



Washoe County School District

Purchasing Department • 14101 Old Virginia Road • Reno, NV 89521
Phone (775) 850-8025 • Fax (775) 857-3175

ADDENDUM #3

Bid # 22-26-B-10-DA
Construction of Rio Wrangler Area Elementary School

November 17, 2021

Signature on this form acknowledges receipt of the Addendum and that any changes, additions, and/or clarifications addressed within the Addendum shall be recognized as an incorporated part of the bid documents. The Contractor shall assure themselves that items covered by the Addendum are thoroughly understood and are fully accounted for in their submitted pricing.

All prospective Bidders should **Acknowledge Receipt** of this Addendum by signing this document where noted and returning it with the bid submission. Failure to acknowledge receipt of this Addendum may result in a rejection of bid.

The opening date for Bid #22-26-B-10-DA – Construction of Rio Wrangler Area Elementary School is scheduled for November 23, 2019 and is due at 2:00 p.m. (Local Time).

- 1. Addendum No. 3 dated November 16, 2021 from H+K Architects – 10 pages attached.**
- 2. Revised Specifications**
Various Specifications have been revised – 75 pages attached.
- 3. Revised Drawing Sheets:**
Various Drawing Sheets have been revised – 68 pages attached.
- 4. Clarification on Specification Section 06 16 00 Sheathing:**
Specification Section 06 16 00, Sheathing, 2.5, Subflooring identifies Ameriform; ARMOROC as an Approved Product. This product does not meet ASTM E136-19 test for non-combustibility and shall be removed from the Approved Products – 1 page attached.
- 5. Addition of Perforated Glazing Film**
Perforated Glazing Film has been added to the project. See Window Elevation and Specification Section 08 80 00 – Glazing.
- 6. Revised Flooring Type F2.**
Flooring Type F2 to has been revised to “Burnished Concrete”.



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7. Question:

Please provide a specification section for Polished Concrete Finishing.

Response:

The polished concrete finishing is described in section 03 39 00 – LITHIUM BASED CONCRETE DESIFIER/SEALER SYSTEM.

8. Question:

Spec section 23 09 00 lists accepted vendors for DDC controls, but sheet M003 is asking specifically for Alerton Controllers. Please advise.

Response:

Specification Section 23 09 00 is reissued in Addendum 3 to allow only the Alerton Control system.

9. Question:

Sheet A133, Appliance Schedule indicates "SC2 - Vollrath company Insulated Cold Server Cabinet w/Breath Guard" located in room B116. We have looked at all the related plans and elevations, but we could not locate any "SC2 Appliance". Please provide detail/location for this Appliance.

Response:

There is one SC - Vollrath company Insulated Hot Server Cabinet and one SC2 - Vollrath company Insulated Cold Server Cabinet. Both are on wheels but are intended to be stored in the corner next to the walk-in refrigerator. See revised sheet A133.

10. Question:

The lighting schedule on E002 does not list a L21 light fixture. On E211 there are 8 of these fixtures on the North side of B103 (Music Room). Are these stage fixtures for room B104 (Multi-Purpose Room)? Are they supplied by others or supplied and installed by others? How should we proceed?

Response:

Fixture L21 now shown on sheet E002 – see revised E002 sheet.

11. Question:

E211 identifies eight (8) L21 Fixtures, however, the lighting schedule on E002 does not list these fixtures. Please advise if L21 can be added to the fixture schedule.

Response:

Please see response to Question #10.



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12. Question:

Spec section 12 24 13 states that manual roller shades are to be located at window types A2, A4, A6, B3, C15, C16, C17 and C18. The detail that is referenced at the (4) Type C windows (C15, C16, C17, C18) is detail 21/A714 which does not appear to call out for a roller shade to be included. Please confirm that a roller window shade is needed at window types C15, C16, C17 and C18 as stated in the specs and if so, please provide a revised head of window detail.

Response:

Detail 21/A714 has been revised to include mini blinds.

13. Question:

Electrical plan sheet E11 note P59 says to provide keyed momentary switch for door mag release. Keyed switches and Magnetic Door holders are listed in the door hardware specifications. Please clarify who is responsible to supply and install these items. If electrical is to supply, can we get a submittal or part number for the required key switches?

Response:

Door hardware supplier is to provide these items as specified in hardware specifications. Note P59 modified on sheet E111 and E112 to reflect that the EC shall install these items.

14. Question:

Electrical plans sheet E111 note P36 says to provide Solatube 0-10v dimming keyed control station compatible with Solatube system. Are these controllers provided by the Solatube providers? If not, what is the specifications or part number of the required controller.

Response:

The sheet note intent is for the EC to provide and install a 0-10V keyed dimming switch for operation of the Solatubes. Refer to manufacturer installation instructions and specification section 086223. The Solatube system comes with controllers mounted to each unit, with a 24V transformer to be wired by the EC as well as control wiring from each unit to the switch.



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15. Question:

Need to Know:

Desired counter height?

Voltage?

Finish?

Breath Guard Style?

Lights?

Which is hot?

Which is cold & How will it breathe?

Response:

The answers to all of these questions are found in Specification Section 11 40 00 FOOD SERVICE EQUIPMENT, Page 5.

16. Question:

Can 2" and under copper piping be soldered in lieu of brazed?

Response:

Yes, Specification Section 221000 2.2 A.1.a. allows 2" and smaller copper to be soldered.

17. Question:

Please provide material spec and also if it does need to be wrapped in plastic per sanitary piping specification.

Response:

Specification Section 221300 2.2 Basic Pipes and Pipe Fittings identifies the allowed materials.

18. Question:

Can schedule 40 PVC piping be utilized for the underground. Spanish Springs, Sun Valley and O'Brian middle school have utilized PVC for the underground sanitary and storm.

Response:

No, schedule 40 PVC piping cannot be used for the underground sanitary and storm.

19. Question:

Please confirm Delta and Quality are approved for this project.

Response:

Please see the response to Question #8.



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20. Question:

Can this be changed to 2" and under ball valves and 2-1/2: and larger butterfly valves?

Response:

Yes, this can be changed.

21. Question:

Can "provide two unions at ball valves" be eliminated?

Response:

Yes, the unions at ball valves can be eliminated.

22. Question:

Please provide a schedule or tag number for the hoods.

Response:

The Weather Hoods are called out on Detail Sheet M601.

23. Question:

On door schedule B, Glass type G9 is used at some FRP doors, but the glazing legends shows "Not Used". Please advise.

Response:

Glazing Type G9 should read: "1" insulated, tempered glazing with integral blinds." See revised sheet A703.

24. Question:

The lighting schedule on E002 does not list a L21 light fixture. On E211 there are 8 of these fixtures on the North side of B 103 (Music Room). Are these stage fixtures for room B104 (Multipurpose room)? Are they supplied by others or supplied and installed by others? How should we proceed?

Response:

Please see response to Question #10.



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25. Question:

Sheet A133, Appliance Schedule indicates "SC2 – Vollrath company Insulated Cold Server Cabinet w/Breath Guard" located in room B116. We have looked at all the related plans and elevations, but we could not locate any "SC2 Appliance". Please provide detail/location for this Appliance.

Response:

Please see response to Question #9.

26. Question:

Substitution Request - Johns Manville offers polyisocyanurate foam board insulation that is comparable to the other mfgs. listed in section 072100 – 2.1 and we'd appreciate your consideration in adding JM as an approved equal.

Response:

This Substitution Request has not been approved because it does not apply to this project – 40 pages attached.

27. Question:

Please provide specification and details for Playground Protective Surfacing.

Response:

The building landscape drawings are located on sheets L100-L300. The playground bark is called out on sheet L100. The playground bark shall meet or exceed the requirements outlined in ASTM-F2075, ASTM-F1292 for Impact Attenuation, ASTM-F1951 Wheelchair Accessibility Test, and ASTM-F2075 Sieve Test Analysis, Hazardous Metals Test, Tramp Metal Test.

28. Question:

The supply air in the classrooms on the first floor shows duct liner being applied to the transition and for the remainder of the ductwork that offsets vertically and finishes at an extended plenum where it is to be externally wrapped. The second-floor supply air in the classrooms shows duct liner continuing to the connection at the extended plenum before it is externally wrapped. These are not typical from the first floor to the second floor. Please advise.

Response:

The straight section of 20/12 supply duct is to be wrapped and not lined per revised Sheets M136 and M146 – 2 pages attached.



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29. Question:

For Detail 7/G402, please confirm Powder Actuated Fasteners, such as the Hilti X-U are acceptable in lieu of welding for attachment to deck.

Response:

In the case where the wall is supported from the floor below, and not suspended from the deck, it is acceptable to connect the track to deck with shot pins at 16" o.c. into SOMD and #10 screws at 16" o.c. into untopped metal deck.

30. Question:

Please confirm bridging for Interior Walls are only required for furred walls, since these do not have sheathing on both sides.

Response:

Bracing is required for all interior metal stud walls that do not extend to the deck above. Gypsum wallboard is not considered adequate sheathing for an unbraced wall. Furred walls are typically assumed to be adequately braced, as they are attached to a masonry substrate, unless bracing is called for in specific locations in the drawings.

31. Question:

For top of Wall Details, 5/G402, please confirm that J-trim is only needed at exposed to view top of walls and not needed where it is hidden.

Response:

We will allow the J-trim to be eliminated in areas which are hidden from view. "Exposed to view" conditions include all public areas and all non-public areas, including but not limited to, storage electrical, mechanical, custodian, IDF, MDF, and fire riser rooms.

32. Question:

Sheet A801/A802 Has a note that states where resinous wall covering is to be applied to exposed masonry walls, contractor shall float masonry wall to provide flush surface. Please confirm this will be by the Resinous Subcontractor.

Response:

Various Contractors can perform various activities for a construction project, and it is the General Contractor's responsibility to determine who the appropriate subcontractor shall be for the work that needs to be completed.



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33. Question:

Sheet A813 has a note that states where tackable wall surface is to be applied to exposed masonry walls, contractor shall float masonry wall to provide flush surface. Please confirm this will be by the Masonry Subcontractor.

Response:

Various Contractors can perform various activities for a construction project, and it is the General Contractor's responsibility to determine who the appropriate subcontractor shall be for the work that needs to be completed.

34. Question:

Please confirm a primer is required for drywall prior to receiving a texture finish.

Response:

No primer is required prior to the application of the drywall texture.

35. Question:

There are conflicting details on how gypsum board ceilings terminate to walls. Please confirm what is required for gypboard ceiling termination.

Response:

Detail 11/A631 is specific to one location, which is the wall at Mechanical B119.

36. Question:

S041/2 Shows a metal stud schedule for 3-5/8", 6" and 8" walls. Per the SSMA the 6" and 8" walls max heights of 21' and 28' respectively can be met with 33mil with 5psf, L/240. Please confirm it is okay to use 33 mil in lieu of the heavier gauges.

Response:

It is not acceptable to use thinner materials than specified. Use stud thickness per the schedule.

37. Question:

Please provide specification for the grind & polish of the concrete floors per Finish Type F2.

Response:

Please see response to Question #7.



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38. Question:

Addendum #2 revised specs 085113 still makes reference to "integral motorized internal roller shades". Please confirm.

Response:

The motorized roller shades have been eliminated from this project. Specification section 085113 Aluminum Windows has been revised to reflect this change.

39. Question:

We are having difficulty getting any commitments for steel joist materials are less than 1 one year lead time. Even if ordered in December upon award, a December '22 delivery will not allow sufficient time to construct remaining work prior to the Jul '23 finish date. Optional roof structure being designed to help this issue (wide flange beam v joists)? If not, will substantial completion be delayed to accommodate the schedule?

Response:

We are currently evaluating an optional roof structure design, but we **strongly** prefer to stick to the original roof structure design **and** schedule.

Therefore, we ask that all bids reflect the original design. We have revised work times and schedule in order to accommodate the goal of a Fall 2023 school opening.

1. Liquidated Damages are changed to \$2,500.00 per day.
2. Hours of work: Exterior work shall be limited to the City of Reno Ordinance conditions, typically Monday through Friday 7:00 am to 7:00 pm and Saturday 8:00 am to 5:00 pm. Interior work may be performed at the contractor discretion 24 hours a day, 7 days a week.
3. Schedule Changes -
Intent to Award – December 1, 2021
Board Award - December 14, 2021
NTP - after December 14th but as early bonding and insurance is received from awarded contractor.
Substantial Completion – July 19, 2023 (Contractor shall schedule and plan, including any necessary regulatory agency approvals, for Washoe County School District to move in and set up FFE)
Final Completion - August 4, 2023.
4. Contractor baseline schedule shall include an onsite start date that allows a continuous flow of construction onsite start to completion.



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40. Question:

Substitution Request - With the sharp rise in lead times with lumber, CFS has the availability and in many cases, studies are showing CFS can be the more cost-effective way to build.

Our fabrication partners can offer you a fully pre-engineered componentized "turnkey" framing package of walls, floors, and roof trusses. This allows for accelerated construction and helps limit communication mishaps.

I've enclosed a few brochures of our flat roof trusses and floor trusses. Our flat Ultra Span systems are currently being used in replace of bar joist. With bar joist's current extended lead times, our system has been used as the best solution with cost, fast install, and our availability.

Response:

Thank you for your email and the information on your products. We do not pre-approve any manufacturer or products during the bidding process. After a review of the contract documents, if you feel your products meet both the specifications and the design intent as shown on the drawings, we encourage you to submit a bid to the General Contractors registered as plan holders for this project - 36 pages attached.

41. Question:

Are the entire planting beds within the school areas supposed to have the soil amended or just in the planting wells?

Response:

Per note on sheet L100 all planter areas are to be amended and in addition plant backfill is to be amended also at the time of plant pit excavation and backfill.

42. Question:

Are relocated existing plants and irrigation along Rio Wrangler Parkway subject to the full 1-year warranty?

Response:

Per plant list note on the Turn Pocket drawing the LS contractor is responsible for all plant material either transplanted or new. Note #8, sheet L101, LS contractor is to guarantee all plant material for one year.

43. Question:

The playgrounds depicted on the plans are manufactured by Burke, but the specifications do not list Burke as an approved vendor for the play structures. Is Burke an approved supplier for the play structures?

Response:

Burke is an approved vendor. The playground equipment detail does not call out a MFG.



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44. Question:

What is the WCSD preferred manufacturer and model number of the playground play structures to bid to?

Response:

The details are generic for required equipment. It is the Landscaping Contractor's responsibility provide proposal for equipment similar to the equipment shown.

ACKNOWLEDGEMENT OF RECEIPT

PRINT NAME (Authorized Proposer)

SIGNATURE (Authorized Proposer)

AGENCY NAME

DATE

SECTION 00 00 10 - PROJECT MANUAL INDEX

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See WCSD Division 1 Specifications (Under Separate Cover)

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01 91 13 GENERAL COMMISSIONING REQUIREMENTS

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Division 3 Concrete

03 10 00 CONCRETE FORMWORK
03 20 00 CONCRETE REINFORCEMENT
03 30 00 CAST-IN-PLACE CONCRETE
03 34 50 CONCRETE FINISHING
03 39 60 LITHIUM BASED CONCRETE DENSIFIER/SEALER SYSTEM

Division 4 Masonry

04 06 50 MASONRY MORTAR & GROUT
04 22 00 CONCRETE UNIT MASONRY
04 41 00 CORNER STONE

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05 40 00 COLD-FORMED METAL FRAMING
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05 51 13 METAL PAN STAIRS
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05 52 13 PIPE AND TUBE RAILINGS
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06 41 16 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS
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07 72 00 ROOF ACCESSORIES
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08 17 43 FLUSH FRP DOORS
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END OF SECTION 00 00 10

SECTION 222200 - HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 CONDITIONS OF THE CONTRACT

- A. Sections 220000 (Plumbing) and 220500 (Basic Materials and Methods for Plumbing) are hereby made a part of this section.

1.2 SUMMARY

- A. Types of heat tracing specified in this section include the following:
Self-regulating, parallel resistance heat tracing

1.3 SUBMITTALS

- A. Product data for electric heating cable and accessories.
- B. Shop drawings for electric heating cable.
- C. Field quality control reports.
- D. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL RESISTANCE HEATING CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
nVent/Raychem XL-Trace
Chromolox
- B. Comply with IEEE Standard 515.1 (Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications).
- C. Heating Element: Pair of parallel No. 16 AWG, nickel coated, stranded copper bus wires embedded in cross-linked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory assembled, non-heating leads with connectors at one end, and seal the opposite end water-tight. Cable shall be capable of crossing over itself once without overheating.
- D. Electrical Insulating Jacket: Flame retardant polyolefin.
- E. Cable Cover: Tinned-copper braid and polyolefin outer jacket with ultraviolet inhibitor.
- F. Maximum Operating Temperature (Power On): 150°F.
- G. Maximum Exposure Temperature (Power Off): 185°F.
- H. Electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for the intended location and application.

2.2 CONTROLS

- A. Remote bulb unit with adjustable temperature range from 30°F to 50°F.
- B. Snap action; open on rise, single pole switch with minimum current rating adequate for the connected cable.
- C. Remote bulb on capillary, resistance temperature device, or thermistor for directly sensing pipe wall temperature.
- D. Provide corrosion resistant and water-proof control enclosure.

2.3 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat conductive putty, cable ties, silicone end seals and splice kits, and installation clips, all furnished by the manufacturer or as recommended in writing by the manufacturer.
- B. Warning Labels: Continuously printed 'Electrical Heat Tracing' vinyl labeling, 3 mil minimum thickness, with pressure sensitive, permanent, waterproof, self-adhesive back.
 - 1. Markers on pipes with outside diameter including Insulation of less than 6 Inches shall be 3/4 inch minimum width.
 - 2. Markers on pipes with outside diameter including Insulation of 6 Inches and larger shall be 1-1/2 inch minimum width.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install electric heating cable across expansion joints according to manufacturer's written instructions; use slack cable to allow movement without damage to cable.
- B. Install electric heating cables after piping has been tested and before insulation is installed.
- C. Install electric heating cables according to IEEE Standard 515.1 (Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications).
- D. Install insulation over piping with electric heating cables according to Specification Section 220700 (Plumbing Insulation).
- E. Install warning tape on piping insulation where piping is equipped with electric heating cables.
- F. Set all field adjustable switches and circuit breaker trip ranges.
- G. Ground equipment according to the requirements listed in Division 26.
- H. Connect wiring according to the requirements listed in Division 26.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Perform tests after cable installation but before application of coverings such as insulation, wall, or ceiling construction, or concrete.
 - 2. Test cables for electrical continuity and insulation integrity before energizing.
 - 3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- B. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe mounted cables.
- C. Cables will be considered defective if they do not pass the listed tests and inspections.
- D. Prepare and submit test and inspection reports.
- E. Remove and replace damaged heat tracing cables.

END OF SECTION

SECTION 230900 – TEMPERATURE CONTROLS

PART 1 - GENERAL

1.1 CONDITIONS OF THE CONTRACT

- A. Sections 230000 (Heating, Ventilating, and Air Conditioning) and 230500 (Basic Materials and Methods for HVAC) are hereby made a part of this section.

PART 2 - SCOPE OF WORK

2.1 GENERAL

- A. The control system shall provide direct digital control with a Windows-based user interface. Third party viewing software is not acceptable. The manufacturer and/or his authorized representative shall be responsible for all work under this section of the specifications. Only pre-approved manufacturers and contractors will be allowed and shall be as follows (no substitutions):

<u>Manufacturers</u>	<u>Northern Nevada Contractors</u>	<u>Telephone</u>
Alerton Controls	Building Control Services	(775) 826-8998

- B. Furnish and install microprocessor-based energy management and control system (EMCS) as an extension to the existing Washoe County School District (WCSD) Alerton EMCS system.
- C. Update the existing Alerton Compass software (most current edition) on existing servers and client computers at the WCSD Plant Facilities office and central data center. When third party software is necessary to allow for control system programming and/or editing of graphic displays that software (most current edition) shall also be provided to the WCSD.
- D. There shall be no annual maintenance or licensing fees of any kind required to be paid by the Owner at any time during the ongoing use of the installed system and software. Licenses shall be issued and authorized as directed by the WCSD.
- E. The Alerton Controls system shall be configured with multiple Ethernet connections to allow for remote network access and for direct connection of multiple computers via local area network. The Alerton Controls system shall utilize 'Compass' web-based graphic interface software (most current version). Communication with large equipment controllers shall be via BACnet IP Ethernet backbone at 100.0 Mbps minimum speed. Controllers for each central plant and/or air handling unit shall be Alerton ACM series. All large equipment controllers shall be furnished with integral hand-off-auto switches. Communication between equipment controllers and application specific controllers shall be via BACnet MS/TP network at 76.8k minimum speed. All Alerton Controls system points and trend logs shall be available as native BACnet objects and BACnet trend logs at the BACnet IP Ethernet backbone).

2.2 SPARE CONTROLLER CAPACITY

- A. All controllers (except application-specific controllers for VAV terminal units) shall be furnished with a minimum of 10 percent spare capacity to allow for addition of both analog and digital inputs and outputs.

2.3 SUBMITTALS AND AS-BUILT DOCUMENTATION

- A. The submittals shall include complete written control sequences for each item of equipment requiring control. The sequences shall include all setpoints, dead-bands, etc. required for successful operation of the specified equipment. The submitted sequences shall include all necessary sequencing details, whether or not those details are furnished as part of the Mechanical Engineer's written control sequences (such details are commonly excluded from the Mechanical Engineer's written control sequences) and all work associated with developing and incorporating those details shall be provided by the Temperature Control Contractor at no additional cost to the Owner. The written control sequences, initial setpoints, dead-bands, and the graphic displays shall all be reviewed and confirmed with the Washoe County School District prior to preparing and forwarding the finalized submittals.
- B. The Temperature Control Contractor shall prepare and submit a complete listing of BACnet points that are to be set up as trended and stored historical data. The list shall be broken down to include each system and/or item of equipment and shall be reviewed with the Washoe County School District for approval prior to setting up the trending in the temperature control system. The BACnet trend log names shall also be provided for approval.
- C. After all temperature control sequences have been finalized and have been approved by the Washoe County School District and the Engineer (and after the HVAC systems commissioning process has been completed) the Contractor shall provide as-built documentation which shall include both an electronic copy of the finalized programming and hard copy of the finalized programming (programming flow charts or line code as may be applicable) and written control sequences.

2.4 TRAINING

- A. Upon completion of the commissioning process, the Temperature Control Contractor shall instruct the Owner's designated personnel on the operation of all control system software features, shall provide a complete explanation of the control sequence for each item of equipment, and shall provide instructions on the operation and maintenance of all control devices. Training time shall be a minimum of twelve total hours (consisting of three separate 4 hour sessions). Both on site and in Classroom front end training.

2.5 WARRANTY PERIOD SERVICES

- A. The Contractor shall provide full service for the temperature control system for a period of one year after the date of substantial completion. Service shall include, as a minimum, calibration of all sensors and other control devices, adjustments to setpoints, and modifications to control sequences or programming as required/desired to fine-tune and/or finalize all control sequences.
- B. The Contractor shall provide a scheduled monitoring and reporting service for the duration of the one year warranty period. Monitoring shall be conducted via the remote control system interface (via modem or network connection) and the associated report shall be issued via email the same day that the monitoring is conducted. Monitoring shall be conducted on a weekly basis, preferably on either Monday or Tuesday. Reports shall include a specific listing of all alarms, all equipment failures, any noted operational problems or irregularities, and as set of screen prints.

2.6 SOFTWARE AND PROGRAMMING REQUIREMENTS

- A. Provide a security/password system with two passwords (username and password) of up to four characters each. The security/password system shall allow access based on security as follows:
 - Level 1 Viewing only
 - Level 2 Room temperature and occupancy schedule adjustment
 - Level 3 Adjustment of all setpoints
 - Level 4 Full access to all setpoints and programming

- B. The Temperature Control Contractor shall program the Washoe County School District Holidays into the EMCS software for the five years following the date of the installation.
- C. Equipment Schedules – Schedules will be coordinated with Washoe County School District facilities department for either a separate or combined occupied/unoccupied schedule shall be provided for each air handling unit, fan coil unit, exhaust fan, and/or other individual air handling system as desired.

2.7 GRAPHIC DISPLAYS

- A. All temperature setpoints and all other setpoints identified as adjustable in the written control sequence shall be adjustable from the appropriate graphic display(s). Setpoints listed in the contract documents are for initial set-up and trial of system operations. Control system shop drawings shall utilize the same (or similar) written sequences with all setpoints, throttling ranges, and differentials identified. As-built drawings shall include this same information with final setpoints resulting from startup, testing, and adjustment.
- B. Monitored points and alarms for each system shall be shown on the displays with full color graphics and real-time data as listed below. Where indicated, graphic displays shall be dynamic (animated). All graphic displays shall be submitted to the Washoe County School District for review and modification.
- C. All temperatures shall be displayed with zero decimal places.
- D. All valve and damper positions shall be displayed as percent open and shall be displayed with zero decimal places.
- E. All setpoints which are identified as “adjustable” in the written control sequences shall be adjustable via the associated graphic displays (including deadband between room setpoints).
- F. All occupied mode and unoccupied mode room temperature setpoints shall have an adjustable deadband (adjustable from the associated graphic display).
- G. All displays specified to be dynamic shall depict motion (as a minimum, dynamic displays shall include chiller compressors, boiler burners, rotating fan wheels, and rotating pump impellers).
- H. All setpoints adjustable from the graphic displays shall be programmed with the deadband on one side of the setpoint (not split evenly across the setpoint) unless otherwise specified.
- I. All outputs shall be programmed with the capability to override the controlled commands/positions via the associated graphic display (this requirement applies to all equipment, valves, dampers, fans, pumps, etc.).
- J. Alarm data fields shall be displayed with a red text when an alarm condition exists.
- K. A set of zone temperature summary screens shall indicate the current room temperature setpoint and current room temperature for each zone. A separate global setpoint and deadband shall be assigned to all zones associated with each air handling unit. The zone summary screens shall also include additional information for each zone such as the remote setpoint and deadband, discharge air temperature, valve position, fan command, fan status, deadband setpoint(s), etc. Summary screen format, function, and required display data shall be coordinated with the Washoe County School District prior to developing the graphic displays.
- L. Each zone shall be capable of being set to any of three setpoints (depending on which setpoint is selected). The three available setpoints shall be the global setpoint (a single setpoint for all associated zones), the remote setpoint (a separate individually adjustable setpoint for each zone), and the local setpoint (adjustable at the room sensor by utilizing a slide or dial type control on the room sensor). The local setpoint adjustment range shall be programmed to allow adjustment only between a fixed temperature range (typically between 73°F and 75°F - range to be confirmed with the Washoe County School District prior to programming).

- M. The current total cfm of all vav boxes associated with each vav air handling unit shall be calculated and displayed on the appropriate air handling unit screen.
- N. Each variable frequency drive shall be programmed to display command, status (via current sensor), input speed, output speed, and alarm/failure status (via alarm contacts at each vfd).
- O. Floor Plan(s) - Provide a display showing the building floor plan(s) with all space temperature sensors including identification of the associated terminal unit or fan coil unit number. Specifically identify each thermal zone on the associated floor plan (AutoCAD file with thermal zone borders can be obtained from the mechanical engineer at no cost to the Contractor).
- P. The current room temperature status shall be indicated utilizing custom Omni Graphics thermal geometry outline area served with dynamic color and opacity based on zone temperature.
- Q. The finalized sequence of operation shall be inserted into the graphics for viewing as a pdf file.

2.8 SPECIALTY CONTROL DEVICES AND REQUIREMENTS

- A. Outdoor temperature sensor (dry bulb only) shall be Mamac Systems Model TE-213-F with solar radiation and precipitation shield, Dwyer Model TE-RND with solar radiation and precipitation shield, or approved equal.
- B. Current sensors for fan and pump motors less than one horsepower shall be split core digital output type and shall have an adjustable setpoint capability.
- C. Duct temperature sensor probes shall have a minimum length of 6 inches and shall be selected with longer lengths when required to ensure accurate temperature readings and to avoid dead air spaces.
- D. Averaging sensors and freeze sensors shall be a minimum length of 20 feet. Longer lengths and/or multiple sensors shall be provided as required to ensure adequate coverage of the entire surface of each coil. Sensor capillary shall be installed in a serpentine arrangement with coverage extending to within 6" of each coil perimeter edge (both top and side edges) and shall be installed such that there is no more than 12" between horizontal passes. Averaging sensors shall provide for averaging of the entire length of the capillary element rather than an average of individual sensing locations.
- E. Carbon Dioxide (CO₂) sensors for indoor applications shall be Vaisala Model GMW21 or approved equal (for wall mount applications). There shall be no display
- F. Carbon Dioxide (CO₂) sensors for outdoor applications shall be Vaisala Model GMP343 or approved equal (for wall mount applications). There shall be no display
- G. Chiller room exhaust fan differential pressure switches (when required at the emergency exhaust fan) shall be Dwyer Instruments Model 1640-0 with Kele Model SSS-1003 duct sensing probes. or approved equal.
- H. Differential pressure sensors for dry applications shall be Veris Industries Model PX, Dwyer Model MS2-W102-LCD, or approved equal. Differential pressure sensors for wet applications shall be Veris Industries Model PW2 or approved equal (for wall mount applications). Verify desired/required sensing range prior to submitting and/or ordering. Sensor tubing connections shall be fitted with brass test tees for use by the test and balance contractor for verification/calibration.

- I. Building static pressure sensor shall have a control range of $\pm .10$ " w.c. Sensor shall be Mamac Model PR-275-R2, Dwyer Model MS2-W101-LCD, Veris Industries Model PX-01-F (fast response), or Setra Model 264-0R1WB or approved equal, and shall be furnished with indoor and outdoor reference probes.

Outdoor static pressure reference probe shall be constructed of anodized aluminum and shall be capable of sensing static pressure to within 2% accuracy when subject to radial wind velocities of up to 80 mph with an approach angle of up to 30 degrees from horizontal ('Static Outside Air Probe' as manufactured by Air Monitor Corporation, or approved equal

Indoor static pressure reference probe(s) shall be suitable for flush mounting, shall be constructed of 10 gauge brushed aluminum, and shall be capable of sensing static pressure to within 1% accuracy when subject to air velocities of up to 1,000 fpm ('Shielded Static Air Probe No. 3' as manufactured by Air Monitor Corporation). Provide a surge dampener for each indoor static pressure probe/sensor (Schneider Electric Model 21-153 or Kele & Associates Model SD-01) or approved equal Interconnecting copper tubing between sensor and indoor/outdoor probes shall be 3/8" diameter.

- J. Refrigerant leak monitor shall be MSA Model LE or approved equal photo-acoustic infrared sensor with single point sensing capability, dual alarm outputs, and the capability to transmit current refrigerant concentration (utilizing a 0 to 10 volt signal) for remote monitoring via the direct digital control system. Provide sensor suitable for sensing refrigerant R-134A (or as required for the specified chiller). Provide two remote sensing probes with end-of-line filters and interconnecting tubing as required to locate the probes as indicated on the drawings (or as field-directed by the mechanical engineer). Interconnecting tubing shall be installed such that the branch tubing to each sensor is the same length. Probes shall be mounted at approximately 6" above finished floor at or near each chiller. Sensor shall be factory calibrated to alarm at 1,000 ppm. The refrigerant leak monitor shall be furnished with a calibration/test kit (MSA Model 50G) and with the appropriate test gas cylinders as required for calibration, testing, and commissioning of the leak monitor. The sensor shall also be furnished with two spare end-of-line filters for future use by the Owner. Locate two alarm horn/strobes at each chiller room exit (one inside and one outside of each exit door). Install each horn/strobe at approximately 7'-6" above finished floor. Remote audible/visible alarm horn/strobes shall be suitable for either indoor or outdoor installation (Amseco Model CSHB-BG with blue light lens, or approved equal by Kele & Associates).
- K. Air filter differential pressure sensors shall be Dwyer Model MS2-W102-LCD, or approved equal.
- L. Audible/visible alarm horn/strobe for seismic gas valves shall be Amseco Model CSHB-BG with blue light lens, or approved equal by Kele & Associates. The alarm horn/strobe shall be located on the building exterior adjacent to the seismic gas valve (mounted at 7'-6" above finished grade).
- M. Water flow meters for chilled water and heating water systems shall be electromagnetic type (Onicon Model F-3100, Rosemount Model 8700, or approved equal). Turbine type flow meters will not be acceptable.
- N. Water flow meters for chilled water and heating water system make-up water shall be ultrasonic type (Belimo Model FM075, Onicon Model F-4600, or approved equal). Turbine type flow meters will not be acceptable.

2.9 MISCELLANEOUS REQUIREMENTS

- A. All control devices shall be installed in reasonably accessible locations. Control devices that may require occasional calibration or adjustment shall be given special consideration with regard to being installed in a reasonably accessible location.
- B. Room temperature sensors shall be programmable Alerton Microtouch type and shall be provided with an override pushbutton and setpoint lever Adjust with ability to be limited or locked out via operator workstation.

- C. Room temperature sensors shall be labeled with the corresponding terminal unit or fan coil unit number. Labels shall be self-adhesive with black lettering (1/8" height lettering).
- D. Room temperature sensors in laboratory areas shall be sealed at the wall penetration behind the sensor to prevent air migration into the sensor from adjacent areas (due to the negative pressure of labs as compared to adjoining spaces).
- E. Room temperature sensors in public and hallway areas shall be blank plate stainless steel tamper resistant type.
- F. Control Valves and Dampers
 - 1. Control valves shall be Belimo automatic control valves with electronic actuators.
 - 2. All large equipment air handlers, Chillers Boilers etc. valve and damper actuators shall be analog type. Incremental actuators will not be acceptable.
 - 3. Refer to control drawings for required type.
- G. Relays
 - 1. Relays shall be plug-in type complete with sockets for panel mounting. Poles shall be required and contact rated for intended use.
- H. VAV Damper and Valve Actuators
 - 1. Actuator shall be modulating, or floating "tri-state" type with permanently lubricated gear train sealed in duct tight enclosure. Actuator shall be sized to handle intended load plus 10% (refer to control drawings for required type).
- I. Control Damper
 - 1. Control dampers are to be provided and installed by the Mechanical Contractor.
- J. An as-built control diagram shall be laminated and secured inside of each temperature control panel prior to commencement of the final on-site mechanical systems commissioning sessions.
- K. All low voltage wiring (whether plenum rated or not) shall be installed in raceways with the following conditions, clarifications, and exceptions.
 - 1. Raceways shall be as defined in the National Electrical Code and open cable trays shall not be construed as meeting the definition of a raceway.
 - 2. Low voltage wiring for temperature controls and energy management systems may be routed utilizing open cable trays above accessible ceilings. Low voltage wiring for temperature controls and energy management systems may also be installed utilizing appropriately spaced and neatly routed j-supports above accessible ceilings. Low voltage wiring routed in walls or at roof penetrations shall be installed in conduit.
 - 3. Where open cable trays are utilized above accessible ceilings the following conditions apply.
 - a. Low voltage wiring routed in open cable trays shall be plenum-rated (whether or not the ceiling space is utilized as a return air plenum).
 - b. Low voltage wiring concealed in walls, floors, and above inaccessible ceilings shall be routed in raceways.
 - c. Low voltage wiring routed between conduit stubs and cable trays shall be secured with appropriately spaced j-supports.
- L. Gas Monitors
 - 1. Gas monitor for CO² and combustibles shall be standalone type utilizing an electrochemical cell (for toxic gas monitoring) or a catalytic combustion cell (for explosive gas monitoring.) Gas monitor shall have an analog output for input to EMCS system. Gas monitor shall also have 2 alarm relays. Monitor shall be Honeywell Analytics Model E3SM with appropriate Sensor Cartridge for all gases except CO².

2.10 INSTRUCTION

- A. Furnish operation and maintenance manuals covering functions and operation of control system for use by Owner's operating personnel. A field instruction period lasting not less than one 4-hour session shall be provided followed by one 4 hour class room training session approximately 30 days later.
- B. Provide control diagrams, reduced as required, diagrams shall show equipment, controls, etc. marked to correspond to identification on equipment.
- C. Control Contractor shall maintain terminal and printer in his office to communicate with jobsite and for system troubleshooting, fine tuning system set points and assistance to owner on-site personnel.
- D. Provide vandal proof type sensors or covers on all devices exposed to public.

2.11 LARGE EQUIPMENT AND GLOBAL CONTROLLER - ASCENT CONTROL MODULE (ACM)

A. General Requirements

1. BACnet Conformance

- a. Building Controller shall be approved by the BTL as meeting the BACnet Building Controller requirements.
 - b. Refer to Section 22.2 (BACnet Functional Groups) in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
- 2. Building controller shall be of scalable design such that the number of trunks and protocols may be selected to fit the specific requirements of a given project.
 - 3. The controller shall be capable of panel-mounted on DIN rail and/or mounting screws.
 - 4. The controller shall be capable of providing global control strategies for the system based on information from any objects in the system, regardless if the object is directly monitored by the building controller module or by another controller.
 - 5. The controller shall be capable of running up to six independent control strategies simultaneously. The modification of one control strategy does not interrupt the function or runtime others.
 - 6. The software program implementing the DDC strategies shall be completely flexible and user definable. All software tools necessary for programming shall be provided as part of project software. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on site, using a WAN or downloaded through remote communications are not acceptable. Changing global strategies using firm ware changes is also unacceptable.
 - 7. Programming shall be object-oriented using control function blocks, and support DDC functions.
 - 8. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.
 - 9. Programming tool shall provide means to graphically view inputs and outputs to each program block in real time as the program is executing. This function may be performed using the operator's workstation or field computer.
 - 10. Controller shall have 6000 Analog Values and 6000 Binary Values
 - 11. Controller IP configuration can be done via a direct USB connect with an operator's workstation or field computer.
 - 12. Controller shall have at a minimum a Quad Core 996 GHz processor to ensure fast processing speeds.

13. Global control algorithms and automated control functions shall execute using a 64-bit processor.
14. Controller shall have a minimum of 1 GB of DDR3 SDRAM on a 533 MHz bus to ensure high speed data recording, large data storage capacity and reliability.
15. Controller shall support two on-board EIA-485 ports capable of supporting various EIA-485 protocols including but not limited to BACnet MS/TP and Modbus.
 - a. Ports are capable of supporting various EIA-485 protocols including but not limited to BACnet MS/TP and Modbus.
16. Controller shall support two gigabit speed Ethernet (10/100/1000) ports.
 - a. Ports are capable of supporting various Ethernet protocols including but not limited to BACnet IP, FOX, and Modbus.
17. All ports shall be capable of having protocol(s) assigned to utilize the port's physical connection
18. The controller shall have at a minimum four on board inputs, two universal inputs and two binary inputs.
19. Schedules
 - a. Building controller modules shall provide normal seven-day scheduling, holiday scheduling and event scheduling.
 - b. Each building controller shall support a minimum of 380 BACnet Schedule Objects and 380 BACnet Calendar Objects.
20. Logging Capabilities
 - a. Each building controller shall log a minimum 2000 objects at 15 minute intervals. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
 - b. Logs may be viewed both on-site and off-site using WAN or remote communication.
 - c. Building controller shall periodically upload trended data to networked operator's workstation for long-term archiving if desired.
 - d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
21. Alarm Generation
 - a. Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
 - b. Each alarm may be dialed out as noted elsewhere.
 - c. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.
 - d. Controller must be able to handle up to 2000 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.
22. BACnet MS/TP
 - a. BACnet MS/TP LAN must be software-configurable from 9.6 to 115.4 Kbps
 - b. Each BACnet MS/TP LAN shall support 64 BACnet devices at a minimum
 - c. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
23. BACnet IP
 - a. The building controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internet work, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN.

- b. Must support interoperability on WANs and CANs and function as a BACnet Broadcast Management Device (BBMD).
- c. Each controller shall support at a minimum 128 BBMD entries.
- d. BBMD management architecture shall support 3000 subnets at a minimum.
- e. Shall support BACnet Network Address Translation.
- f. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

24. Expansion port

- a. Controller shall support two expansion ports.
- b. Combining the two on-board EIA-458 ports with fully loaded expansion ports the controller shall support 6 EIA-485 trunks simultaneously.

2.12 APPLICATION SPECIFIC CONTROLLERS (VLC)

A. General Requirements

- 1. Each controller shall be microprocessor based and communicate with its respective GC and also be stand-alone maintaining its own control strategy in the event of communication failure with the GC or remote computer terminals. Each controller shall contain RAM and ROM and be capable of controlling heat pumps, boilers, cooling towers, pumps, etc. as specified in sequence of operation. Inputs shall be either analog or digital. Momentary type switch closure allows an input to be both analog and digital. Outputs shall be analog or digital with LED's provided to indicate status. Each controller is linked serially by a pair of wires and communicates to its respective GC at 4800 baud. Controllers default to last programmed temperature or to fixed operator selectable control whenever communication to GC is lost. Default mode shall be field changeable. All operating modes (except default) and set points shall be modified at the computer terminals. Each unit shall allow complete calibration of all temperatures.
- 2. System shall be capable of accomplishing any controller-to-controller command in a maximum of 1 second.

END OF SECTION

SECTION 230910 – SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 CONDITIONS OF THE CONTRACT

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and Section 230000 (Heating, Ventilating, and Air-Conditioning) are hereby made a part of this Section.
- B. For convenience or reference the Specifications are separated into Divisions and Sections. Such separations shall not operate to make the Engineer an arbitrator to establish subcontract limits between the Prime Contractor and his Subcontractors. In any case, the Prime Contractor is responsible to the Owner for a complete project

1.2 SEQUENCE OF OPERATION

HEAT PUMP LOOP

Occupied Mode

1. The lead heat pump water pump (P-1/P-2) VFD shall start and run continuously
2. Whenever lead pump (P-1/P-2) or jockey pump (P-3) fails, the backup pump shall run.
3. If the lead pump's VFD is running at minimum speed and the differential pressure is greater than setpoint, jockey pump (P-3) shall be enabled and the lead pump shall be disabled. The lead pump shall be re-enabled when P-3 VFD is running at 100% and the differential pressure is below setpoint.
4. If jockey pump P-3 VFD is running at minimum speed and the differential pressure is still greater than setpoint, open CWV on HP-1 and HP-45 to maintain minimum loop flow.
5. An alarm shall be sent through EMS to operator's terminal if any pump is commanded on and does not see status.
6. Alarm shall be sent through EMS to the operator's terminal if the heat pump loop water supply temperature is less than 40°F (adj.) or above 105°F (adj.).

Unoccupied Mode

1. Jockey condenser water pump (P-3) VFD shall start whenever any heat pump enables heating or cooling through DDC.
2. Whenever P-3 fails the lead pump (P-1/P-2) shall run and an alarm shall be sent through EMS to operator's terminal.

COOLING TOWER (HYBRID LOOP)

General

1. The cooling tower is connected in series with the ground loop and shall be operated accordingly.
2. The 6" bypass with a manual isolation valve is intended for use should there ever be a need to allow excess flow from the building heat pump loop to bypass the well field piping system.

Status

1. Building status shall be determined as follows:
 - a. If the heat pump loop water temperature leaving building is warmer than heat pump loop water temperature entering building, building shall be in Cooling Mode.
 - b. If the heat pump loop water temperature leaving building is cooler than heat pump loop water temperature entering building, building shall be in Heating Mode.
2. Cooling tower CT-1 and condenser water pumps P-4/P-5 shall only be enabled when the building is in Cooling Mode.

Occupied Mode

1. Normal three-way valve position is such that heat pump water does not flow through the cooling tower heat exchanger, only through the ground loop.
2. If the heat pump loop water temperature entering the building is greater than or equal to 85°F (adjustable), and the building is in Cooling Mode, the three-way valve shall position such that the heat pump loop water flows first through the tower heat exchanger and then through the ground loop. Cooling tower CT-1 and cooling tower pumps (P-4/P-5) shall be enabled.
3. If the heat pump loop water temperature entering the building is greater than or equal to 87°F (adjustable), and the building is in Cooling Mode, the three-way valve shall position such that the heat pump loop water flows first through the tower heat exchanger and then through the ground loop. The cooling tower pumps (P-4/P-5) shall run.
4. If the heat pump loop water temperature entering the building is greater than or equal to 90°F (adjustable) and the building is in Cooling Mode, the three-way valve shall position such that the heat pump loop water flows first through the cooling tower heat exchanger and then through the ground loop. The cooling tower pumps (P-4/P-5) shall run, and the cooling tower CT-1 fan(s) shall start staging on. The fan(s) shall start together at the minimum speed (adjustable) and shall ramp up together equally (if applicable).
 - a. If the heat pump loop water temperature entering the building is 90°F (adjustable) the cooling tower CT-1 fans shall operate at 10% (adjustable) speed.
 - b. If the heat pump loop water temperature entering the building is 95°F (adjustable) the cooling tower CT-1 fans shall operate at 100% (adjustable) speed.
 - c. The cooling tower CT-1 fans shall modulate between 10% (adjustable) speed and 100% (adjustable) speed to maintain the heat pump loop water temperature entering the building between 90°F (adjustable) and 95°F (adjustable).
 - d. If the heat pump loop water temperature entering the building exceeds 105°F (adjustable), an alarm shall be sent through the EMS to the operator's terminal.
5. Occupied mode operation of the hybrid loop shall continue after the building schedule reverts to unoccupied mode and shall not end until the heat pump loop water temperature entering the building falls below 85°F (adjustable), regardless of occupied mode scheduled end.

