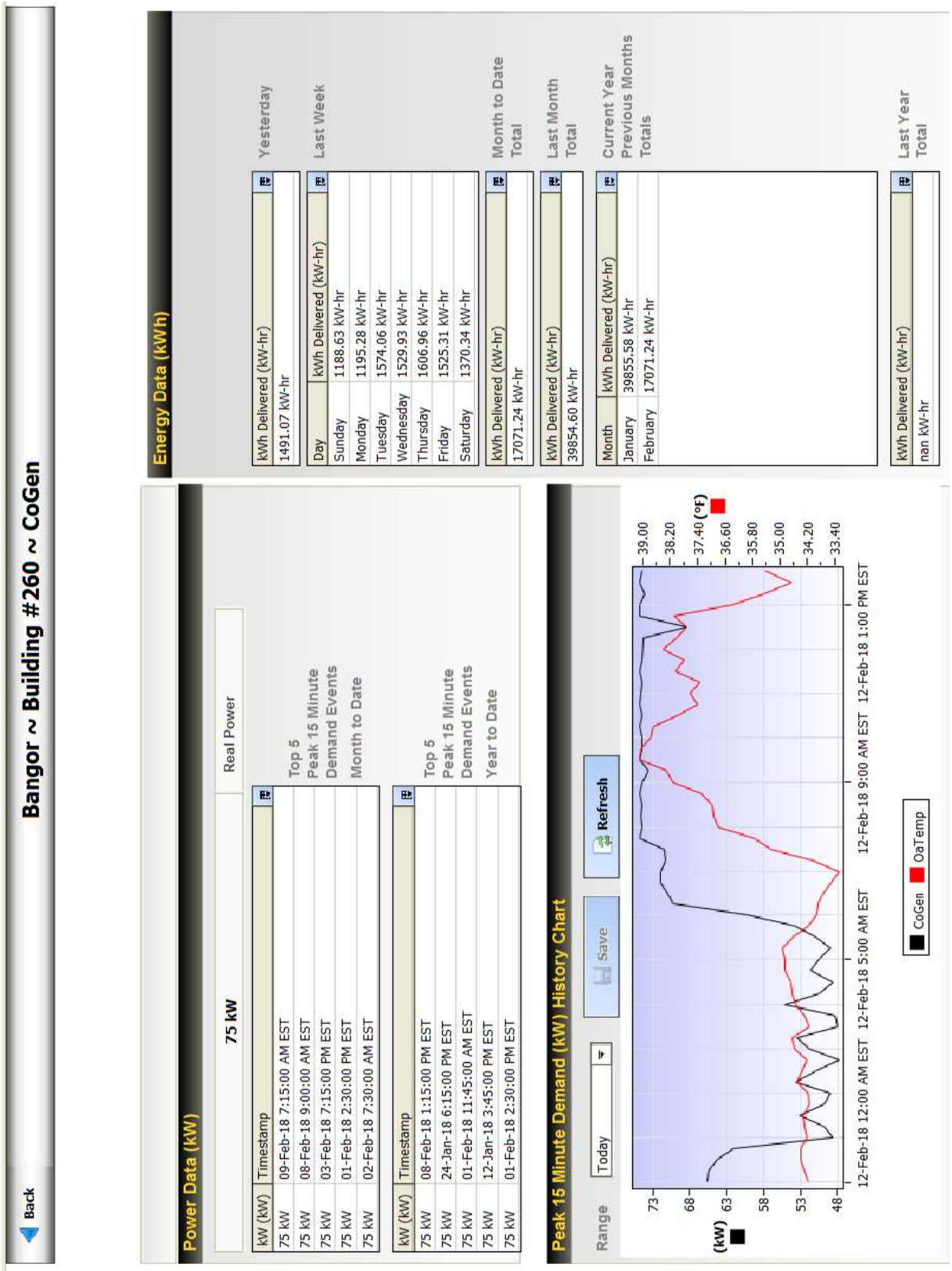
The following energy and system monitoring screens shall be included in the GUI for this project in addition to other typical AHU, zone temperature, exhuast fan, etc. graphics created for the sequence of operation and related points lists.

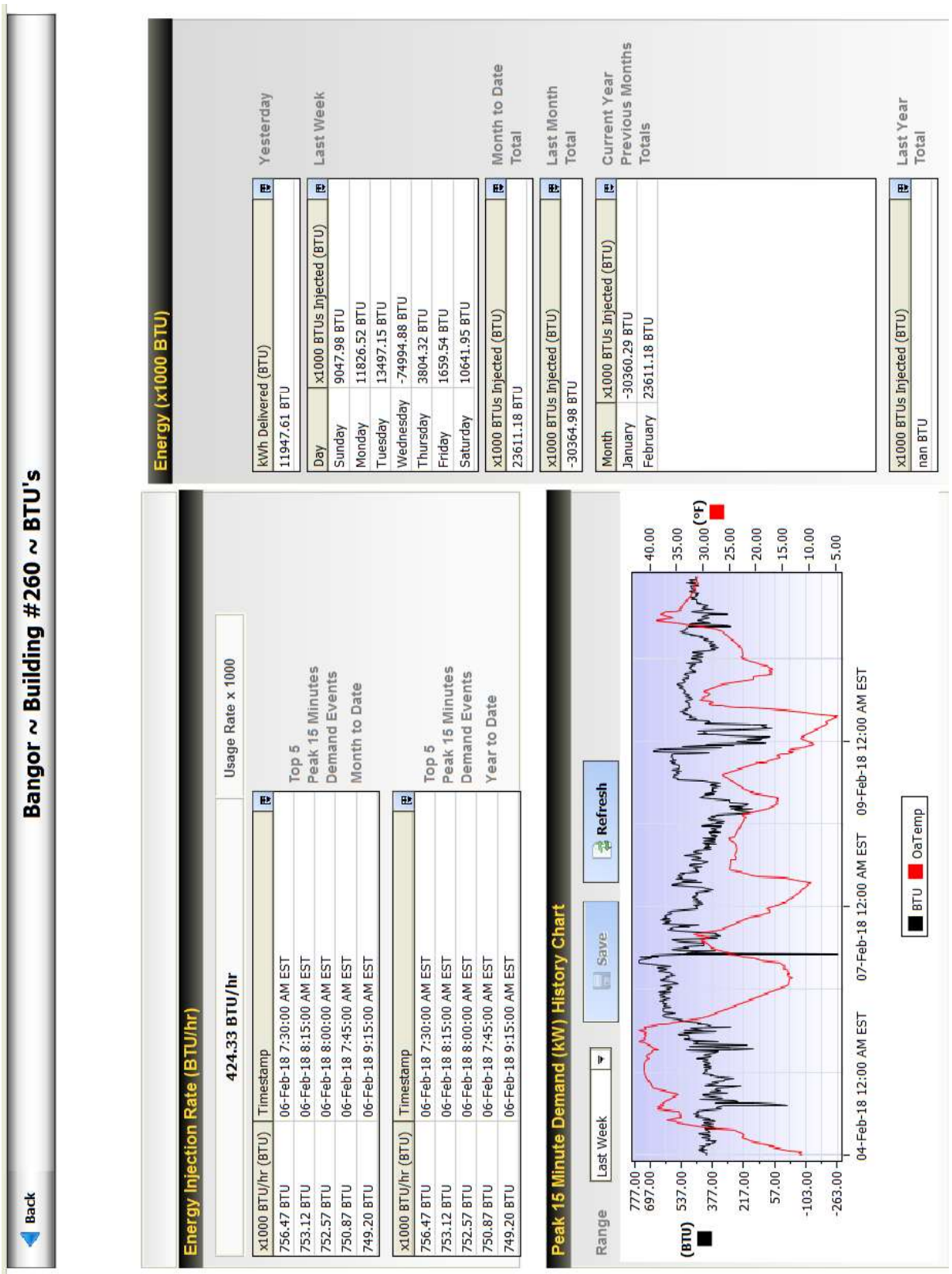
Control contractor shall provide and install any equipment and/or sensors required to produce the following control screens.

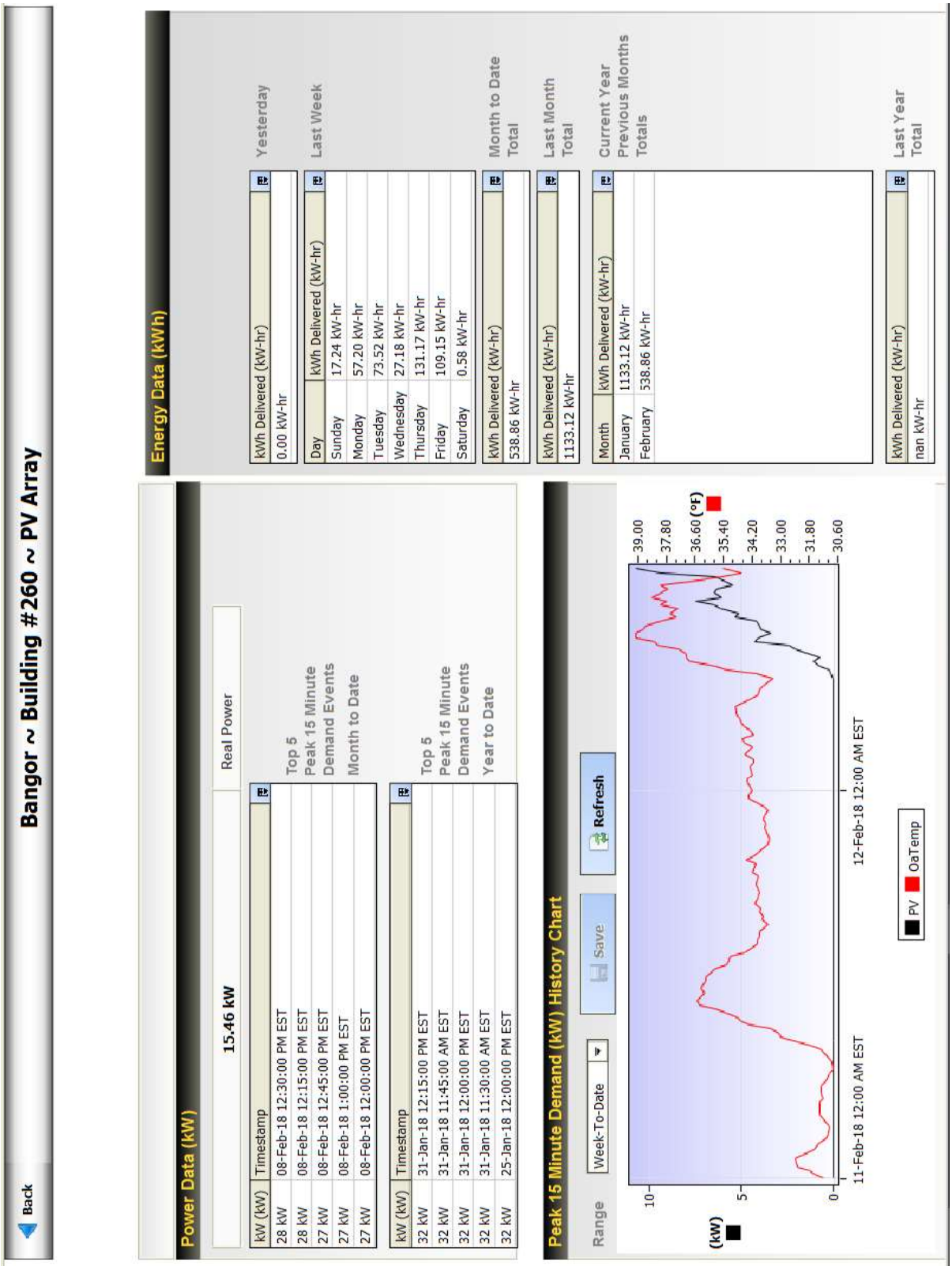


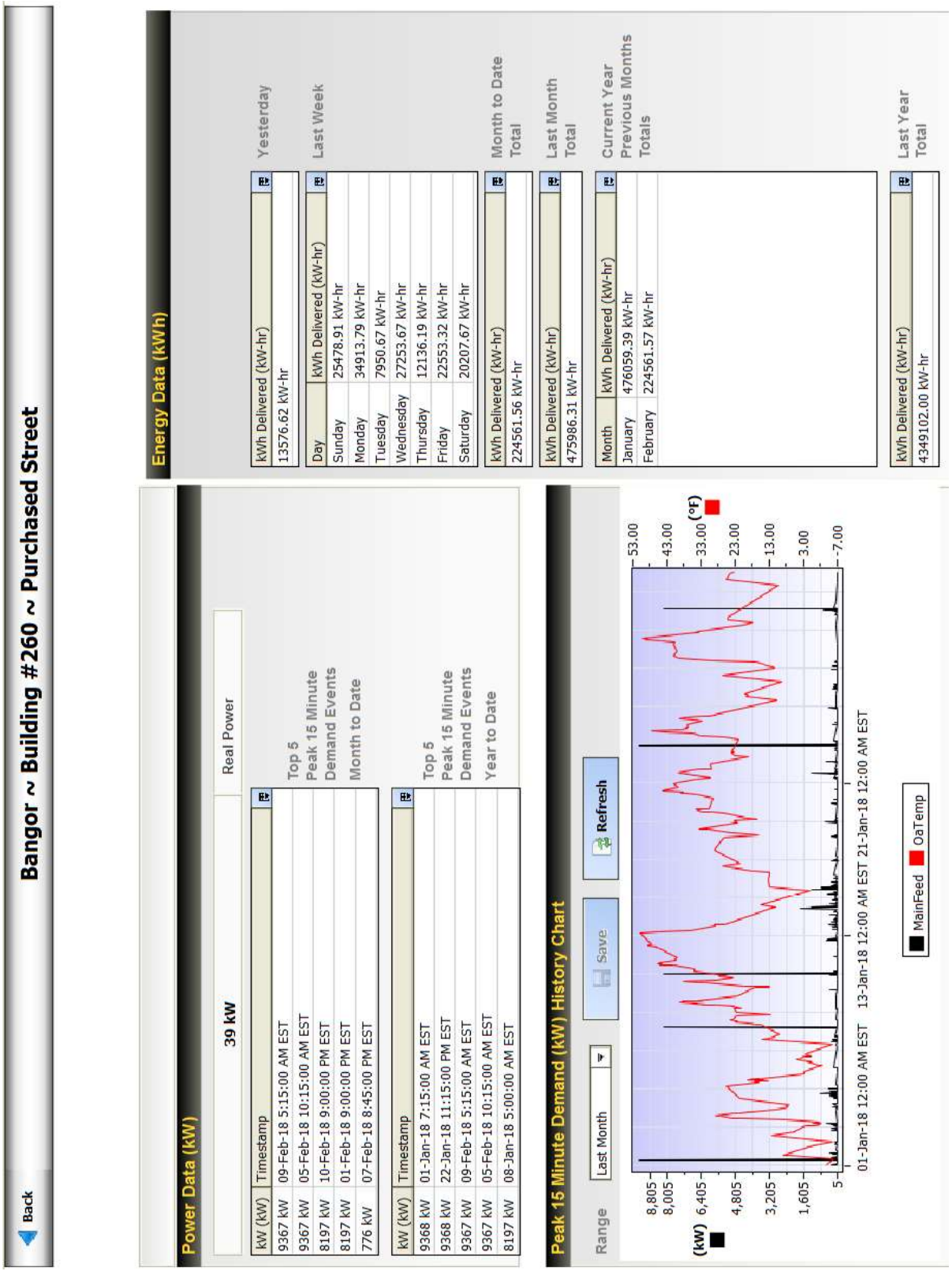

Back
Bangor ~ Building #260 ~ Hot Water System Overview
Outside Air Temp 35.44 °F
2 February 2018 1:55:11 P
System
Control Auto
Enable below 60 °F Enable
°F OAT
Mode
Area's A, C & E
AHU's 5 & 6
Area D
Hangar B Doors
AHU 3
161.08 °F
157.08 °F
154.89 °F
151.87 °F
155.45 °F
151.87 °F
67.38 °F
152.77 °F
138.26 °F
100.00 %
0.00 %
0.00 %
3.02 %
100.00 %
167.73 °F
65.94 gal/min
88.60 %
Open
148.08 °F
151.60 °F
167.62 °F
204.54 °F
100.00 %
154.29 °F
157.98 °F
155.26 °F
149.39 °F
153.47 °F
0.00 %
Loaded
160.46 °F
-49.00 °F
ALARM!!!
0.00 %
Open
-49.00 °F
-49.00 °F
0.00 %
Close
-49.00 °F
66.00 %
L2
1
2
3
4

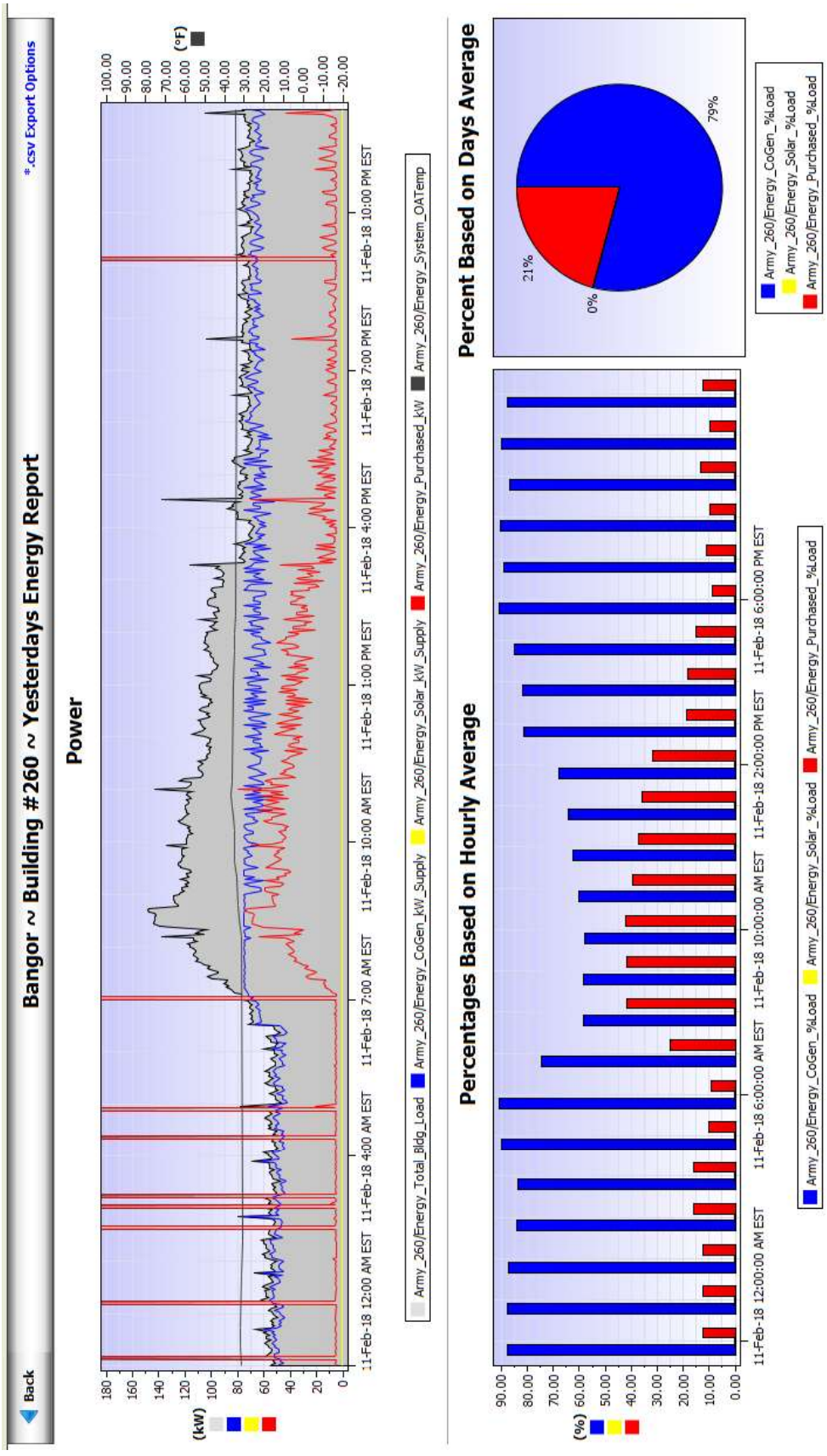

Back
Bangor ~ Building #260 ~ Pumps
Outside Air Temp 35.25 °F
Lead/Lag Schedule
Area A, C & E
System Pressure
Setpoint 20 psi
Signal
Override nan %
Lead/Lag
Lead 1
Change Lead
Temperature Reset
OAT Low 0 °F
OAT High 60 °F
Override nan °F
Stpt Low 165 °F
Effective 169.13 °F
Stpt High 175 °F
AHU's 5 & 6
Temperature Reset
OAT Low 0 °F
OAT High 60 °F
Override nan °F
Stpt Low 120 °F
Effective 138.60 °F
Stpt High 165 °F
Lead/Lag
Lead 3
Change Lead
Area D
Temperature Reset
OAT Low 0 °F
OAT High 60 °F
Override nan °F
Stpt Low 120 °F
Effective 138.60 °F
Stpt High 165 °F
Lead/Lag
Lead 8
Change Lead
Hangar B Doors
OAT Low 20 °F
OAT High 60 °F
Override nan °F
Stpt Low 50 °F
Effective 68.60 °F
Stpt High 80 °F
AHU 3
OAT Low 0 °F
OAT High 60 °F
Override nan °F
Stpt Low 135 °F
Effective 145.33 °F
Stpt High 160 °F
1 Enable
2 Disable
3 Enable
4 Disable
8 Enable
9 Disable
6 Enable
10 Enable
158.05 °F
20.01 psi
156.56 °F
155.53 °F
150.45 °F
156.01 °F
150.45 °F
68.99 °F
152.70 °F
143.24 °F
100.00 %
0.00 %
0.00 %
0.00 %
100.00 %


Back
Bangor ~ Building #260 ~ CoGen
Energy Data (kWh)
Yesterday
kWh Delivered (kW-hr)
1491.07 kW-hr
Last Week
Day | kWh Delivered (kW-hr)
Sunday 1188.63 kW-hr
Monday 1195.28 kW-hr
Tuesday 1574.06 kW-hr
Wednesday 1529.93 kW-hr
Thursday 1606.96 kW-hr
Friday 1525.31 kW-hr
Saturday 1370.34 kW-hr
Month to Date Total
kWh Delivered (kW-hr)
17071.24 kW-hr
Last Month Total
kWh Delivered (kW-hr)
39854.60 kW-hr
Current Year Previous Months Totals
Month | kWh Delivered (kW-hr)
January 39855.58 kW-hr
February 17071.24 kW-hr
Last Year Total
kWh Delivered (kW-hr)
nan kW-hr
Power Data (kW)
75 kW
Real Power
kW (kW) | Timestamp
75 kW 09-Feb-18 7:15:00 AM EST
75 kW 08-Feb-18 9:00:00 AM EST
75 kW 03-Feb-18 7:15:00 PM EST
75 kW 01-Feb-18 2:30:00 PM EST
75 kW 02-Feb-18 7:30:00 AM EST
Top 5 Peak 15 Minute Demand Events Month to Date
kW (kW) | Timestamp
75 kW 08-Feb-18 1:15:00 PM EST
75 kW 24-Jan-18 6:15:00 PM EST
75 kW 01-Feb-18 11:45:00 AM EST
75 kW 12-Jan-18 3:45:00 PM EST
75 kW 01-Feb-18 2:30:00 PM EST
Top 5 Peak 15 Minute Demand Events Year to Date
Peak 15 Minute Demand (kW) History Chart
Range
Today
Save
Refresh
(kW)
73
68
63
58
53
48
(°F)
39.00
38.20
37.40
36.60
35.80
35.00
34.20
33.40
12-Feb-18 12:00 AM EST
12-Feb-18 5:00 AM EST
12-Feb-18 9:00 AM EST
12-Feb-18 1:00 PM EST
CoGen
OaTemp


Back
Bangor ~ Building #260 ~ BTU's
Energy (x1000 BTU)
kWh Delivered (BTU)
11947.61 BTU
Yesterday
x1000 BTUs Injected (BTU)
23611.18 BTU
Yesterday
Day
x1000 BTUs Injected (BTU)
Sunday 9047.98 BTU
Monday 11826.52 BTU
Tuesday 13497.15 BTU
Wednesday -74994.88 BTU
Thursday 3804.32 BTU
Friday 1659.54 BTU
Saturday 10641.95 BTU
Last Week
x1000 BTUs Injected (BTU)
-30364.98 BTU
Month to Date Total
x1000 BTUs Injected (BTU)
nan BTU
Last Month Total
Month
x1000 BTUs Injected (BTU)
January -30360.29 BTU
February 23611.18 BTU
Current Year Previous Months Totals
x1000 BTUs Injected (BTU)
nan BTU
Last Year Total
Energy Injection Rate (BTU/hr)
424.33 BTU/hr
Usage Rate x 1000
x1000 BTU/hr (BTU)
Timestamp
756.47 BTU 06-Feb-18 7:30:00 AM EST
753.12 BTU 06-Feb-18 8:15:00 AM EST
752.57 BTU 06-Feb-18 8:00:00 AM EST
750.87 BTU 06-Feb-18 7:45:00 AM EST
749.20 BTU 06-Feb-18 9:15:00 AM EST
Top 5 Peak 15 Minutes Demand Events Month to Date
x1000 BTU/hr (BTU)
Timestamp
756.47 BTU 06-Feb-18 7:30:00 AM EST
753.12 BTU 06-Feb-18 8:15:00 AM EST
752.57 BTU 06-Feb-18 8:00:00 AM EST
750.87 BTU 06-Feb-18 7:45:00 AM EST
749.20 BTU 06-Feb-18 9:15:00 AM EST
Top 5 Peak 15 Minutes Demand Events Year to Date
Peak 15 Minute Demand (kW) History Chart
Range
Last Week
Save
Refresh
(BTU)
777.00
697.00
537.00
377.00
217.00
57.00
-103.00
-263.00
(°F)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
04-Feb-18 12:00 AM EST
07-Feb-18 12:00 AM EST
09-Feb-18 12:00 AM EST
BTU
OaTemp


Back
Bangor ~ Building #260 ~ PV Array
Energy Data (kWh)
kWh Delivered (kW-hr)
0.00 kW-hr
Yesterday
Day
kWh Delivered (kW-hr)
Sunday 17.24 kW-hr
Monday 57.20 kW-hr
Tuesday 73.52 kW-hr
Wednesday 27.18 kW-hr
Thursday 131.17 kW-hr
Friday 109.15 kW-hr
Saturday 0.58 kW-hr
Last Week
kWh Delivered (kW-hr)
538.86 kW-hr
Month to Date Total
kWh Delivered (kW-hr)
1133.12 kW-hr
Last Month Total
Month
kWh Delivered (kW-hr)
January 1133.12 kW-hr
February 538.86 kW-hr
Current Year Previous Months Totals
kWh Delivered (kW-hr)
nan kW-hr
Last Year Total
Power Data (kW)
15.46 kW
Real Power
kW (kW)
Timestamp
28 kW 08-Feb-18 12:30:00 PM EST
28 kW 08-Feb-18 12:15:00 PM EST
27 kW 08-Feb-18 12:45:00 PM EST
27 kW 08-Feb-18 1:00:00 PM EST
27 kW 08-Feb-18 12:00:00 PM EST
Top 5 Peak 15 Minute Demand Events Month to Date
32 kW 31-Jan-18 12:15:00 PM EST
32 kW 31-Jan-18 11:45:00 AM EST
32 kW 31-Jan-18 12:00:00 PM EST
32 kW 31-Jan-18 11:30:00 AM EST
32 kW 25-Jan-18 12:00:00 PM EST
Top 5 Peak 15 Minute Demand Events Year to Date
Peak 15 Minute Demand (kW) History Chart
Range
Week-To-Date
Save
Refresh
(kW)
10
5
0
39.00
37.80
36.60 (°F)
35.40
34.20
33.00
31.80
30.60
11-Feb-18 12:00 AM EST
12-Feb-18 12:00 AM EST
PV
OaTemp


Back
Bangor ~ Building #260 ~ Purchased Street
Energy Data (kWh)
Yesterday
kWh Delivered (kW-hr)
13576.62 kW-hr
Last Week
Day
kWh Delivered (kW-hr)
Sunday 25478.91 kW-hr
Monday 34913.79 kW-hr
Tuesday 7950.67 kW-hr
Wednesday 27253.67 kW-hr
Thursday 12136.19 kW-hr
Friday 22553.32 kW-hr
Saturday 20207.67 kW-hr
Month to Date Total
kWh Delivered (kW-hr)
224561.56 kW-hr
Last Month Total
kWh Delivered (kW-hr)
475986.31 kW-hr
Current Year Previous Months Totals
Month
kWh Delivered (kW-hr)
January 476059.39 kW-hr
February 224561.57 kW-hr
Last Year Total
kWh Delivered (kW-hr)
4349102.00 kW-hr
Power Data (kW)
39 kW
Real Power
kW (kW)
Timestamp
9367 kW 09-Feb-18 5:15:00 AM EST
9367 kW 05-Feb-18 10:15:00 AM EST
8197 kW 10-Feb-18 9:00:00 PM EST
8197 kW 01-Feb-18 9:00:00 PM EST
776 kW 07-Feb-18 8:45:00 PM EST
Top 5 Peak 15 Minute Demand Events Month to Date
kW (kW)
Timestamp
9368 kW 01-Jan-18 7:15:00 AM EST
9368 kW 22-Jan-18 11:15:00 PM EST
9367 kW 09-Feb-18 5:15:00 AM EST
9367 kW 05-Feb-18 10:15:00 AM EST
8197 kW 08-Jan-18 5:00:00 AM EST
Top 5 Peak 15 Minute Demand Events Year to Date
Peak 15 Minute Demand (kW) History Chart
Range
Last Month
Save
Refresh
(kW)
8,805
8,005
6,405
4,805
3,205
1,605
5
(°F)
53.00
43.00
33.00
23.00
13.00
3.00
-7.00
01-Jan-18 12:00 AM EST
13-Jan-18 12:00 AM EST
21-Jan-18 12:00 AM EST
MainFeed
OaTemp


Back
*.csv Export Options
Bangor ~ Building #260 ~ Yesterdays Energy Report
Power
(kW)
(°F)
11-Feb-18 12:00:00 AM EST
11-Feb-18 4:00 AM EST
11-Feb-18 7:00 AM EST
11-Feb-18 10:00 AM EST
11-Feb-18 1:00 PM EST
11-Feb-18 4:00 PM EST
11-Feb-18 7:00 PM EST
11-Feb-18 10:00 PM EST
Army_260/Energy_Total_Bldg_Load
Army_260/Energy_CoGen_kW_Supply
Army_260/Energy_Solar_kW_Supply
Army_260/Energy_Purchased_kW
Army_260/Energy_System_OATemp
Percentages Based on Hourly Average
(%)
11-Feb-18 6:00:00 AM EST
11-Feb-18 2:00:00 PM EST
11-Feb-18 6:00:00 PM EST
Army_260/Energy_CoGen_%Load
Army_260/Energy_Solar_%Load
Army_260/Energy_Purchased_%Load
Percent Based on Days Average
21%
0%
79%
Army_260/Energy_CoGen_%Load
Army_260/Energy_Solar_%Load
Army_260/Energy_Purchased_%Load

END OF SECTION 231000

SECTION 28 46 21.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACOUSTICAL SOCIETY OF AMERICA (ASA)

ASA S3.2	(2020) American National Standard Method for Measuring the Intelligibility of Speech Over Communication Systems (ASA 85)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A17.1/CSA B44	(2019) Safety Code for Elevators and Escalators

ASTM INTERNATIONAL (ASTM)

ASTM F402	(2005; R 2012) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 4	(2018) Standard for Integrated Fire Protection and Life Safety System Testing
NFPA 70	(2023) National Electrical Code
NFPA 72	(2022; ERTA 22-1) National Fire Alarm and Signaling Code
NFPA 90A	(2021) Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 170	(2021) Standard for Fire Safety and Emergency Symbols

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-601-02	(2021) Fire Protection Systems Inspection, Testing, and Maintenance
UFC 4-010-06	(2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices
47 CFR 90	Private Land Mobile Radio Services

UNDERWRITERS LABORATORIES (UL)

UL 228	(2006; Reprint Mar 2022) UL Standard for Safety Door Closers-Holders, With or Without Integral Smoke Detectors
UL 268	(2016; Reprint Nov 2021) UL Standard for Safety Smoke Detectors for Fire Alarm Systems
UL 268A	(2008; Reprint Oct 2014) Smoke Detectors for Duct Application
UL 464	(2016; Reprint Sep 2017) UL Standard for Safety Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
UL 497A	(2001; Bul. 2019) UL Standard for Safety Secondary Protectors for Communications Circuits
UL 497B	(2004; Reprint Feb 2022) UL Standard for Safety Protectors for Data Communications and Fire Alarm Circuits
UL 521	(1999; Reprint Feb 2023) UL Standard for Safety Heat Detectors for Fire Protective Signaling Systems
UL 864	(2014; Reprint May 2020) UL Standard for Safety Control Units and Accessories for Fire Alarm Systems
UL 1283	(2017) UL Standard for Safety Electromagnetic Interference Filters
UL 1449	(2021; Reprint Dec 2022) UL Standard for Safety Surge Protective Devices
UL 1480	(2016; Reprint Sep 2017) UL Standard for Safety Speakers for Fire Alarm and Signaling Systems, Including Accessories
UL 1638	(2016; Reprint Sep 2017) UL Standard for Safety Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
UL 1971	(2002; Reprint Oct 2008) Signaling Devices for the Hearing Impaired
UL 2017	(2008; Reprint Dec 2018) UL Standard for Safety General-Purpose Signaling Devices and Systems

UL 2034	(2017; Reprint Oct 2022) UL Standard for Safety Single and Multiple Station Carbon Monoxide Alarms
UL 2075	(2013; Bul. 2019) UL Standard for Safety Gas and Vapor Detectors and Sensors
UL 2572	(2016; Bul. 2018) UL Standard for Safety Mass Notification Systems
UL Fire Prot Dir	(2012) Fire Protection Equipment Directory

1.2 RELATED SECTIONS

A. Section 25 05 11 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS, applies to this section, with the additions and modifications specified herein. In addition, refer to the following sections for related work and coordination:
B. Section 21 13 13 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION
C. Section 23 31 13 HVAC DUCTS
D. Section 08 71 00 DOOR HARDWARE for door release, door unlocking and additional work related to finish hardware.
E. Section 07 84 00 FIRESTOPPING for additional work related to firestopping.

1.3 SUMMARY

1.3.1 Scope

A. This work includes designing and providing a new, complete, fire alarm and mass notification (MNS) system as described herein and on the contract drawings. Include system wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, initiating devices, notification appliances, supervising station fire alarm transmitters/mass notification transceiver, and other accessories and miscellaneous items required for a complete operational system even though each item is not specifically mentioned or described. Provide system complete and ready for operation. Design and installation must comply with UFGS 25 05 11, UFC 4-010-06 and AFGM 2019-320-02.

B. Provide equipment, materials, installation, workmanship, inspection, and testing in strict accordance with NFPA 72, except as modified herein. The system layout on the drawings show the intent of coverage and suggested locations. Final quantity, system layout, and coordination are the responsibility of the Contractor.

C. Each remote fire alarm control unit must be powered from a wiring riser specifically for that use or from a local emergency power panel located on the same floor as the remote fire alarm control unit. Where remote fire control units are provided, equipment for notification appliances may be located in the remote fire alarm control units.

D. The fire alarm and mass notification system must be independent of the building security, building management, and energy/utility monitoring systems other than for control functions.

1.3.2 Qualified Fire Protection Engineer (QFPE)

A. Services of the QFPE must include:

1. Reviewing SD-02, SD-03, and SD-05 submittal packages for completeness and compliance with the provisions of this specification. Construction (shop) drawings and calculations must be prepared by, or prepared under the immediate supervision of, the QFPE. The QFPE must affix their professional engineering stamp with signature to the shop drawings, calculations, and material data sheets, indicating approval prior to submitting the shop drawings to the DFPE.
2. Providing a letter documenting that the SD-02, SD-03, and SD-05 submittal package has been reviewed and noting any outstanding comments.
3. Performing in-progress construction surveillance prior to installation of ceilings (rough-in inspection).
4. Witnessing pre-Government and final Government functional performance testing and performing a final installation review.
5. Signing applicable certificates under SD-07.

1.4 DEFINITIONS

Wherever mentioned in this specification or on the drawings, the equipment, devices, and functions must be defined as follows:

1.4.1 Interface Device

An addressable device that interconnects hard wired systems or devices to an analog/addressable system.

1.4.2 Fire Alarm and Mass Notification Control Unit (FMCU)

A master control unit having the features of a fire alarm control unit (FACU) and an autonomous control unit (ACU) where these units are interconnected to function as a combined fire alarm/mass notification system. The FACU and ACU functions may be contained in a single cabinet or in independent, interconnected, and co-located cabinets.

1.4.3 Remote Fire Alarm and Mass Notification Control Unit

A control unit, physically remote from the fire alarm and mass notification control unit, that receives inputs from automatic and manual fire alarm devices; may supply power to detection devices and interface devices; may provide transfer of power to the notification appliances; may provide transfer of condition to relays or devices connected to the control unit; and reports to and receives signals from the fire alarm and mass notification control unit.

1.4.4 Local Operating Console (LOC)

A unit designed to allow emergency responders and/or building occupants to operate the MNS including delivery of recorded messages and/or live voice announcements, initiate visual, textual visual, and audible appliance operation and other relayed functions.

1.4.5 Terminal Cabinet

A steel cabinet with locking, hinge-mounted door where terminal strips are securely mounted inside the cabinet.

1.4.6 Control Module and Relay Module

Terms utilized to describe emergency control function interface devices as defined by NFPA 72.

1.4.7 Designated Fire Protection Engineer (DFPE)

The DoD fire protection engineer that oversees that Area of Responsibility for that project. This is sometimes referred to as the "cognizant" fire protection engineer. Interpret reference to "authority having jurisdiction" and/or AHJ in referenced standards to mean the Designated Fire Protection Engineer (DFPE). The DFPE may be responsible for review of the contractor submittals having a "G" designation, and for witnessing final inspection and testing.

1.4.8 Qualified Fire Protection Engineer (QFPE)

A QFPE is an individual who is a licensed professional engineer (P.E.), who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and has relevant fire protection engineering experience.

1.5 SUBMITTALS

A. Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval.

B. Shop drawings (SD-02), product data (SD-03) and calculations (SD-05) must be prepared by the fire alarm designer and combined and submitted as one complete package. The QFPE must review the SD-02/SD-03/SD-05 submittal package for completeness and compliance with the Contract provisions prior to submission to the Government. The QFPE must provide a Letter of Confirmation that they have reviewed the submittal package for compliance with the contract provisions. This letter must include their registered professional engineer stamp and signature. Partial submittals and submittals not reviewed by the QFPE will be returned by the Government disapproved without review.

C. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1. SD-01 Preconstruction Submittals

a. Qualified Fire Protection Engineer (QFPE); G
b. Fire alarm system designer; G
c. Supervisor; G
d. Technician; G
e. Installer; G
f. Test Technician; G
g. Fire Alarm System Site-Specific Software Acknowledgement; G

2. SD-02 Shop Drawings

a. Nameplates; G
b. Instructions; G
c. Wiring Diagrams; G
d. System Layout; G
e. Notification Appliances; G
f. Initiating devices; G

g. Amplifiers; G
h. Battery Power; G
i. Voltage Drop Calculations; G

3. SD-03 Product Data

a. Fire Alarm and Mass Notification Control Unit (FMCU); G
b. Local Operating Console (LOC); G
c. Amplifiers; G
d. Tone Generators; G
e. Digitalized voice generators; G
f. LCD Annunciator; G
g. Manual Stations; G
h. Smoke Detectors; G
i. Duct Smoke Detectors; G
j. Heat Detectors; G
k. Carbon monoxide detector; G
l. Addressable Interface Devices; G
m. Addressable Control Modules; G
n. Isolation Modules; G
o. Notification Appliances; G
p. Textual Display Sign Control Panel; G
q. Textual Display Signs; G
r. Batteries; G
s. Battery Chargers; G
t. Supplemental Notification Appliance Circuit Panels; G
u. Auxiliary Power Supply Panels; G
v. Surge Protective Devices; G
w. Alarm Wiring; G
x. Back Boxes and Conduit; G
y. Ceiling Bridges for Ceiling-Mounted Appliances; G
z. Terminal Cabinets; G
aa. Digital Alarm Communicator Transmitter (DACT); G
bb. Mass Notification Transceiver; G
cc. Electromagnetic Door Holders; G
dd. Environmental Enclosures or Guards; G
ee. Document Storage Cabinet; G

4. SD-06 Test Reports

a. Test Procedures; G

5. SD-07 Certificates

a. Verification of Compliant Installation; G
b. Request for Government Final Test; G

6. SD-10 Operation and Maintenance Data

a. Operation and Maintenance (O&M) Instructions; G
b. Instruction of Government Employees; G

7. SD-11 Closeout Submittals

a. As-Built Drawings
b. Spare Parts

1.6 SYSTEM OPERATION

A. Fire alarm system/mass notification system including textual display sign control panel(s), components requiring power, except for the FMCU(s) power supply, must operate on 24 volts DC unless noted otherwise in this section.

B. The interior fire alarm and mass notification system must be a complete, supervised, noncoded, analog/addressable fire alarm and mass notification system conforming to NFPA 72, UL 864, and UL 2572. Systems meeting UL 2017 only are not acceptable. The system must be activated into the alarm mode by actuation of an alarm initiating device. The system must remain in the alarm mode until the initiating device is reset and the control unit is reset and restored to normal. The system may be placed in the alarm mode by local microphones, LOC, FMCU, or remotely from authorized locations/users.

C. Ensure that any single impairment of the system does not affect the system on more than one-half of any floor.

1.6.1 Alarm Initiating Devices and Notification Appliances (Visual, Voice, Textual)

A. Connect alarm initiating devices to initiating device circuits (IDC) Class "B", or to signaling line circuits (SLC) Class "B" and installed in accordance with NFPA 72.

B. Connect notification appliances to notification appliance circuits (NAC) Class "B".

1.6.2 Functions and Operating Features

A. The system must provide the following functions and operating features:

1. Power, annunciation, supervision, and control for the system. Addressable systems must be microcomputer (microprocessor or microcontroller) based with a minimum word size of eight bits with sufficient memory to perform as specified.

2. Visual alarm notification appliances must be synchronized as required by NFPA 72.

3. Electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control unit.

4. An audible and visual trouble signal to activate upon a single break or open condition, or ground fault. The trouble signal must also operate upon loss of primary power (AC) supply, absence of a battery supply, low battery voltage, or removal of alarm or supervisory control unit modules. After the system returns to normal operating conditions, the trouble signal must again sound until the trouble is acknowledged. A smoke detector in the process of being verified for the actual presence of smoke must not initiate a trouble condition.

5. A trouble signal silence feature that must silence the audible trouble signal, without affecting the visual indicator.

6. Program capability via switches in a locked portion of the FMCU to bypass the automatic notification appliance circuits, fire reporting system, air handler shutdown, door release, door unlocking features. Operation of this programmed action must indicate on the FMCU

display as a supervisory or trouble condition. Notification appliance bypass must be selectable by floor.

7. Alarm functions must override trouble or supervisory functions. Supervisory functions must override trouble functions.

8. The system must be capable of being programmed from the control unit keyboard. Programmed information must be stored in non-volatile memory.

9. The system must be capable of operating, supervising, and/or monitoring non-addressable alarm and supervisory devices.

10. There must be no limit, other than maximum system capacity, as to the number of addressable devices that may be in alarm simultaneously.

11. Where the fire alarm/mass notification system is responsible for initiating an action in another emergency control device or system, such as HVAC, releasing service, the addressable fire alarm relay must be located in the vicinity of the emergency control device.

12. An alarm signal must automatically initiate the following functions:

    a. Transmission of an alarm signal to a remote supervising station.
    b. Visual indication of the device operated on the FMCU.
    c. Actuation of alarm notification appliances.
    d. Recording of the event electronically in the history log of the FMCU.
    e. Release of doors held open by electromagnetic devices.
    f. Release of power to electric locks (delayed egress locks) on doors that are part of the means of egress.

13. A supervisory signal must automatically initiate the following functions:

14. Visual indication of the device operated on the FMCU.

    a. Transmission of a supervisory signal to a remote supervising station.
    b. Operation of a duct smoke detector must shut down the appropriate air handler in accordance with NFPA 90A in addition to other requirements of this paragraph and as allowed by NFPA 72.
    c. Recording of the event electronically in the history log of the FMCU.

15. A trouble condition must automatically initiate the following functions:

    a. Visual indication of the device operated on the FMCU.
    b. Transmission of a trouble signal to a remote supervising station.
    c. Recording of the event electronically in the history log of the FMCU.

16. System control equipment must be programmed to provide a 60-minute to 180-minute delay in transmission of trouble signals resulting from primary power failure.

17. Activation of a LOC pushbutton must activate the audible and visual alarms in the facility. The audible message must be the one associated with the pushbutton activated.

1.7 TECHNICAL DATA AND SITE-SPECIFIC SOFTWARE

A. Technical data and site-specific software (meaning technical data that relates to computer software) that are specifically identified in this project, and may be required in other specifications, must be delivered, strictly in accordance with the CONTRACT CLAUSES. The

fire alarm system manufacturer must submit written confirmation of this contract provision as "Fire Alarm System Site-Specific Software Acknowledgement". Identify data delivered by reference to the specification paragraph against which it is furnished. Data to be submitted must include complete system, equipment, and software descriptions. Descriptions must show how the equipment will operate as a system to meet the performance requirements of this contract. The site-specific software data package must also include the following:

1. Items identified in NFPA 72, titled "Site-Specific Software".
2. Identification of programmable portions of the system equipment and capabilities.
3. Description of system revision and expansion capabilities and methods of implementation detailing both equipment and software requirements.
4. Provision of operational software data on all modes of programmable portions for fire alarm and mass notification.
5. Description of Fire Alarm and Mass Notification Control Unit equipment operation.
6. Description of auxiliary and remote equipment operations.
7. Library of application software.
8. Operation and maintenance manuals.

1.8 EXISTING EQUIPMENT

Equipment and devices must be compatible and operable with the existing installation-wide mass notification system and must not impair reliability or operational functions of the existing system.

1.9 QUALITY ASSURANCE

1.9.1 Submittal Documents

1.9.1.1 Preconstruction Submittals

Within 36 days of contract award but not less than 14 days prior to commencing any work on site, the Contractor must submit the following for review and approval. SD-02, SD-03 and SD-05 submittals received prior to the review and approval of the qualifications of the fire alarm subcontractor and QFPE must be returned disapproved without review. All resultant delays must be the sole responsibility of the Contractor.

1.9.1.2 Shop Drawings

Shop drawings must not be smaller than the Contract Drawings. Drawings must comply with the requirements of NFPA 72 and NFPA 170. Minimum scale for floor plans must be 1/8"=1'.

1.9.1.3 Nameplates

Nameplate illustrations and data to obtain approval by the Contracting Officer before installation.

1.9.1.4 Wiring Diagrams

Submit digital pdf copies of point-to-point wiring diagrams showing the points of connection and terminals used for electrical field connections in the system, including interconnections between the equipment or systems that are supervised or controlled by the system. Diagrams must show connections from field devices to the FMCU and remote FMCU, initiating circuits, switches, relays and terminals, including pathway diagrams between the control unit and shared communications equipment within the protected premises. Point-to-point wiring diagrams must

be job specific and must not indicate connections or circuits not being utilized. Provide complete riser diagrams indicating the wiring sequence of all devices and their connections to the control equipment. Include a color-code schedule for the wiring.

1.9.1.5 System Layout

A. Submit digital pdf copies of plan view drawing showing device locations, terminal cabinet locations, junction boxes, other related equipment, conduit routing, conduit sizes, wire counts, conduit fill calculations, wire color-coding, circuit identification in each conduit, and circuit layouts for all floors. Indicate candela rating of each visual notification appliance. Indicate the wattage of each speaker. Clearly identify the locations of isolation modules. Indicate the addresses of all devices, modules, relays, and similar. Show/identify all acoustically similar spaces. Indicate if the environment for the FMCU is within its environmental listing (e.g. temperature/humidity).

B. Provide a complete description of the system operation in matrix format similar to the "Typical Input/Output Matrix" included in the Annex of NFPA 72.

1.9.1.6 Notification Appliances

Calculations and supporting data on each circuit to indicate that there is at least 25 percent spare capacity for notification appliances. Annotate data for each circuit on the drawings.

1.9.1.7 Initiating Devices

Calculations and supporting data on each circuit to indicate that there is at least 25percent spare capacity for initiating devices. Annotate data for each circuit on the drawings.

1.9.1.8 Amplifiers

Calculations and supporting data to indicate that amplifiers have sufficient capacity to simultaneously drive all notification speakers at tapped settings plus 25 percent spare capacity. Annotate data for each circuit on the drawings.

1.9.1.9 Battery Power

Calculations and supporting data as required in paragraph Battery Power Calculations for alarm, alert, and supervisory power requirements. Calculations including ampere-hour requirements for each system component and each control unit component, and the battery recharging period, must be included on the drawings.

1.9.1.10 Voltage Drop Calculations

Voltage drop calculations for each notification circuit indicating that sufficient voltage is available for proper operation of the system and all components, at a minimum rated voltage of the system operating on batteries. Include the calculations on the system layout drawings.

1.9.1.11 Product Data

Submit digital pdf copies of annotated descriptive data to show the specific model, type, and size of each item. Catalog cuts must also indicate the NRTL listing. The data must be highlighted to show model, size, and options that are intended for consideration. Data must be adequate to

demonstrate compliance with all contract requirements. Product data for all equipment must be combined into a single submittal.

Provide an equipment list identifying the type, quantity, make, and model number of each piece of equipment to be provided under this submittal. The equipment list must include the type, quantity, make and model of spare equipment. Types and quantities of equipment submitted must coincide with the types and quantities of equipment used in the battery calculations and those shown on the shop drawings.

1.9.1.12 Operation and Maintenance (O&M) Instructions

A. Six copies of the Operation and Maintenance Instructions. The O&M Instructions must be prepared in a single volume or in multiple volumes, with each volume indexed, and may be submitted as a Technical Data Package. Manuals must be approved prior to training. The Interior Fire Alarm And Mass Notification System Operation and Maintenance Instructions must include the following:

1. Operating manual outlining step-by-step procedures required for system startup, operation, and shutdown. The manual must include the manufacturer's name, model number, service manual, parts list, and preliminary equipment list complete with description of equipment and their basic operating features.

2. Maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals must include conduit layout, equipment layout and simplified wiring, and control diagrams of the system as installed.

3. Complete procedures for system revision and expansion, detailing both equipment and software requirements.

4. Software submitted for this project on CD/DVD media utilized.

5. Printouts of configuration settings for all devices.

6. Routine maintenance checklist. The routine maintenance checklist must be arranged in a columnar format. The first column must list all installed devices, the second column must state the maintenance activity or state no maintenance required, the third column must state the frequency of the maintenance activity, and the fourth column provided for additional comments or reference. All data (devices, testing frequencies, and similar) must comply with UFC 3-601-02.

7. A final Equipment List must be submitted with the Operating and Maintenance (O&M) manual.

1.9.1.13 As-Built Drawings

The drawings must show the system as installed, including deviations from both the project drawings and the approved shop drawings. These drawings must be submitted within two weeks after the final Government test of the system. At least one set of the as-built (marked-up) drawings must be provided at the time of, or prior to the final Government test.

1.9.2 Qualifications

1.9.2.1 Fire Alarm System Designer

The fire alarm system designer must be certified as a Level IV (minimum) Technician by National Institute for Certification in Engineering Technologies (NICET) in the Fire Alarm Systems subfield of Fire Protection Engineering Technology or meet the qualifications for a QFPE.

1.9.2.2 Supervisor

A NICET Level IV fire alarm technician must supervise the installation of the fire alarm/mass notification system. The fire alarm technicians supervising the installation of equipment must be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.9.2.3 Technician

Fire alarm technicians with a minimum of four years of experience must be utilized to install and terminate fire alarm/mass notification devices, cabinets and control units. The fire alarm technicians installing the equipment must be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.9.2.4 Installer

Fire alarm installer with a minimum of two years of experience utilized to assist in the installation of fire alarm/mass notification devices, cabinets and control units. A licensed electrician must be allowed to install wire, cable, conduit and backboxes for the fire alarm system/mass notification system. The fire alarm installer must be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.9.2.5 Test Technician

Fire alarm technicians with a minimum of eight years of experience and NICET Level III or IV utilized in testing and certification of the installation of the fire alarm/mass notification devices, cabinets and control units. The fire alarm technicians testing the equipment must be factory trained in the installation, adjustment, testing, and operation of the equipment installed as part of this project.

1.9.2.6 Manufacturer

Components must be of current design and must be in regular and recurrent production at the time of installation. Provide design, materials, and devices for a protected premises fire alarm system, complete, conforming to NFPA 72, except as specified herein.

1.9.3 Regulatory Requirements

Equipment and material must be listed or approved. Listed or approved, as used in this section, means listed, labeled or approved by a Nationally Recognized Testing Laboratory (NRTL) such as UL Fire Prot Dir or FM APP GUIDE. The omission of these terms under the description of any item of equipment described must not be construed as waiving this requirement. All listings or approvals by testing laboratories must be from an existing ANSI or UL published standard.

The recommended practices stated in the manufacturer's literature or documentation must be considered as mandatory requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

Protect equipment delivered and placed in storage from the weather, humidity, and temperature variation, dirt and dust, and other contaminants.

1.11 MAINTENANCE

1.11.1 Spare Parts

A. Furnish the following spare parts in the manufacturers original unopened containers:

1. Five complete sets of system keys.
2. Two of each type of fuse required by the system.
3. Two manual stations.
4. Two of each type of detector installed.
5. Two of each type of detector base and head installed.
6. Two of each type of audible and visual alarm device installed.
7. Two textual visual notification appliances.
8. Two of each type of addressable monitor module installed.
9. Two of each type of addressable control module installed.
10. Two low voltage, one telephone, one internet, and one 120 VAC surge protective device.

1.11.2 Special Tools

Software, connecting cables and proprietary equipment, necessary for the maintenance, testing, and reprogramming of the equipment must be furnished to the Contracting Officer, prior to the instruction of Government employees.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENT

All fire alarm and mass notification equipment must be listed for use under the applicable reference standards. Interfacing of UL 864 or similar approved industry listing with Mass Notification equipment listed to UL 2572 must be done in a laboratory listed configuration, if the software programming features cannot provide a listed interface control.

2.2 MATERIALS AND EQUIPMENT

2.2.1 Standard Products

Provide materials, equipment, and devices that have been tested by a nationally recognized testing laboratory and listed for fire protection service when so required by NFPA 72 or this specification. Select material from one manufacturer, where possible, and not a combination of manufacturers, for any particular classification of materials. Material and equipment must be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 2 years prior to bid opening.

2.2.2 Nameplates

A. Major components of equipment must have the manufacturer's name, address, type or style, model or serial number, catalog number, date of installation, installing Contractor's name and address, and the contract number provided on a new name plate permanently affixed to the item or equipment. Major components include, but are not limited to, the following:

1. FMCU

B. Nameplates must be etched metal or plastic, permanently attached by screws to control units or adjacent walls.

2.2.3 Keys

Keys and locks for equipment, control units and devices must be identical. Master all keys and locks to a single key as required by the Fire Department.

2.2.4 Instructions

Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the FMCU. The card must show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory, and trouble. The instructions must also include procedures for operating live voice microphones. The instructions and their mounting location must be approved by the Contracting Officer before being posted.

2.3 FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT

A. Provide a complete fire alarm and mass notification control unit (FMCU) fully enclosed in a lockable steel cabinet as specified herein. Operations required for testing or for normal care, maintenance, and use of the system must be performed from the front of the enclosure. If more than a single unit is required at a location to form a complete control unit, the unit cabinets must match exactly. The system must be capable of defining any module as an alarm module and report alarm trouble, loss of polling, or as a supervisory module, and reporting supervisory short, supervisory open or loss of polling such as waterflow switches, valve supervisory switches, fire pump monitoring, independent smoke detection systems, relays for output function actuation.

1. Each control unit must provide power, supervision, control, and logic for the entire system, utilizing solid state, modular components, internally mounted and arranged for easy access. Each control unit must be suitable for operation on a 120 volt, 60 hertz, normal building power supply. Provide each control unit with supervisory functions for power failure, internal component placement, and operation.

2. Visual indication of alarm, supervisory, or trouble initiation on the FMCU must be by liquid crystal display or similar means with a minimum of 80 characters. The mass notification control unit must have the capability of temporarily deactivate the fire alarm audible notification appliances while delivering voice messages.

3. Provide secure operator console for initiating recorded messages, strobes and displays; and for delivering live voice messages. Provide capacity for at least eight prerecorded messages. Provide the ability to automatically repeat prerecorded messages. Provide a secure microphone for delivering live messages. Provide adequate discrete outputs to temporarily

deactivate fire alarm audible notification, initiate/synchronize strobes and initiate textual visual notification appliances. Provide a complete set of self-diagnostics for controller and appliance network. Provide local diagnostic information display and local diagnostic information and system event log file.

2.3.1 Cabinet

Install control unit components in cabinets large enough to accommodate all components and also to allow ample gutter space for interconnection of control units as well as field wiring. The cabinet must be a sturdy steel housing, complete with back box, hinged steel door with cylinder lock, and semi-recessed mounting provisions. The enclosure must be identified by an engraved phenolic resin nameplate. Lettering on the nameplate must say "Fire Alarm and Mass Notification control unit" and must not be less than 1-inch high. Provide prominent rigid plastic or metal identification plates for lamps, circuits, meters, fuses, and switches.

2.3.2 Silencing Switches

2.3.2.1 Alarm Silencing Switch

Provide an alarm silencing switch at the FMCU that must silence the audible and visual notification appliances. Subsequent activation of initiating devices must cause the notification appliances to re-activate.

2.3.2.2 Supervisory/Trouble Silencing Switch

Provide supervisory and trouble silencing switch(es) that must silence the audible trouble and supervisory signal(s), but not extinguish the visual indicator. This switch must be overridden upon activation of a subsequent supervisory or trouble condition. Audible trouble indication must resound automatically every 24 hours after the silencing feature has been operated if the supervisory or trouble condition still exists.

2.3.3 Non-Interfering

Power and supervise each circuit such that a signal from one device does not prevent the receipt of signals from any other device. Initiating devices must be manually reset by switch from the FMCU after the initiating device or devices have been restored to normal.

2.3.4 Audible Notification System

A. The Audible Notification System must comply with the requirements of NFPA 72 for Emergency Voice/Alarm Communications System requirements, except as specified herein. The system must be a one-way, multi-channel voice notification system incorporating user selectability of a minimum eight distinct sounds for tone signaling, and the incorporation of a voice module for delivery of recorded messages. Audible appliances must produce a three-pulse temporal pattern for three cycles followed by a voice message that is repeated until the control unit is reset or silenced. Automatic messages must be broadcast through speakers throughout the building/facility. A live voice message must override the automatic audible output through use of a microphone input at the control unit or the LOC.

1. When using the microphone, live messages must be broadcast throughout a selected floor or floors, selectable by zone, or all call. The system must be capable of operating all speakers at the same time. The Audible Notification System must support Public Address (PA) paging

for the facility. This must be accomplished with the provision of a separate microphone with a head unit that interfaces with the FMCU. The public address paging function must not override any fire alarm or mass notification functions. The microphone must be desktop hand-held style. Hand-held microphones must be housed in a separate protective cabinet. The cabinet must be accessible without the use of a key. The location of the microphone(s) must be approved by the Designated Fire Protection Engineer (DFPE). Activation of the public address microphone must not initiate activation of visual notification appliances or LED text displays.

2. The microprocessor must actively interrogate circuitry, field wiring, and digital coding necessary for the immediate and accurate rebroadcasting of the stored voice data into the appropriate amplifier input. Loss of operating power, supervisory power, or any other malfunction that could render the digitalized voice module inoperative must automatically cause the three-pulse temporal pattern to take over all functions assigned to the failed unit in the event an alarm is activated.

2.3.4.1 Outputs and Operational Modules

All outputs and operational modules must be fully supervised with on-board diagnostics and trouble reporting circuits. Provide form "C" contacts for system alarm and trouble conditions. Provide circuits for operation of auxiliary appliance during trouble conditions. During a Mass Notification event, the control unit must not generate nor cause any trouble alarms to be generated with the Fire Alarm system.

2.3.4.2 Mass Notification

A. The system must have the capability of utilizing an LOC with redundant controls of the FMCU. Notification Appliance Circuits (NAC) must be provided for the activation of strobe appliances. Audio output must be selectable for line level. A hand-held microphone must be provided and, upon activation, must take priority over any tone signal, recorded message or PA microphone operation in progress, while maintaining the strobe NAC circuit activation.

B. The Mass Notification functions must override the manual or automatic fire alarm notification, and public address (PA) functions. Other fire alarm functions including transmission of a signal(s) to the fire department must remain operational. When a mass notification announcement is disengaged and a fire alarm condition still exists, the audible and visual notification appliances must resume activation for alarm conditions. The fire alarm message must be of lower priority that all other messages (except any "test" messages) and must not override any other messages.

C. Messages must be recorded professionally utilizing standard industry methods, in a professional female voice. Message and tone volumes must both be at the same decibel level. Messages recorded from the system microphone must not be accepted. A 1000 Hz tone (as required by NFPA 72) must precede messages and be similar to the following unless Installation or Facility specific messages are required:

1. Fire: "May I have your attention please. May I have your attention please. A fire emergency has been reported in the building. Please leave the building by the nearest exit" (Provide a 2 second pause.) "May I have your attention please, (repeat the tones and message on a continuous loop)."

2. Test: "May I have your attention please. May I have your attention please. This is a test of the building mass notification system. Please continue your normal duties. This is only a test." (Provide a 2 second pause.)

3. All Clear: "May I have your attention please. May I have your attention please. An all clear has been issued, resume normal activities." (Provide a 2 second pause.)

D. Auxiliary Input Module must be designed to be an outboard expansion module to either expand the number of optional LOC's, or allow a telephone interface.

2.3.5 Memory

Provide each control unit with non-volatile memory and logic for all functions. The use of long life batteries, capacitors, or other age-dependent devices must not be considered as equal to non-volatile processors, PROMS, or EPROMS.

2.3.6 Field Programmability

Provide control units and control units that are fully field programmable for both input and output of control, initiation, notification, supervisory, and trouble functions. The system program configuration must be menu driven. System changes must be password protected. Any proprietary equipment and proprietary software needed by qualified technicians to implement future changes to the fire alarm system must be provided as part of this contract.

2.3.7 Input/Output Modifications

The FMCU must contain features that allow the bypassing of input devices from the system or the modification of system outputs. These control features must consist of a control unit mounted keypad and a keyboard. Any bypass or modification to the system must indicate a trouble condition on the FMCU.

2.3.8 Resetting

Provide the necessary controls to prevent the resetting of any alarm, supervisory, or trouble signal while the alarm, supervisory or trouble condition on the system still exists.

2.3.9 Walk Test

The FMCU must have a walk test feature. When using this feature, operation of initiating devices must result in limited system outputs, so that the notification appliances operate for only a few seconds and the event is indicated in the history log, but no other outputs occur.

2.3.10 History Logging

The control unit must have the ability to store a minimum of 400 events in a log. These events must be stored in a battery-protected memory and must remain in the memory until the memory is downloaded or cleared manually. Resetting of the control unit must not clear the memory.

2.3.11 Manual Access

A. An operator at the control unit, having a proper access level, must have the capability to manually access the following information for each initiating device.

1. Primary status.
2. Device type.
3. Present average value.
4. Present sensitivity selected.
5. Detector range (normal, dirty).

2.3.12 Heat Detector Self-Test Routines

Automatic self-test routines must be performed on each detector that will functionally check detector sensitivity electronics and ensure the accuracy of the value being transmitted. Any detector that fails this test must indicate a trouble condition with the detector location at the control unit.

2.4 LOCAL OPERATING CONSOLES (LOC)

2.4.1 General

The LOC must consist of a remote microphone station incorporating a push-to-talk (PTT) hand-held microphone and system status indicators. The LOC must have the capability of being utilized to activate prerecorded messages. The unit must incorporate microphone override of any tone generation or recorded messages. The unit must be fully supervised from the FMCU. The housing for the LOC must not be lockable. The LOC must have public address capability with the provision of a separate microphone. The PA paging function must not override any alarm or notification functions. The PA microphone must be hand-held style. Hand-held microphones must be housed in a separate protective cabinet. The cabinet must be accessible without the use of a key. The location of the microphone must be approved by the Designated Fire Protection Engineer (DFPE). Activation of the PA microphone must not initiate activation of visual notification appliances or LED text displays. The PA paging function must not override any alarm or notification functions.

2.4.2 Multiple LOCs

When an installation has more than one LOC, the LOCs must be programmed to allow only one LOC to be available for paging or messaging at a time. Once one LOC becomes active, all other LOC's will have an indication that the system is busy (Amber Busy Light) and cannot be used at that time. This is to avoid two messages being given at the same time. It must be possible to override or lockout the LOC's from the FMCU.

2.5 AMPLIFIERS, PREAMPLIFIERS, TONE GENERATORS

Any amplifiers, preamplifiers, tone generators, digitalized voice generators, and other hardware necessary for a complete, operational, textual audible circuit conforming to NFPA 72 must be housed in a remote FMCU, terminal cabinet, or in the FMCU. Individual amplifiers must be 100 watts maximum.

2.5.1 Operation

The system must automatically operate and control all building speakers.

2.5.2 Construction

Amplifiers must utilize computer grade solid state components and must be provided with output protection devices sufficient to protect the amplifier against any transient up to 10 times the highest rated voltage in the system.

2.5.3 Inputs

Equip each system with separate inputs for the tone generator, digitalized voice driver and control unit mounted microphone Public Address Paging Function. Microphone inputs must be of the low impedance, balanced line type. Both microphone and tone generator input must be operational on any amplifier.

2.5.4 Tone Generator

The tone generator must produce a three-pulse temporal pattern and must be constantly repeated until interrupted by either the digitalized voice message, the microphone input, or the alarm silence mode as specified. The tone generator must be single channel with an automatic backup generator per channel such that failure of the primary tone generator causes the backup generator to automatically take over the functions of the failed unit and also causes transfer of the common trouble relay. The tone generator must be provided with securely attached labels to identify the component as a tone generator and to identify the specific tone it produces.

2.5.5 Protection Circuits

Each amplifier must be constantly supervised for any condition that could render the amplifier inoperable at its maximum output. Failure of any component must cause illumination of a visual "amplifier trouble" indicator on the control unit, appropriate logging of the condition in the history log, and other actions for trouble conditions as specified.

2.6 REMOTE ANNUNCIATOR

2.6.1 LCD Annunciator

Provide a flush mounted annunciator that includes an LCD display. The display must indicate the device in trouble/alarm or any supervisory device. Display the device name and address. The remote annunciator must duplicate functions of the FMCU for message display, fire alarm, supervisory alarm, and trouble conditions, visual and audible notification, and system reset functions. Remote annunciator must require the use of a key for accessing the reset, control and other functions.

A building floor plan must be provided and mounted (behind Plexiglass or similar protective material) at the annunciator location. The floor plan must indicate all rooms by name and number including the locations of stairs and elevators. The floor plan must show all devices and their programmed address to facilitate identification of their physical location from the LCD display information.

2.7 MANUAL STATIONS

Provide metal or plastic, semi-flush or flush mounted, double-action, addressable manual stations, that are not subject to operation by jarring or vibration. Stations must be equipped with screw

terminals for each conductor. Stations that require the replacement of any portion of the device after activation are not permitted. Stations must be finished in red with molded raised lettering operating instructions of contrasting color. The use of a key must be required to reset the station.

2.8 SMOKE DETECTORS

2.8.1 Spot Type Detectors

A. Provide addressable photoelectric smoke detectors as follows:

1. Provide analog/addressable photoelectric smoke detectors utilizing the photoelectric light scattering principle for operation in accordance with UL 268. Smoke detectors must be listed for use with the FMCU.

2. Provide self-restoring type detectors that do not require any readjustment after actuation at the FMCU to restore them to normal operation. The detector must have a visual indicator to show actuation.

3. Vibration must have no effect on the detector's operation. Protect the detection chamber with a fine mesh metallic screen that prevents the entrance of insects or airborne materials. The screen must not inhibit the movement of smoke particles into the chamber.

4. Provide twist lock bases with screw terminals for each conductor. The detectors must maintain contact with their bases without the use of springs.

5. The detector address must identify the particular unit, its location within the system, and its sensitivity setting. Detectors must be of the low voltage type rated for use on a 24 VDC system.

2.8.2 Duct Smoke Detectors

A. Duct-mounted addressable photoelectric smoke detectors must consist of a smoke detector, as specified in paragraph Spot Type Detectors, mounted in a special housing fitted with duct sampling tubes. Detector circuitry must be mounted in a metallic or plastic enclosure exterior to the duct. It is not permitted to cut the duct insulation to install the duct detector directly on the duct. Detectors must be listed for operation over the complete range of air velocities, temperature and humidity expected at the detector when the air-handling system is operating. Detectors must be powered from the FMCU.

1. Sampling tubes must run the full width of the duct. The duct detector package must conform to the requirements of NFPA 90A, UL 268A, and must be listed for use in air-handling systems. The control functions, operation, reset, and bypass must be controlled from the FMCU.

2. Lights to indicate the operation and alarm condition must be visible and accessible with the unit installed and the cover in place. Remote indicators must be provided where required by NFPA 72. Remote indicators as well as the affected fan units must be properly identified in etched plastic placards.

3. Detectors must provide for control of auxiliary contacts that provide control, interlock, and shutdown functions specified in Section 23 09 00 to INSTRUMENTATION AND CONTROL FOR HVAC. Auxiliary contacts provide for this function must be located within 3 feet of the controlled circuit or appliance. The auxiliary contacts must be supplied by the fire alarm system manufacturer to ensure complete system compatibility.

2.9 HEAT DETECTORS

2.9.1 Heat Detectors

Heat detectors must be analog/addressable and designed for detection of fire by combination fixed temperature and rate-of-rise principle in accordance with UL 521. The alarm condition must be determined by comparing detector value with the stored values. Detectors located in areas subject to moisture, exterior atmospheric conditions, or hazardous locations as defined by NFPA 70, must be types approved for such locations.

2.9.1.1 Combination Fixed-Temperature and Rate-of-Rise Detectors

Detectors must be semi-flush mounted in the horizontal orientation and supported independently of wiring connections. Detectors must be self-resetting. Detector must operate at 135 degrees F. Detector must feature rate compensation. Detectors rated to operate at 135 degrees F must not respond to momentary temperature fluctuations less than 30 degrees F per minute between 60 and 100 degrees F.

2.10 ADDRESSABLE INTERFACE DEVICES

The initiating device being monitored must be configured as a Class "B" initiating device circuits. The module must be listed as compatible with the control unit. The module must provide address setting means compatible with the control unit's SLC supervision and store an internal identifying code. Monitor module must contain an integral LED that flashes each time the monitor module is polled and is visible through the device cover plate. Pull stations with a monitor module in a common backbox are not required to have an LED. Modules must be listed for the environmental conditions in which they will be installed.

2.11 ADDRESSABLE CONTROL MODULES

The control module must be capable of operating as a relay (dry contact form C) for interfacing the control unit with other systems, and to control door holders. The module must be listed as compatible with the control unit. The indicating device or the external load being controlled must be configured as Class B notification appliance circuits. The system must be capable of supervising, audible, visual and dry contact circuits. The control module must have both an input and output address. The supervision must detect a short on the supervised circuit and must prevent power from being applied to the circuit. The control module must provide address setting means compatible with the control unit's SLC supervision and store an internal identifying code. The control module must contain an integral LED that flashes each time the control module is polled and is visible through the device cover plate. Control Modules must be listed for the environmental conditions in which they will be installed.

2.12 ISOLATION MODULES

A. Provide isolation modules to subdivide each signaling line circuit into groups of not more than 20 addressable devices in accordance with NFPA 72 between adjacent isolation modules.
B. Isolation modules must provide short circuit isolation for signaling line circuit wiring.
C. Power and communications must be supplied by the SLC and must report faults to the FMCU.
D. After the wiring fault is repaired, the fault isolation modules must test the lines and automatically restore the connection.

2.13 NOTIFICATION APPLIANCES

2.13.1 Audible Notification Appliances

Audible appliances must conform to the applicable requirements of UL 464. Appliances must be connected into notification appliance circuits. Surface mounted audible appliances must be painted white. Recessed audible appliances must be installed with a grill that is painted white with a factory finish to match the surface to which it is mounted.

2.13.1.1 Speakers

A. Speakers must conform to the applicable requirements of UL 1480. Speakers must have six different sound output levels and operate with audio line input levels of 70.7 VRMs and 25 VRMs, by means of selectable tap settings. Interior speaker tap settings must include taps of 1/4, 1/2, 1, and 2 watt, at a minimum. Exterior speakers must also be multi-tapped with no more than 15 watt maximum setting. Speakers must incorporate a high efficiency speaker for maximum output at minimum power across a frequency range of 400 Hz to 4,000 Hz, and must have a sealed back construction. Speakers must be capable of installation on standard 4-inch square electrical boxes. Where speakers and strobes are provided in the same location, they may be combined into a single unit. All inputs must be polarized for compatibility with standard reverse polarity supervision of circuit wiring via the FMCU.

B. Provide speaker mounting plates constructed of cold rolled steel having a minimum thickness of 16 gage or molded high impact plastic and equipped with mounting holes and other openings as needed for a complete installation. Fabrication marks and holes must be ground and finished to provide a smooth and neat appearance for each plate. Each plate must be primed and painted.

C. Speakers must utilize screw terminals for termination of all field wiring.

2.13.2 Visual Notification Appliances

Visual notification appliances must conform to the applicable requirements of UL 1638, UL 1971 and conform to the Architectural Barriers Act (ABA). Visual Notification Appliances must have clear high intensity optic lens, xenon flash tubes, or light emitting diode (LED) and be marked "Alert" in letters of contrasting color. The light pattern must be dispersed so that it is visible above and below the strobe and from a 90 degree angle on both sides of the strobe. Strobe flash rate must be 1 flash per second and a minimum of 15 candela based on the UL 1971 test. Strobe must be semi-flush mounted.

2.13.3 Textual Display Signs

A. Textual display signs must be LED scrolling and must not exceed 16 inches long by 6 inches high by 3 inches deep with a height necessary to meet the requirements of NFPA 72. The text display must spell out the word "EVACUATE" or "ANNOUNCEMENT" and the remainder of the emergency instructions as appropriate. The design of text display must be such that it cannot be read when not illuminated.

B. LED scrolling text displays must meet the following requirements at a minimum:

1. Two lines of information for high priority messaging.
2. Minimum of 20 characters per line (40 total) displayed.
3. Text must be no less than height requirements and color/contrast requirements of NFPA 72.

4. 32K character memory.
5. Display must be wall or ceiling mounted.
6. Mounting brackets for a convenient wall/cubicle mount.
7. During non-emergency periods, display date and time.
8. The system must interface with the textual display sign control panel to activate the proper message.

2.14 ELECTRIC POWER

2.14.1 Primary Power

Power must be 120 VAC 60 Hz service for the FMCU from the AC service to the building in accordance with NFPA 72.

2.15 SECONDARY POWER SUPPLY

Provide for system operation in the event of primary power source failure. Transfer from normal to auxiliary (secondary) power or restoration from auxiliary to normal power must be automatic and must not cause transmission of a false alarm.

2.15.1 Batteries

Provide sealed, maintenance-free, sealed lead acid batteries as the source for emergency power to the FMCU. Batteries must contain suspended electrolyte. The battery system must be maintained in a fully charged condition by means of a solid state battery charger. Provide an automatic transfer switch to transfer the load to the batteries in the event of the failure of primary power.

2.15.1.1 Capacity

A. Battery size must be the greater of the following two capacities. This capacity applies to every control unit associated with this system, including supplemental notification appliance circuit panels, auxiliary power supply panels, fire alarm transmitters, and Base-wide mass notification transceivers. When determining the required capacity under alarm condition, visual notification appliances must include both textual and non-textual type appliances.

1. Sufficient capacity to operate the fire alarm system under supervisory and trouble conditions, including audible trouble signal devices for 48 hours and audible and visual signal devices under alarm conditions for an additional 15 minutes.

2. Sufficient capacity to operate the mass notification for 60 minutes after loss of AC power.

2.15.1.2 Battery Power Calculations

A. Verify that battery capacity exceeds supervisory and alarm power requirements for the criteria noted in the paragraph "Capacity" above.

1. Substantiate the battery calculations for alarm and supervisory power requirements. Include ampere-hour requirements for each system component and each control unit component, and compliance with UL 864.

2. Provide complete battery calculations for both the alarm and supervisory power requirements. Submit ampere-hour requirements for each system component with the calculations.

3. Provide voltage drop calculations to indicate that sufficient voltage is available for proper operation of the system and all components. Calculations must be performed using the minimum rated voltage of each component.

B. For battery calculations assume a starting voltage of 24 VDC for starting the calculations to size the batteries. Calculate the required Amp-Hours for the specified standby time, and then calculate the required Amp-Hours for the specified alarm time. Using 20.4 VDC as starting voltage, perform a voltage drop calculation for circuits containing device and/or appliances remote from the power sources.

2.15.2 Battery Chargers

Provide a solid state, fully automatic, variable charging rate battery charger. The charger must be capable of providing 120 percent of the connected system load and must maintain the batteries at full charge. In the event the batteries are fully discharged (20.4 Volts dc), the charger must recharge the batteries back to 95 percent of full charge within 48 hours after a single discharge cycle as described in paragraph CAPACITY above. Provide pilot light to indicate when batteries are manually placed on a high rate of charge as part of the unit assembly if a high rate switch is provided.

2.16 SURGE PROTECTIVE DEVICES

A. Surge protective devices must be provided to suppress all voltage transients which might damage fire alarm control unit components. Systems having circuits located outdoors, communications equipment must be protected against surges induced on any signaling line circuit. Cables and conductors, that serve as communications links, must have surge protection circuits installed at each end. The surge protective device must wire in series to the power supply of the protected equipment with screw terminations. Line voltage surge arrestor must be installed directly adjacent to the power panel where the FMCU breaker is located.

1. Surge protective devices for nominal 120 VAC must be UL 1449 listed with a maximum 500 volt suppression level and have a maximum response time of 5 nanoseconds. The surge protective device must also meet IEEE C62.41.1 and IEEE C62.41.2 category B tests for surge capacity. The surge protective device must feature multi-stage construction and be provided with a long-life indicator lamp (either light emitting diode or neon) which extinguishes upon failure of protected components. Any unit fusing must be externally accessible.

2. Surge protective devices for nominal 24 VAC, fire alarm telephone dialer, or ethernet connection must be UL 497B listed, meet IEEE C62.41.1 and have a maximum response time of 1-nanosecond. The surge protective device must feature multi-stage construction and be self-resetting. The surge protective device must be a base and plug style. The base assembly must have screw terminals for fire alarm wiring. The base assembly must accept "plug-in" surge protective module.

3. All surge protective devices (SPD) must be the standard product of a single manufacturer and be equal or better than the following:

a. For 120 VAC nominal line voltage: UL 1449 and UL 1283 listed, series connected 120 VAC, 20A rated, surge protective device in a NEMA 4x enclosure. Minimum 50,000 amp surge current rating with EMI/RFI filtering and a dry contact circuit for remote monitoring of surge protection status.

b. For 24-volt nominal line voltage: UL 497B listed, series connected low voltage, 24-volt, 5A rated, loop circuit protector, base and replaceable module.

c. For alarm telephone dialers: UL 497A listed, series connected, 130-volt, 150 mA rated with self-resetting fuse, dialer circuit protector with modular plug and play.

d. For IP-DACTS: UL 497B listed, series connected, 6.4-volt, 1.5A rated with 20 kA/pair surge current, data network protector with modular plug and play.

2.17 WIRING

Provide wiring materials under this section as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM with the additions and modifications specified herein.

2.17.1 Alarm Wiring

IDC and SLC wiring must be solid copper cable in accordance with the manufacturers requirements. Copper signaling line circuits and initiating device circuit field wiring must be No. 18 AWG size conductors at a minimum. Visual notification appliance circuit conductors, that contain audible alarm appliances, must be copper No. 14 AWG size conductors at a minimum. Speaker circuits must be copper No. 16 AWG size twisted and shielded conductors at a minimum. Wiring for textual notification appliance circuits must be in accordance with manufacturer's requirements but must be supervised by the FMCU. Wire size must be sufficient to prevent voltage drop problems. Circuits operating at 24 VDC must not operate at less than the listed voltages for the detectors and/or appliances. Power wiring, operating at 120 VAC minimum, must be a minimum No. 12 AWG solid copper having similar insulation. Acceptable power-limited cables are FPL, FPLR or FPLP as appropriate with red colored covering. Nonpower-limited cables must comply with NFPA 70.

2.18 AUTOMATIC FIRE ALARM TRANSMITTERS

2.18.1 Radio Transmitter and Interface Panels

Transmitters must be compatible with proprietary supervising station receiving equipment. Each radio alarm transmitter must be the manufacturer's recognized commercial product, completely assembled, wired, factory tested, and delivered ready for installation and operation. Transmitters must be provided in accordance with applicable portions of NFPA 72, Federal Communications Commission (FCC) 47 CFR 90 and Federal Communications Commission (FCC) 47 CFR 15. Transmitter electronics module must be contained within the physical housing as an integral, removable assembly. At the contractors option, and if listed, the transmitter may be housed in the same control unit as the FMCU. The transmitter must be narrowband radio, with FCC certification for narrowband operation and meets the requirements of the NTIA (National Telecommunications and Information Administration) Manual of Regulations and Procedures for Federal Frequency Management.

2.18.1.1 Operation

Operate each transmitter from 120-volt ac power. In the event of 120-volt ac power loss, the transmitter must automatically switch to battery operation. Switchover must be accomplished with no interruption of protective service, and must automatically transmit a trouble message. Upon restoration of ac power, transfer back to normal ac power supply must also be automatic.

2.18.1.2 Battery Power

Transmitter standby battery capacity must provide sufficient power to operate the transmitter in a normal standby status for a minimum of 72 hours and be capable of transmitting alarms during that period.

2.18.1.3 Transmitter Housing

Use NEMA Type 1 for housing. The housing must contain a lock that is keyed identical to the fire alarm system for the building. Radio alarm transmitter housing must be factory painted with a suitable priming coat and not less than two coats of a hard, durable weatherproof enamel.

2.18.1.4 Antenna

Antennas must be for radio alarm transmitters with a driving point impedance to match transmitter output. The antenna and antenna mounts must be corrosion resistant and designed to withstand wind velocities of 100 mph. Do not mount antennas to any portion of the building roofing system. Protect the antenna from physical damage.

2.18.2 Signals to Be Transmitted to the Base Receiving Station

A. The following signals must be sent to the base receiving station:

1. Sprinkler waterflow
2. Manual pull stations
3. Smoke detectors
4. Duct smoke detectors
5. Heat detectors
6. Fire extinguishing system
7. Sprinkler valve supervision

2.19 SYSTEM MONITORING

2.19.1 Valves

Each valve affecting the proper operation of a fire protection system, including automatic sprinkler control valves, sprinkler service entrance valve, isolating valves for pressure type waterflow or supervision switches, and valves at backflow preventers, whether supplied under this contract or existing, must be electrically monitored to ensure its proper position. Provide each tamper switch with a separate address.

2.19.2 Room Low Temperature Supervisory Switch

Provide monitoring of the listed supervisory air temperature switch for the sprinkler riser room. Switch must cause a supervisory signal to be transmitted to the FMCU whenever the temperature in the room drops to below 40 degrees F. Device must reset when temperature rises above 40 degrees F.

2.19.3 Electromagnetic Door Holders

Electromagnetic holding devices must operate on 24 VDC and require not more than 3 watts of power to develop 25 psi of holding force. Under normal conditions, the magnets must attract and

hold the doors open. Operation must be fail safe with no moving parts. Electromagnetic door hold-open devices must not be required to be held open during building power failure. The device must be listed based on UL 228 tests.

2.20 ENVIRONMENTAL ENCLOSURES OR GUARDS

Environmental enclosures must be provided to permit fire alarm/mass notification components to be used in areas that exceed the environmental limits of the listing. The enclosure must be listed for the device or appliance as either a manufactured part number or as a listed compatible accessory for the component is currently listed. Guards required to deter mechanical damage must be either a listed manufactured part or a listed accessory for the category of the initiating device or notification appliance.

PART 3 - EXECUTION

3.1 VERIFYING ACTUAL FIELD CONDITIONS

Before commencing work, examine all adjoining work on which the contractor's work is in any way dependent for perfect workmanship according to the intent of this specification section, and report to the Contracting Officer's Representative any condition which prevents performance of first class work. No "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed before submittal of a proposal.

3.2 INSTALLATION

3.2.1 Fire Alarm and Mass Notification Control Unit (FMCU)

Locate the FMCU where indicated on the drawings. Semi-recess the enclosure with the top of the cabinet 6 feet above the finished floor or center the cabinet at 5 feet, whichever is lower. Conductor terminations must be labeled and a drawing containing conductors, their labels, their circuits, and their interconnection must be permanently mounted in the FMCU. Locate the document storage cabinet adjacent to the FMCU unless the Contracting Officer directs otherwise.

3.2.2 Battery Cabinets

When batteries will not fit in the FMCU, locate battery cabinets below or adjacent to the FMCU. Battery cabinets must be installed at an accessible location when standing at floor level. Battery cabinets must not be installed lower than 12 inches above finished floor, measured to the bottom of the cabinet, nor higher than 36 inches above the floor, measured to the top of the cabinet. Installing batteries above drop ceilings or in inaccessible locations is prohibited. Battery cabinets must be large enough to accommodate batteries and also to allow ample gutter space for interconnection of control units as well as field wiring. The cabinet must be provided in a sturdy steel housing, complete with back box, hinged steel door with cylinder lock, and surface mounting provisions.The cabinet must be identified by an engraved phenolic resin nameplate. Lettering on the nameplate must indicate the control unit(s) the batteries power and must not be less than 1-inch high.

3.2.3 Manual Stations

Locate manual stations as required by NFPA 72 and as indicated on the drawings. Mount stations so they are located no farther than 5 feet from the exit door they serve, measured horizontally. Manual stations must be mounted at 44 inches measured to the operating handle.

3.2.4 Notification Appliances

A. Locate notification appliance devices as required by NFPA 72 and to meet the intelligibility requirements. Where two or more visual notification appliances are located in the same room or corridor or field of view, provide synchronized operation. Devices must use screw terminals for all field wiring. Audible and visual notification appliances mounted in acoustical ceiling tiles must be centered in the tiles plus or minus 2 inches.

B. Audible and visual notification appliances mounted on the exterior of the building, within unconditioned spaces, or in the vicinity of showers must be listed weatherproof appliances installed on weatherproof backboxes.

C. Speakers must not be located in close proximity to the FMCU or LOC so as to cause feedback when the microphone is in use.

3.2.5 Smoke and Heat Detectors

Locate detectors as required by NFPA 72 and their listing and as indicated on the drawings on a 4-inch mounting box. Install heat detectors not less than 4 inches from a side wall to the near edge. Heat detectors located on the wall must have the top of the detector at least 4 inches below the ceiling, but not more than 12 inches below the ceiling. Smoke detectors are permitted to be on the wall no lower than 12 inches from the ceiling with no minimum distance from the ceiling. Install smoke detectors no closer than 3 feet from air handling supply diffusers. Detectors installed in acoustical ceiling tiles must be centered in the tiles plus or minus 2 inches.

3.2.6 LCD REMOTE Annunciator

Locate the LCD annunciator as shown on the drawings. Mount the annunciator, with the top 6 feet above the finished floor or center the annunciator at 5 feet, whichever is lower.

3.2.7 Electromagnetic Door Holder Release

Doors must be held open at a minimum of 90 degrees so as not to impede egress from the space. Mount the armature portion on the door and have an adjusting screw for seating the angle of the contact plate. Wall-mount the electromagnetic release, with a total horizontal projection not exceeding 4 inches. Ensure all doors release to close upon first stage (pre-discharge) alarm. Electrical supervision of wiring external of control unit for magnetic door holding circuits is not required.

3.2.8 Local Operating Console (LOC)

Locate the LOC(s) as required by NFPA 72 and as indicated. Mount the console so that the top message button and microphone is no higher than 4 feet above the floor and the bottom (lowest) message button and microphone is at least 3 feet above the finished floor.

3.2.9 Ceiling Bridges

Provide ceiling bridges for ceiling-mounted appliances. Ceiling bridges must be as recommended/required by the manufacturer of the ceiling-mounted notification appliance.

3.3 SYSTEM FIELD WIRING

3.3.1 Wiring within Cabinets, Enclosures, and Boxes

A. Provide wiring installed in a neat and workmanlike manner and installed parallel with or at right angles to the sides and back of any box, enclosure, or cabinet. Conductors that are terminated, spliced, or otherwise interrupted in any enclosure, cabinet, mounting, or junction box must be connected to screw-type terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. The use of wire nuts or similar devices is prohibited. Wiring to conform with NFPA 70.

B. Indicate the following in the wiring diagrams:

1. Point-to-point wiring diagrams showing the points of connection and terminals used for electrical field connections in the system, including interconnections between the equipment or systems that are supervised or controlled by the system. Diagrams must show connections from field devices to the FMCU and remote fire alarm/mass notification control units, initiating circuits, switches, relays and terminals.

2. Complete riser diagrams indicating the wiring sequence of devices and their connections to the control equipment. Include a color code schedule for the wiring. Include floor plans showing the locations of devices and equipment.

3.3.2 Terminal Cabinets

Provide a terminal cabinet at the base of any circuit riser, on each floor at each riser, and where indicated on the drawings. Terminal size must be appropriate for the size of the wiring to be connected. Conductor terminations must be labeled and a drawing containing conductors, their labels, their circuits, and their interconnection must be permanently mounted in the terminal cabinet. Minimum size is 8 inches by 8 inches. Only screw-type terminals are permitted. Provide an identification label, that displays "FIRE ALARM TERMINAL CABINET" with 2-inch lettering, on the front of the terminal cabinet.

3.3.3 Alarm Wiring

A. Voltages must not be mixed in any junction box, housing or device, except those containing power supplies and control relays.
B. Utilize shielded wiring where recommended by the manufacturer. For shielded wiring, ground the shield at only one point, in or adjacent to the FMCU.
C. Pigtail or T-tap connections to signal line circuits, initiating device circuits, supervisory alarm circuits, and notification appliance circuits are prohibited.
D. Color coding is required for circuits and must be maintained throughout the circuit. Conductors used for the same functions must be similarly color coded. Conform wiring to NFPA 70.
E. Pull all conductors splice free. The use of wire nuts, crimped connectors, or twisting of conductors is prohibited. Where splices are unavoidable, the location of the junction box or pull box where they occur must be identified on the as-built drawings. The number and location of splices must be subject to approval by the Designated Fire Protection Engineer (DFPE).

3.3.4 Back Boxes and Conduit

A. Provide all wiring in rigid metal conduit or intermediate metal conduit unless specifically indicated otherwise. Minimum conduit size must be 3/4-inch in diameter. Do not use electrical non-metallic tubing (ENT) or flexible non-metallic tubing and associated fittings.

1. Galvanized rigid steel (GRS) conduit must be utilized where exposed to weather, where subject to physical damage, and where exposed on exterior of buildings. Intermediate metal conduit (IMC) may be used in lieu of GRS as allowed by NFPA 70.

2. Electrical metallic tubing (EMT) is permitted above suspended ceilings or exposed where not subject to physical damage. Do not use EMT underground, encased in concrete, mortar, or grout, in hazardous locations, where exposed to physical damage, outdoors or in fire pump rooms. Use die-cast compression connectors.

3. For rigid metallic conduit (RMC), only threaded type fitting are permitted for wet or damp locations.

4. Flexible metal conduit is permitted for initiating device circuits 6 feet in length or less. Flexible metal conduit is prohibited for notification appliance circuits and signaling line circuits. Use liquid tight flexible metal conduit in damp and wet locations.

5. Schedule 40 (minimum) polyvinyl chloride (PVC) is permitted where conduit is routed underground or underground below floor slabs. Convert non-metallic conduit, other than PVC Schedule 40 or 80, to plastic-coated rigid, or IMC, steel conduit before turning up through floor slab.

6. Exterior wall penetrations must be weathertight. Conduit must be sealed to prevent the infiltration of moisture.

3.3.5 Conductor Terminations

Labeling of conductors at terminal blocks in terminal cabinets, FMCU, and remote FMCU and the LOC must be provided at each conductor connection. Each conductor or cable must have a shrink-wrap label to provide a unique and specific designation. Each terminal cabinet, FMCU, and remote FMCU must contain a laminated drawing that indicates each conductor, its label, circuit, and terminal. The laminated drawing must be neat, using 12 point lettering minimum size, and mounted within each cabinet, control unit, or unit so that it does not interfere with the wiring or terminals. Maintain existing color code scheme where connecting to existing equipment.

3.4 DISCONNECTION AND REMOVAL OF EXISTING SYSTEM

A. Maintain existing fire alarm equipment fully operational until the new equipment has been tested and accepted by the Contracting Officer. As new equipment is installed, label it "NOT IN SERVICE" until the new equipment is accepted. Once the new system is completed, tested, and accepted by the Government, it must be placed in service and connected to the supervising station. Remove tags from new equipment and tag the existing equipment "NOT IN SERVICE" until removed from the building.

1. After acceptance of the new system by the Contracting Officer, remove existing equipment not connected to the new system, remove unused exposed conduit, and restore damaged surfaces. Remove the material from the site and dispose.

2. Disconnect and remove the existing fire alarm/mass notification and smoke detection systems where indicated and elsewhere in the specification.

3. Control units and fire alarm devices and appliances disconnected and removed must be turned over to the Contracting Officer.

4. Properly dispose of fire alarm outlet and junction boxes, wiring, conduit, supports, and other such items.

3.5 CONNECTION OF NEW SYSTEM

A. The following new system connections must be made during the last phase of construction, at the beginning of the pre-Government tests. New system connections must include:

1. Connection of new relays to existing magnetic door hold-open devices.

2. Connection of new system transmitter to existing installation fire reporting system.

B. Once these connections are made, system must be left energized. Report immediately to the Contracting Officer, coordination and field problems resulting from the connection of the above components.

3.6 FIRESTOPPING

Provide firestopping for holes at conduit penetrations through fire-rated walls, partitions with fire-rated doors, and corridor walls in accordance with Section 07 84 00 FIRESTOPPING.

3.7 PAINTING

A. In unfinished areas (including areas above drop ceilings), paint all exposed electrical conduit (serving fire alarm equipment), fire alarm conduit, surface metal raceway, junction boxes and covers red. In lieu of painting conduit, the contractor may utilize red conduit with a factory applied finish.

B. In finished areas, paint exposed electrical conduit (serving fire alarm equipment), fire alarm conduit, surface metal raceways, junction boxes, and electrical boxes to match adjacent finishes. The inside cover of the junction box must be identified as "Fire Alarm" and the conduit must have painted red bands 3/4-inch wide at 10-foot centers and at each side of a floor, wall, or ceiling penetration.

3.8 FIELD QUALITY CONTROL

3.8.1 Test Procedures

A. Submit detailed test procedures, prepared and signed by the NICET Level IV Fire Alarm Technician, and the representative of the installing company, and reviewed by the QFPE 60 days prior to performing system tests. Detailed test procedures must list all components of the installed system such as initiating devices and circuits, notification appliances and circuits, signaling line devices and circuits, control devices/equipment, batteries, transmitting and receiving equipment, power sources/supply, annunciators, special hazard equipment, emergency communication equipment, interface equipment, and surge protective devices. Test procedures must include sequence of testing, time estimate for each test, and sample test data forms. The test data forms must be in a check-off format (pass/fail with space to add applicable test data; similar to the forms in NFPA 72 and NFPA 4.) The test procedures and accompanying test data forms must be used for the pre-Government testing and the Government testing. The test data forms must record the test results and must:

1. Identify the NFPA Class of all Initiating Device Circuits (IDC), and Notification Appliance Circuits (NAC), Voice Notification System Circuits (NAC Audio), and Signaling Line Circuits (SLC).

2. Identify each test required by NFPA 72 Test Methods and required test herein to be performed on each component, and describe how these tests must be performed.

3. Identify each component and circuit as to type, location within the facility, and unique identity within the installed system. Provide necessary floor plan sheets showing each component location, test location, and alphanumeric identity.

4. Identify all test equipment and personnel required to perform each test (including equipment necessary for smoke detector testing. The use of magnets is not permitted.

5. Provide space to identify the date and time of each test. Provide space to identify the names and signatures of the individuals conducting and witnessing each test.

3.8.2 Pre-Government Testing

3.8.2.1 Verification of Compliant Installation

A. Conduct inspections and tests to ensure that devices and circuits are functioning properly. Tests must meet the requirements of paragraph entitled "Minimum System Tests" as required by NFPA 72. The contractor and an authorized representative from each supplier of equipment must be in attendance at the pre-Government testing to make necessary adjustments. After inspection and testing is complete, provide a signed Verification of Compliant Installation letter by the QFPE that the installation is complete, compliant with the specification and fully operable. The letter must include the names and titles of the witnesses to the pre-Government tests. Provide all completion documentation as required by NFPA 72 including all referenced annex sections and the test reports noted below.

1. NFPA 72 Record of Completion.
2. NFPA 72 Record of Inspection and Testing.
3. Fire Alarm and Emergency Communication System Inspection and Testing Form.
4. Audibility test results with marked-up test floor plans.
5. Intelligibility test results with marked-up floor plans.
6. Documentation that all tests identified in the paragraph "Minimum System Tests" are complete.

3.8.2.2 Request for Government Final Test

When the verification of compliant installation has been completed, submit a formal request for Government final test to the Designated Fire Protection Engineer (DFPE) and Contracting Officer's Representative (COR). Government final testing will not be scheduled until the DFPE has received copies of the request for Government final testing and Verification of Compliant Installation letter with all required reports. Government final testing will not be performed until after the connections to the installation-wide fire reporting system been completed and tested to confirm communications are fully functional. Submit request for test at least 15 calendar days prior to the requested test date.

3.8.3 Correction of Deficiencies

If equipment was found to be defective or non-compliant with contract requirements, perform corrective actions and repeat the tests. Tests must be conducted and repeated if necessary until the system has been demonstrated to comply with all contract requirements.

3.8.4 Government Final Tests

A. The tests must be performed in accordance with the approved test procedures in the presence of the DFPE. Furnish instruments and personnel required for the tests. The following must be provided at the job site for Government Final Testing:

1. The manufacturer's technical representative.
2. The contractor's Qualified Fire Protection Engineer (QFPE).
3. Marked-up red line drawings of the system as actually installed.
4. Loop resistance test results.