Unoccupied Mode:

1. If during unoccupied mode, the building is in Cooling Mode, and the outdoor wet bulb temperature is more than 25°F (adjustable) below the heat pump loop water temperature leaving the building, the three-way valve shall position such that the heat pump loop water flows first through the cooling tower heat exchanger and then through the ground loop. Cooling tower CT-1 and the cooling tower pumps (P-4/P-5) shall be enabled. The cooling tower CT-1 fans shall not be allowed to run during building unoccupied mode.
2. If during unoccupied mode, the building is in Cooling Mode, and the outdoor wet bulb temperature is less than 10°F (adjustable) below the heat pump loop water temperature leaving the building, the three-way valve shall position such that the heat pump loop water does not flow through the tower heat exchanger and only through the ground loop. Cooling tower CT-1 and the cooling tower pumps (P-4/P-5) shall be disabled.
3. This sequence shall be capable of being restricted to run only between the hours of 4:00 AM (adjustable) and the building Occupied Mode time.
4. If during unoccupied mode, the heat pump loop water temperature leaving the building falls below 75°F (adjustable) the three-way valve shall position such that the heat pump loop water does not flow through the cooling tower heat exchanger and flows only through the ground loop. Cooling tower CT-1 and the cooling tower pumps (P-4/P-5) shall be disabled and a warning shall be sent through the EMS to the operator's terminal.

HEAT PUMPS

Occupied Mode

1. After heat pump loop flow has been proven, the heat pump fan shall be enabled and the zone controls function to provide set point heating.
2. After heat pump loop flow has been proven, the heat pump fan shall be enabled and the zone controls function to provide set point cooling.

Unoccupied Mode

1. Room temperature sensor T, through DDC controller HPC, reverts to night low limit setpoint. See table for setpoints.
2. Room temperature sensor T, through DDC controller HPC and CPC, starts the heat pump loop circulating pumps.
3. After heat pump loop flow has been proven, the heat pump cycles on to maintain the room temperature night low limit setpoint.
4. The outside air dampers remain closed during unoccupied mode.
5. The zone heat pump automatic control valve shall open through the DDC controller whenever heating or cooling is required. The compressor shall be enabled after the HPV is proven open at end switch.

Warm-Up Mode

1. Any room temperature sensor T of the coldest zone, in conjunction with OA temperature sensor TOA, starts heat pump loop circulating pump P-1/P-2 utilizing optimized start program to reach occupied cycle room temperature setpoint at scheduled time of occupancy.
2. Zone heat pump automatic control valve shall open through DDC controller HPC whenever heating or cooling is required. Compressor shall be enabled after HPC is proven open at end switch.
3. After heat pump loop flow has been proven, the heat pump fan shall be enabled and the zone controls function to provide maximum heating.
4. The outside air dampers remain closed during warm-up mode.

Safety Control

1. The duct mounted smoke detector shall disable the fans and dampers whenever smoke is detected and an alarm condition shall be indicated.
2. If either mechanical mezzanine space temperature drops below 50°F (adjustable), the associated heat pump is enabled (HP-5 serves M201 and HP-18 serves A201). If either mechanical mezzanine space temperature drops below 45°F (adjustable) an alarm condition shall be indicated.

MAKE-UP AIR UNIT

Occupied Mode

Sequencing of the make-up air unit shall be accomplished by interfacing the direct digital control system with the makeup air unit manufacturer's controller (via BACnet interface). The fan shall be enabled to run continuously and the make-up air unit integral heating/cooling controls shall be staged/sequenced to maintain the room temperature setpoint (initially 75°F, with a 5°F deadband, cooling on at 75°F and heating on at 70°F).

The unit shall operate utilizing the integral factory controls for heating and cooling. The direct digital control system shall be interfaced with the unit to provide for scheduled on-off control, unoccupied mode on-off control, and transmission of the programmed heating and cooling setpoints. The indoor fan shall be programmed to allow for either continuous or intermittent operation as selected using the settings available on the associated graphic display.

Evaporative Cooler

The sump fill valve shall be open and the drain valve shall be closed whenever the outside air temperature is above setpoint (initially 60°F, adjustable with a 25°F deadband, sump drained at 35°F).

The sump fill valve shall be closed and the drain valve shall be open whenever the drain cycle is initiated (at 7:00 a.m. every Monday and Thursday during the summer calendar schedule). The drain cycle shall terminate 5 minutes after it is initiated. The drain cycle summer schedule calendar shall be set initially from May 1 thru October 30.

Unoccupied Heating Mode

The fan shall be enabled and the rooftop unit integral heating controls shall be staged/sequenced to maintain the room temperature setpoint (initially 55°F, with a 5°F deadband, heating on at 55°F and heating off at 60°F). Both setpoint and deadband shall be adjustable.

Override Mode

Whenever the room sensor override button is pressed during the unoccupied time period the unit shall be enabled and controlled in the normal occupied mode for a period of 2 hours (adjustable).

DESTRATIFICATION FANS

Each destratification fan shall be programmed for control of occupied time, fan speed via the required BACnet interface. The associated graphic display for each fan shall include a minimum of 6 data points (specific objects to be determined during the submittal review process).

EXHAUST FANS

EF-1 thru EF-17	Enabled during scheduled occupied hours.
KEF-1	Manually enabled via local toggle switch (switch to be installed and wired by the temperature control contractor).

RELIEF FANS

Each relief fan is equipped with an EC motor and shall be programmed to operate at a fixed speed that is tested and set to maintain a reasonable positive pressure in the associated space. The fan speed required shall be determined by the test and balance contractor)the

ELECTRIC WALL HEATERS

The integral thermostat for each electric wall heater shall be set initially at 50°F.

DOMESTIC HOT WATER RE-CIRCULATING PUMPS

The re-circulating pump shall be enabled in accordance with the associated occupancy schedule and when the domestic hot water return temperature falls below setpoint (enabled at 90°F, with a 10°F deadband, disabled at 100°F). Both the enable setpoint and the disable setpoint shall be adjustable. An alarm condition shall be indicated whenever the pump fails (as determined by current sensor). Pumps shall be programmed for a maximum on time of 30 minutes and for a minimum off time of 10 minutes.

SEISMIC GAS VALVE

An alarm condition shall be indicated via the direct digital control system whenever the seismic gas valve indicates an alarm condition. This is in addition to the local audible/visible alarm.

ELEVATOR SUMP PUMP

An alarm condition shall be indicated via the direct digital control system whenever the water level in the elevator sump reaches the high alarm level. This is in addition to the local audible/visible alarm.

VARIABLE FREQUENCY DRIVES

The minimum speed on each variable frequency drive shall be set at 20% (12 hertz). The upward and downward ramp times on each variable frequency drive shall be set at 60 seconds.

END OF SECTION

SECTION 232135 –UNINSULATED UNDERGROUND PIPING

PART 1 - GENERAL

1.1 CONDITIONS OF THE CONTRACT

- A. Sections 230000 (Heating, Ventilating, and Air Conditioning) and 230500 (Basic Materials and Methods for HVAC) are hereby made a part of this section.

1.2 WORK INCLUDED

- A. Buried piping with or without thermal pipe insulation as indicated on the drawings and herein.
- B. Miscellaneous incidental labor and materials required to complete the installation of field applied exterior insulation on the entire piping system.

1.3 QUALITY ASSURANCE

- A. Piping and insulation manufacturers must be firms regularly engaged in the manufacture of the specified piping and insulation products of size and type required, and whose product has been in satisfactory use in similar service for not less than 10 years.
- B. The installing Contractor must have at least 3 years of successful installation experience on projects with underground piping systems.
- C. Provide the services of a manufacturer-trained representative for two site visits. The first shall include pre-installation training and installation training immediately prior to beginning initial pipe burial. The second visit shall be to observe the installed piping system prior to burial and during pressure testing. Provide a written report to the Owner and Engineer identifying the results of each site visit, observations made, and a summary of the training provided.

1.4 MANUFACTURER'S WARRANTY

- A. The piping system manufacturer shall warrant all pipe and fittings for 30 years to be free of defects in materials and workmanship. Insurance shall be provided by a third party world-wide insurance company. The piping system warranty shall cover labor and material costs for repairing and/or replacing defective materials. Such costs shall include costs for repairing incidental damage, and financial losses due to the expense of repair or removal of damage or personal injury caused by failure of the piping system due to defects in materials or workmanship.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver insulation, associated adhesives, form work, and supplementary steel to the project site in manufacturer's containers with manufacturer's stamp or label clearly shown.
- B. Protect piping, insulation, packaging, and associated components against sun, dirt, water, and chemical damage.

PART 2 - PRODUCTS

2.1 POLYPROPYLENE PIPING BELOW GRADE

- A. Subject to compliance with requirements, manufacturers offering piping products which may be incorporated in the work include the following, or approved equal:
 - Aquatechnik
 - Aquatherm
 - Niron

- B. Provide pipe and fittings based on the following listing as applicable to the associated system temperature and pressure ratings indicated on the drawings. The ratings listed below are based on a 50 year lifetime and a 1.25 safety factor.
PP-RCT SDR-11 Cooling Tower Water Applications: Rated For 283 psi at 60°F
- C. Field service shall be provided by a certified manufacturer's representative or company field service technician. The representative/technician shall be available at the job a minimum of two days (or more if appropriate for the job size) to check unloading, storing, and handling of piping, piping installation, pressure testing, field joint installation, and backfilling techniques.
- D. Polypropylene Pipe and Fittings
1. Piping shall be manufactured from a polypropylene random co-polymer, PP-RCT resin meeting the short term properties and long term strength and pressure requirements of ASTM F2389. The piping shall contain no rework or recycled materials and shall be manufactured only from virgin resins. All piping shall be made using a three layer extrusion process.
 2. Domestic cold water piping shall comply with the requirements of ASTM F2389.
 3. All fittings and components shall have a pressure rating equal to or greater than the operating pressure of the overall system that they are connected to.
 4. All fittings through 10" diameter shall be injection molded, unless otherwise approved in writing as a 'custom fitting' and shall be manufactured from a high quality polypropylene random co-polymer, PP-R Super 80 SDR5 resin meeting the short term properties and long term strength requirements of ASTM F2389. The fittings shall contain no rework or recycled materials and shall be manufactured only from virgin resins. All fittings shall be certified as complying with ASTM F2389.
 5. Fittings larger than 10" diameter shall be fabricated using the same piping material furnished for the piping application and complying with ASTM F2389.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. The drawings, schematics, details, and diagrams indicate the general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to the layout are noted and approved on the Contractor's shop drawings.
- B. Installers shall be trained and certified to install the piping per the manufacturer's guidelines.
- C. Remove standing water in the bottom of trench.
- D. Do not backfill piping trench until field quality control testing has been completed and the results have been approved.
- E. Pipe trench shall have a minimum of 6" of sand or pea gravel placed above, below, and on both sides of the pre-insulated piping.
- F. Install piping at uniform grade of 0.2 percent. Install drains (consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple with cap) at all low points and elsewhere as required for complete system drainage. Install manual air vents at all high points.
- G. All components shall have a pressure rating equal to or greater than the system operating pressure.
- H. Install polypropylene piping free of sags and/or bends.
- I. Thrust blocks are not required for polypropylene piping.
- J. Expansion loops are not required for direct buried underground polypropylene piping.

3.2 FIELD QUALITY CONTROL

- A. While still accessible all piping shall be pressure and leak tested to the manufacturer's standards. Tests shall be carried out using water, compressed air, or a mixture of the two. The test pressure shall be as indicated in the pressure and leak testing procedures published by the manufacturer. Any leaks detected shall be repaired at the Contractor's expense by removing the leaking part and replacing with new parts welded per the pipe manufacturer's guidelines. See manufacturer's literature for additional details and forms.
- B. Prepare test and inspection reports and deliver the reports to the Architect/Engineer, the Owner, and the Manufacturer as required to obtain the product warranty. Provide warranty documents to the Owner.

3.3 CLEANING UP

- A. Upon completion of the Work remove materials, equipment, apparatus, tools, and the like, and leave the premises clean, neat, and orderly.

END OF SECTION

SECTION 232300 - HEAT TRACING FOR HVAC PIPING

PART 1 - GENERAL

1.1 CONDITIONS OF THE CONTRACT

- A. Sections 230000 (Heating, Ventilating, and Air Conditioning) and 230500 (Basic Materials and Methods for HVAC) are hereby made a part of this section.

1.2 SUMMARY

- A. Types of heat tracing specified in this section include the following:
Self-regulating, parallel resistance heat tracing

1.3 SUBMITTALS

- A. Product data for each type of product.
- B. Shop drawings for electric heating cable.
- C. Field quality control reports.
- D. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL RESISTANCE HEATING CABLES

- A. Manufacturer shall be as follows, or approved equal:
nVent/Raychem
Chromolox
Thermon
- B. Comply with IEEE Standard 515.1 (Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications).
- C. Heating Element: Pair of parallel No. 16 AWG, nickel-coated, stranded copper bus wires embedded in cross-linked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory-assembled, non-heating leads with connectors at one end, and seal the opposite end water-tight. Cable shall be capable of crossing over itself once without overheating.
- D. Electrical Insulating Jacket: Flame-retardant polyolefin.
- E. Cable Cover: Tinned-copper braid and polyolefin outer jacket with ultraviolet inhibitor.
- F. Maximum Operating Temperature (Power On): 150°F.
- G. Maximum Exposure Temperature (Power Off): 185°F.
- H. Electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for the intended location and application.

2.2 CONTROLS

- A. Remote bulb unit with adjustable temperature range from 30°F to 50°F.
- B. Snap action; open on rise, single pole switch with minimum current rating adequate for the connected cable.
- C. Remote bulb on capillary, resistance temperature device, or thermistor for directly sensing pipe wall temperature.
- D. Provide corrosion resistant and water-proof control enclosure.

2.3 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat conductive putty, cable ties, silicone end seals and splice kits, and installation clips, all furnished by the manufacturer or as recommended in writing by the manufacturer.
- B. Warning Labels: Continuously printed 'Electrical Heat Tracing' vinyl labeling, 3 mil minimum thickness, with pressure sensitive, permanent, waterproof, self-adhesive back.
 - 1. Markers on pipes with outside diameter including Insulation of less than 6 Inches shall be $\frac{3}{4}$ inch minimum width.
 - 2. Markers on pipes with outside diameter including Insulation of 6 Inches and larger shall be 1-1/2 inch minimum width.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install electric heating cable across expansion joints according to manufacturer's written instructions; use slack cable to allow movement without damage to cable.
- B. Install electric heating cables after piping has been tested and before insulation is installed.
- C. Install electric heating cables according to IEEE Standard 515.1 (Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications).
- D. Install insulation over piping with electric heating cables according to Specification Section 230700 (HVAC Insulation)
- E. Install warning tape on piping insulation where piping is equipped with electric heating cables.
- F. Set all field-adjustable switches and circuit breaker trip ranges.
- G. Ground equipment according to the requirements listed in Division 26.
- H. Connect wiring according to the requirements listed in Division 26.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Perform tests after cable installation but before application of coverings such as insulation, wall, or ceiling construction, or concrete.
 - 2. Test cables for electrical continuity and insulation integrity before energizing.
 - 3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- B. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe mounted cables.
- C. Cables will be considered defective if they do not pass the listed tests and inspections.
- D. Prepare and submit test and inspection reports.
- E. Remove and replace damaged heat tracing cables.

END OF SECTION

SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable and wiring connectors and connections.
- B. Related Sections:
 - 1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.
 - 2. Section 31 20 00 - Trenching: Execution requirements for trenching required by this section.
 - 3. Section 31 20 00 - Fill: Requirements for backfill to be placed by this section.

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Underwriters Laboratories, Inc.:
 - 1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 12 AWG and smaller.
 - 2. Stranded conductors for feeders and branch circuits 10 AWG and larger.
 - 3. Stranded conductors for control circuits.
 - 4. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 5. Conductor not smaller than 16 AWG for control circuits.
 - 6. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. All Locations Unless Noted Otherwise: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.

1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper, aluminum conductors are not acceptable.

1.5 SUBMITTALS

- A. General Conditions: Requirements for submittals.

- B. Product Data: Submit for building wire.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Product Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 90 degrees C.
- E. Insulation Material: Thermoplastic.

2.2 ARMORED CABLE

- A. Type AC Cable may not be used on this project.

2.3 METAL CLAD CABLE

- A. Type MC Cable may not be used on this project and is strictly prohibited.

2.4 CONNECTORS AND SPLICES

- A. Provide UL-listed factory-fabricated wiring connectors of size, ampacity rating, material, type and class for application and for service indicated. Select connectors to comply with Project's installation requirements and as specified in Part 3 "Applications" of this Article.
- B. For Conductors #10 AWG and Smaller: Wire and cable connectors shall be solderless, twist on, 600 volts, 105°C., shall comply with UL 486A/C standards. Connectors coded for easy selection compatible with wiring to be spliced. Install connectors as recommended by manufacturer. Use proper crimping tool where crimp sleeves are used.
1. Acceptable Connector Manufacturers
 - a) 3M- "Scotchlock"
 - b) Buchanan - "B Cap"
 - c) Thomas & Betts - "Stak-On"
 - d) Ideal - "Wing Nuts"
- C. Compression Splices: Splice conductors #8 and larger with solid copper barrel, type fittings applied with an appropriate hydraulic tool. Splices used only where approved. Splice fittings: Burndy "Hydent". Insulate splices with 600 volt, 105°C, "heat shrink", "cold shrink" covers, or taped insulation consisting of rubber, friction and vinyl tapes applied per manufacturer for 600 volt, 105°C covering to 150 percent of installation rating of conductor.
1. Acceptable Splice and Tape Manufacturers
 - a) Burndy
 - b) Thomas & Betts
 - c) IlSCO
 - d) Anderson
 - e) Blackburn
 - f) Oz/Gedney
- D. Connectors and/or Terminations for Conductors #6 AWG and larger: Tin plated, 98% copper, dual crimp long barrel compression lugs with two bolt holes, insulated with molded covers to accommodate 1/2" bolts. Apply with hydraulic tool recommended by manufacturer.
1. Acceptable Manufacturers and Products
 - a) O-Z Gedney
 - b) Burndy Engineering Company "Hylugs"
 - c) Thomas and Betts, "Color Keyed"
 - d) Anderson
- E. Use pulling lubricant which will not be detrimental to insulation of conductors indicated by published user information.
1. Acceptable Manufacturers of Lubricant
 - a) Ideal Industries
 - b) Panduit Corp.
 - c) OZ/Gedney
 - d) Plymouth/Bishop
 - e) American Polywater Corp.
 - f) Thomas & Betts

- F. Insulate all live joints to 600 volts with strip rubber, friction tape, and electrical vinyl tape installed in accordance with manufacturers recommendations.
 - 1. Acceptable Tape Manufacturers
 - a) 3M
 - b) Plymouth

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.
- D. Install wiring complete with connections to equipment.
- E. Install wiring so conductors are not in tension in completed system.
- F. Form wiring neatly and group in circuit. Tie grouped conductors with nylon ties, T&B "Tyrap" or approved equivalent.
- G. Each conduit run shall be run complete end to end before conductors are installed.
- H. Use pulling lubricant to decrease pulling tension for all feeder cables, and all difficult cable pulls of any type or size. Pull all conductors into raceway at the same time.
- I. Provide cable supports, at locations required by NEC and/or as shown. Supports with malleable screwed conduit fitting and non-conductive wedges drilled for the size conductors installed. Provide supports rated for all types of insulation and all voltage. Cable supports shall be O.Z./Gedney type "R" or accepted equivalent. Furnish pullbox, sized per NEC for each cable support.
- J. Bond circuit ground wires where installed to all devices, equipment, outlet and junction boxes, and grounding bushings (where provided) with a full size conductor and lugged type connection.

- K. Securely fasten non-ferrous identifying tapes, pressure sensitive labels or engraved nameplates to all cables, feeders and power cables exposed in vaults, inside pull boxes, exposed in manholes, exposed in switchboard, termination compartments, etc
- L. Join and terminate copper conductors individually. Do not mix voltages in the same raceway.
- M. Provide lugs where not furnished as part of equipment - furnish as specified above, to connect all conductors.
- N. Furnish lugs for conductors #1/0 and larger with two bolt tongue or accepted equivalent single bolt tongue with anti-turn devices.
- O. Mark all branch circuit conductors at panel terminations including neutrals with pressure sensitive numbers to correspond to circuit numbers connected. See Section 260553 for labels.
- P. Connect circuits and feeders as shown on drawings. Drawings are diagrammatic and do not show every detail required in the wiring system. Detail wiring accomplished per NEC.
- Q. All conductors making up parallel feeders to be same size, same type, and same insulation, all cut same length. Bond each group of conductors making up a phase or neutral at both ends in an approved manner. Parallel conductors shall not be run in the same raceway.
- R. DO NOT COMBINE CIRCUITS into more than three circuits per homerun unless specifically approved by the Consultant.
- S. Neutral conductors shall not be used for equipment grounding.
- T. Circuitry shall not be run in elevator shafts and hoistways.
- U. Provide a separate neutral and grounding conductor for all GFI circuits or GFI devices to ensure an adequate ground-fault return path.

V. Conductors for receptacle and lighting circuits shall be installed in accordance with the following conditions:

Maximum one-way circuit length in feet for 90°C copper conductors with unity power factor to first device on circuit. Assumed 1920VA loading per circuit.

- 1. 120V – Single Phase
 - a. #12AWG – 53'
 - b. #10AWG – 88'
 - c. #8AWG – 138'
 - d. #6 AWG – 223'
 - 2. 277V – Single Phase
 - a. #12AWG – 123'
 - b. #10AWG – 205'
 - c. #8AWG – 319'
 - d. #6AWG – 515'
- W. Panelboards may not be used as raceways.
 - X. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
 - Y. Install terminal lugs on ends of 600-volt wires unless lugs are furnished on connected device, such as circuit breakers.

- Z. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
- AA. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.
- BB. Clean conductor surfaces before installing lugs and connectors.
- CC. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

3.4 WIRE COLOR

- A. General:
 - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
 - 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 - 1. For 6 AWG and smaller: Green.
 - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 260519

SECTION 260923 – LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Remote control lighting relays.
 - 2. Lighting contactors.
 - 3. Switches.
 - 4. Switch plates.
 - 5. Occupancy sensors.
 - 6. Photocells.
 - 7. Photocell control unit.
- B. Related Sections:
 - 1. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.
 - 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
 - 4. Section 26 05 53 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
 - 5. Section 26 24 16 - Panelboards.
 - 6. Section 26 27 26 - Wiring Devices: Product requirements for wiring devices for placement by this section.

1.2 SYSTEM DESCRIPTION

- A. Distributed switching control using self contained individually mounted lighting relays.
- B. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting inside building larger than 5000 square feet (465 square meters). Control shutoff by method conforming to ICC IECC.
- C. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting outside building. Control shutoff by method conforming to ICC IECC.
- D. Extent of lighting control system work is indicated by drawings and by the requirements of this section. It is the intent of this section to provide an integrated, energy saving lighting control system including Lighting Control Panels and Occupancy Sensors, and Daylighting Controls from a single supplier. Contractor is responsible for confirming that the panels and sensors interoperate as a single system.

1.3 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
 - 1. One Line Diagram: Indicating system configuration indicating panels, number and type of switches or devices.
 - 2. Include typical wiring diagrams for each component.

3. Detailed point to point wiring diagrams and floor plans showing occupancy and daylighting sensor locations.
4. Provide typical mounting details for all equipment and devices.
5. Sample calibration log.
6. Provide Source Code and Source Code Licenses for all equipment that is computer driven. Provide Development licenses so Source Code can be examined. These Development Licenses, along with all software licenses shall become property of the Owner. Third parties will be allowed to use the software as necessary for this project.

C. Product Data: Submit manufacturer's standard product data for each system component.

D. Manufacturer's Installation Instructions: Submit for each system component.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. General Conditions: Requirements for submittals.

B. Project Record Documents: Record the following information:

1. Actual locations of components and record circuiting and switching arrangements.
2. Wiring diagrams reflecting field installed conditions with identified and numbered, system components and devices.

C. Operation and Maintenance Data:

1. Submit replacement parts numbers.
2. Submit manufacturer's published installation instructions and operating instructions.
3. Recommended renewal parts list.
4. Submit final calibration log.

1.5 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Comply with NEC, NEMA, and FCC Emission requirements for Class A applications.

C. UL Approvals: Relay panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Configured to order or custom relay panels shall be UL Listed under UL 508, Industrial Control Panels.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the consultant.

1.7 PRE-INSTALLATION MEETINGS

A. General Conditions: Pre-installation meeting.

- B. Convene minimum one week prior to commencing work of this section. Attendance required: Electrical Contractor, Factory Representative, Local Factory Representative and Outside Commissioning Agent.

Review placement of all components, wiring schematics and samples.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's packaging. Inspect for damage.
- C. Protect components by storing in manufacturer's containers indoor protected from weather.

1.9 WARRANTY

- A. General Conditions: Requirements for warranties.
- B. Furnish five year manufacturer warranty for components.

1.10 EXTRA MATERIALS

- A. General Conditions: Requirements for extra materials.
- B. Furnish 5 of each switch type installed.
- C. Furnish 5 of each occupancy sensor type installed.
- D. Furnish 1 of each photocell type.

PART 2 - PRODUCTS

2.1 RELAY PANELS

A. System Description

Lighting Control Panels shall be UL listed and consist of the following:

1. Enclosure/Tub: NEMA 1 as indicated on the drawings, sized to accept an interior with 24 relays and six (6) four pole contactors.
2. Cover: Surface or Flush as required, hinged, and lockable and with restricted access to line voltage section.
3. Interior: Barrier included for separation of high voltage (class 1) and low voltage (class 2) wiring. The interior shall include intelligence boards, power supply, mechanically latched control relays and multi-pole contactors. The interiors will include the following features:
 - a. Screwless, removable, plug-in connections for all low voltage terminations.
 - b. Each relay shall be capable of individual ON/OFF control by a low voltage switch and/or occupancy sensor input.
 - c. The system shall monitor true relay status; the relay status will be displayed at the onboard pilot LED and monitored by the system electronics.
 - d. Stagger the ON and OFF sequence of the relays.

- e. Heavy Duty Relays – Mechanically latching contacts with single moving part design for improved reliability. Relays to have the following characteristics:
 - (1) 30 amp NEMA 410 electronic ballast rated and 20 amp tungsten, rated for 50,000 ON/OFF cycles at full load, Support #12 - #14 AWG solid or stranded wire and rated for 120, and 277 volts; 20 amp NEMA 410 electronic ballast rated and 20 amp tungsten 347 volts.
 - (2) 30 VAC isolated contacts for status feedback and pilot light indication.
 - (3) 14,000 amp short circuit current rating.
 - 4. Contactors shall be DIN rail mounted, four pole standard, normally open or normally closed, electrically held with 120 or 277 volt coil voltage to match panel control power voltage. Contactors shall be compatible with all lighting, ballast and HID loads and be rated for 277 volt 20 amp tungsten and 600 volt 30 amp ballast loads.
- B. Power Supply: Multi-voltage transformer assembly with enough power to supply all electronics, occupancy sensors, dataline switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

2.2 NETWORK CLOCK

- A. Provide an eight channel network clock that connects to the system using the four conductor data communications wire network described in Section 2.10.
- B. The clock will be used to schedule any of the eight global channel groups (Section 2.03) in the relay panel network. The clock will support all of the energy saving features required of ASHRAE 90.1 - 2001, IECC 2003, as well as all state and local energy codes.
- C. The clock will provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and EEPROM for program retention. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
- D. The clock shall allow unique scenario and time delays. Scenarios are:
 - 1. Scheduled ON / OFF
 - 2. Manual ON / Scheduled OFF
 - 3. Manual ON / Auto Sweep OFF (for AS-100 Switches)
 - 4. Astro ON / OFF (or Photo ON / OFF)
 - 5. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
- E. The clock shall include system diagnostic functions to identify devices anywhere on the network dataline, and will function as a dataline switch programming tool.
- F. Features
 - 1. Clear 8-line, 22-character per line display and a simple user interface and online help.
 - 2. Retains memory and time for a minimum of 10 years.

2.3 NATIVE BACnet INTEGRATION

- A. Description
 - 1. Lighting Control Panels shall have a BACnet card with the capability to modify the IP address at the job site. The controller shall be furnished with all hardware/software required to field modify the IP address.

2. BACnet card shall allow interface with the direct digital control system via BACnet / MSTP protocol.

2.4 ETHERNET MULTI-USER CONNECTIVITY - WEBLINK

- A. System Description
 1. A network appliance will provide multi-user, simultaneous access to the lighting system using standard TCP/IP and the manufacturer's software.
 2. The network appliance will include the following hardware:
 - a. Ethernet, Serial and Parallel port, optional 56K BAUD internal modem, Video graphics card.
- B. Features
 1. Multiple users (each with a licensed copy of the manufacturer's software will be able to simultaneously connect to the IP address of the WebLink.
 2. Users may be connected via an Intranet, or Internet depending upon network security limitations.
 3. A single user may connect using the manufacturer's software, via the internal modem of the WebLink.
 4. The WebLink will provide all the features of a direct connected site to the simultaneous users.
- C. Optional 365 day and Events Scheduler (Schools, Retail and Event Centers)
 1. 365 day event scheduling will allow "Events" to be defined as a series of commands to allow a preprogrammed timed sequence to occur by selecting the start time and stop time of the event. Events may be programmed as a repeating schedule with specific start and ending times or as one time scheduled events.
 2. 365 day programming will simplify single day activities for schools, retail applications, or event centers. The schedules may be programmed up to two years in advance.
- D. **Contractor shall coordinate networking/IT/VPN requirements with owner prior to start of system installation. The contractor is required to provide information from the lighting controls supplier as to the individual who is responsible for system startup. Coordinate with WCSD IT department for network access requirements.**

2.5 LOW VOLTAGE SWITCHES / PLATES

- A. Description
 1. Low voltage switches shall provide a momentary signal to allow individual relay control or group control using the Group Switching card specified in Section 2.03 above. Switches shall be available in 1-button, 3-button, 5-button, or 9-button designs. The 1, 3, and 5 switch devices shall mount in a standard single gang box: the 9-switch version in a two-gang box.
- B. Features
 1. Switches shall be constructed of non-breakable Lexan on all exposed parts and shall include a matching screwless Lexan wall plate.
 2. **Individual buttons shall be labeled and identified to their use with either removable faceplates or permanent engraving on the button.**
 3. Each switch shall use an LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays.

2.6 OCCUPANCY SENSORS AND POWER PACKS

- A. Occupancy Sensors

1. All products listed shall integrate fully with the Lighting Control Panels and daylighting controls listed in the project specifications.
 2. Dual technology sensors shall:
 - a. Either corner mounted, or ceiling mounted in such a way as to minimize coverage in unwanted areas
 - b. Passive infrared and ultrasonic *or* microphonic technologies for occupancy detection. Products that react to noise or ambient sound shall have sophisticated filtering technology to masks out and recognize noises made by the building or the environment such as the sound of the HVAC system, air currents, equipment, cars driving by, etc. They shall also have automatic gain control to dynamically self-adapt to the environment by filtering out constant background noise.
 5. Ultrasonic sensors shall:
 - a. Utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.
 - b. Have an ultrasonic operating frequency that is crystal controlled at 25 kHz within $\pm 0.005\%$ tolerance, 32 kHz within $\pm 0.002\%$ tolerance, or 40 kHz $\pm 0.002\%$ tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
 6. All sensors shall be capable of operating normally **with LED Drivers.**
 7. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
 8. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
 9. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
 10. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
 11. **The lighting controls contractor/supplier shall provide sensors adequate for the use in each space and individual device selection shall be made with regards to ceiling heights and specific installation location. It is the contractor's responsibility to select appropriate sensors with varying coverage ranges for each space where required to be provided with occupant sensor control. Additional devices shall be provided at no cost the owner to provide best level of detection and energy savings. All documents in the project shall be reviewed with regards to mounting heights and obstructions in the space.**
- B. Circuit Control Hardware – (Power Packs)
1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
 2. Relay Contacts shall have ratings of:
 - a. 13A - 120 VAC Tungsten
 - b. 20A - 120 VAC Ballast
 - c. 20A - 277 VAC Ballast

d. 20A – 347 VAC Ballast

- C. Control wiring between sensors and control units shall be Class II, 18-20 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.
1. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

2.7 EXTERIOR PHOTOCELLS

- A. Each photocell shall be mounted in the appropriate location for measuring the available daylight. Each photocell will have a separate control/calibration module mounted separately and in an accessible location.
- B. The control module shall:
1. Have a separate trip point settings. These settings will be entered via easily readable dial switches.
 2. Have a fixed deadband of 10%.
 3. Have a starting delay.
 4. Be suitable for panel mounting.
 5. Be UL listed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount switches, occupancy sensors, and photocells as indicated on Drawings and by manufacturer's requirements. **Provide additional sensors as required to provide optimal detection in each space.**
- B. Install wiring in accordance with Section 26 05 19.
- D. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 26 05 33.
- E. Label each low voltage wire clearly indicating connecting relay panel. Refer to Section 26 05 53.
- F. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
- G. Label each low voltage wire with relay number at each switch or sensor.

3.2 SUPPORT SERVICES

Service Description:

- A. System Startup
1. Manufacturer shall have a factory authorized technician confirm proper installation and operation of all system components. The startup requirement is intended to verify:
 - a. That all occupancy sensors are located, installed, and adjusted as intended by the factory and the contract documents.
 - b. The occupancy sensors are operating within the manufacturers specifications.

- c. The sensors and relay panels interact as a complete and operational system to meet the design intent.
 - 2. Manufacturer to provide minimum of two day factory start-up at site. Additional days shall be included as required
 - 3. Manufacturer to provide a written statement verifying that the system meets the above requirements.
- H. Training
- 1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and controls.
 - 2. Manufacturer shall provide minimum of one day on site training.
 - 3. Training shall be video recorded and provided to Owner on a DVD.
- C. Factory Commissioning
- 1. Manufacturer shall provide factory authority technician for on site Commissioning Agent Testing. Number of days on-site shall be as necessary based on number of components and systems.
 - 2. Factory Commissioning shall include:
 - a. Fine tune occupancy sensors.
 - b. Program daylight harvesting.
 - c. Program relay panels,
 - d. Program dimming panels.
 - e. Fine tune dimming controls.
- D. **Follow-up Site Assistance**
- 1. **The lighting controls representative shall visit the site 1-year post final commissioning to ensure the system is operating appropriately and make any fine-tuning programming adjustments as requested by the owner at that time. The controls representative shall also provide an additional 1-day training session for the owner at this time.**

3.3 ADJUSTING AND CALIBRATING

- A. General Conditions: Requirements for starting and adjusting.
- B. Test each system component after installation to verify proper operation.
- C. Test relays, contactors, and switches after installation to confirm proper operation.
- D. Confirm correct loads are recorded on directory card in each panel.
- E. Provide calibration logs for all devices. Sample log shall be part of shop drawing submittal.

CONTROL TYPE	COMMISSIONING AND CALIBRATION
Occupancy sensors and photosensors	Ensure that the sensor is correctly placed and oriented per the specifications and/ or construction drawings. If unanticipated obstructions are present, it may be necessary to adjust the sensor location and orientation.
Occupancy sensors	Adjust the sensitivity and time delay of the occupancy sensor, and test to ensure it provides appropriate response. For optimal user acceptance, energy

	savings and lamp life, set the time delay initially for a minimum of 15 minutes (NEMA recommendation).
Daylight harvesting	All furnishings and interior finishes and materials should be installed before calibrating the sensors. Adjust the photosensor to determine the threshold for switching based on detected light level. It may be helpful to calibrate under normal daylight conditions and dusk conditions (it may be possible to close window blinds to approximate dusk). Record the calibration adjustments if possible and replicate in similar spaces.
Automatic shut-off ("sweep off")	Input the schedule into the programmable scheduling controls, incorporating weekday, weekend and holiday operating times. Ensure that overrides work and that they are located conveniently for users.
Dimming systems	It is recommended that fluorescent lamps be "seasoned" before dimming by operating them at full light output, so as to ensure uniform dimming performance across all lamps in a system. Recommendations vary, but NEMA recommends seasoning fluorescent linear lamps overnight, or about 12 hours, and compact fluorescent lamps for 100 hours, prior to dimming. Consult the lamp manufacturer to determine whether the select lamp type must be seasoned and for how long prior to dimming.
Manual dimming	Ensure correct placement of the dimmer per the construction drawings. Adjust the upper limit of the dimming range according to the task being performed, and set the lower limit of the range so that the minimum light level meets the use/application of the space.

END OF SECTION 260923

SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes aluminum windows for interior and exterior locations with **integral internal manual venetian blinds**.
- B. Related Requirements:
 - 1. Section 014339 – “Classroom Mockup”.
 - 2. Section 079200 “Joint Sealants”.
 - 3. Section 084113 “Aluminum-Framed Entrances and Storefronts” for frames where Aluminum Windows occur.
 - 4. Section 088000 “Glazing” for additional glazing requirements for Aluminum Windows.

1.3 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2017.
- B. B.AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2012.
- D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

- J. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).
- K. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
- L. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation; 2016.
- M. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2019c.
- N. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.

1.7 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.9 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
1. Build mockup of typical wall area as described in Section 014339 – Classroom Mockup.
 2. Testing shall be performed on mockups in accordance with requirements in "Field Quality Control" Article.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
- B. Aluminum Window Warranty
1. 1.Products: Submit a written warranty, executed by the window manufacturer, for a period of 10 years from the date of manufacture, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements and industry standards, which result in premature failure of the windows, finish, factory-glazed glass, or parts, outside of normal wear.
 2. .In the event that windows or components are found defective, manufacturer will repair or provide replacement material without charge at manufacturer's option.
 3. Warranty for all components must be direct from the manufacturer (non pass-through) and non pro-rated for the entire term. Warranty must be assignable to the non-residential owner, and transferable to subsequent owners through its length.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide 3-1/2" AW (Architectural Window) 4250i INvent Series Thermal Fixed windows w/ internal venetian blind on hinged access sash by Wausau Window and Wall Systems. – DESIGNATED BY 'W' ON GLAZING LEGEND.
- B. Basis-of-Design Product: Subject to compliance with requirements, 3-1/2" AW (Architectural Window) 4250i INvent Series Thermal Fixed windows w/ ballistic glazing and internal venetian blind on hinged access sash by Wausau Window and Wall Systems. – DESIGNATED BY 'W3' ON GLAZING LEGEND.

1. Exterior (non-classroom side) lite to be BR2 Rated per UL752 with Glass surface on outside face.
2. Interior (classroom side) lite to be 5/16" Laminated Glass with two plies of fully tempered float glass.
 - a. Minimum Thickness of Each Glass Ply: 3 mm.
 - b. Interlayer Thickness: 0.060 inch.
3. Interior (classroom side) lite to be 1/4" fully tempered float glass at Window Types B9, B10, B11 & B12.
4. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 1. Minimum Performance Class: AW/HC.
 2. Minimum Performance Grade: 80.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.32 Btu/sq. ft. x h x deg F.
- D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 52.
- E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.

2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
 1. Casement: Project out.
 2. Fixed.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials

and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

2. Thermal barrier to be Azo-braided for reduced thermal shrinkage.

C. Glass Type: Insulating-Glass Units: ASTM E 2190.

1. Glass: ASTM C 1036, Type 1, Class 1, q3.
 - a. Tint: Clear exterior lite, clear interior lite.
 - b. Kind: 1/4-inch fully tempered exterior lite, 5/16-inch laminated interior lite.
2. Lites: Two.
3. Filling: Fill space between glass lites with air.
4. Low-E Coating: Pyrolytic on second surface.

D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.

F. Projected Window Hardware:

1. Type and Style: Manufacturer's Standard Lift-Lock Hardware.
2. Hinges: Non-friction type, not less than two per sash.
3. Lock: Lever handle and cam-action lock with keeper.
4. Limit Devices: Manufacturer's standard limit devices designed to restrict sash opening.
 - a. Limit clear opening to 4 inches for ventilation; with custodial key release.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Sub Sill: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

B. Integral Venetian Blinds:

1. 5/8" wide aluminum slat blinds. Blind color shall be selected by Architect from entire product range.
2. Blind to be integrally mounted between the dual or triple glazing.
3. Tilt-control knob will be located on the interior face and incorporate a "slip clutch" feature.
4. Raise and lower pull cords will be located between glass for access only when glazed access panel is opened.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- G. Limited Opening Device
 - 1. Provide concealed device to limit initial sash operation to 4". (Specify other limited opening as necessary.)
 - 2. Operation past this point to be by use of a tool or removable key.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. 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 openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Manufacturer Site Visit: A representative from the Window Manufacturer is to visit the jobsite for the installation with the Manufacturer's Representative.
- C. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- D. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for storefront framing.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 081743 "Flush FRP Doors" for glazing in flush FRP doors.
 - 2. Section 084113 "Aluminum Framed Entrances and Storefronts."
 - 3. Section 088853 "Security Glazing."
 - 4. Section 085113 "Aluminum Windows" for glazing in Aluminum Windows.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of the following products: 12 inches square.
 - 1. Laminated glass.
 - 2. Insulating glass.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Preconstruction adhesion and compatibility test report.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" and Section 085113 "Aluminum Windows" to match glazing systems required for Project, including glazing methods.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:
1. Guardian Glass; SunGuard.
 2. Oldcastle BuildingEnvelope™.
 3. Viracon, Inc.
 4. Citidel Architectural Products, Inc.
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
1. Obtain tinted glass from single source from single manufacturer.
 2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
1. Design Wind Pressures: As indicated on Drawings.
 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 140 mph.
 - c. Importance Factor: 1.0.
 - d. Exposure Category: C.
 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic glass lites, properties are based on units with lites 6 mm thick.
 - 2. For laminated glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.
 - 7. Optical Distortion Limits:
 - a. Maximum peak-to-valley roll wave 0.005 inch in the central area of the glass lite excluding the leading and trailing 12 inches
 - b. Maximum localized and overall bow (warp) per lite shall each be one-half of maximum allowed by ASTM C 1048.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements, but not less than 0.060 inch.
 - 3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Spacer: Aluminum with black, color anodic finish.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 EXTERIOR INSULATING OPAQUE COMPOSITE PANELS – G6

- A. Water Resistant Opaque Glazing Panels
 - 1. Manufacturer: Citadel Architectural Products, Inc., or equal.
 - 2. Prefinished Smooth Aluminum Skins.024" (min).
 - 3. High Density Polypropylene Stabilizers 5/32"
 - 4. Polyisocyanurate Foam ISO Core 5/8"
 - 5. Panel Weight: 1.05 lbs/s.f.
 - 6. Nominal Thickness: 1"
 - 7. Exterior Aluminum Skin Finish: Class 1 Clear Anodized
 - 8. Interior Finish: Standard- Plus Kynar 500 or Premium Kynar 500
 - a. Color: As selected by Architect from Manufacturer's full range.

2.8 INTERIOR INSULATING OPAQUE COMPOSITE PANELS – G7 & G8

- A. Water Resistant Opaque Glazing Panels
 - 1. Manufacturer: Citadel Architectural Products, Inc., or equal.
 - 2. Prefinished Smooth Aluminum Skins.024" (min).

3. High Density Polypropylene Stabilizers 5/32"
4. Polyisocyanurate Foam ISO Core 5/8"
5. Panel Weight: 1.05 lbs/s.f.
6. Nominal Thickness: 1"
7. Aluminum Skin: Class 1
8. Interior and Exterior Finish: Standard- Plus Kynar 500 or Premium Kynar 500

a. Color: As selected by Architect from Manufacturer's full range.

2.9 MANUAL INTEGRAL HORIZONTAL BLIND LITES AT DOORS: (Doors B104A, B104B, B104C, B104D, B116A, B116B, B124, B125, B126A, B126B, C135) – G9

1. Provide manufactures microblinds and accessories at doors indicated on Door Schedule.
 - a. 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:
 - b. Basis-of-Design Product: Subject to compliance with requirements, provide Pariluse LLC; IE Blinds or comparable product by one of the following:
 - 1) ODL
 - 2) Thermat-Tru Corp.
 - 3) Unicel Architectural
2. Glazed integral blind units to be sealed at perimeter.
3. Integral blind units to be assembled and integrated with tempered and laminated glazing.
4. Controls: Single side direct drive.
5. Color: to be selected by Architect from manufactures full range.