5. Complete program printout including input/output addresses.
6. Copy of pre-Government Test Certificate, test procedures and completed test data forms.
7. Audibility test results with marked-up floor plans.
8. Intelligibility test results with marked-up floor plans.

B. Government Final Tests will be witnessed by the Designated Fire Protection Engineer, Contracting Officer's Representative (COR), Qualified Fire Protection Engineer (QFPE). At this time, any and all required tests noted in the paragraph "Minimum System Tests" must be repeated at their discretion.

3.9 MINIMUM SYSTEM TESTS

3.9.1 System Tests

A. Test the system in accordance with the procedures outlined in NFPA 72. The required tests are as follows:

1. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests must be witnessed by the Contracting Officer and test results recorded for use at the final Government test.

2. Verify the absence of unwanted voltages between circuit conductors and ground. The tests must be accomplished at the pre-Government test with results available at the final system test.

3. Verify that the control unit is in the normal condition as detailed in the manufacturer's O&M manual.

4. Test each initiating device and notification appliance and circuit for proper operation and response at the control unit. Smoke detectors must be tested in accordance with manufacturer's recommended calibrated test method. Use of magnets is prohibited. Testing of duct smoke detectors must comply with the requirements of NFPA 72 except disconnect at least 20 percent of devices. If there is a failure at these devices, then supervision must be tested at each device.

5. Test the system for specified functions in accordance with the contract drawings and specifications and the manufacturer's O&M manual.

6. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the time period and in the manner specified.

7. Determine that the system is operable under trouble conditions as specified.

8. Visually inspect wiring.

9. Test the battery charger and batteries.

10. Verify that software control and data files have been entered or programmed into the FMCU. Hard copy records of the software must be provided to the Contracting Officer.

11. Verify that red-line drawings are accurate.

12. Measure the current in circuits to ensure there is the calculated spare capacity for the circuits.

13. Measure voltage readings for circuits to ensure that voltage drop is not excessive.

14. Disconnect the verification feature for smoke detectors during tests to minimize the amount of smoke needed to activate the sensor. Testing of smoke detectors must be conducted using real smoke or the use of canned smoke which is permitted.

15. Measure the voltage drop at the most remote appliance (based on wire length) on each notification appliance circuit.

16. Verify the documentation cabinet is installed and contains all as-built shop drawings, product data sheets, design calculations, site-specific software data package, and all documentation required by paragraph titled "Test Reports".

3.9.2 Audibility Tests

Sound pressure levels from audible notification appliances must be a minimum of 15 dBa over ambient with a maximum of 110 dBa in any occupiable area. The provisions for audible notification (audibility and intelligibility) must be met with doors, fire shutters, movable partitions, and similar devices closed.

3.9.3 Intelligibility Tests

A. Intelligibility testing of the System must be accomplished in accordance with NFPA 72 for Voice Evacuation Systems, and ASA S3.2. Following are the specific requirements for intelligibility tests:

1. Intelligibility Requirements: Verify intelligibility by measurement after installation.

2. Ensure that a CIS value greater than the required minimum value is provided in each area where building occupants typically could be found. The minimum required value for CIS is .8. Rounding of values is permitted.

3. Areas of the building provided with hard wall and ceiling surfaces (such as metal or concrete) that are found to cause excessive sound reflections may be permitted to have a CIS score less than the minimum required value if approved by the DFPE, and if building occupants in these areas can determine that a voice signal is being broadcast and they must walk no more than 33 feet to find a location with at least the minimum required CIS value within the same area.

4. Areas of the building where occupants are not expected to be normally present are permitted to have a CIS score less than the minimum required value if personnel can determine that a voice signal is being broadcast and they must walk no more than 50 feet to a location with at least the minimum required CIS value within the same area.

5. Take measurements near the head level applicable for most personnel in the space under normal conditions (e.g., standing, sitting, sleeping, as appropriate).

6. The distance the occupant must walk to the location meeting the minimum required CIS value must be measured on the floor or other walking surface as follows:

   a. Along the centerline of the natural path of travel, starting from any point subject to occupancy with less than the minimum required CIS value.
   b. Curving around any corners or obstructions, with a 12 inches clearance there from.
   c. Terminating directly below the location where the minimum required CIS value has been obtained.

B. Use commercially available test instrumentation to measure intelligibility as specified by NFPA 72 as applicable. Use the mean value of at least three readings to compute the intelligibility score at each test location.

3.10 SYSTEM ACCEPTANCE

A. Following acceptance of the system, as-built drawings and O&M manuals must be delivered to the Contracting Officer for review and acceptance. The drawings must show the system as installed, including deviations from both the project drawings and the approved shop drawings. These drawings must be submitted within two weeks after the final Government test of the system. At least one set of as-built (marked-up) drawings must be provided at the time of, or prior to the Final Government Test.

1. The drawings must be prepared electronically and sized no less than the contract drawings. Furnish one set of CDs or DVDs containing software back-up and CAD based drawings in latest version of AutoCAD, DXF and portable document formats of as-built drawings and schematics.

2. Include complete wiring diagrams showing connections between devices and equipment, both factory and field wired.

3. Include a riser diagram and drawings showing the as-built location of devices and equipment.

4. Provide Operation and Maintenance (O&M) Instructions.

5. In existing buildings, the transfer of devices from the existing system to the new system and the permission to begin demolition of the old fire alarm system will not be permitted until the as-built drawings and O&M manuals are received.

3.11 INSTRUCTION OF GOVERNMENT EMPLOYEES

3.11.1 Instructor

Provide the services of an instructor, who has received specific training from the manufacturer for the training of other persons regarding the operation, inspection, testing, and maintenance of the system provided. The instructor must train the Government employees designated by the Contracting Officer, in the care, adjustment, maintenance, and operation of the fire alarm system. The instructor must be thoroughly familiar with all parts of this installation. The instructor must be trained in operating theory as well as in practical O&M work. Submit the instructors information and qualifications including the training history.

3.11.2 Required Instruction Time

Provide 8 hours of instruction after final acceptance of the system. The instruction must be given during regular working hours on such dates and times selected by the Contracting Officer. The instruction may be divided into two or more periods at the discretion of the Contracting Officer. The training must allow for rescheduling for unforeseen maintenance and/or fire department responses.

3.11.3 Technical Training Manual

Provide, in manual format, lesson plans, operating instructions, maintenance procedures, and training data for the training courses. The operations training must familiarize designated

government personnel with proper operation of the installed system. The maintenance training course must provide the designated government personnel adequate knowledge required to diagnose, repair, maintain, and expand functions inherent to the system.

3.12 EXTRA MATERIALS

3.12.1 Repair Service/Replacement Parts

A. Repair services and replacement parts for the system must be available for a period of 10 years after the date of final acceptance of this work by the Contracting Officer. During the warranty period, the service technician must be on-site within 24 hours after notification. All repairs must be completed within 24 hours of arrival on-site.

B. During the warranty period, the installing fire alarm contractor is responsible for conducting all required testing and maintenance in accordance with the requirements and recommended practices of NFPA 72 and the system manufacturer. Installing fire alarm contractor is NOT responsible for any damage resulting from abuse, misuse, or neglect of equipment by the end user.

3.12.2 Spare Parts

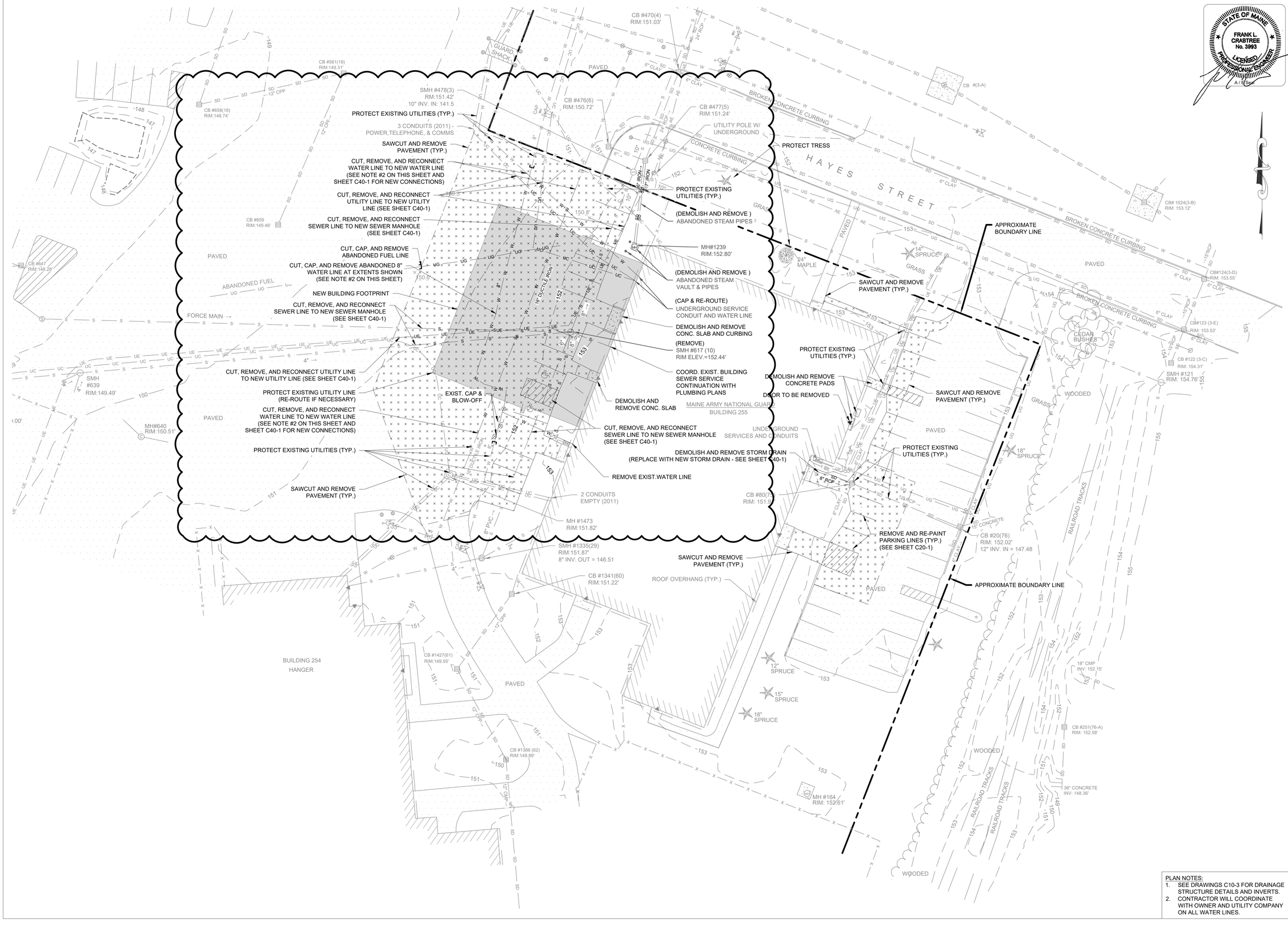
Spare parts furnished must be directly interchangeable with the corresponding components of the installed system. Spare parts must be suitably packaged and identified by nameplate, tagging, or stamping. Spare parts must be delivered to the Contracting Officer at the time of the Government testing and must be accompanied by an inventory list.

3.12.3 Document Storage Cabinet

A. Upon completion of the project, but prior to project close-out, place in the document storage cabinet copies of the following record documentation:

1. As-built shop drawings
2. Product data sheets
3. Design calculations
4. Site-specific software data package
5. All documentation required by SD-06.

-- End of Section --



PLAN NOTES:
1. SEE DRAWINGS C10-3 FOR DRAINAGE STRUCTURE DETAILS AND INVERTS.
2. CONTRACTOR WILL COORDINATE WITH OWNER AND UTILITY COMPANY ON ALL WATER LINES.

STATE OF MAINE
FRANK L. CRABTREE
No. 3993
LICENSED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY:	CWB
DRAWN BY:	CWB
CHECKED BY:	FLC
DATE:	08-13-2024
SCALE:	1" = 20'
DFE PROJECT NO:	23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

SITE DEMOLITION PLAN

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
C10-2
SHEET: 9 OF 176

NDMH-2
RIM ELEV. = 152.4
8" INV. IN (OVERFLOW NDMH-1) = 147.2
4" INV. IN (FILTER) = 146.8
4" INV. IN (FOOTING DRAIN) = 146.8
8" INV. OUT (CB #477) = 146.8

NEW DRAIN MANHOLE (NDMH-1)
RIM ELEV. = 152.5
8" INV. IN (ROOF DRAIN)= 149.5
8" INV. OUT (FILTER) = 149.5
8" INV. OUT (OVERFLOW NDMH-2) = 150.8

NEW 8" STORMDRAIN CONNECTION TO EXIST. CB #477 INV. = 146.59

CB #581(19) RIM:149.31'

CB #658(18) RIM:148.74'

CB #470(4) RIM:151.03'

CB #476(6) RIM:150.72'

CB #477(5) RIM:151.24'

CB #(3-A)

GUARD SHACK

RIM:151.42'
10" INV. IN: 141.5

3 CONDUITS (2011) - POWER,TELEPHONE, & COMMS

UTILITY POLE W/ UNDERGROUND

REMOVE AND SALVAGE PORTION OF CHAIN LINK-FENCE TO ENABLE UTILITY CONSTRUCTION AND REPLACE TO MATCH EXISTING (SECURE FENCE AT END OF EACH DAY)

CONNECT TO EXIST. WATER MAIN WITH TAPPING SLEEVE AND GATE VALVE (SEE NOTE #1) (COORD. WITH WATER DISTRICT)

PROTECT EXIST. TREES

HAYES STREET

NSMH 5
RIM = 150.7
10" INV. IN = 142.29
10" INV. OUT = 142.29

10' MIN. BETWEEN NEW WATER LINE AND NEW SEWER LINE

CB #659 RIM:149.46'

CB# 1524(3-B) RIM: 153.12'

APPROXIMATE BOUNDARY LINE

PAVED

GRASS

NEW WATER LINE RE-ALIGNMENTS

NEW UTILITY LINE CONNECTIONS (SEE NOTE #1)

NEW FOUNDATION UNDERDRAIN (TYP.)

NSMH 4
RIM = 151.2
EXIST. 8" FORCE MAIN INV. IN = 147.2± (SEE NOTE #1)
NEW 10" INV. IN = 142.93
NEW 10" INV. OUT = 142.93

ABANDONED FUEL

CONNECT 4" NUD (FOOTING DRAIN) TO 4" NSD INV. = 147.0

NEW UTILITY LINE AND WATER CONNECTIONS (COORD. WITH PLUMBING AND ELECTRICAL PLANS)

NEW UNDERDRAINED SUBSURFACE SAND FILTER
4 ROWS OF 5 = 20 CHAMBERS

CB#124(3-D) RIM: 153.55'

CB#123 (3-E) RIM: 153.53'

CB #122 (3-C) RIM: 154.31'

SMH #121 RIM: 154.76'

FORCE MAIN →

NEW UTILITY LINE CONNECTION (SEE NOTE #1)

NEW BUILDING ADDITION
FFE ELEV. = 153.7

NSMH 3
RIM = 151.2
EXIST. 4" INV. IN = 143.0 (SEE NOTE #1)
NEW 10" INV. IN = 143.0
NEW 10" INV. OUT = 143.0

NSMH 6
RIM = 152.5
10" INV. IN = 141.7
EXIST. 10" INV. OUT = 141.7± (SEE NOTE #1)

NEW 8" STORMDRAIN (ROOF DRAIN) INV. = 149.7 (COORD. WITH PLUMBING PLANS)

NEW 4" SEWER LINE INV. = 148.7 (COORD. WITH PLUMBING PLANS)

NEW SEWER LINE ALIGNMENT

NEW FOUNDATION UNDERDRAIN CLEANOUT (TYP. OF 3)

CONTRACTOR TO PROVIDE TEST PIT TO VERIFY LOCATION OF UNDERGROUND CONDUIT AND RELOCATE IF NECESSARY

MAINE ARMY NATIONAL GUARD
BUILDING 255

NEW HVAC UNIT (TYP. OF 4) (COORD. WITH MECHANICAL PLANS)

NEW UNDERGROUND ELECTRIC LINE CONNECTION (COORD. WITH ELECTRICAL PLANS)

SMH #639 RIM:149.49'

NEW SEWER MANHOLE (NSMH 2)
RIM = 151.4
NEW 10" INV. IN = 143.5
NEW 10" INV. OUT = 143.5

UNDERGROUND SERVICES AND CONDUITS

RAISE EXIST. CATCHBASIN COVER TO NEW GRADE AND CONNECT NEW SD TO EXIST. INV. OF 147.83
RIM = 152.65

MH#640 RIM:150.51'

NSMH 1
RIM = 153.5
NEW 4" INV. IN = 148.5
EXIST. 8" INV. IN = 145.6± (SEE NOTE #1)
NEW 10" INV. OUT = 145.67

NEW SPRINKLER & DOMESTIC WATER SERVICES (COORD. WITH PLUMBING PLANS)

NEW 6" GATE VALVE

NEW 2" GATE VALVE

NEW CATCHBASIN (NCB-1)
RIM = 152.24
12" INVS. = 147.7 ±
CONNECT TO EXIST. STORM DRAIN

CONNECT TO EXIST. WATER MAIN WITH TAPPING SLEEVE AND GATE VALVE (COORD. WITH WATER DISTRICT) (SEE NOTE #1)

NEW 6" STORM DRAIN TO REPLACE EXIST. STORM DRAIN (COORD. WITH PLUMBING PLANS)

2 CONDUITS EMPTY (2011)

CB #80(75)
~~RIM: 151.51'~~
NEW 8" INV. IN = 147.83
EXIST. INV. OUT = 147.75

MH #1479 RIM:151.82'

NEW TRANSFORMER ON 9'x9' CONC. PAD (COORD. WITH ELECTRICAL PLANS)

CB #20(76)
RIM: 152.02'
12" INV. IN = 147.48

SMH #1335(29)
RIM:151.87'
8" INV. OUT = 146.51

CB #1341(60) RIM:151.22'

ROOF OVERHANG (TYP.)

RAILROAD TRACKS

BUILDING 254
HANGER

CB #1427(61) RIM:149.55'

CB #1386 (62) RIM:149.99'

CB #251(76-A) RIM: 152.58'

18" CMP INV: 152.15'

36" CONCRETE INV: 148.36'

GREEN PAINT

MH #164 RIM: 152.61'

PLAN NOTES:
1. PROVIDE TEST PITS TO VERIFY EXISTING UTILITY INFRASTRUCTURE INVERTS PRIOR TO UTILITY CONSTRUCTION.
2. COORDINATE WITH BANGOR WATER DISTRICT FOR REVIEW OF WATER LINE CONSTRUCTION.
3. MAIN ENTRY GATE TO REMAIN CLEAR AND UNBLOCKED AT ALL TIMES.

STATE OF MAINE
FRANK L CRABTREE
No. 3993
LICENSED PROFESSIONAL ENGINEER
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FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY:	CWB
DRAWN BY:	CWB
CHECKED BY:	FLC
DATE:	08-13-2024
SCALE:	1" = 20'
DFE PROJECT NO:	23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

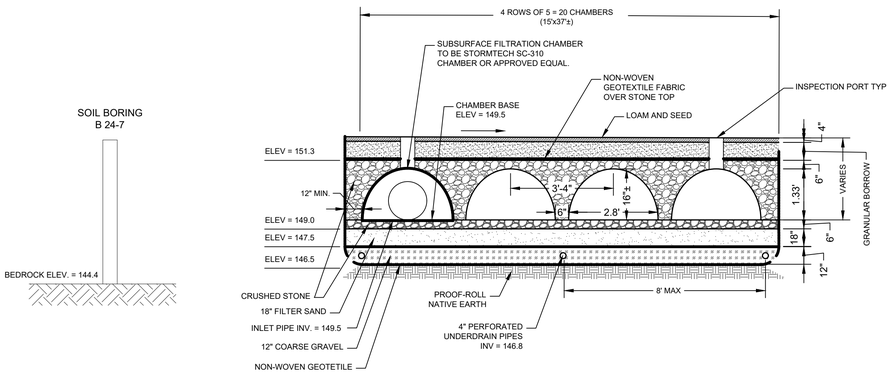
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

SITE UTILITY PLAN

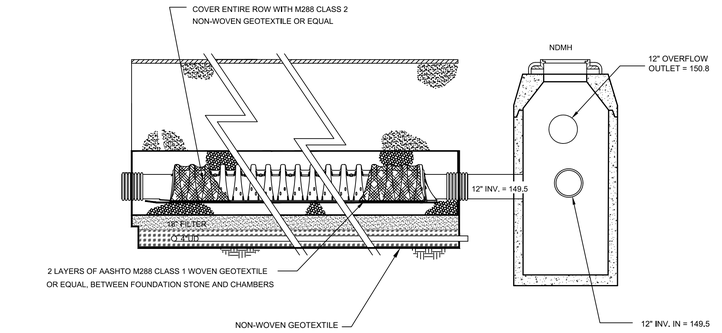
PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
C40-1
SHEET: 13 OF 176



C1 UNDERDRAIN SUBSURFACE SAND FILTER SECTION

SCALE: N.T.S



C4 ISOLATOR ROWS DETAIL

SCALE: N.T.S

STATE OF MAINE
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DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

CONSTRUCTION OVERSIGHT:

1. FIELD OBSERVATION OF THE INFILTRATION SYSTEMS SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY THE DESIGN ENGINEER . AT A MINIMUM, CONTRACTOR SHALL NOTIFY ARCHITECT ONE WEEK PRIOR TO THE FOLLOWING:
   - AFTER PRELIMINARY CONSTRUCTION OF THE STONES/FILTER GRADES AND ONCE THE PIPES ARE INSTALLED BUT NOT BACKFILLED;
   - AFTER THE STONES/FILTER MEDIA HAS BEEN PLACED AND CHAMBERS ARE BEING INSTALLED;
   - ALL MATERIAL USED FOR THE CONSTRUCTION OF THE INFILTRATION BASIN WILL BE APPROVED BY THE DESIGN ENGINEER AFTER TESTS BY A CERTIFIED LABORATORY SHOW THAT THEY ARE PASSING SPECIFICATIONS SHOWN ON THIS SHEET.

2. CHAMBER MANUFACTURER'S REPRESENTATIVE SHALL INSPECT THE CHAMBER INSTALLATION AT THE FOLLOWING TIMES:
   A. DURING INSTALLATION OF CHAMBERS. PARTICULARLY OBSERVING THE ISOLATOR ROW.
   B. FOLLOWING COMPLETION OF SYSTEM INSTALLATION AND BACK FILL.
   C. FOLLOWING STABILIZATION OF GROUND SURFACE AREAS DRAINING INTO THE CHAMBERS.

3. MAINTENANCE: PROVIDE THE MANUFACTURER'S REPRESENTATIVE FOR ONE YEAR OF MAINTENANCE FROM THE DATE OF SUBSTANTIAL COMPLETION.

SUBSURFACE INFILTRATION BASIN NOTES:

1. BASIN EXCAVATION: THE AREA OF THE BASIN MAY NOT BE USED FOR A SEDIMENT TRAP FROM THE SITE DURING CONSTRUCTION. AFTER EXCAVATION OF THE BASIN, THE OUTLET STRUCTURE AND PIPING SYSTEM MUST BE INSTALLED AT THE APPROPRIATE ELEVATION AND PROTECTED WITH A SEDIMENT BARRIER.
2. COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 90 AND 92% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN AT LEAST 2 LIFTS OF 9 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.
3. CONSTRUCTION SEQUENCE: EROSION AND SEDIMENTATION FROM UNSTABLE SUBCATCHMENTS IS THE MOST COMMON REASON FOR INFILTRATION FAILURE. NOT HEEDING THE CONSTRUCTION SEQUENCING CRITERIA IS LIKELY TO RESULT IN THE NEED TO REPLACE THE SYSTEM. THE STONES/FILTER MEDIA MUST NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, 90% VEGETATION COVER, OR OTHER PERMANENT STABILIZATION. OTHERWISE, THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA MUST BE DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETED UNLESS THE DEPARTMENT HAS DETERMINED THAT SUFFICIENT MEASURES ARE BEING TAKEN TO PREVENT EROSION OF MATERIAL FROM THE UNSTABLE CATCHMENT AREA AND DEPOSITION ON THE FILTER.
4. TESTING AND SUBMITTALS: THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:
   A. SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
   B. PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES; 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL..
   C. PERFORM A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MIXTURE CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90-92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698.
5. DO NOT DISCHARGE SEDIMENT-LADEN WATERS FROM CONSTRUCTION ACTIVITIES (RUNOFF, WATER FROM EXCAVATIONS) TO THE INFILTRATION SYSTEMS.
6. DO NOT TRAFFIC EXPOSED SOIL SURFACE WITH CONSTRUCTION EQUIPMENT. IF FEASIBLE, PERFORM EXCAVATIONS WITH EQUIPMENT POSITIONED OUTSIDE THE LIMITS OF THE INFILTRATION SYSTEMS.
7. AFTER THE AREA IS EXCAVATED TO THE FINAL DESIGN ELEVATION, THE FLOOR SHOULD BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW TO RESTORE INFILTRATION RATES, FOLLOWED BY A PASS WITH A LEVELING DRAG.
8. DO NOT PLACE INFILTRATION SYSTEMS INTO SERVICE UNTIL THE CONTRIBUTING AREAS HAVE BEEN FULLY STABILIZED.

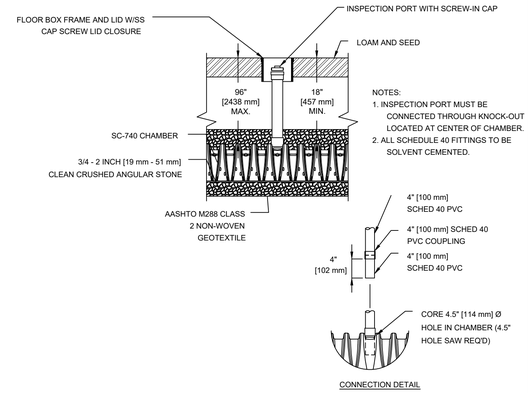
B1 TYPICAL SOIL FILTER NOTES

SCALE: N.T.S

THE FILTER SAND SHALL BE TESTED AT A SOIL TESTING LAB AND:
- MEET ALL OF THE BELOW GRADATION EXCEPT THAT IT SHALL HAVE BETWEEN 8% AND 10% PASSING THE #200 SIEVE*
- HAVE MINIMAL CLAY CONTENT OF LESS THAN 2%.
- BE FREE OF STONES, STUMPS, ROOTS OR OTHER OBJECTS GREATER THAN 2".

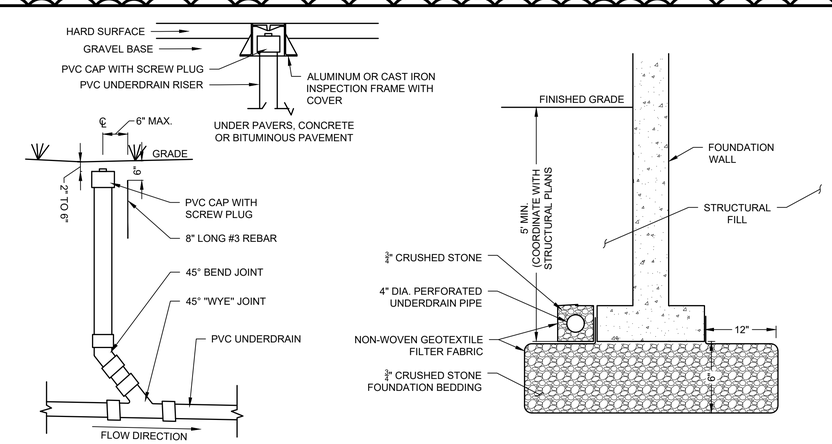
COARSE FILTER SAND LAYER (MEDOT #703.01)	
SIEVE SIZE	% BY WEIGHT
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#50	10-30
#100	2-10
#200	0-5* (8 TO 10)

COARSE GRAVEL	MEDOT SPECIFICATIONS FOR UNDERDRAINS (MEDOT #703.22)
SIEVE SIZE	% PASSING BY WEIGHT
UNDERDRAIN TYPE B	
1"	90-100
¾"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5



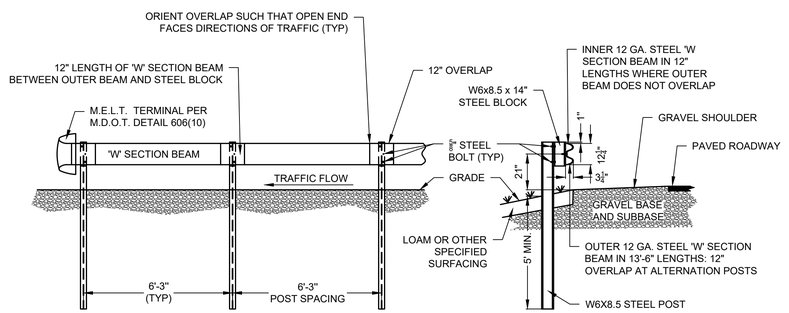
B5 TYPICAL INSPECTION PORT DETAIL

SCALE: N.T.S



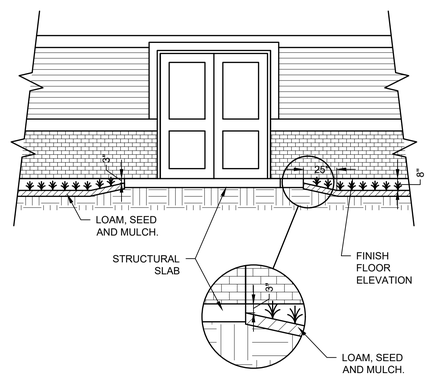
A1 FOUNDATION DRAIN

SCALE: N.T.S



A3 STEEL GUARD RAIL

SCALE: N.T.S



A5 TYP GRADE AT DOOR SLABS

SCALE: N.T.S

DESIGNED BY: CWB
DRAWN BY: CWB
CHECKED BY: FLC
DATE: 08-13-2024
SCALE:
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
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Auburn, ME 04210
207-784-5100

HA Project No: 23245

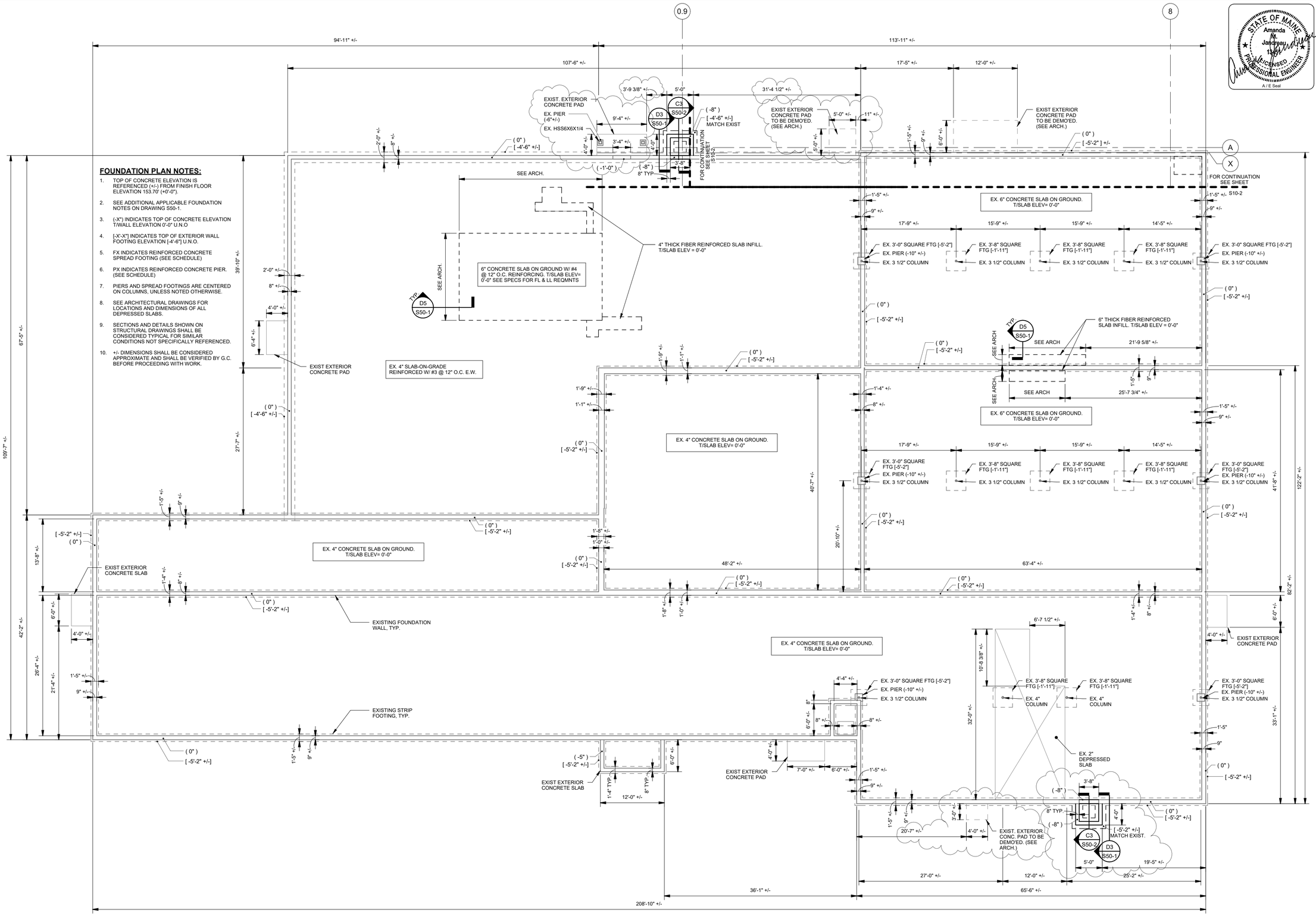
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
SITE AND STORMWATER DETAILS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
C50-2
SHEET: 15 OF 176

FOUNDATION PLAN NOTES:

1. TOP OF CONCRETE ELEVATION IS REFERENCED (+/-) FROM FINISH FLOOR ELEVATION 153.70' (+0'-0").
2. SEE ADDITIONAL APPLICABLE FOUNDATION NOTES ON DRAWING S50-1.
3. (-X") INDICATES TOP OF CONCRETE ELEVATION T/WALL ELEVATION 0'-0" U.N.O
4. [-X'-X"] INDICATES TOP OF EXTERIOR WALL FOOTING ELEVATION [-4'-6"] U.N.O.
5. FX INDICATES REINFORCED CONCRETE SPREAD FOOTING (SEE SCHEDULE)
6. PX INDICATES REINFORCED CONCRETE PIER. (SEE SCHEDULE)
7. PIERS AND SPREAD FOOTINGS ARE CENTERED ON COLUMNS, UNLESS NOTED OTHERWISE.
8. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS AND DIMENSIONS OF ALL DEPRESSED SLABS.
9. SECTIONS AND DETAILS SHOWN ON STRUCTURAL DRAWINGS SHALL BE CONSIDERED TYPICAL FOR SIMILAR CONDITIONS NOT SPECIFICALLY REFERENCED.
10. +/- DIMENSIONS SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY G.C. BEFORE PROCEEDING WITH WORK.



A1 RENOVATION FOUNDATION PLAN (ALTERNATE 1)
SCALE: 1/8" = 1'-0"

STATE OF MAINE — Amanda M. Jandreau 13457 — LICENSED PROFESSIONAL ENGINEER — A / E Seal

FACILITIES ENGINEERING — DFE — CAMP KEYES DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY: AMJ
DRAWN BY: VMB
CHECKED BY: AMJ
DATE: 8/13/2024
SCALE: 1/8" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
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207-784-5100

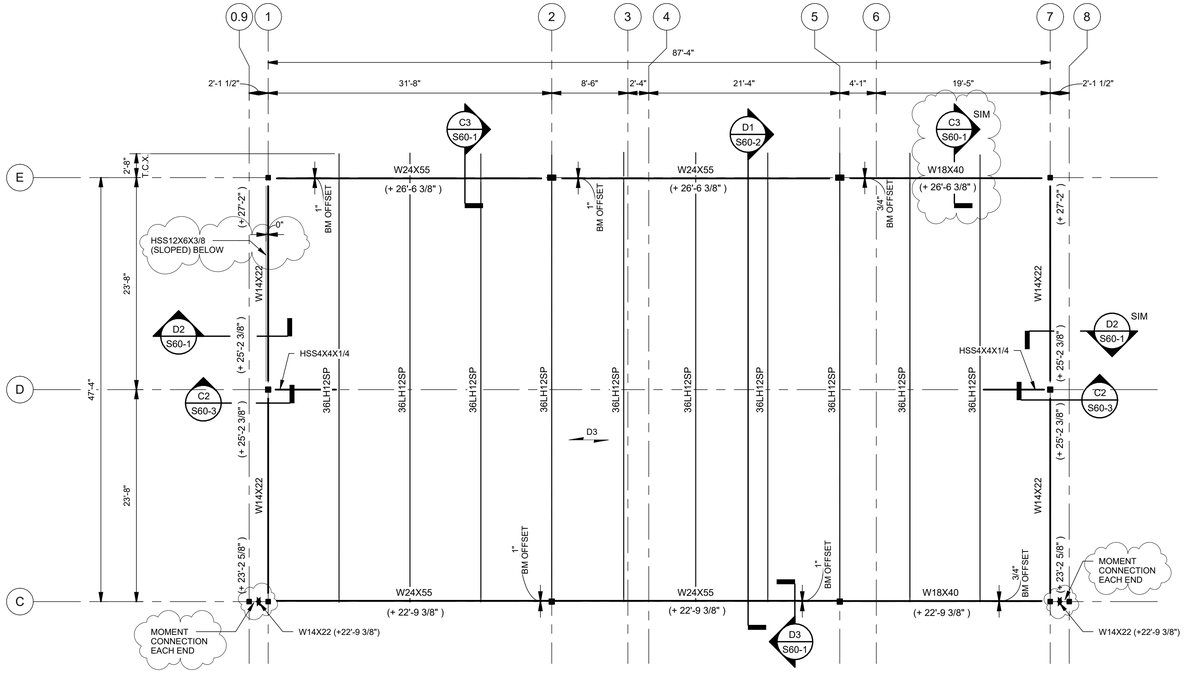
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

RENOVATION FOUNDATION PLAN

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID: S10-1
SHEET: 19 OF 176

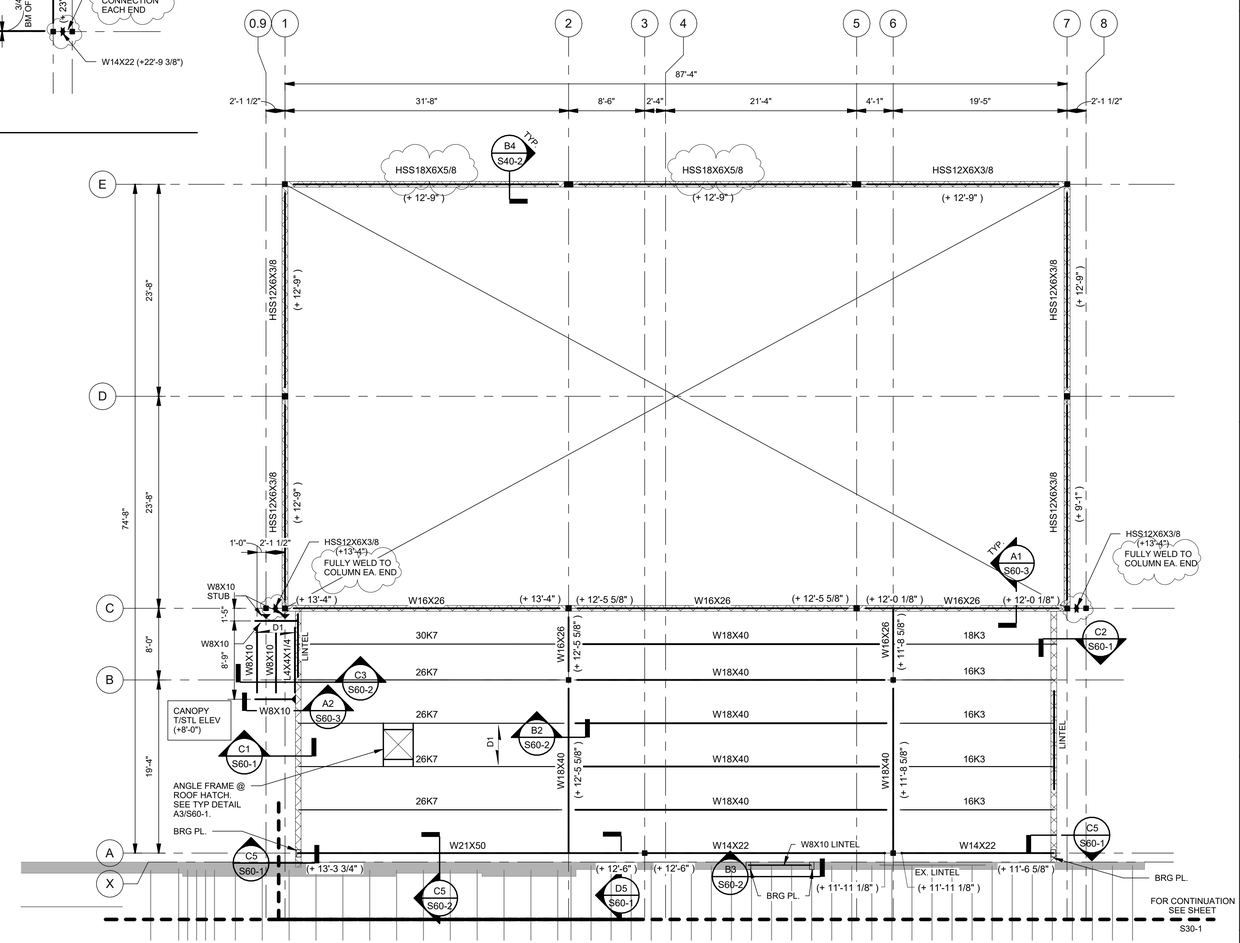


C1 ADDITION HIGH ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"

FRAMING PLAN NOTES:

1. TOP OF STEEL/UNDERSIDE OF DECK ELEVATION IS REFERENCED (+/-) FROM FINISH FLOOR ELEVATION 164.00' (+0'-0").
2. D1 INDICATES SPAN OF 1 1/2" - 20 GA. (TYPE B) ROOF DECK (PTD.)
3. D3 INDICATES SPAN OF 3" - 20 GA. (TYPE NA) ROOF DECK (PTD.)
4. +/- DIMENSIONS SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY G.C. BEFORE PROCEEDING WITH WORK.
5. SECTIONS AND DETAILS SHOWN ON STRUCTURAL DRAWINGS SHALL BE CONSIDERED TYPICAL FOR SIMILAR CONDITIONS NOT SPECIFICALLY REFERENCED.
6. L INDICATES LINTEL IN CMU WALL.



A3 ADDITION LOW ROOF FRAMING PLAN

SCALE: 1/8" = 1'-0"

STATE OF MAINE
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DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY:	AMJ
DRAWN BY:	VMB
CHECKED BY:	AMJ
DATE:	8/13/2024
SCALE:	1/8" = 1'-0"
DFE PROJECT NO:	23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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HA Project No: 23245

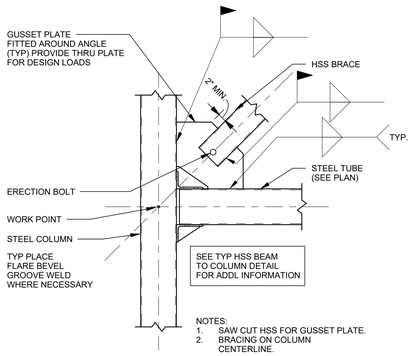
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ADDITION ROOF FRAMING PLANS

PLAN PROGRESS

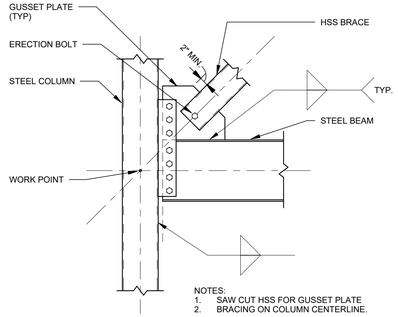
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
S30-2
SHEET: 22 OF 176



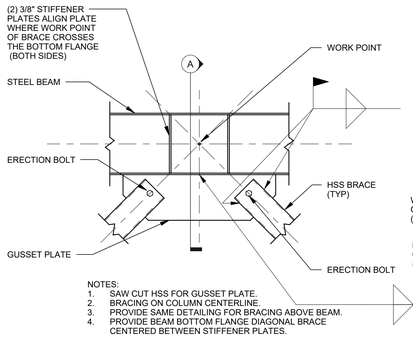
C1 TYP. BRACE DETAIL AT HSS GIRT

SCALE: 3/4" = 1'-0"



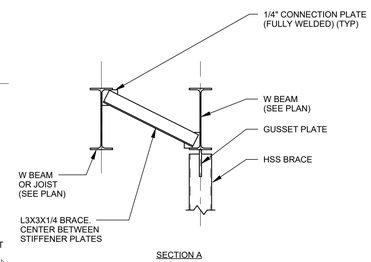
C2 TYP. BRACE DETAIL

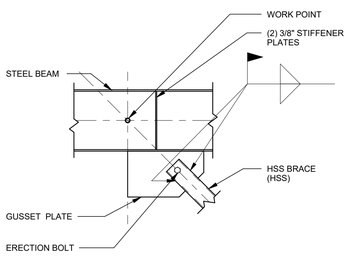
SCALE: 3/4" = 1'-0"

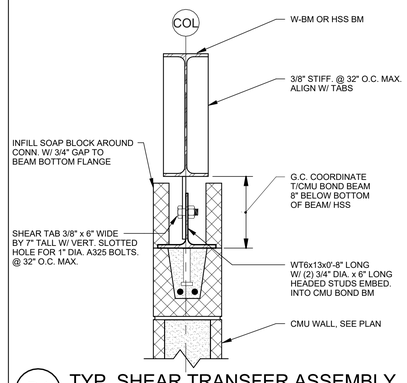


B1 TYP. BRACE DETAIL

SCALE: 3/4" = 1'-0"

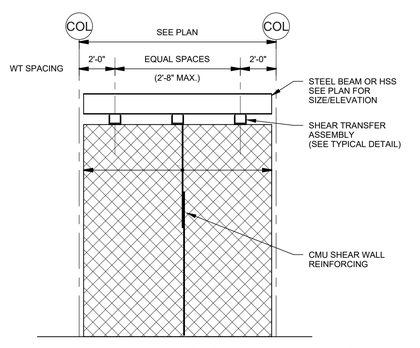






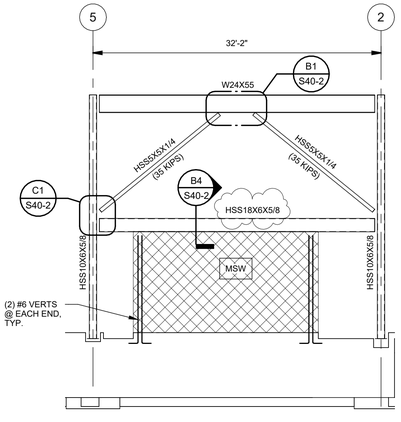
B4 TYP. SHEAR TRANSFER ASSEMBLY

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



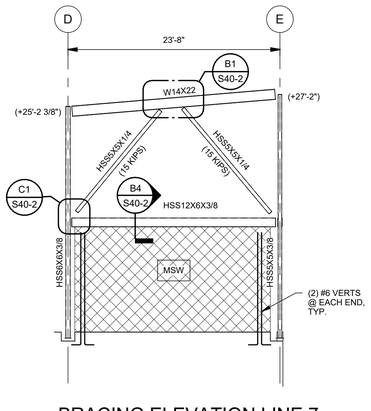
MASONRY SHEAR WALL ELEVATION AT BRACE FRAMES

B5 SCALE: 1/4" = 1'-0"



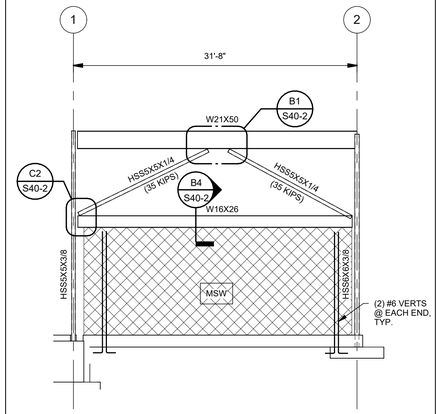
A1 BRACING ELEVATION LINE E (S30-2)

SCALE: 1/8" = 1'-0"



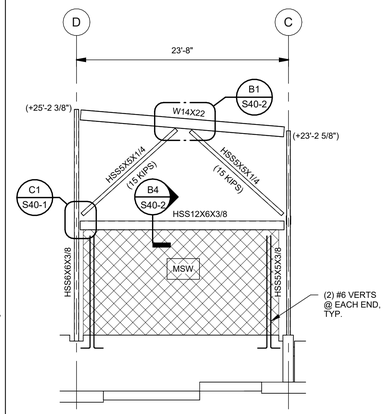
A2 BRACING ELEVATION LINE 7 (S30-2)

SCALE: 1/8" = 1'-0"



A3 BRACING ELEVATION LINE C (S30-2)

SCALE: 1/8" = 1'-0"



A4 BRACING ELEVATION LINE 1 (S30-2)

SCALE: 1/8" = 1'-0"

BRACED FRAME NOTES:

1. LOADS INDICATED ON BRACED FRAME ELEVATIONS ARE THE UNFACTORED AXIAL LOAD IN KIPS (–K).
2. LOADS SHOWN MAY BE IN TENSION OR COMPRESSION.
3. CONNECTION DESIGN AND CALCULATIONS TO BE COMPLETED BY AN ENGINEER REGISTERED IN THE STATE OF MAINE. SUBMIT CALCULATIONS FOR REVIEW. DESIGN OF CONNECTIONS SHALL BE COMPLETED USING THE UNIFORM FORCE METHOD.
4. SLIP CRITICAL BOLTS (SC) ARE REQUIRED AT ALL MOMENT CONNECTIONS AND BRACED FRAME CONNECTIONS.
5. CONNECTIONS SHALL BE DESIGNED TO NOT INDUCE MOMENTS INTO BEAMS OR COLUMNS, BEYOND THAT FORCED BY MEMBER GEOMETRY.

A5 BRACING NOTES

SCALE: 1/8" = 1'-0"

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DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY: AMJ
DRAWN BY: VMB
CHECKED BY: AMJ
DATE: 8/13/2024
SCALE: As indicated
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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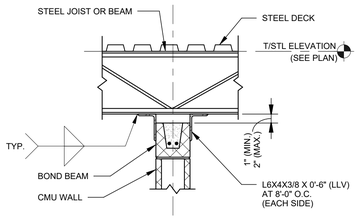
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

BRACE FRAME ELEVATIONS AND DETAILS

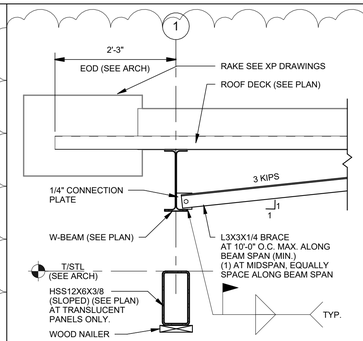
PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
S40-2
SHEET: 24 OF 176



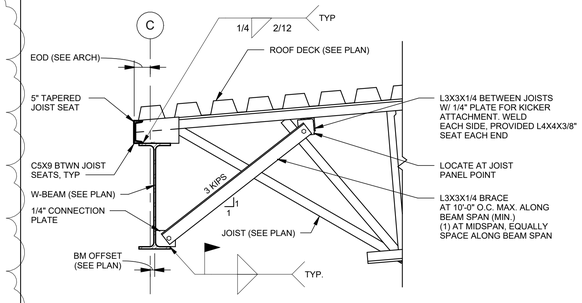
D1 TYP. TOP OF PARTITION DETAIL PERPENDICULAR TO JOISTS OR BEAMS

SCALE: 3/4" = 1'-0"



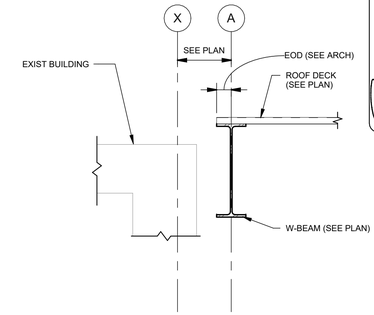
D2 SECTION AT HIGH ROOF BEAM (S30-2)

SCALE: 3/4" = 1'-0"



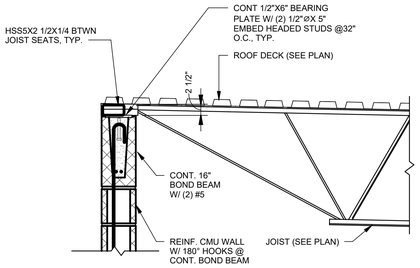
D3 SECTION AT HIGH ROOF (LOW SIDE) (S30-2)

SCALE: 3/4" = 1'-0"



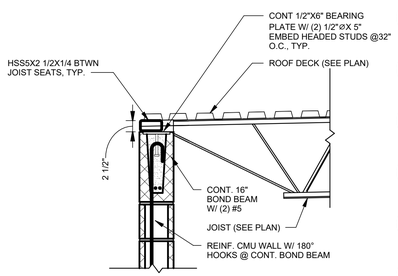
D5 SECTION AT NEW TO EXIST. ROOF EDGE (S30-2)

SCALE: 3/4" = 1'-0"



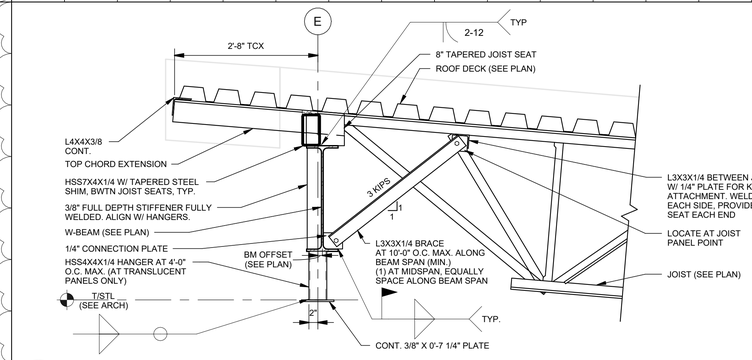
C1 SECTION AT LOW ROOF EDGE(HIGH SIDE) PERPENDICULAR TO JOIST (S30-2)

SCALE: 3/4" = 1'-0"



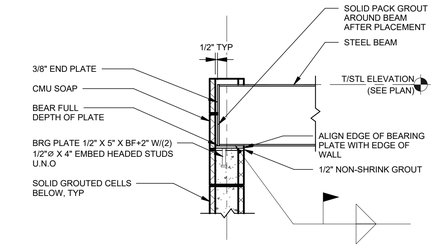
C2 SECTION AT LOW ROOF (LOW SIDE) (S30-2)

SCALE: 3/4" = 1'-0"



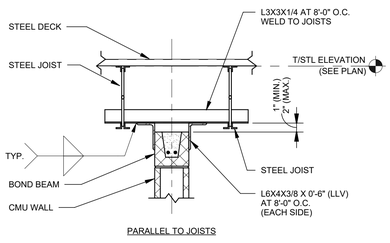
C3 SECTION AT HIGH ROOF EDGE (HIGH SIDE) PERPENDICULAR TO JOIST (S30-2)

SCALE: 3/4" = 1'-0"

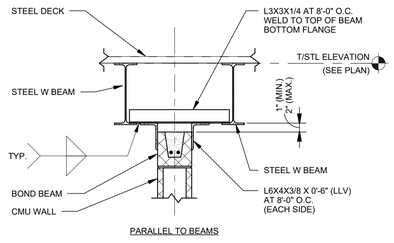


C5 TYP. BEAM BEARING DETAIL PERPENDICULAR TO MASONRY WALL

SCALE: 3/4" = 1'-0"



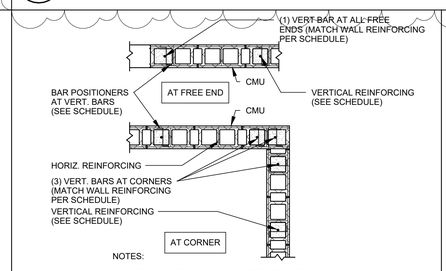
PARALLEL TO JOISTS



PARALLEL TO BEAMS

B1 TYP. TOP OF PARTITION SUPPORT DETAIL PARALLEL TO JOISTS

SCALE: 3/4" = 1'-0"

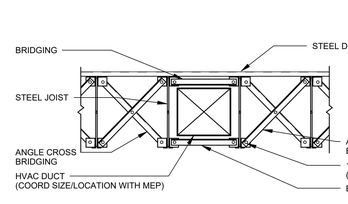


NOTES:

1. PROVIDE TRUSS TYPE LADDER JOINT REINF. AT 16" O.C. U.N.O.
2. ALL REINFORCED CELLS ARE TO BE FULLY GROUTED.
3. LAP BARS AT SPLICES MIN. 48 BAR DIAMETERS.
4. PROVIDE (2) #5 MIN. BELOW ALL OPENINGS. EXTEND 8" MIN. BEYOND EDGE OF OPENING EACH SIDE.
5. LOCATE REINFORCING EACH SIDE OF CONTRACTION JOINTS AND STEEL COLUMNS.
6. SEE ARCH DRAWINGS FOR ADD'L INFORMATION.

B3 TYP. MASONRY REINFORCING PLAN

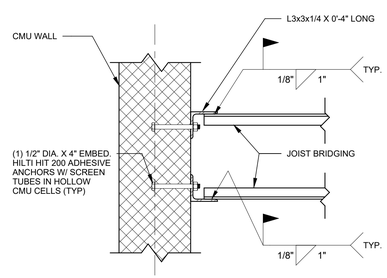
SCALE: 1/2" = 1'-0"



NOTE: MAKE CROSS BRIDGING HORIZONTAL IN LAST BRIDGING BAY BEFORE TERMINATING BRIDGING, SIMILAR TO THIS DETAIL.
NOTE: BRIDGING SHOWN FOR CONCEPT ONLY. ALL BRIDGING TO BE DESIGNED BY JOIST MANUF.

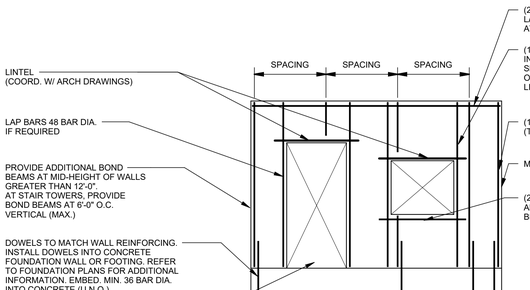
B4 TYP. JOIST BRIDGING AT HVAC DUCT

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



B5 TYP. JOIST BRIDGING ANCHORAGE TO CMU WALL

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

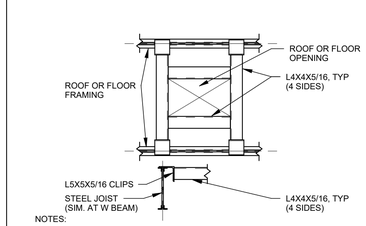


CMU WALL REINFORCING SCHEDULE, U.N.O	
BLOCK	REINFORCING
8" CMU WALLS (INTERIOR)	(1) #5 AT 32" O.C.
8" CMU WALLS (EXTERIOR)	(1) #5 AT 24" O.C. (U.N.O. ON PLAN)
8" CMU SHEAR WALLS	(1) #5 AT 32" O.C. (U.N.O. ON PLAN)

STANDARD LAP LENGTH OF GRADE 60 MASONRY REINFORCING BARS SHALL BE 48 BAR DIAMETERS FOR BARS #5 AND SMALLER. CHECK LAPS WITH LATEST MASONARY CODE.
LAP LENGTH FOR #6 BARS SHALL BE 54" AND LAP LENGTH FOR #7 BARS SHALL BE 63". AT G.C. OPTION PROVIDE MECHANICAL SPLICES RATED FOR 125% THE BAR YIELD STRENGTH FOR BARS #6 AND LARGER. PROVIDE CORNER BARS TO MATCH HORIZONTAL REINFORCEMENT.

A1 TYP. MASONRY WALL REINFORCING

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



NOTES:

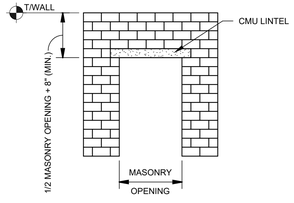
1. PROVIDE AT ALL OPENINGS LARGER THAN 12". LOCATIONS ARE NOT ALL IDENTIFIED ON THE PLANS AND SHALL BE COORDINATED BY THE CONTRACTOR FOLLOWING INSTRUCTIONS PROVIDED BELOW.
2. FOR OPENINGS UP TO 6" - NO REINFORCING REQUIRED.
3. FOR OPENINGS FROM 6" TO 12" - USE 24"X24" 16 GA. COVER PLATE SCREWED TO TOPSIDE OF DECK WITH #10 TEK SCREWS AT 8" O.C. (MAX.) ALL AROUND.
4. ALL FRAME CONNECTIONS TO BE WELDED.
5. COORDINATE SIZE AND LOCATION OF ALL OPENINGS WITH M,E,P TRADES.
6. MULTIPLE OPENINGS WITH LESS THAN 12" OF DECK BETWEEN THEM SHALL BE CONSIDERED AS A SINGLE OPENING.

A3 TYP. FRAME AT ROOF OR FLOOR OPENINGS

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

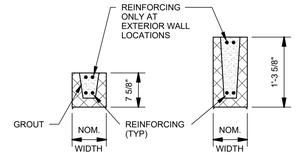
NOTES:

1. LINTEL SCHEDULE BASED ON F'm = 1900 PSI.
2. LINTEL UNITS MUST BE SHORED (MIN. 3 DAYS).
3. MIN. BEARING AT EACH END = 8".
4. USE OF MORTAR TO FILL LINTELS IS NOT PERMITTED.
5. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR ALL WALL OPENINGS WHERE A CONCRETE MASONRY LINTEL IS REQUIRED.



CONCRETE MASONRY LINTEL SCHEDULE			
NOM. BLOCK WIDTH	NOM. BLOCK HEIGHT	REINFORCING	MASONRY OPENING
6"	8"	(1) #5	6'-0" OR LESS
8"	8"	(2) #5 T&B	6'-11" OR LESS
8"	24"	(2) #5 T&B	7'-0" TO 12'-0"

* AT EXTERIOR CMU LINTELS, PROVIDE REINFORCING TOP AND BOTTOM.



A4 CONCRETE MASONRY LINTEL SCHEDULE

SCALE: 3/4" = 1'-0"

STATE OF MAINE
Amanda M. Jandreau
12/31/2024
LICENSED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr
1	ADDENDUM 2	8-30-2024	

DESIGNED BY: AMJ
DRAWN BY: VMB
CHECKED BY: AMJ
DATE: 8/13/2024
SCALE: As indicated
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman
Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

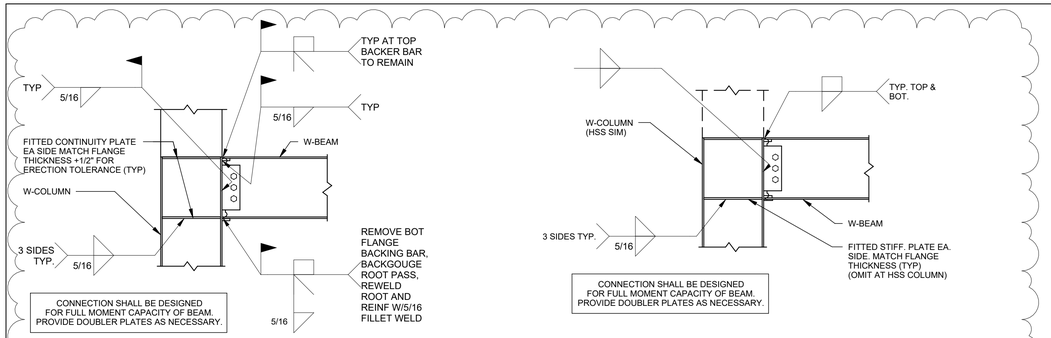
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

TYPICAL FRAMING DETAILS

PLAN PROGRESS

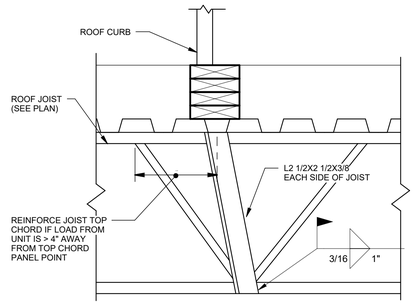
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
S60-1
SHEET: 27 OF 176



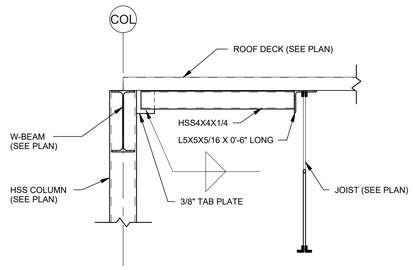
D1 MOMENT CONN. DETAIL

SCALE: 3/4" = 1'-0"



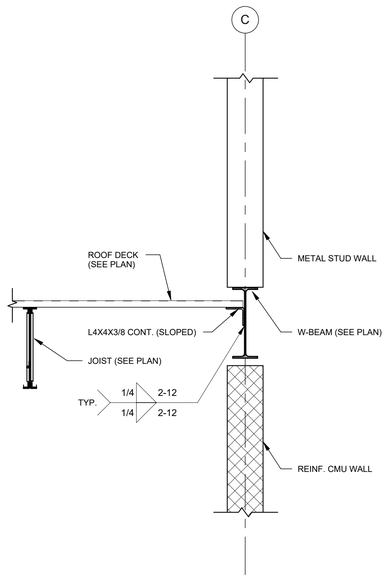
C1 TYP. JOIST REINFORCING DETAIL AT ROOF UNIT CURB PERIMETER

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



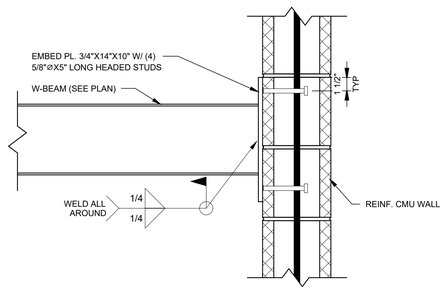
C2 SECTION

SCALE: 3/4" = 1'-0"



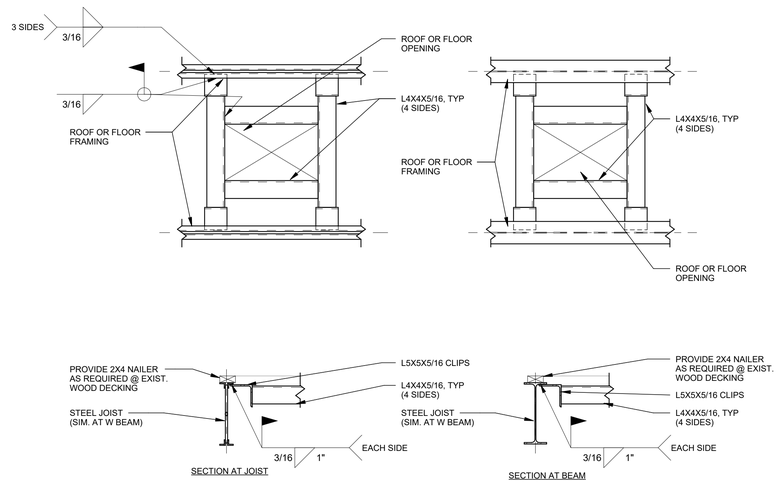
A1 SECTION (S30-2)

SCALE: 3/4" = 1'-0"



A2 SECTION (S30-2)

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



NOTES:

1. PROVIDE AT ALL OPENINGS LARGER THAN 12", LOCATIONS ARE NOT IDENTIFIED ON THE PLANS AND SHALL BE COORDINATED BY THE CONTRACTOR FOLLOWING INSTRUCTIONS PROVIDED BELOW.
2. ALL FRAME CONNECTIONS TO BE WELDED.
3. COORDINATE SIZE AND LOCATION OF ALL OPENINGS WITH M,E, AND P TRADES.
4. ANGLE SHALL BE IN CONTACT WITH EXIST. CONCRETE ALL AROUND
5. IF CONNECTING TO AN EXISTNG MASONRY WALL USE DETAIL C1/S60-1.

A4 TYP. FRAME AT EXISTING ROOF OR FLOOR OPENING

SCALE: 3/4" = 1'-0"

STATE OF MAINE
Amanda M. Jauregui
13571
LICENSED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	8-30-2024	

DESIGNED BY:	AMJ
DRAWN BY:	VMB
CHECKED BY:	AMJ
DATE:	8/13/2024
SCALE:	As indicated
DFE PROJECT NO:	23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

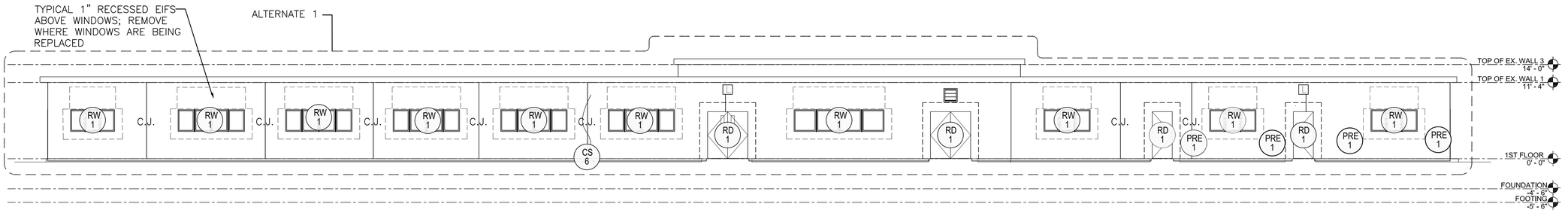
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

TYPICAL FRAMING DETAILS

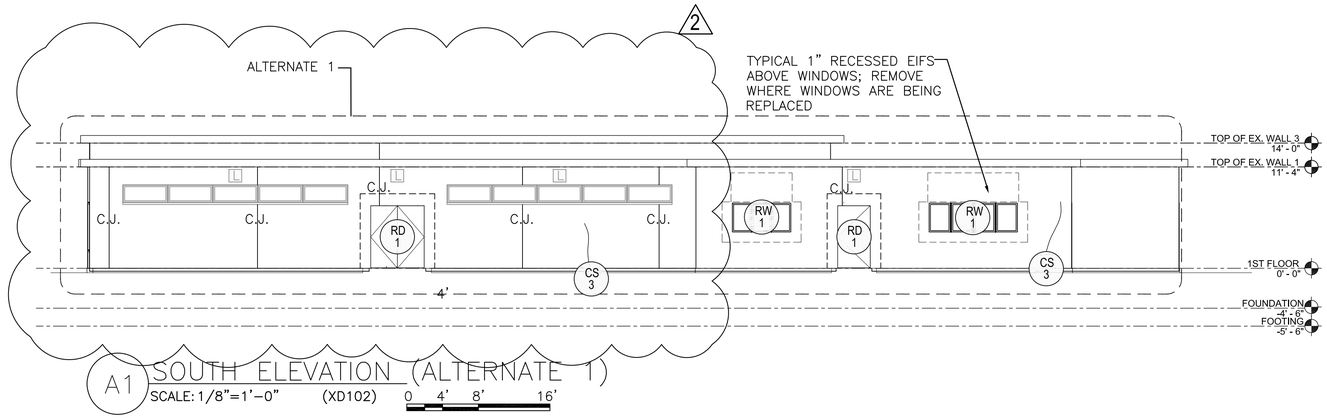
PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
S60-3
SHEET: 29 OF 176



A2 EAST ELEVATION (ALTERNATE 1)
SCALE: 1/8"=1'-0" (XD102) 0 4' 8' 16'



A1 SOUTH ELEVATION (ALTERNATE 1)
SCALE: 1/8"=1'-0" (XD102) 0 4' 8' 16'

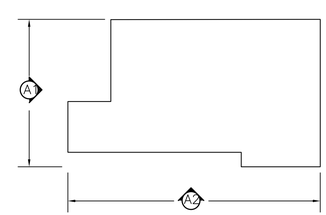
SHEET NOTES

1. REFER TO SHEET XG100 FOR GENERAL NOTES AND ELEVATION NOTES.
2. REFER TO SHEET XD102 FOR ADDITIONAL INFORMATION.
3. REFER TO MECHANICAL, ELECTRICAL, AND PLUMBING PLANS AND ELEVATIONS FOR ADDITIONAL INFORMATION.

KEY PLAN

NOT TO SCALE

TRUE NORTH
PLAN NORTH



LEGEND:
ELEVATION # SHOWN ON THIS PLAN

DEMOLITION/REPAIR WORK LEGEND

- RE # — REMOVE EIFS EXTERIOR FINISH TO CMU BACKUP WALL. #INDICATES SQUARE FOOTAGE
- RFI # — REMOVE PERIMETER FOUNDATION INSULATION. #INDICATES SQUARE FOOTAGE
- PRE # — SELECTIVELY CUT AND REMOVE EXISTING DEFECTIVE EIFS. REPAIR TO MATCH ADJACENT SURFACE IN TEXTURE AND FINISH. # INDICATES SQUARE FEET QUANTITY
- CS # — REPAIR CRACKED SURFACE IN EIFS. # INDICATES LINEAR FEET
- RD # — REMOVE DOOR INCLUDING EIFS A MINIMUM OF 12" BEYOND PERIMETER OF DOOR OPENING
- RW # — REMOVE WINDOW INCLUDING EIFS A MINIMUM OF 12" BEYOND PERIMETER OF WINDOW OPENING
- RM # — REMOVE METAL FASCIA, SOFFIT, AND COPING. # INDICATES LINEAR FEET QUANTITY

NOTE: NOT ALL LEGEND ITEMS MAY BE SHOWN ON THIS SHEET

ELEVATION LEGEND

ALL ITEMS ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE

- C.J. — EXISTING EIFS CONTROL JOINT; RAKE OUT SEALANT AND BACKER ROD
- L — EXISTING LIGHT
- EXISTING LOUVER
- L — EXISTING LIGHT
- APPROXIMATE AREA OF EIFS TO BE REMOVED AT ADDITION; VERIFY LIMITS IN THE FIELD
- EXISTING WINDOW/DOOR AND EIFS TO BE REMOVED

NOTE: NOT ALL LEGEND ITEMS MAY BE SHOWN ON THIS SHEET

LICENSED ARCHITECT — BRIAN H. NEELY No. 3829 — STATE OF MAINE

FACILITIES ENGINEERING — DFE — MILITARY BUREAU — DIRECTORATE

PLAN REVISIONS

Revn	Description	Date	Appr
1	ADDENDUM #1	8/20/24	
2	ADDENDUM #2	8/30/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 1/8"=1'-0"
DFE PROJECT NO: 23SR24-400-ABC

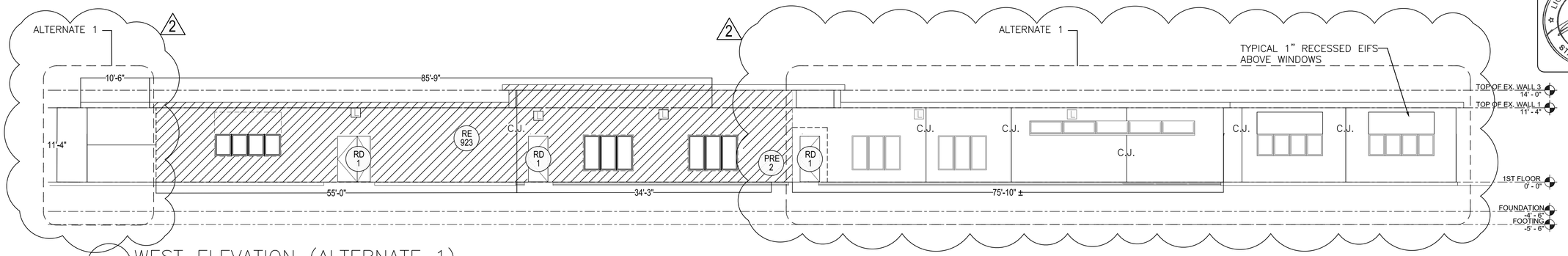
STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman
Architects + Engineers
48 Harriman Drive
Auburn, Maine 04210
207-784-5100
HA Project No: 23245

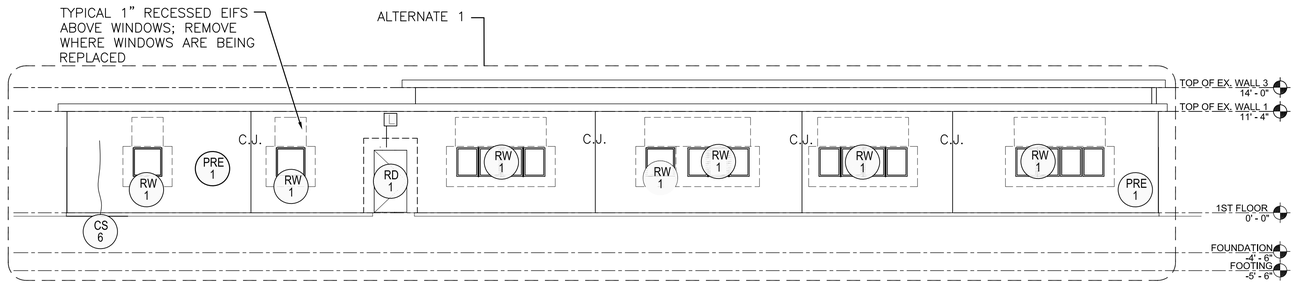
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
EXTERIOR ELEVATIONS DEMOLITION SOUTH AND EAST ELEVATIONS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

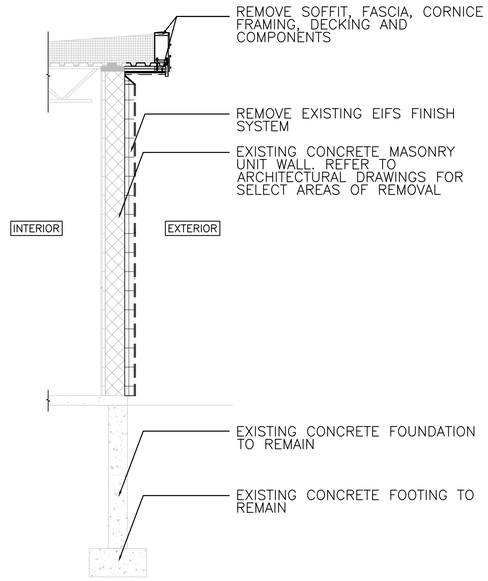
SHEET ID: XD201
SHEET: 32 OF 176



A2 WEST ELEVATION (ALTERNATE 1)
SCALE: 1/8"=1'-0" (XD102) 0 4' 8' 16'



A1 NORTH ELEVATION (ALTERNATE 1)
SCALE: 1/8 =1'-0" (XD102) 0 4' 8' 16'



C1 EIFS AND CORNICE SELECTIVE DEMOLITION SECTION DETAIL
SCALE: 3/8"=1'-0" (XD101) 0 2' 4' 6'

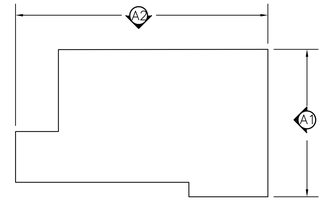
SHEET NOTES

1. REFER TO SHEET XG100 FOR GENERAL NOTES AND ELEVATION NOTES.
2. REFER TO SHEET XD102 FOR ADDITIONAL INFORMATION.
3. REFER TO MECHANICAL, ELECTRICAL, AND PLUMBING PLANS AND ELEVATIONS FOR ADDITIONAL INFORMATION.

KEY PLAN

NOT TO SCALE

TRUE NORTH
PLAN NORTH



LEGEND:
ELEVATION # SHOWN ON THIS PLAN

DEMOLITION/REPAIR WORK LEGEND

- RE # — REMOVE EIFS EXTERIOR FINISH TO CMU BACKUP WALL. #INDICATES SQUARE FOOTAGE
- PRE # — SELECTIVELY CUT AND REMOVE EXISTING DEFECTIVE EIFS. REPAIR TO MATCH ADJACENT SURFACE IN TEXTURE AND FINISH. # INDICATES SQUARE FEET QUANTITY
- CS # — REPAIR CRACKED SURFACE IN EIFS. # INDICATES LINEAR FEET
- RD # — REMOVE DOOR INCLUDING EIFS A MINIMUM OF 12" BEYOND PERIMETER OF DOOR OPENING
- RW # — REMOVE WINDOW INCLUDING EIFS A MINIMUM OF 12" BEYOND PERIMETER OF WINDOW OPENING
- RM # — REMOVE METAL FASCIA, SOFFIT, AND COPING. # INDICATES LINEAR FEET QUANTITY

NOTE: NOT ALL LEGEND ITEMS MAY BE SHOWN ON THIS SHEET

ELEVATION LEGEND

ALL ITEMS ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE

- C.J. — EXISTING EIFS CONTROL JOINT; RAKE OUT SEALANT AND BACKER ROD
- EXISTING LIGHT
- EXISTING LOUVER
- EXISTING LIGHT
- APPROXIMATE AREA OF EIFS TO BE REMOVED AT ADDITION; VERIFY LIMITS IN THE FIELD
- EXISTING WINDOW/DOOR AND EIFS TO BE REMOVED

NOTE: NOT ALL LEGEND ITEMS MAY BE SHOWN ON THIS SHEET

LICENSED ARCHITECT — BRIAN H. NISELY No. 3829 — STATE OF MAINE

FACILITIES ENGINEERING — DFE — MILITARY BUREAU — DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM #1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: AS NOTED
DFE PROJECT NO: 23SR24-403-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

Architects + Engineers
48 Harriman Drive
Auburn, Maine 04210
207-784-5100

HA Project No: 23245

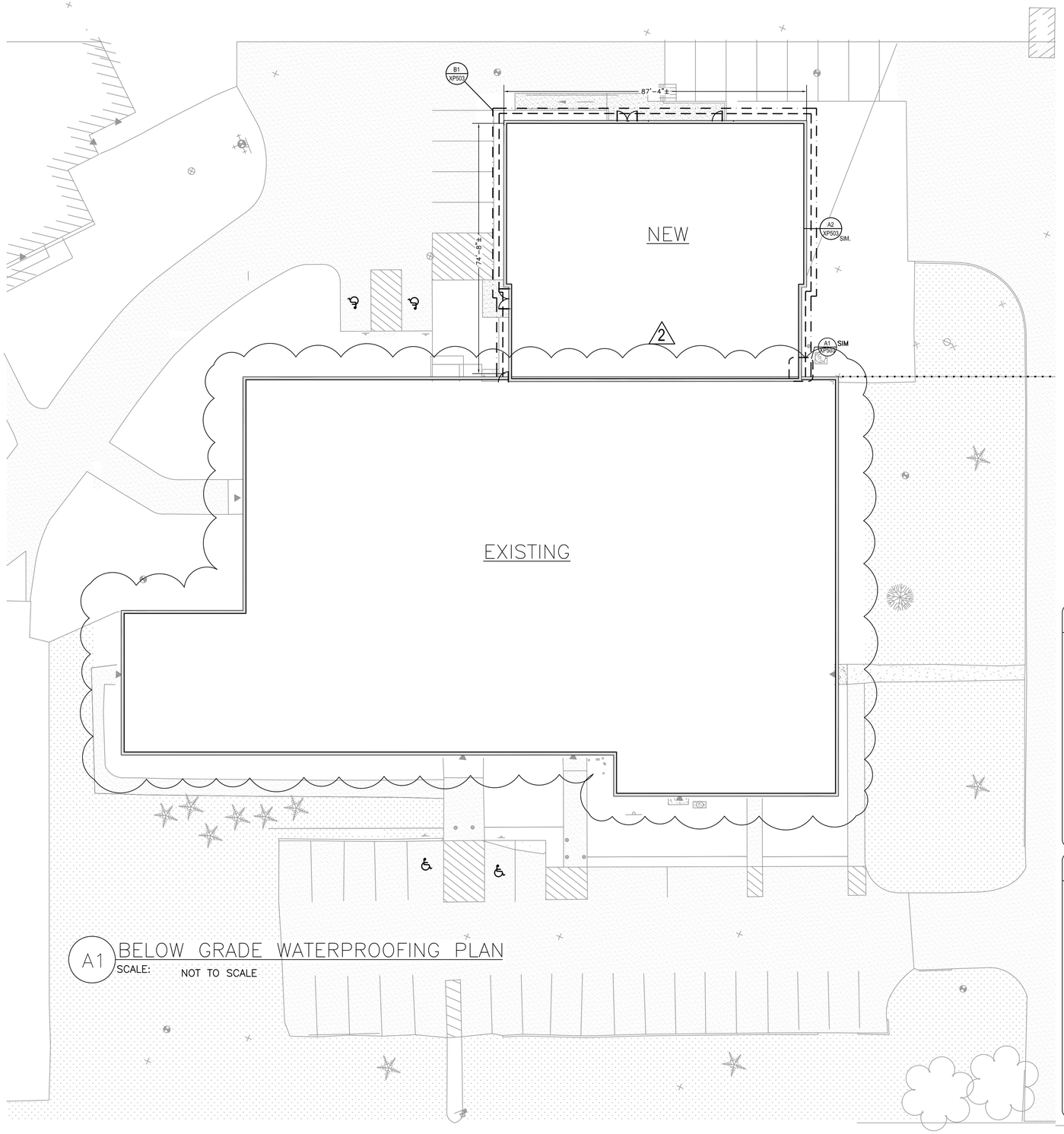
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
EXTERIOR ELEVATIONS DEMOLITION NORTH AND WEST ELEVATION

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID: XD202
SHEET: 33 OF 176

PLAN NORTH

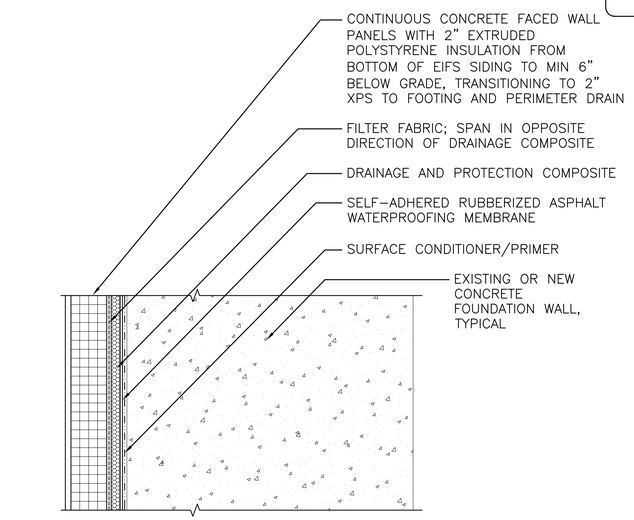
TRUE NORTH



A1 BELOW GRADE WATERPROOFING PLAN

SCALE: NOT TO SCALE

1



ALL ITEMS ARE NEW UNLESS NOTED OTHERWISE

NOTE: BACKFILL BY OTHERS NOT SHOWN FOR CLARITY.

A4 PROPOSED WATERPROOFING CROSS SECTION

SCALE: 3" = 1'-0"

0 3" 6" 9"

LEGEND

ALL ITEMS ARE EXISTING UNLESS OTHERWISE NOTED

- FENCE
- GRASS
- BITUMINOUS CONCRETE
- CONCRETE PAVEMENT
- FOUNDATION WALL
- DETAIL TAG
- TREE
- LIMITS OF NEW BELOW GRADE WATERPROOFING AND FOUNDATION INSULATION
- LIMITS OF PERIMETER DRAIN

2

SHEET NOTES

1. REFER TO SHEET XG100 FOR GENERAL NOTES AND WATERPROOFING NOTES.
2. IT IS THE CONTRACTOR'S RESPONSIBLY TO EXCAVATE DEPTHS AND WIDTHS TO ALLOW FOR INSTALLATION OF ALL NEW WATERPROOFING AND FOUNDATION INSULATION.
3. REFER TO THE STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION REGARDING NEW FOUNDATIONS AND EXTENTS FOR EXCAVATION.
4. REFER TO THE CIVIL DRAWINGS FOR ADDITIONAL INFORMATION REGARDING FOUNDATION DRAINAGE.
5. LANDSCAPING/HARDSCAPE CONTRACTOR TO COORDINATE BACKFILL REQUIREMENTS, PAVEMENT FINISHES, AND UTILITIES WITH THE CIVIL, ARCHITECTURAL, PLUMBING, AND ELECTRICAL DOCUMENTS.
6. ALL ITEMS IDENTIFIED AS EXISTING SHALL REMAIN UNLESS NOTED OTHERWISE.
7. REFER TO XP503 FOR BELOW GRADE WATERPROOFING DETAILS

LICENSED ARCHITECT
BRIAN H. NADEAU
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM_#1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 05/13/2024
SCALE: NOT TO SCALE
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

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48 Harriman Drive
Auburn, Maine 04210
207-784-5100

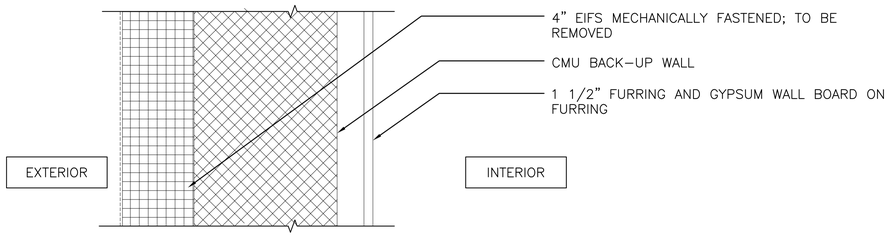
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
BELOW GRADE WATERPROOFING PLAN

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

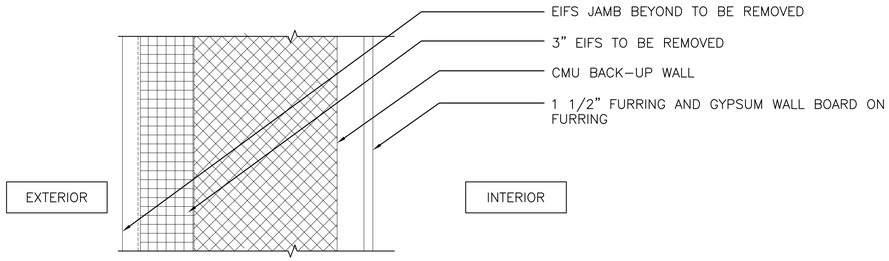
SHEET ID:
XP100
SHEET: 35 OF 176



WALL TYPE A1–EXISTING BUILDING

ALL ITEMS ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE

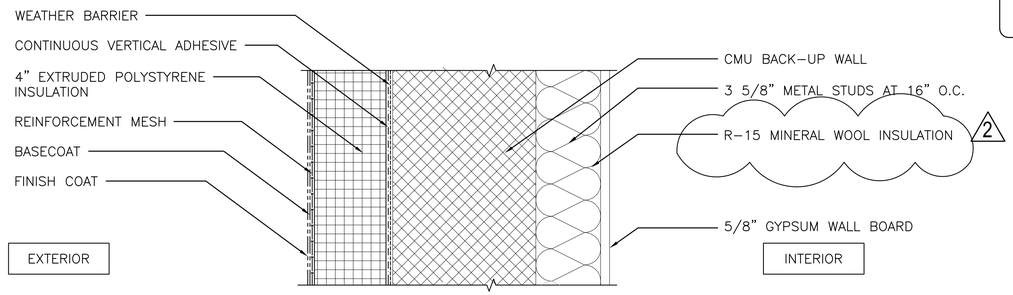
0 3" 6" 9"



WALL TYPE A2–ABOVE WINDOWS AT EXISTING BUILDING

ALL ITEMS ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE

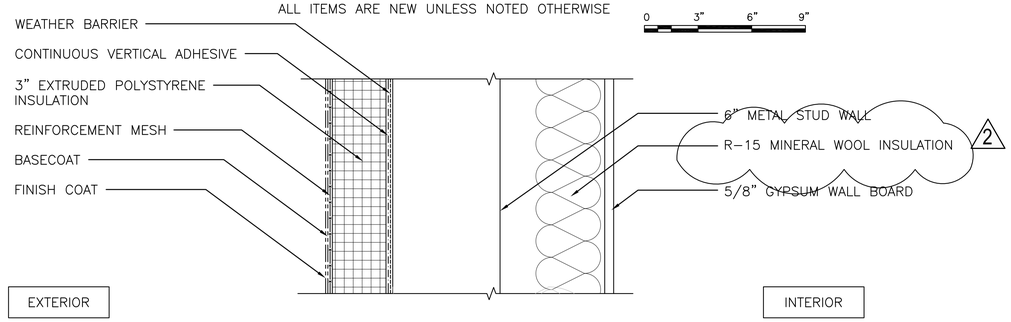
0 3" 6" 9"



WALL TYPE A3–NEW EXTERIOR WALL

ALL ITEMS ARE NEW UNLESS NOTED OTHERWISE

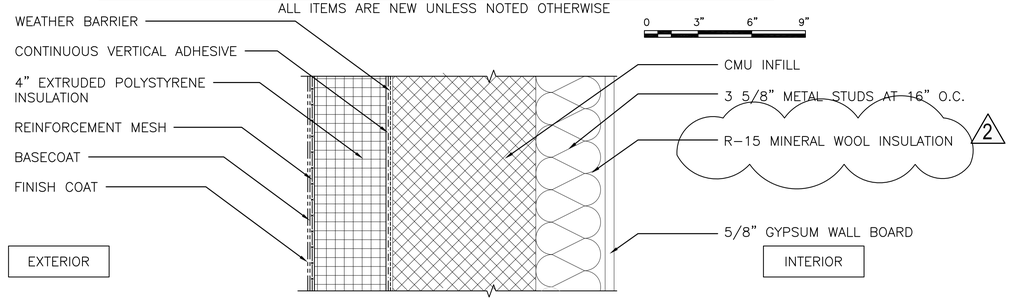
0 3" 6" 9"



WALL TYPE A4–NEW EXTERIOR WALL ABOVE CMU

ALL ITEMS ARE NEW UNLESS NOTED OTHERWISE

0 3" 6" 9"



WALL TYPE A5–INFILL

ALL ITEMS ARE NEW UNLESS NOTED OTHERWISE

0 3" 6" 9"

SHEET NOTES

1. REFER TO SHEET XG100 FOR GENERAL NOTES.
2. THE WEATHER BARRIER IS TO BE EXPOSED FOR A MAXIMUM OF THIRTY (30) DAYS UNLESS DIRECTED OTHERWISE BY THE MANUFACTURER. SHOULD THE WEATHER BARRIER BE EXPOSED LONGER THAN THIS DURATION, IT SHALL BE EITHER REMOVED AND REPLACED, OR ANOTHER APPLICATION INSTALLED, AT NO ADDITIONAL COST TO THE OWNER.