2.10 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Field-applied sealants shall have a VOC content of not more than 250 g/L.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; Dow Corning® 790 Silicone Building Sealant.
 - b. Pecora Corporation; 890NST.
 - c. Sika Corporation; SikaSil WS-290.

2.11 NON-ADHESIVE BANNER PERFORATED PVC GLAZING FILMS - GF

- A. Double-sided, non-scrim, opaque perforated PVC banner without release liner with a block out layer in the middle to provide a high degree of opacity.**
- 1. Composition: High-opacity white/white PVC composite film with a center block out layer.**
 - 2. Open area: 40% (approx.)**
 - 3. Vinyl Thickness: 12 mils.**
 - 4. Perforation Diameter: 062 in., approx.**
 - 5. Image: Custom: As selected and supplied digitally by Architect.**
 - 6. Locations: As indicated on Drawings.**
- B. See 08 80 01 – GLAZING SUPPLEMENT for window graphics.**

2.12 MISCELLANEOUS GLAZING MATERIALS

- A. General:** Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers:** Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:** Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers:** Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks:** Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing:** ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.13 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.**
- 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.**
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.**
- B. Grind smooth and polish exposed glass edges and corners.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior, or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.6 INSULATING-LAMINATED-GLASS SCHEDULE

- A. Glass Type **G1**: Low-E-coated, clear insulating laminated glass.
1. Basis-of-Design Product: Solarban 60 Solar Control Low-E Glass by Vitro Architectural Glass.
 2. Overall Unit Thickness: 1 inch.
 3. Minimum Thickness of Each Glass Lite: 6 mm.
 4. Outdoor Lite: Tinted fully tempered float glass.
 5. Tint Color: Solexia.
 6. Interspace Content: Air.
 7. Indoor Lite: Clear laminated glass with two plies of fully tempered float glass.
 - a. Minimum Thickness of Each Glass Ply: 3 mm.
 - b. Interlayer Thickness: 0.060 inch.
 8. Low-E Coating: Sputtered on second surface.
 9. Winter Nighttime U-Factor: 0.32 maximum.
 10. Visible Light Transmittance: 61 percent minimum.
 11. Solar Heat Gain Coefficient: 0.27 maximum.

3.7 MONOLITHIC GLASS SCHEDULE

- A. Glass Type - **G4**: Clear fully tempered float glass.
1. Minimum Thickness: 6 mm.
 2. Safety glazing required.

3.8 OPAQUE PANEL GLAZING SCHEDULE

- A. Panel Type - **G6**: Exterior Insulating Opaque Composite Panel
1. Minimum Thickness: 1 inch.

3.9 OPAQUE PANEL GLAZING SCHEDULE

- A. Panel Type - **G7**: Interior Insulating Opaque Composite Panel - Color 1
1. Minimum Thickness: 1 inch.

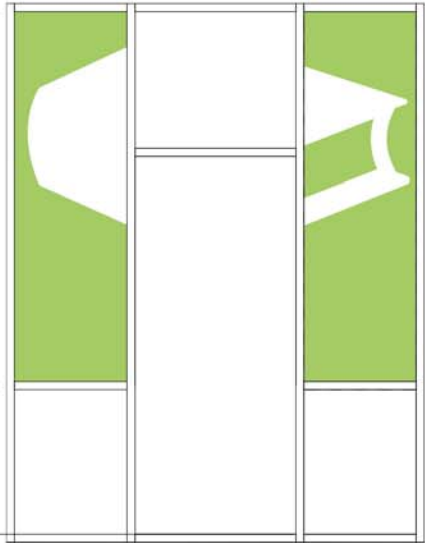
3.10 OPAQUE PANEL GLAZING SCHEDULE

- A. Panel Type - **G8**: Interior Insulating Opaque Composite Panel - Color 2
1. Minimum Thickness: 1 inch.

3.11 MANUAL INTEGRAL HORIZONTAL BLIND LITES AT DOORS – see Specification Sections 081113 Hollow Metal Doors and Frames, 081416 Flush Wood Doors, and 081743 Flush FRP Doors.

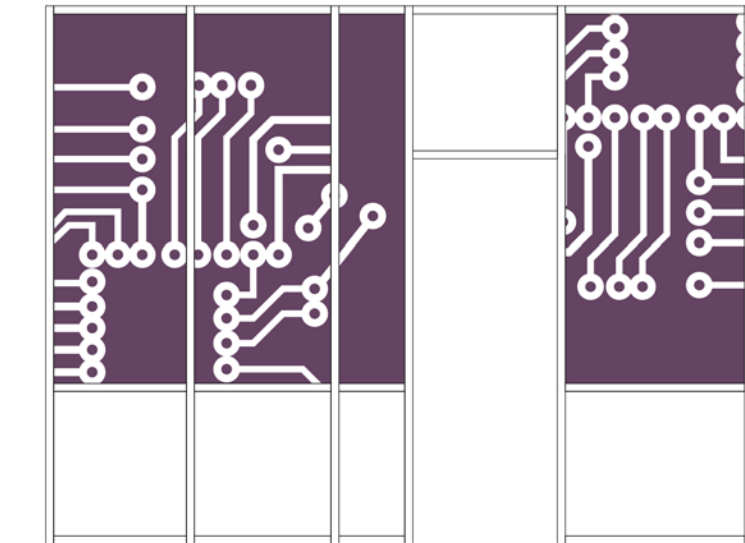
A. Panel Type - **G9**: Glazing with Integral Manual Blind

END OF SECTION 088000



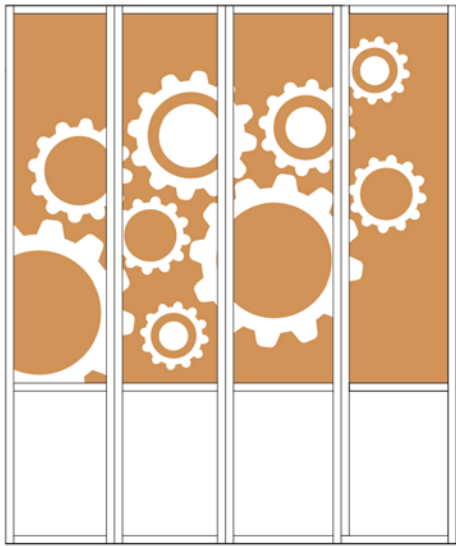
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Frame Type: AL
Frame Size: 0' - 6"



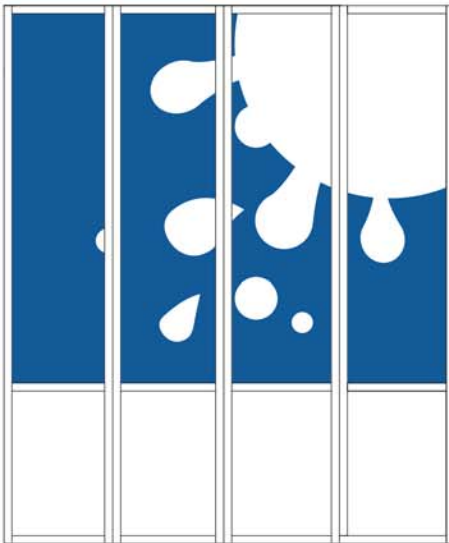
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Frame Type: AL
Frame Size: 0' - 6"



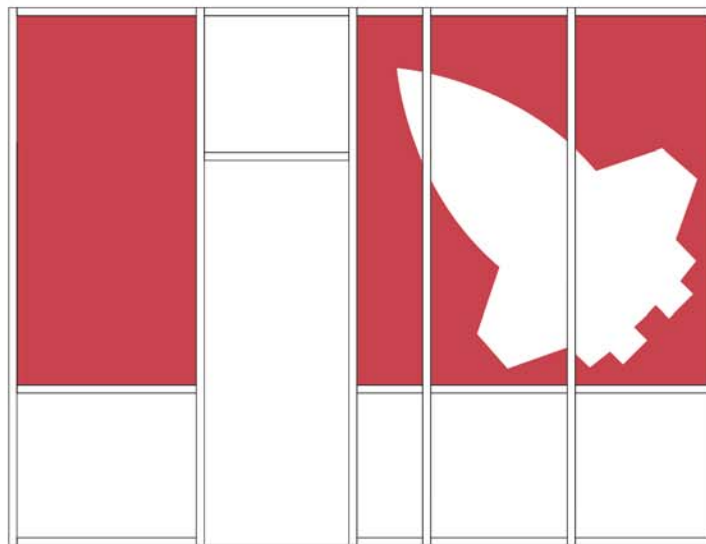
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Frame Type: AL
Frame Size: 0' - 6"



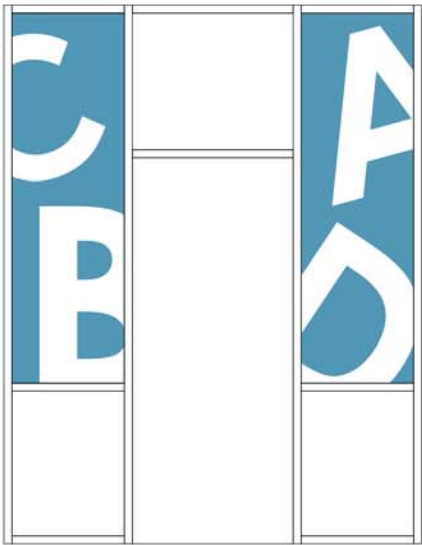
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Frame Type: AL
Frame Size: 0' - 6"



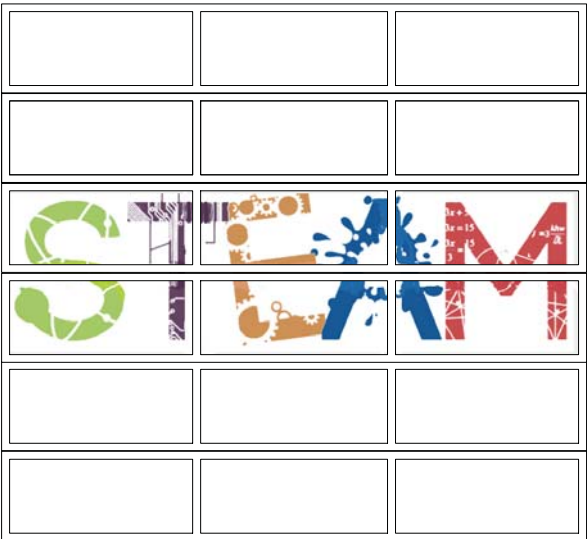
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Frame Type: AL
Frame Size: 0' - 4 1/2"



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B25
v

Frame Type: AL
Frame Size: 0' - 6"



Frame Type: AL
Frame Size: 0' - 6"

Typical two locations.

Ameriform LLC
41 Pope Rd
Holliston, MA 01746

9/21/20

TO WHOM IT MAY CONCERN:

Re: Armoroc Cement Bonded Particle Board

Aarmoroc® panels do not meet the ASTM E136-19 test for non-combustibility. Any questions regarding this statement or Armoroc generally should be referred to the brand owner and supplier, Ectek.

Sincerely,

Michael Kavanagh

Michael Kavanagh
President

Certificate of Compliance



PLAYGROUND FIBER

Norcal Wholesale Bark's Playground Fiber meets or exceeds the requirements outlined in **ASTM F2075**

ASTM-F1292 Specification for impact attenuation performance requirements for playground surfaces within the use zone of playground equipment.

ASTM-F1951 Wheel chair accessibility test. Specification for determining accessibility of materials used under and around playground equipment.

ASTM-F2075 Sieve Test Analysis, Hazardous Metals Test, Tramp Metal Test

All natural, virgin chips

No recycled urban waste

[illegible]

24. *Sequafunds during construction shall be considered and provided per Chapter 33 of the 2012 IBC w/ attention to sections 3306 "Protection Of Pedestrians" & section 3309 "Fire Extinguishers"*

25. *Deferred Submittals:*

- *Open Web Steel Roof Joist & Girders*
- *Metal Fabricated Stairs & Ladders*
- *Support, Bracing and Anchorage of Mechanical, Electrical, Sprinkler, or Other Piping Systems and Equipment for Wind or Seismic Loads*
- *Automatic Fire Sprinkler System*

Design Criteria	
Applicable Codes:	
Buliding Code:	2018 International Building Codes (IBC)
Mechanical Code:	2018 Uniform Mechanical Code (UMC)
Plumbing Code:	2018 Uniform Plumbing Code (UPC)
	2018 International Plumbing Code (IPC) for fixture counts
Electrical Code:	2017 National Electrical Code (NEC)
Fire Code:	2018 International Fire Code, Vol. 1 (IFC)
	State Fire Marshal, Nevada Department of Public Safety Regulations
Accessibility Codes:	2010 Americans with Disabilities Act, Accessibility Guidelines and 2009 ICC/ANSI 117.1
Energy Code:	2018 International Energy Conservation Code
Allowable Floor Area:	
$A_n = (A_n + (N \times I)) \times S_a$ $= (43,500 + (14,500 \times .75)) \times 1$ $= (43,500 + (10,875)) \times 1$ $= 54,375 \text{ SF}$ Allowable for one story	
Actual Floor Area:	
First Floor:	51,240 SF
Canopies:	3,040 SF
Total First Floor:	54,280 SF
Second Floor:	31,590 SF
Kindergarten Storage and Mechanical at Cooling Tower:	459 SF
Total:	86,329 SF
Occupancy Group:	Group E - Classrooms, M.P. Room & Student Hub Group B - Administration Offices
Type of Construction:	Type II-B
Required Area and/or Occupancy Separations:	1-Hour at Vertical Shafts, Electrical Rooms, and MDF Rooms
Fire Sprinkler Requirements:	Project is Fully Sprinklered, Fire Sprinkler Under Separate Permit
Alarm Systems:	Fire Alarm Drawings under Separate Permit
No. Stories:	2
Maximum Height:	65' - 0"
Actual Height:	33' - 4"

Plumbing Fixture Count per 2018 IBC Table 2902.1.1									
	Water Closets		Urinals	Lavatories		Drinking Fountains	Service Sink		
	Male	Female		Male	Female				
B Business 80, Total 40M, 40F	1:25 for first 50, 1:50 remaining over 50		0	1:40 for first 80, 1:80 remaining over 80		1:100	1		
	2	2	0	1	1	1	1		
Total Provided	3	4	0	3	3	1	0		
	Water Closets		Urinals	Lavatories		Drinking Fountains	Service Sink		
	Male	Female		Male	Female				
E Educational 1772 Total 886M, 886F	1:50		0	1:50		1:100	1		
	18	18	0	18	18	18	1		
Total Provided	18	18	28	18	18	32	2		
	Water Closets		Urinals	Lavatories		Drinking Fountains	Service Sink		
	Male	Female		Male	Female				
A-3 Assembly 583 Total 292M, 292F	1:125 / 1:65		0	1:200		1:500	1		
	3	5	0	2	2	2	1		
Total Provided	5	5	0	4	4	2	2		
Building Required:	23	25	0	21	21	21	3		
Building Provided:	26	27	28	25	25	34	3		

Owner:

Washoe County School District
Capital Projects and Planning Department
14101 Old Virginia Road
Reno, Nevada 89521
(775) 768-3638
Contact: Teresa Golden

Architect:

H+K Architects
5485 Reno Corporate Drive, Suite 100
Reno, Nevada 89511
(775) 332-6640
(775) 332-6642 (Fax)
Contact: Lee Murray, A.I.A.

Civil Engineer:

Odyssey Engineering
895 Roberta Lane, Suite 104
Sparks, Nevada 89431
(775) 359-3303
Contact: Frank Bidart, P.E.

Structural Engineer:

Hyttinen Engineering
400 Don Bell Lane
Reno, Nevada 89523
(775) 772-6988
Contact: Roger Hyttinen, P.E., S.E.

Electrical Engineer:

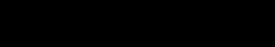
PK Electrical
681 Sierra Rose Drive, Suite B
Reno, Nevada 89511
(775) 826-9010
Contact: Craig Carroll, S.E.T.

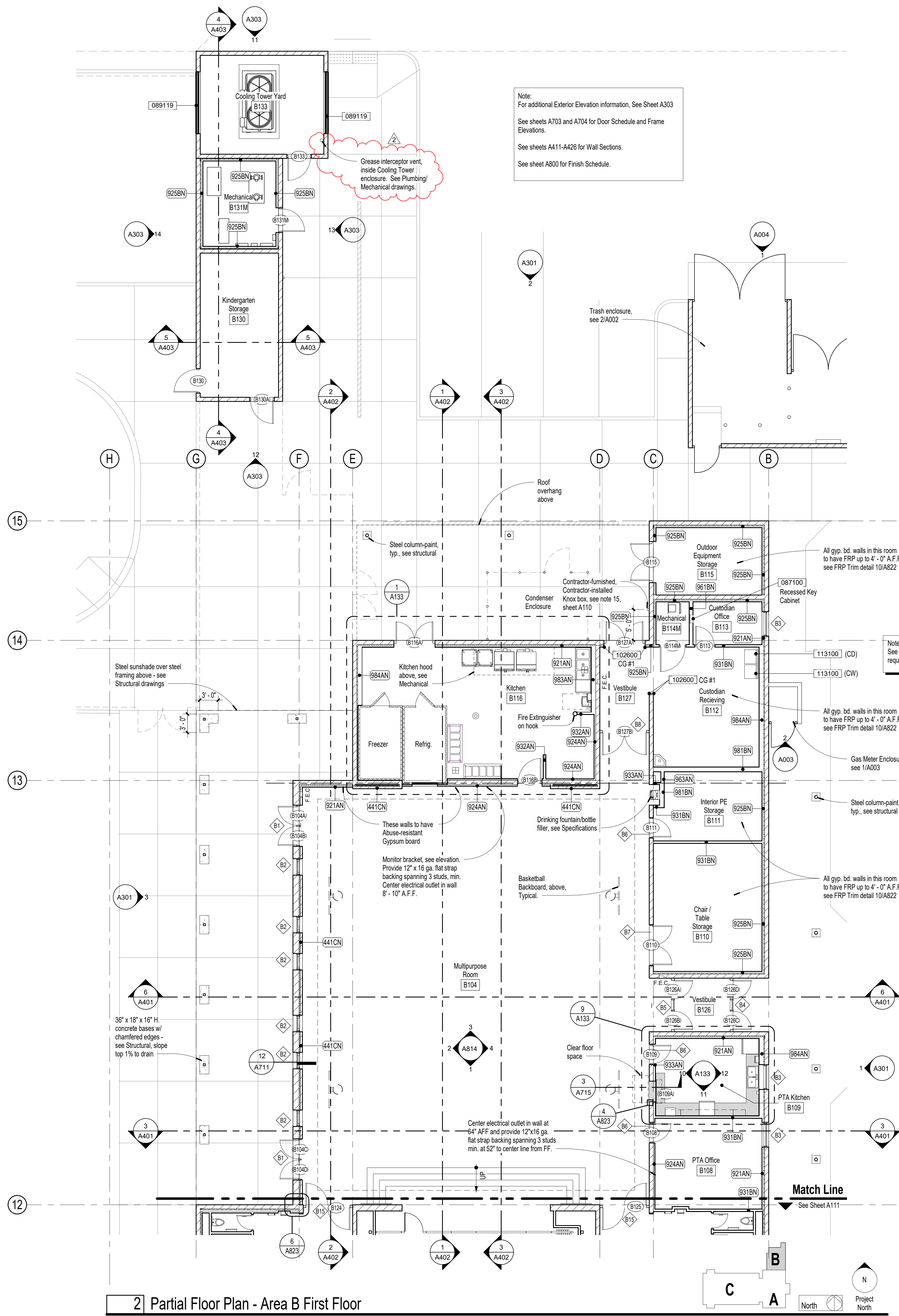
Landscape Architect:

GreenDesign Landscape Architects
1464 Poppinjay Drive
Reno, Nevada 89509
(775) 829-1364
Contact: Barbara Hatch, RLA, ASLA

Mechanical Engineer:

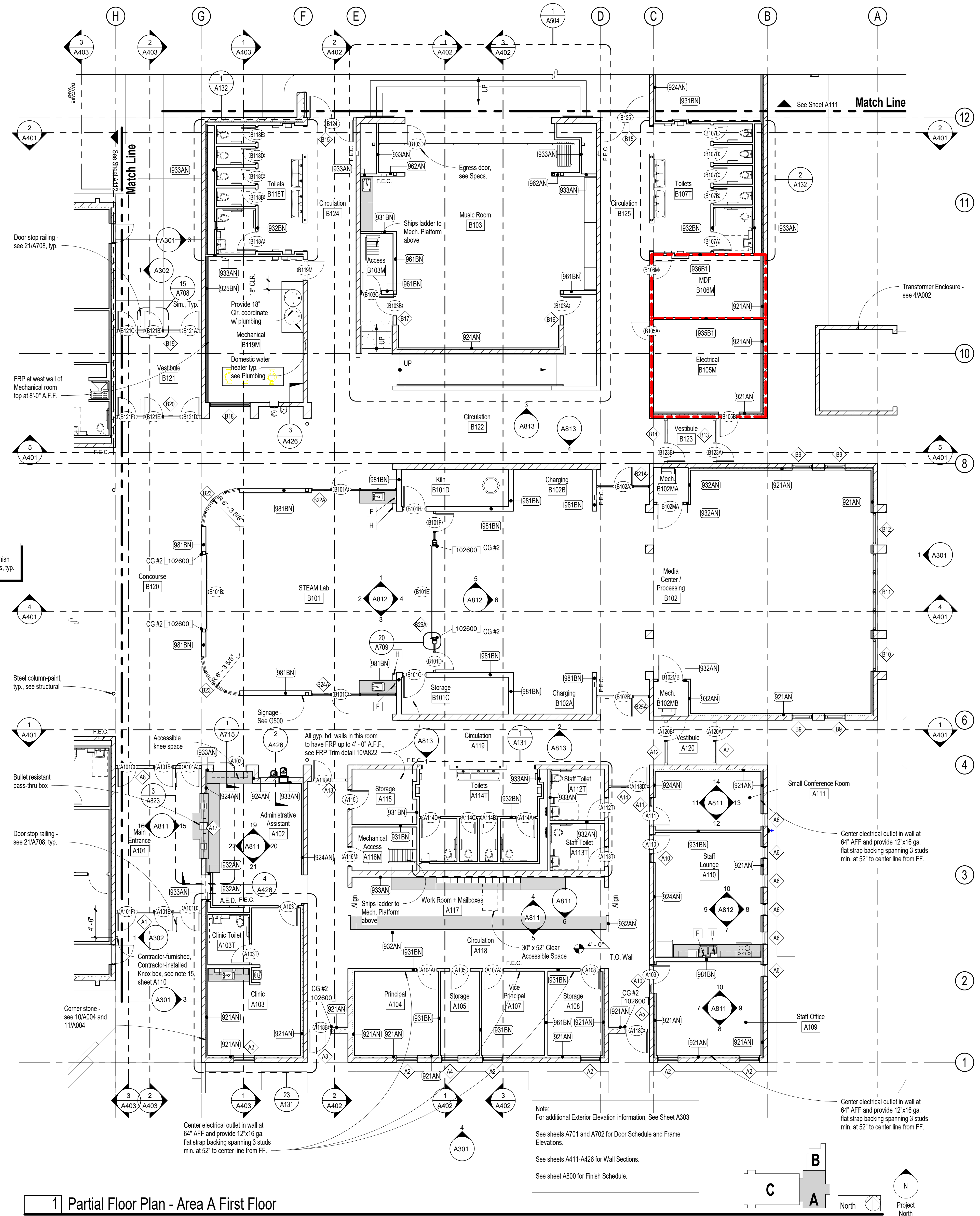
Ainsworth Associates Mechanical Engineers
1420 Holcomb Avenue, Suite 201
Reno, Nevada 89502
(775) 329-9100
(775) 737-6015 (Fax)
Contact: Alison Hall, P.E., LEED AP BD+C, CPD

<p>Washoe County School District Rio Wrangler Elementary School</p> <p>0600 Green Pasture Drive Reno, Nevada 89521</p>	<p>Project Data and Sheet Index</p> <p>October 13, 2021 H+K Project No: 2001</p> <p>G101</p>	
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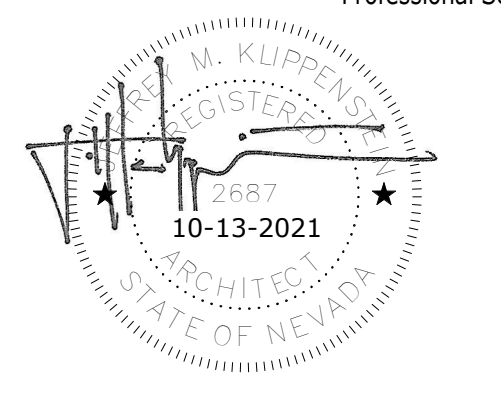
2 Partial Floor Plan - Area B First Floor

1/8" = 1'-0"



1 Partial Floor Plan - Area A First Floor

1/8" = 1'-0"



Professional Seal	Date	Revision
	1 11/4/21	Addendum #2
	2 11/16/21	Addendum #3

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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

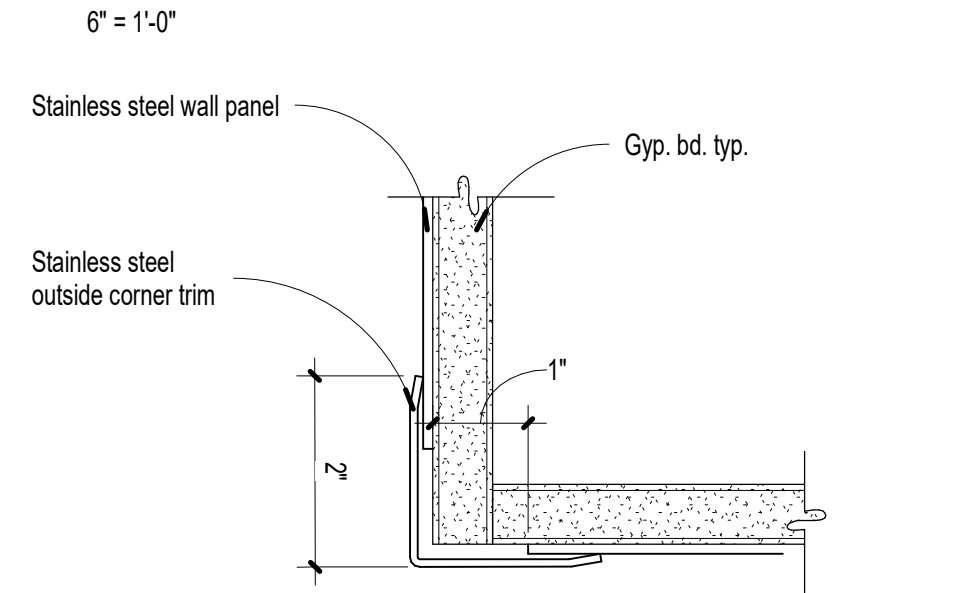
Enlarged First Floor
Plans - Areas A + B

October 13, 2021
H+K Project No: 2001

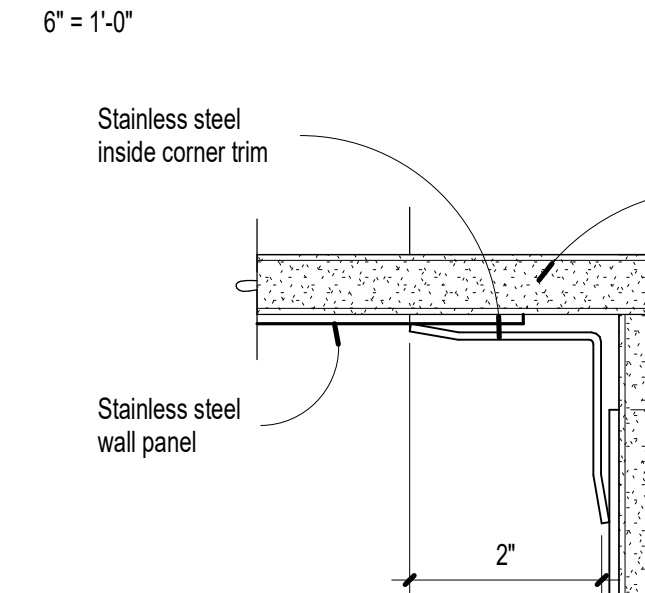
A111



19 Stainless Steel Trim at End Wall



18 Stainless Steel Joint



17 Stainless Steel Trim Outside Corner

6" = 1'-0"

16 Stainless Steel Trim Inside Corner

6" = 1'-0"

15 Foundation at Freezer

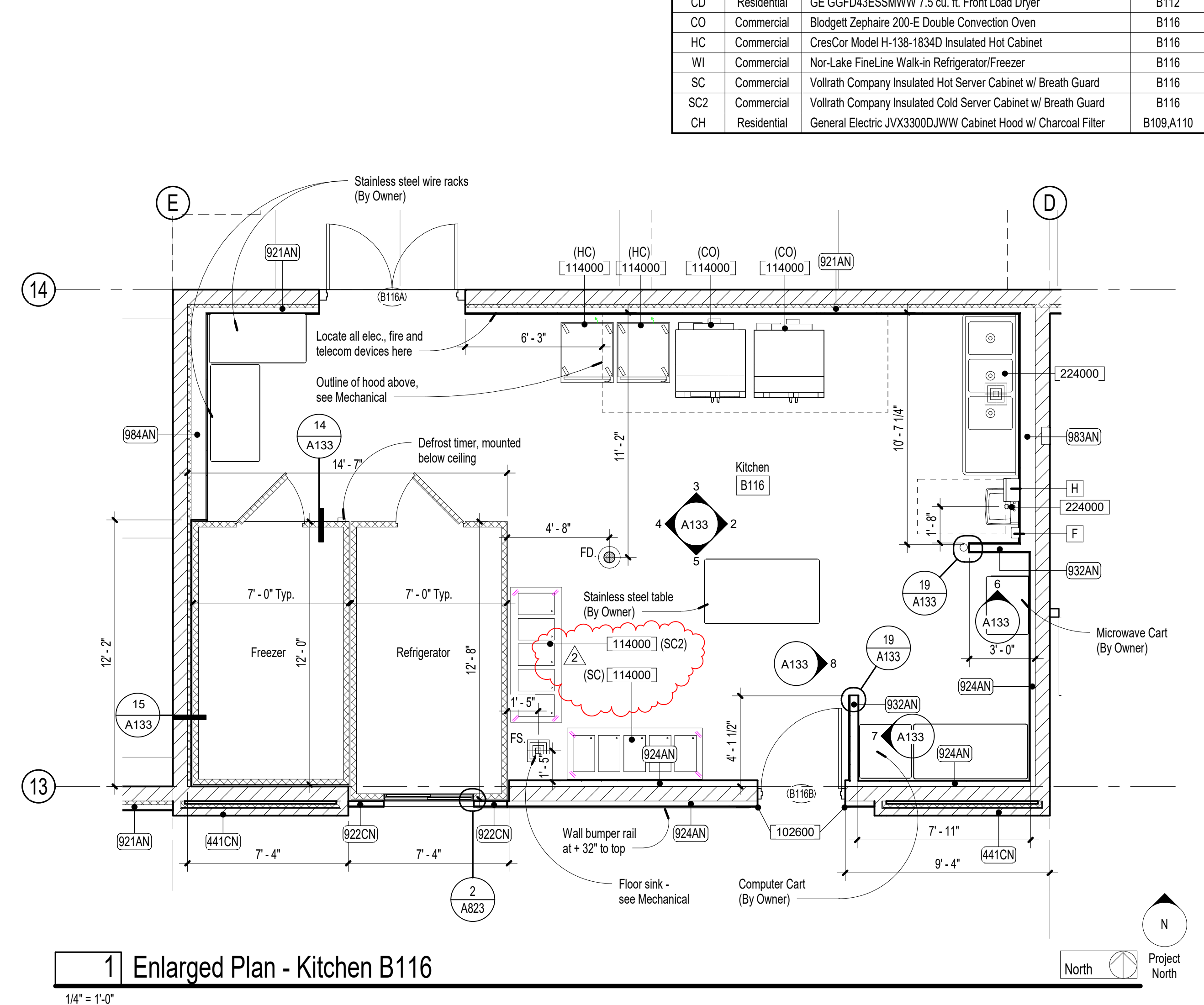
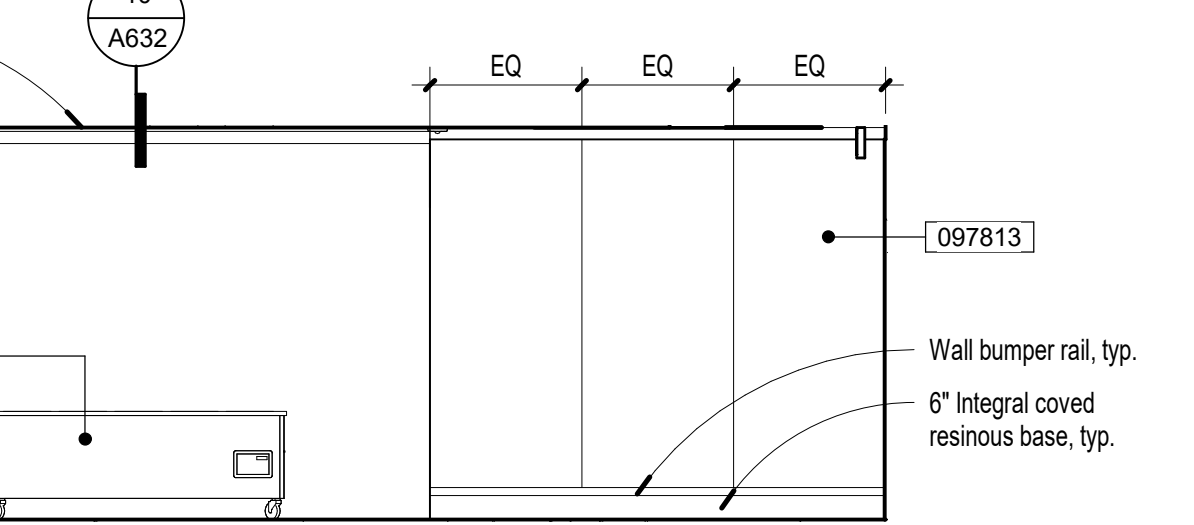
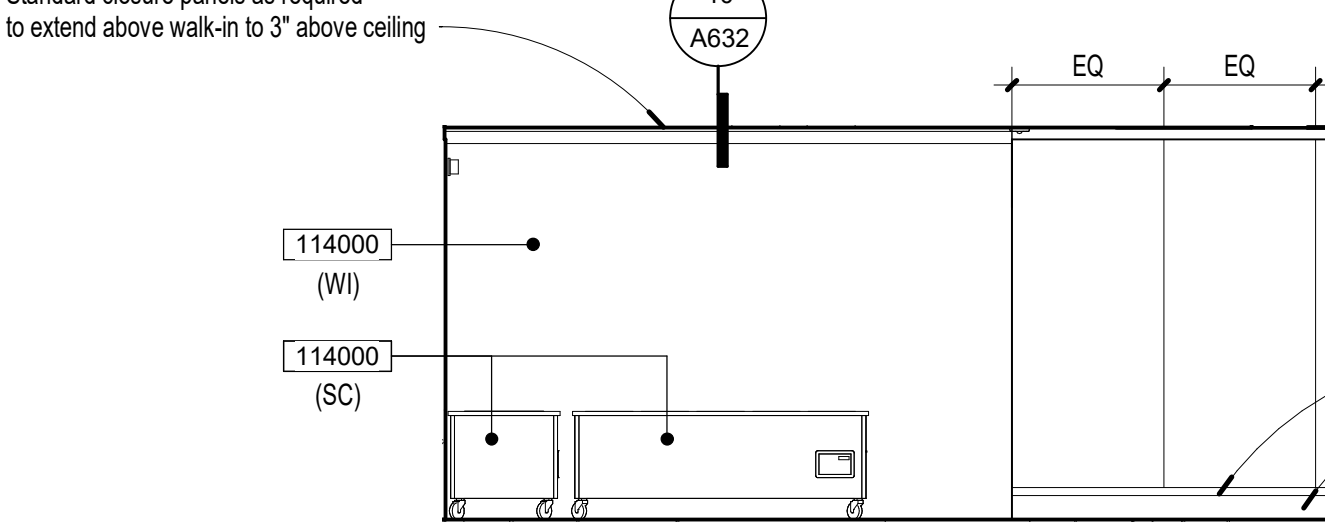
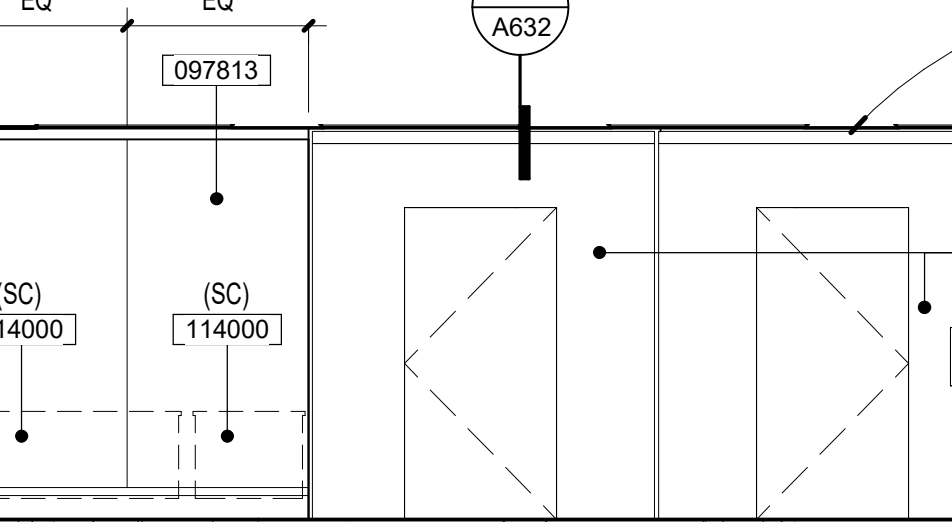
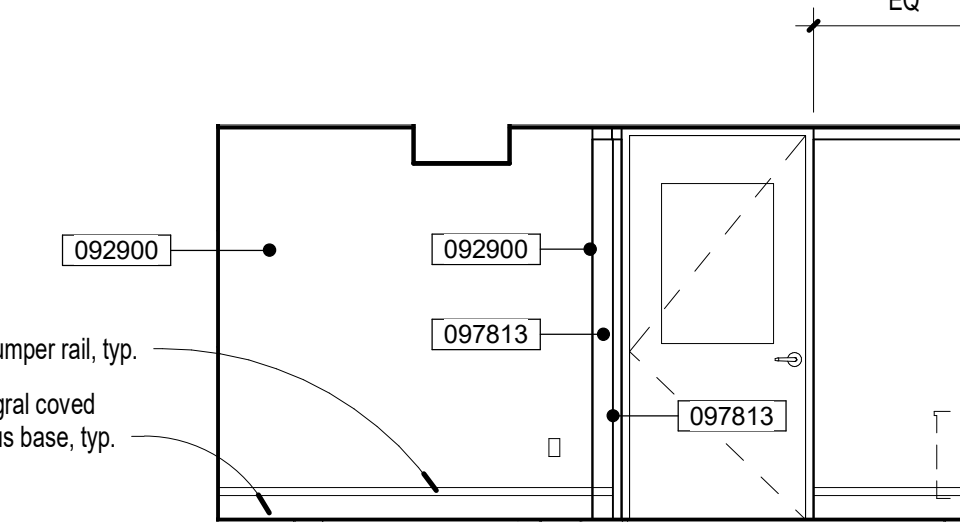
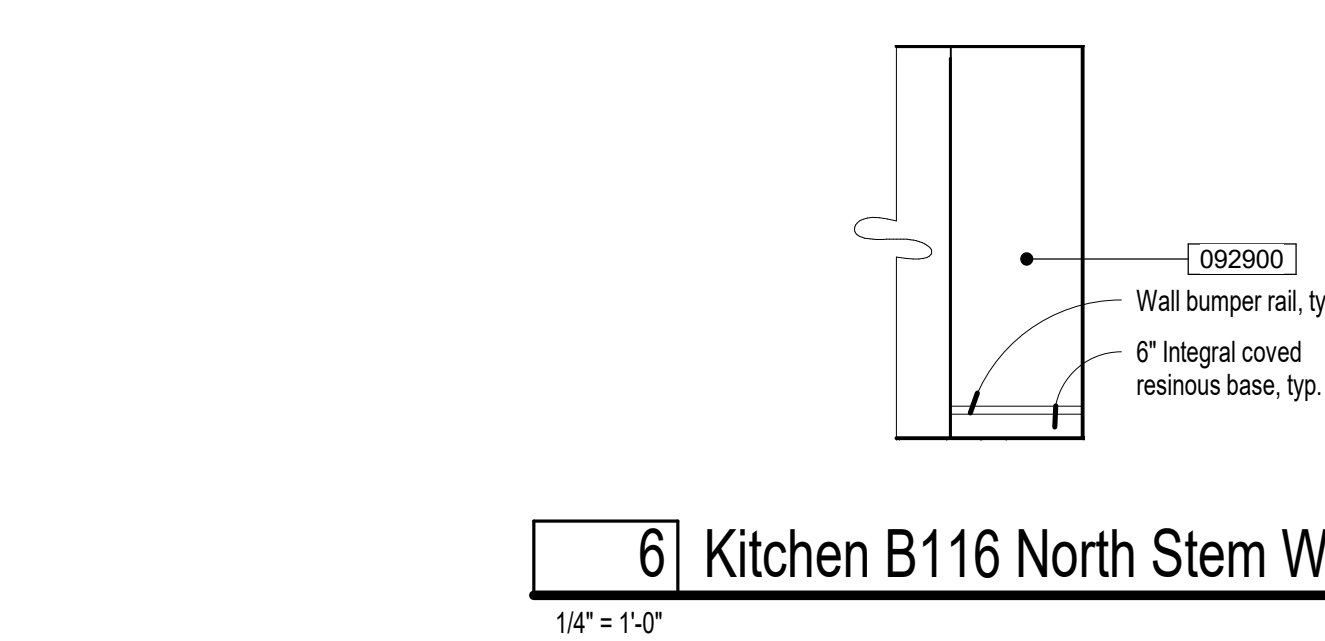
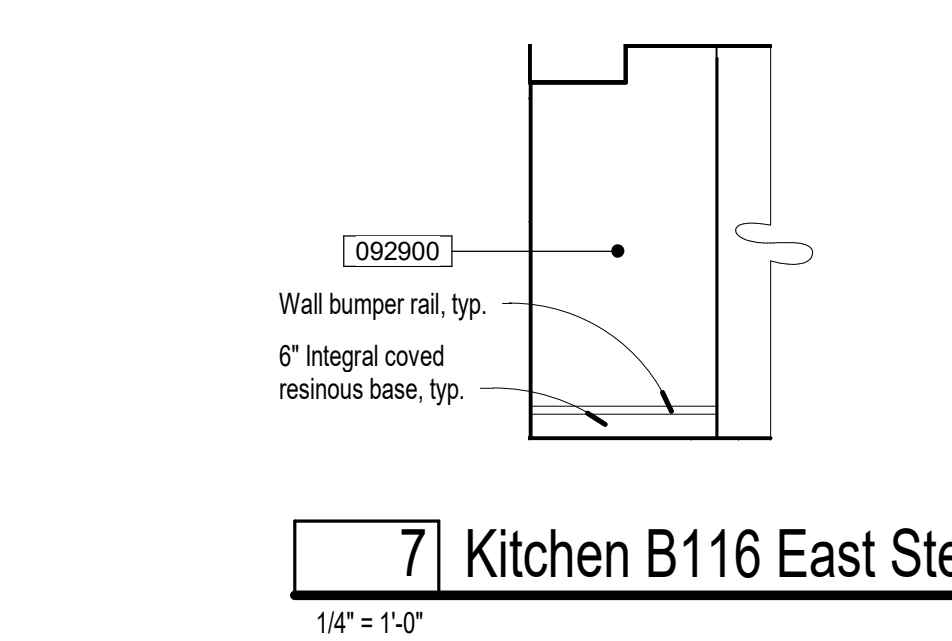
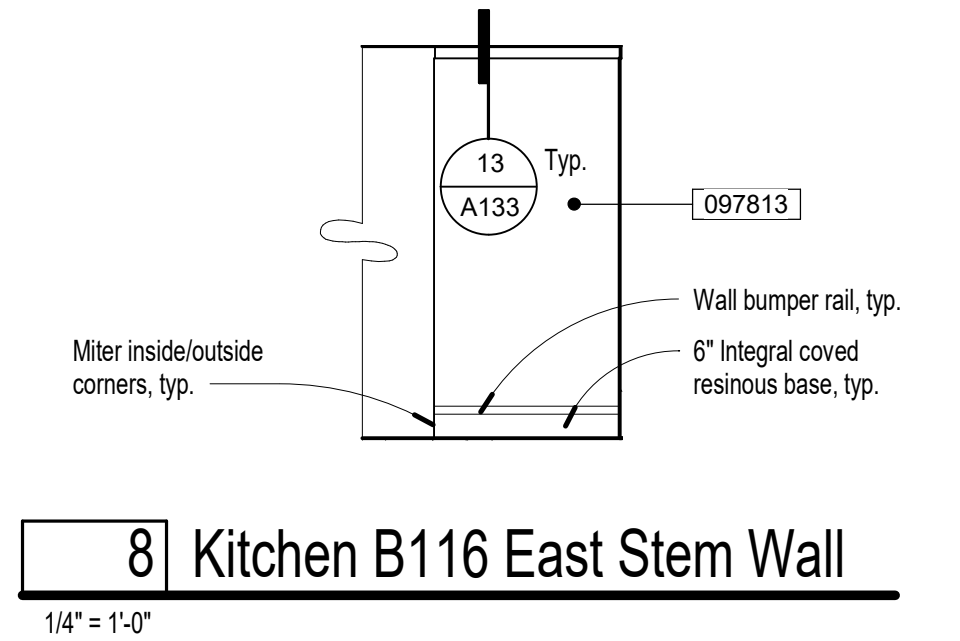
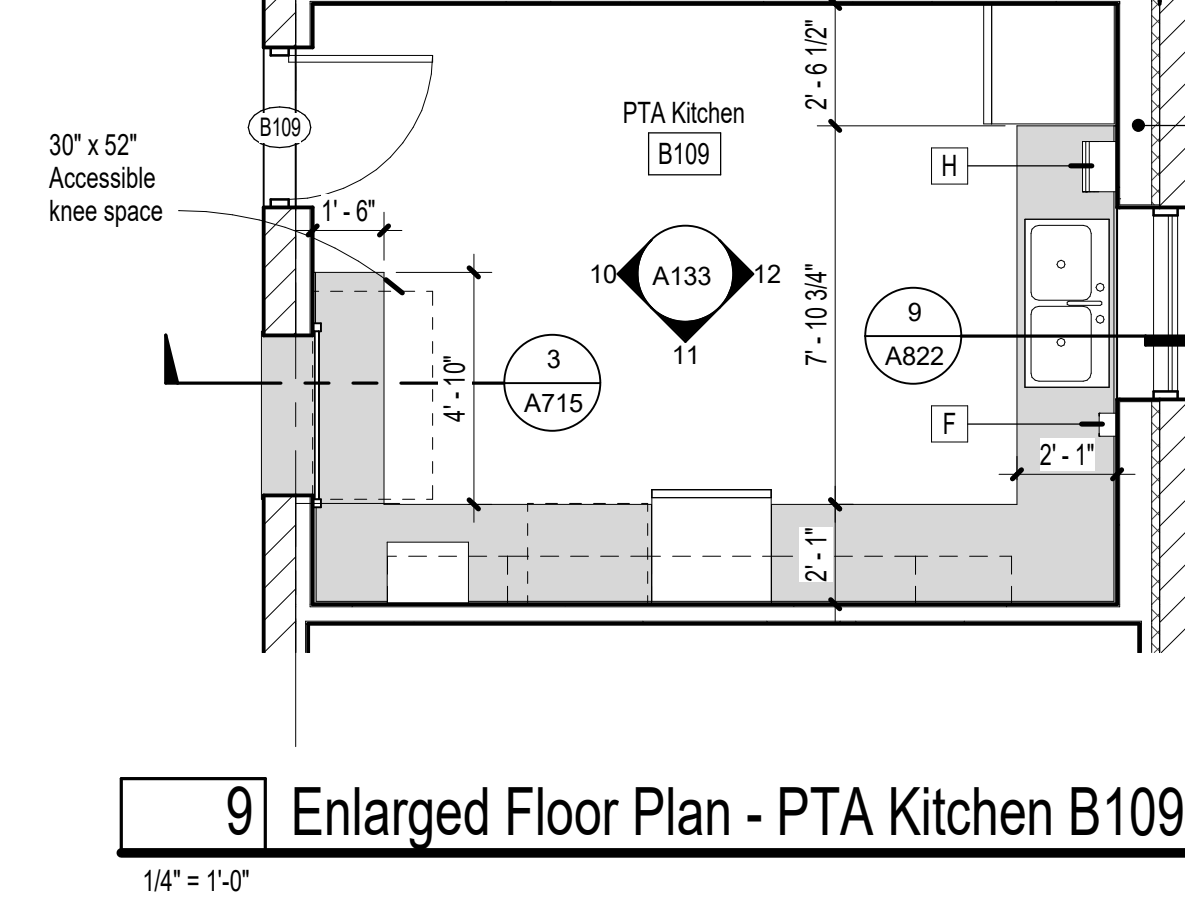
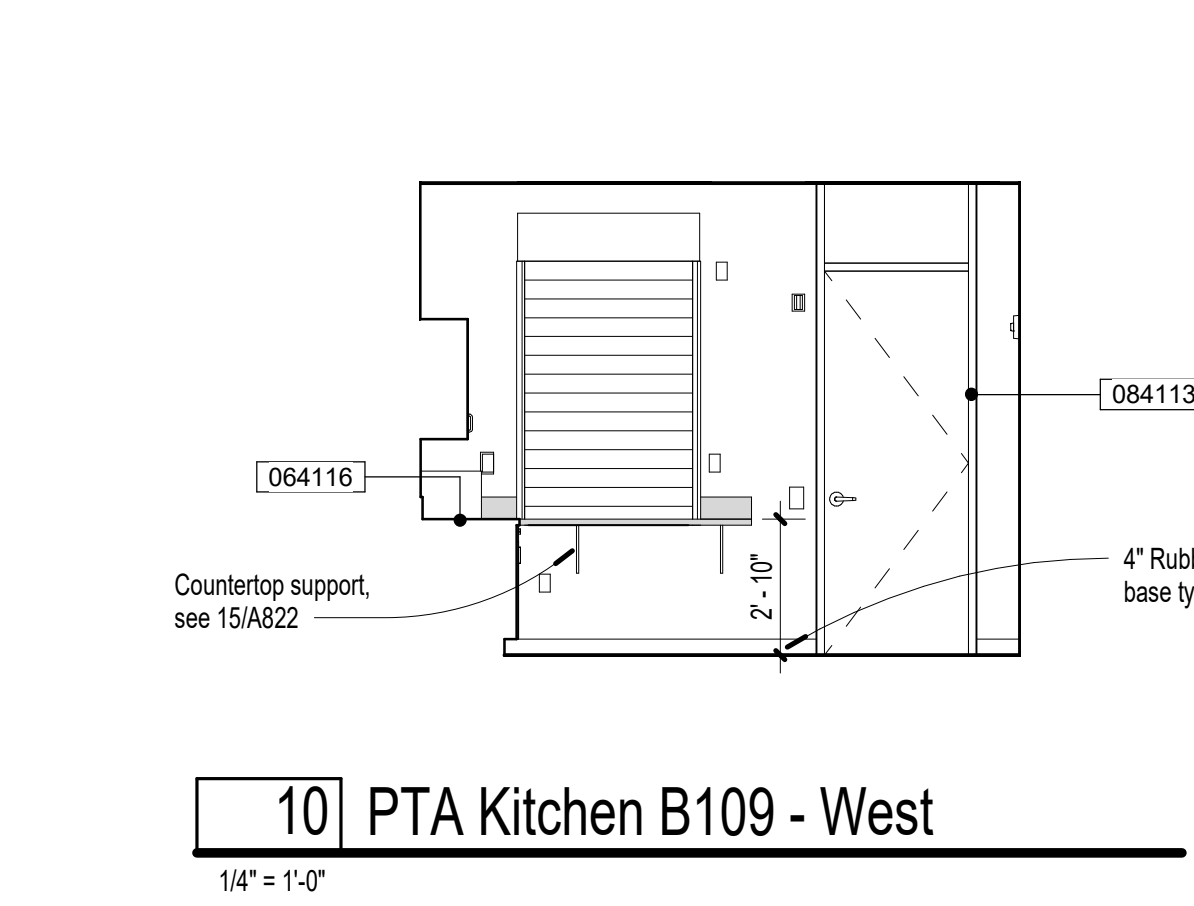
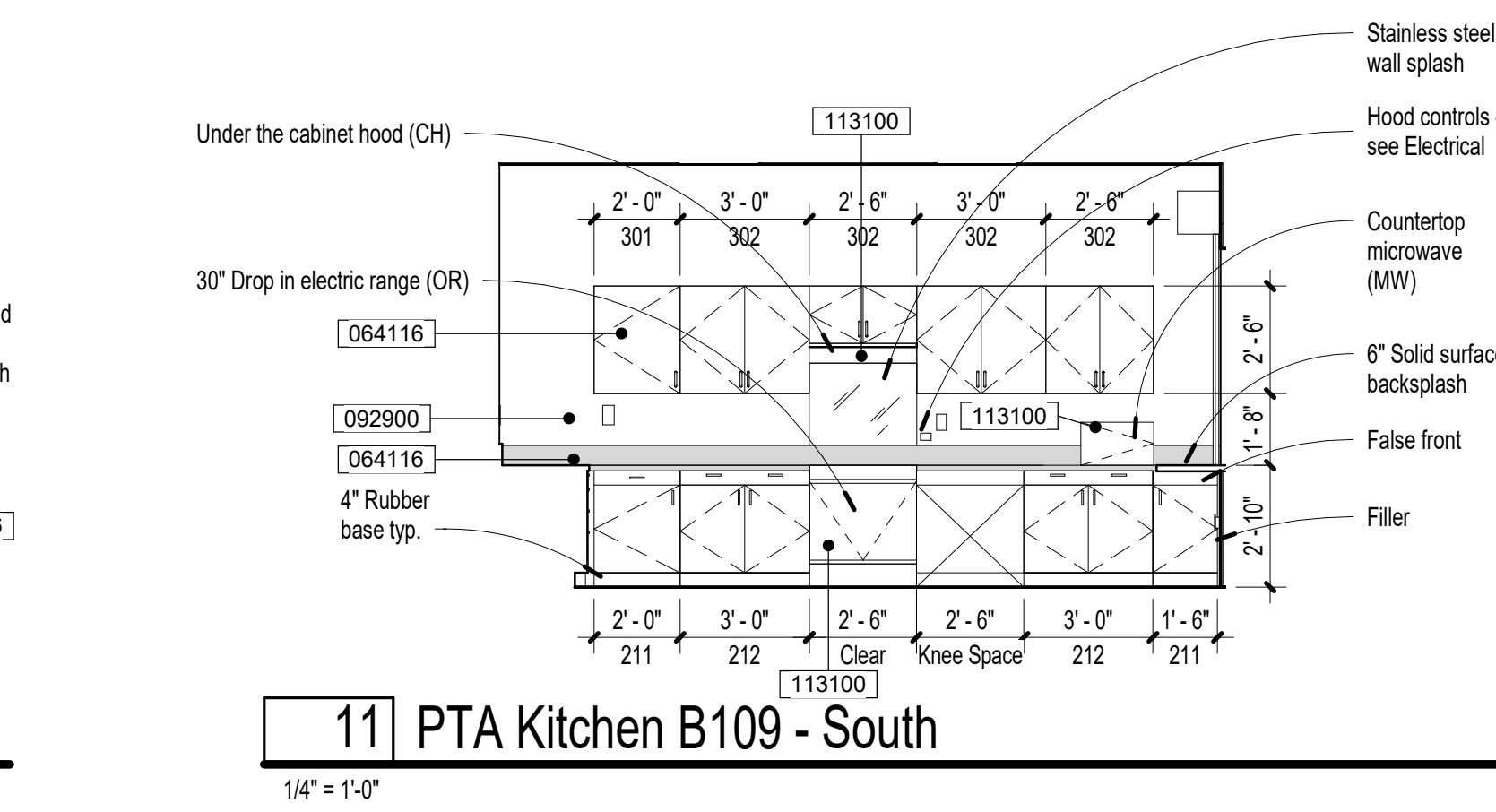
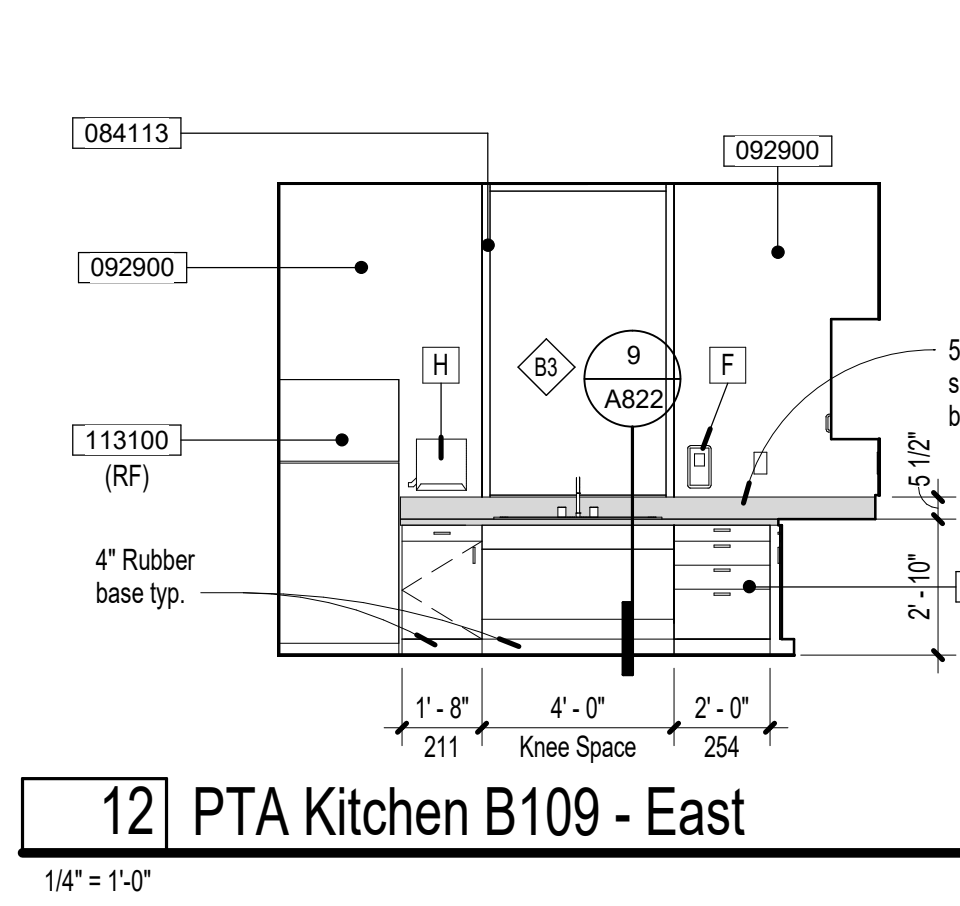
1 1/2" = 1'-0"