LICENSED ARCHITECT
BRIAN H. NEELY
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appv.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM_#1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 3"=1'-0"
DFE PROJECT NO.: 2SSR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

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207-784-5100

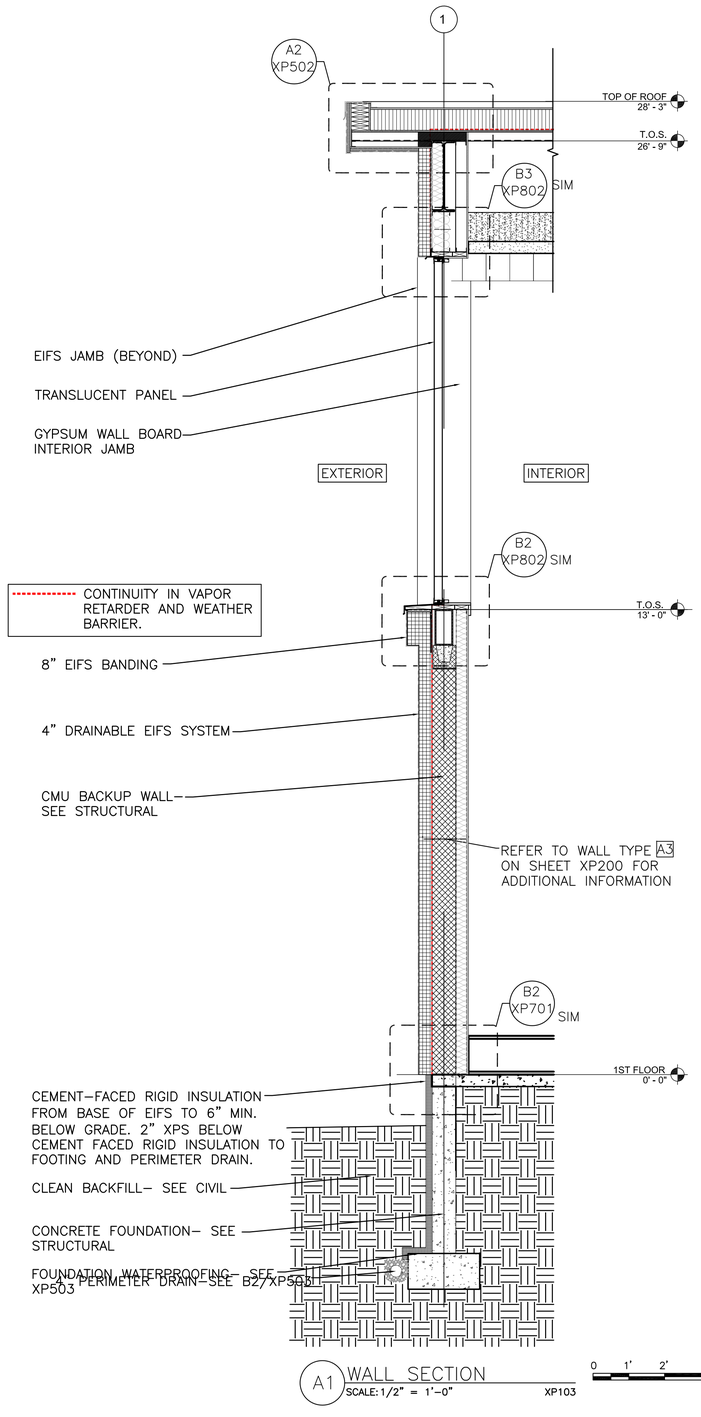
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

EXTERIOR WALL ASSEMBLY CROSS SECTIONS

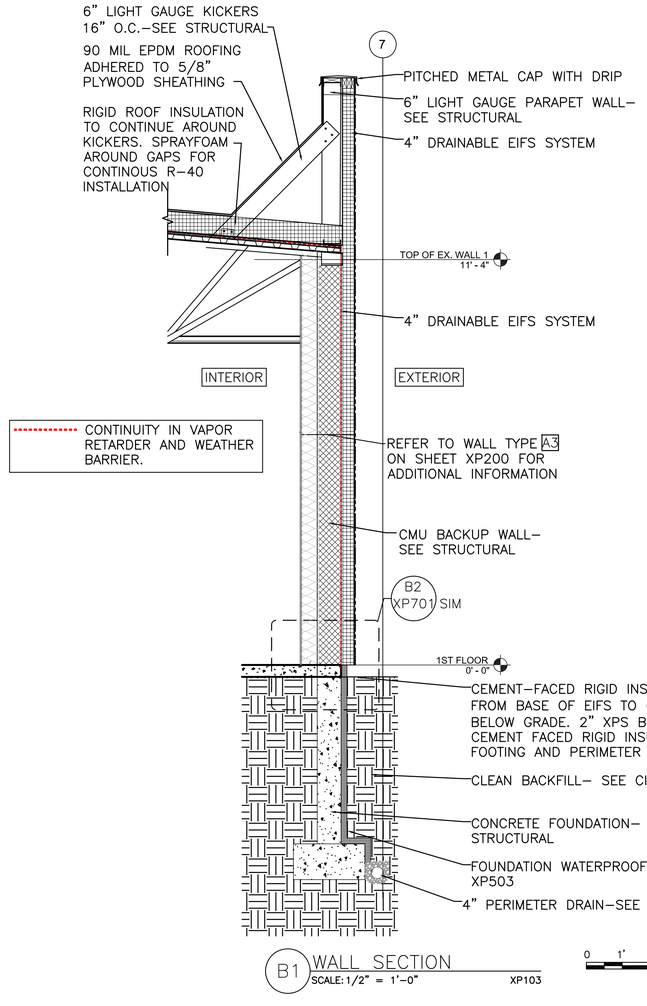
PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP200
SHEET: 40 OF 176



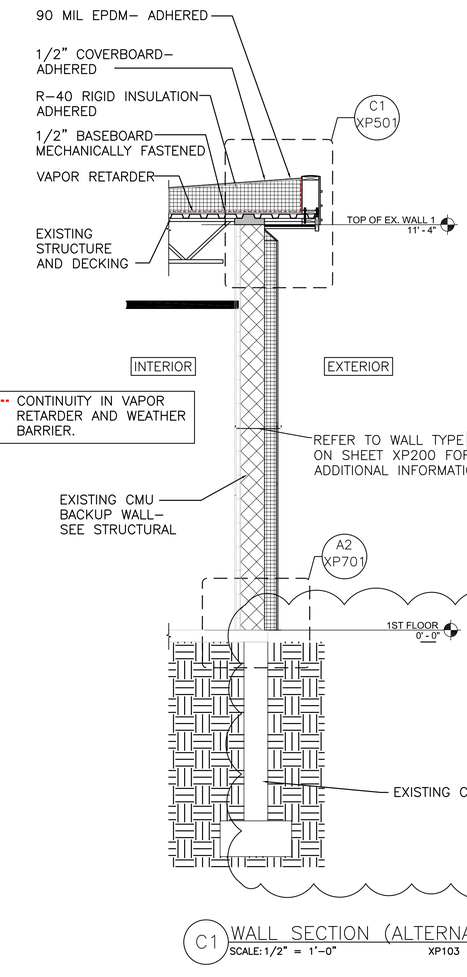
A1 WALL SECTION
SCALE: 1/2" = 1'-0" XP103

0 1' 2' 4'



B1 WALL SECTION
SCALE: 1/2" = 1'-0" XP103

0 1' 2' 4'



C1 WALL SECTION (ALTERNATE 1)
SCALE: 1/2" = 1'-0" XP103

0 1' 2' 4'

1

LICENSED ARCHITECT
BRIAN H. NEELY
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM_#1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 1"=1'-0"
DFE PROJECT NO: 23SR24-400-ABC
HA Project No: 23245

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

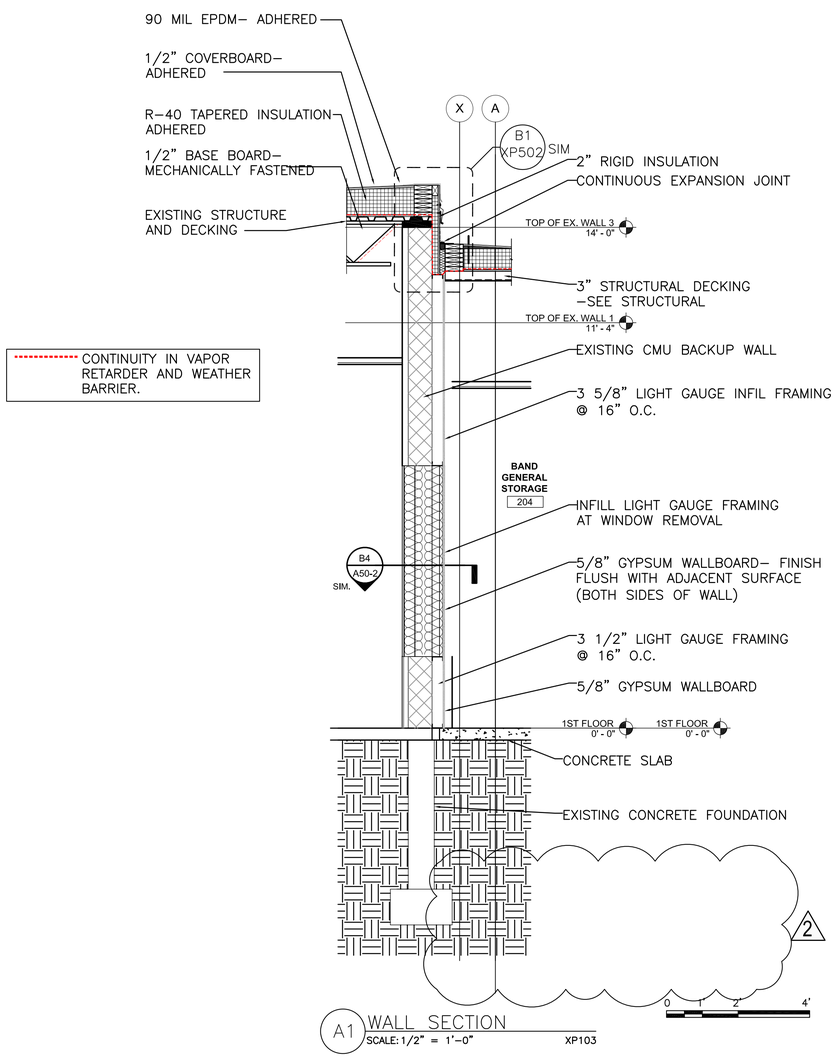
Architects + Engineers
48 Harriman Drive
Auburn, Maine 04210
207-784-5160

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

WALL SECTIONS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP302
SHEET: 44 OF 176



LICENSED ARCHITECT
BRIAN H. NEELY
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM_#1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 1"=1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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Architects + Engineers
48 Harriman Drive
Auburn, Maine 04210
207-784-5100

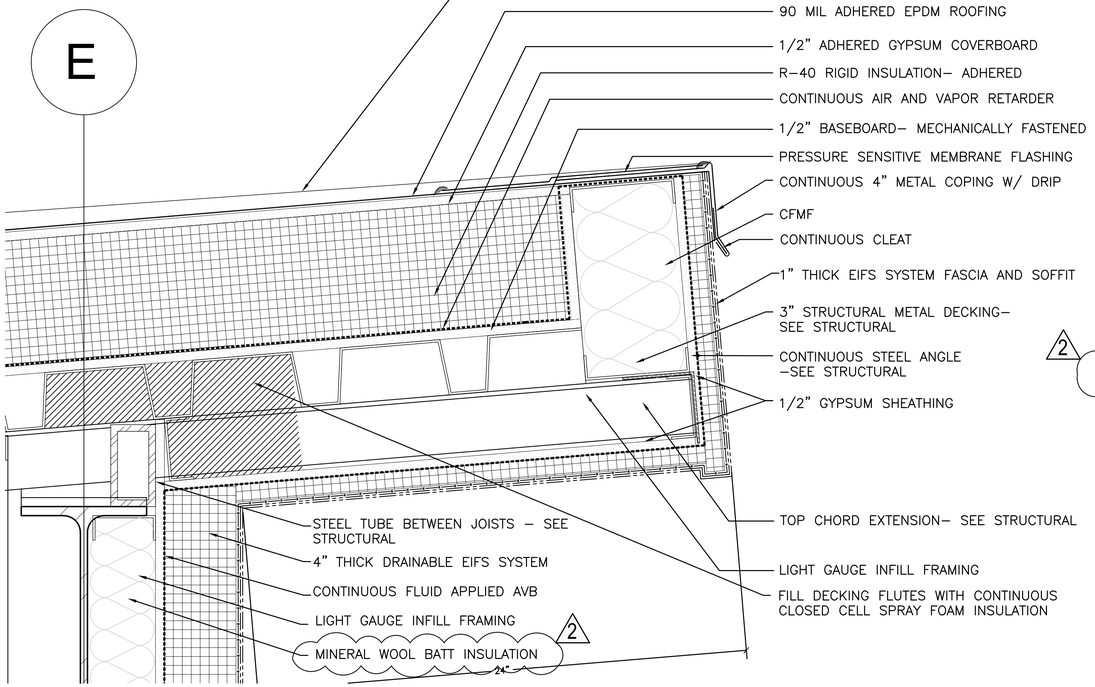
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
WALL SECTIONS

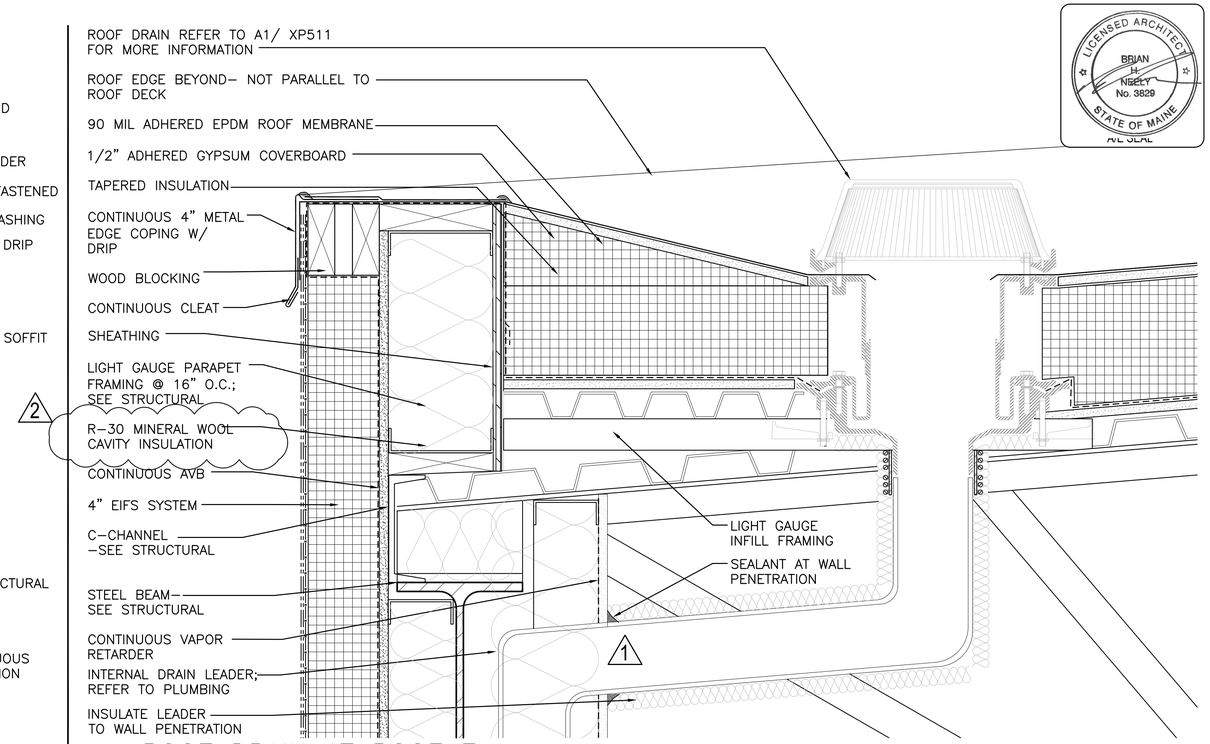
PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP303
SHEET: 45 OF 176

E

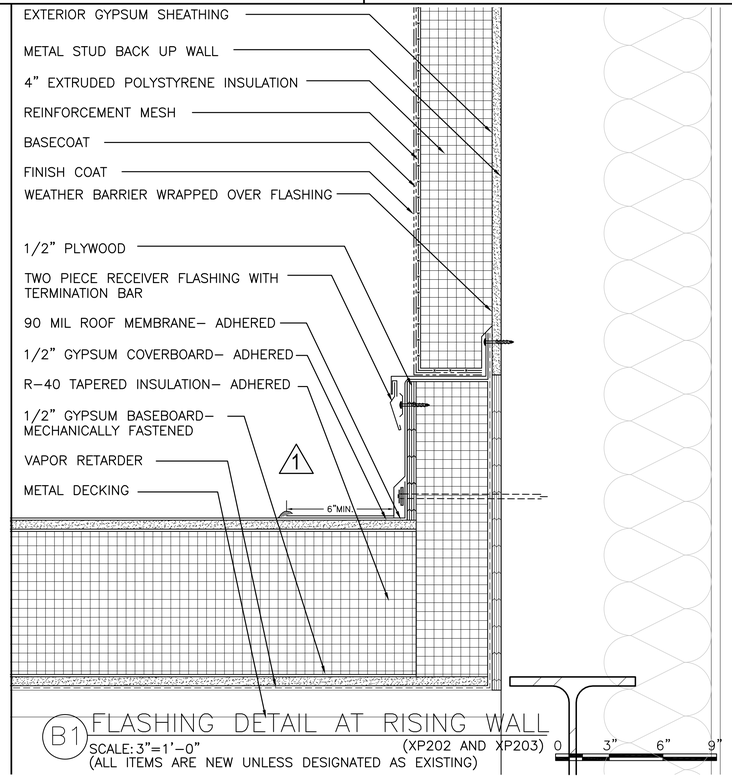


A2 ROOF EDGE DETAIL (XP301)
SCALE: 3"=1'–0"
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

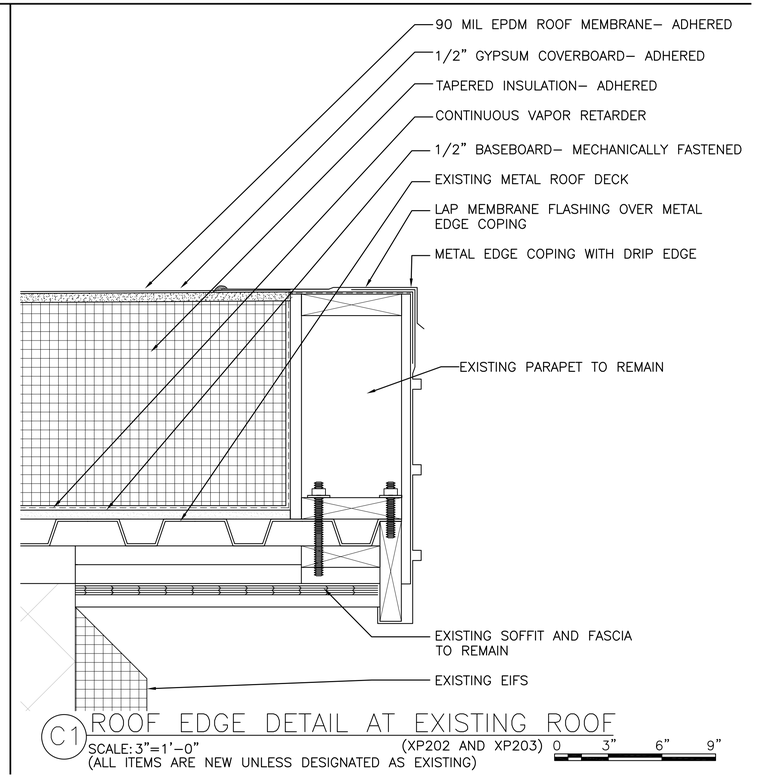


B2 ROOF DRAIN AT ROOF E (XP202 AND XP203)
SCALE: 3"=1'–0"
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

SPACE
INTENTIONALLY
LEFT BLANK



B1 FLASHING DETAIL AT RISING WALL (XP202 AND XP203)
SCALE: 3"=1'–0"
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"



C1 ROOF EDGE DETAIL AT EXISTING ROOF (XP202 AND XP203)
SCALE: 3"=1'–0"
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

LICENSED ARCHITECT
BRIAN L. NISELY
No. 3829
STATE OF MAINE
AE SEAL

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM_#1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 3"=1'-0"
DFE PROJECT NO: 23SR24-400-ABC
HA Project No: 23245

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

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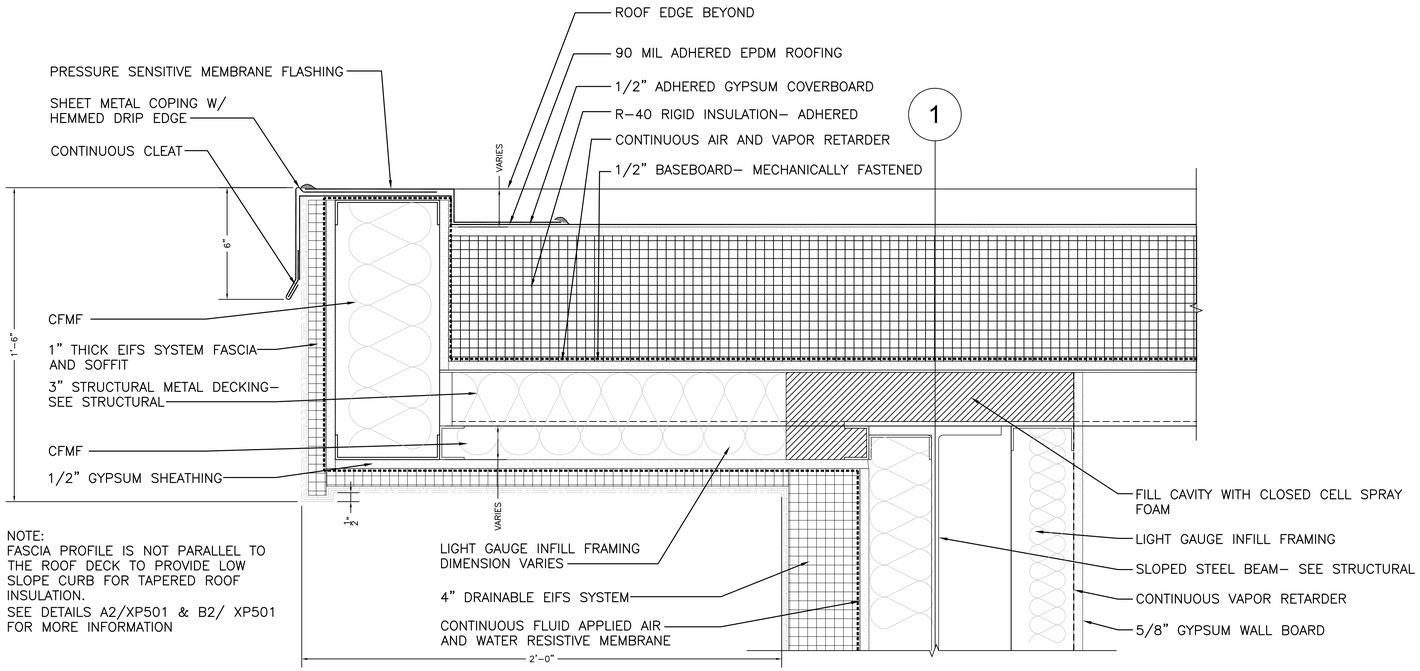
48 Harriman Drive
Auburn, Maine 04210
207-784-5100

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
DETAILS- ROOF AND CORNICE

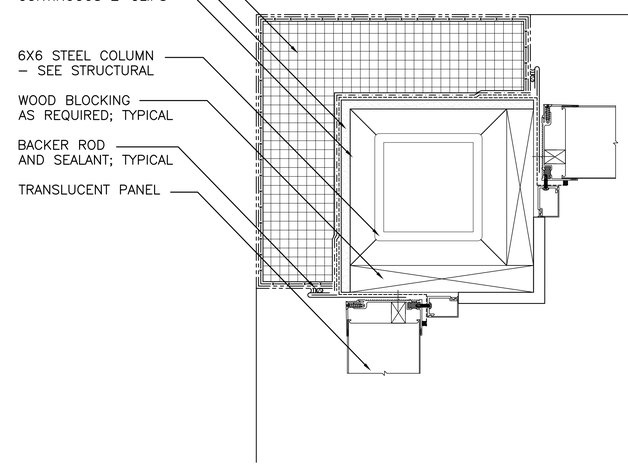
PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP501
SHEET: 46 OF 176



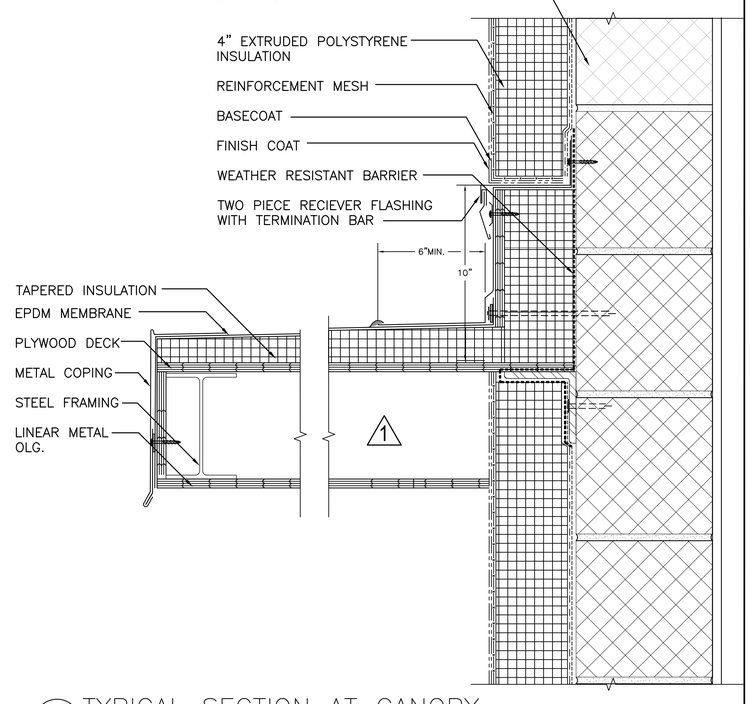
A2 ROOF RAKE DETAIL
SCALE: 3"=1'-0" XP302
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)

0 3" 6" 9"



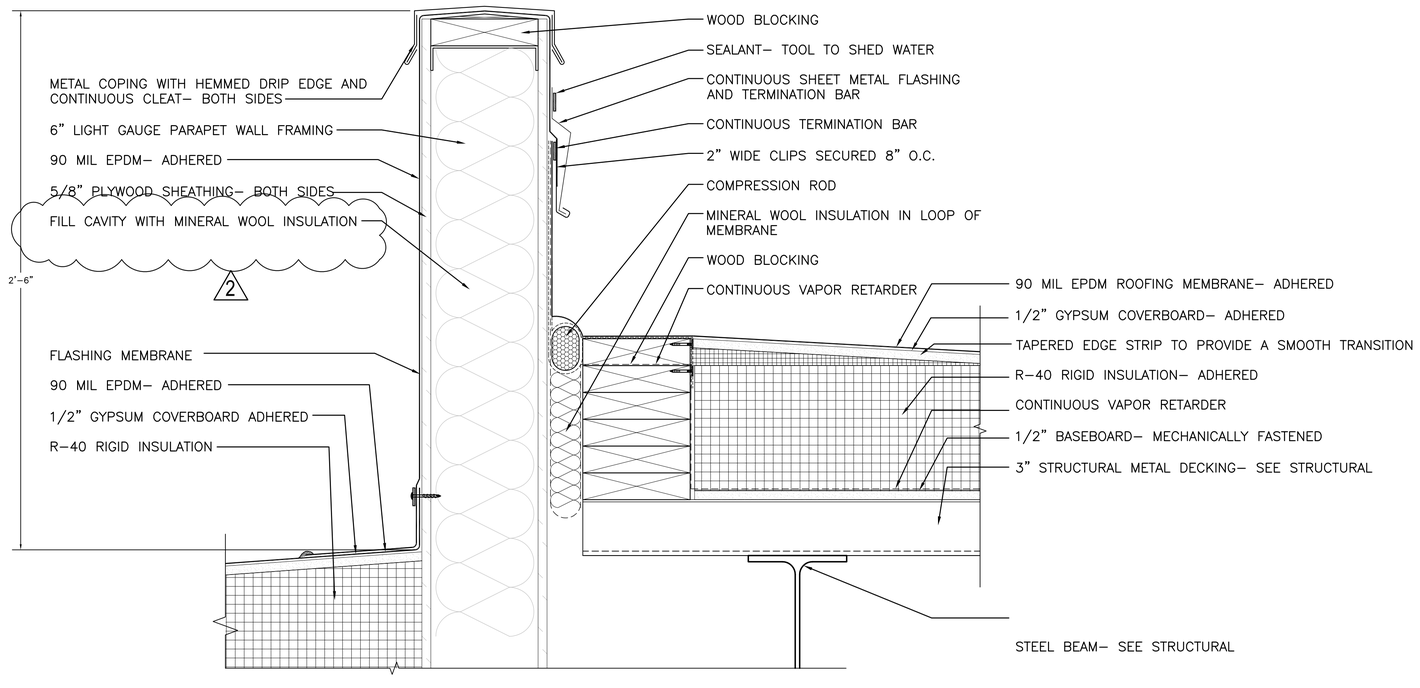
B2 TRANSLUCENT PANEL CORNER
SCALE: 3"=1'-0" XP202
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)

0 3" 6" 9"



A1 TYPICAL SECTION AT CANOPY
SCALE: 3"=1'-0" XP104
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)

0 3" 6" 9"



B1 DETAIL AT ROOF TRANSITION
SCALE: 3"=1'-0" XP301
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)

0 3" 6" 9"

LICENSED ARCHITECT
BRIAN H. NEELY
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM #1	8/20/24	
2	ADDENDUM #2	8/30/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: 3"=1'-0"
DFE PROJECT NO: 2SSR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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Auburn, Maine 04210
207-784-5100

Harriman

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

DETAILS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP502
SHEET: 47 OF 176

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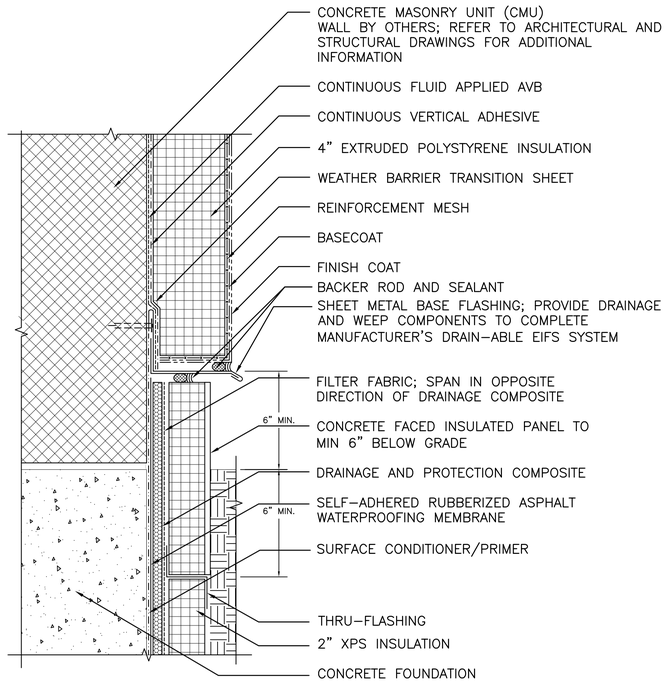
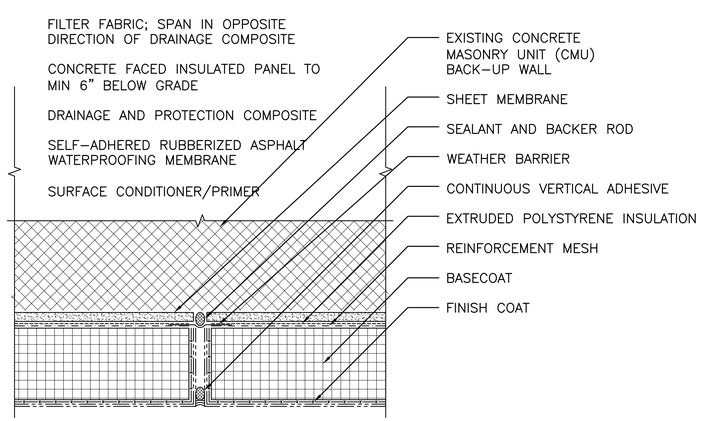


B2 EIFS BASE FLASHING AT ADDITIONS
SCALE: 3"=1'-0" (XP301)
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

INSULATION THICKNESS VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

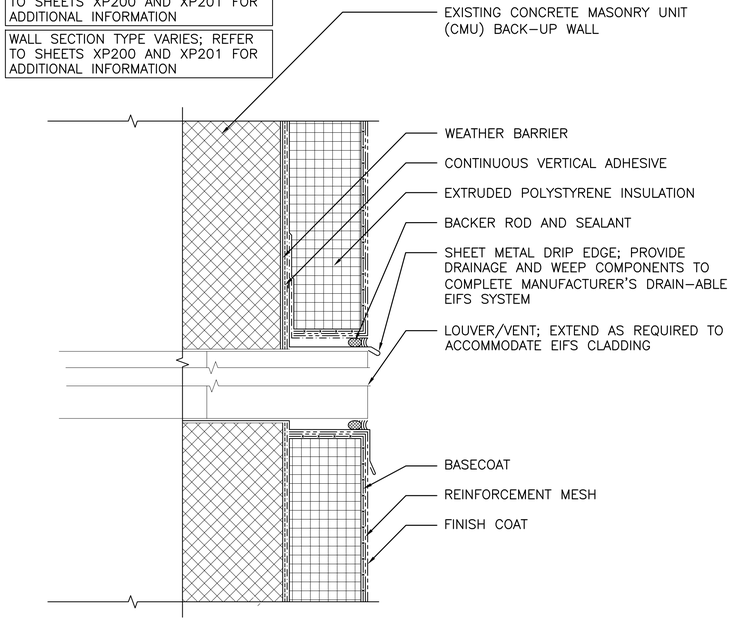
WALL SECTION TYPE VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION



C2 EIFS VERTICAL CONTROL JOINT
SCALE: 3"=1'-0" (XP202 AND XP203)
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

INSULATION THICKNESS VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

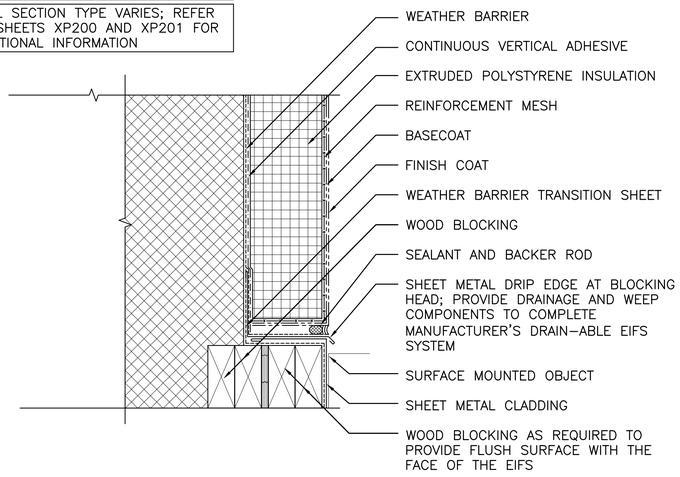
WALL SECTION TYPE VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION



A1 LOUVER/VENT PENETRATION
SCALE: 3"=1'-0" (XP202 AND XP203)
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

INSULATION THICKNESS VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

WALL SECTION TYPE VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

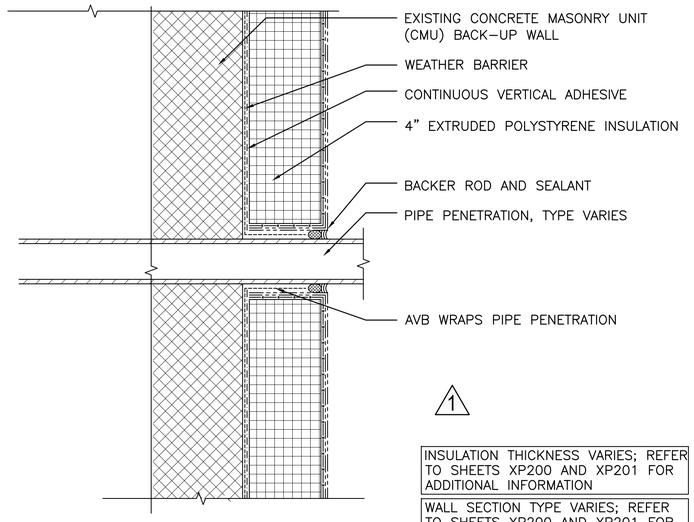


REFER TO ELECTRICAL DRAWINGS FOR SURFACE MOUNTED ELECTRICAL FIXTURE INSTALLATIONS.

B1 SURFACE MOUNTED OBJECTS AT EIFS
SCALE: 3"=1'-0" (XP202 AND XP203)
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

PLEASE NOTE THAT THIS DETAIL IS NOT INDICATED AT LOCATIONS ON THE ELEVATIONS

WEATHER BARRIER TO WRAP ONTO PIPE PENETRATION BEHIND THE EIFS



1

INSULATION THICKNESS VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

WALL SECTION TYPE VARIES; REFER TO SHEETS XP200 AND XP201 FOR ADDITIONAL INFORMATION

C1 TYPICAL PIPE PENETRATION
SCALE: 3"=1'-0"
(ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING)
0 3" 6" 9"

LICENSED ARCHITECT
BRIAN H NEELY
No. 3829
STATE OF MAINE

FACILITIES ENGINEERING
DFE
MILITARY BUREAU
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
2	ADDENDUM #2	8/30/24	
1	ADDENDUM #1	8/20/24	

DESIGNED BY: PDG
DRAWN BY: PDG, DAC
CHECKED BY: CM
DATE: 08/13/2024
SCALE: AS NOTED
DFE PROJECT NO: 23SR24-400-ABC
HA Project No: 23245

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman
Architects + Engineers
48 Harriman Drive
Auburn, Maine 04210
207-784-5100

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

EXTERIOR INSULATION FINISH SYSTEM CLADDING DETAILS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
XP701
SHEET: 51 OF 176

GENERAL NOTES

1. SEE ENVELOPE DRAWINGS FOR EXTERIOR DOOR AND WINDOW SCOPE AND DETAILS
2. BUILDING ABATEMENT TO BE COMPLETED PRIOR TO DEMOLITION
3. SQUARE FOOTAGES ARE APPROXIMATES AND ARE SHOWN FOR DEMOLITION ESTIMATION PURPOSES ONLY. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS

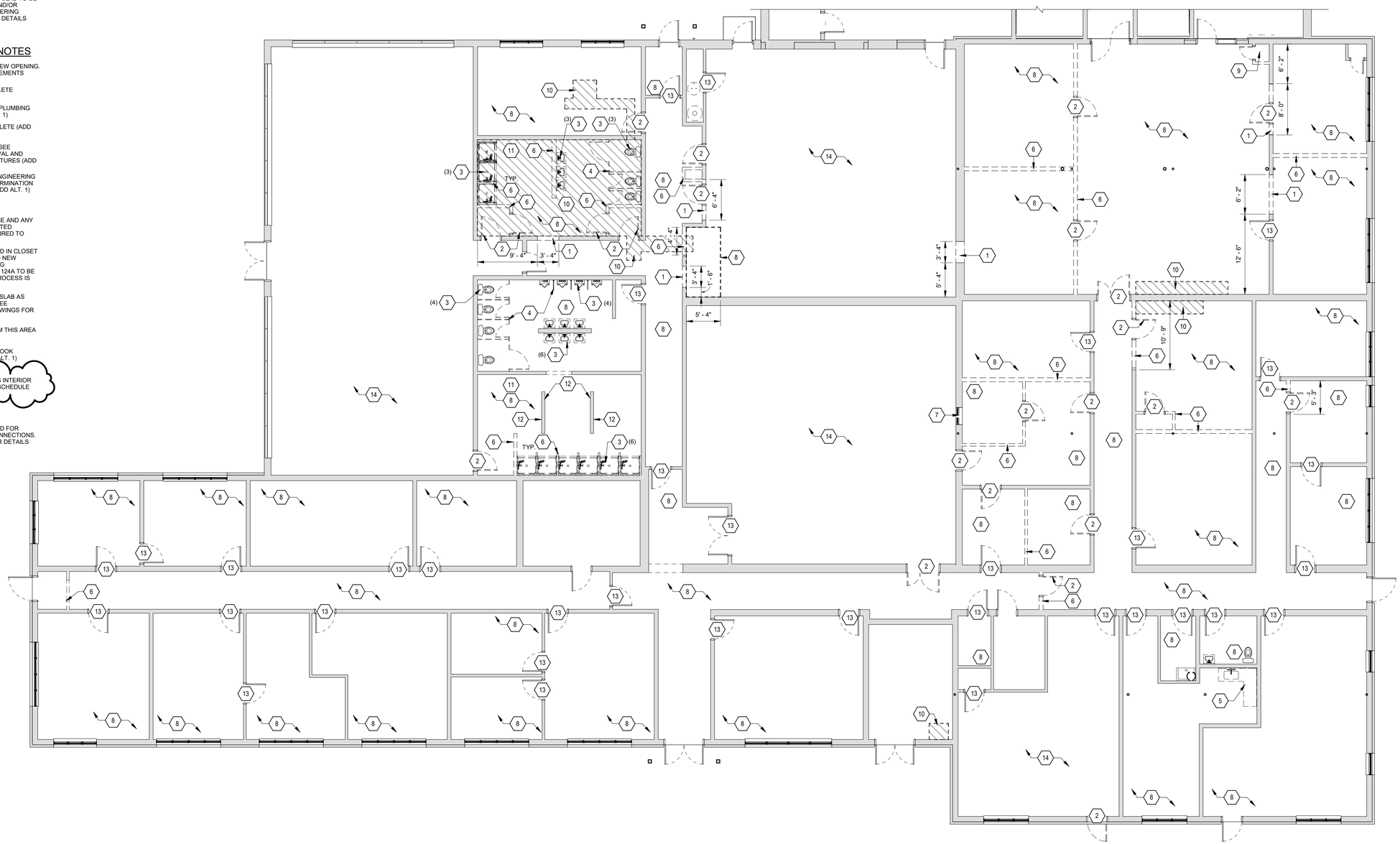
SYMBOLS LEGEND

(#) DEMOLITION KEYNOTE TAG

APPROXIMATE AREA OF EXISTING SLAB TO BE REMOVED FOR NEW PLUMBING AND/OR STRUCTURAL WORK. SEE ENGINEERING DRAWINGS FOR FULL SCOPE AND DETAILS

DEMOLITION PLAN KEYNOTES

1. REMOVE PORTION OF WALL FOR NEW OPENING. G.C. TO COORDINATE R.O. REQUIREMENTS
2. REMOVE DOOR AND FRAME COMPLETE
3. REMOVE PLUMBING FIXTURE. SEE PLUMBING DRAWINGS FOR DETAILS (ADD ALT. 1)
4. REMOVE TOILET PARTITION COMPLETE (ADD ALT. 1)
5. REMOVE CASEWORK COMPLETE. SEE PLUMBING DRAWINGS FOR REMOVAL AND TERMINATION OF ASSOCIATED FIXTURES (ADD ALT. 1)
6. REMOVE WALL COMPLETE. SEE ENGINEERING DRAWINGS FOR REMOVAL AND TERMINATION OF ASSOCIATED CONNECTIONS (ADD ALT. 1)
7. REMOVE WINDOW (BASE BID)
8. REMOVE FLOOR FINISH, WALL BASE AND ANY WALL TREATMENTS IN THE INDICATED ROOM/AREA. PREP SLAB AS REQUIRED TO RECEIVE NEW FINISH (ADD ALT. 1)
9. ALL EXISTING UTILITIES CONTAINED IN CLOSET 124A TO BE RELOCATED PRIOR TO NEW CONSTRUCTION. SEE ENGINEERING DRAWINGS FOR DETAILS. CLOSET 124A TO BE DEMOLISHED ONLY AFTER THIS PROCESS IS COMPLETED. (BASE BID)
10. REMOVE PORTION OF CONCRETE SLAB AS REQUIRED FOR NEW PLUMBING. SEE STRUCTURAL AND PLUMBING DRAWINGS FOR DETAILS (ADD ALT. 1)
11. REMOVE EXISTING LOCKERS FROM THIS AREA COMPLETE (ADD ALT. 1)
12. REMOVE EXISTING SHAKER PEG HOOK BOARDS. SAVE FOR REUSE (ADD ALT. 1)
13. ADD ALT. 3: REMOVE ALL EXISTING INTERIOR DOORS AND FRAMES. SEE DOOR SCHEDULE FOR DETAILS.
14. EXISTING FINISHES TO REMAIN
15. CORE EXISTING SLAB AS REQUIRED FOR RELOCATED AND NEW UTILITY CONNECTIONS. SEE ENGINEERING DRAWINGS FOR DETAILS (BASE BID)



A1 DEMOLITION FLOOR PLAN (ADD ALT. 1)
SCALE: 1/8" = 1'-0"

Plan North True North

LICENSED ARCHITECT MARK D LEE #3640 STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING DFE CAMP KEYES DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: KLS
DRAWN BY: KLS
CHECKED BY: MDL
DATE: 8/13/2024
SCALE: 1/8" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

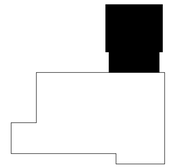
Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
DEMOLITION FLOOR PLAN (ADD ALT. 1)

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
A05-2
SHEET: 60 OF 176

KEY PLAN



GENERAL NOTES

1. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS
2. SEE EXTERIOR ENVELOPE DRAWINGS FOR ALL EXTERIOR ASSEMBLIES AND COMPONENT DETAILS.
3. SEE 'G' SERIES CODE PLANS FOR WALL RATING REQUIREMENTS.
4. EXTERIOR DOOR NUMBERS SHOWN FOR COORDINATION PURPOSES ONLY.
5. DIMENSIONS ARE TO FACE OR CENTER OF STUD UNLESS OTHERWISE NOTED
6. SEE A11-1 FOR ENLARGED PLANS
7. SEE INTERIORS DRAWINGS FOR ADDITIONAL ENLARGED PLANS AND ELEVATIONS
8. SEE I73-1 FOR SPECIALTY EQUIPMENT AND SIGNAGE

SYMBOLS LEGEND

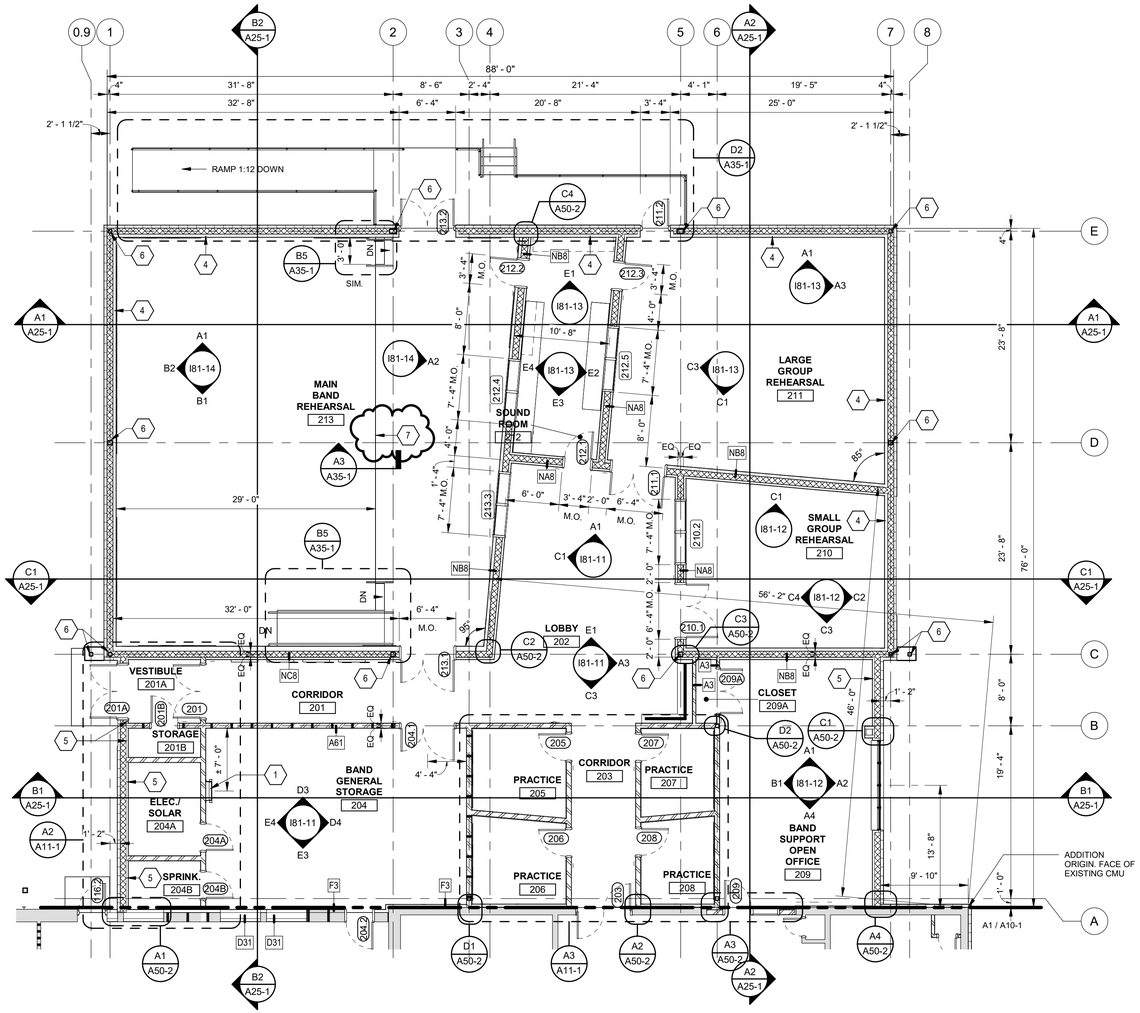
(#) DOOR / BORROWED LITE TAG. SEE A60-1 FOR DETAILS

[A61.A] WALL TAG. SEE A40-1 FOR DETAILS

⟨#⟩ KEYNOTE TAG

KEYNOTE LEGEND

1. ROOF ACCESS HATCH. SEE B1 / A50-1 FOR DETAILS. CENTER BETWEEN STRUCTRUAL JOISTS ABOVE
2. INSTRUMENT LOCKERS SHOWN FOR DIAGRAMMATIC PURPOSES ONLY. INSTRUMENT LOCKERS ARE IN SEPARATE FF&E SCOPE (ADD ALT. 1)
3. MODIFY EXISTING ROOM SURROUND WALL AS REQUIRED TO MEET PROPOSE USE SMOKE AND FIRE RATINGS. SEE 'G' SERIES CODE PLAN FOR DETAILS (ADD ALT. 1)
4. 3 5/8" METAL FURRING WALL ON INTERIOR FACE OF EXTERIOR WALL. 1/2" SPACE OFF CMU. FILL CAVITY W/ INSULATION. SEE A40-1 WALL TYPE 'N' FOR SIMILAR DETAIL. SEE EXTERIOR ENVELOPE DRAWINGS FOR EXTERIOR DETAILS.
5. 2 1/2" METAL FURRING WALL ON INTERIOR FACE OF EXTERIOR WALL. SEE A40-1 WALL TYPE 'F' FOR SIMILAR DETAIL.
6. PROVIDE 2 HOUR SPRAY FIREPROOFING FOR EXTERIOR WALL LOAD BEARING STEEL COLUMN & ASSOCIATED STEEL. SEE A4 / A40-1 FOR DETAILS
7. ACCESS PANEL @ CENTER FRONT OF PLATFORM. SEE B3 / A35-1 FOR DETAILS. LOCATE SPECIALTY POWER AND AUDIO AT THIS LOCATION UNDER PLATFORM. SEE ELECTICAL DRAWINGS FOR DETAILS.



A1 FLOOR PLAN - ADDITION (BASE BID)
SCALE: 1/8" = 1'-0"

Plan North True North

LICENSED ARCHITECT MARK D. LEE #3640 STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING DFE CAMP KEYES DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: KLS
DRAWN BY: KLS
CHECKED BY: MDL
DATE: 8/13/2024
SCALE: 1/8" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman
Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
ADDITION FLOOR PLAN

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
A10-3
SHEET: 65 OF 176

DOOR AND FRAME SCHEDULE (BASE BID)

DOOR MARK	PHASE		DOOR							FRAME					FIRE RATING	MIN. STC	HARD WARE SET	ALT. #	REMARKS
	CREATED	DEMO	OPENING SIZE		THK	LEAVES	TYPE	MAT / FIN	GLASS	TYPE	MAT / FIN	DETAILS							
			WIDTH	HEIGHT								HEAD	JAMB	SILL					
101.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	8	1, 3	
102A	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
102B	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
102C	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
103	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	16	1, 3	
104A	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
104B	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	16	1, 3	
105	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
106	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
107.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
107.2	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	ROOM 106 SECURE SIDE
108	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
109	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
110	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	60 MIN	ETR	2	3	EXISTING DOOR TO RECEIVE NEW HARDWARE
111.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	8	1, 3	
111.2	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	15	1, 3	
111.3	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	8	1, 3	
112A	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	15	1, 3	
114.1	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
114.2	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
114A	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
114B	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
115	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
116.1	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
116.3	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
116A	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	S	ETR	16	-	
118.1	EXIST	None	6' - 0"	7' - 0"	1 3/4"	(2)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	30	2	1, 3	
118.2	EXIST	ADD ALT 1	5' - 0"	7' - 0"	1 3/4"	(2 UN)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	30	ETR	1	
119	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	S	ETR	16	1, 3	
120	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
121	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
122.1	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
122.2	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
122.3	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
122A	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
123	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	45 MIN	30	17	1, 3	
124.1	EXIST	ADD ALT 1	5' - 0"	7' - 0"	1 3/4"	(2 UN)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
124C	EXIST	ADD ALT 1	2' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR		
125	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
125	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	25	20	1	
126	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
127	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
127A	BASE	None	2' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	16	-	
129	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
129A	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
130	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1, 3	INCLUDE MALE AND HANDICAP ICON
131	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	
132	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	1	
133.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	F	ETR / PTD	-	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
133.2	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	20	1, 3	ROOM 133 SECURE SIDE
134.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
135	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	20	1, 3	
136	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	16	1, 3	
137	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	18	1, 3	
138	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1, 3	
138.1	EXIST	ADD ALT 1	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1	
138A	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	ETR	ETR	-	
138B	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	ETR	1, 3	NEW CORE PER OWNER
139	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	16	1, 3	
140.1	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	-	30	17	1, 3	
140.2	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	30	17	1, 3	
142	EXIST	None	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	1	ETR / PTD	-	-	-	S	ETR	16	1, 3	
201	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2)	FG2	HM / PTD	TEMP	3	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	26	-	
201B	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	45 MIN	-	16	-	
203	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2)	N	HM / PTD	TEMP	DE	HM / PTD	D2 / A60-2	C2 / A60-2	A4/A60-2	-	-	11	-	
204.1	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2 UN)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	45 MIN	-	13	-	
204.2	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D3 / A60-2	C3 / A60-2	A4/A60-2	45 MIN	-	14	-	
204A	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	16	-	
204B	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	16	-	
205	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	35	18	-	
206	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	35	18	-	
207	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	35	18	-	
208	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	35	18	-	
209	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	G	HM / PTD	TEMP	4	HM / PTD	D2 / A60-2	C1&C2/A60-2	A4/A60-2	-	25	20	-	
209A	BASE	None	5' - 0"	7' - 0"	1 3/4"	(2)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	24	-	
210.1	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2 UN)	G	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	22	-	
211.1	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2 UN)	G	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	22	-	
212.1	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	20	-	
212.2	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	20	-	
212.3	BASE	None	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	20	-	
213.1	BASE	None	6' - 0"	7' - 0"	1 3/4"	(2 UN)	G	HM / PTD	TEMP	1	HM / PTD	D3 / A60-2	C3 / A60-2	A3/A60-2	-	40	22	-	

DOOR AND FRAME SCHEDULE (ADD ALT. 1)

DOOR MARK	DOOR							FRAME					FIRE RATING	MIN. STC	HARD WARE SET	ALT. #	REMARKS
	OPENING SIZE		THK	LEAVES	TYPE	MAT / FIN	GLASS	TYPE	MAT / FIN	DETAILS							
	WIDTH	HEIGHT								HEAD	JAMB	SILL					
100.2	6' - 0"	7' - 0"	1 3/4"	(2)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	2	1	
111B	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	S	-	16	1	
112B	3' - 0"	7' - 0"	1 3/4"	(1)	ETR	ETR / PTD	ETR	2	ETR / PTD	-	-	-	-	ETR	15	1, 3	
114	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	2	HM / PTD	D2 / A60-2	C2 / A60-2	-	-	-	15	1	
116.1	6' - 0"	7' - 0"	1 3/4"	(2)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	30	21	1	
117	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	25	17	1	
118.2	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	2	HM / PTD	D3 / A60-2	C3 / A60-2, SIM.	-	-	30	7	1	
120	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	23	1	
121.1	3' - 0"	7' - 0"	1 3/4"	(1)	N	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	8	1	PROVIDE (2) SIGN. EACH SIDE OF DOOR
122.1	6' - 0"	7' - 0"	1 3/4"	(2)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	45 MIN	-	21	1	
124	5' - 4"	7' - 0"	1 3/4"	(0)	-	-	-	5	HM / PTD	-	-	-	-	-	-	1	
124B	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	2	HM / PTD	D3 / A60-2	C3 / A60-2	-	-	30	17	1	
126	3' - 0"	7' - 0"	1 3/4"	(1)	G	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	25	20	1	
127	3' - 0"	7' - 0"	1 3/4"	(1)	G	HM / PTD	TEMP	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	25	20	1	
128	3' - 4"	7' - 0"	1 3/4"	(0)	-	-	-	5	HM / PTD	D2 / A60-2	C2 / A60-2	-	-	-	-	1	
132	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	25	20	1	
134.2	3' - 0"	7' - 0"	1 3/4"	(1)	F	HM / PTD	-	1	HM / PTD	D1 / A60-2	C1 / A60-2	-	-	-	8	1	

BORROWED LITE SCHEDULE

LITE MARK	PHASE CREATED	LITE TYPE	SIZE / POSITION			FRAME MAT / FIN	FRAME DETAILS			GLASS MAT	FIRE RATING	MIN. STC	REMARKS
			WIDTH	HEIGHT	HEAD HEIGHT		HEAD	JAMB	SILL				
125A	ADD ALT 1	BL1	6' - 2"	3' - 2"	7' - 2"	HM / PTD	D1 / A60-2	C1 / A60-2	B1 / A60-2	TEMP	-	25	
210.2	BASE	BL2	7' - 4"	4' - 2"	7' - 4"	HM / PTD	D3 / A60-2	C3 / A60-2	B3 / A60-2	TEMP	-	40	
212.4	BASE	BL2	7' - 4"	4' - 2"	7' - 4"	HM / PTD	D3 / A60-2	C3 / A60-2	B3 / A60-2	TEMP	-	40	
212.5	BASE	BL2	7' - 4"	4' - 2"	7' - 4"	HM / PTD	D3 / A60-2	C3 / A60-2	B3 / A60-2	TEMP	-	40	
213.3	BASE	BL2	7' - 4"	4' - 2"	7' - 2"	HM / PTD	D3 / A60-2	C3 / A60-2	B3 / A60-2	TEMP	-	40	

DOOR SCHEDULE GENERAL NOTES:

1. SEE EXTERIOR ENVELOPE DRAWINGS FOR EXTERIOR DOOR SCHEDULE
2. SEE SPECIFICATIONS FOR DOOR HARDWARE SCHEDULE AND HARDWARE BASIS OF DESIGN
3. DOOR SCHEDULE SHOWS AS ADD ALTERNATE 1 ACCEPTED AND INDICATES ADD ALTERNATE 4 VARIABLE
4. BASE BID: NOTED EXISTING DOORS AND FRAMES TO REMAIN. TO BE REFINISHED AND RECEIVE NEW HARDWARE AS INDICATED. EXISTING DOORS AND FRAMES TO BE MODIFIED AS REQUIRED TO FOR NEW HARDWARE AND ACOUSTIC MINIMUMS.
5. CONDITIONS FOR REPLACEMENT DOOR AND FRAME UNITS.
6. CONTRACTOR IS RESPONSIBLE FOR DOOR FRAME THROAT SIZE VERIFICATIONS
7. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE UL CONDITION OF ALL EXISTING DOORS TO REMAIN AND PERFORM TO NEW MINIMUM RATINGS NOTED. CONTRACTOR TO PROVIDE PHOTOS AND SCHEDULE OF DOORS FOR RECORD.
8. CONTRACTOR TO REMOVE AND REPLACE ANY EXISTING DOORS THAT ARE VERIFIED TO NOT MEET NEW MINIMUM RATINGS NOTED.
9. FRAMES SHALL BE HOLLOW METAL UNLESS NOTED OTHERWISE
10. FRAME HEADS SHALL BE 2" UNLESS NOTED OTHERWISE
11. JAMBS AND MULLIONS SHALL BE 2" UNLESS NOTED OTHERWISE
12. BASES OF SIDELITES SHALL BE 6" UNLESS NOTED OTHERWISE
13. GLAZING WITHIN FRAMES INCLUDING TRANSOMS SHALL BE TEMPERED UNLESS NOTED OTHERWISE.
14. ALL DOORS WITH A NOTED MINIMUM STC TO RECEIVE ACOUSTIC HEAD & JAMB BULB GASKETING IF NOT ALREADY NOTED IN THE HARDWARE SPECIFICATIONS. COLOR MATCH SIM TO FRAME PAINT

DOOR SCHEDULE ALTERNATES

ADD ALTERNATE 1:

- EXISTING DOORS AND FRAMES TO REMAIN. REMOVE RUST AND REPAIR PHYSICAL INTEGRITY OF DOOR ASSEMBLY. PRIME AND PAINT. SEE FINISH SCHEDULE. MODIFY OR REPLACE EXISTING DOOR HARDWARE AS NOTED IN DOOR SCHEDULE.

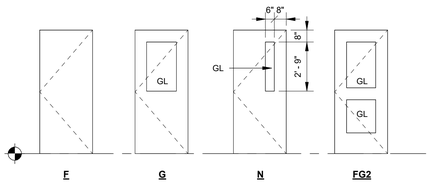
ADD ALTERNATE 3:

- ACCEPTANCE OF ADD ALTERNATE 3 TO BE DETERMINED PRIOR IMPLEMENTATION OF ADD ALTERNATE 1 RENOVATION
- ACCEPTANCE OF ADD ALTERNATE 3 WILL SUPERSEDE ADD ALTERNATE 1 DOOR SCOPE NOTED ABOVE.
- ALL EXISTING DOORS, FRAMES, AND HARDWARE TO BE REPLACED. CONTRACTOR RESPONSIBLE FOR VERIFYING EXISTING WALL THICKNESS FOR FRAME THROAT REQUIREMENTS. SEE EXTERIOR ENVELOPE DRAWINGS FOR EXTERIOR DOOR DETAILS

DOOR SCHEDULE ABBREVIATIONS

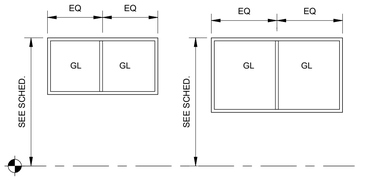
TEMP	TEMPERED (GLAZING)
PTD	PAINTED, SEE FINISH SCHEDULE
MTL	METAL
HM	HOLLOW METAL
WD	WOOD VENEER FINISH, SEE FINISH SCHEDULE
MIN	MINUTE (RATING)
MIN	MINIMUM (MEASUREMENT)
STC	SOUND TRANSMISSION COEFFICIENT (RATING)
ETR	EXISTING TO REMAIN
MAT	BASE MATERIAL
FIN	FINISH
DE	DOUBLE EGRESS

DOOR PANEL TYPES



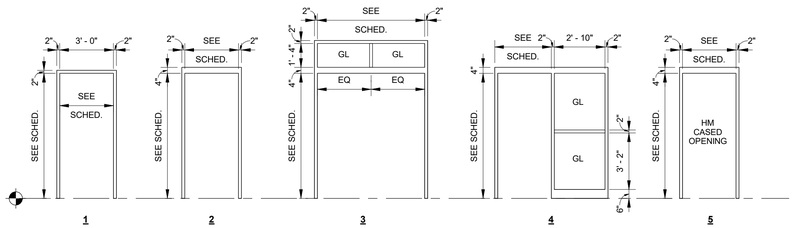
F G N FG2

BORROWED LITE FRAME TYPES



BL1 BL2

DOOR FRAME TYPES



1 2 3 4 5

LICENSED ARCHITECT
MARK D. LEE #3640
STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr
2	ADDENDUM 2	08-30-2024	
1	ADDENDUM 1	08-20-2024	

DESIGNED BY: KLS
DRAWN BY: KLS
CHECKED BY: MDL
DATE: 8/13/2024
SCALE: As indicated
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

DOOR & BORROWED LITE SCHEDULE & TYPES

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
A60-1
SHEET: 75 OF 176

ROOM FINISH SCHEDULE

NOTE: SCHEDULE INCLUDES ADD ALTERNATE 1 SCOPE

ROOM			FLOOR	BASE	WAINSCOT		WALLS				CEILING	REMARKS
No.	NAME	ALT #			CODE	HT	N	E	S	W		
1ST FLOOR												
100	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
100A	VESTIBULE	-	MAT	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
100C	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
100D	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
101	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
102A	152ND MAINT. ORDERLY ROOM	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
102B	152ND MAINT. OIC	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
102C	152ND MAINT.	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
103	152ND MAINT. SUPPLY	-	RF1	-	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
104A	126/132ND SUPPLY NCO	-	RF1	-	-		P1	P1	P1	P1	ACT1	
104B	126/132ND SUPPLY	-	RF1	-	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
105	521ST S4 OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
106	521ST COMMAND OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
107	521ST XO OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
108	521ST OPEN OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
109	521ST CSM OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
110	VAULT ARMS ROOM	-	P7	P7	-		P1	P1	P1	P1	ETR/P	PAINT EXISTING CONCRETE FLOOR
111	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
111A	VESTIBULE	-	MAT	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
111B	UTILITY	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
112A	MENS LATRINE	-	PT1	CT	CT1	5' - 0"	P2	P2	P2	P2	ACT2	
112B	MEN SHOWER	-	PT1	CT	CT1	5' - 0"	P2	P2	P2	P2	ACT2	
113	GYM & LOCKERS	-	P7	P7	EPOXY	4' - 0"	P1	P1	P1	P1	EXP/P	PAINT EXISTING CONCRETE FLOOR, EXISTING RUBBER TILES TO BE REMOVED FOR FLOOR REFINISH AND REINSTALLED
114A	WOMENS LATRINE	-	PT1	RB	CT1	5' - 0"	P2	P2	P2	P2	ACT2	
114B	WOMENS LATRINE	-	PT1	CT	CT1	5' - 0"	P2	P2	P2	P2	ACT2	
114C	WOMENS SHOWER	-	PT1	CT	CT1	5' - 0"	P2	P2	P2	P2	ACT2	
116	BAND DRILL PAD ASSEMBLY ROOM	-	ETR	ETR	-		ETR	ETR	ETR	ETR	ETR	ROOM MAY NEED ADDITIONAL PARTITIONS AND/OR PATCHING FOR NEW USE
116A	STORAGE	-	CONC/H	-	-		P1	P1	P1	P1	ETR	
117	LAUNDRY & UNIFORM STORAGE	-	RF1	RB	EPOXY	4' - 0"	P2	P2	P2	P2	ACT2	
118	521ST DRILL PAD ASSEMBLY ROOM	-	ETR	ETR	-		ETR	ETR	ETR	ETR	ETR	ROOM MAY NEED ADDITIONAL PARTITIONS AND/OR PATCHING FOR NEW USE
119	RECRUITMENT STORAGE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
120	LACTATION/ BREAK ROOM	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
121	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
122	BAND SUPPLY & REPAIR	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
123	BAND LIBRARY	-	RF1	RB	-		P1	P1	P1	P1	ACT1	PROVIDE ACOUSTIC PANELING AND CEILING COMPONENTS AS NEEDED
124A	BAND DAY ROOM	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
124B	INSTRUMENT LOCKERS	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
125	BAND E7 OPEN OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
126	BAND CDR OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
127	BAND 1SG OFFICE	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
127A	UTILITY	1	RF1	RB	-		P1	P1	P1	P1	ACT1	
128	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
131	R&R NCOIC	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
132	R&R ADMIN.	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
133	R&R (OSM)	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
134	R&R RECRUITERS	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
134A	VESTIBULE	-	MAT	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
135	UNISEX LAV.	-	CT	CT	CT1	5' - 0"	P2	P2	P2	P2	ACT1	
136	UTILITY CLOSET	-	CONC/H	CONC	CT1	5' - 0"	P1	P1	P1	P1	ACT1	
137	BREAK ROOM	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
138	FUNERAL HONORS	-	ETR	ETR	-		ETR	ETR	ETR	ETR	ETR	ROOM MAY NEED ADDITIONAL PARTITIONS AND/OR PATCHING FOR NEW USE
138A	CLOSET	-	ETR	RB	-		P1	P1	P1	P1	ETR	
138B	I.T. ROOM	-	ETR	ETR	-		ETR	ETR	ETR	ETR	ETR	
139	MECHANICAL	-	ETR	ETR	-		ETR	ETR	ETR	ETR	ACT1	
140	CONFERENCE ROOM	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
141	BOILER ROOM	-	P7	ETR	-		P1	P1	P1	P1	ETR	
142	521ST SUPPLY ROOM	-	RF1	RB	-		P1	P1	P1	P1	ACT1	
201	CORRIDOR	-	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P6	ACT1	
201A	VESTIBULE	-	MAT	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
201B	STORAGE	-	CONC/H	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
202	LOBBY	1	RF1	RB	EPOXY	4' - 0"	P1	P1	P6	P1	ACT1/ACP1	
203	CORRIDOR	1	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
204	BAND GENERAL STORAGE	1	RF1	RB	EPOXY	4' - 0"	P1	P1	P1	P1	ACT1	
204A	ELEC./ SOLAR	1	CONC/H	RB	-		P1	P1	P1	P1	ACT1	
204B	SPRINK.	1	CONC/H	RB	-		P1	P1	P1	P1	ACT1	
205	PRACTICE	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
206	PRACTICE	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
207	PRACTICE	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
208	PRACTICE	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
209	BAND SUPPORT OPEN OFFICE	1	RF1	RB	-		P1	P1	P1	P1	ACT1	
209A	CLOSET	1	RF1	RB	-		P1	P1	P1	P1	ACT1	
210	SMALL GROUP REHEARSAL	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
211	LARGE GROUP REHEARSAL	1	CPT	RB	-		P1	P1	P1	P1	GWB3	
212	SOUND ROOM	1	CPT	RB	-		P1	P1	P1	P1	ACT1	
213	MAIN BAND REHEARSAL	1	CPT	RB	-		P1	P1	P1	P1	GWB3	

MATERIALS LEGEND

NOTE: ANY PRODUCT NAMED IS CONSIDERED A BASIS OF DESIGN. SEE SPECIFICATIONS FOR MATERIAL PREFORMANCE REQUIREMENTS AND ALTERNATE SUBMISSION GUIDELINES.

MATERIAL	CODE No.	MANUFACTURER / SERIES	COLOR / FINISH	REMARKS
RUBBER BASE	RB	TARKETT / JOHNSONITE OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
CARPET	CPT1	J+J / KINETEX OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
CARPET	CPT2	J+J / KINETEX OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
ENTRY MAT	MAT	INTERFACE STEP REPEAT OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
RESILIENT FLOORING	RF1	TARKETT / JOHNSONITE OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
CERAMIC TILE	CT1	DALTILE ARTCRAFTED OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
PORCELAIN TILE	PT1	DALTILE INDOTERRA OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
ACOUSTIC WALL PANEL	AWP	ARMSTRONG SOUNDSCAPE SHAPES OR APPROVED EQUAL	FABRIC, COLOR TBD BY ARCHITECT FROM FULL SELECTION	ARMSTRONG PRODUCT MUST BE SPECIFIED AS BABAA COMPLIANT TO MEET STANDARD
ACOUSTIC CLOUD	AC1	ARMSTRONG SOUNDSCAPE SHAPES OR APPROVED EQUAL	FABRIC, COLOR TBD BY ARCHITECT FROM FULL SELECTION	HUNG @ 20'-0". SEE ENLARGEMENT DIAGRAM
ACCENT CEILING PANEL SYSTEM	ACP1	FINISH GRADE PLYWOOD	STAINED, TBD	
2X2 ACOUSTIC CEILING TILE	ACT1	ARMSTRONG OPTIMA TEGULAR OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	CAC 35 MINIMUM, USE ARMSTRONG HRC GRID OR EQUAL
2X4 HIGH MOISTURE CEILING TILE	ACT2	ARMSTRONG OPTIMA HEALTHZONE OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	CAC 35 MINIMUM, USE ARMSTRONG HRC GRID OR EQUAL
EXISTING 2X2 TILE TO BE REINSTALLED	EXC1	ETR, VERIFY W/ OWNER	ETR, MATCH EXISTING	REPLACE & MATCH ANY MATERIALS DAMAGED IN SCOPE OF WORK
EXISTING ACOUSTIC BAFFLE GRID REINSTALLED	EXC2	ETR, VERIFY W/ OWNER	ETR, MATCH EXISTING	REPLACE & MATCH ANY MATERIALS DAMAGED IN SCOPE OF WORK
EXISTING ACOUSTIC CLOUD REINSTALLED	EXC3	ETR, VERIFY W/ OWNER	ETR, MATCH EXISTING	REPLACE & MATCH ANY MATERIALS DAMAGED IN SCOPE OF WORK
SUSPENDED ACOUSTIC GWB CEILING SYSTEM	GWB3	ARMSTRONG ACOUSTIBUILT CEILING SYSTEM OR APPROVED EQUAL	PAINTED, COLOR TBD BY ARCHITECTFROM FULL SELECTION	CAC 40 MINIMUM. CONTROL & EXPANSION JOINTS PER MANUF. & MANUF. REVEAL @ WALL
EPOXY WAINSCOT	EPOXY	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	
PAINT	P1	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION / EGGSHELL	FIELD
PAINT	P3	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION / SEMI-GLOSS	MOISTURE RESISTANT FIELD
PAINT	P4	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION / SEMI-GLOSS	PAINT FOR DOORS AND TRIM WHERE APPLICABLE
PAINT	P5	SHERWIN WILLIAMS OR APPROVED EQUAL	CEILING BRIGHT WHITE OR EQUAL/ FLAT	CEILING AND SOFFIT PAINT WHERE APPLICABLE
PAINT	P6	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION / EGGSHELL	ACCENT PAINT COLOR
PAINT	P7	SHERWIN WILLIAMS OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	PAINT FOR FLOORS
PAINT	P8	TNEMEC OR APPROVED EQUAL	TBD BY OWNER & ARCHITECT FROM FULL SELECTION	EXPOSED DUCT AND METAL DECK

LICENSED ARCHITECT
MARK D. LEE #3649
STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: ABD
DRAWN BY: ABD
CHECKED BY: PJP
DATE: 8/13/2024
SCALE:
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ROOM FINISH SCHEDULE & MATERIALS LIST

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
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- ☒ FOR BIDDING
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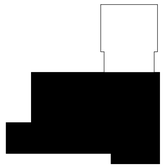
- ☐ RECORD DRAWINGS

SHEET ID:
I61-1
SHEET: 77 OF 176

KEY PLAN



GENERAL NOTES

1. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
2. MECHANICAL, ELECTRICAL AND LIFE SAFETY FIXTURES AND DEVICES SHOWN FOR LAYOUT COORDINATION PURPOSES ONLY. SEE ENGINEERING DRAWINGS FOR FULL DETAILS

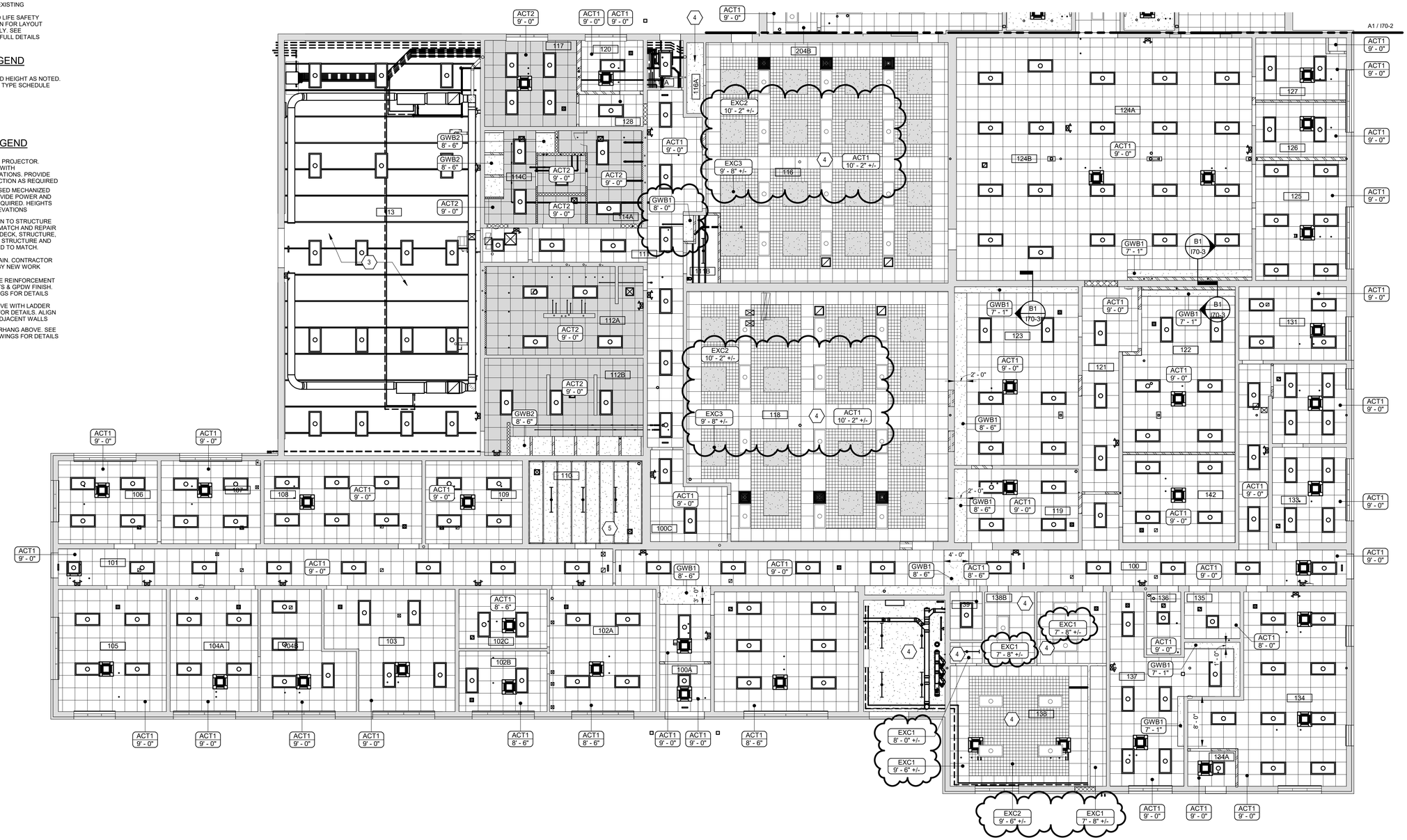
SYMBOLS LEGEND

ACT1 10'-0" — CEILING TAG. TYPE AND HEIGHT AS NOTED. SEE I61-1 FOR CEILING TYPE SCHEDULE

(#) — KEYNOTE TAG

KEYNOTES LEGEND

1. CEILING HUNG OVER HEAD PROJECTOR. COORDINATE PLACEMENT WITH MANUFACTURER SPECIFICATIONS. PROVIDE POWER AND DATA CONNECTION AS REQUIRED
2. 12'-0" WIDE SOFFIT RECESSED MECHANIZED PROJECTOR SCREEN. PROVIDE POWER AND REMOTE CONTROLS AS REQUIRED. HEIGHTS AS NOTED IN INTERIOR ELEVATIONS
3. NO FINISHED CEILING. OPEN TO STRUCTURE ABOVE. CONTRACTOR TO MATCH AND REPAIR PAINTED FINISH EXPOSED DECK, STRUCTURE, AND DUCTWORK. ALL NEW STRUCTURE AND DUCT WORK TO BE PAINTED TO MATCH.
4. EXISTING CEILING TO REMAIN. CONTRACTOR TO REPAIR AS REQUIRED BY NEW WORK
5. VAULT CEILING TO RECEIVE REINFORCEMENT PANELS, NEW STEEL JOISTS & GPDW FINISH. SEE STRUCTURAL DRAWINGS FOR DETAILS
6. ROOF ACCESS HATCH ABOVE WITH LADDER BELOW. SEE B1 / A50-1. FOR DETAILS. ALIGN WITH FINISH FACE OF (2) ADJACENT WALLS
7. UNDERSIDE OF ROOF OVERHANG ABOVE. SEE EXTERIOR ENVELOPE DRAWINGS FOR DETAILS



A1 REFLECTED CEILING PLAN - RENOVATION (ADD. ALT. 1)
SCALE: 1/8" = 1'-0"

Plan North True North

LICENSED ARCHITECT — MARK D LEE #3640 — STATE OF MAINE — A / E Seal

FACILITIES ENGINEERING — DFE — CAMP KEYES DIRECTORATE

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1	ADDENDUM 2	08-30-2024	

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STATE OF MAINE
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46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

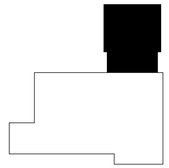
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

RENOVATION REFLECTED CEILING PLAN (ADD ALT. 1)

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID: I70-1
SHEET: 78 OF 176

KEY PLAN



GENERAL NOTES

1. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
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SYMBOLS LEGEND

ACT1 / 10'-0" — CEILING TAG. TYPE AND HEIGHT AS NOTED. SEE I61-1 FOR CEILING TYPE SCHEDULE

(#) — KEYNOTE TAG

KEYNOTES LEGEND

1. CEILING HUNG OVER HEAD PROJECTOR. COORDINATE PLACEMENT WITH MANUFACTURER SPECIFICATIONS. PROVIDE POWER AND DATA CONNECTION AS REQUIRED
2. 12'-0" WIDE SOFFIT RECESSED MECHANIZED PROJECTOR SCREEN. PROVIDE POWER AND REMOTE CONTROLS AS REQUIRED. HEIGHTS AS NOTED IN INTERIOR ELEVATIONS
3. NO FINISHED CEILING. OPEN TO STRUCTURE ABOVE. CONTRACTOR TO MATCH AND REPAIR PAINTED FINISH EXPOSED DECK, STRUCTURE, AND DUCTWORK. ALL NEW STRUCTURE AND DUCT WORK TO BE PAINTED TO MATCH.
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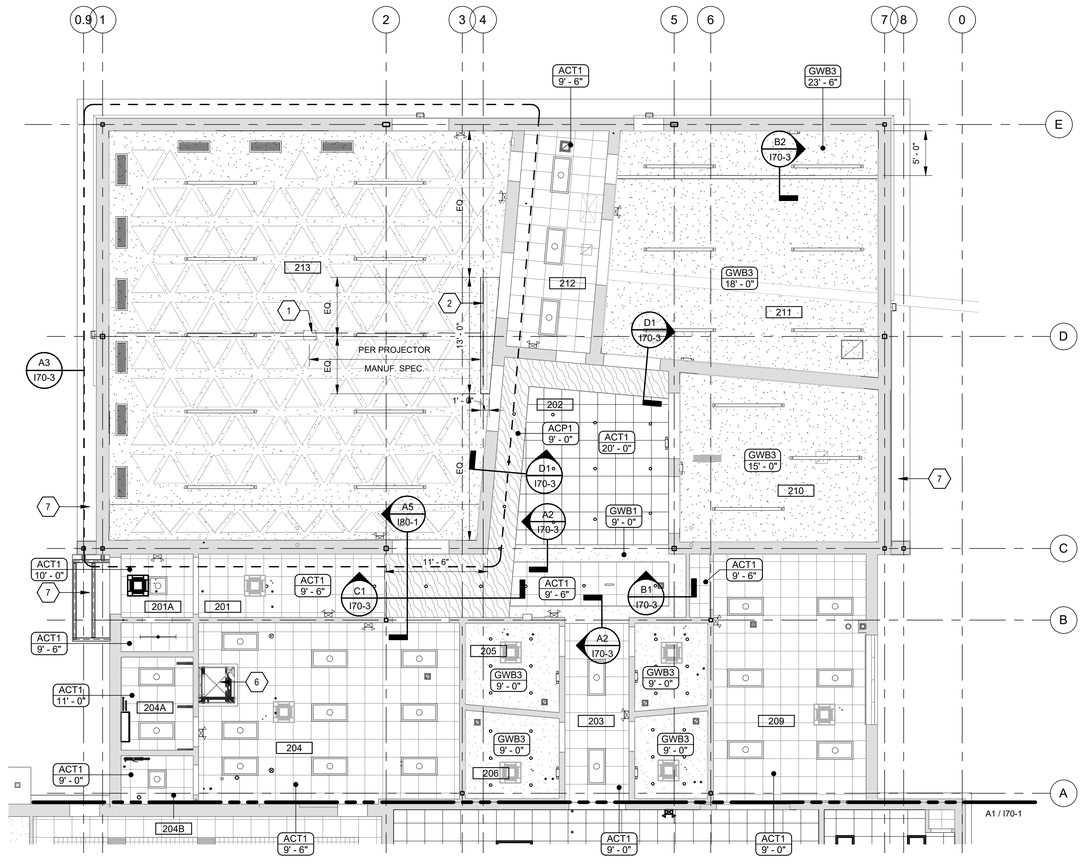
5. VAULT CEILING TO RECEIVE REINFORCEMENT PANELS. NEW STEEL JOISTS & GPDW FINISH. SEE STRUCTURAL DRAWINGS FOR DETAILS.
6. ROOF ACCESS HATCH ABOVE WITH LADDER BELOW. SEE B1 / A50-1 FOR DETAILS. ALIGN WITH FINISH FACE OF (2) ADJACENT WALLS.
7. UNDERSIDE OF SPACE OVERHANG ABOVE. SEE EXTERIOR ENVELOPE DRAWINGS FOR DETAILS



A1 REFLECTED CEILING PLAN - ADDITION (BASE BID)
SCALE: 1/8" = 1'-0"

Plan North / True North

LICENSED ARCHITECT — MARK D. LEE #3640 — STATE OF MAINE — A / E Seal

FACILITIES ENGINEERING — DFE — CAMP KEYES — DIRECTORATE

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Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

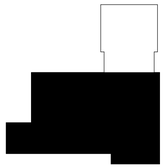
ADDITION REFLECTED CEILING PLAN

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
I70-2
SHEET: 79 OF 176

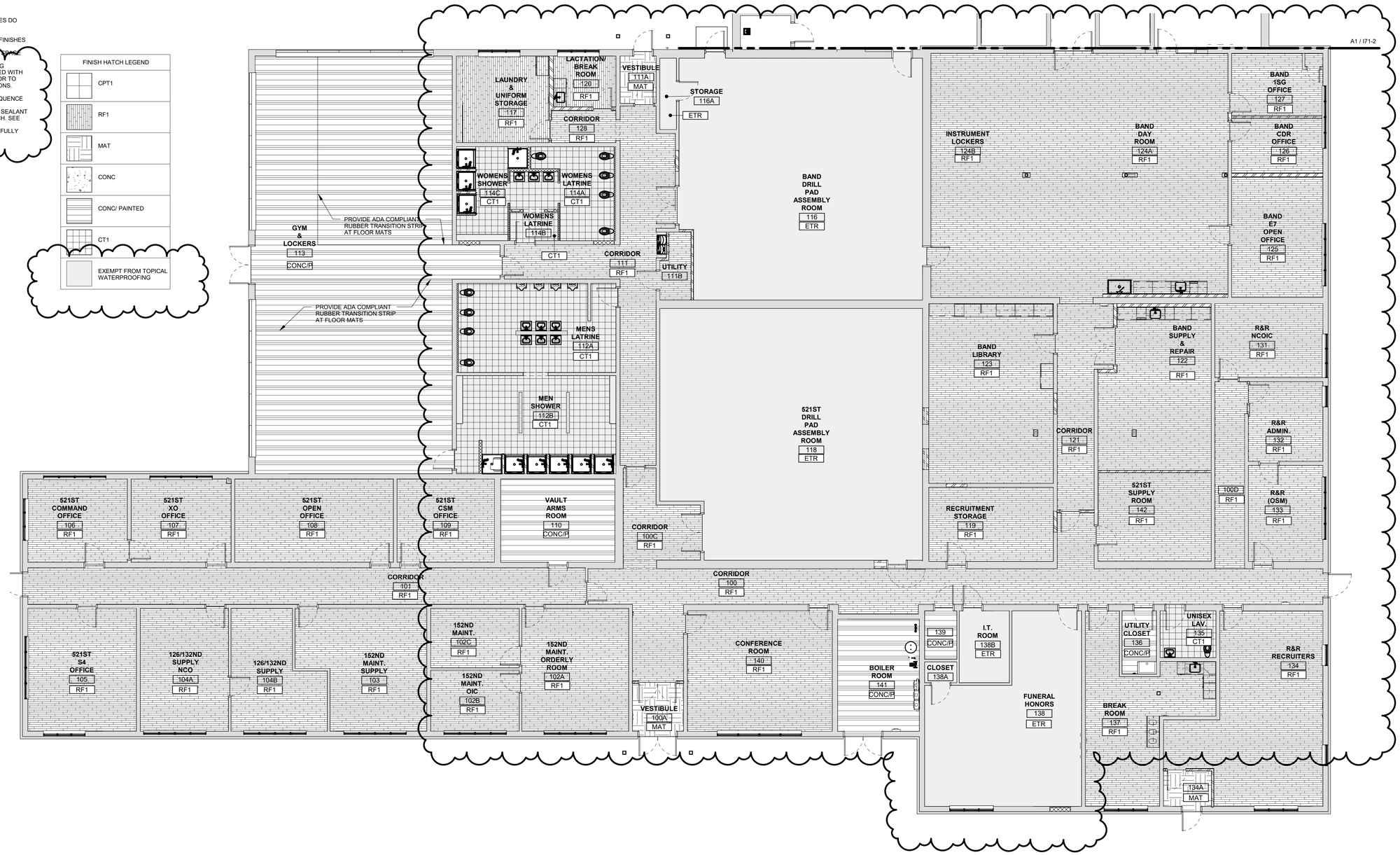
KEY PLAN



GENERAL NOTES

1. HATCH PATTERNS DENOTE AREA. HATCHES DO NOT INDICATE INSTALL LAYOUT UNLESS OTHERWISE NOTED.
2. LAYOUT FOR TILED OR MODULAR FLOOR FINISHES PER MATERIAL MANUFACTURER'S RECOMMENDATIONS FOR CENTERING ON SPACE AND MINIMAL WASTE.
3. UNLESS NOTED OTHERWISE, ALL EXISTING INTERIOR CONCRETE SLAB TO BE TREATED WITH TOPICAL WATERPROOFING SEALANT PRIOR TO NEW FINISH FLOORING. SEE SPECIFICATIONS. CONTRACTOR TO COORDINATE SEALANT APPLICATION AND FLOORING INSTALL SEQUENCE PER MANUFACTURER REQUIREMENTS.
4. ROOMS EXEMPT FROM WATERPROOFING SEALANT ARE INDICATED WITH A LIGHT GRAY HATCH. SEE HATCH LEGEND.
5. FINISH FLOORING SHOULD BE INSTALLED FULLY UNDER ALL CASEWORK.

FINISH HATCH LEGEND
CPT1
RF1
MAT
CONC
CONC/ PAINTED
CT1
EXEMPT FROM TOPICAL WATERPROOFING



A1 MATERIALS FLOOR PLAN (ADD ALT. 1)
SCALE: 1/8" = 1'-0"

Plan North True North

LICENSED ARCHITECT MARK D. LEE #3649 STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING DFE CAMP KEYES DIRECTORATE

PLAN REVISIONS

Revit	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: ABD
DRAWN BY: ABD
CHECKED BY: PJP
DATE: 8/13/2024
SCALE: 1/8" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

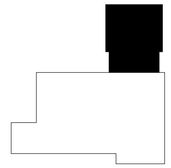
NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

RENOVATION MATERIALS FLOOR PLAN (ADD ALT. 1)

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
I71-1
SHEET: 81 OF 176

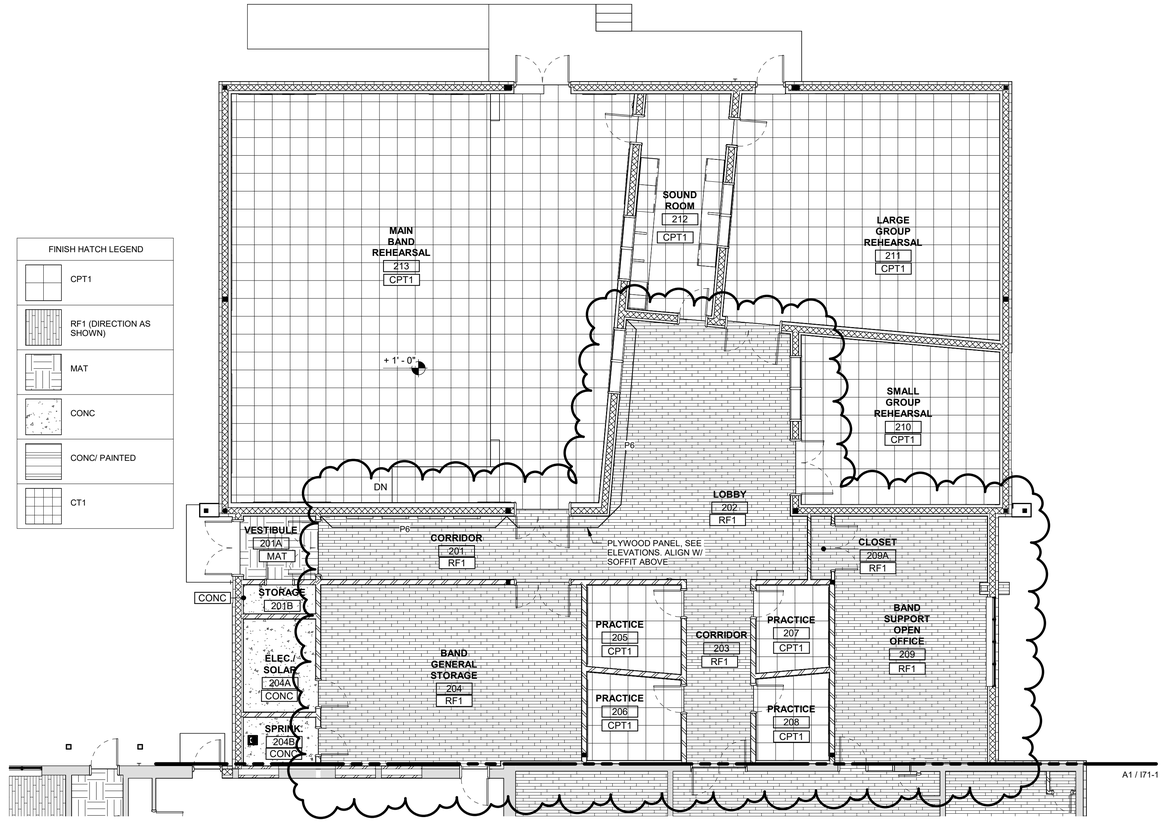
KEY PLAN



GENERAL NOTES

1. HATCH PATTERNS DENOTE AREA. HATCHES DO NOT INDICATE INSTALL LAYOUT UNLESS OTHERWISE NOTED.
2. LAYOUT FOR TILED OR MODULAR FLOOR FINISHES PER MATERIAL MANUFACTURER'S RECOMMENDATIONS FOR CENTERING ON SPACE AND MINIMAL WASTE.
3. UNLESS NOTED OTHERWISE, ALL EXISTING INTERIOR CONCRETE SLAB TO BE TREATED WITH TOPICAL WATERPROOFING SEALANT PRIOR TO NEW FINISH FLOORING. SEE SPECIFICATIONS. CONTRACTOR TO COORDINATE SEALANT APPLICATION AND FLOORING INSTALL SEQUENCE PER MANUFACTURER REQUIREMENTS.
4. ROOMS EXEMPT FROM WATERPROOFING SEALANT ARE ROOMS WHERE THE EXISTING FLOORING IS TO REMAIN: 116, 116A, 118, 138, 138A, 138B
5. FINISH FLOORING SHOULD BE INSTALLED FULLY UNDER ALL CASEWORK.