14 Foundation at Freezer

1 1/2" = 1'-0"

13 Stainless Steel at Ceiling

3" = 1'-0"



1 Enlarged Plan - Kitchen B116

1/4" = 1'-0"

Sheet Notes

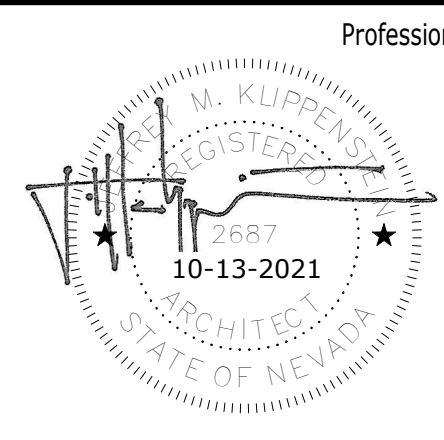
- All door locations in gypsum board partitions not dimensioned will be 4" from the studs of perpendicular wall to edge of rough opening (U.N.O.).
- All dimensions are from face-of-stud, face of CMU, or center of framed opening, unless noted otherwise.
- Overall and major dimensions are shown on this plan. For dimensions of masonry walls and rough openings, see the Structural drawings. Where the plans reference enlarged plans, see the enlarged plans for specific dimensions in those areas. Masonry dimensions shown on this plan are for reference only. Any discrepancies found between the dimensions on this sheet and the Structural drawings shall be brought to the immediate attention of the Architect.
- Provide 6" wide, 24 gage flat strap backing behind all fixtures and wall mounted accessories. This includes cabinets and any other items that are wall mounted. Blocking shall span a minimum of three studs and be connected to each stud with a minimum of two screws.
- Refer to Mechanical, Plumbing, Electrical, and Telecom plans for equipment related to those disciplines. All required equipment not necessarily noted on this sheet.
- Room Signage: Provide signs adjacent to doors where indicated on plan. Signs will be ADA compliant and the text will be that indicated on the Room Signage Schedule.
- Openings, pockets, etc. shall not be placed in slabs, beams, columns, walls, etc., unless specifically detailed on the drawings.
- Cap all open ends in structural steel components, typical.
- The exposed concrete floors will have all exposed construction and control joints sealed with a polyurethane sealant bead (backer rod where required).
- Provide a rubber-vinyl reducer or transition trim at all intersections of carpet and resilient tile, carpet and vinyl sheet goods, or at all edges of carpet that abut a raised or lowered surface of dissimilar material.
- Refer to the Site Plan for concrete stoops and walkways.
- Kitchen equipment shown in Drawings shall be Contractor supplied and Contractor installed. Contractor is to provide rough-ins for Plumbing and Electrical. The Contractor shall also provide the Mechanical exhaust, exhaust hood and make-up air. The Contractor shall complete the final hookup and installation of the kitchen equipment as provided by the Owner. Coordinate exact locations of rough-ins with the owner's kitchen consultant prior to construction. See Mechanical, Plumbing, Electrical, AND Telecom Drawings for additional requirements.
- There should be no surface mounted conduit. All conduit to be concealed.
- See Code Analysis Plans, sheets G102 and G103, and Fire Protection Assemblies, sheet G210 and G211, for fire rated construction, rated enclosures, and occupancy classifications.
- The Contractor shall install two (2) Contractor provided recess mounted "Knox Box" #3272 (Aluminum) in an exterior wall location selected by the Owner. (1) One Knox Box shall be installed at a height specified by Owner, and (1) one Knox Box shall be installed 6'-0" A.F.F. Knox box shall be located adjacent to main entrance. Final location shall be coordinated with fire department. Contractor shall include cost of Knox Boxes and all labor for installation in their bid.
- Floor Drains and Floor Sinks: Provide positive drainage to all floor drains and floor sinks. See details, sheet G403.

Project Keynotes

Keynote	Description
064116	Plastic-Laminate-Faced Architectural Cabinets
081113	Hollow Metal Doors and Frames
084113	Aluminum-Framed Entrances and Storefronts
092900	Gypsum Board
097813	Metal Interior Wall Paneling
102800	Wall and Door Protection
113100	Residential Appliances
114000	Foodservice Equipment
224000	Plumbing Fixtures

Appliance Schedule

MARK	TYPE	DESCRIPTION	LOCATION
OR	Residential	General Electric JDE30DF 30" Drop in Electric Range	B109, A110
MW	Residential	General Electric JES1145DLWW Countertop Microwave	B109, A110
RF	Residential	GE GGIE18ETHWW 18.2 cu. ft. Top Freezer Refrigerator	B109, A110, C130, C229
MF	Residential	U-Line CO29FW-00A-ADA Combo Model	A103
LC	Residential	Kenmore 81422 24" 1.5 cu.ft. Electric Laundry Center	C123
CW	Residential	GE GGFV430SMWW 4.5 cu. ft. Front Load Washer	B112
CD	Residential	GE GGF430SMWW 7.5 cu. ft. Front Load Dryer	B112
CO	Commercial	Blodgett Zephraire 200-E Double Convection Oven	B116
HC	Commercial	CresCar Model H-138-1834D Insulated Hot Cabinet	B116
WI	Commercial	Nor-Lake FineLine Walk-in Refrigerator/Freezer	B116
SC	Commercial	Voltrath Company Insulated Hot Server Cabinet w/ Breath Guard	B116
SC2	Commercial	Voltrath Company Insulated Cold Server Cabinet w/ Breath Guard	B116
CH	Residential	General Electric JYX330DJWW Cabinet Hood w/ Charcoal Filter	B109, A110



Professional Seal
Date: 2 11/16/21
Revision: Addendum #3

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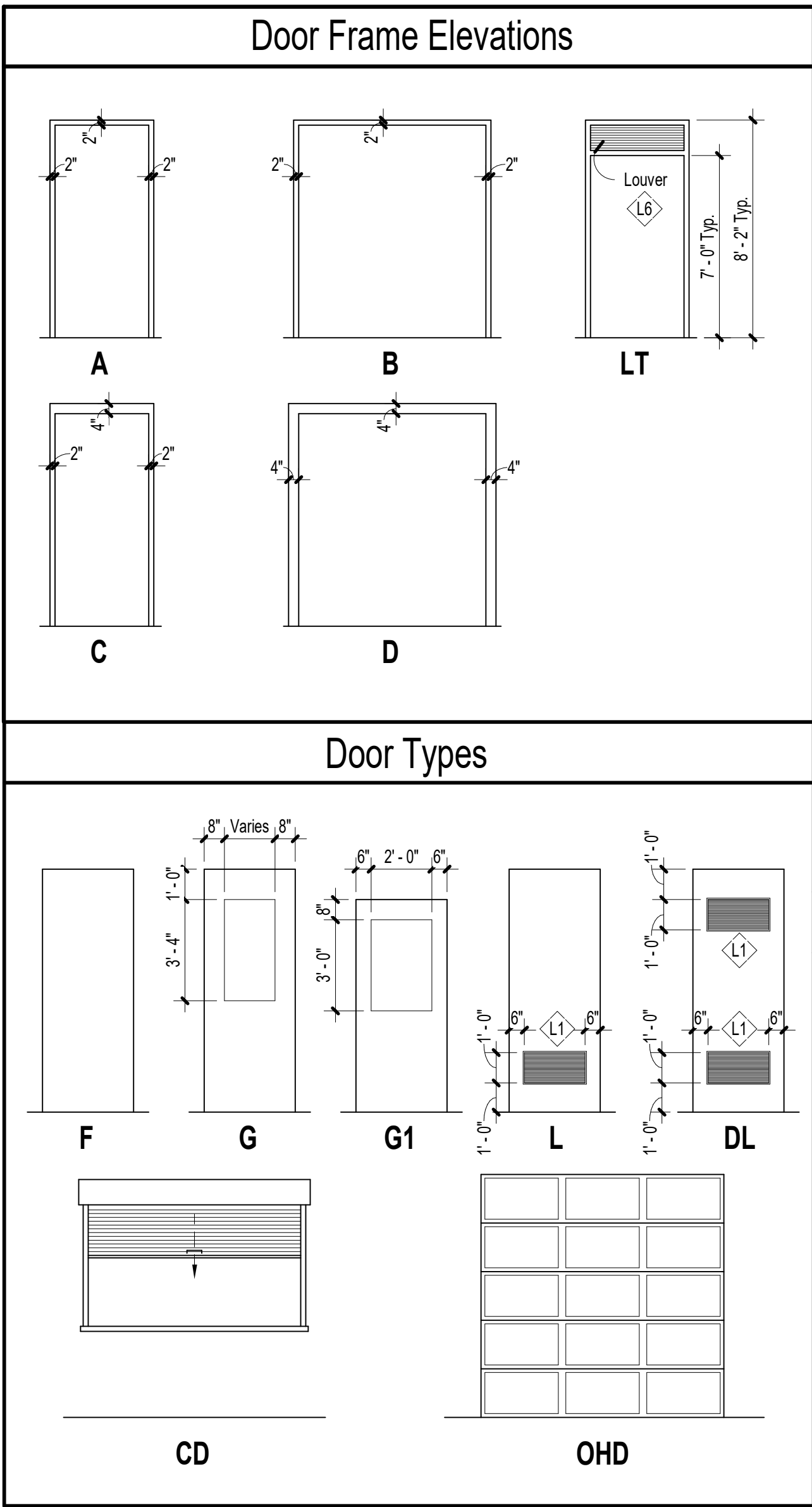
Enlarged Kitchen Plans,
Elevations and Details

October 13, 2021
H+K Project No: 2001

A133



Door Schedule - Area B																			
Door Number	DOORS						FRAME			DETAILS						Hardware Group	Comments		
	Width	Height	Pair	Material	Type	Glass	Door Rating	Material	Frame Rating	Elev.	Glass	Head	Strike	Hinge	Sill				
Level 1																			
B101A	3'-0"	8'-0"		WD	F	-		AL		B22A	G5/G7	15A707	14A707	14A707	14A709	H1			
B101B	12'-2"	11'-2"		AL	OHD	G4		AL		-	G4	13A709	23A709	23A709	-	H19		See Interior Elevation 2/A812	
B101C	3'-0"	8'-0"		WD	F	-		AL		B24A	G5/G7	15A707	14A707	14A707	14A709	H1			
B101D	2'-11 1/4"	8'-0"		WD	F	-		AL		B26A	G4	15A707	14A707	23A707	14A709	H7			
B101E	15'-0"	11'-2"		AL	OHD	G4		AL		B26A	G4	13A709	20A709	20A709	14A709	H19		See Interior Elevation 4/A812	
B101F	2'-11 1/2"	8'-0"		WD	F	-		AL		B26A	G4	15A707	14A707	23A707	14A709	H7			
B101G	3'-8"	8'-0"		WD	F	-		AL		A	-	20A707	19A707	19A707	-	H6A			
B101H	3'-8"	8'-0"		WD	F	-		AL		A	-	20A707	19A707	19A707	-	H6A			
B102A	3'-0"	8'-0"		WD	F	-		AL		B21A	G5/G7	15A707	14A707	13A707	14A709	H1			
B102B	3'-0"	8'-0"		WD	F	-		AL		B25A	G5/G7	15A707	14A707	13A707	14A709	H1			
B102MA	4'-0"	8'-0"		WP	F	-		AL (4")		A	-	20A707	24A707	23A708 O.H.	14A709	H3			
B102MB	4'-0"	8'-0"		WP	F	-		AL (4")		A	-	20A707	24A707 O.H.	23A708	14A709	H3			
B103A	3'-0"	8'-0"		WD	F	-		AL		B16	G4/G7	15A707	14A707	1A708	14A709	H1			
B103B	3'-0"	8'-0"		WD	F	-		AL		B17	G4/G7	15A707	14A707	2A708	14A709	H1			
B103C	3'-0"	8'-0"		WD	F	-		AL		A	-	5A708	4A708	3A708	-	H6A			
B103D	3'-0"	7'-0"																Folding panel door by manufacturer. See Specs.	
B104A	3'-1"	8'-0"		FRP	G	G9		AL		B1		10A707	11A707	9A707	12A709	H11		Manual integral horizontal blind lites, see Specs.	
B104B	3'-1"	8'-0"		FRP	G	G9		AL		B1		10A707	11A707	9A707 O.H.	12A709	H11		Manual integral horizontal blind lites, see Specs.	
B104C	3'-1"	8'-0"		FRP	G	G9		AL		B1		10A707	11A707	9A707	12A709	H11		Manual integral horizontal blind lites, see Specs.	
B104D	3'-1"	8'-0"		FRP	G	G9		AL		B1		10A707	11A707	9A707 O.H.	12A709	H11		Manual integral horizontal blind lites, see Specs.	
B105A	3'-0"	7'-2"		WD	F	-	1 Hour	HM	1 Hour	A	-	8A709	6A709	6A709	-	H11B		6" Vinyl letters on exterior of door to read "FIRE ALARM CONTROL PANEL"	
B105B	3'-0"	7'-2"		HM	F	-	1 Hour	HM	1 Hour	A	-	5A709	4A709	3A709	12A709	H11A		6" Vinyl letters on exterior of door to read "FIRE ALARM CONTROL PANEL ELECTRICAL ROOM"	
B106M	3'-0"	7'-2"		WD	F	-	1 Hour	HM	1 Hour	A	-	8A709	6A709	6A709	-	H6			
B107A	3'-0"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707 O.H.	19A707	-	H2B		See note #7	
B107B	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B107C	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B107D	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B107E	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B108	3'-0"	8'-0"		WD	F	-		AL		B6	G7	15A707	21A707	21A707 O.H.	14A709	H5			
B109	3'-0"	8'-0"		WD	F	-		AL		B6	G7	15A707	21A707	21A707 O.H.	14A709	H5			
B109A	3'-10"	5'-2"		ST	CD	-		ST		-	-	4A715	7A715	7A715	5A715	H19			
B110	3'-2 1/8"	8'-0"	X	WD	F	-		AL		B7	G7	15A707	16A707	16A707	-	H4A			
B111	3'-0"	8'-0"		WD	F	-		AL		B6	G7	15A707	16A707	16A707	-	H6A			
B113	3'-0"	7'-0"		WD	F	-		AL (4")		A	-	20A707	19A707 O.H.	19A707	-	H5			
B114M	4'-0"	8'-0"		WP	F	-		AL (4")		A	-	20A707	19A707 O.H.	19A707	-	H3			
B115	6'-0"	7'-0"	X	HM	DL	-		HM		B	-	2A709	-	1A709	12A709	H16		4" HM frame head and jamb	
B116A	6'-0"	7'-0"	X	HM	G1	G9		HM		D	-	24A709 Sim.	-	24A709	12A709	H16		4" HM frame head and jamb	
B116B	3'-8"	8'-0"		WD	G	G9		HM		A	-	11A709	9A709	10A709	14A709	H6		Custom frame with masonry anchors. Manual integral horizontal blind lites, see Specs.	
B118A	3'-0"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707 O.H.	19A707	-	H2B		See note #7	
B118B	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B118C	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B118D	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B118E	2'-4"	7'-0"		FRP	F	-		AL (4")		LT		15A707	19A707	19A707 O.H.	-	H2		See note #7	
B119M	3'-0"	7'-2"		WD	F	-		AL		A	-	7A709	6A709	6A709 O.H.	-	H11B			
B121A	3'-0"	8'-0"		FRP	G	G1		AL		B19	G1/G4/G6/G7	6A707	8A707	7A707	12A709	H12		Closer to allow for greater than 90 degree swing.	
B121B	3'-0"	8'-0"		FRP	G	G1		AL		B19	G1/G4/G6/G7	6A707	8A707	7A707	12A709	H11		Closer to allow for greater than 90 degree swing.	
B121C	3'-0"	8'-0"		FRP	G	G1		AL		B19	G1/G4/G6/G7	6A707	8A707	7A707	12A709	H11		Closer to allow for greater than 90 degree swing.	
B121D	3'-0"	8'-0"		FRP	G	G4		AL		B20	G1/G4/G6/G7	6A707	8A707	12A707	14A709	H10		Closer to allow for greater than 90 degree swing.	
B121E	3'-0"	8'-0"		FRP	G	G4		AL		B20	G1/G4/G6/G7	6A707	8A707	8A707	14A709	H10		Closer to allow for greater than 90 degree swing.	
B121F	3'-0"	8'-0"		FRP	G	G4		AL		B20	G1/G4/G6/G7	6A707	8A707	7A707	14A709	H10		Closer to allow for greater than 90 degree swing.	
B123A	3'-0"	8'-0"		FRP	G	G5		AL		B13	G1/G6	6A707	8A707 O.H.	7A707 O.H.	12A709	H11			
B123B	3'-0"	8'-0"		FRP	G	G4		AL		B14	G4/G7	6A707	8A707 O.H.	7A707 O.H.	14A709	H10			
B124	3'-7"	8'-0"	X	FRP	G	G9		AL		B15		7A708	-	8A708 O.H.	13A709	H9		Provide Radius Meeting Stiles. Manual integral horizontal blind lites, see Specs.	
B125	3'-7"	8'-0"	X	FRP	G	G9		AL		B15		7A708	-	8A708 O.H.	13A709	H9		Provide Radius Meeting Stiles. Manual integral horizontal blind lites, see Specs.	
B126A	3'-0"	8'-0"		FRP	G	G9		AL		B5	G7	6A707	8A707	7A707	14A709	H10		Manual integral horizontal blind lites, see Specs.	
B126B	3'-0"	8'-0"		FRP	G	G9		AL		B5	G7	6A707	8A707	7A707	14A709	H10		Manual integral horizontal blind lites, see Specs.	
B126C	3'-0"	8'-0"		FRP	G	G5		AL		B4	G1/G6	6A707	8A707	7A707	12A709	H11			
B126D	3'-0"	8'-0"		FRP	G	G5		AL		B4	G1/G6	6A707	8A707	7A707	12A709	H11			
B127A	6'-0"	7'-0"	X	HM	F	-		HM		D	-	2A709	-	1A709	12A709	H17		4" HM frame head and jamb	
B127B	3'-7"	8'-0"	X	WD	F	-		AL		B8	-	15A707	-	7A709	-	14A709	H18		
B130	3'-8"	7'-2"		HM	F	-		HM		A	-	7A709	-	6A709	12A709	H15			
B130A	3'-8"	7'-2"		HM	F	-		HM		A	-	7A709	-	6A709	12A709	H15			
B131M	3'-8"	7'-2"		HM	F	-		HM		A	-	7A709	-	6A709	12A709	H15			
B133	3'-8"	7'-2"			F	-				A									
T.O. Mech. Platform Deck																			
B201M	3'-0"	7'-0"		HM	F	-		HM		A	-	2A709	1A709	1A709	17A709	H15		Sill at 15'-10" - with 4" HM Head at Frame	



Glazing, Material, and Type Legend

Glazing Legend:

- G1 1" Insulated, tempered and laminated glass
- G3 BR3 Rated Security glazing - See Specifications
- G4 1/4" Clear tempered glass
- G5 BR2 Rated Security glazing - See Specifications
- G6 1" Exterior opaque insulated panel
- G7 1" Interior opaque panel - Color 1
- G8 1" Interior opaque panel - Color 2
- G9 1" Insulated tempered glass with integral blind
- G10 1" Insulated translucent glass
- GS Not Used
- GF Vinyl Glazing Film

Material and Type Legend:

- WD Solid Core Wood Veneer-faced
- WP Solid Core Wood Veneer P-Lam Face
- HM Steel Hollow Metal - painted
- AL Aluminum
- ST Steel
- FRP Fiber-Reinforced Plastic

Aluminum Window w/manually operated venetian blinds - see Specification Section 08513

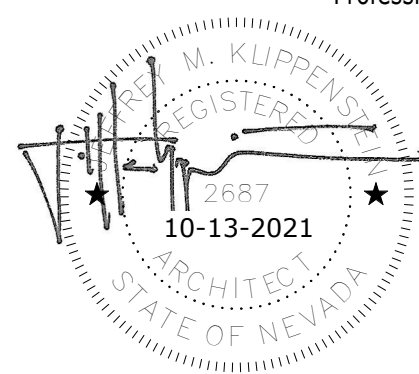
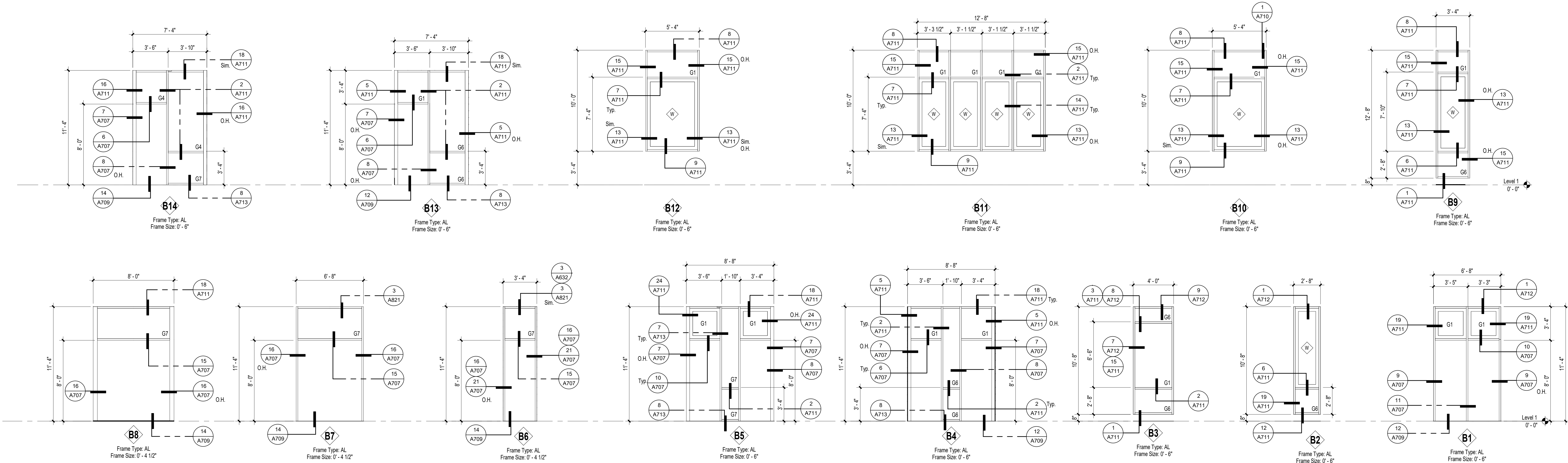
Ballistic Rated Aluminum Window w/ manually operated venetian blinds - see Specification Section 08513

Door Schedule Notes

- Contractor and subcontractors shall provide all required electrical service and equipment for complete installation of any hardware requiring electrical service even though they may not be specifically noted on the electrical drawings.
- Hardware locations shall be in accordance with current edition of ANSISDI A250.6 for steel doors. Hardware for wood doors shall be located per DHI-WDH5-3. Contractor shall coordinate all door handing including all hardware provisions.
- Hardware supplier shall coordinate keying with Owner prior to submittal.
- All frame sizes in Door Schedule indicate overall frame width. Throat widths shall be coordinated by Contractor.
- Contractor to coordinate door handing per floor plans. Frame detail references do not indicate handing or orientation. Actual installations may be opposite hand, mirrored, or both. Detail references indicated for one frame condition are considered the same for all other similar conditions on that frame elevation.
- See Frame Elevations for additional details.
- Gender-neutral toilet room doors undercut - to be 1/8" above finish floor, max.

Glazing Notes:

1. All exterior windows:
U-Values shall be certified by an independent laboratory per NFRC 100 and labeled as such by the manufacturer.