FINISH HATCH LEGEND
CPT1
RF1 (DIRECTION AS SHOWN)
MAT
CONC
CONC/ PAINTED
CT1



A1 FIRST FLOOR MATERIALS PLAN (BASE BID)
SCALE: 1/8" = 1'-0"

Plan North True North

LICENSED ARCHITECT MARK D. LEE #3849 STATE OF MAINE
A / E Seal

FACILITIES ENGINEERING DFE CAMP KEYES DIRECTORATE

PLAN REVISIONS

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STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

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46 Harriman Drive
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207-784-5100
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
ADDITION MATERIALS FLOOR PLAN

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
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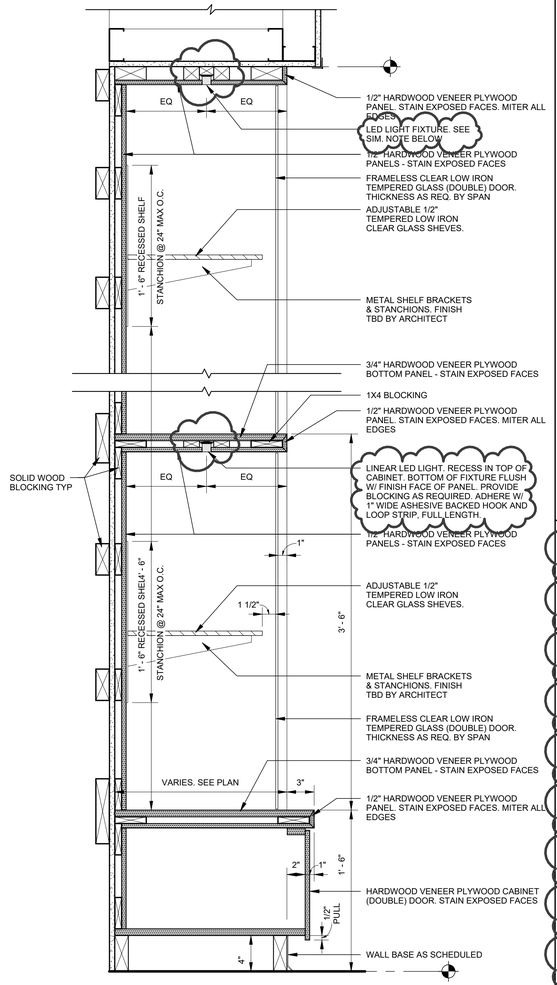
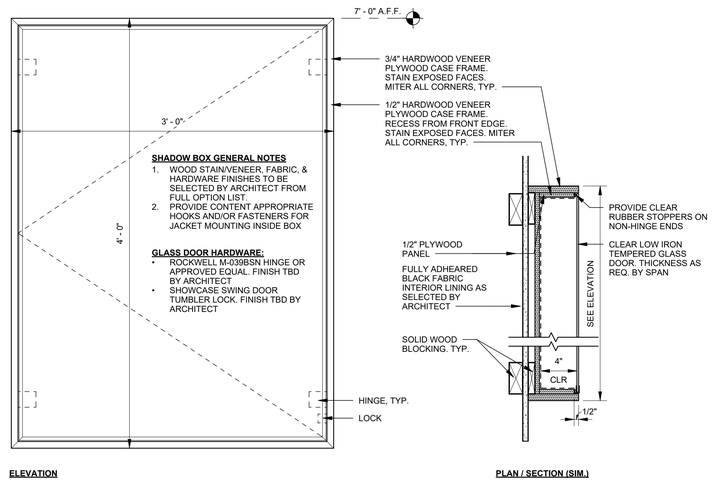
- ☐ RECORD DRAWINGS

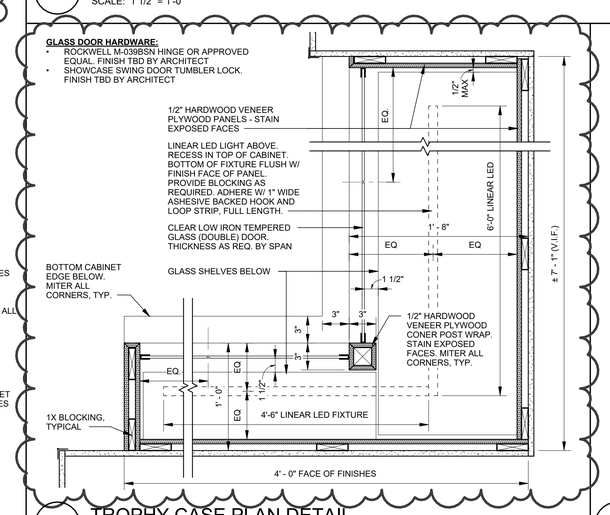
SHEET ID:
I71-2
SHEET: 82 OF 176



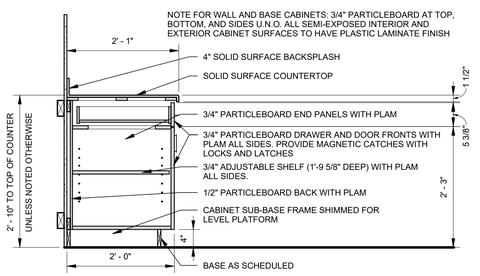
A1 TROPHY CASE DETAIL
SCALE: 1 1/2" = 1'-0"



B2 JACKET SHADOW BOX DETAIL
SCALE: 1 1/2" = 1'-0"



A2 TROPHY CASE PLAN DETAIL
SCALE: 1 1/2" = 1'-0"



A3 BASE CABINET DETAIL - SS
SCALE: 3/4" = 1'-0"

LICENSED ARCHITECT
MARK D. LEE #3640
STATE OF MAINE

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

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STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

CASEWORK DETAILS

PLAN PROGRESS
- ☐ DRAFT
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I83-2
SHEET: 105 OF 176

DRAINAGE FIXTURE CALCULATIONS

TAG	DESCRIPTION	QUANTITY	DRAINAGE (F.U)	TOTAL (F.U)
WC-1	ADA COMPLIANT WATER CLOSET FLOOR MOUNTED	3	4	12
WC-2	WATER CLOSET FLOOR MOUNTED	7	4	28
UR-1	ADA COMPLIANT WALL HUNG URINAL	1	2	2
UR-2	WALL HUNG URINAL	3	2	6
L-1	ADA COMPLIANT LAVATORY	10	<varies>	<varies>
SH-1	ADA COMPLIANT SHOWER	1	2	4
SH-2	ADA COMPLIANT SHOWER	1	2	4
SH-3	SHOWER	8	2	16
SK-1	ADA COMPLIANT UNDERCOUNTER MOUNT SINK	2	2	<varies>
SK-3	ADA COMPLIANT UNDERCOUNTER MOUNT SINK	2	2	6
SK-4	SINGLE BOWL INSTRUMENT SINK	1	2	2
OB-1	WASHING MACHINE SUPPLY & DRAIN BOX	1		
EWC-1	ADA COMPLIANT BI-LEVEL ELECTRONIC WATER COOLER WITH BOTTLE FILLER	1		TOTAL F.U = 88.0
WH-1	WALL HYDRANT	0		

DOMESTIC WATER FIXTURE CALCULATIONS

TAG	DESCRIPTION	QUANTITY	F.U PER FIXTURE	TOTAL F.U
WC-1	ADA COMPLIANT WATER CLOSET FLOOR MOUNTED	3	10	30
WC-2	WATER CLOSET FLOOR MOUNTED	7	10	70
UR-1	ADA COMPLIANT WALL HUNG URINAL	1	6	6
UR-2	WALL HUNG URINAL	3	6	18
L-1	ADA COMPLIANT LAVATORY	10	<varies>	<varies>
SH-1	ADA COMPLIANT SHOWER	1	2	4
SH-2	ADA COMPLIANT SHOWER	1	2	4
SH-3	SHOWER	8	2	16
SK-1	ADA COMPLIANT UNDERCOUNTER MOUNT SINK	2	2	<varies>
SK-3	ADA COMPLIANT UNDERCOUNTER MOUNT SINK	2	2	6
SK-4	SINGLE BOWL INSTRUMENT SINK	1	3	3
OB-1	WASHING MACHINE SUPPLY & DRAIN BOX	1		
EWC-1	ADA COMPLIANT BI-LEVEL ELECTRONIC WATER COOLER WITH BOTTLE FILLER	1		TOTAL F.U = 165
WH-1	WALL HYDRANT	2		
			TOTAL REQUIRED FLOW= 60.0 GPM	

WATER CALCULATIONS

AVAILABLE WATER PRESSURE	58.0 PSI
PRESSURE LOSS ACROSS METER	5.0 PSI
BACKFLOW PREVENTER PRESSURE LOSS	5.0 PSI
STATIC PRESSURE LOSS 0.43 x 10.0 FT =	4.3 PSI
MINIMUM PRESSURE TO LAST FIXTURE	25.0 PSI
TOTAL PRESSURE AVAILABLE	18.0 PSI
DISTANCE TO LAST FIXTURE	225.0 FT
FLOW RATE	60.0 GPM

PIPE SIZING CHART

DIA.	HOT WATER (F.U)	COLD WATER TANK (F.U)	COLD WATER VALVE (F.U)
1/2"	1	1	-
3/4"	7	7	-
1"	14	20	-
1 1/4"	19	39	-
1 1/2"	45	78	25
2"	120	275	148
2 1/2"	250	585	490
3"	500	1091	1091

TOTAL GAS CALCULATIONS

TAG	QUANTITY	DESCRIPTION	BTUH (EACH)	TOTAL (MBH)
RTU-1	1	MECHANICAL EQUIPMENT	300000	300
WHTR-1	1	FREE STANDING TANKLESS WATER HEATER RACKING SYSTEM	599700	599.7
			TOTAL	899.7

PROPANE GAS SYSTEM OPERATING PRESSURE	7" W.C
NATURAL GAS SYSTEM SIZED WITH TOTAL DEVELOPED LENGTH FROM GAS METER TO MOST REMOTE PIECE OF EQUIPMENT:	165 FEET
SYSTEM DESIGN PRESSURE DROP:	0.3" W.C

DRAINAGE PIPE SIZING

PIPE SIZE	1-1/4"	1-1/2"	2"	3"	4"	6"	8"
SANTITARY DRAINAGE PIPING							
MAXIMUM HORIZONTAL (F.U) @ 1/4" PER FT SLOPE	1	1	8	35	216	1380	3600
STORM DRAINAGE							
TOTAL SQ. FT @ 2.2 INCHES PER HOUR	-	-	-	1370	3133	8916	19165
VENT PIPING							
MAXIMUM UNITS	1	8	24	84	256	1380	3600
MAXIMUM LENGTH IN FEET	45	60	120	212	300	510	750

STATE OF MAINE
DAVID W. STORY
No. 12653
LICENSED PROFESSIONAL ENGINEER
A / E Seal

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CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: DWS
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DATE: 8-13-2024
SCALE:
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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207-784-5100
Harriman
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

DESIGN CALCULATIONS

PLAN PROGRESS
- ☐ DRAFT
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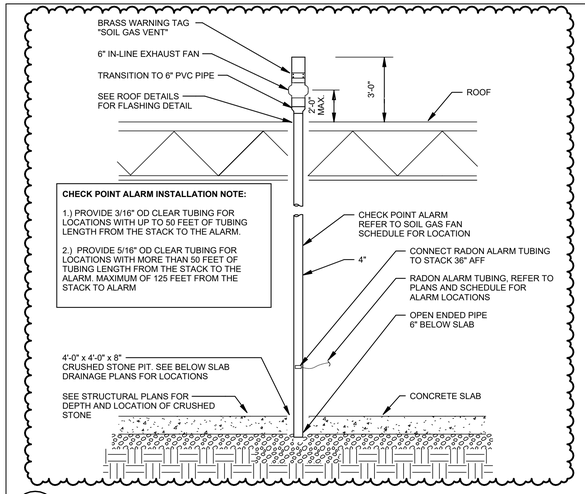
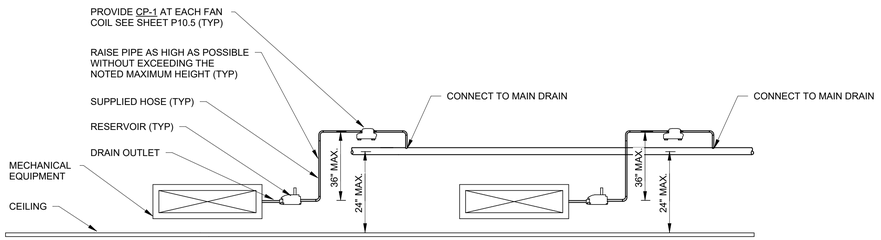
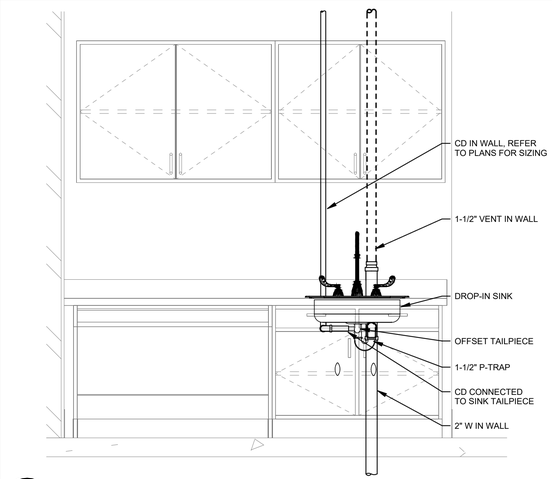
SHEET ID:
P00-2
SHEET: 123 OF 176



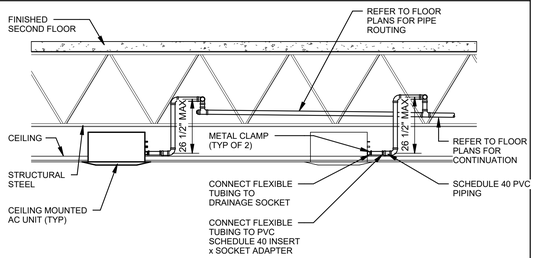
C1 SOIL GAS VENT PIPING DETAIL
NO SCALE



B1 CEILING MOUNTED FAN COIL WITH PUMP
NO SCALE



A1 CONDENSATE TO HAND SINK PIPING DETAIL
NO SCALE



A3 CEILING MOUNTED AIR CONDITIONER
CONDENSATE PIPING DETAIL
NO SCALE

BUILDING AUTOMATED CONTROLS SYSTEM MONITORING POINTS

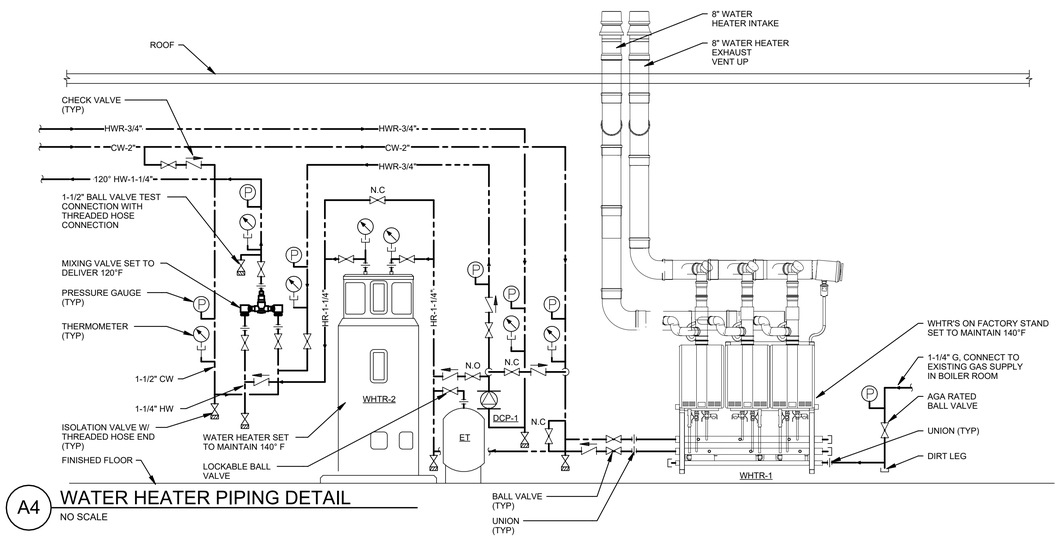
A. CONNECTION TO EACH GAS WATER HEATER CONTROL PANEL FOR POWER AND ERROR NOTIFICATIONS.
B. WHTR-1 SHALL BE POWERED ON DURING BUILDING OCCUPIED MODE AND OFF DURING NOT OCCPIED MODE.
C. CONNECTION TO HEAT PUMP WATER HEATER CONTROL PANEL FOR POWER AND ERROR NOTIFICATIONS.
D. CONNECTION TO DCP-1 POWER AND BUILDING OCCUPIED MODE.

SEQUENCE OF CONTROLS FOR GAS WATER HEATER WHTR-1:

A. ONBOARD CONTROLS SHALL PROVIDE MASTER/SLAVE OPERATION FOR BANK OF WATER HEATERS.
B. AUTOMATIC LEAD /LAG ROTATION FOR EACH WATER HEATER. LEAD/LAG SHALL BE ADJUSTED EVERY 10 OPERATION CYCLES BY THE ONBOARD CONTROLS.
C. THE GAS FIRED WATER HEATERS SHALL ONLY BE POWERED WHILE THE BUILDING IS IN OCCUPIED MODE. THE LEAD WATER HEATER SHALL BE IN STAND-BY MODEL WITH SERVO VALVE IN THE OPEN POSITION. UNIT SHALL FIRE WHEN DEMAND MINIMUM FLOW IS REACHED
D. EACH WATER HEATER SHALL BE EQUIPPED WITH WATER FLOW SERVO AND SHALL MODULATE FIRING RATE TO MATCH HOT WATER DEMAND BASED ON TEMPERATURE DROP AND PRESSURE DROP. EACH WATER HEATER SHALL MODULATE INDEPENDENTLY AND SHALL STAGE "ON" ADDITIONAL HEATERS TO MATCH SYSTEM HOT WATER DEMAND.
E. TEMPERATURE SET POINT SHALL BE 140°F
F. EACH UNIT SHALL BE EQUIPPED WITH DOMESTIC PRIORITY SWITCH/ MAINTENANCE INDICATION SWITCH FOR REMOTE COMMUNICATION WITH THE BUILDINGS AUTOMATED CONTROLS SYSTEM AND SYSTEM FUNCTION AND ERROR ALARM MONITORING
G. THE BUILDING AUTOMATED CONTROLS SYSTEM SHALL INDICATE RUN TIME FOR EACH GAS FIRED WATER HEATER MODULE

SEQUENCE OF CONTROLS FOR HEAT PUMP WATER HEATER WHTR-2

A. THE UNIT SHALL BE POWERED AT ALL TIMES INCULDING DURING UNOCCUPIED BUILDING.
B. THE ONBOARD CONTROLS SHALL BE SET TO ECO-MODE (HEAT PUMP ONLY) AND SET TO MAINTAIN 140°F.
C. DCP-1 SHALL BE POWERED ON AND SHALL RUN CONTINUOUS DURING BUILDING OCCUPIED MODE AND POWERED OFF DURING UNOCCUPIED BUILDING MODE.



A4 WATER HEATER PIPING DETAIL
NO SCALE

STATE OF MAINE
DAVID W. STORY
No. 12853
REGISTERED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

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Harriman

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HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

DETAILS

PLAN PROGRESS

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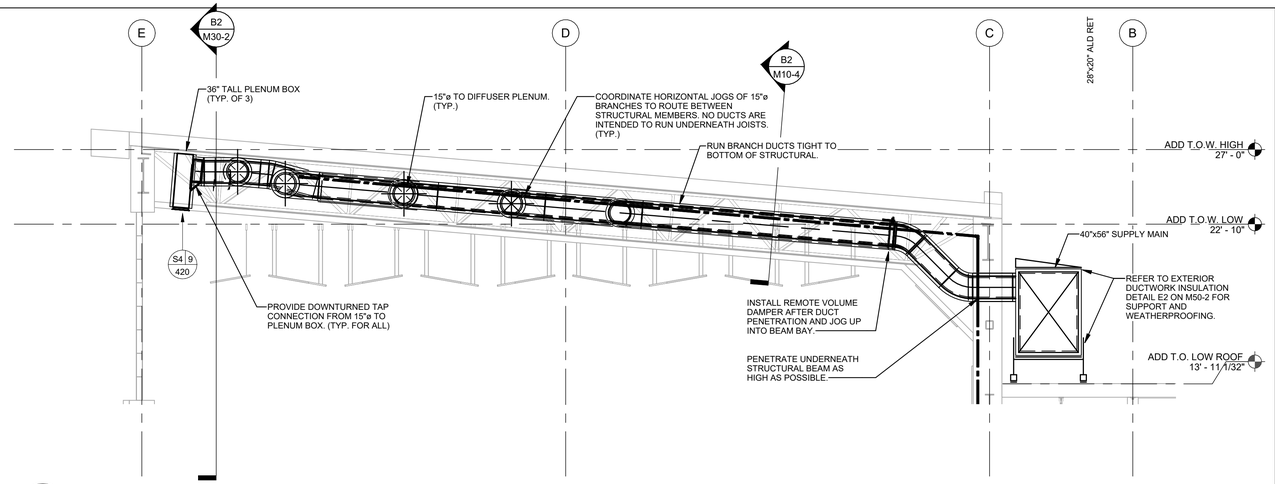
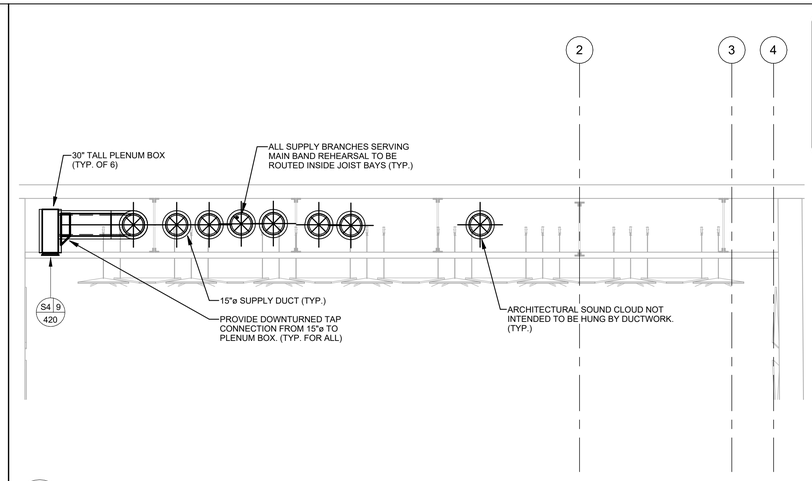


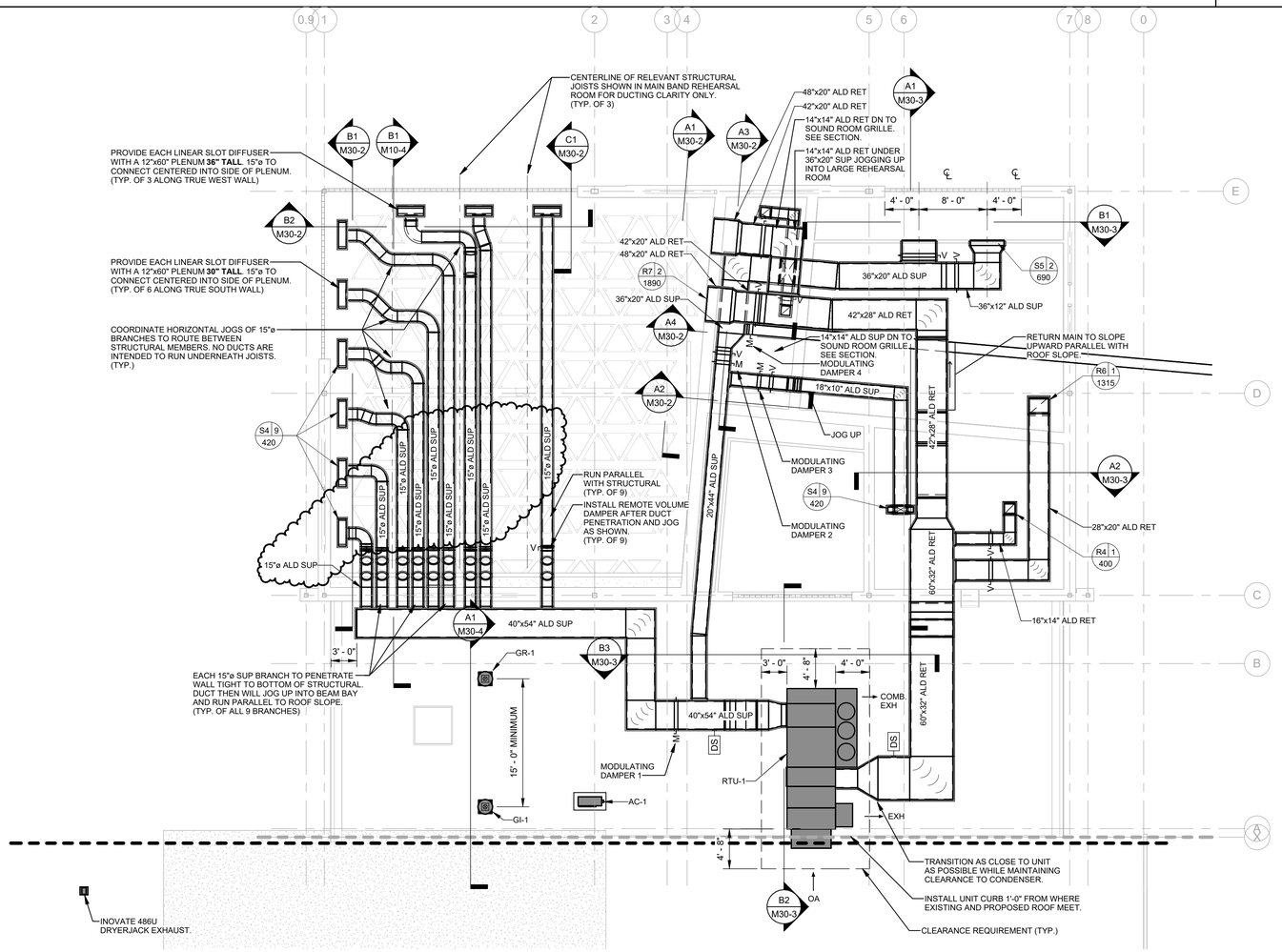
B1 MAIN BAND REHEARSAL ROOM DUCTING SECTION

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



B2 MAIN BAND REHEARSAL ROOM DUCTING CROSS-SECTION

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



A1 ROOFTOP DUCTWORK - ADDITION - BASE BID

SCALE: 1/8" = 1'-0"

STATE OF MAINE
DAVID W. STORY
No. 12853
REGISTERED PROFESSIONAL ENGINEER
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ROOFTOP DUCTWORK ADDITION

PLAN PROGRESS

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- ☐ 50% REVIEW
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SHEET ID:

M10-4

SHEET: 147 OF 176

SEQUENCE OF OPERATIONS

GENERAL
1. EQUIPMENT SHALL OPERATE TO ACHIEVE SPACE TEMPERATURE SETPOINTS DURING OCCUPIED/UNOCCUPIED MODES OF OPERATION.
2. SCHEDULING OF OCCUPIED/UNOCCUPIED TIMES SHALL BE COORDINATED WITH OWNER AND BE ADJUSTABLE BY OWNER.
3. OWNER SHALL HAVE CAPABILITY TO TEMPORARILY OVERRIDE INDIVIDUAL ZONE UNOCCUPIED STATUS FOR 3 HOURS.

HEATING/COOLING MODES OF OPERATION
1. HEATING MODE SHALL AUTOMATICALLY BE ENABLED WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW 40 DEG. (ADJ.).
2. COOLING MODE SHALL AUTOMATICALLY BE ENABLED WHEN OUTSIDE AIR ENTHALPY RISES ABOVE 25 BTU/LB OF DRY AIR (ADJ.).
3. ECONOMOZER COOLING SHALL BE ENABLED ANY TIME THAT THE OUTDOOR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY AND THERE IS A CALL FOR COOLING.

ERV UNIT OPERATION (TYP. OF ERV-1 THROUGH ERV-5)
1. EQUIPMENT SHALL BE ENABLED DURING OCCUPIED MODE OF OPERATION AND DISABLED DURING UNOCCUPIED MODE OF OPERATION.
2. SUPPLY AND EXHAUST FANS SHALL MODUATE SPEED AS NECESSARY TO ACHIEVE DUCT STATIC PRESSURE SETPOINT.
3. BUILDING AUTOMATION SYSTEM (BAS) SHALL SIGNAL AN ALARM IF STATUS DEVIATES FROM COMMAND.
4. (FOR ERV-1 ONLY) DUCT MOUNTED SMOKE DETECTORS SHALL SHUT DOWN ASSOCIATED EQUIPMENT AND SIGNAL ALARM TO BAS & FIRE ALARM SYSTEM.

RTU-1 OPERATION
1. EQUIPMENT SHALL BE ENABLED DURING OCCUPIED MODE OF OPERATION AND DISABLED DURING UNOCCUPIED MODE OF OPERATION.
2. SUPPLY AND EXHAUST FANS SHALL MODUATE SPEED AS NECESSARY TO ACHIEVE DUCT STATIC PRESSURE SETPOINT.
3. BUILDING AUTOMATION SYSTEM (BAS) SHALL SIGNAL AN ALARM IF STATUS DEVIATES FROM COMMAND.
4. DUCT MOUNTED SMOKE DETECTORS SHALL SHUT DOWN ASSOCIATED EQUIPMENT AND SIGNAL ALARM TO BAS & FIRE ALARM SYSTEM.
5. HEAT PUMP SHALL BE FIRST STAGE OF HEATING AND MODULATE COMPRESSORS AS NECESSARY TO ACHIEVE SETPOINT.
6. IF HEAT PUMP IS NOT CAPABLE OF ACHIEVING SETPOINT, GAS FURNACE SHALL BE SECOND STAGE AND MODULATE GAS VALVE AS NECESSARY TO ACHIEVE SETPOINT.

CO2 CONTROL (TYP. OF ERV-1 THROUGH ERV-5 AND RTU-1)
1. CO2 SENSORS ARE EITHER MOUNTED IN RETURN DUCTWORK OR WALL MOUNTED IN OCCUPIED SPACES; SEE DRAWINGS.
2. ERV-1 THROUGH ERV-5 SHALL REDUCE TOTAL SUPPLY & EXHAUST AIRFLOW DURING OCCUPIED MODE IF CO2 CONCENTRATION DROPS BELOW SETPOINT INDICATING THAT SPACES ARE UNOCCUPIED. FANS SHALL RESUME FULL SPEED DURING OCCUPIED MODE IF CO2 LEVELS INCREASE ABOVE SETPOINT. FOR ERV-1, BOTH SENSORS NEED TO INDICATE CO2 LEVELS BELOW SETPOINT BEFORE BAS REDUCES TOTAL SUPPLY & EXHAUST AIRFLOW FOR ERV-1. AIRFLOW REDUCTION FOR ALL ERV-1 THROUGH ERV-5 SHALL BE 50% (ADJ.).
3. RTU-1 WILL MODULATE OUTSIDE AIR DAMPER BASED UPON CO2 CONCENTRATION OF ASSOCIATED CONDITIONED SPACES.
4. THERE ARE DUCT MOUNTED MOTORIZED DAMPERS CONTROLLED BY CO2 CONCENTRATION THAT WILL CLOSE IF THEIR ASSOCIATED SPACES ARE BELOW SETPOINT AND OPEN IF THEIR ASSOCIATED SPACES ARE ABOVE SETPOINT DURING OCCUPIED MODE; SEE DRAWINGS.
5. BUILDING FLUSH OUT SHALL OCCUR SUCH THAT ERVS OPERATE AT FULL SPEED FOR A FIXED PERIOD OF TIME DURING THE UNOCCUPIED MODE.
6. SCHEDULING OF THE BUILDING FLUSH OUT SHALL BE COORDINATED WITH OWNER.

VRF SYSTEM INTEGRATION
1. BAS SHALL ENABLE/DISABLE VRF SYSTEMS TO PROVIDE HEATING AND COOLING TO THEIR ASSOCIATED SPACES.
2. BAS SHALL MONITOR STATUS AND SIGNAL AN ALARM IF STATUS DEVIATES FROM COMMAND.
3. THERE ARE DISCHARGE AIR TEMPERATURE SENSORS PROVIDED AT SOME EVAPORATORS REPORTING TO BAS, SEE DRAWINGS.

SPLIT HEAT PUMP INTEGRATION
1. BAS SHALL ENABLE/DISABLE VRF SYSTEMS TO PROVIDE HEATING AND COOLING TO THEIR ASSOCIATED SPACES.
2. BAS SHALL MONITOR STATUS AND SIGNAL AN ALARM IF STATUS DEVIATES FROM COMMAND.

ELECTRIC UNIT HEATER
1. BAS SHALL ENABLE/DISABLE UH-1 TO PROVIDE HEATING TO SPRINKLER ROOM.
2. BAS SHALL MONITOR STATUS AND SIGNAL AN ALARM IF STATUS DEVIATES FROM COMMAND.
3. UNIT HEATER SHALL CONTROL TO INTEGRAL THERMOSTAT, HOWEVER BAS SHALL INSTALL WALL MOUNTED SENSOR TO MONITOR SPACE.
4. SPACE TEMPERATURE SETPOINT IN BAS SHALL MATCH SETTING OF INTEGRAL THERMOSTAT WITHIN UNIT HEATER.
5. BAS SHALL MONITOR SPACE TEMPERATURE AND SIGNAL ALARM IS SPACE TEMPERATURE DROPS BELOW SETPOINT.

METERING AND TRENDING
1. Monitor natural gas consumption at individual equipment meter and report consumption to BAS graphic page as: kW & gas in gallons.
2. Monitor electrical consumption at individual equipment meter and report consumption to BAS graphic page as: kW demand and Cumulative kWh consumption.
3. Note: locations of gas, water and electrical meters shall be coordinated with owner to be in secure locations only accessible to the parties needing to access those meters.
4. Record, track and calculate daily, weekly, monthly, semi-annual and annual usage for all metered end uses. Include display of daily, weekly, monthly, semi-annual and annual average outdoor temperature. Calculate current and historical degree day total using a base 65 deg. F. Create a DDC graphical display which shall include current and historical data for each end use (propane & electrical) and display deviation from historical data in a table format. Display and send an alert if current usage exceeds historical usage by more than 15% (adjustable). Items that shall be displayed on the reporting table include:
   A. Date
   B. Current Propane & Electrical Consumption
   C. Historical Propane & Electrical Consumption
   D. Current Average Outdoor Temperature
   E. Historical Average Outdoor Temperature
   F. Current Degree Day (Heating or Cooling) Calculation
   G. Historical Degree Day (Heating or Cooling) Calculation
   H. Percent Change in Usage, Temperature or Degree Day Compared to Historical

ERV POINTS LIST (TYPICAL OF ERV-1 THROUGH ERV-5 UNLESS NOTED OTHERWISE)				
DESCRIPTION	AO	AI	DO	DI
OCCUPANCY MODE				X
ALARM STATUS				X
SUPPLY FAN STATUS				X
SUPPLY FAN CFM		X		
SUPPLY DUCT STATIC PRESSURE		X		
SUPPLY FAN SPEED COMMAND	X			
RETURN FAN STATUS				X
RETURN FAN CFM		X		
RETURN DUCT STATIC PRESSURE		X		
RETURN FAN SPEED COMMAND	X			
SUPPLY AIR TEMPERATURE		X		
SUPPLY AIR RELATIVE HUMIDITY		X		
SUPPLY AIR ENTHALPY		X		
RETURN AIR TEMPERATURE		X		
RETURN AIR RELATIVE HUMIDITY		X		
RETURN AIR ENTHALPY		X		
OUTSIDE AIR TEMPERATURE		X		
OUTSIDE AIR RELATIVE HUMIDITY		X		
OUTSIDE AIR ENTHALPY		X		
OUTSIDE AIR DAMPER POSITION		X		
EXHAUST AIR DAMPER POSITION		X		
SUPPLY FILTER PRESSURE DROP		X		
EXHAUST FILTER PRESSURE DROP		X		
HEAT RECOVERY CORE PRESSURE DROP		X		
HIGH LIMIT SUPPLY STATIC STATUS		X		
HIGH LIMIT RETURN STATIC STATUS		X		
SUPPLY DUCT SD STATUS (ERV-1 ONLY)				X
RETURN DUCT SD STATUS (ERV-1 ONLY)				X

NOTE: FAN SPEED CONTROL FOR ERV-1, ERV-2 & ERV-4 SHALL BE THROUGH VARIABLE FREQUENCE DRIVE (VFD). FAN SPEED CONTROL FOR ERV-3 & ERV-5 SHALL BE THROUGH EC MOTORS.

A2 TYPICAL ERV POINTS LIST
NO SCALE

VRF SYSTEM INTEGRATION POINTS LIST				
DESCRIPTION	AO	AI	DO	DI
VRF SYSTEM ENABLE (TYP. EACH SYSTEM)			X	
VRF SYSTEM STATUS (TYP. EACH SYSTEM)				X
VRF SYSTEM ALARM (TYP. EACH SYSTEM)				X
DA TEMP. SENSOR: (APPLICABLE TO IU-1-1, IU-1-6, IU-2-4, IU-2-8, IU-2-13, IU-2-18, IU-3-3, IU-3-13, IU-4-1 & IU-4-8)		X		

NOTE: MAPPING BACK POINTS FROM ITOUCH CONTROLLER WILL INCREASE THIS LIST

A4 VRF SYSTEM INTEGRATION POINTS LIST
NO SCALE

RTU-1 POINTS LIST				
DESCRIPTION	AO	AI	DO	DI
OCCUPANCY MODE				X
ALARM STATUS				X
SUPPLY FAN STATUS				X
EXHAUST FAN STATUS				X
SUPPLY DUCT STATIC PRESSURE		X		
SUPPLY FAN SPEED COMMAND	X			
SUPPLY FAN CFM		X		
EXHAUST DUCT STATIC PRESSURE		X		
EXHAUST FAN SPEED COMMAND	X			
EXHAUST FAN CFM		X		
SUPPLY AIR TEMPERATURE		X		
SUPPLY AIR RELATIVE HUMIDITY		X		
SUPPLY AIR ENTHALPY		X		
SUPPLY AIR TEMPERATURE SETPOINT	X			
RETURN AIR TEMPERATURE		X		
RETURN AIR RELATIVE HUMIDITY		X		
RETURN AIR ENTHALPY		X		
OUTSIDE AIR TEMPERATURE		X		
OUTSIDE AIR RELATIVE HUMIDITY		X		
OUTSIDE AIR ENTHALPY		X		
ENERGY WHEEL MODE				X
ENERGY WHEEL STATUS				X
ENERGY WHEEL SPEED COMMAND	X			
E. WHEEL BYPASS DAMPER COM. POS.	X			
E. WHEEL SUPPLY AIR TEMPERATURE		X		
E. WHEEL SUPPLY RELATIVE HUMIDITY		X		
E. WHEEL SUPPLY AIR ENTHALPY		X		
E. WHEEL EXHAUST AIR TEMPERATURE		X		
E. WHEEL EXHAUST RELATIVE HUMIDITY		X		
E. WHEEL EXHAUST AIR ENTHALPY		X		
E. WHEEL BYPASS DAMPER SETPOINT	X			
E. WHEEL DEFROST EAT SETPOINT	X			
OUTSIDE AIR DAMPER POSITION		X		
EXHAUST AIR DAMPER POSITION		X		
SUPPLY FILTER PRESSURE DROP		X		
EXHAUST FILTER PRESSURE DROP		X		
ENERGY WHEEL PRESSURE DROP		X		
HIGH LIMIT SUPPLY STATIC STATUS		X		
HIGH LIMIT RETURN STATIC STATUS		X		
SUPPLY DUCT SD STATUS				X
RETURN DUCT SD STATUS				X
DX COOLING COMMAND	X			
PROPAND FURNACE COMMAND			X	
PROPANE FURNACE STATUS				X

A5 RTU-1 POINTS LIST
NO SCALE

CO2 CONTROL POINTS LIST				
DESCRIPTION	AO	AI	DO	DI
ERV-1 SPACE CO2 CONCENTRATION (TYP. OF 2)		X		
ERV-1 CO2 CONCENTRATION SETPOINT	X			
ERV-1 CO2 FAN SETBACK COMMAND			X	
ERV-1 MOTORIZED DAMPER STATUS (TYP. OF 2)				X
ERV-1 MOTORIZED DAMPER COMMAND (TYP. OF 2)			X	
ERV-2 SPACE CO2 CONCENTRATION		X		
ERV-2 CO2 CONCENTRATION SETPOINT	X			
ERV-2 CO2 FAN SETBACK COMMAND			X	
ERV-3 SPACE CO2 CONCENTRATION		X		
ERV-3 CO2 CONCENTRATION SETPOINT	X			
ERV-3 CO2 FAN SETBACK COMMAND			X	
ERV-3 MOTORIZED DAMPER STATUS				X
ERV-3 MOTORIZED DAMPER COMMAND			X	
ERV-4 SPACE CO2 CONCENTRATION		X		
ERV-4 CO2 CONCENTRATION SETPOINT	X			
ERV-4 CO2 FAN SETBACK COMMAND			X	
ERV-4 MOTORIZED DAMPER STATUS (TYP. OF 2)				X
ERV-4 MOTORIZED DAMPER COMMAND (TYP. OF 2)			X	
ERV-5 SPACE CO2 CONCENTRATION		X		
ERV-5 CO2 CONCENTRATION SETPOINT	X			
ERV-5 CO2 FAN SETBACK COMMAND			X	
RTU-1 SPACE CO2 CONCENTRATION (TYP. OF 3)		X		
RTU-1 CO2 CONCENTRATION SETPOINT	X			
RTU-1 OA DAMPER SETBACK COMMAND	X			
RTU-1 MOTORIZED DAMPER STATUS (TYP. OF 3)				X
RTU-1 MOTORIZED DAMPER COMMAND (TYP. OF 3)			X	

A7 CO2 CONTROL POINTS LIST
NO SCALE

DOMESTIC WATER HEATER INTEGRATION POINTS LIST				
DESCRIPTION	AO	AI	DO	DI
WATER HEATER WHTR-1 ENABLE			X	
WATER HEATER WHTR-1 STATUS				X
WATER HEATER WHTR-1 ALARM				X
WATER HEATER WHTR-2 ENABLE			X	
WATER HEATER WHTR-2 STATUS				X
WATER HEATER WHTR-2 ALARM				X

A1 DOMESTIC WATER HEATER POINTS LIST
NO SCALE

ELECTRIC UNIT HEATER POINTS LIST (UH-1)				
DESCRIPTION	AO	AI	DO	DI
SPACE TEMPERATURE		X		
SPACE TEMPERATURE SETPOINT	X			
UNIT COMMAND			X	
UNIT STATUS				X
SPACE LOW TEMPERATURE ALARM		X		

NOTE: UNIT HEATER UH-1 IS CONTROLLED BY INTEGRAL THERMOSTAT. WALL MOUNTED TEMPERATURE SENSOR IS PROVIDED TO INFORM BAS OF SPACE CONDITIONS WITHIN SPRINLKER ROOM.

A3 ELECTRIC UNIT HEATER POINTS LIST
NO SCALE

SPLIT HEAT PUMP INTEGRATION POINTS LIST				
DESCRIPTION	AO	AI	DO	DI
HEAT PUMP SYSTEM ENABLE (TYP. OF 2)			X	
HEAT PUMP SYSTEM STATUS (TYP. OF 2)				X
HEAT PUMP SYSTEM ALARM (TYP. OF 2)				X

A6 SPLIT HEAT PUMP INTEGRATION POINTS LIST
NO SCALE

A8 SPLIT HEAT PUMP INTEGRATION POINTS LIST
NO SCALE

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PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: DWS
DRAWN BY: MJP
CHECKED BY: DWS
DATE: 8/13/2024
SCALE: 1/2" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

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HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

CONTROL POINT LISTS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
M50-4
SHEET: 159 OF 176

GENERAL NOTES

1. ALL RECESSED LIGHTING FIXTURES IN LAY-IN CEILINGS SHALL BE INSTALLED WITH MAXIMUM 6' LONG FLEXIBLE METAL CONDUIT.
2. ALL MOUNTING HEIGHTS FOR LIGHTING FIXTURES ARE TO THE BOTTOM OF THE FIXTURES UNLESS INDICATED OTHERWISE.
3. SEE ARCHITECTURAL EXTERIOR ELEVATIONS FOR MOUNTING HEIGHTS OF EXTERIOR LIGHTING FIXTURES.
4. WIRE COUNTS FOR CIRCUIT CONDUCTORS ARE NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.
5. CONNECT AND EXTEND EXISTING LIGHTING BRANCH CIRCUITS TO ALL NEW FIXTURES IN EXISTING BUILDING. PROVIDE NEW BRANCH CIRCUIT WIRING TO SWITCHES INDICATED ON PLAN.
6. LIGHTING SHEET E10-1 BASE BID REFLECTS EXISTING CONDITIONS TO REMAIN. SHEET E10-3 REFLECTS NEW LIGHTING LAYOUT AND RECONFIGURATION UNDER ADD ALT 1.

KEY NOTES

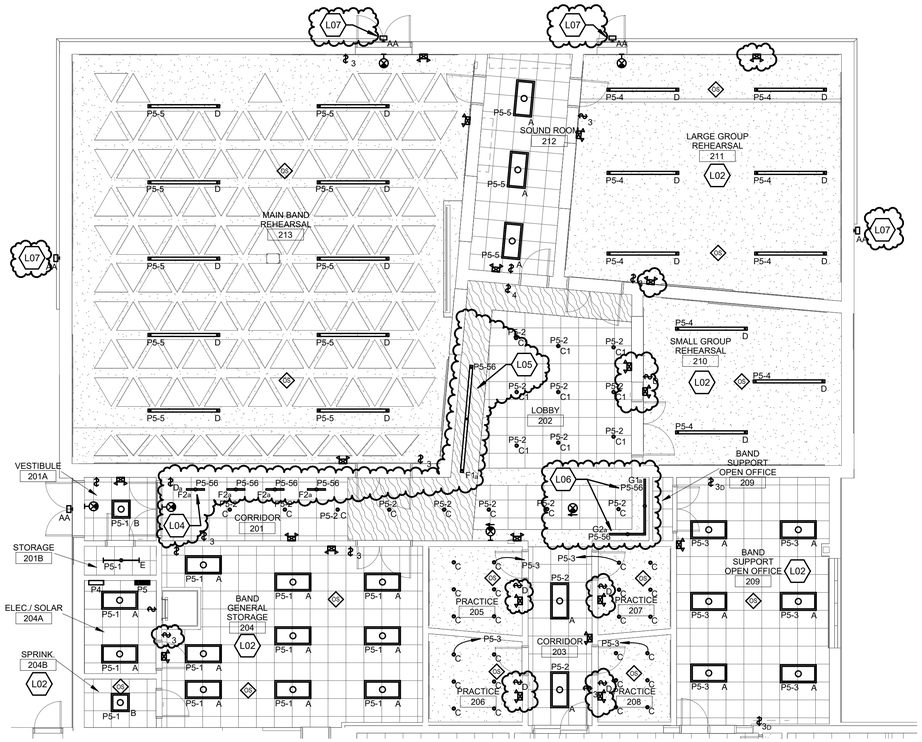
L02 SPACE SHALL BE CONFIGURED WITH LIGHTING CONTROLS TO OPERATE WITH VACANCY SENSOR (MANUAL ON/AUTO OFF) AND SWITCH STATION CAPABLE OF (ON/OFF AND RAISE/LOWER).

L04 MOUNT FIXTURE TYPE P2 8'-0" AFF WITH 12" ARM. COORDINATE MOUNTING TO BE CENTERED OVER (4) UNIFORM SHADOW BOXES. SEE ELEVATION A5 ON SHEET I80-1.

L05 MOUNT FIXTURE TYPE F1 8'-0" AFF WITH 12" ARM. COORDINATE MOUNTING TO BE CENTERED OVER WALL MOUNTED TROMBONE AND BUGLE.

L06 MOUNT FIXTURE TYPES G1 AND G2 (QUANTITY (2) EACH) INSIDE TROPHY CASE. SEE INTERIOR ELEVATION DETAILS A1 AND A2 ON I83-2 FOR INSTALLATION.

L07 CONNECT EXTERIOR BUILDING MOUNTING LIGHTING FIXTURE TO EXISTING EXTERIOR LIGHTING CIRCUIT AND CONTROLS.



1 FIRST FLOOR - LIGHTING PLAN - ADDITION FLOOR PLAN

SCALE: 1/8" = 1'-0"

STATE OF MAINE
JAMES LEO HEBERT
No. 14371
LICENSED PROFESSIONAL ENGINEER
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PLAN REVISIONS

Rev#	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

STATE OF MAINE
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HA Project No: 23245

DESIGNED BY:	JLH
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CHECKED BY:	CLH
DATE:	8/13/2024
SCALE:	1/8" = 1'-0"
DFE PROJECT NO:	23SR24-400-ABC

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

FIRST FLOOR ADDITION LIGHTING - BASE BID

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E10-2
SHEET: 166 OF 176

GENERAL NOTES

1 WHERE CONNECTED TO A 20A. BRANCH CIRCUIT SUPPLYING AN INDIVIDUAL RECEPTACLE (SIMPLEX OR DUPLEX), THE RECEPTACLE SHALL BE RATED AT 20A.

2 PROVIDE HOUSEKEEPING PADS FOR ALL FLOOR MOUNTED AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE, 4" WIDER AND 4" LONGER THAN EQUIPMENT TO BE PLACED ON IT. REFER TO ELECTRICAL DETAIL DRAWINGS FOR TRANSFORMER, GENERATOR, OR SWITCHGEAR PADS THAT MAY EXCEED THESE REQUIREMENTS.

3 WIRE COUNTS FOR CIRCUIT CONDUCTORS ARE NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.

4 MODIFICATIONS TO NUMBER OF CONDUCTORS IN HOME RUNS IN ADDITION TO CIRCUITS INDICATED ON THIS DRAWING ARE PROHIBITED.

5 CIRCUIT NUMBERS AT DEVICES CORRESPOND TO PANELBOARD BREAKERS (SEE PANELBOARD SCHEDULE). BRANCH CIRCUITS SHALL BE SIZED ACCORDING TO THE CIRCUIT BREAKER RATING, UNLESS INDICATED OTHERWISE ON THE ELECTRICAL EQUIPMENT SCHEDULE.

6 MEARNG RECENTLY COMPLETED A NETWORK UPGRADE AND TR RENOVATION IN BUILDING 255. IN AREAS WHERE THE ROOM DIMENSIONS DO NOT CHANGE AND THE LOCATION OF DATA DROPS ARE ACCEPTABLE FOR THE USERS THESE UPDATED CAT6 DROPS WILL BE PRESERVED. THESE DROPS ARE NOTED HERE FOR INFORMATION PURPOSES.

7 SEE SHEET E20-3 FOR MECHANICAL AND PLUMBING EQUIPMENT POWER CONNECTIONS. MECHANICAL AND PLUMBING ELECTRICAL SCOPE ON E20-1 AND E20-3 ARE THE SAME.

KEY NOTES

P01 PROVIDE NEW 600A 480V, 3PHASE, 4 WIRE MAIN SWITCHBOARD WITH MAIN CIRCUIT BREAKER. PROVIDE 200A PRIMARY CIRCUIT BREAKER TO FEED NEW 112.5KVA TRANSFORMER TX-1.

P02 REMOVE EXISTING 600A MAIN CIRCUIT BREAKER FROM PANEL "MP", AND REPLACE WITH NEW 400A MAIN CIRCUIT BREAKER FED FROM THE SECONDARY LUGS OF TRANSFORMER TX-1. EXISTING PANEL "MP" IS CUTLER HAMMER PRL3A TYPE PANELBOARD. NEW 400A CIRCUIT BREAKER MUST MATCH EXISTING MANUFACTURER AND MODEL COMPATIBLE WITH PANELBOARD.

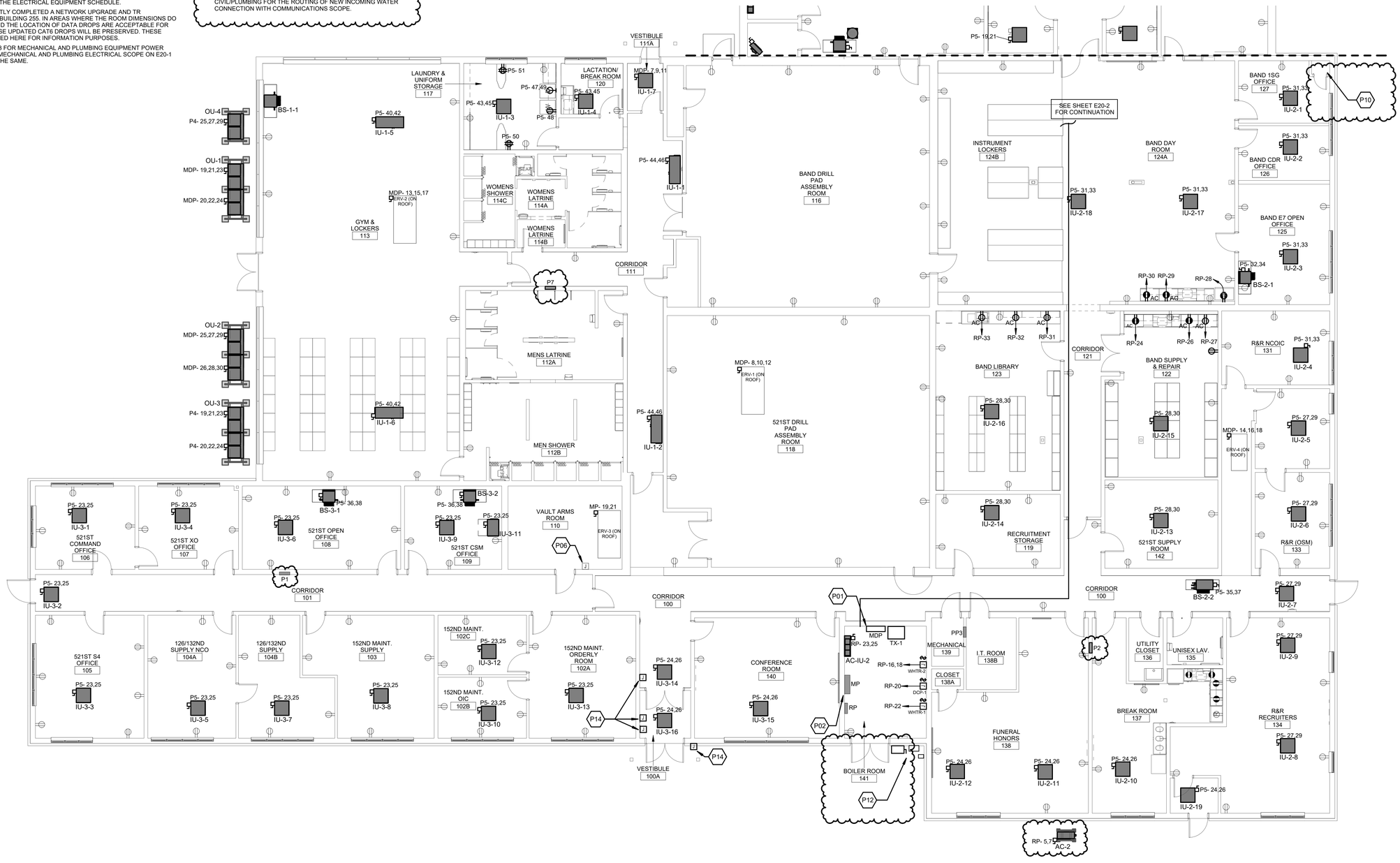
P06 EXISTING IDS SECURITY SYSTEM TO REMAIN. COORDINATE ANY SELECTED POWER OUTAGE WITH OWNER AND BASE PERSONNEL.