Professional Seal

Date Revision

- 11/4/21 Addendum #2
- 11/16/21 Addendum #3

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Washoe County School District
Rio Wrangler Elementary School

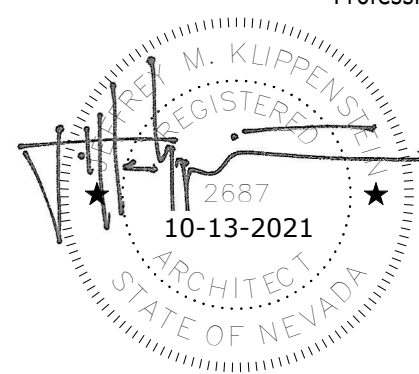
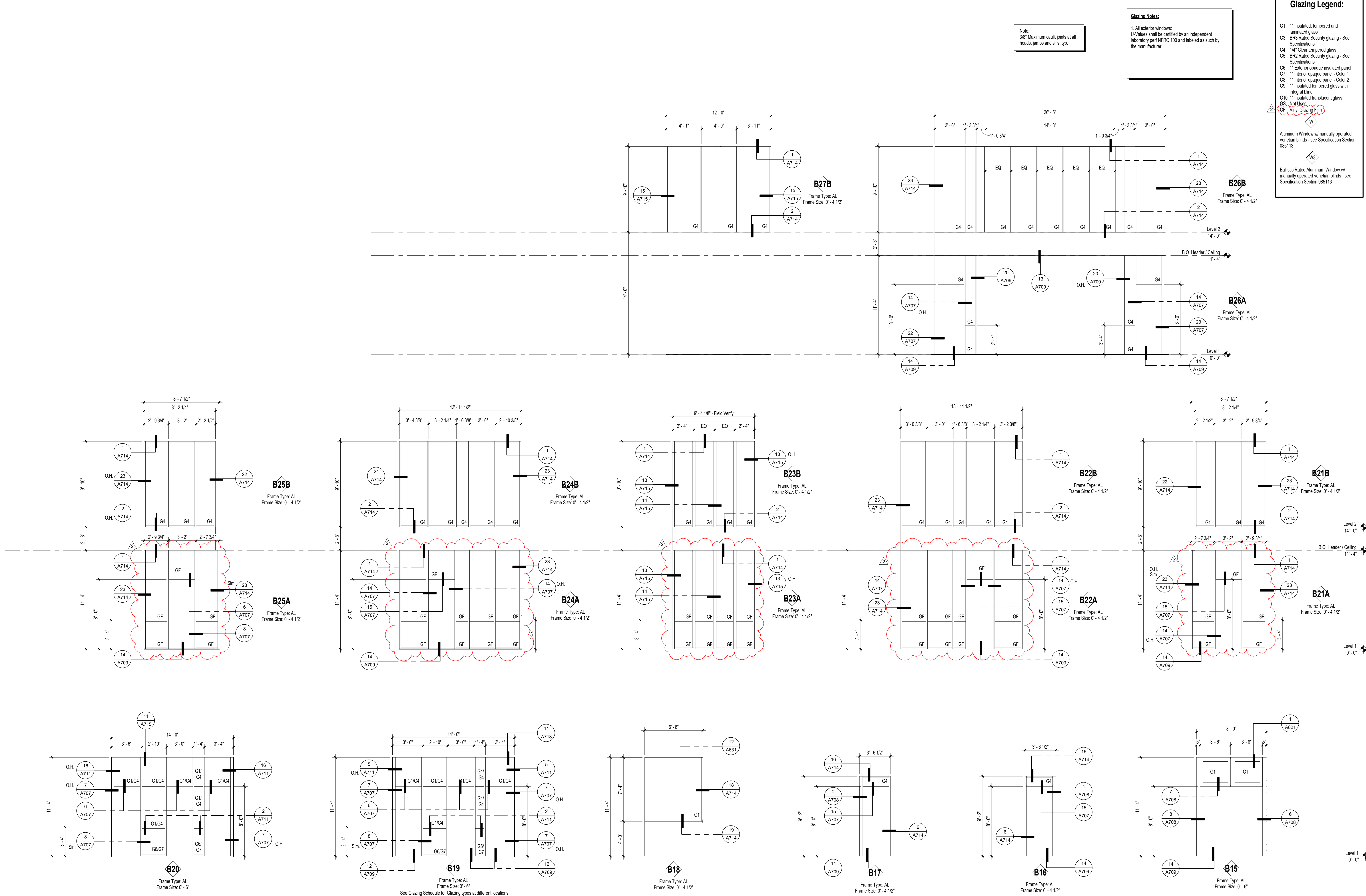
10600 Green Pasture Drive
Reno, Nevada 89521

Frame Elevations, Door
Schedule and Door
Types - Area B

October 13, 2021
H+K Project No: 2001

A703





Professional Seal

Date Revision
2 11/16/21 Addendum #3

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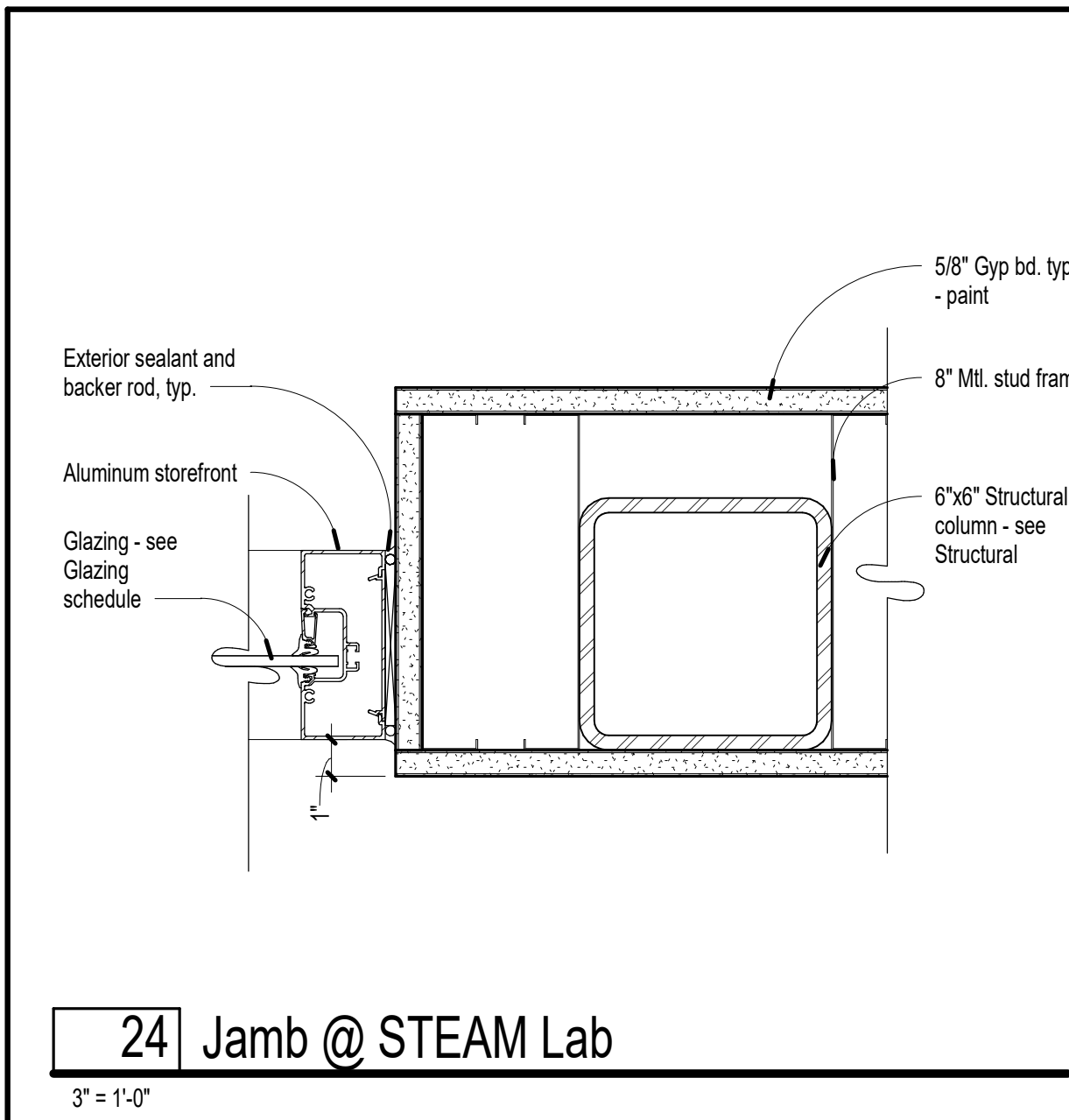
Frame Elevations - Area B

October 13, 2021
H+K Project No: 2001

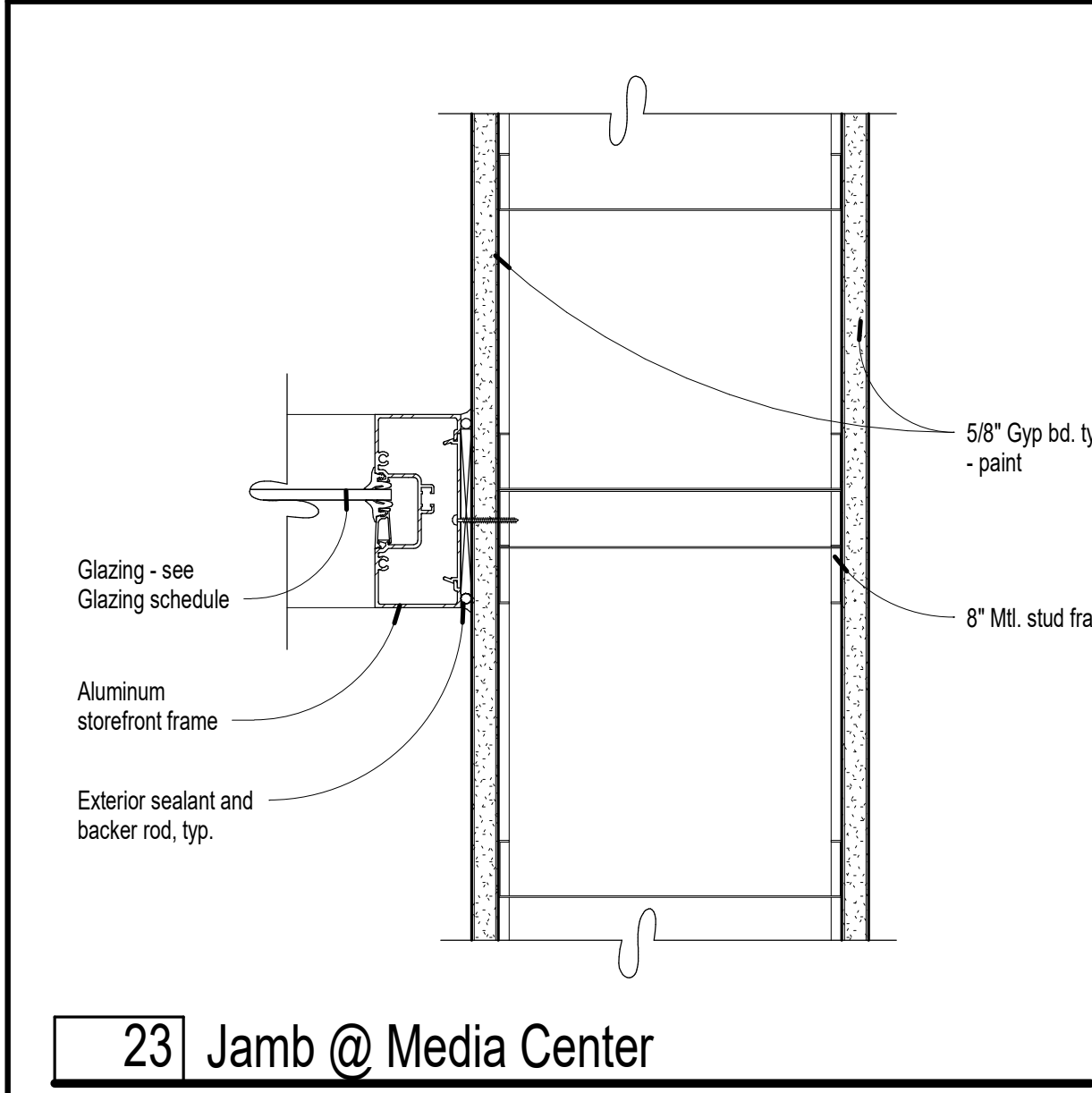
A704



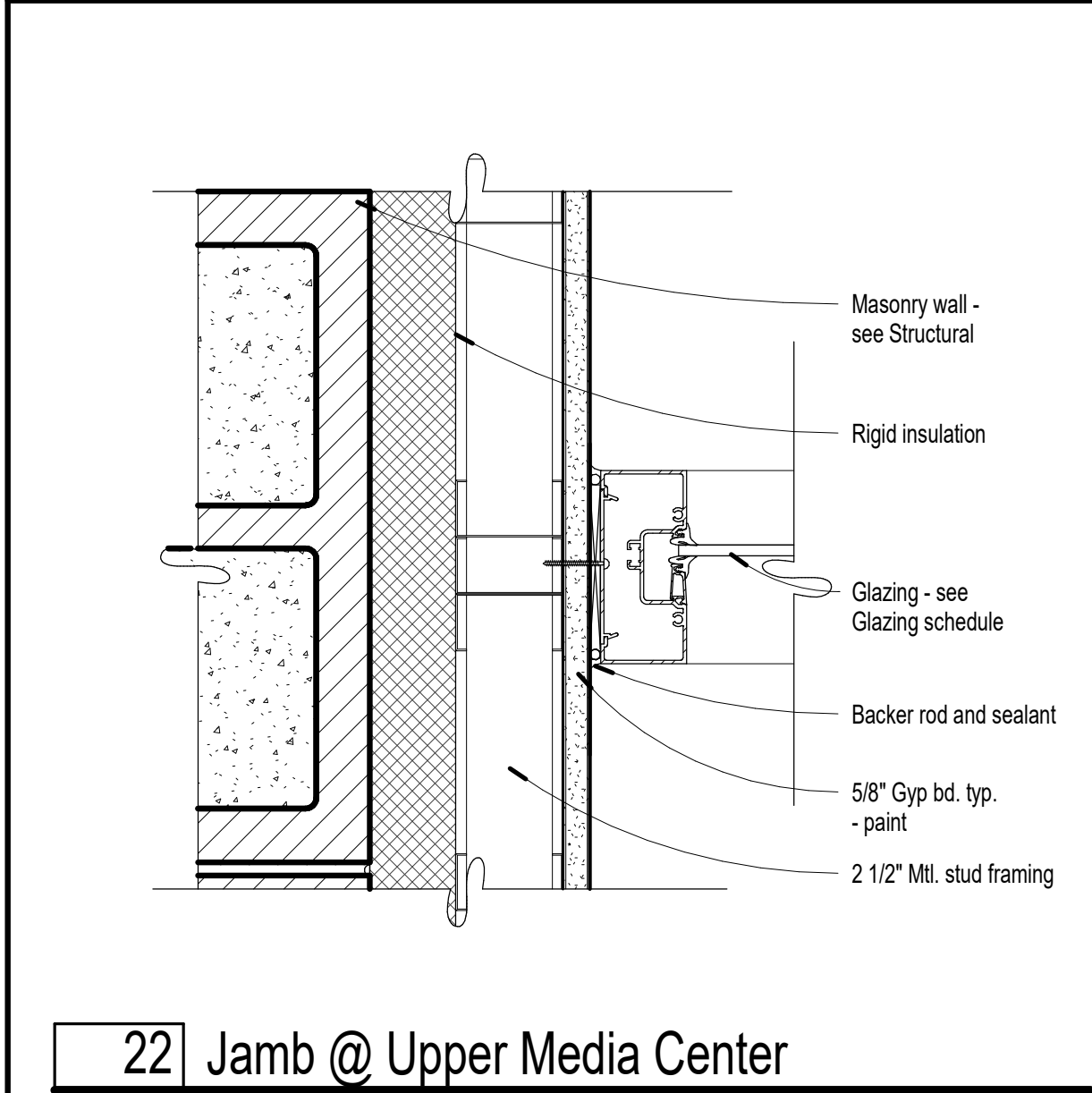
Door Schedule - Area C																	Door Schedule - Area C																								
Door Number		DOORS						FRAME					DETAILS					Hardware Group		Comments	Door Number		DOORS						FRAME					DETAILS					Hardware Group		Comments
Width	Height	Pair	Material	Type	Glass	Door Rating	Material	Frame Rating	Elev.	Glass	Head	Strike	Hinge	Sill				Width	Height		Pair	Material	Type	Glass	Door Rating	Material	Frame Rating	Elev.	Glass	Head	Strike	Hinge	Sill								
Level 2																	Level 1																								
C201	3'-0"	8'-0"		WD	F	-		AL			C11	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C101	3'-0"	8'-0"		WD	F	-		AL			C11	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C201M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3	C101M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3						
C201T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707 O.H.	-	H2C	C101T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707 O.H.	-	H2C							
C202	3'-0"	8'-0"		WD	F	-		AL	G7/G8		C14		11A/708	14A/707	10A/708	14A/709	H1A	C102	3'-0"	8'-0"		WD	F	-		AL	G7/G8		C14		11A/708	14A/707	10A/708	14A/709	H1A						
C202M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3	C102M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3						
C202T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C	C102T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C						
C203	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C103	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C203M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3	C103M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3						
C203T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707 O.H.	-	H2C	C103T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707 O.H.	-	H2C							
C204	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C104	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	10A/708	14A/709	H1A							
C204M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3	C104M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3						
C204T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C	C104T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C						
C205	3'-0"	8'-0"		WD	F	-		AL	G7/G8		C14		11A/708	14A/707	10A/708	14A/709	H1A	C105	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C205M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3	C105M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3						
C205T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707 O.H.	-	H2C	C105T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707 O.H.	-	H2C							
C206	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C106	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C206M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3	C106M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3						
C206T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C	C106T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C						
C207	3'-0"	8'-0"		AL				C14	G7/G8			11A/708	14A/707	10A/708	14A/709	H1A		C107	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
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C208	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C108	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C208M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	13A/709	H3	C108M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	13A/709	H3						
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C209	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C109	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
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C210	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C110	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
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C211	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C111	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A						
C211M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3	C111M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708 O.H.	13A/708	-	H3						
C211T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707 O.H.	-	H2C	C111T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707 O.H.	-	H2C							
C212	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C112	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	10A/708	14A/709	H1A							
C212M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3	C112M	4'-0"	8'-0"		WP	F	-		AL (4")			A		20A/707	14A/708	13A/708	-	H3						
C212T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C	C112T	3'-0"	8'-0"		WD	L	-		AL (4")			A		20A/708	19A/707	19A/707	-	H2C						
C213	3'-0"	8'-0"		WD	F	-		AL			C14	G7/G8	11A/708	14A/707	10A/708	14A/709	H1A	C113	3'-0"	8'-0"		WD	F	-		AL															



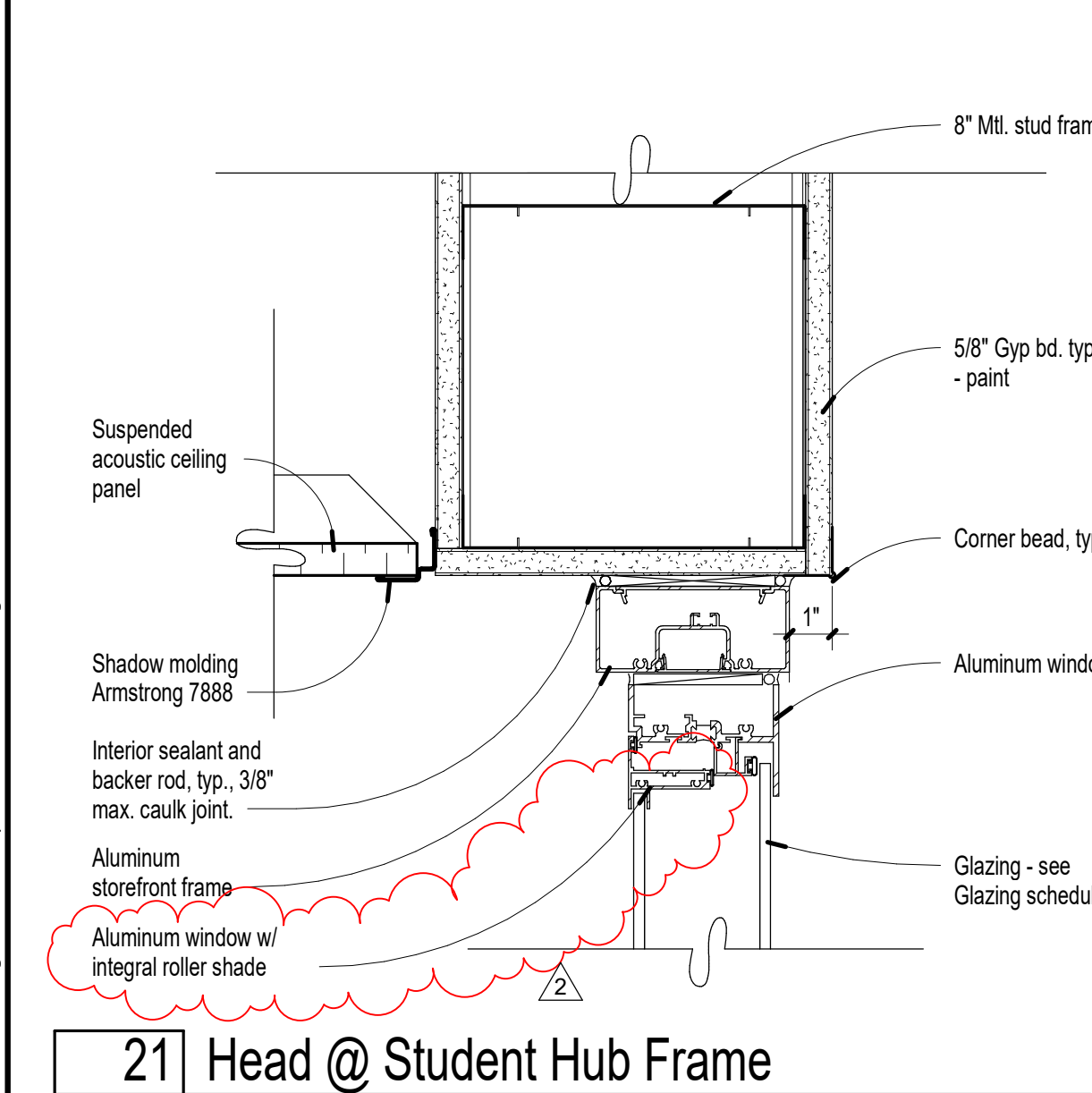
24 Jamb @ STEAM Lab



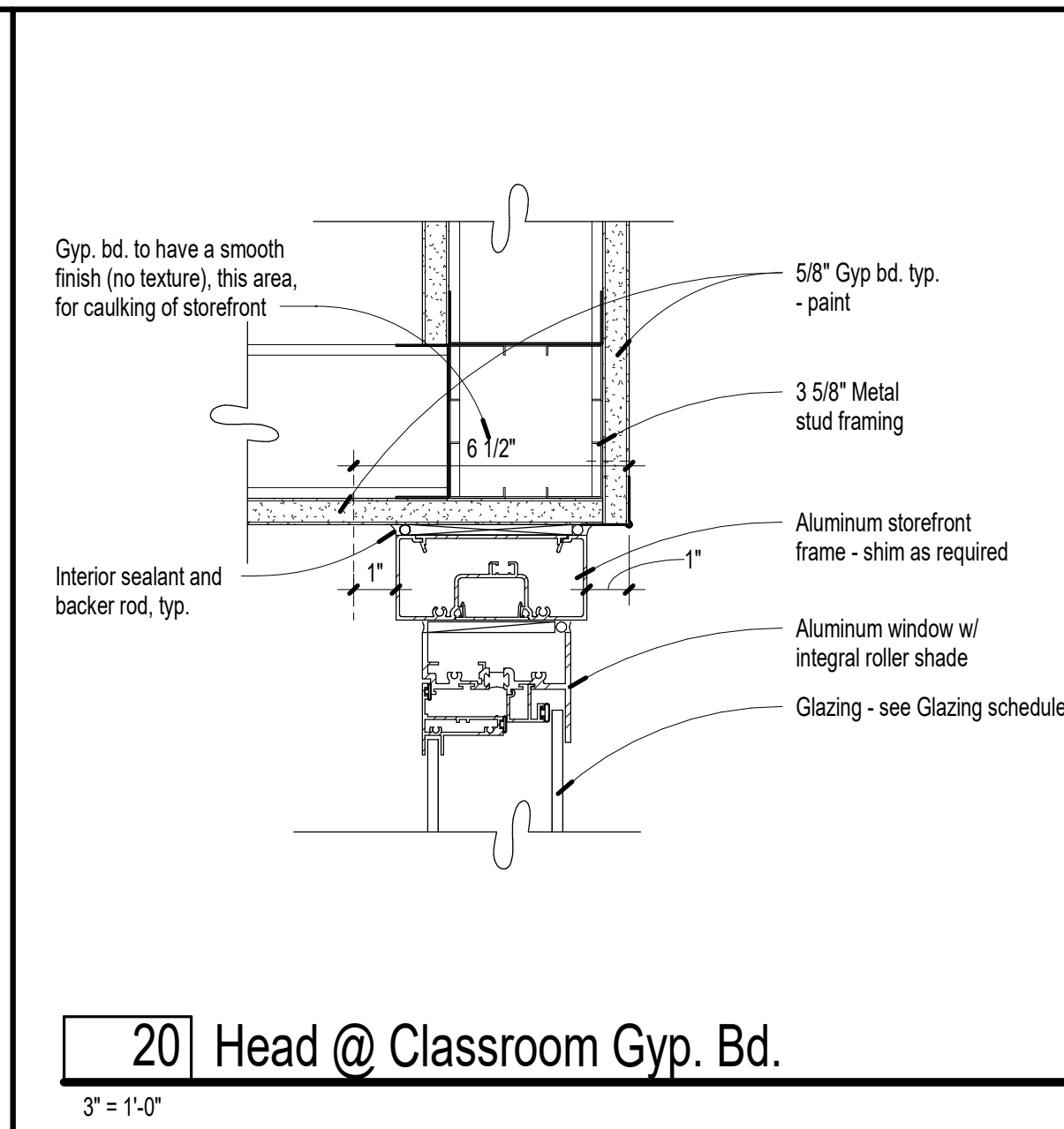
23 Jamb @ Media Center



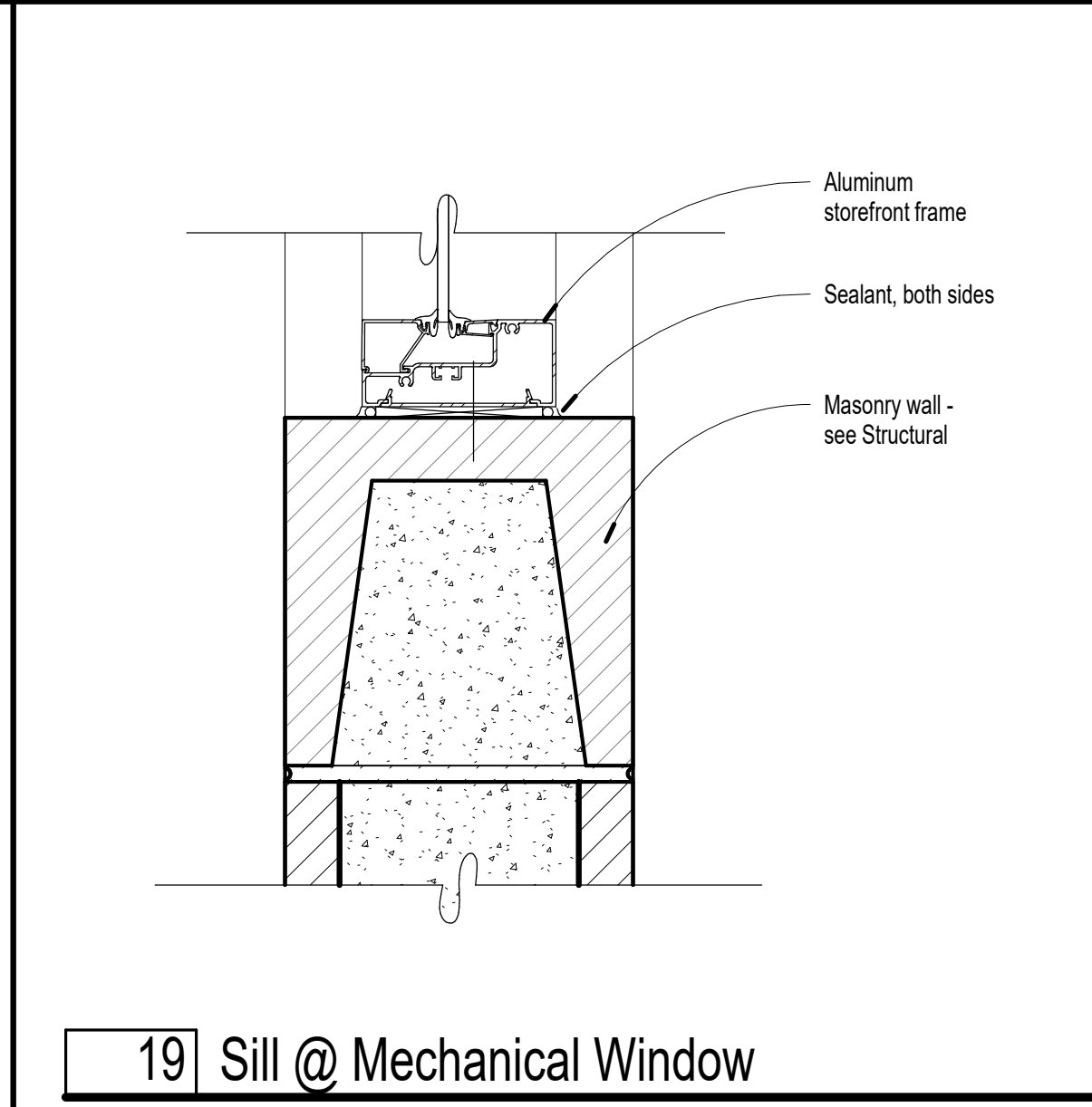
22 Jamb @ Upper Media Center



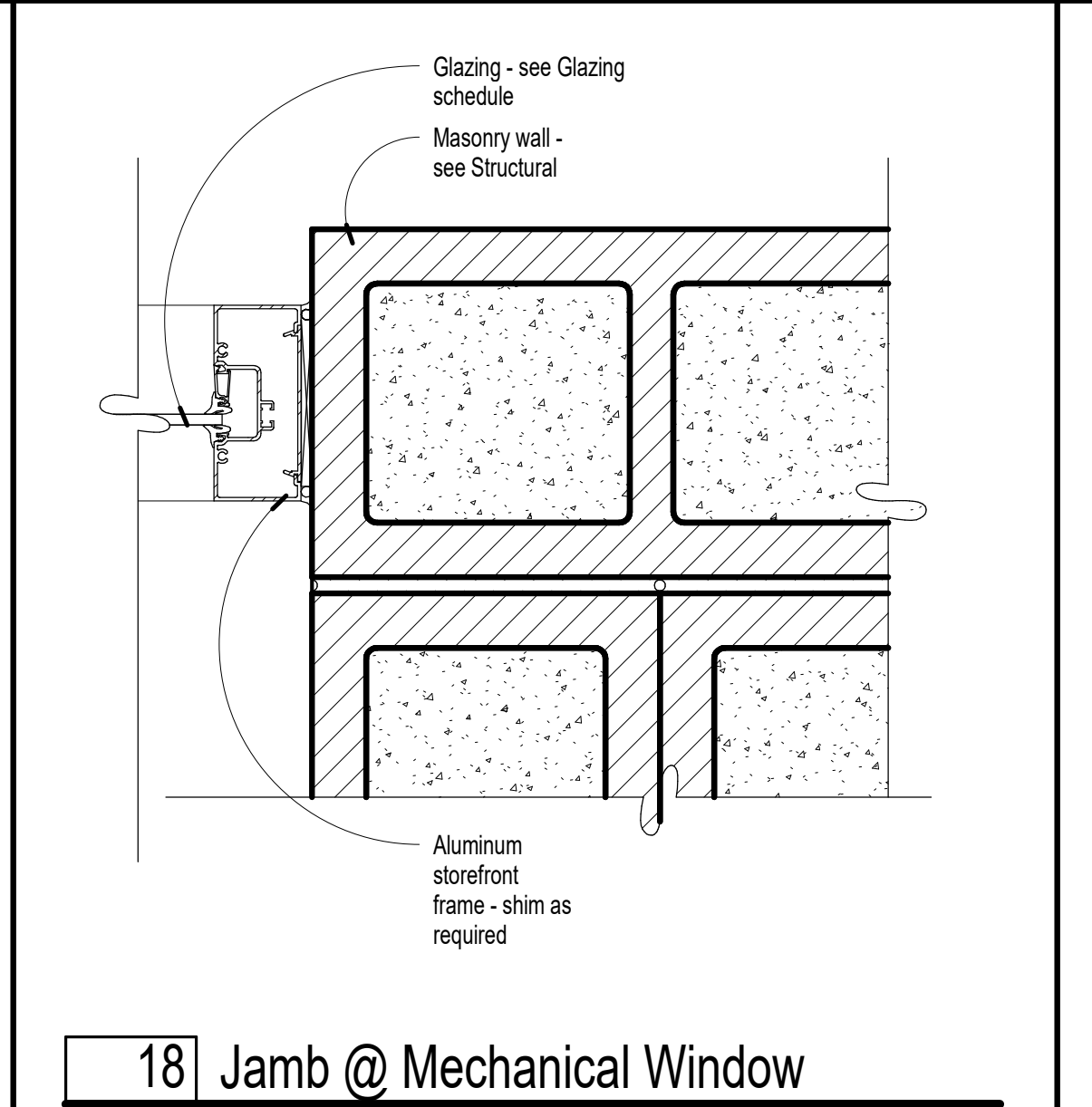
21 Head @ Student Hub Frame



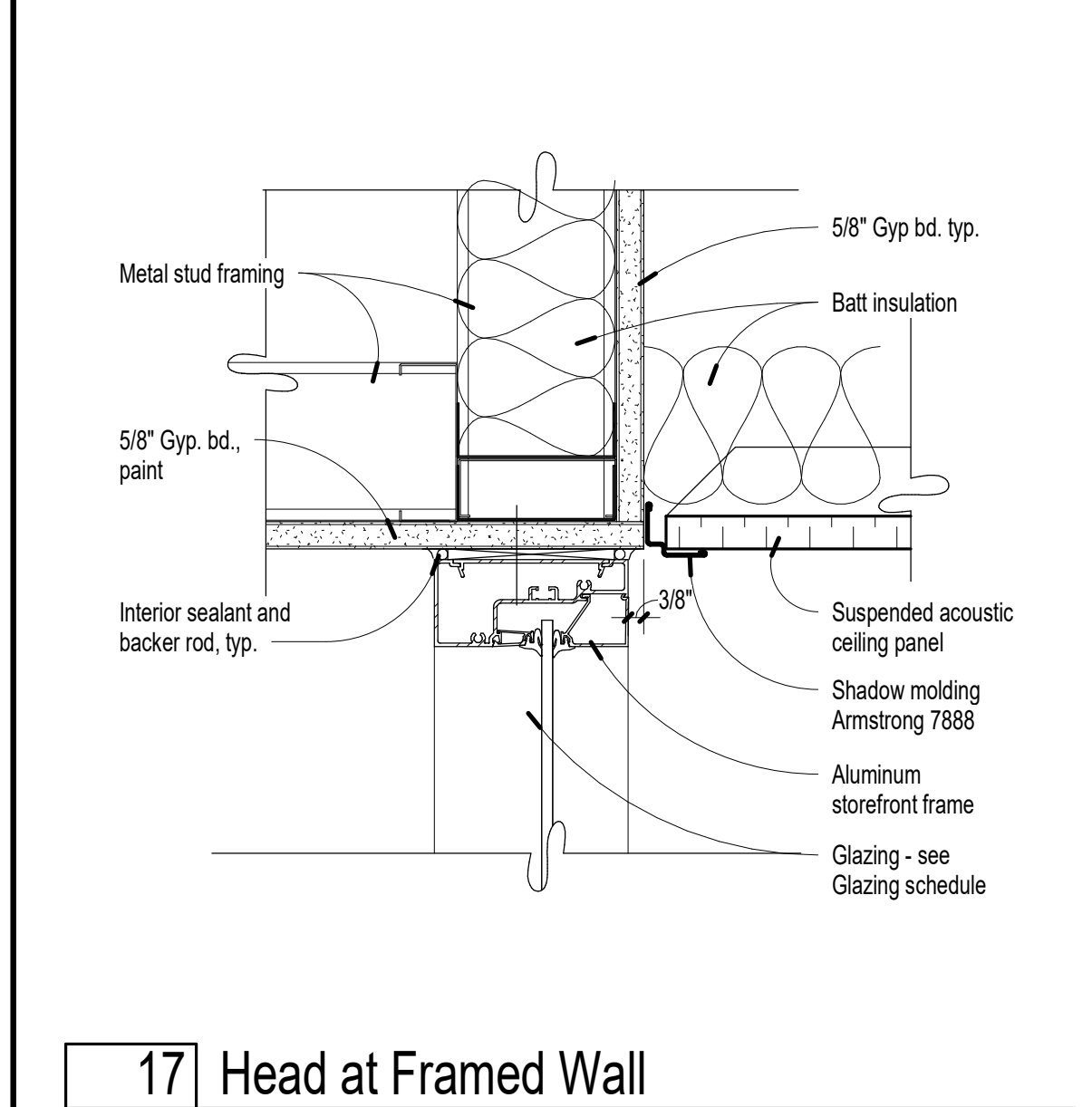
20 Head @ Classroom Gyp. Bd.



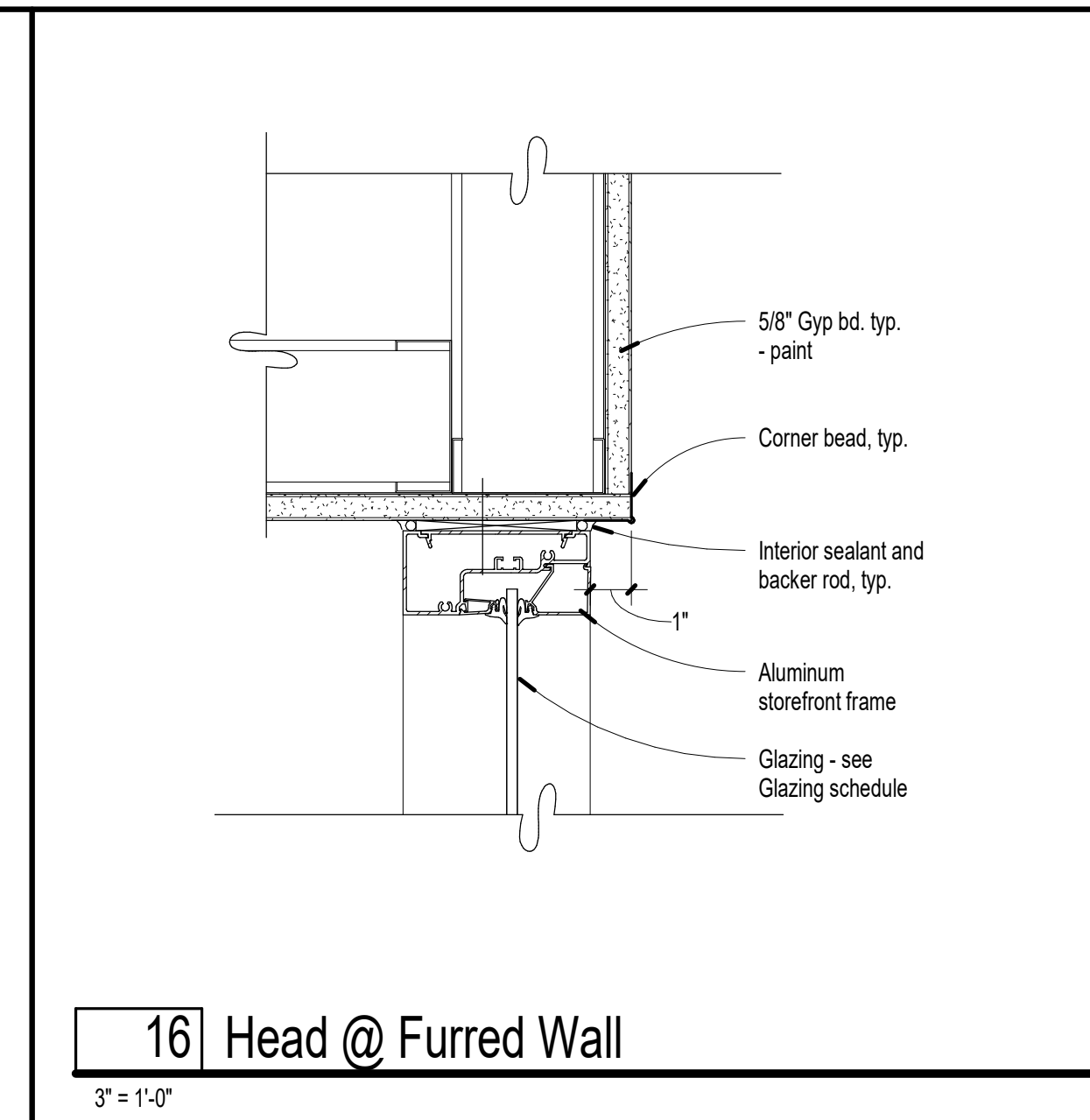
19 Sill @ Mechanical Window



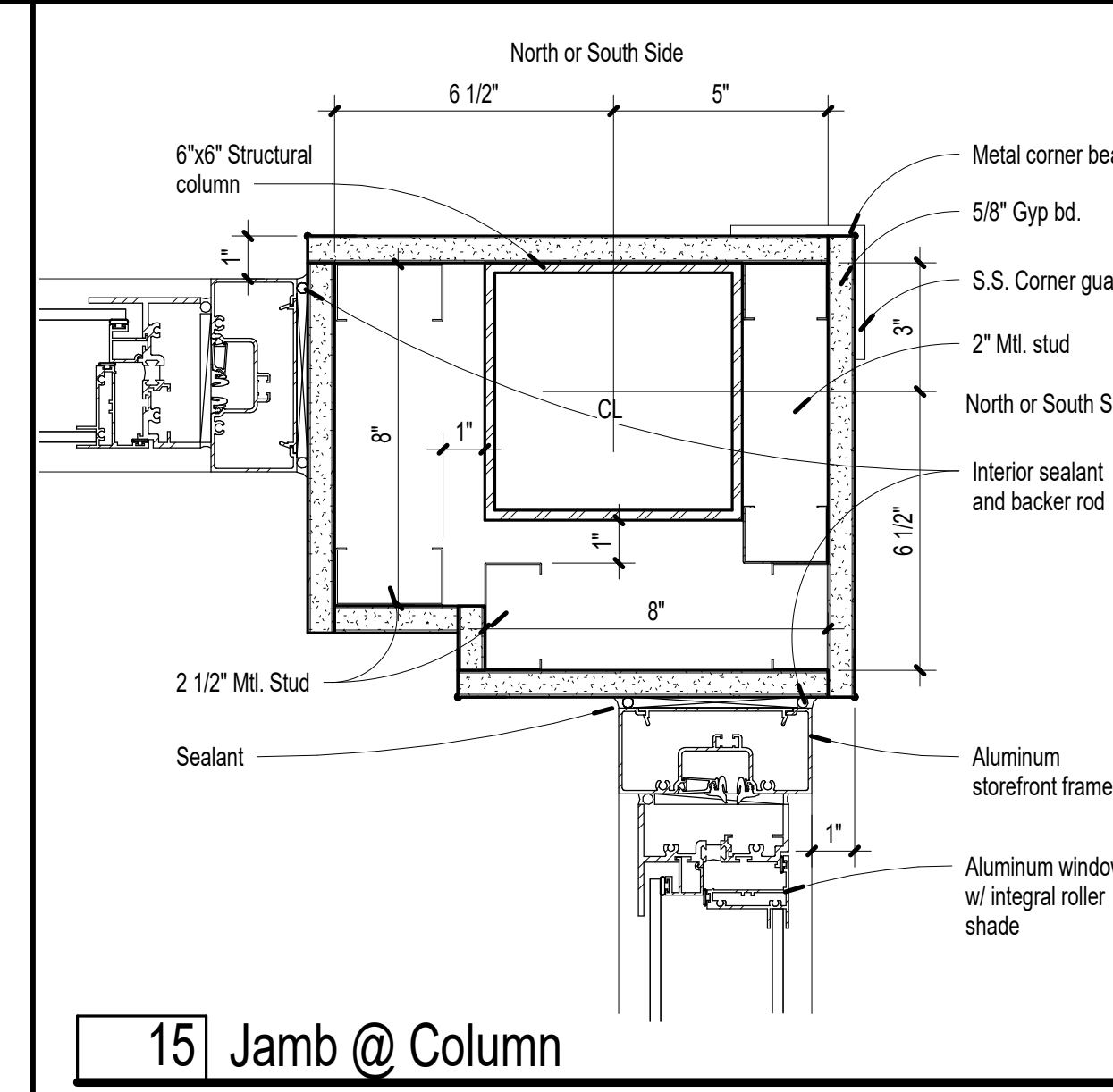
18 Jamb @ Mechanical Window



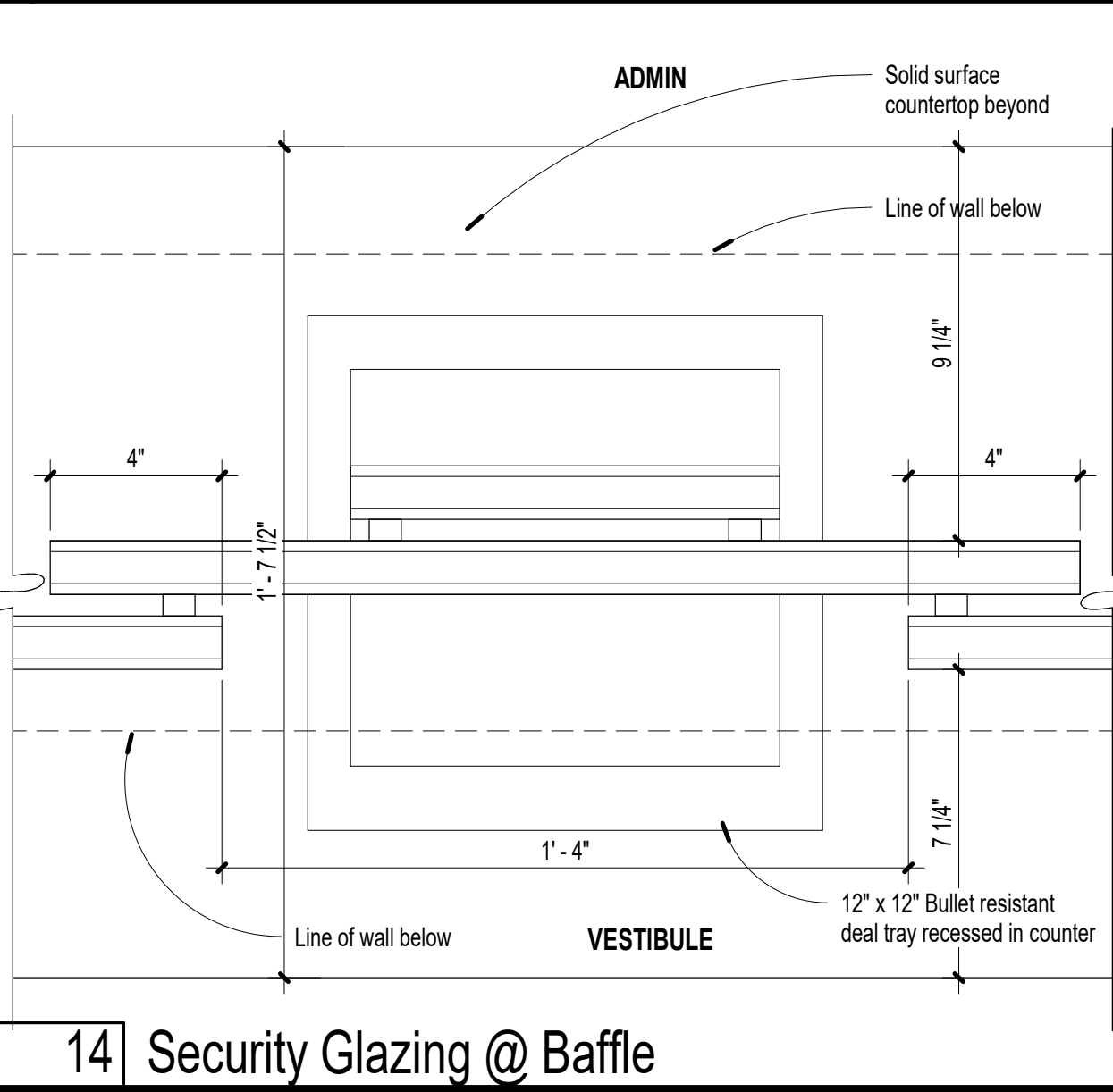
17 Head at Framed Wall



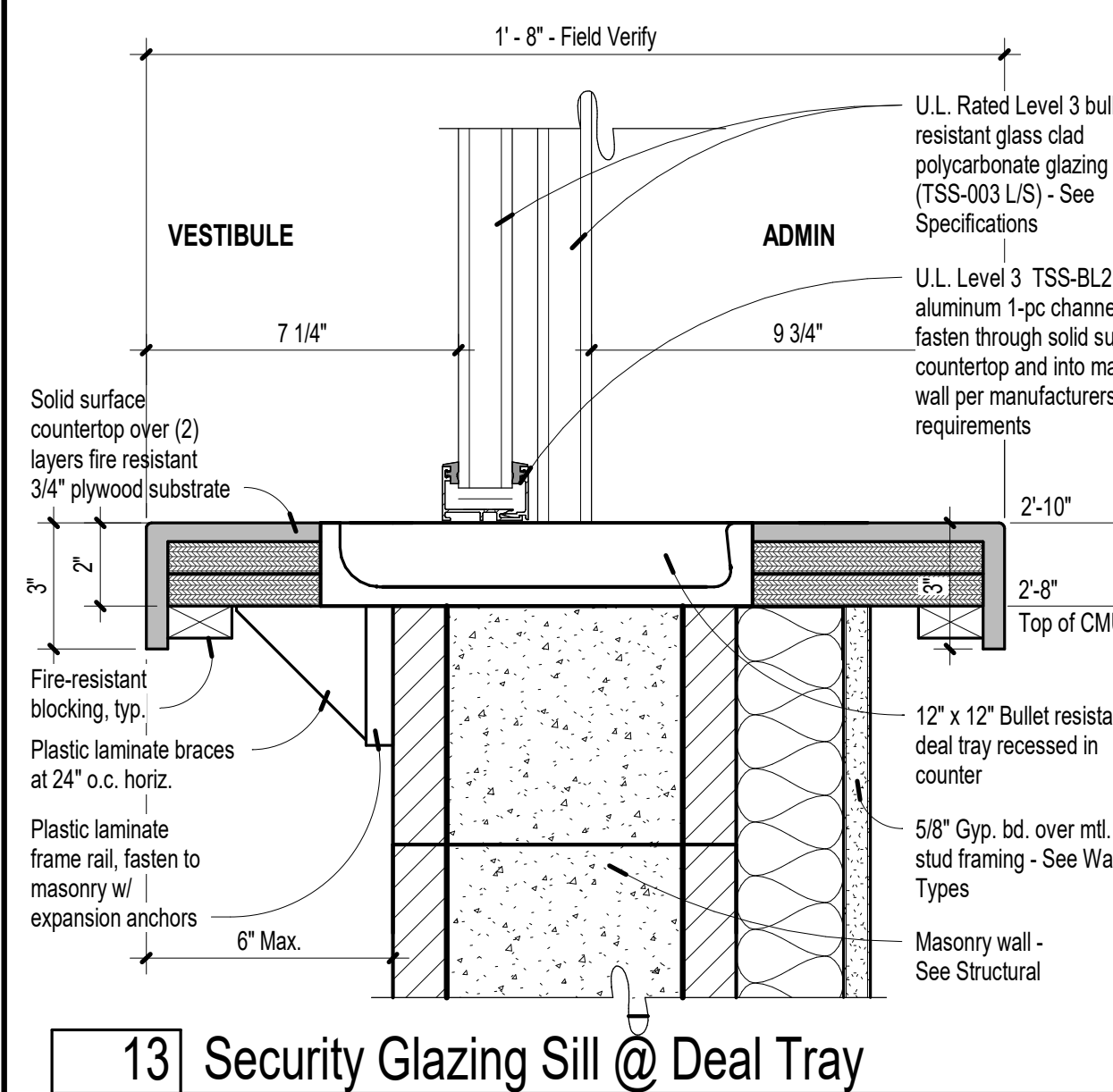
16 Head @ Furred Wall



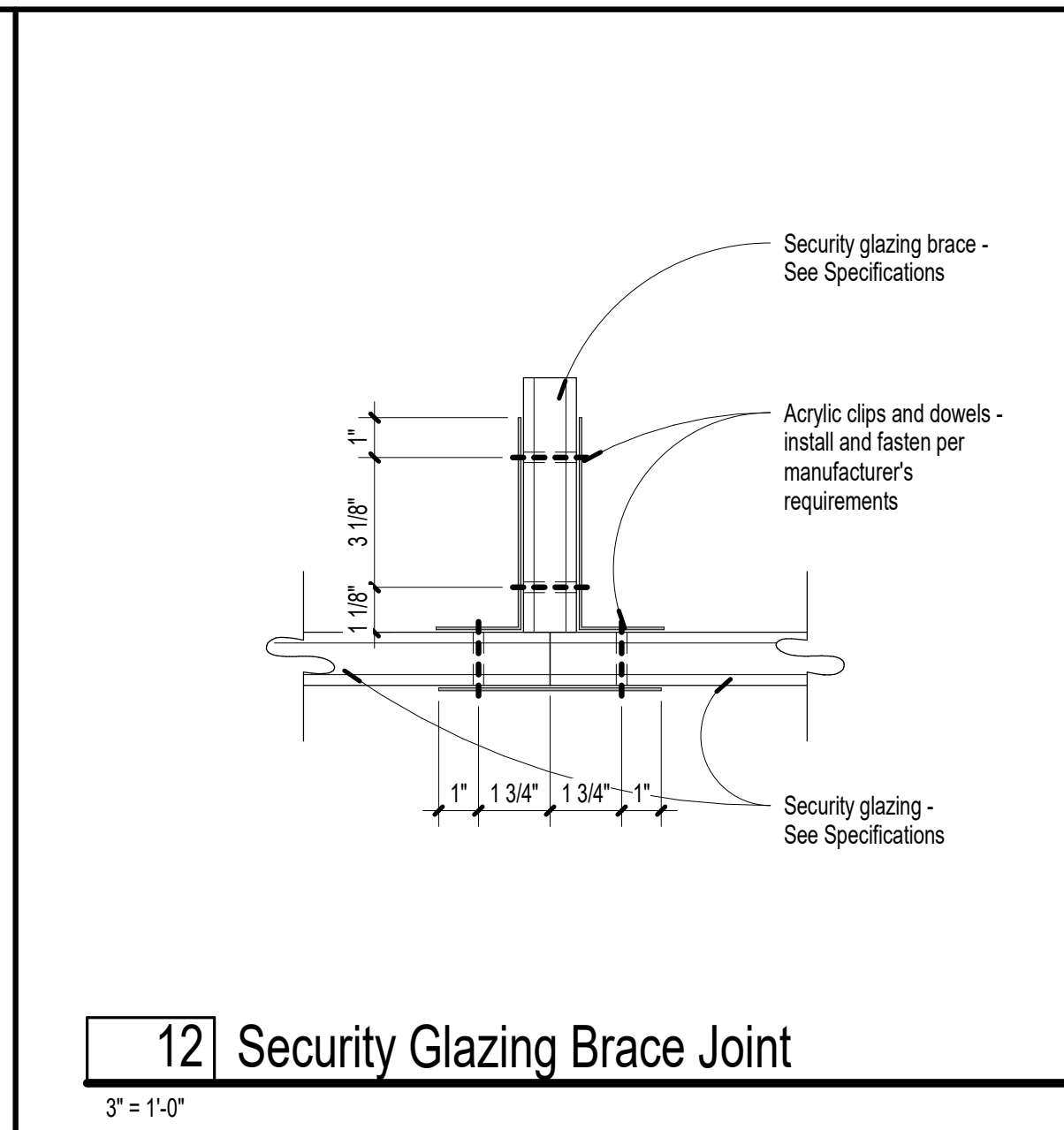
15 Jamb @ Column



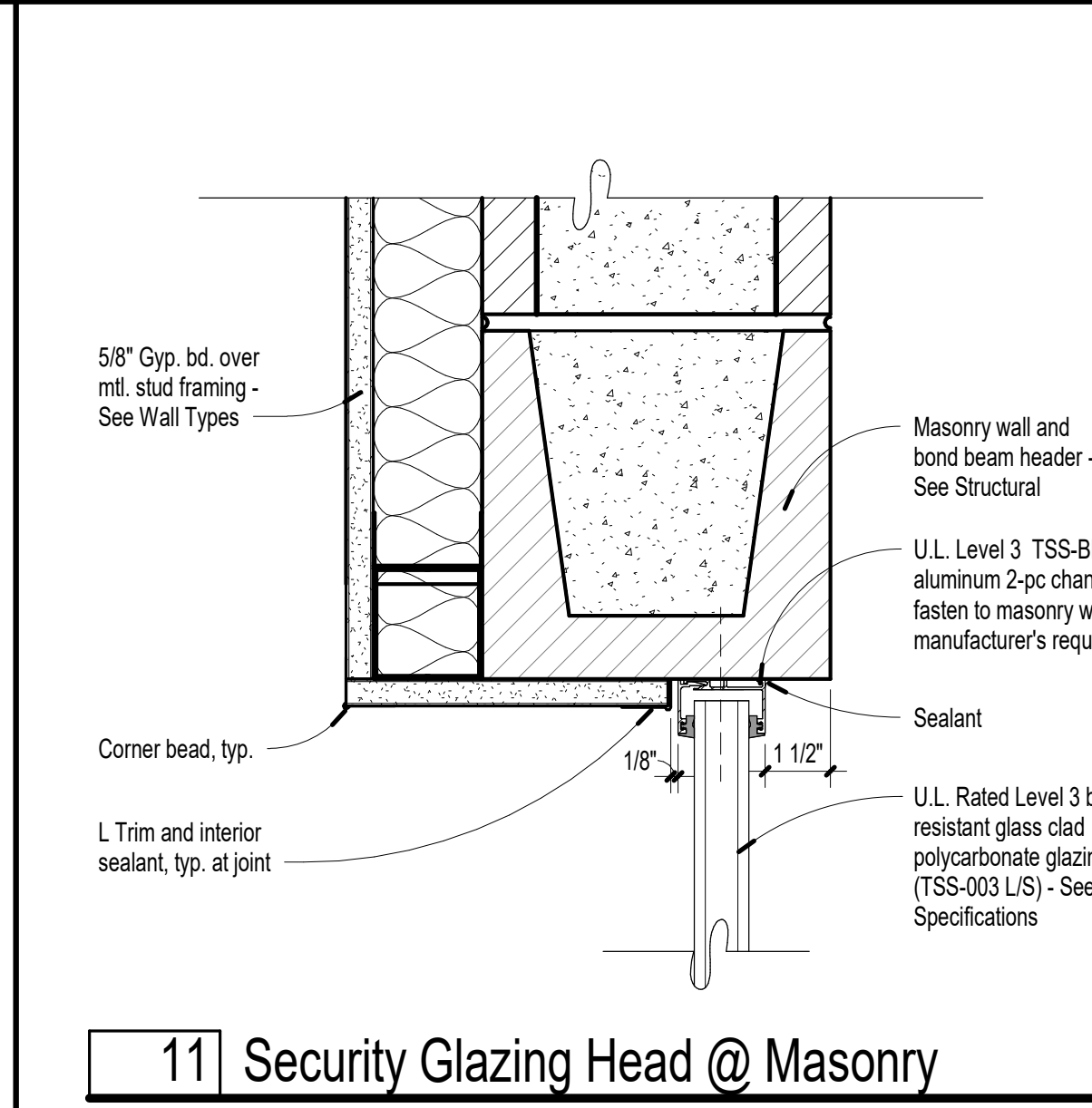
14 Security Glazing @ Baffle



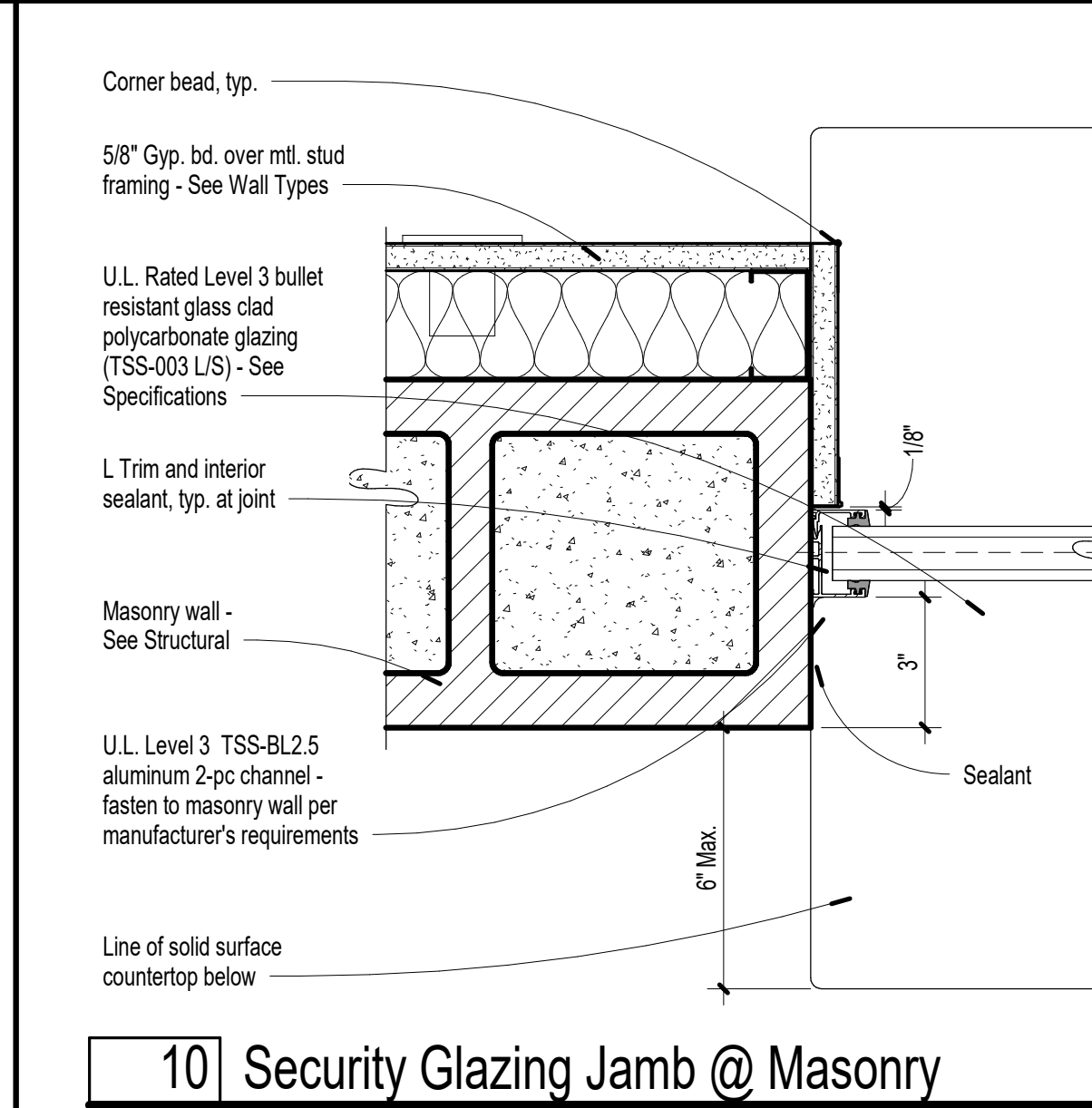
13 Security Glazing Sill @ Deal Tray



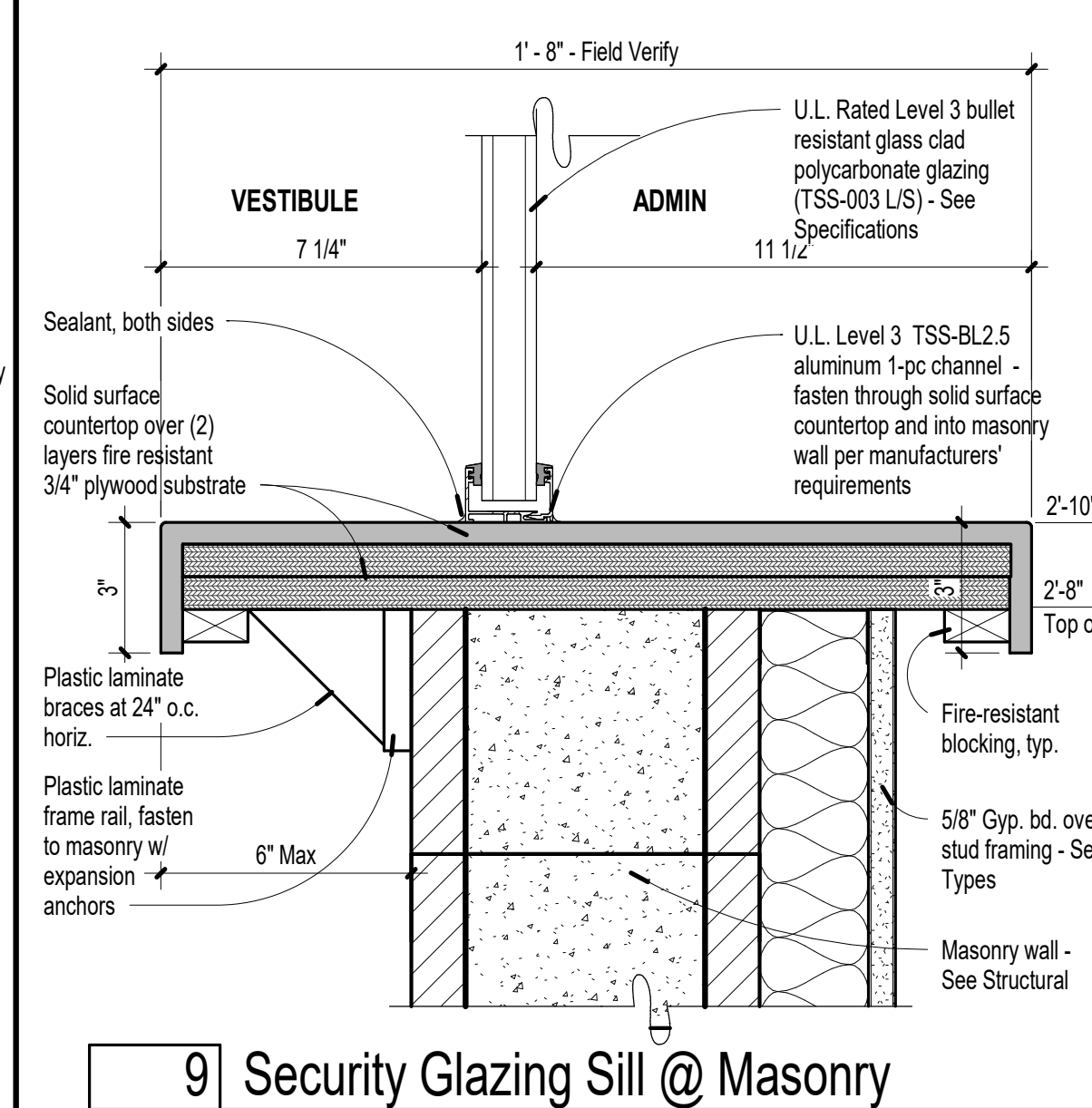
12 Security Glazing Brace Joint



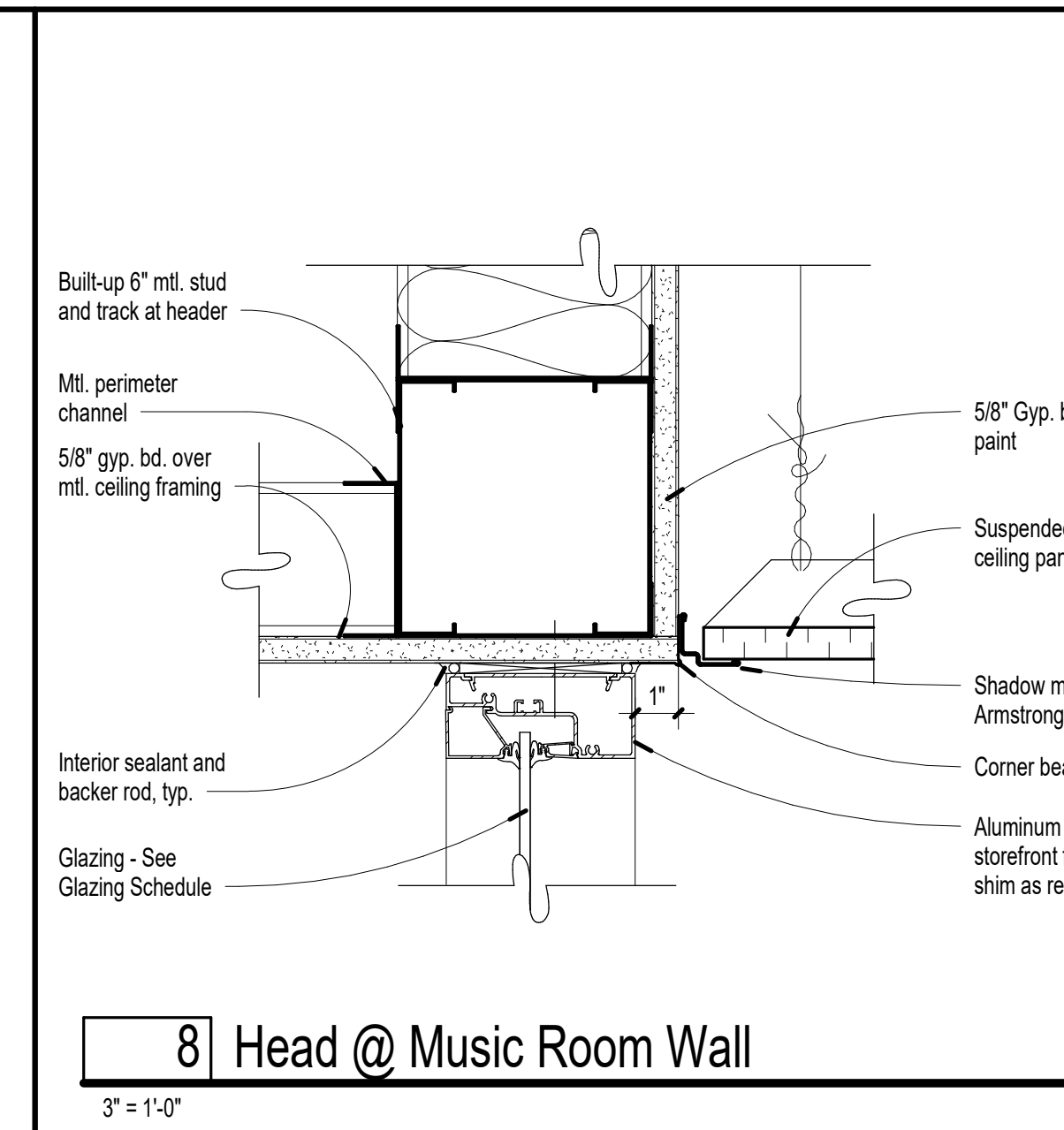
11 Security Glazing Head @ Masonry



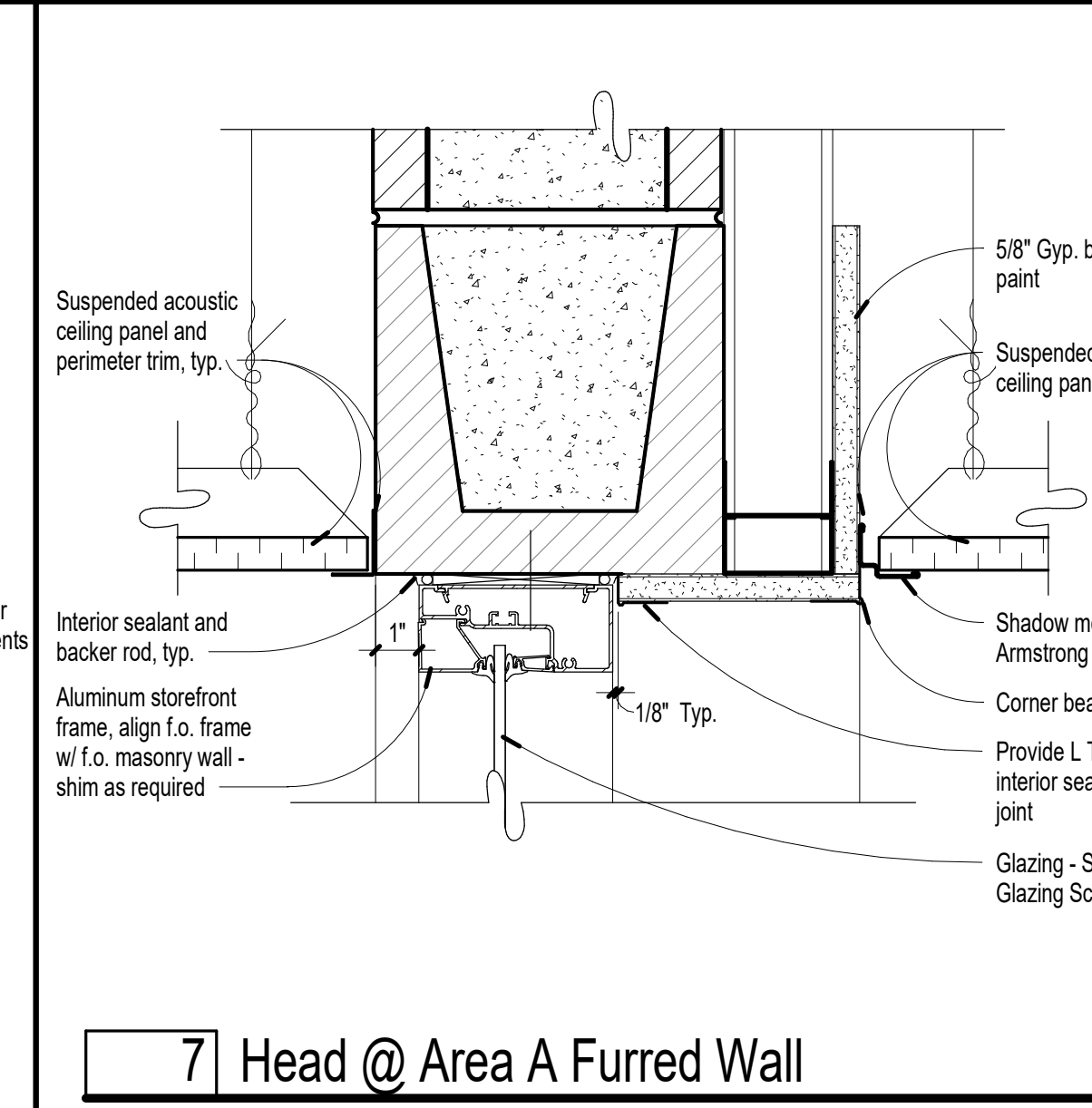
10 Security Glazing Jamb @ Masonry



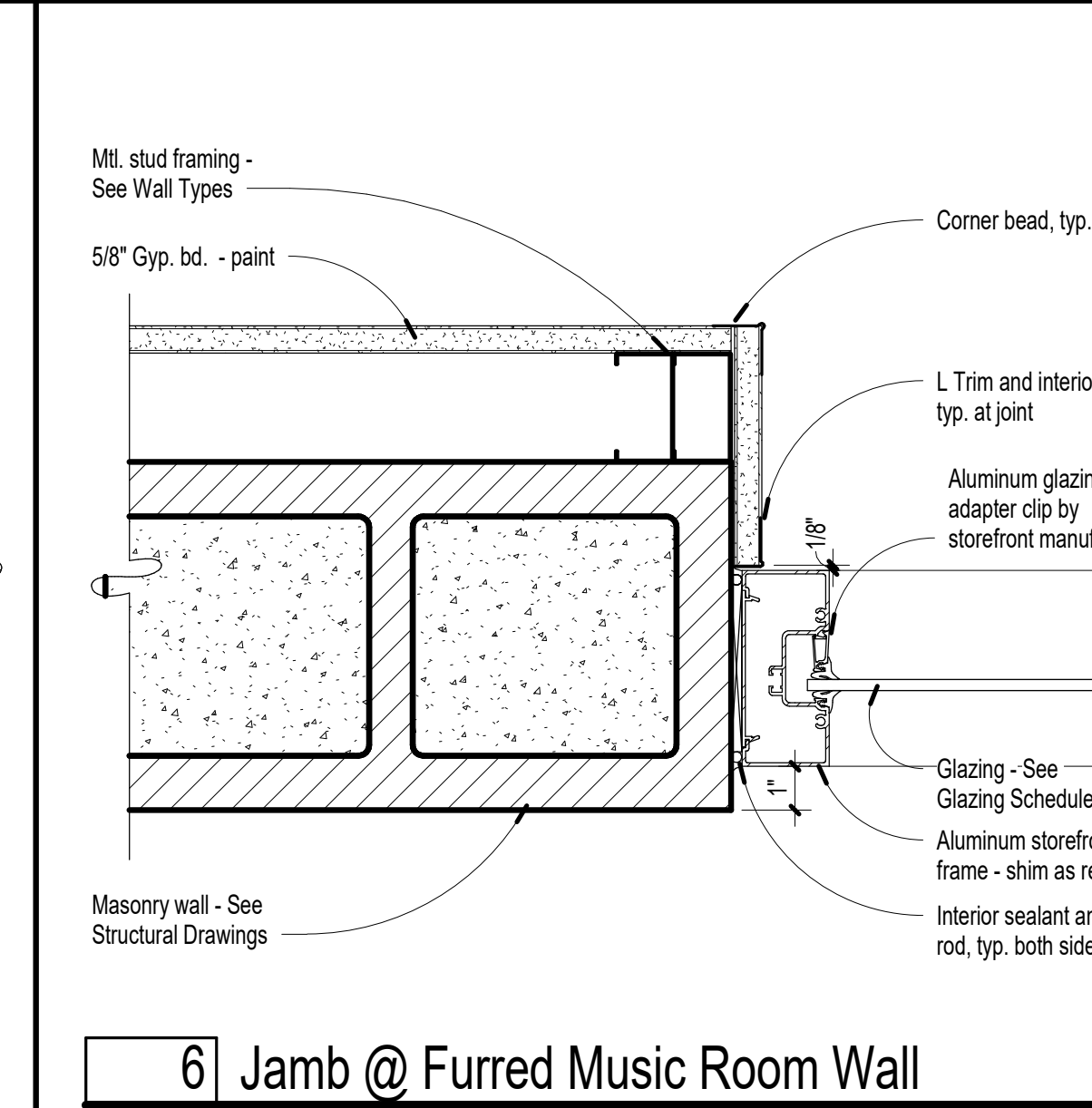
9 Security Glazing Sill @ Masonry



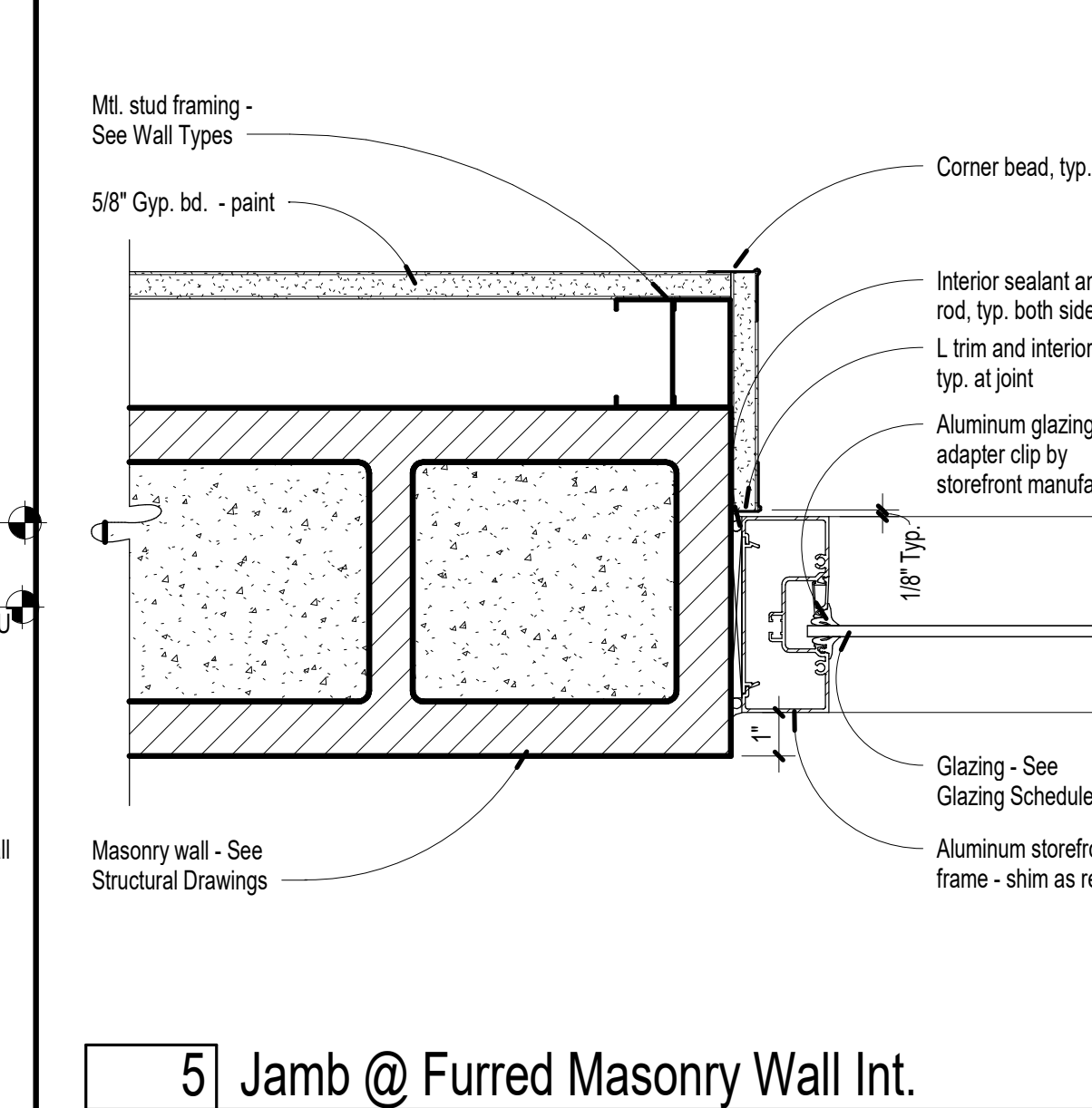
8 Head @ Music Room Wall



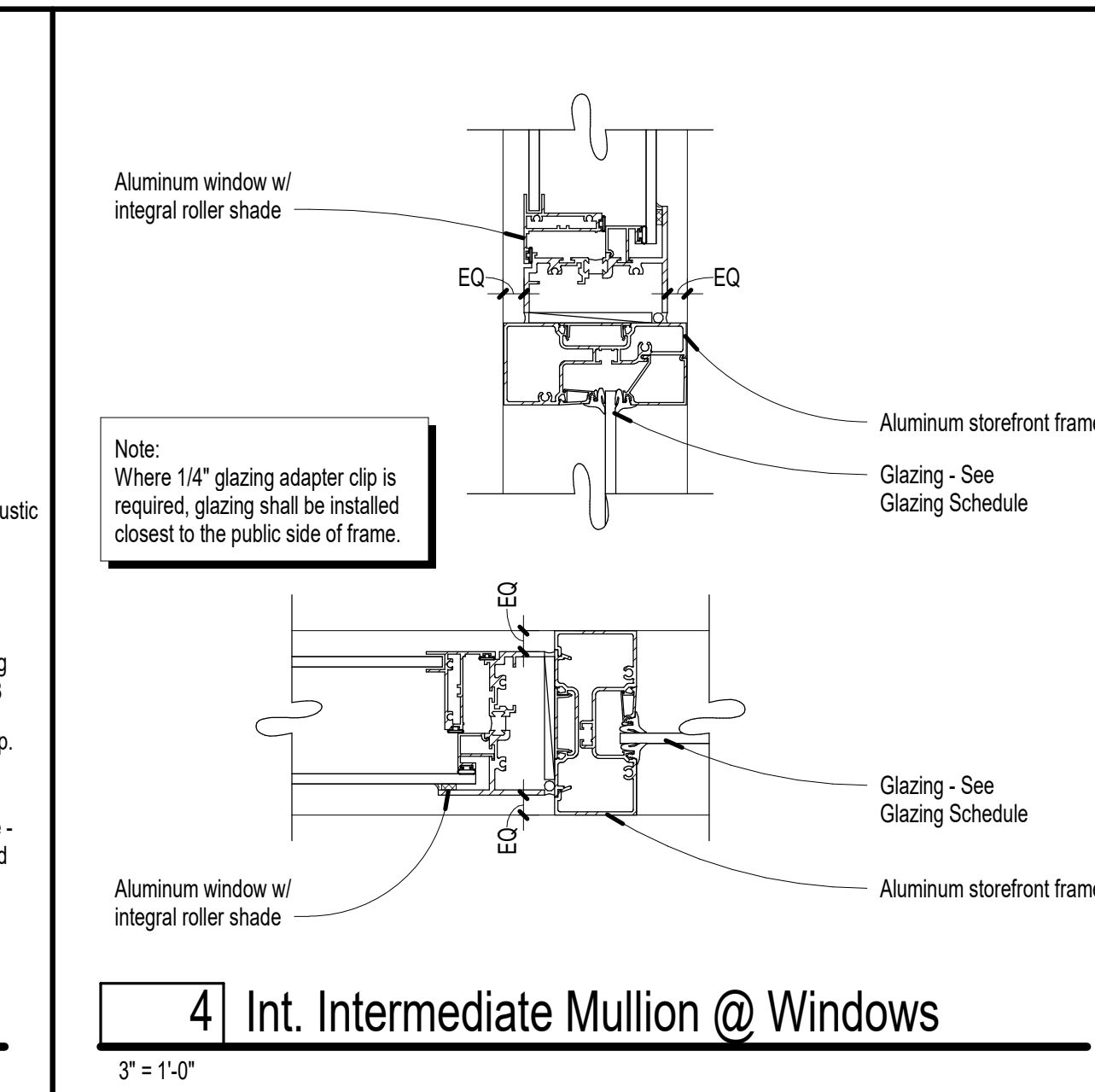
7 Head @ Area A Furred Wall



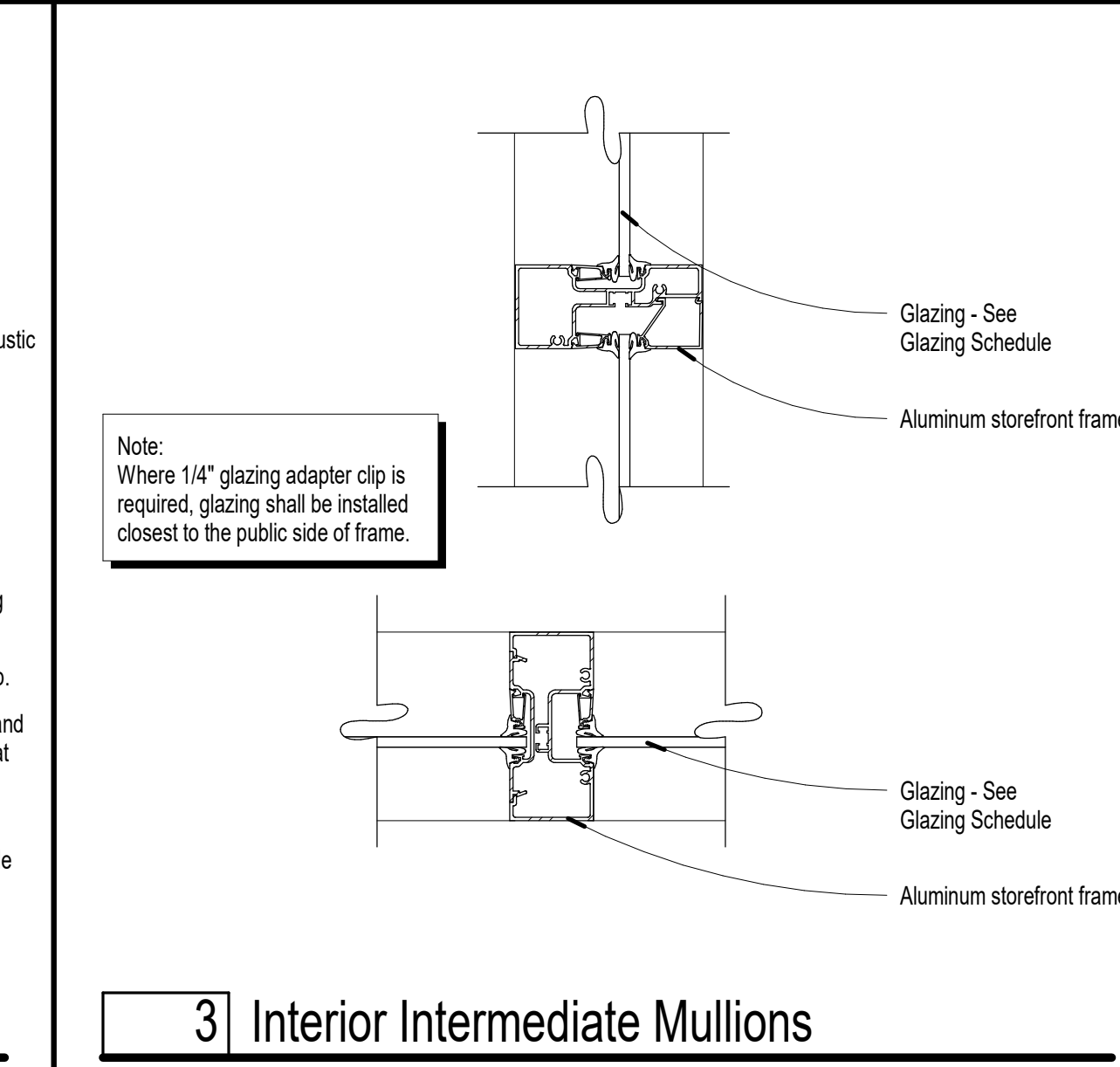
6 Jamb @ Furred Music Room Wall



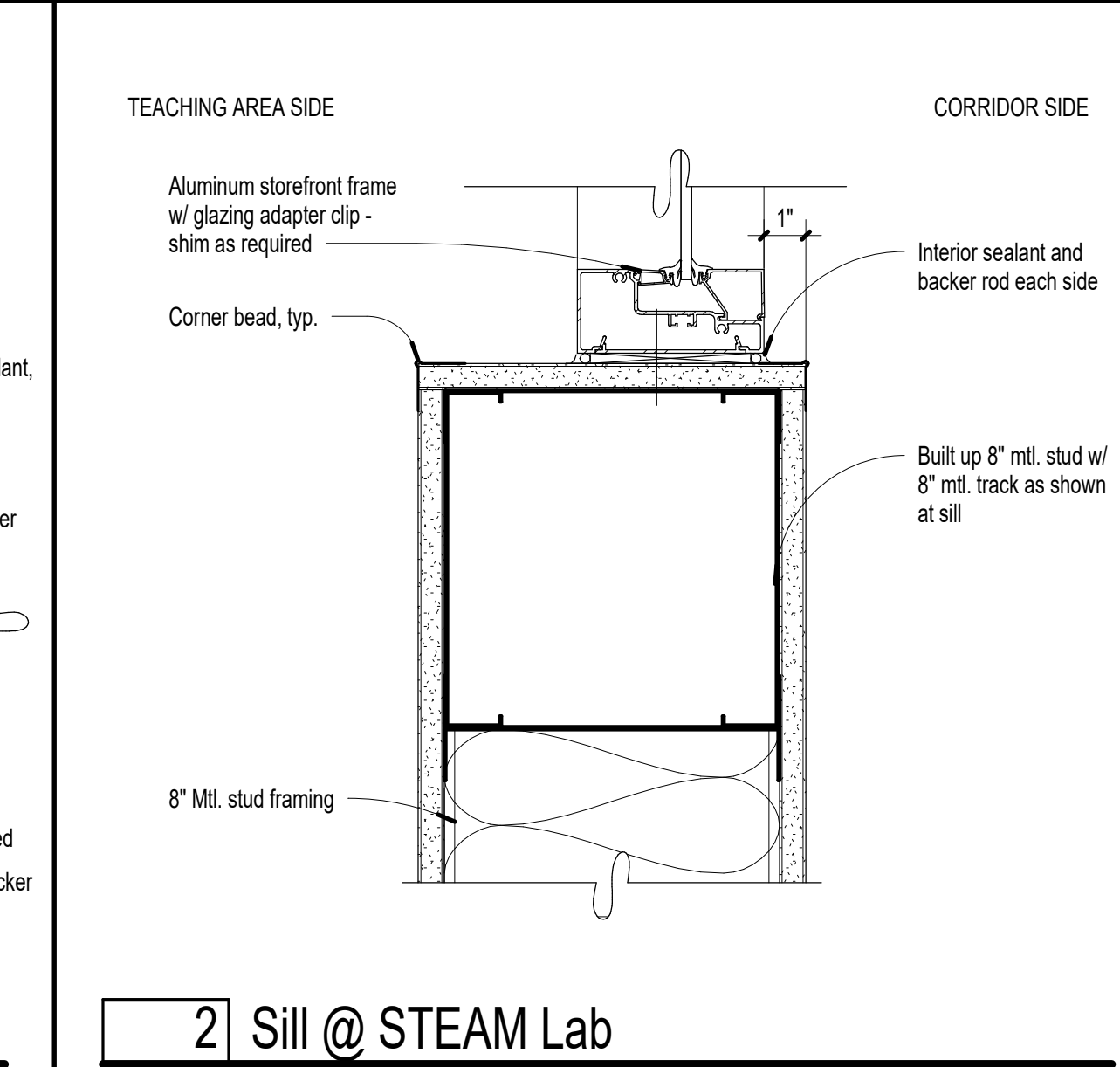
5 Jamb @ Furred Masonry Wall Int.