P10 EXISTING ELECTRICAL POWER AND COMMUNICATIONS LINES ROUTED UNDER BUILDING FOOTING INCLUDES BUILDING B255 MAIN COMMUNICATIONS SERVICE CONDUIT (NOT BUILDING 255 ELECTRICAL SERVICE). COORDINATE WORK IN THIS AREA WITH CIVIL/PLUMBING FOR THE ROUTING OF NEW INCOMING WATER CONNECTION WITH COMMUNICATIONS SCOPE.

KEY NOTES

P12 PROVIDE NEW WALL MOUNTED 600A RATED SERVICE ENTRANCE DISCONNECT, CT CABINET, AND UTILITY METER. PROVIDE LOCKABLE NEMA 3R ENCLOSURE FOR ALL EQUIPMENT. COORDINATE UNDERGROUND STUB UP WITH CIVIL DRAWINGS.

P14 PROVIDE 120V CONNECTION FROM PANEL "RP" FOR DOOR ACCESS PUSH PADDLES. COORDINATE FINAL LOCATIONS WITH ARCHITECTURAL ELEVATIONS.



1 FIRST FLOOR - RENOVATION ADD ALT 1
SCALE: 1/8" = 1'-0"

STATE OF MAINE
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DIRECTORATE

PLAN REVISIONS

Revn	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

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CHECKED BY: CLH
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FIRST FLOOR RENOVATION POWER - ADD ALT 1

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E20-3
SHEET: 170 OF 176

GENERAL NOTES

1 ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON THE DRAWINGS, EXCEPT ITEMS LISTED ON SHEET E00-1 GENERAL ELECTRICAL NOTES.

2 SEE FIRE ALARM ZONE SCHEDULE FOR INITIATING ZONES AND SIGNAL CIRCUITS.

3 MAXIMUM NUMBER OF 4 INFORMATION OUTLET LOCATIONS PER CONDUIT HOME RUN TO MDF OR IDF IS PERMITTED. CONDUIT SHALL BE SIZED AS FOLLOWS:

(1) INFORMATION OUTLET LOCATION: 1"

(2) INFORMATION OUTLET LOCATIONS: 1 1/4"

(3) INFORMATION OUTLET LOCATIONS: 1 1/2"

4 INSTALL CONDUIT WITH NO MORE THAN (2) 90° BENDS BETWEEN PULL BOXES, AND NO MORE THAN 100'-0" BETWEEN PULL BOXES. PULL BOXES SHALL BE INSTALLED FOR STRAIGHT THRU PULLS ONLY.

GENERAL NOTES

5 ALL COMMUNICATIONS CABLES SHALL BE INSTALLED IN CONDUIT, CABLE TRAY, OR SUPPORTED BY CABLE HOOKS. PROVIDE BUSHINGS AT THE ENDS OF ALL CONDUIT WHERE STUBBED ABOVE ACCESSIBLE CEILINGS OR WHERE DROPPED INTO CABLE TRAY. PROVIDE CABLE HOOKS ABOVE ACCESSIBLE CEILINGS FOR CABLE INSTALLATION WHERE NOT INSTALLED IN CONDUIT OR CABLE TRAY.

6 ALL COMMUNICATIONS CABLES SHALL BE INSTALLED IN CONDUIT OR CABLE TRAY.

7 VOICE/DATA DROPS IN THE FOLLOWING ROOMS HAVE BOTH OLD TERMINATIONS AND CABLING NEED TO BE DEMOLISHED AND NEW CABLING AND TERMINATIONS THAT NEED TO BE MOUNTED IN THE EXISTING BACK BOXES. THE NEW CABLING WILL NEED TO BE RE-TESTED FOLLOWING INSTALLATION INTO THE EXISTING BACK-BOXES: 102A, 102B, 103, 104A, 104B, 105, 106, 107, 108, 109, 121, 124A, 125, 131, 132, 133, 134, 136, 138, 140

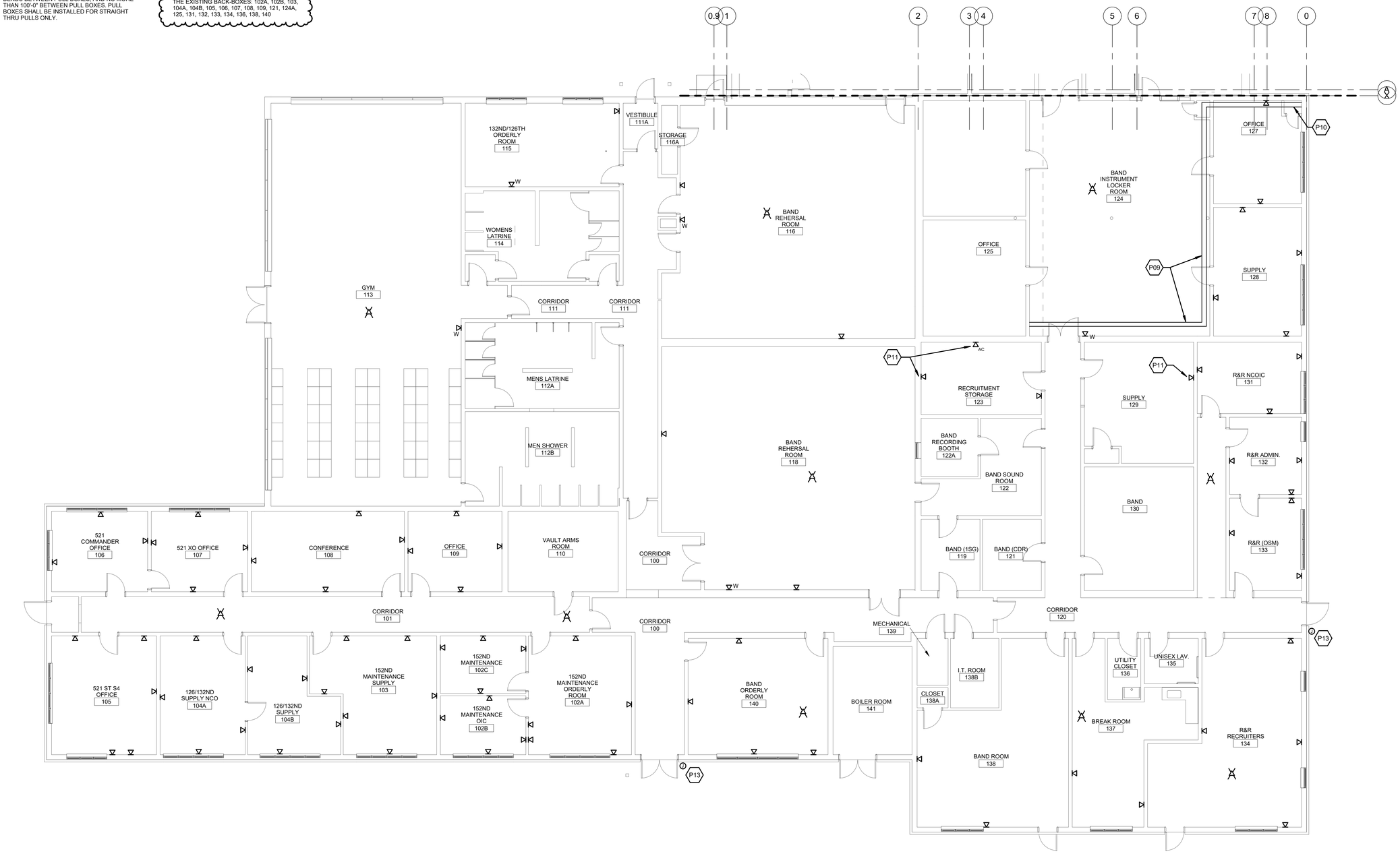
KEY NOTES

P09 4"x2" SINGLE SPINE CABLE TRAY. INSTALL ABOVE CEILING AND CONNECT TO EXISTING CABLE TRAY SYSTEM IN CORRIDOR 121.

P10 COORDINATE WITH CIVIL/PLUMBING FOR REROUTING OF EXISTING UNDERGROUND COMMUNICATIONS SERVICE FEEDERS. TRANSITION FROM BELOW GROUND TO ABOVE SLAB IN CORNER ROOM AS INDICATED. COORDINATE WITH CIVIL, STRUCTURAL, PLUMBING AND ARCHITECTURAL DRAWINGS FOR PHASING.

P11 DATA DROP INCLUDED IN ADD ALT 1 PACKAGE ONLY.

P13 PROVIDE AI PHONE IX-DV.



1 FIRST FLOOR - SYSTEMS PLAN - RENOVATION FLOOR PLAN

SCALE: 1/8" = 1'-0"

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HA Project No: 23245

NGRC BUILDING 255 RENOVATION
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FIRST FLOOR RENOVATION SYSTEMS - BASE BID

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E30-1
SHEET: 171 OF 176

GENERAL NOTES

1 ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON THE DRAWINGS, EXCEPT ITEMS LISTED ON SHEET E00-1 GENERAL ELECTRICAL NOTES.

2 SEE FIRE ALARM ZONE SCHEDULE FOR INITIATING ZONES AND SIGNAL CIRCUITS.

3 MAXIMUM NUMBER OF 4 INFORMATION OUTLET LOCATIONS PER CONDUIT HOME RUN TO MDF OR IDF IS PERMITTED. CONDUIT SHALL BE SIZED AS FOLLOWS:

(1) INFORMATION OUTLET LOCATION: 1"

(2) INFORMATION OUTLET LOCATIONS: 1 1/4"

(3) INFORMATION OUTLET LOCATIONS: 1 1/2"

4 INSTALL CONDUIT WITH NO MORE THAN (2) 90° BENDS BETWEEN PULL BOXES, AND NO MORE THAN 100'-0" BETWEEN PULL BOXES. PULL BOXES SHALL BE INSTALLED FOR STRAIGHT THRU PULLS ONLY.

5 ALL COMMUNICATIONS CABLES SHALL BE INSTALLED IN CONDUIT, CABLE TRAY, OR SUPPORTED BY CABLE HOOKS. PROVIDE BUSHINGS AT THE ENDS OF ALL CONDUIT WHERE STUBBED ABOVE ACCESSIBLE CEILINGS OR WHERE DROPPED INTO CABLE TRAY. PROVIDE CABLE HOOKS ABOVE ACCESSIBLE CEILINGS FOR CABLE INSTALLATION WHERE NOT INSTALLED IN CONDUIT OR CABLE TRAY.

6 ALL COMMUNICATIONS CABLES SHALL BE INSTALLED IN CONDUIT OR CABLE TRAY.

7 VOICE/DATA DROPS IN THE FOLLOWING ROOMS HAVE BOTH OLD TERMINATIONS AND CABLING NEED TO BE DEMOLISHED AND NEW CABLING AND TERMINATIONS THAT NEED TO BE MOUNTED IN THE EXISTING BACK BOXES. THE NEW CABLING WILL NEED TO BE RE-TESTED FOLLOWING INSTALLATION INTO THE EXISTING BACK-BOXES: 102A, 102B, 103, 104A, 104B, 105, 106, 107, 108, 109, 121, 124A, 125, 131, 132, 133, 134, 136, 138, 140

KEY NOTES

P16 FLUSH MOUNTED XLR FLOOR BOX WITH METAL COVER. PROVIDE WITH (2) MIC JACKS.

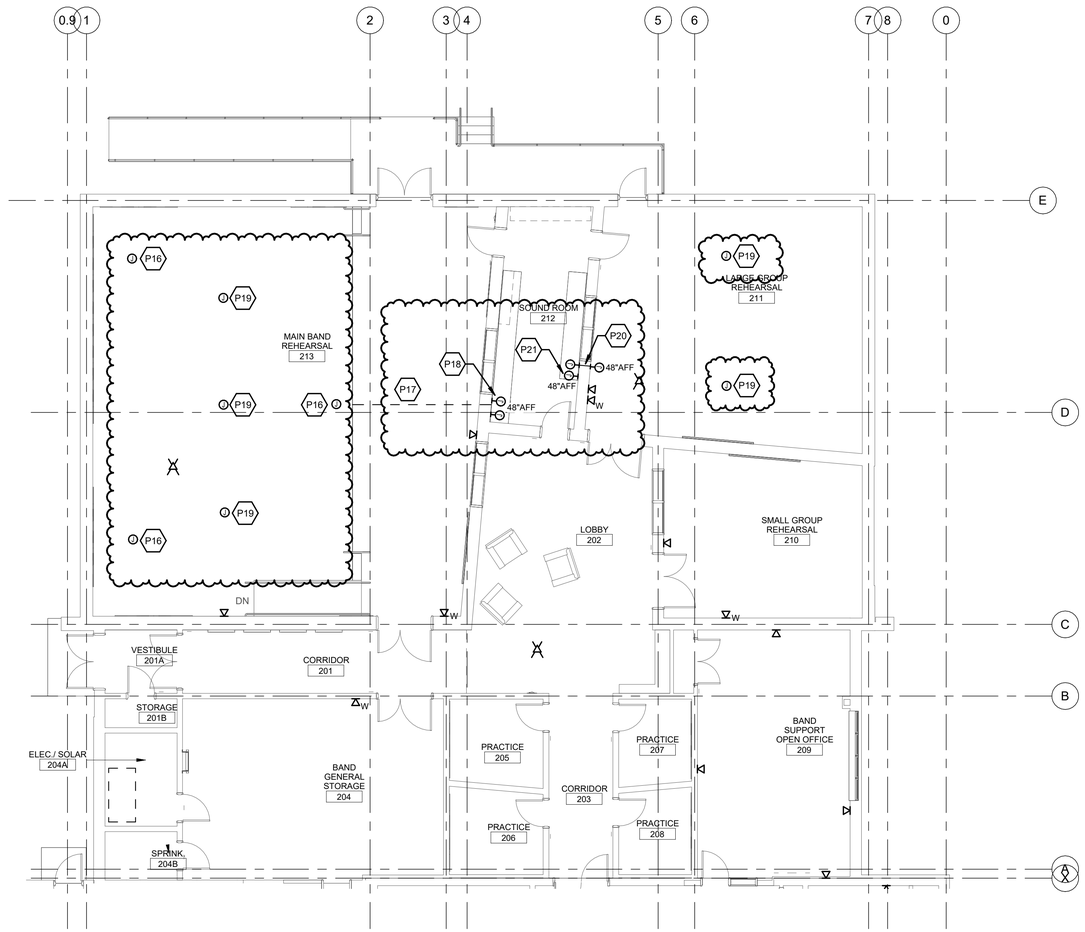
P17 ROUTE (6) XLR CABLES IN 2" EMT CONDUIT IN FLOOR TRENCH TO SOUND ROOM 212. STUB UP INTO SOUND ROOM WALL.

P18 PROVIDE (2) XLR FACEPLATES SIZED TO TERMINATE (6) XLR CABLES EACH AT 48" AFF. ROUTE (6) STAGE LEVEL XLR CABLES IN 2" EMT CONDUIT IN SLAB TRENCH TO ONE WALL MOUNTED XLR FACEPLATE, AND (6) CEILING LEVEL XLR CABLES IN 2" EMT CONDUIT IN THE OTHER WALL MOUNTED XLR FACEPLATE.

P19 PROVIDE CEILING FLUSH MOUNTED XLR BOX AND ROUTE (2) XLR CABLES IN 2" EMT TO SOUND ROOM 212. ROUTE CONDUIT ABOVE CEILING, PAINT ANY EXPOSED CONDUIT TO MATCH CEILING/WALL FINISH. ALL CEILING MOUNTED XLR CABLES TO TERMINATE IN WALL MOUNTED FACEPLATES INDICATED.

P20 PROVIDE (1) 4-GANG XLR FACEPLATE CONNECTED FROM LARGE REHEARSAL ROOM 211 TO SOUND ROOM 212. INSTALL FACE PLATES AT 48" AFF.

P21 PROVIDE 4 GANG WALL MOUNTED XLR FACEPLATE FOR THE TERMINATION OF XLR CABLES FROM LARGE GROUP REHEARSAL 211. INSTALL FACEPLATE AT 48" AFF.



1 FIRST FLOOR - SYSTEMS PLAN - ADDITION FLOOR PLAN

SCALE: 1/8" = 1'-0"

STATE OF MAINE
JAMES LEO HEBERT
No. 14371
LICENSED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr.
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: JLH
DRAWN BY: JLH
CHECKED BY: CLH
DATE: 8/13/2024
SCALE: 1/8" = 1'-0"
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401
FIRST FLOOR ADDITION SYSTEMS - BASE BID

PLAN PROGRESS

- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E30-2
SHEET: 172 OF 176

FEEDER SCHEDULE: 4 WIRE			
SYMBOL	PHASE CONDUCTOR	EGC	CONDUIT
20Y	(4) #12	(1) #12	3/4"
30Y	(4) #10	(1) #10	3/4"
40Y	(4) #8	(1) #10	1"
50Y	(4) #6	(1) #10	1"
60Y	(4) #4	(1) #10	1-1/4"
70Y	(4) #4	(1) #8	1-1/4"
80Y	(4) #3	(1) #8	1-1/4"
90Y	(4) #2	(1) #8	1-1/2"
100Y	(4) #2	(1) #8	1-1/2"
125Y	(4) #1	(1) #6	2"
150Y	(4) #1/0	(1) #6	2"
175Y	(4) #2/0	(1) #6	2"
200Y	(4) #3/0	(1) #6	2"
225Y	(4) #4/0	(1) #4	2-1/2"
250Y	(4) #250 KCMIL	(1) #4	2-1/2"
300Y	(4) #350 KCMIL	(1) #4	3"
350Y	(4) #500 KCMIL	(1) #3	3"
400Y	(4) #600 KCMIL	(1) #3	4"
500Y	(2) SETS OF (4) #250 KCMIL	(1) #2	(2) 2-1/2"
600Y	(2) SETS OF (4) #350 KCMIL	(1) #1	(2) 3"
800Y	(3) SETS OF (4) #500 KCMIL	(1) #1/0	(3) 3"
1000Y	(3) SETS OF (4) #400 KCMIL	(1) #2/0	(3) 3"
1200Y	(4) SETS OF (4) #350 KCMIL	(1) #3/0	(4) 3"
1600Y	(5) SETS OF (4) #400 KCMIL	(1) #4/0	(5) 3"
2000Y	(6) SETS OF (4) #500 KCMIL	(1) #250 KCMIL	(6) 4"
2500Y	(7) SETS OF (4) #500 KCMIL	(1) #350 KCMIL	(7) 4"
3000Y	(8) SETS OF (4) #500 KCMIL	(1) #400 KCMIL	(8) 4"
4000Y	(10) SETS OF (4) #600 KCMIL	(1) #500 KCMIL	(10) 4"
5000Y	(12) SETS OF (4) #600 KCMIL	(1) #700 KCMIL	(12) 4"

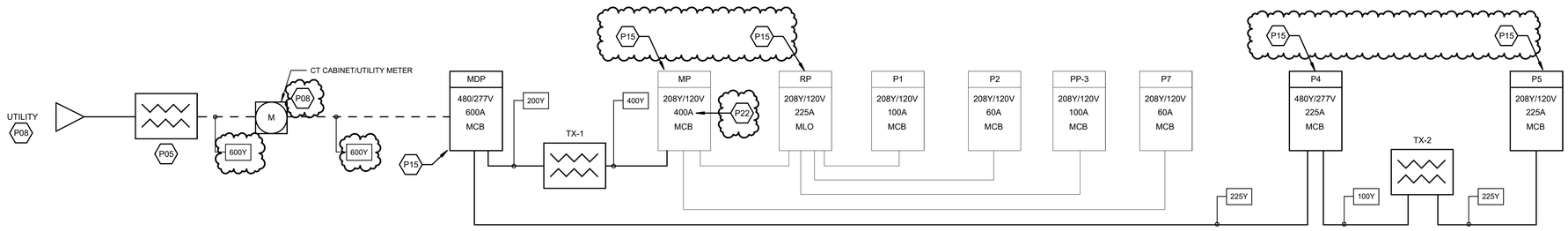
KEY NOTES

P05 NEW PAD MOUNTED TRANSFORMER PROVIDED BY UTILITY. CONTRACTOR RESPONSIBLE FOR TRANSFORMER PAD DESIGNED TO UTILITY STANDARDS. SEE CIVIL SHEET C40-1 FOR EXACT LOCATION OF PAD. CONTRACTOR IS RESPONSIBLE FOR SECONDARY TERMINATIONS TO TRANSFORMER AND ROUTING OF SECONDARIES TO BUILDING.

P08 CONTRACTOR TO PROVIDE NEW UNDERGROUND DUCTBANK FROM EXISTING UTILITY POLE ON HAYES STREET TO NEW PAD MOUNTED TRANSFORMER LOCATED IN FRONT OF BUILDING (SEE SHEET C40-1). UTILITY TO ROUTE PRIMARY FEEDERS TO NEW TRANSFORMER PAD. CONTRACTOR TO CONNECT NEW SECONDARY FEEDERS TO TRANSFORMER SECONDARY, AND ROUTE UNDERGROUND TO BUILDING MOUNTED CT CABINET, UTILITY METER, AND DISCONNECT. TRANSITION FEEDERS ABOVE GROUND AND PENETRATE INTO BOILER ROOM 141, TERMINATING AT NEW SWITCHBOARD "MDP". COORDINATE WORK WITH UTILITY.

P15 PROVIDE METERING IN "MDP", "MP", "P4", "P5" AND "RP" FOR MONITORING MECHANICAL EQUIPMENT. METERING TO BE COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING.

PHASING: COORDINATE ALL BUILDING ELECTRICAL OUTAGES WITH OWNER FOR PHASED INSTALLATION OF NEW "MDP". REMOVE FEEDERS FROM EXISTING PANEL "MP". REMOVE NEUTRAL BOND LINK FROM SERVICE ENTRANCE EQUIPMENT.



1 ELECTRICAL RISER DIAGRAM
NO SCALE

STATE OF MAINE
JAMES LEO HEBERT
No. 14371
LICENSED PROFESSIONAL ENGINEER
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FACILITIES ENGINEERING
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DIRECTORATE

PLAN REVISIONS

Rev#	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: JLH
DRAWN BY: JLH
CHECKED BY: CLH
DATE: 8/13/2024
SCALE: As indicated
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

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46 Harriman Drive
Auburn, ME 04210
207-784-5100

HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ELECTRICAL DIAGRAMS

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
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- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E50-1
SHEET: 173 OF 176

LIGHTING FIXTURE SCHEDULE

NOTES:
1. ALL FIXTURES SHALL BE FURNISHED COMPLETE WITH ALL HARDWARE, LAMPS, HANGERS, FITTINGS, ETC. FOR A COMPLETE AND PROPER INSTALLATION.

TYPE	DESCRIPTION	LENS	MOUNTING	LAMP	VOLT	WATT	MFR	CATALOG SERIES	NOTES
A	2'X4' LED VOLUMETRIC TROFFER, 4000 LUMENS 80CRI, 3500K, 0-10 DIMMING DOWN TO 1%		RECESSED	LED	120 V	50 W	NEW STAR	NST24-LT-HC20-IC20-L2-35-1C-PA12-UN-DM1	
AA	SURFACE MOUNT LED WALL PACK		SURFACE	LED	120 V	20 W	ECLIPSE	GW-C-DN30-35K-UNV-BK-9328	
B	2'X4' LED VOLUMETRIC TROFFER, 3300 LUMENS, 80CRI, 3500K, 0-10 DIMMING DOWN TO 1%	ACRYLIC LINEAR PRISMATIC	RECESSED	LED	120 V	38 W	NEW STAR	NST22-LT-HC20-IC20-L2-35-1C-PA12-UN-DM1	
C	4" RECESSED LED DOWNLIGHT, 1000 LUMENS, 3500K, MEDIUM / WIDE DISTRIBUTION, CLEAR MATTE REFLECTOR, 0-10 DIMMING DOWN TO 10%, WHITE FLANGE	CLEAR MATTE DIFFUSED	RECESSED	LED	120 V	19 W	PRESCOLITE	EVO4-35/10-AR-MWD-LD-MVOLT-GZ10-TRW	
C1	4" RECESSED LED DOWNLIGHT, 1000 LUMENS, 3500K, MEDIUM / WIDE DISTRIBUTION, CLEAR MATTE REFLECTOR, 0-10 DIMMING DOWN TO 10%, WHITE FLANGE	CLEAR MATTE DIFFUSED	RECESSED	LED	120 V	19 W	PRESCOLITE	EVO4-35/10-AR-MWD-LD-MVOLT-GZ10-TRW	
D	PENDANT - 8'-0" DIRECT / INDIRECT LINEAR - 538 LM/FT UPLIGHT, 379LM/FT DOWNLIGHT, 80CRI, 3500K, TOP GLOW UPLIGHT OPTICS, FLUSH DOWNLIGHT OPTICS, 0-10 DIMMING DOWN TO 10%, WHITE FINISH.	LOW GLOSS WHITE	PENDANT	LED	120 V	65 W	NEW STAR	HP4P-ID-8'-B-S-835-TG-F-96LG-UNV-SC-FC10%-FA-*-FE-SW	
E	4' INDUSTRIAL LED STRIP, 3175 LUMENS, 80CRI, 3500K, SYMMETRIC REFLECTOR, WHITE FINISH.	FROSTED	SURFACE	LED	120 V	41 W	NEW STAR	ACD4-W-L1-35-1C-UN-WH	
EM	SURFACE MOUNT LED EMERGENCY BATTERY PACK	CLEAR MATTE DIFFUSED	SURFACE	LED	120 V	12 W	NEW STAR		
EX	SURFACE MOUNTED EXIT SIGN	RED	UNIVERSAL	LED	120 V	3 W	NEW STAR		
F1	11'-0" WALL MOUNTED LINEAR LED.	LOW GLOSS WHITE	WALL MOUNT	LED	120 V	112 W	TETRA	T1-ARM-12'-4-11'-927-L-SB-1D-SC-MF-SC	MOUNT AT 8' AFF - COORDINATE INSTALLATION WITH ARCHITECTURAL
F2	24" WALL MOUNTED LINEAR LED, 2700K		WALL MOUNT	LED	120 V	20 W	TETRA	T1-ARM-12'-4-2'-927-L-SB-1D-SC-MF-SC	MOUNT AT 8' AFF - COORDINATE INSTALLATION WITH INTERIOR ELEVATIONS E1 ON SHEET I81-11.
G1	6' SEMI-RECESSED UNDERCABINET FIXTURE.		SEMI-RECESSED	LED	120 V	20 W	TETRA	CS-D-44-M-PS-4-6'-927-L-SB-1D-SC-MF-SC	MOUNTING OF PENDANT FIXTURE TO BE SURFACE MOUNTED. COORDINATE MOUNTING WITH ARCHITECTURAL DETAILS A1 AND A2 ON SHEET I83-2.
G2	4' SEMI-RECESSED UNDERCABINET FIXTURE.		SEMI-RECESSED	LED	120 V	20 W	TETRA	CS-D-44-M-PS-4-4'-927-L-SB-1D-SC-MF-SC	MOUNTING OF PENDANT FIXTURE TO BE SURFACE MOUNTED. COORDINATE MOUNTING WITH ARCHITECTURAL DETAILS A1 AND A2 ON SHEET I83-2.

Branch Panel: MDP

Location: BOILER ROOM 141
Supply From: UTILITY
Mounting: Surface
Enclosure: Type 1

Volts: 480Y/277
Phases: 3
Wires: 4

A.I.C. Rating: 42KAIC
Mains Type: MCB
Mains Rating: 600 A
MCB Rating: 600 A

Notes:

CKT	Load Name	Trip	Poles	A		B		C		Poles	Trip	Load Name	CKT
1				3000...	3000...								2
3	UNIT HEATER UH-2	20 A	3			3000...	3000...			3	20 A	UNIT HEATER UH-5 ROOM 119	4
5								3000...	3000...				6
7				3000...	2355...								8
9	UNIT HEATER ROOM 209	20 A	3			3000...	2355...			3	20 A	ERV-1 (ROOF)	10
11								3000...	2355...				12
13				1386...	1386...								14
15	ERV-2 (ROOF)	20 A	3			1386...	1386...			3	20 A	ERV-4 (ROOF)	16
17								1386...	1386...				18
19				1202...	1202...								20
21	OU-1	60 A	3			1202...	1202...			3	60 A	OU-1	22
23								1202...	1202...				24
25				7787...	7787...								26
27	OU-2	40 A	3			7787...	7787...			3	40 A	OU-2	28
29								7787...	7787...				30
31				5195...									32
33	PANEL P4	225 A	3			5063...							34
35								5482...					36
37				0 VA									38
39	TRANSFORMER TX-1	200 A	3			0 VA							40
41								0 VA					42
			Total Load:	103038 VA		101752 VA		105827 VA					
			Total Amps:	373 A		367 A		383 A					

Legend:

Panel Totals

Total Conn. Load:	310615 VA
Total Est. Demand:	310615 VA
Total Conn.:	374 A
Total Est. Demand:	374 A

Notes:
1. PROVIDE METERING FOR MECHANICAL EQUIPMENT COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING. 2. PROVIDE SURGE PROTECTIVE DEVICE.

Branch Panel: MP

Location: BOILER ROOM-1 141-1
Supply From: MDP VIA TX-1
Mounting: Surface
Enclosure: Type 1

Volts: 208Y/120
Phases: 3
Wires: 4

A.I.C. Rating: 42KAIC
Mains Type: MCB
Mains Rating: 600 A
MCB Rating: 400 A

Notes:

CKT	Load Name	Trip	Poles	A		B		C		Poles	Trip	Load Name	CKT
1				0 VA	0 VA					2	20 A	UNKNOWN	2
3	RTU #4	90 A	3			0 VA	0 VA						4
5								0 VA	0 VA	1	20 A	UNKNOWN	6
7	PUMP #3	20 A	2	0 VA	0 VA								8
9						0 VA	0 VA			3	50 A	RTU #2	10
11	PUMP #4	20 A	1					0 VA	0 VA				12
13				0 VA	0 VA								14
15	RTU #1	50 A	3			0 VA	0 VA			3	50 A	RTU #3	16
17								0 VA	0 VA				18
19	ERV-3 (ROOF)	20 A	2	645 VA	0 VA					2	125 A	EV CHARGER	20
21						645 VA	0 VA						22
23	BUSSED SPACE	--	1					--	0 VA	1	20 A	CONTROL PUMP #1-4	24
25	BUSSED SPACE	--	1	--	0 VA								26
27	BUSSED SPACE	--	1			--	0 VA			3	60 A	PANEL PP7	28
29	PUMP #1	15 A	2					0 VA	0 VA				30
31				0 VA	0 VA								32
33	BUSSED SPACE	--	1			--	0 VA			3	15 A	PUMP #2	34
35	BUSSED SPACE	--	1					--	0 VA				36
37				0 VA	--								38
39	UNKNOWN EXISTING PANEL	200 A	3			0 VA	--			3	--	BUSSED SPACE	40
41								0 VA	--				42
43				--	0 VA								44
45	BUSSED SPACE	--	3			--	0 VA			3	225 A	PANEL P2	46
47								--	0 VA				48
49				0 VA	--								50
51	TR1	100 A	3			0 VA	--			3	--	BUSSED SPACE	52
53								0 VA	--				54
			Total Load:	645 VA		645 VA		0 VA					
			Total Amps:	6 A		6 A		0 A					

Legend:

Panel Totals

Total Conn. Load:	1290 VA
Total Est. Demand:	1290 VA
Total Conn.:	4 A
Total Est. Demand:	4 A

Notes:
PROVIDE METERING FOR MECHANICAL EQUIPMENT COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING.

STATE OF MAINE
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Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
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HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ELECTRICAL SCHEDULES SHEET 1

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E60-1
SHEET: 174 OF 176

Branch Panel: P4

Location: ELEC./ SOLAR-1 204A-1
Supply From: MDP
Mounting: Surface
Enclosure: Type 1

Volts: 480Y/277
Phases: 3
Wires: 4

A.I.C. Rating: 42KAIC
Mains Type: MCB
Mains Rating: 225 A
MCB Rating: 225 A

Notes:

CKT	Load Name	Trip	Poles	A		B		C		Poles	Trip	Load Name	CKT
1				3000...	1615...								2
3	ELECTRIC UNIT HEATER UH-3	15 A	3			3000...	1615...			3	80 A	RTU-1 (ROOF)	4
5								3000...	1615...				6
7				--	--								8
9	BUSSED SPACE	--	3			--	--			3	--	BUSSED SPACE	10
11								--	--				12
13				--	--								14
15	BUSSED SPACE	--	3			--	--			3	--	BUSSED SPACE	16
17								--	--				18
19				7787...	7787...								20
21	OU-3	40 A	3			7787...	7787...			3	40 A	OU-3	22
23								7787...	7787...				24
25				7787...									26
27	OU-4	400 A	3			7787...							28
29								7787...					30
31													32
33													34
35								1332...					36
37	TRANSFORMER TX-2	100 A	3	1027...									38
39						8857...							40
			Total Load:	51958 VA		50637 VA		54820 VA					
			Total Amps:	188 A		183 A		199 A					

Legend:

Panel Totals	
Total Conn. Load:	157403 VA
Total Est. Demand:	157403 VA
Total Conn.:	189 A
Total Est. Demand:	189 A

Notes:
PROVIDE METERING FOR MECHANICAL EQUIPMENT COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING

Branch Panel: P5

Location: ELEC./ SOLAR-1 204A-1
Supply From: P4 VIA TX-2
Mounting: Surface
Enclosure: Type 1

Volts: 208Y/120
Phases: 3
Wires: 4

A.I.C. Rating: 42KAIC
Mains Type: MCB
Mains Rating: 225 A
MCB Rating: 225 A

Notes:

CKT	Load Name	Trip	Poles	A		B		C		Poles	Trip	Load Name	CKT
1	LIGHTING Room 148, 147, 149	20 A	1	736 VA	460 VA					1	20 A	LIGHTING Room 163, 152, 159	2
3	LIGHTING Room 157, 154, 155, 156, 153	20 A	1			825 VA	589 VA			1	20 A	LIGHTING Room 158, 161	4
5	LIGHTING Room 160, 162	20 A	1					815 VA	720 VA	1	20 A	RCPT Room 148, 151, 152, 159	6
7	RCPT Space 147	20 A	1	1440...	720 VA					1	20 A	RCPT Room 153, 154	8
9	RCPT Room 163, 156, 155	20 A	1			900 VA	540 VA			1	20 A	RCPT Space 157	10
11	RCPT Space 157	20 A	1					540 VA	720 VA	1	20 A	RCPT Space 158	12
13	RCPT Room 162, 160, 159	20 A	1	1080...	720 VA					1	20 A	RCPT Space 161	14
15	RCPT Room 161, 162	20 A	1			900 VA	360 VA			1	20 A	RCPT Space 160	16
17	RCPT Space 160	20 A	1					720 VA	1920...	1	20 A	ELECTRIC UNIT HEATER UH-4 Space 149	18
19	INDOOR UNITS IU-4,5,6,8	20 A	2	180 VA	90 VA					2	20 A	INDOOR UNITS IU-1,2,3 Room 155, 156, 157	20
21						180 VA	90 VA						22
23	INDOOR UNITS - Rooms 105, 106, 104, 108, 109, 110, 112, 111, 129, 107, 113	20 A	2					585 VA	315 VA	2	20 A	INDOOR UNITS Room 118, 117, 115, 114	24
25				585 VA	315 VA								26
27	UNIT HEATERS Room 119, 166, 142, 168	20 A	2			225 VA	180 VA			2	20 A	INDOOR UNITS Room 122, 123, 125, 124	28
29								225 VA	180 VA				30
31	INDOOR UNITS Room 144, 140, 145	20 A	2	270 VA	65 VA					2	20 A	INDOOR UNITS Space 144	32
33						270 VA	65 VA						34
35	INDOOR UNITS Space 166	20 A	2					65 VA	130 VA	2	20 A	INDOOR UNITS Room 129, 107	36
37				65 VA	130 VA								38
39	INDOOR UNITS Space 201	20 A	2			65 VA	1352...			2	20 A	INDOOR UNITS Space 201	40
41								65 VA	1352...				42
43	AC-1	30 A	2	0 VA	1352...					2	20 A	INDOOR UNITS Space 134	44
45						0 VA	1352...						46
47	Other Space 136	20 A	2					1872...	900 VA	1	20 A	RCPT Space 136	48
49				1872...	360 VA					1	20 A	RCPT Space 136	50
51	RCPT Space 136	20 A	1			360 VA	799 VA			1	20 A	RCPT MAIN BAND REHEARSAL-1 213-1	52
53	RCPT MAIN BAND REHEARSAL-1 213-1	20 A	1					799 VA	1352...	1	20 A	LIGHTING Room 202-1, 201-1	54
55	SPARE	20 A	1	0 VA	234 VA					1	20 A	LIGHTING Room 202-1, 201-1	56
57	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	58
59	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	60
			Total Load:	10434 VA		8857 VA		13455 VA					
			Total Amps:	89 A		74 A		114 A					

Legend:

Panel Totals	
Total Conn. Load:	32724 VA
Total Est. Demand:	31538 VA
Total Conn.:	91 A
Total Est. Demand:	88 A

Notes:
PROVIDE METERING FOR MECHANICAL EQUIPMENT COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING

Branch Panel: RP

Location: BOILER ROOM-1 141-1
Supply From: MP
Mounting: Surface
Enclosure: Type 1

Volts: 208Y/120
Phases: 3
Wires: 4

A.I.C. Rating: 42KAIC
Mains Type: MCB
Mains Rating: 225 A
MCB Rating: 225 A

Notes:

CKT	Load Name	Trip	Poles	A		B		C		Poles	Trip	Load Name	CKT
1	PANEL 1	100 A	2	0 VA	0 VA					2	60 A	PANEL 2	2
3						0 VA	0 VA						4
5	AC-1	30 A	2					2059...	0 VA	2	100 A	PP-3	6
7				2059...	0 VA								8
9	SPARE	20 A	2			0 VA	0 VA			2	20 A	SPARE	10
11								0 VA	0 VA				12
13	SPARE	20 A	2	0 VA	0 VA					1	20 A	SUMP RECEPTACLE	14
15						0 VA	936 VA			2	20 A	WATER HEATER WHTR-2	16
17	LIGHTS	20 A	1					0 VA	936 VA				18
19	OUTLETS BY DOOR	20 A	1	0 VA	528 VA					1	20 A	PUMP DCP-1	20
21	OUTLETS	20 A	1			0 VA	960 VA			1	20 A	WATER HEATER WHTR-1	22
23	AC-2	30 A	2					2059...	180 VA	1	20 A	COUNTERTOP GFCI BAND SUPPLY 122	24
25				2059...	180 VA					1	20 A	COUNTERTOP GFCI BAND SUPPLY 122	26
27	COUNTERTOP GFCI BAND SUPPLY 122	20 A	1			180 VA	180 VA			1	20 A	COUNTERTOP GFCI BAND DAY RM 124A	28
29	COUNTERTOP GFCI BAND DAY RM 124A	20 A	1					180 VA	180 VA	1	20 A	COUNTERTOP GFCI BAND DAY RM 124A	30
31	COUNTERTOP RCPT BAND LIBRARY 123	20 A	1	180 VA	180 VA					1	20 A	COUNTERTOP RCPT BAND LIBRARY 123	32
33	COUNTERTOP RCPT BAND LIBRARY 123	20 A	1			180 VA	0 VA			1	20 A	SPARE	34
35	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	36
37	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	38
39	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	40
41	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	42
			Total Load:	5137 VA		2394 VA		5545 VA					
			Total Amps:	46 A		20 A		50 A					

Legend:

Panel Totals	
Total Conn. Load:	13073 VA
Total Est. Demand:	13073 VA
Total Conn.:	36 A
Total Est. Demand:	36 A

Notes:
PROVIDE METERING FOR MECHANICAL EQUIPMENT COMPATIBLE WITH BACNET/MSTP FOR ENERGY MONITORING

STATE OF MAINE
JAMES LEO HEBERT
No. 14371
LICENSED PROFESSIONAL ENGINEER
A / E Seal

FACILITIES ENGINEERING
DFE
CAMP KEYES
DIRECTORATE

PLAN REVISIONS

Revn	Description	Date	Appr
1	ADDENDUM 2	08-30-2024	

DESIGNED BY: JLH
DRAWN BY: JLH
CHECKED BY: CLH
DATE: 8/13/2024
SCALE:
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

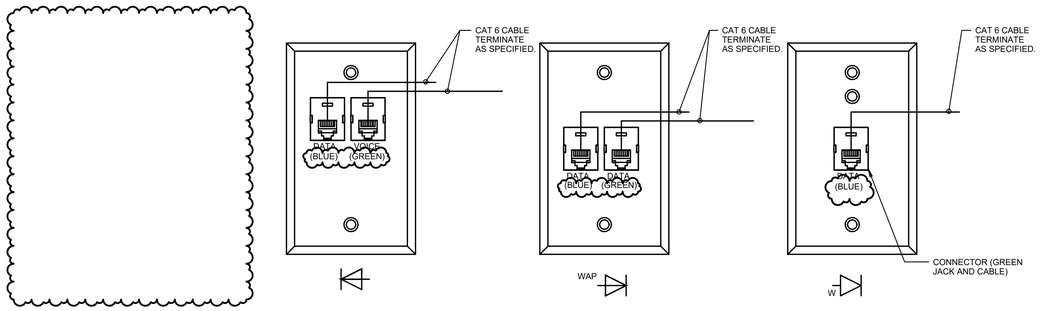
Harriman

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ELECTRICAL SCHEDULES SHEET 2

PLAN PROGRESS
- ☐ DRAFT
- ☐ 35% REVIEW
- ☐ 50% REVIEW
- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E60-2
SHEET: 175 OF 176



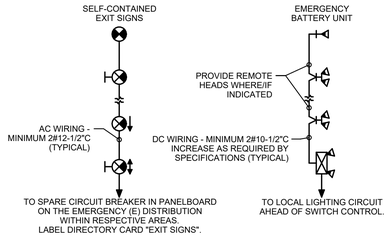
1 DATA FACEPLATES

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

COMMUNICATIONS OUTLET DETAIL NOTES:
1. TERMINATE CABLES UTILIZING T5688B PIN/PAIR ASSIGNMENT.
2. REFER TO COMMUNICATIONS OUTLET LABELING CONVENTION DETAIL THIS SHEET.
3. PROVIDE QUANTITY OF VOICE AND DATA JACKS AS NOTED ON PLAN.

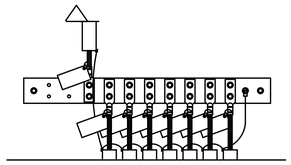
COMMUNICATIONS OUTLET LABELING:
1. LABELING ON OUTLET COVER TO INCLUDE:
   A. CLOSET NUMBER
   B. PATCH PANEL (110 BLOCK, PHONE)
   C. RACK NUMBER (BACKBOARD PHONE)
   D. ENCLOSURE NUMBER
   E. ROOM NUMBER
   F. DROP (SEAT) NUMBER

TELEPHONE OUTLET DETAIL NOTES:
1. WALL MOUNTED PHONES: VERIFY PHONIE HANDSET PHYSICAL SIZE PRIOR TO ROUGH-IN
2. WALL MOUNTED PHONES: ADJUST BOX LOCATION TO ACCOMMODATE PHONE AND ADJACENT WALL FINISHES, TRIM, CABINETS AND OTHER OBSTACLES.
3. TERMINATE CABLES UTILIZING T5688B PINPAIR ASSIGNMENT.
4. REFER TO COMMUNICATIONS OUTLET LABELING CONVENTION DETAIL THIS SHEET.
5. MOUNTING HEIGHT AT 60" AFF.



2 EXIT SIGN AND EMERGENCY BATTERY UNIT WIRING

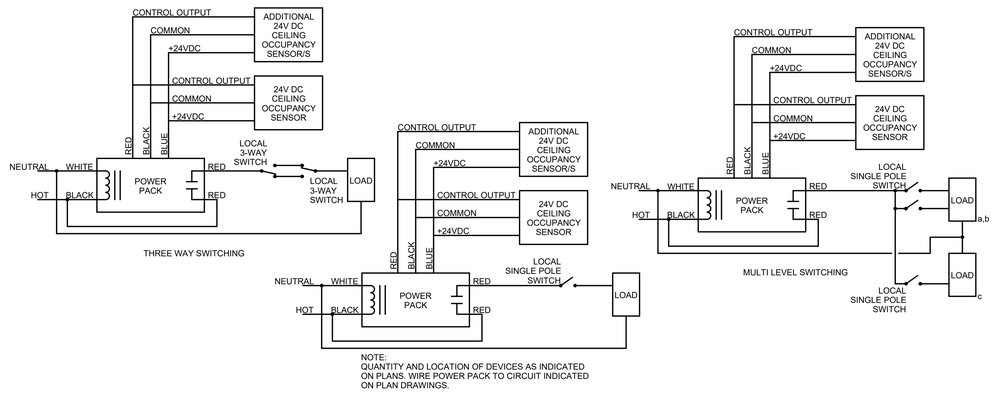
SCALE: 1" = 1'-0"



NOTES:
1. PROVIDE COPPER GROUNDING BUS (ERICO EGBA SERIES OR APPROVED EQUAL) WHERE INDICATED ON PLANS.
2. PROVIDE PERMANENT PHENOLIC TAG ON EACH CONDUCTOR INDICATING ORIGIN OF EACH CONDUCTOR.
3. GROUND TO ITEMS INDICATED ON POWER RISERS.
4. BOND TO THE FOLLOWING ITEMS:
   a. STRUCTURAL STEEL.
   b. TEL/DATA GROUND BUSBAR.
   c. METALLIC PIPING.

3 GROUNDING BUS DETAIL

SCALE: 3/4" = 1'-0"



4 OCCUPANCY SENSOR CONTROL DETAIL

SCALE: 1" = 1'-0"

NOTES:
1. ALL EQUIPMENT IS EXISTING EXCEPT FOR (2) CAT 6 PATCH PANELS, (3) 2U HORIZONTAL CABLE MANAGEMENT WHICH ARE TO BE PROVIDED BY THE CONTRACTOR.

Rack Unit	DATA (BLUE CABLES)	EQUIPMENT	VOICE (GREEN CABLES)	Rack Unit
45	2U HORIZ CABLE MGMT	FIBER OPTIC PATCH PANEL	200 PAIR 110 PUNCH DOWN BLOCK	45
44				44
43	48-PORT CAT6 PATCH PANEL	2U HORIZ CABLE MGMT	2U HORIZ CABLE MGMT	43
42				42
41	2U HORIZ CABLE MGMT	OWNER FURN SWITCH 48P	48-PORT CAT6 PATCH PANEL	41
40		2U HORIZ CABLE MGMT		40
39	48-PORT CAT6 PATCH PANEL		2U HORIZ CABLE MGMT	39
38		OWNER FURN SWITCH 48P		38
37	2U HORIZ CABLE MGMT	2U HORIZ CABLE MGMT	48-PORT CAT6 PATCH PANEL	37
36				36
35	48-PORT CAT6 PATCH PANEL	OWNER FURN SWITCH 48P	2U HORIZ CABLE MGMT	35
34		2U HORIZ CABLE MGMT		34
33	2U HORIZ CABLE MGMT	OWNER FURN SWITCH 48P	48-PORT CAT6 PATCH PANEL	33
32				32
31	48-PORT CAT6 PATCH PANEL	2U HORIZ CABLE MGMT	2U HORIZ CABLE MGMT	31
30		**OWNER FURN SWITCH 48P**		30
29	2U HORIZ CABLE MGMT	**2U HORIZ CABLE MGMT**	**48-PORT CAT6 PATCH PANEL**	29
28				28
27	**48-PORT CAT6 PATCH PANEL**		**2U HORIZ CABLE MGMT**	27
26				26
25	**2U HORIZ CABLE MGMT**			25
24				24
23				23
22				22
21				21
20				20
19				19
18				18
17				17
16				16
15				15
14				14
13				13
12				12
11		120V 10 RECEPTACLE POWER STRIP		11
10		208V 10 RECEPTACLE POWER STRIP		10
9				9
8				8
7				7
6				6
5		UPS FURNISHED BY GOV		5
4				4
3				3
2	120V 10 RECEPTACLE POWER STRIP		120V 10 RECEPTACLE POWER STRIP	2
1	208V 10 RECEPTACLE POWER STRIP		208V 10 RECEPTACLE POWER STRIP	1

8"W VERTICAL CABLE MANAGEMENT

5 RACK ELEVATION FOR TR 138B

SCALE: NO SCALE

STATE OF MAINE
JAMES LEO HEBERT
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PLAN REVISIONS

Rev#	Description	Date	Appr.
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CHECKED BY: CLH
DATE: 8/13/2024
SCALE: As indicated
DFE PROJECT NO: 23SR24-400-ABC

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

Harriman

Architects + Engineers
46 Harriman Drive
Auburn, ME 04210
207-784-5100
HA Project No: 23245

NGRC BUILDING 255 RENOVATION
28 HAYES STREET, BANGOR, ME 04401

ELECTRICAL DETAILS

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- ☐ DRAFT
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- ☐ 95% REVIEW
- ☐ FINAL REVIEW
- ☒ FOR BIDDING
- ☐ ISSUED FOR CONSTRUCTION
- ☐ RECORD DRAWINGS

SHEET ID:
E70-1
SHEET: 176 OF 176