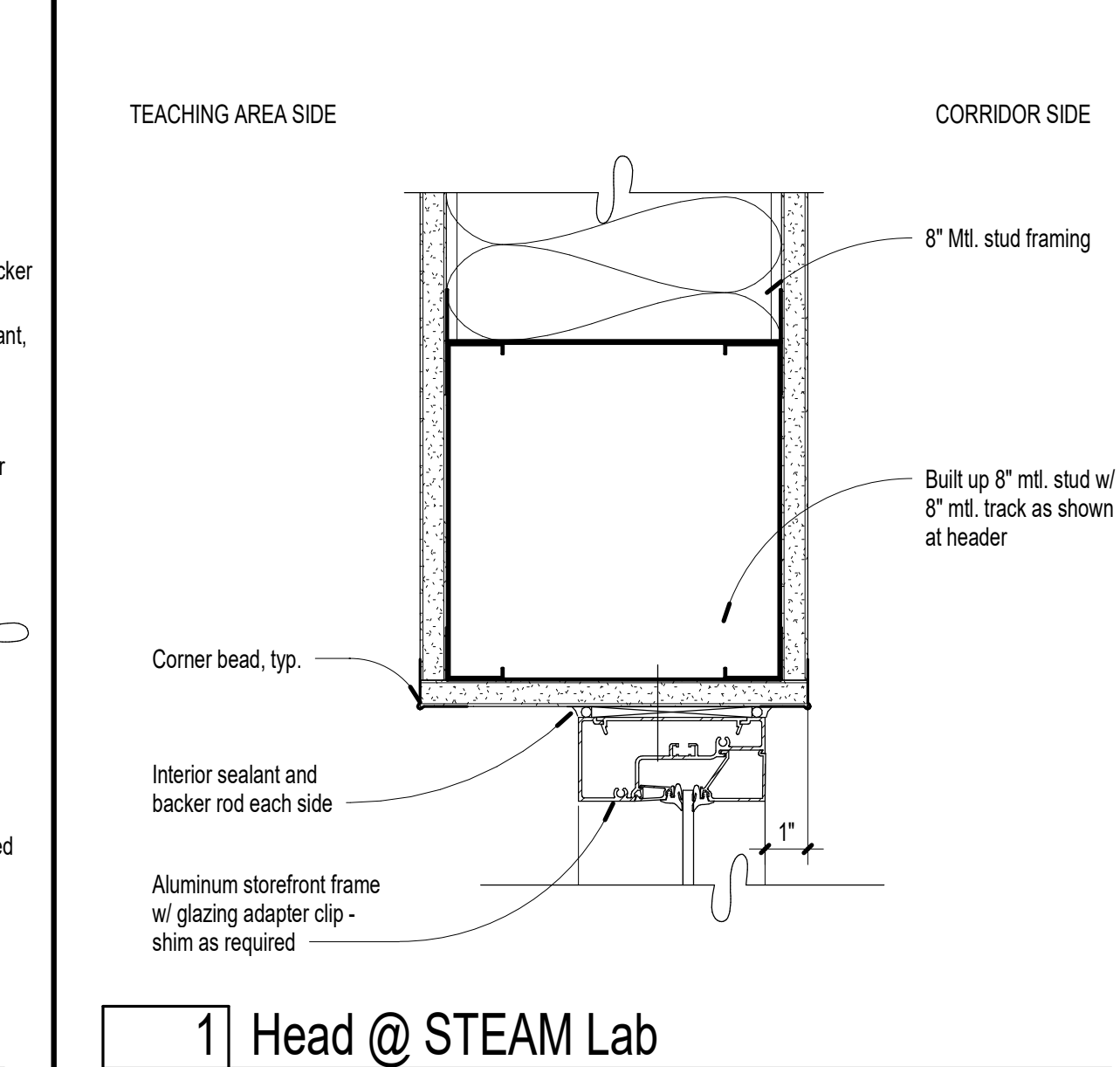
4 Int. Intermediate Mullion @ Windows



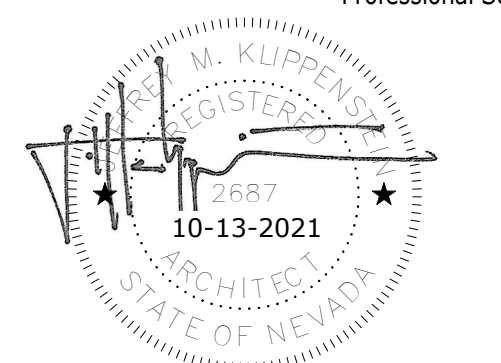
3 Interior Intermediate Mullions



2 Sill @ STEAM Lab



1 Head @ STEAM Lab



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△ Date Revision
2 11/16/21 Addendum #3

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Rio Wrangler Elementary School
10600 Green Pasture Drive
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Interior Aluminum
Frame Details
October 13, 2021
H+K Project No: 2001

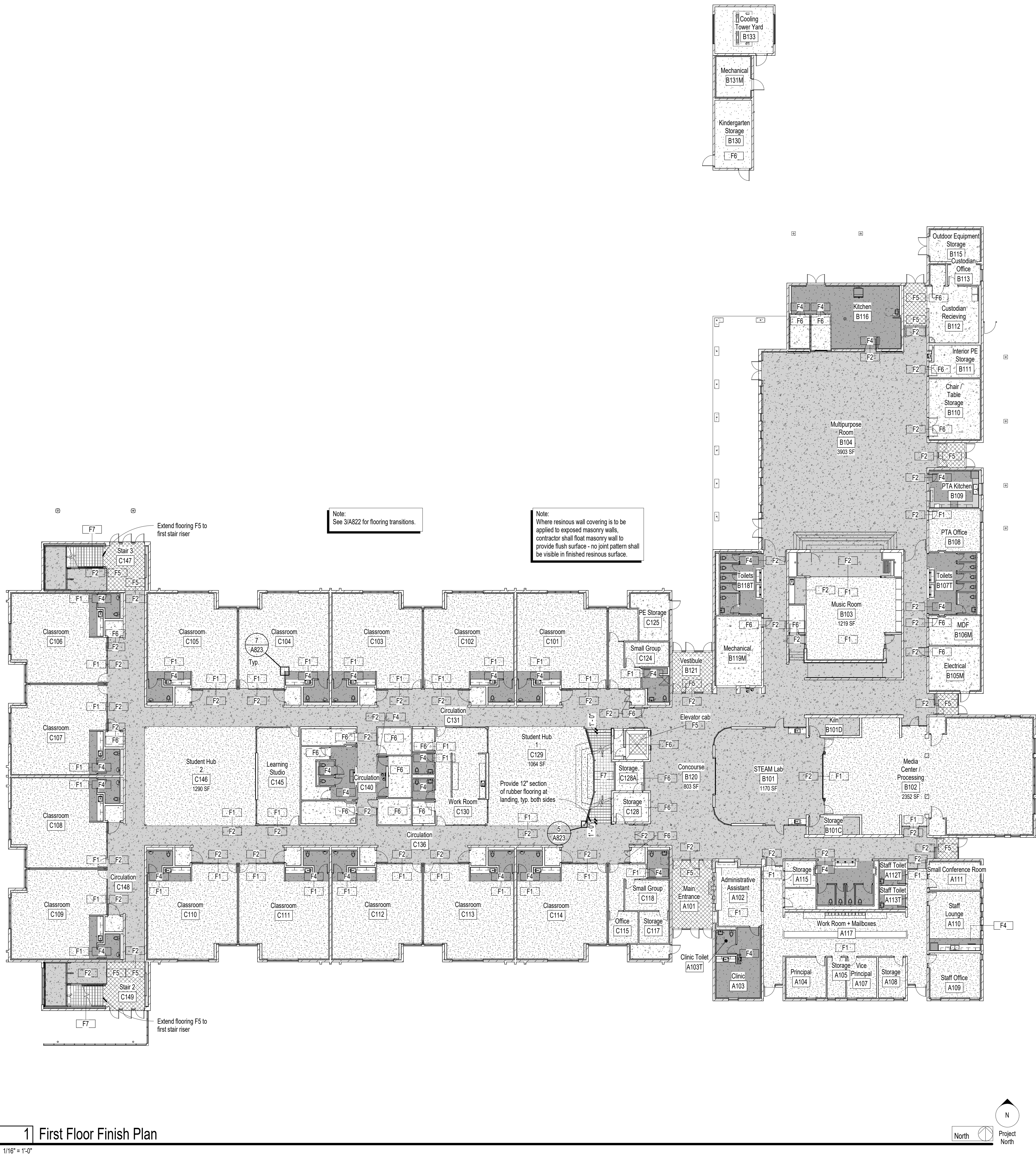
A714



Room Finish Schedule - First Floor												
Number	Room Name	Floor Finish	Base Finish	Walls				Ceiling Finish	Flame Spread Index	Countertop Finish	Millwork Finish	Remarks
				North	East	South	West					
A101	Main Entrance	F5	B1	W5	W1	W5	W1	C1	C	S1		
A102	Administrative Assistant	F1	B1	W2	W2/W3	W2	W2	C1	C	S1	M1	
A103	Clinic	F4	B1	W2	W2/W5	W2	W2	C1	C	S1	M1	
A103T	Clinic Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
A104	Principal	F1	B1	W2	W2	W2	W2	C1	C	-	-	
A105	Storage	F1	B1	W2	W2	W2	W2	C1	C	-	-	
A107	Vice Principal	F1	B1	W2	W2	W2	W2	C1	C	-	-	
A108	Storage	F1	B1	W2	W2	W2	W2	C1	C	-	-	
A109	Staff Office	F1	B1	W2	W2	W2	W2/W5	C1	C	-	-	
A110	Staff Lounge	F1/F4	B1/B2	W2	W2/W5	W2	W2/W5	C1	C	S1	M1	See notes 5 and 6.
A111	Small Conference Room	F1	B1	W2	W2	W2	W2/W5	C1	C	-	-	
A112T	Staff Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
A113T	Staff Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
A114T	Toilets	F4	B2	W4	W2/W4	W2/W4	W2/W4	C2	C	S1	-	See sheets A131, A132 for extent of resinous wallcovering. See note 7.
A115	Storage	F6	B1	W1	W2	W2	W1	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
A116M	Mechanical Access	F6	B1	W2	W2	W1	W1	C5	C	-	-	
A117	Work Room + Mailboxes	F1	B1	W1/W2	W2	W2	W2	C1	C	S1	M1	
A118	Circulation	F1	B1	W2/W5	W1/W5	W2/W5	W1/W5	C1	C	-	-	
A119	Circulation	F2	B1	W1/W2/W3/W5	W1/W2/W5	W1/W3/W5	-	C4	C	-	-	
A120	Vestibule	F5	B1	W1	W5	W1	W5	C1	C	-	-	
B101	STEAM Lab	F2	B1	W2/W3/W5	W2/W5	W2/W3/W5	W2/W3/W5	C4	C	S1	M1	
B101C	Storage	F2	B1	W2	W2	W1	W2	C2	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
B101D	Klin	F2	B1	W1	W2	W2	W2	C2	C	-	-	
B102	Media Center / Processing	F1	B1	W1/W2/W3/W5	W2/W3/W5	W1/W2/W3/W5	W2/W5	C1/C4	C	-	-	
B102A	Charging	F1	B1	W1	W2	W2	W2	C2	C	-	-	
B102B	Charging	F1	B1	W2	W2	W1	W2	C2	C	-	-	
B102MA	Mech.	F6	B1	W1	W2	W2	W1	C4	C	-	-	
B102MB	Mech.	F6	B1	W2	W2	W1	W1	C4	C	-	-	
B103	Music Room	F1/F2	B1	W2/-	W1/W2/W5	W2	W1/W2/W5	C1/C2	C	S1	M1	
B103M	Access	F6	B1	W2	W2	W2	W1	C5	C	-	-	
B104	Multipurpose Room	F2	B1	W1/W2/W5/W6	W1/W2/W6	W1/W5/W6	W1/W5/W6	C4	C	-	-	
B105M	Electrical	F6	B1	W2/W8	W2/W8	W2/W8	W1/W8	C5	C	-	-	Provide cont. fire rated plywood at all walls from 8" a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
B106M	MDF	F6	B1	W2/W8	W2/W8	W2/W8	W1/W8	C5	C	-	-	Provide cont. fire rated plywood at all walls from 8" a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
B107T	Toilets	F4	B2	W2/W4	W2/W4	W2/W4	W2/W4	C2	C	S1	-	See sheets A131, A132 for extent of resinous wallcovering. See note 7.
B108	PTA Office	F1	B1	W2	W2	W2	W2	C1	C	S1	M1	
B109	PTA Kitchen	F4	B2	W2	W2	W2	W2	C6	C	-	-	See notes 5 and 6.
B110	Chair / Table Storage	F6	B1	W2	W2	W2	W1	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
B111	Interior PE Storage	F6	B1	W2	W2	W2	W1/W5	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
B112	Custodian Reviewing	F5/F6	B1	W2	W2	W2	W1	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
B113	Custodian Office	F6	B1	W2	W2	W2	W2	C1	C	-	-	
B114M	Mechanical	F6	B1	W2	W2	W2	W2	C7	C	-	-	
B115	Outdoor Equipment Storage	F6	-	W2	W2	W1	W2	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
B116	Kitchen	F4	B2	W2/W9	W2/W9	W2/W9	W2/W9	C6	C	-	-	See Interior Elevations for locations of metal wall coverings and wall bumpers. Provide semi-gloss paint above S.S. wall paneling.
B118T	Toilets	F4	B2	W2/W4	W2/W4	W2/W4	W2/W4	C2	C	-	-	See sheets A131, A132 for extent of resinous wallcovering. See note 7.
B119M	Mechanical	F6	B1	W2	W1	W1/W5	W2/W7	C7	C	-	-	
B120	Concourse	F2	B1	W2/W5	W2/W5	W2/W5	W1/W2/W5	C4	C	-	-	
B121	Vestibule	F5	B1	W5	W1	W5	W1	C1	C	-	-	
B122	Circulation	F2	B1	W1/W6	W1/W2/W5	W1/W2/W3/W5	-	C4	C	-	-	See notes 5 and 6.
B123	Vestibule	F5	B1	W1	W5	W1	W5	C1	C	-	-	
B124	Circulation	F2	B1	W5	W1	-	W1	C1	C	-	-	
B125	Circulation	F2	B1	W5	W1	-	W1	C1	C	-	-	
B126	Vestibule	F5	B1	W1	W5	W1	W5	C1	C	-	-	
B127	Vestibule							C				
B130	Kindergarten Storage	F6	-	W1	W1	W1	W1	C5	C	-	-	
B131M	Mechanical											
B133	Cooling Tower Yard											
C101	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C101M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C101T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C102	Classroom	F1/F4	B1	W2/W3/W5	W2	W2/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C102M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C102T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C103	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C103M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C103T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C104	Classroom	F1/F4	B1	W2/W3/W5	W2	W2/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C104M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C104T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C105	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C105M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C105T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C106	Classroom	F1/F4	B1	W2	W2/W5	W2/W3	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C106M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C106T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C107	Classroom	F1/F4	B1	W2/W3	W2/W5	W2	W2/W3/W5	C1/C2	C	-	-	See notes 5 and 6.
C107M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C107T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C108	Classroom	F1/F4	B1	W2	W2/W5	W2/W3	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C108M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C108T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C109	Classroom	F1/F4	B1	W2/W3	W2/W5	W2	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C109M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C109T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C110	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C110M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C110T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C111	Classroom	F1/F4	B1	W2/W5	W2	W2/W3/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C111M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C111T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C112	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C112M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C112T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C113	Classroom	F1/F4	B1	W2/W5	W2	W2/W3/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C113M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C113T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C114	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C114M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C114T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C115	Office	F1	B1	W2/W5	W2	W2/W5	W2	C1	C	-	-	
C116	Fire Riser Room	F6	B1	W2	W2	W2	W2	C7	C	-	-	
C117	Storage	F1	B1	W2	W2	W2	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C118	Small Group	F1	B1	W2/W5	W2	W2	W2	C1	C	-	-	
C119	Circulation	F1	B1	W2/W5	W2	W2/W5	W2	C2	C	-	-	
C120T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C121M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C122M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C123T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C124	Small Group	F1	B1	W2	W2	W2/W5	W2	C1	C	-	-	
C125	PE Storage	F6	B1	W2	W2	W2	W2	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C126	Counseor	F1	B1	W2/W5	W2	W2/W5	W2	C1	C	-	-	
C127	Circulation	F1	B1	W2/W5	W2	W2/W5	W2	C2	C	-	-	
C128	Storage	F6	B1	W1	W1	W1	W1	C5	C	-	-	
C128A	Storage	F6	B1	W1	W2	W1	W2	C5	C	-	-	
C129	Student Hub 1	F1/F2	B1	W2/-	W1/-	W2/-	W2/W5/W6	C4	C	-	-	
C130	Work Room	F1	B1	W5	W2/W5	W5	W2	C1	C	S1	M1	
C131	Circulation	F2	B1	W1/W3/W5	-	W1/W2/W5	-	C1	C	-	-	
C132	Storage	F6	B1	W2	W2	W2	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C133T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C134T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.

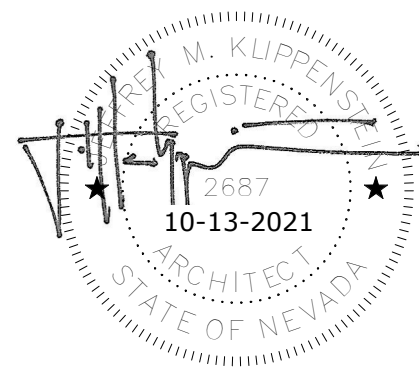
Room Finish Schedule - First Floor												
Number	Room Name	Floor Finish	Base Finish	Walls				Ceiling Finish	Flame Spread Index	Countertop Finish	Millwork Finish	Remarks
				North	East	South	West					
C135	Staff Privacy Rm	F1	B1	W2	W2	W2	W2	C1	C	-	-	
C136	Circulation	F2	B1	W1/W2/W5	-	W1/W3/W5	-	C1	C	-	-	
C137	IDF	F6	B1	W2/W8	W2/W8	W2/W8	W2/W8	C5	C	-	-	Provide cont. fire rated plywood at all walls from 8' a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
C138M	Mech	F6	B1	W2	W2	W2	W2	C7	C	-	-	
C139M	Electrical	F6	B1	W2/W8	W2/W8	W2/W8	W2/W8	C5	C	-	-	Provide cont. fire rated plywood at all walls from 8' a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
C140	Circulation	F2/F4	B1/B2	W4/-	W4	W4/-	W2/-	C1/C2	C	-	-	
C141	Storage	F6	B1	W2	W2	W2	C5	C	-	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C142T	Toilets	F4	B2	W4	W4	W4	W4	C2	C	S1	-	See note 7.
C143M	Mech	F6	B1	W2	W2	W2	W2	C7	C	-	-	
C144	Custodian	F6	B1	W2	W2	W2	W2	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C145	Learning Studio	F1	B1	W5	W2	W5	W2/W5	C1	C	-	-	
C146	Student Hub 2	F1	B1	W2/-	W2/W5/W6	W2/-	W2/-	C4	C	-	-	
C147	Star 3	F5/F6/F7	B1	W1/W5	-	W1/-	W2/W5	C1/C2	B	-	-	Rubber tread at stairs, rubber tile (F7) at intermediate landing
C148	Circulation	F2	B1	-	W1/-	-	W1/W3/W5	C1	C	-	-	
C149	Star 2	F5/F6/F7	B1	W1/-	W2	W1/W5	W2/W5	C1/C2	B	-	-	Rubber tread at stairs, rubber tile (F7) at intermediate landing
C150	Elevator Access	F6	B1	W1	W2	W1	W1	C5	C	-	-	
Room Finish Schedule - Second Floor												
Number	Room Name	Floor Finish	Base Finish	Walls				Ceiling Finish	Flame Spread Index	Countertop Finish	Millwork Finish	Remarks
				North	East	South	West					
A201M	Mech.	F6	B1	W1	W2	W2	W2	C5	C	-	-	
B201M	Mech.	F6	B1	W1	W2	W1	W2	C5	C	-	-	
C201	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C201M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C201T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C202	Classroom	F1/F4	B1	W2/W3/W5	W2	W2/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C202M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C202T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C203	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C203M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C203T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C204	Classroom	F1/F4	B1	W2/W3/W5	W2	W2/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C204M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C204T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C205	Classroom	F1/F4	B1	W2/W3/W5	W2/W3	W2/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C205M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C205T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C206	Classroom	F1/F4	B1	W2	W2/W5	W2/W3	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C206M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C206T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C207	Classroom	F1/F4	B1	W2/W3	W2/W5	W2	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C207M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C207T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C208	Classroom	F1/F4	B1	W2	W2/W5	W2/W3	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C208M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C208T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C209	Classroom	F1/F4	B1	W2/W3	W2/W5	W2	W2/W3/W5	C1/C2	C	S1	M1	See notes 5 and 6.
C209M	Mech.	F6	B1	W2	W1	W2	W2	C7	C	-	-	
C209T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C210	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C210M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C210T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C211	Classroom	F1/F4	B1	W2/W5	W2	W2/W3/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C211M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C211T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C212	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C212M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C212T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C213	Classroom	F1/F4	B1	W2/W5	W2	W2/W3/W5	W2/W3	C1/C2	C	S1	M1	See notes 5 and 6.
C213M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C213T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C214	Classroom	F1/F4	B1	W2/W5	W2/W3	W2/W3/W5	W2	C1/C2	C	S1	M1	See notes 5 and 6.
C214M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C214T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C215	Support Office	F1	B1	W2/W5	W2	W2/W5	W2	C1	C	-	-	
C217	Storage	F1	B1	W2	W2	W2/W5	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C218	Small Group	F1	B1	W2/W5	W2	W2	W2	C1	C	-	-	
C219	Circulation	F1	B1	W2/W5/-	W2	W2/W5	W2	C1/C2	C	-	-	
C220T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C221M	Mech.	F6	B1	W1	W2	W2	W2	C7	C	-	-	
C222M	Mech.	F6	B1	W2	W2	W1	W2	C7	C	-	-	
C223T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C224	Small Group	F1	B1	W2	W2	W2/W5	W2	C1/C2	C	-	-	
C225	Storage	F1	B1	W2/W5	W2	W2	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C226	Support Office	F1	B1	W2/W5	W2	W2/W5	W2	C1	C	-	-	
C227	Circulation	F1	B1	W2/W5/-	W2	W2/W5	W2	C1/C2	C	-	-	
C228M	Mech.	F6	B1	W1	W2	W1	W1	C7	C	-	-	
C230	Work Room	F1	B1	W5	W2/W5	W5	W2	C1	C	S1	M1	
C231	Circulation	F2	B1	W1/W3/W5	-	W1/W2/W5	-	C1	C	-	-	
C232	Storage	F6	B1	W2	W2	W2	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C233T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C234T	Toilet	F4	B2	W4	W4	W4	W4	C2	C	-	-	See note 7.
C235	Storage	F6	B1	W2	W2	W2	W2	C1	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C236	Circulation	F2	B1	W1/W2/W5	-	W1/W3/W5	-	C1	C	-	-	
C237	IDF	F6	B1	W2/W8	W2/W8	W2/W8	W2/W8	C7	C	-	-	Provide cont. fire rated plywood at all walls from 8' a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
C238M	Mech.	F6	B1	W2	W2	W2	W2	C7	C	-	-	
C239	Main Stair	F7	B1	W1/-	W1/-	W1/-	-	C1/C4	B	-	-	
C239M	Electrical	F6	B1	W2/W8	W2/W8	W2/W8	W2/W8	C5	C	-	-	Provide cont. fire rated plywood at all walls from 8' a.f.f. to 8'-8" a.f.f., mask fire rating markings and paint, typ.
C240	Circulation	F2/F4	B1/B2	W4/-	W2/W4	W4/-	W2/-	C1/C2	C	-	-	
C241	Storage	F6	B1	W2	W2	W2	W2	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C242T	Toilets	F4	B2	W2/W4	W4/-	W2/W4	W2/W4	C2	C	S1	-	See note 7.
C243M	Mech	F6	B1	W2	W2	W2	W2	C	C	-	-	
C244	Custodian	F6	B1	W2	W2	W2	W2	C5	C	-	-	FRP to 4'-0" A.F.F. all gyp. bd. walls
C245	Learning Studio	F1	B1	W5	W5	W5	W2/W5	C1	C	-	-	
C246	Student Hub 3	F1	B1	W2/-	W6/W5	W2/-	W2/-	C4	C	-	-	
C247	Star 3	F2/F7	B1	W1/W5	W2	W1/-	W2/W5	C1	B	-	-	Rubber tread at stairs, rubber tile (F7) at intermediate landing
C248	Circulation	F2/F3	B1	W1/W5	W2	W1/-	W2/W5	C3	C	-	-	
C249	Star 2	F2/F7	B1	W1/-	W2	W1/W5	W2/W5	C1	B	-	-	Rubber tread at stairs, rubber tile (F7) at intermediate landing
C250	Storage	F6	B1	W1	W2	W1	W1	C5	C	-	-	
C251	Circulation	C251	B1	W1/W3	-	W1/W3	W1/-	C1	C	-	-	

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Flooring Legend	
	Carpet flooring (F1)
	Burnished concrete floor slab (F2)
	Resilient tread and riser flooring (F3)
	Methylmethacrylate (MMA) resinous flooring (F4)
	Walk-off mat carpet tile flooring (F5)
	Sealed Concrete floor slab (F6)
	Rubber Tile, Rubber Stair Treads (F7)
Note: See sheet A822 for floor transition details.	

1 First Floor Finish Plan
1/16" = 1'-0"



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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

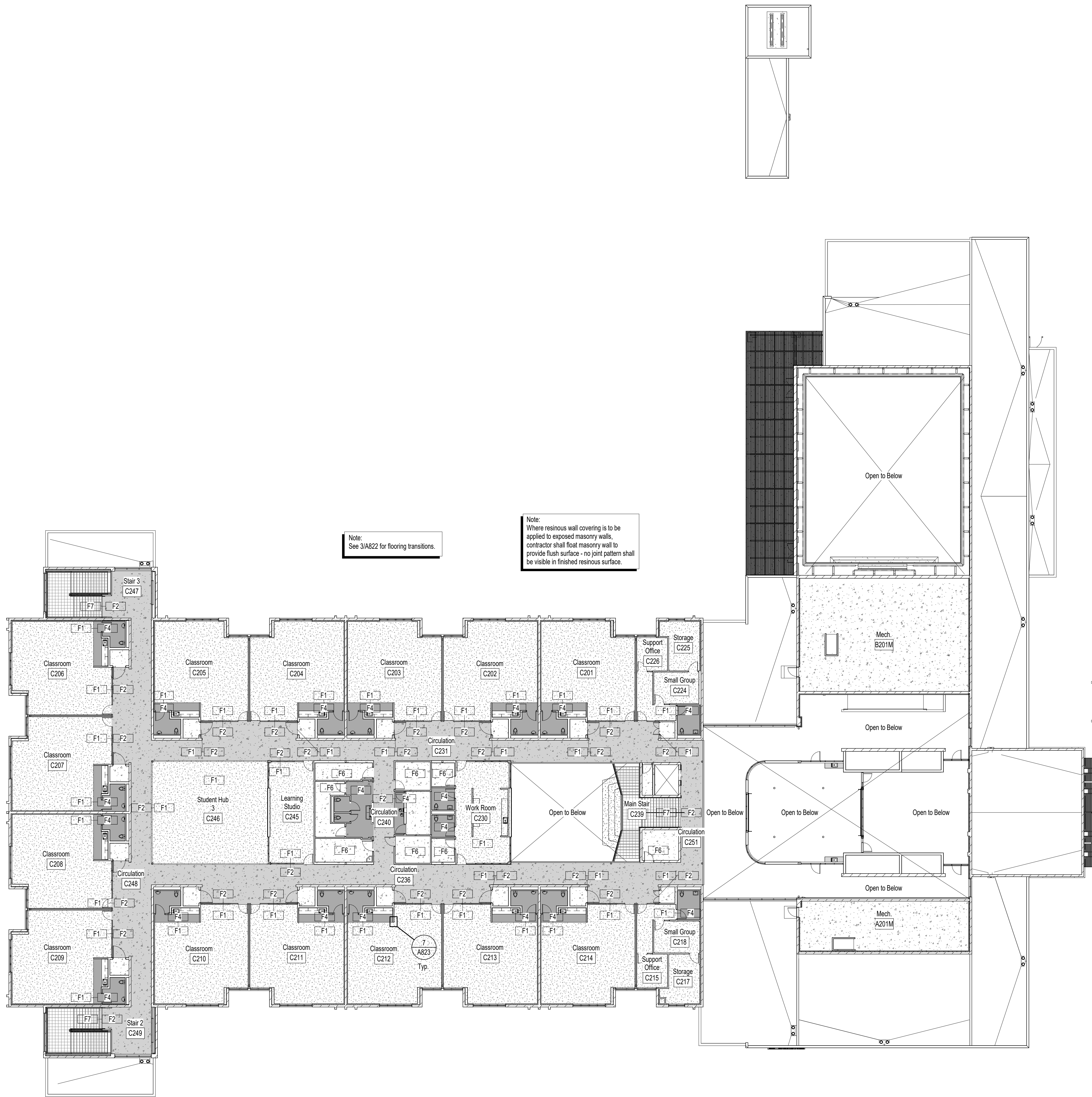
First Floor Finish Plan

October 13, 2021
H+K Project No: 2001

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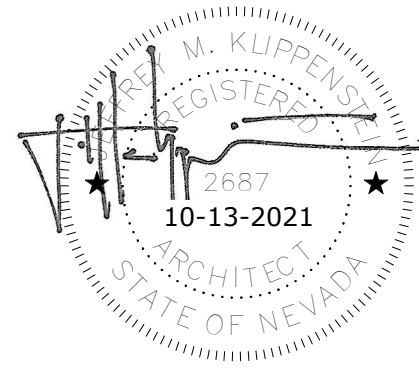


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Flooring Legend	
	Carpet flooring (F1)
	Burnished concrete floor slab (F2)
	Resilient tread and riser flooring (F3)
	Methylmethacrylate (MMA) resinous flooring (F4)
	Walk-off mat carpet tile flooring (F5)
	Sealed Concrete floor slab (F6)
	Rubber Tile, Rubber Stair Treads (F7)
Note: See sheet A822 for floor transition details.	

1 Second Floor Finish Plan
1/16" = 1'-0"



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Washoe County School District
Rio Wrangler Elementary School

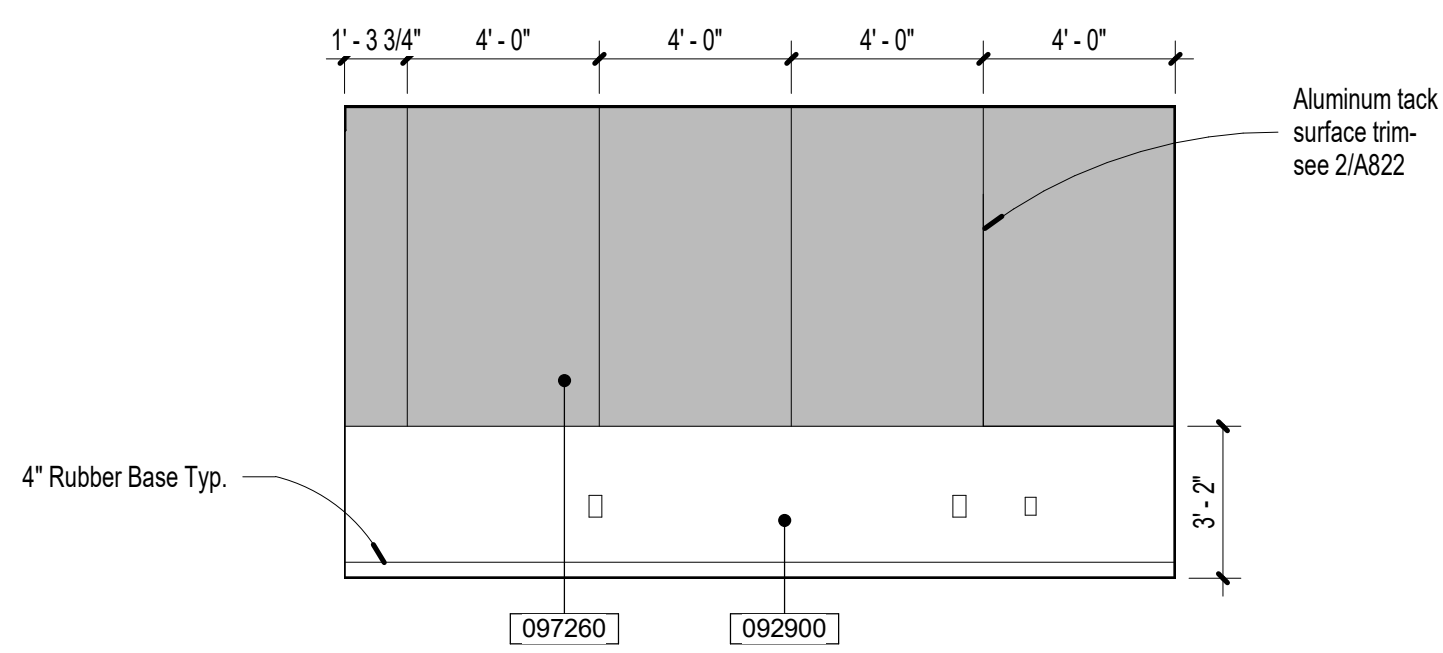
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Second Floor Finish Plan

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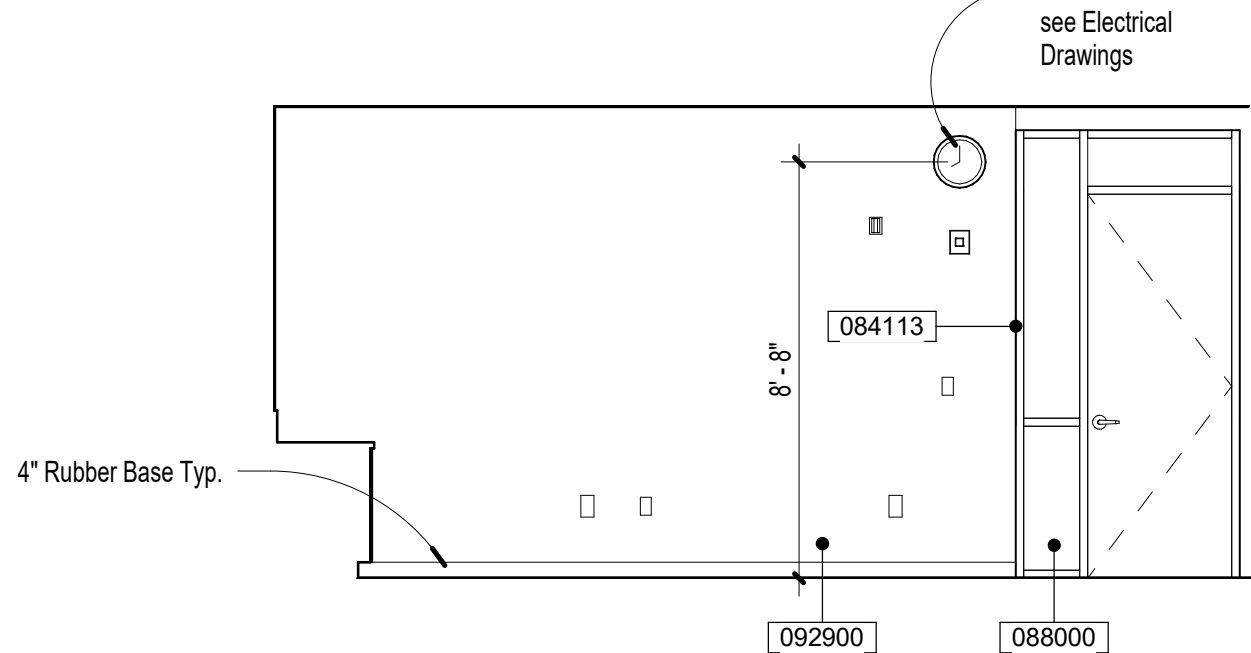
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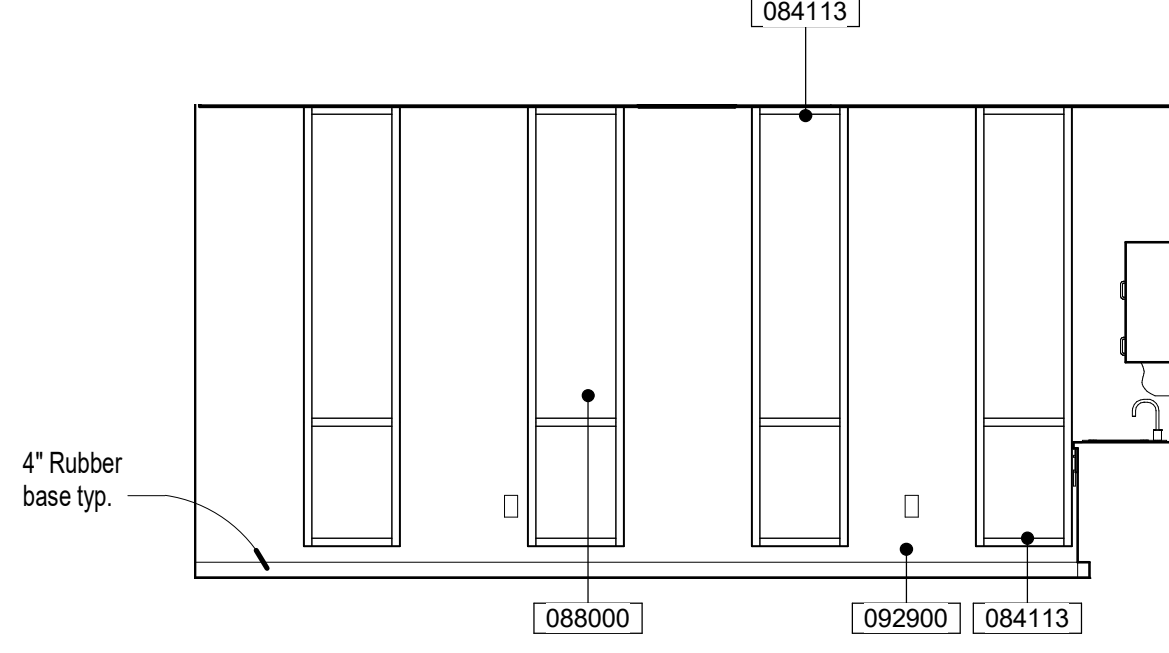
10 Staff Lounge A110 - North

1/4\" = 1'-0"



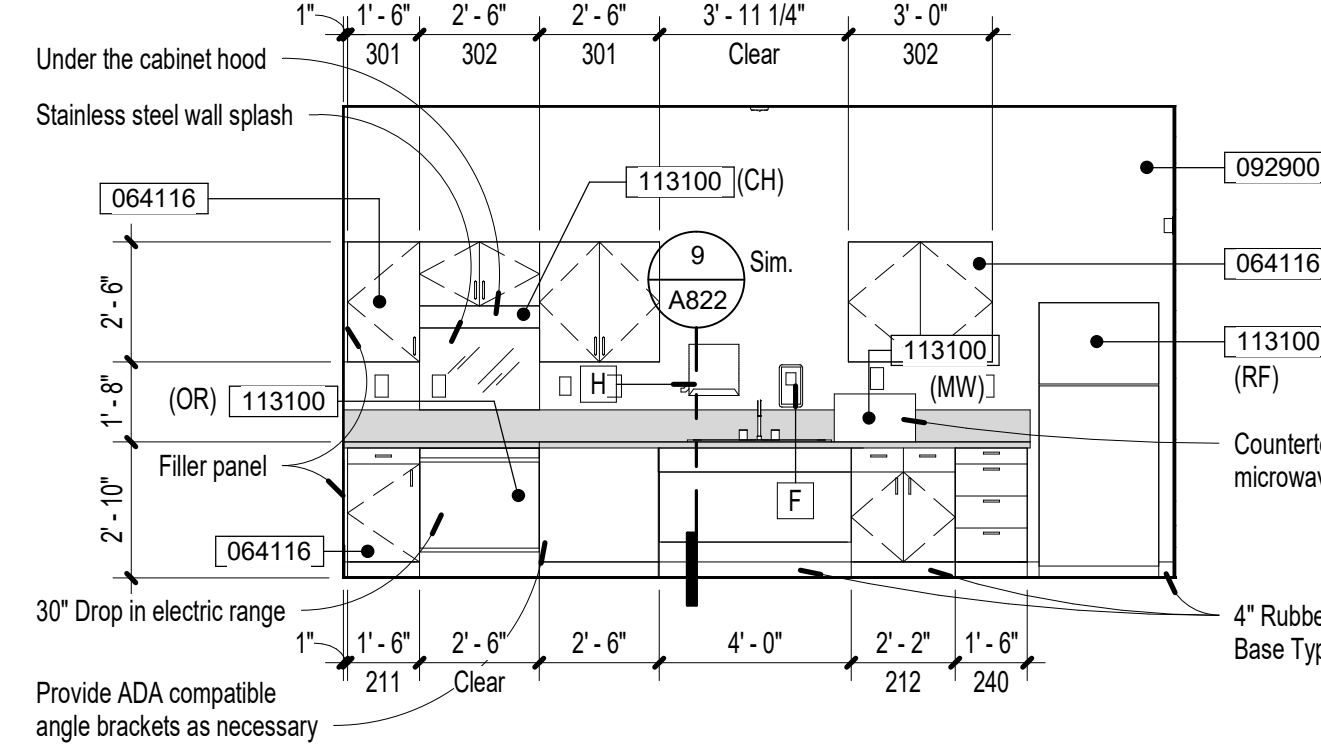
9 Staff Lounge A110 - West

1/4\" = 1'-0"



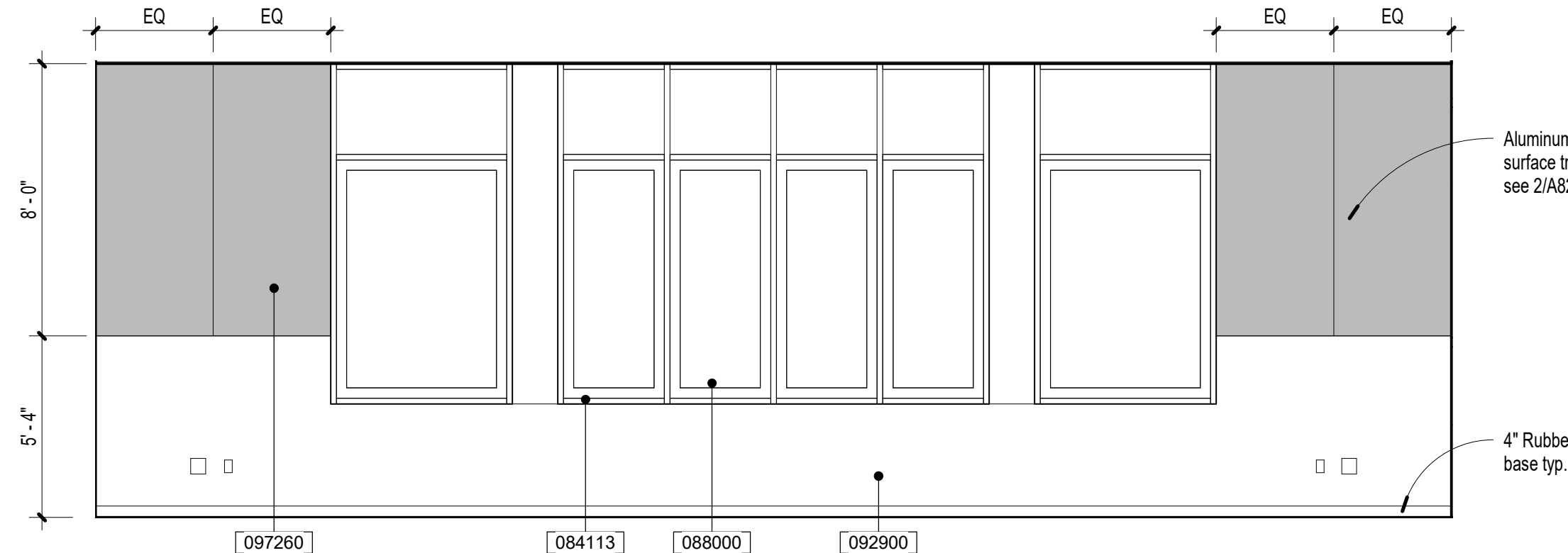
8 Staff Lounge A110 - East

1/4\" = 1'-0"



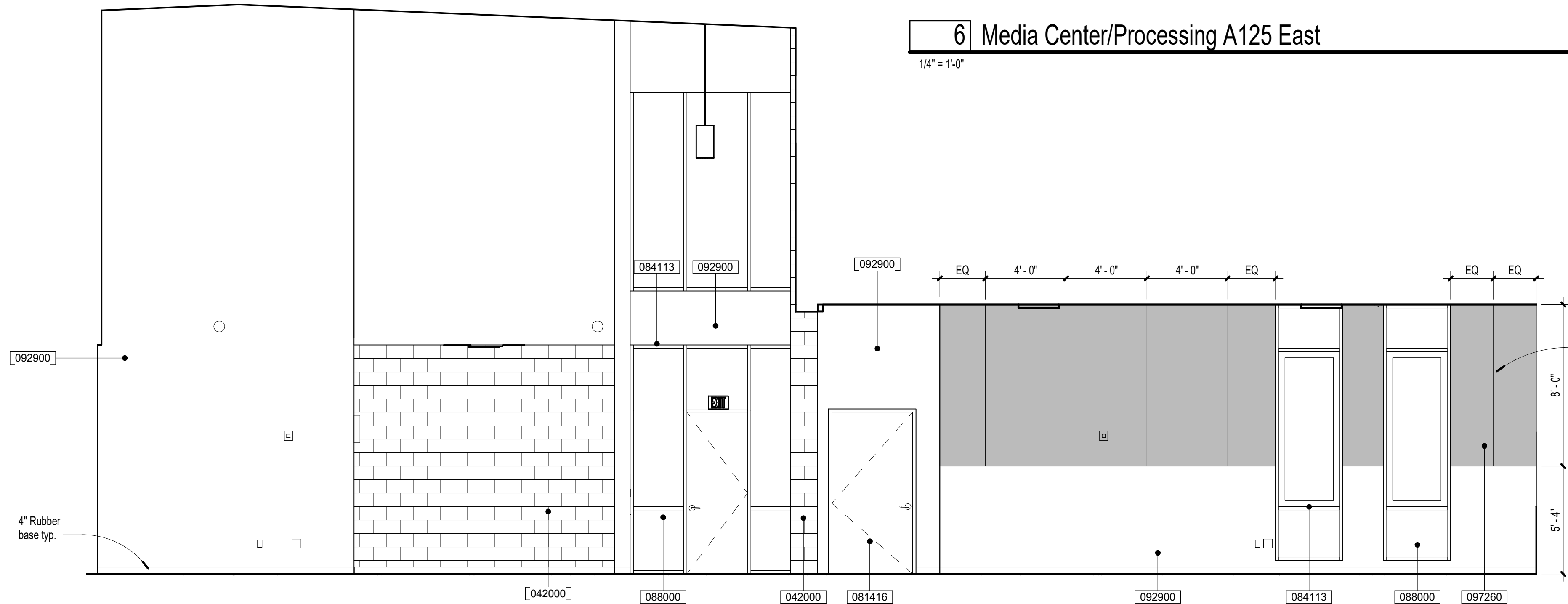
7 Staff Lounge A110 - South

1/4\" = 1'-0"



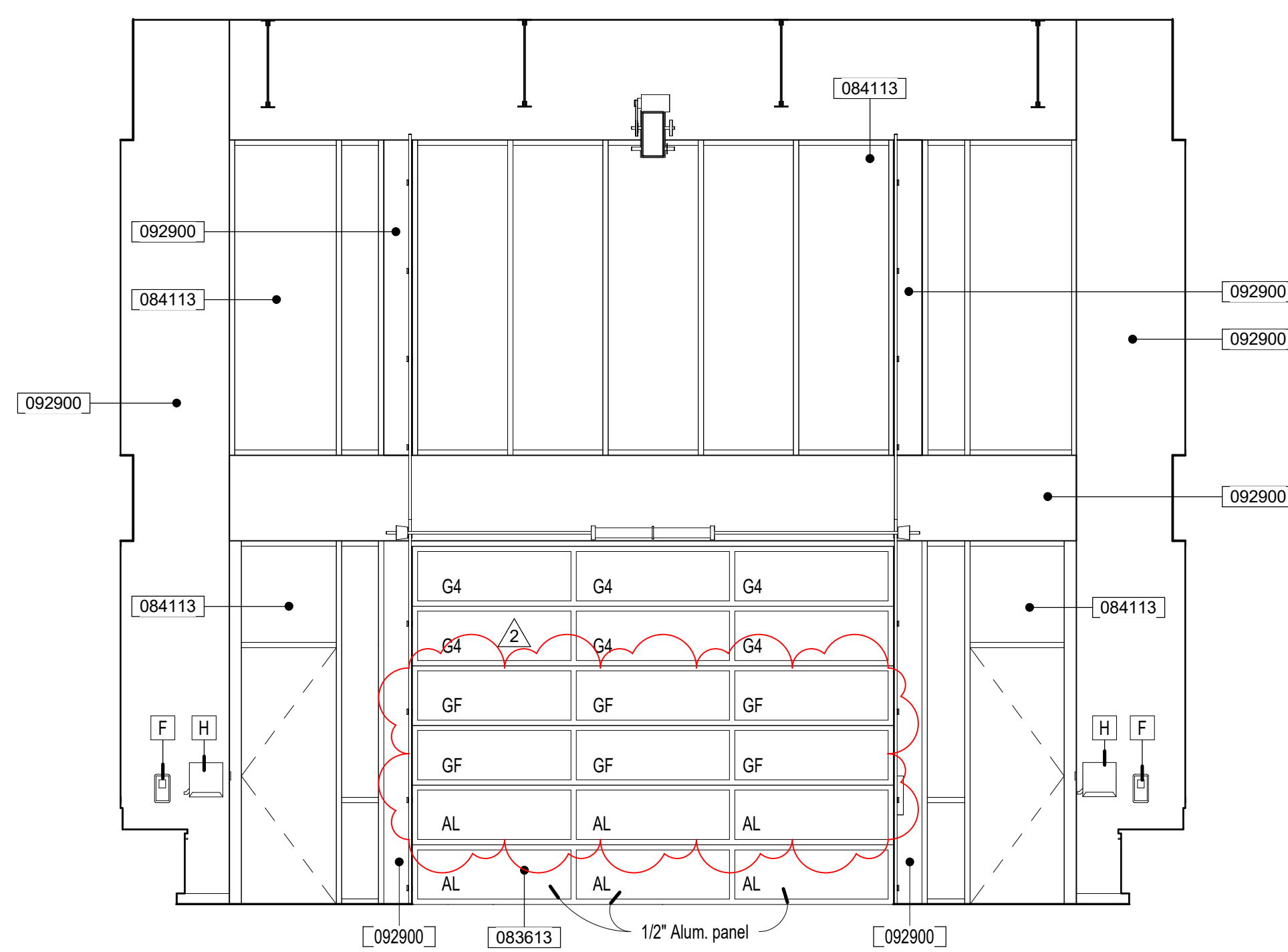
6 Media Center/Processing A125 East

1/4\" = 1'-0"



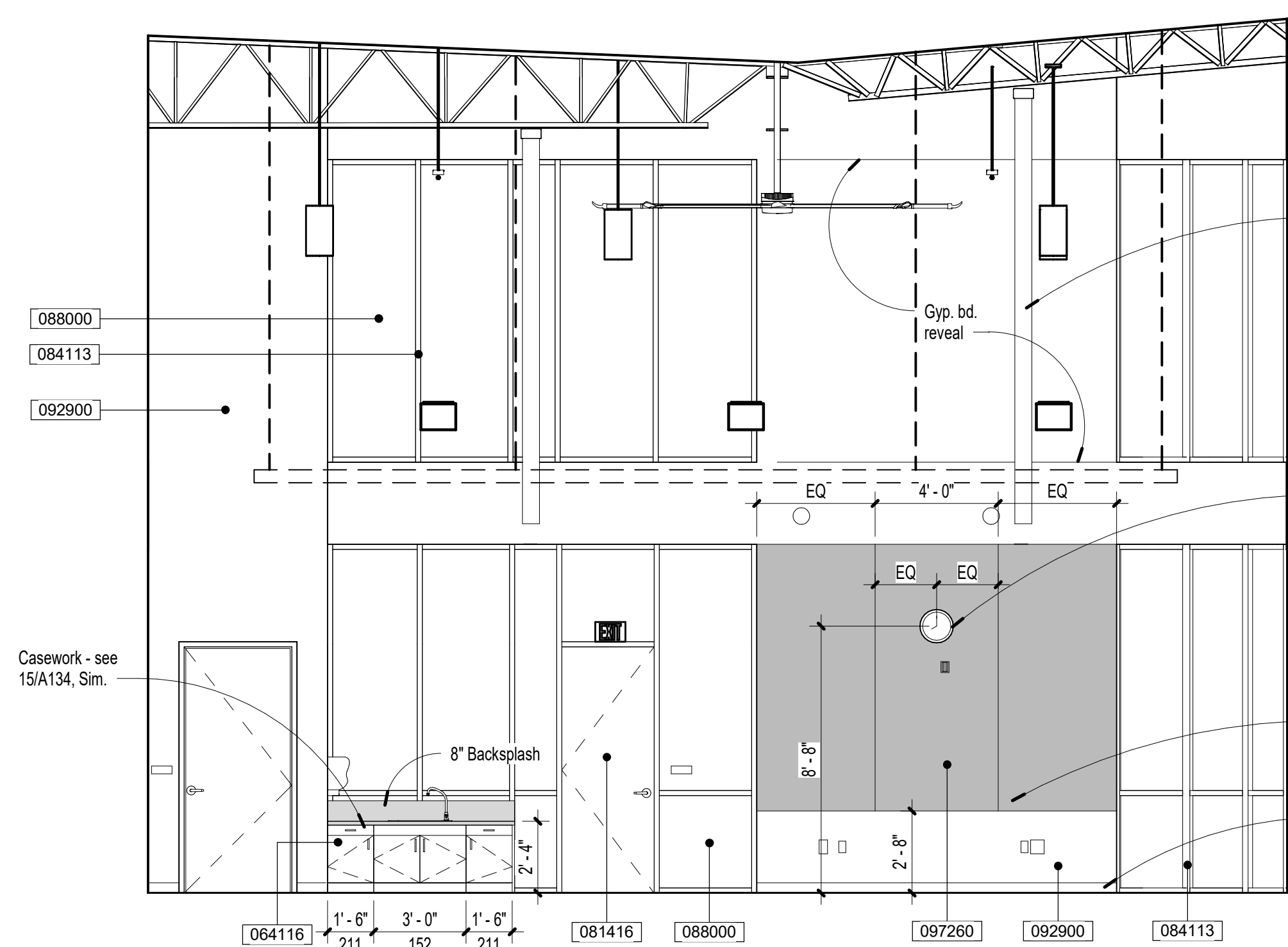
5 Media Center/ Processing B102 North

1/4\" = 1'-0"



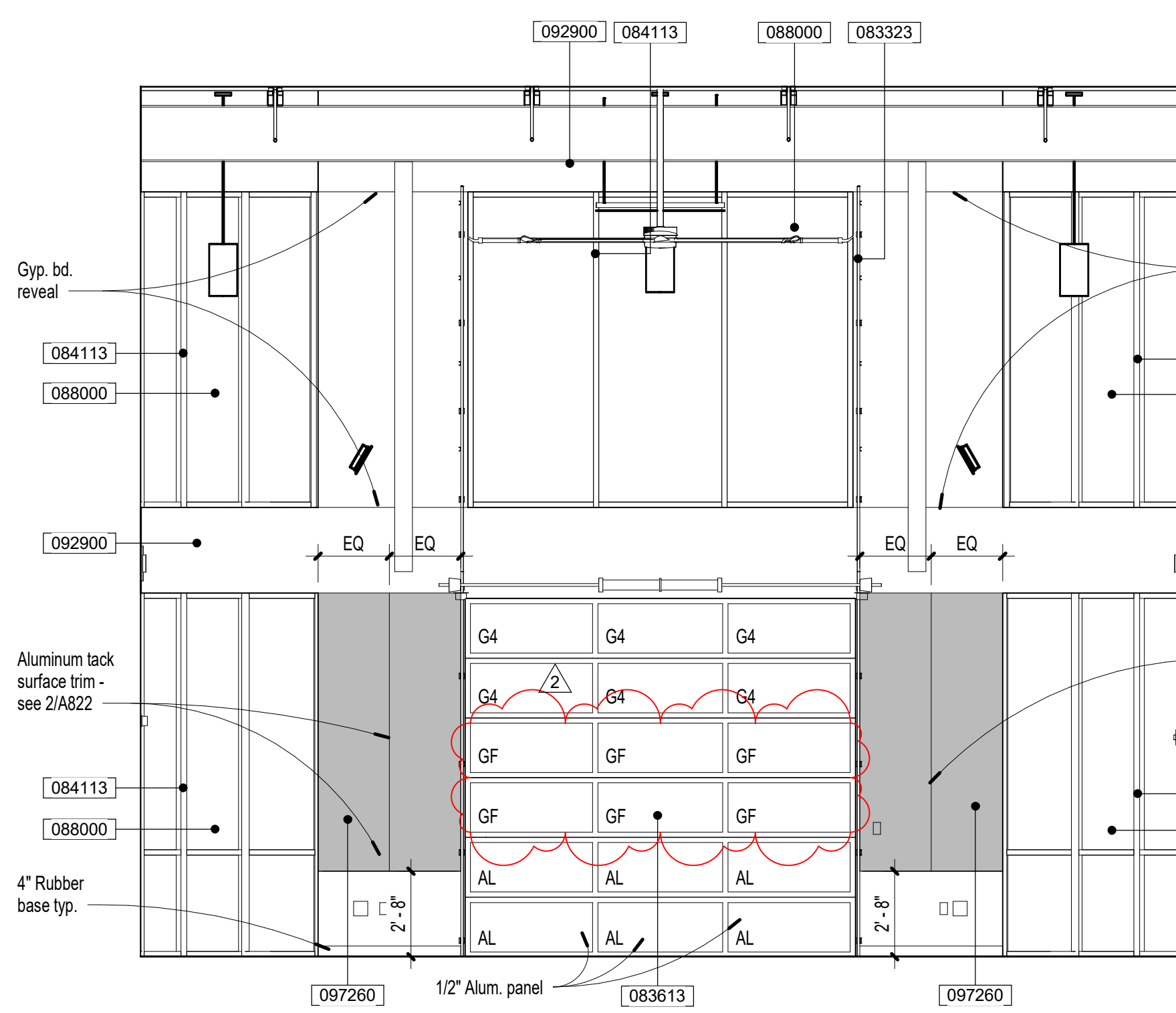
4 STEAM Lab B101 - East

1/4\" = 1'-0"



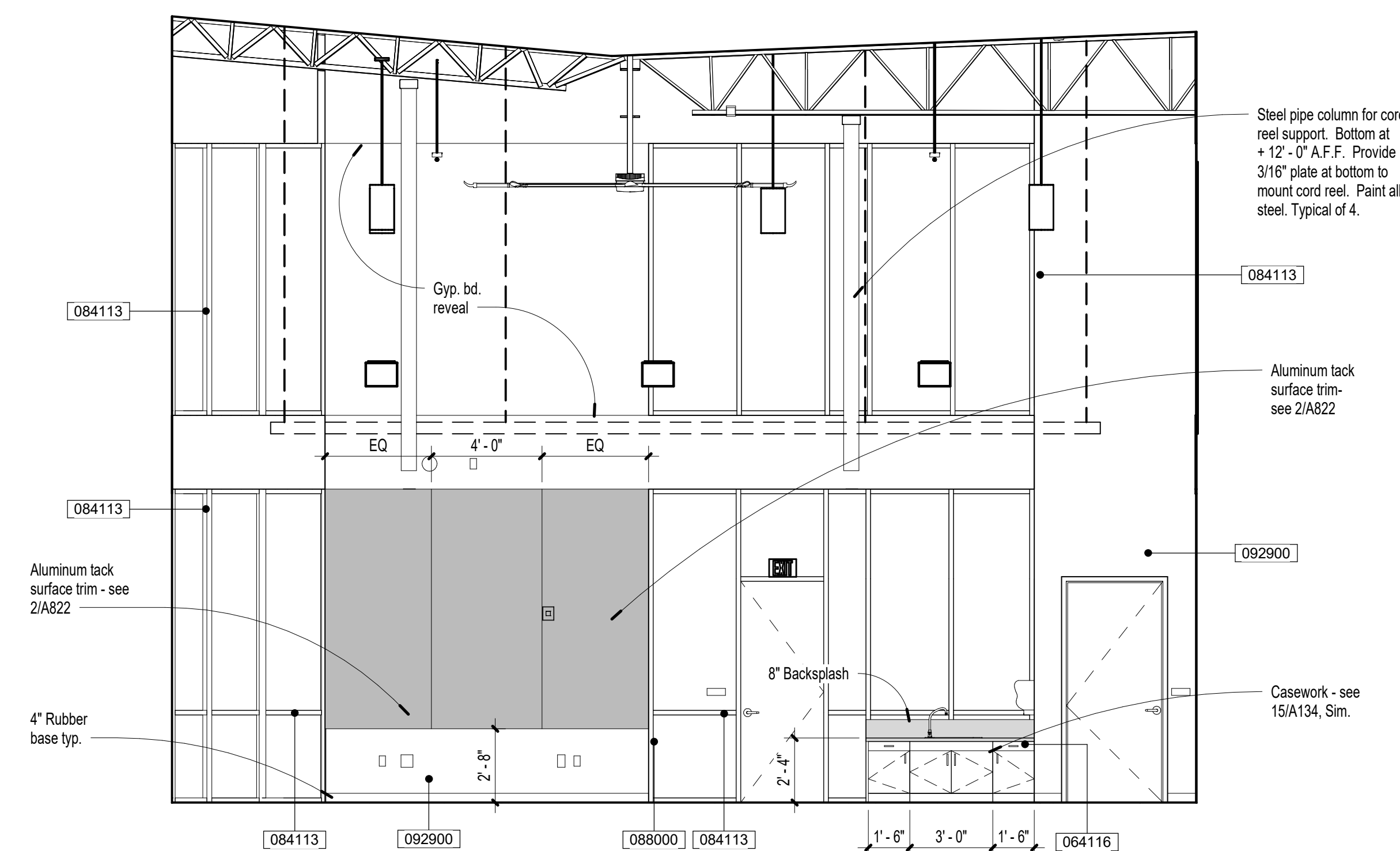
3 STEAM Lab B101 - South

1/4\" = 1'-0"



2 STEAM Lab B101 - West

1/4\" = 1'-0"



1 STEAM Lab B101 - North

1/4\" = 1'-0"

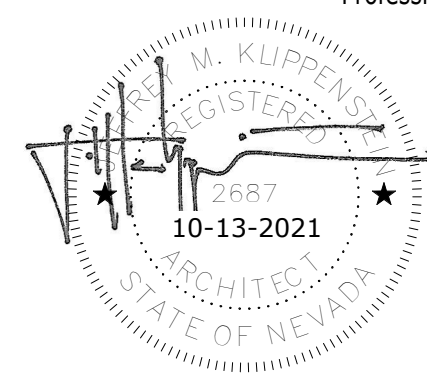
Project Keynotes		
Keynote		Description
042000	Concrete Unit Masonry	
064116	Plastic-Laminate-Faced Architectural Cabinets	
081416	Flush Wood Doors	
083323	Overhead Ceiling Doors	
083613	Sectional Doors	
084113	Aluminum-Framed Entrances and Storefronts	
090000	Glazing	
092900	Gypsum Board	
097260	Tackable Wall Coverings	
113100	Residential Appliances	

Appliance Schedule			
MARK	TYPE	DESCRIPTION	LOCATION
OR	Residential	General Electric JDB30DF 30" Drop in Electric Range	B108, A110
MW	Residential	General Electric JES1145DLWW Countertop Microwave	B108, A110
RF	Residential	GE GGIE18ETHWW 18.2 cu. ft. Top Freezer Refrigerator	B109, A110, C130, C229
MF	Residential	U-Line C028FW-00A-ADA Combo Model	A103
LC	Residential	Kenmore 81422 24" 1.5 cu. ft. Electric Laundry Center	C123
CW	Residential	GE GGFV43SSMMWW 4.5 cu. ft. Front Load Washer	B112
CD	Residential	GE GGFV43SSMMWW 7.5 cu. ft. Front Load Dryer	B112
CO	Commercial	Blodgett Zephraire 200-E Double Convection Oven	B116
HC	Commercial	CresCor Model H-138-1834D Insulated Hot Cabinet	B116
WI	Commercial	Nor-Lake FineLine Walk-In Refrigerator/Freezer	B116
SC	Commercial	Vollrath Company Insulated Hot Server Cabinet w/ Breath Guard	B116
SC2	Commercial	Vollrath Company Insulated Cold Server Cabinet w/ Breath Guard	B116
CH	Residential	General Electric JXX3300JWW Cabinet Hood w/ Charcoal Filter	B108, A110

Toilet Accessories Schedule			
Mark	Description	Model	Manufacturer
A	Horizontal Grab Bar (36")	B-5806 99x36	Bobrick
B	Horizontal Grab Bar (42")	B-5806 99x42	Bobrick
C	Vertical Grab Bar (18")	B-5806 99x18	Bobrick
D	Twin Jumbo Bath Tissue Roll Dispenser	50TR	TORK
F	Push Style Surface Mounted Soap Dispenser (OFCI)	CSA	Purell
G	Seat Cover Dispenser	B-221	Bobrick
H	Surface-Mounted Paper Towel Dispenser	83TR	TORK
I	Horizontal Wall Mounted Stainless Steel Finish Baby Changing Station	KB110-SSRE	Bobrick
K	Glass Mirror with Stainless Steel Angle Frame	B-165 1836	Bobrick
M	Mop & Broom Holder	B-239	Bobrick
N	Under Lavatory Guards	Lavguard 2	Truebro
O	Bobrick B-8861.99 Two-Wall Shower Stall Peened Grab Bar	B-8861.99	Bobrick
P	Bobrick B-5181 Reversible Folding Shower Seat	B-5181	Bobrick
Q	Bobrick Surface Mounted ADA Dryer	B-7128	Bobrick
R	Shower Curtain Hooks, Rod and Curtain	B6107, B204-1, B204-2	Bobrick

Glazing Legend:

- G1 1" Insulated, tempered and laminated glass
- G3 BR3 Rated Security glazing - See Specifications
- G4 1/4" Clear tempered glass
- G5 BR2 Rated Security glazing - See Specifications
- G6 1" Exterior opaque insulated panel
- G7 1" Interior opaque panel - Color 1
- G8 1" Interior opaque panel - Color 2
- G9 1" Insulated tempered glass with integral blind
- G10 1" Insulated translucent glass
- GS Not Used
- GF Vinyl Glazing Film
- W Aluminum Window w/manually operated venetian blinds - see Specification Section 085113
- WS Ballistic Rated Aluminum Window w/ manually operated venetian blinds - see Specification Section 085113



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Interior Elevations -
Areas A+B

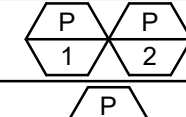
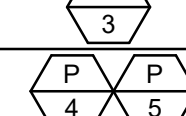
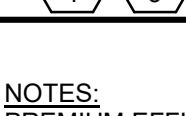
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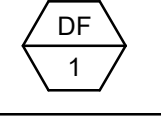
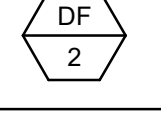
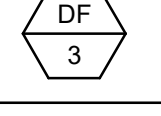
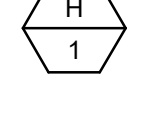
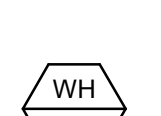
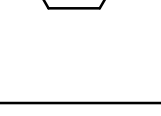





Appliance Schedule			
MARK	TYPE	DESCRIPTION	LOCATION
OR	Residential	General Electric JDE30DF 30" Drop in Electric Range	B108, A110
MW	Residential	General Electric JET1145DWW Countertop Microwave	
RF	Residential	GE GGE18ETHHWW 18.2 cu. ft. Top Freezer Refrigerator	B109, A110, C130, C229
MC	Residential	LF LFCO29FW-QDA-A04A Combo Model	A103
LC	Residential	Kemmore 81422 24" 1.5 cu. ft. Electric Laundry Center	C123
CW	Residential	GE GSGW430SMMWW 4.5 cu. ft. Front Load Washer	B112
CD	Residential	GE GFGD438SMMWW 5.7 cu. ft. Front Load Dryer	B112
CO	Commercial	Budget Zephrae 200-E Double Convection Oven	B116
HC	Commercial	CresCor Model H-138-1834D Insulated Hot Cabinet	B116
WI	Commercial	Nor-Lake FineLine Walk-in Refrigerator/Freezer	B116
SC	Commercial	Vollrath Company Insulated Hot Server Cabinet w/ Breath Guard	B116
SC2	Commercial	Vollrath Company Insulated Cold Server Cabinet w/ Breath Guard	B116
CH	Residential	General Electric JXV330DWW Jeweled Cabinet w/ Chandelier	B108, A110

Technical drawing of a wall assembly. The drawing shows a cross-section of a wall with a rubber base, aluminum tack surface trim, and a rubber base. The dimensions are 4' - 0" and 8". The labels are EQ, 04200, and 09726.

CIRCULATING PUMP SCHEDULE												
SYMBOL	DUTY	TACO MODEL NO.	TYPE	PUMP SIZE	TRIMMED IMPELLER SIZE	GPM	TDH	MIN. EFF.	HP	RPM	OPER. WEIGHT	VOLTAGE
	HEAT PUMP WATER	KS 6011	VERTICAL CLOSE COUPLED	6x6x9.75	FULL	600	76 FEET MAX	69%	15	1,760	800 LBS.	480 V 3 PH.
	HEAT PUMP WATER	KS 3009	VERTICAL CLOSE COUPLED	3x3x8	FULL	140	43 FEET MAX	63%	3	1,760	325 LBS.	480 V 3 PH.
	CONDENSER WATER	KS 4007D	VERTICAL SPLIT COUPLED	4x4x7.5	5.25"	350	25 FEET MAX	77%	5	1,760	400 LBS.	480 V 3 PH.
NOTES: PREMIUM EFFICIENCY MOTORS REQUIRED. FURNISH WITH VIBRO-ACOUSTICS MODEL #SPS-NSN SEISMIC INLINE PUMP STAND WITH VIBRATION ISOLATION PADS. FURNISH WITH SUCTION DIFFUSER AND FLEX ON INLET, AND TRIPLE DUTY VALVE AND FLEX ON OUTLET. MOTORS TO INCLUDE AEGIS SHAFT GROUNDING RINGS.												

EQUIPMENT SCHEDULE

	ELECTRIC WALL HEATER (RISER ROOM - C116) QMARK MODEL WHT500 RISER ROOM ELECTRIC UNIT HEATER WITH INTEGRAL THERMOSTAT, 500 W, 1.7 MBH, 4.2 AMPS, 120V / 1 PHASE. FURNISH WITH 24 VOLT CONTROL, TRANSFORMER. OPERATING WEIGHT = 25 LBS. MOUNT UNIT AT +18" AFF.
	ELECTRIC WALL HEATER (OUTDOOR EQUIPMENT STORAGE - B115, MECH B131) QMARK MODEL WHT2000 RISER ROOM ELECTRIC UNIT HEATER WITH INTEGRAL THERMOSTAT, 2000 W, 6.8 MBH, 9.6 AMPS, 208V / 1 PHASE. FURNISH WITH 24 VOLT CONTROL, TRANSFORMER. OPERATING WEIGHT = 25 LBS. MOUNT UNIT AT +18" AFF.
	DESTRATIFICATION FAN (MEDIA CENTER / PROCESSING - B102) BIG ASS FAN MODEL ESSENCE (10 FT. DIAMETER) VARIABLE SPEED INDUSTRIAL FAN WITH WINGLETS, FULL BMS OPERATING CAPACITY AND BACNET INTERFACE CARD. MAX FAN SPEED 107 RPM. INPUT POWER 100-125 VAC, 1ø, 50/60 HZ, 10 A. OPERATING WEIGHT = 81 LBS. CONTROLLER TO BE WIRED AND MOUNTED IN STORAGE ROOM A122. NOTE: BIG ASS LOGO MUST BE REMOVED. NO EXCEPTION.
	DESTRATIFICATION FAN (STEAM LAB - B101) BIG ASS FAN MODEL ESSENCE (10 FT. DIAMETER) VARIABLE SPEED INDUSTRIAL FAN WITH WINGLETS, FULL BMS OPERATING CAPACITY AND BACNET INTERFACE CARD. MAX FAN SPEED 107 RPM. INPUT POWER 100-125 VAC, 1ø, 50/60 HZ, 10 A. OPERATING WEIGHT = 81 LBS. CONTROLLER TO BE WIRED AND MOUNTED IN STORAGE ROOM A122. NOTE: BIG ASS LOGO MUST BE REMOVED. NO EXCEPTION.
	DESTRATIFICATION FAN (STUDENT HUB 1 - C129) BIG ASS FAN MODEL ESSENCE (12 FT. DIAMETER) VARIABLE SPEED INDUSTRIAL FAN WITH WINGLETS, FULL BMS OPERATING CAPACITY AND BACNET INTERFACE CARD. MAX FAN SPEED 107 RPM. INPUT POWER 100-125 VAC, 1ø, 50/60 HZ, 10 A. OPERATING WEIGHT = 81 LBS. CONTROLLER TO BE WIRED AND MOUNTED IN STORAGE ROOM C128. NOTE: BIG ASS LOGO MUST BE REMOVED. NO EXCEPTION.
	KITCHEN HOOD (KITCHEN B116) GREENHECK MODEL GO-156-430 STAINLESS STEEL TYPE II KITCHEN HOOD. 156 INCH HOOD LENGTH, 54 INCH HOOD WIDTH, 24 INCH HEIGHT FRONT AND BACK, 2,600 CFM EXHAUST STATIC PRESSURE. FURNISH WITH 2-31"x12" FACTORY MOUNTED EXHAUST COLLAR AND 18" HIGH STAINLESS STEEL CEILING ENCLOSURES. OPERATING WEIGHT, 520 LBS. UL 70 LISTED. HOOD MANUFACTURER TO INCLUDE LIGHTS AND LIGHT SWITCH MOUNTED ON WALL. 120V POWER CONNECTION REQUIRED.
	WEATHER HOOD (ELEVATOR RELIEF) GREENHECK MODEL PEV-400 PENTHOUSE ELEVATOR VENT, 26"x36" THROAT SIZE, 36"x36" ROOF OPENING, 38"x38"x18" HIGH OVERALL SIZE. ALUMINUM CONSTRUCTION WITH CLEAR ANODIZED FINISH. FREE AREA 3.45 SQ. FT. FURNISH WITH 24" SLOPING ROOF CURB. FINAL ROOF CURB HEIGHT MINIMUM 12" ABOVE FINISHED ROOF. BIRD SCREEN AND MODEL SMD-201 26"x26" SMOKE DAMPER WITH 120 VOLT ACTUATOR. OPERATING WEIGHT 500 LBS.
	SEQUENCE OF OPERATION FOR SMOKE DAMPER SMOKE DAMPER IS NORMALLY CLOSED UNTIL ACTIVATED BY ANY FIRE ALARM DETECTOR. EQUIPMENT HERE-IN CORRECTED FOR 4,500 FOOT ELEVATION MAKE UP AIR UNIT GREENHECK MODEL #DGX-110-112 DIRECT FIRED MAKE UP AIR UNIT WITH EVAPORATIVE COOLER MODULE, 264.8 MBH NATURAL GAS INPUT, 243.8 MBH OUTPUT AT ALTITUDE, 2,450 CFM. COOLING: 96°F/64°F EAT, 67°F/64°F LAT. HEATING: -0.5°F EAT, 110°F LAT. 0.75" ESP, 1.753" TSP. 2 HP, 480V/3ø, 5.1 MAG, 15 MOP, 1,100 LBS. OPER. WGT. PRODUCTS OF COMBUSTION DETECTOR REQUIRED (PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR). EQUAL BY MODINE. ACCESSORIES: 1. GALVANIZED STEEL HOUSING 2. REMOVABLE ACCESS PANELS 3. FAN ASSEMBLY VIBRATION ISOLATORS 4. ADJUSTABLE MOTOR PULLEYS 5. MOTORIZED INLET DAMPER 6. END OUTDOOR AIR INTAKE 7. DOWNFLOW DISCHARGE 8. DOUBLE WALL CONSTRUCTION ENTIRE UNIT 9. CONTROL CENTER 10. 1" INSULATED SEISMIC SLOPING ROOF CURB WITH CALCULATIONS FOR BOTH ROOF CURBS AND ATTACHMENT TO ROOF. FINAL ROOF CURB HEIGHT MINIMUM 12" ABOVE FINISHED ROOF. 11. 1 YEAR STANDARD WARRANTY 12. STAINLESS STEEL EVAPORATIVE COOLER MODULE 13. MANUFACTURERS CONTROL PANEL 14. CONTROL CONTRACTOR TO PROVIDE FILL AND DRAIN VALVES
	COOLING TOWER EVAPOC MODEL HAT-USS-14-369 INDUCED DRAFT AXIAL FAN TOWER TO COOL 350 GPM FROM 88°F. TO 78°F WITH 65°F WET BULB, 1,750 MBH (350 GPM x 500 x 10°F) CAPACITY. TWO (2) 2 HP MOTORS AT 2.8 AMPS EACH AT 460 VOLT 3 PHASE. 4,000 LBS. OP. WGT. ACCESSORIES: 1. IBC STANDARD STRUCTURAL DESIGN 2. EVAPAK FILL 3. LADDER 4. SUMP SWEEPER PIPING 5. PREMIUM FAN MOTOR INVERTER CAPABLE 6. ELECTRONIC WATER LEVEL CONTROL PACKAGE 7. (2) 3.5 KW ELECTRIC SUMP HEATERS (STAGED) 8. FAN MOTOR SPACE HEATERS (FACTORY WIRED) 9. 304 WELDED STAINLESS STEEL BASIN AND UPPER WETTED SURFACES 10. VIBRATION SWITCH 11. CONTACTOR FOR HEATER PACKAGE
	COOLING TOWER BASIN CLEANER MILLER-LEAMAN MODEL #AA-ATD2 (1)X2-130M-P70-70-AC, SKID MOUNTED SINGLE POD AIR ASSIST DISC FILTER SYSTEM. 1-1/2 HP AT 460 VOLT 3 PHASE. 2 HP AIR COMPRESSOR AT 120 VOLT SINGLE PHASE. MAX. 5 GALLONS BACKWASH.
	HEAT EXCHANGER SONDEX MODEL PHE #A47-IS10-171-TMTL67 PLATE FRAME HEAT EXCHANGER TO COOL 350 GPM FROM 90 DEGREES F. TO 80 DEGREES F. USING 350 GPM, 70 DEGREE F. WATER. 1,742,764 BHT/H HEAT EXCHANGED, MAX 5 PSI PRESSURE DROP BOTH SIDES. 150 PSI MAX WORKING PRESSURE. 2,800 LBS. OP.WGT. PROVIDE PORT STRAINERS.

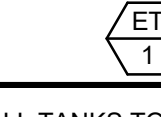
FILTER SCHEDULE

FILTER RACK	AAF / FLANDERS SURFPLAT	OVERALL FLANGE HEIGHT x WIDTH	QUANTITY - FILTER SIZE	MAX VELOCITY (FPM)	MAX CFM	HOUSING DEPTH (INCHES)	HOUSING WEIGHT (LBS)	OPTIONS / ACCESSORIES
A	05H x 10W	15" x 23-3/8"	1 - 12x24	500	1000	12"	50	1
B	10H x 10W	27" x 23-3/8"	1 - 24x24	500	2000	12"	100	1
C	10H x 15W	27" x 34-3/4"	1 - 12x24 1 - 24x24	500	3000	12"	200	1
D	10H x 20W	27" x 46-3/4"	2 - 24x24	500	4000	12"	250	1
OPTIONS / ACCESSORIES: ALL UNITS FURNISH WITH ONE COMPLETE SET OF SPARE FILTERS - 2" THICK 1. 16 GAUGE GALVANIZED STEEL FRAME AND CASING, EXTRUDED ALUMINUM FILTER TRACKS, POLYPROPYLENE GASKETS, AND POSITIVE LOCK LATCHES. NOTE: VERTICAL CLASSROOM CLOSET HEAT PUMPS SHALL HAVE A CONTRACTOR FABRICATED FILTER BOX IN THE RETURN DUCT WITH ONE(1) 24X24 FILTER SET AT AN ANGLE IN C CHANNEL W/ PULL STRAP AND HINGED/CAM LOCK ACCESS DOOR.								

GENERAL NOTES


- ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES, SPECIFICATIONS, LOCAL ORDINANCES, INDUSTRY STANDARDS.
- COORDINATE EXACT LOCATION OF EQUIPMENT AND ALL PENETRATIONS THROUGH ROOF, FLOORS, AND WALLS WITH STRUCTURAL DRAWINGS PRIOR TO SHOP DRAWING SUBMITTAL.
- COORDINATE THE ROUTING OF DUCTWORK WITH PLUMBING AND ELECTRICAL SECTIONS PRIOR TO SHOP DRAWING SUBMITTAL.
- PROVIDE MANUAL VOLUME DAMPER AT EACH EXHAUST BRANCH AND BRANCH SUPPLY DUCT TAKEOFF. FLEXIBLE DUCT LENGTH SHALL NOT EXCEED 5'-0". MVD SHALL BE AS FAR AWAY FROM THE DIFFUSER/GRILLE AS POSSIBLE.
- SLOPE ALL CONDENSATE DRAINS 1" PER 8'-0".
- PROVIDE A MINIMUM OF 12" BELOW DUCTWORK TO CEILING FOR LIGHT REMOVAL.
- COORDINATE EXACT SIZE AND LOCATION OF DUCTWORK WITH ALL OTHER TRADES.
- VERIFY FINAL THERMOSTAT LOCATIONS WITH BUILT-IN CABINETS, DOOR SWINGS, ETC.
- DO NOT ROUTE ANY PIPING DIRECTLY ABOVE ELECTRICAL EQUIPMENT, SWITCH BOARDS, DISTRIBUTION PANELS, MCCS, ETC. AS PROHIBITED BY THE NEC.
- PLANS ARE SCHEMATIC AND ARE INTENDED TO SHOW THE GENERAL NATURE OF THE WORK. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL MEASUREMENTS AND CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH OTHER TRADES TO ACCOMPLISH THE INTENT OF THE PROJECT IN A FIRST CLASS MANNER. NOT ALL OFFSETS IN DUCTWORK AND PIPING ARE SHOWN. EXTRAS WILL NOT BE ALLOWED FOR FIELD-COORDINATION OFFSETS.
- DUCT DIMENSIONS SHOWN ON PLANS, SCHEDULES AND DETAILS ARE NET INSIDE DIMENSIONS.
- ALL MANUAL VOLUME BALANCING DAMPERS INSTALLED ABOVE SHEETROCK CEILINGS OR INACCESSIBLE LOCATIONS SHALL UTILIZE A YOUNG REGULATOR MODEL 1200 WORM GEAR OPERATOR COMPLETE WITH OPERATING SHAFT AND MODEL #270-896 CEILING CAP WITH MODEL #301-09-C OVERSIZED CHROME PLATED COVER, PRIMED FOR PAINTING. NO EXCEPTIONS. THIS SHALL BE INCLUDED IN SUBMITTAL PACKAGE. FIELD PAINT TO MATCH CEILING COLOR, SEE SPECIFICATIONS.
- BRANCH DUCT SIZES ARE DIFFUSER NECK SIZE WITH EXCEPTIONS SHOWN ON DRAWINGS.

EXPANSION TANKS

SYMBOL	LOCATION / DUTY	ELBI MODEL NO.	TANK GALLONS	CHARGE PRESSURE	OPER. WGT.
	MECH. B119 HEAT PUMP SUPPLY/RETURN	HTL-1200	320	20 PSI	960 LBS

ALL TANKS TO BE ASME CODE CONSTRUCTION WITH 150 PSI MAXIMUM WORKING PRESSURE. REPLACEABLE BLADDER AND BOTTOM CONNECTION REQUIRED.

AIR / DIRT SEPARATORS

SYMBOL	LOCATION/DUTY	THRUSH MODEL NO.	SIZE	RATED GPM	P.D./FT	OPER. WGT.
	MECH. B119 HEAT PUMP RETURN	HVR	6"	600	0.6 PSI	675 LBS


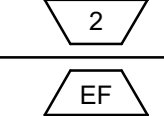

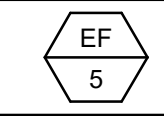
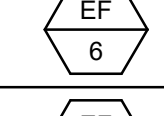
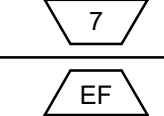

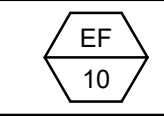
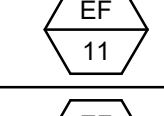
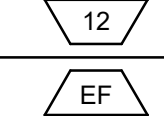
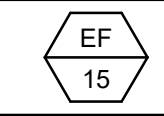
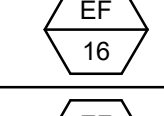
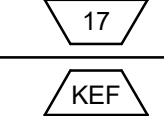
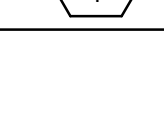
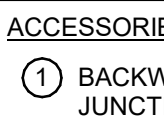
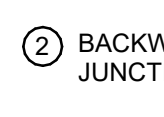
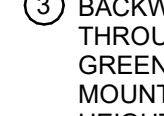
ACCESSORIES:
1. REMOVABLE LOWER HEAD AND COALESCING MEDIUM
2. AUTOMATIC AIR VENTS
3. BLOWDOWN VALVE

EQUAL BY SPIROTHERM

HEAT PUMP VALVE SIZING

HEAT PUMP SIZE	GPM	BRANCH SIZE	VALVE SIZE
015	3.0	3/4"	3/4"
018	4.0	1"	1"
024	4.5	1"	1"
030	6.0	1"	1"
036	7.0	1 1/4"	1"
048	9.0	1 1/4"	1"
060	12.0	1 1/2"	1 1/2"
070	15.0	1 1/2"	1 1/2"
120	22.0	2"	2"

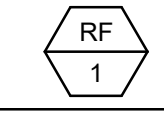
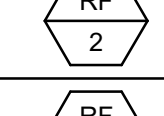
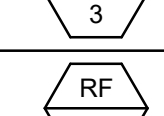
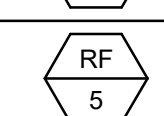
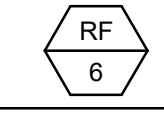
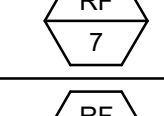
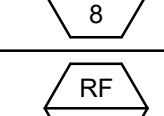
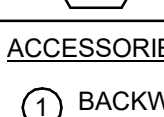

EXHAUST FAN SCHEDULE

SYMBOL	AREA SERVED	GREENHECK MODEL #	CFM	E.S.P. "WC	FAN RPM	MAX. SONES	MOTOR HP / RPM	VOLT/ PHASE	OP. WGT.	ACC
	CUST. RCVG. - B112	SQ-90-VG	500	0.5"	1,702	8.7	1/10, 1,725	115 / 1	63 LBS	①
	TOILETS - B107T, PTA KITCHEN - B109	SQ-99-VG	560	0.5"	1,840	12.4	3/4, 2,200	115 / 1	71 LBS	①
	TOILETS - B118T	SQ-95-VG	360	0.5"	1,598	8.4	1/6, 1,725	115 / 1	63 LBS	①
	STAFF - A112, STAFF - A113, TOILETS - A114 & CL TOILET - A103T	SQ-95-VG	630	0.5"	1,725	9.3	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C123 & TOILET - C222	SQ-80-VG	225	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C120 & TOILET - C218	SQ-80-VG	200	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C101T, TOILET - C102T, TOILET - C201T & TOILET - C202T	SQ-90-VG	400	0.5"	1,725	8.8	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C113T, TOILET - C114T, TOILET - C213T & TOILET - C214T	SQ-90-VG	400	0.5"	1,725	8.8	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C133, TOILET - C232 TOILET - C134 & TOILET - C233	SQ-99-VG	540	0.5"	1,522	11.1	1/4, 1,725	115 / 1	62 LBS	①
	TOILET - C103T, TOILET - C104T, TOILET - C203T & TOILET - C204T	SQ-90-VG	400	0.5"	1,725	8.8	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C111T, TOILET - C112T, TOILET - C134 & TOILET - C212T	SQ-90-VG	400	0.5"	1,725	8.8	1/10, 1,725	115 / 1	63 LBS	①
	TOILETS - C142, TOILETS - C241, CUSTODIAN - C144 & CUSTODIAN - C243	SQ-100-VG	860	0.5"	1,516	7.4	1/4, 1,725	115 / 1	68 LBS	②
	TOILET - C105T & TOILET - C205T	SQ-80-VG	200	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C110T & TOILET - C210T	SQ-80-VG	200	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C106T & TOILET - C206T	SQ-80-VG	200	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C107T, TOILET - C108T, TOILET - C207T & TOILET - C208T	SQ-90-VG	400	0.5"	1,725	8.8	1/10, 1,725	115 / 1	63 LBS	①
	TOILET - C109T & TOILET - C209T	SQ-80-VG	200	0.5"	1,670	8.2	1/10, 1,725	115 / 1	63 LBS	①
	KITCHEN - B116	CUE-180-VG	2,600	0.6"	974	11.8	1, 1,000	115 / 1	175 LBS	③

ACCESSORIES:

- BACKWARD INCLINED ALUMINUM WHEEL, VARI-GREEN EC MOTOR WITH DIAL, UL/UL 705 LISTED, NEMA-1 DISCONNECT, JUNCTION BOX MOUNTED & WIRED, WD-330-PB-12X12 DAMPER SHIPPED LOOSE, MOTOR COVER, SPRING HANGING KIT
- BACKWARD INCLINED ALUMINUM WHEEL, VARI-GREEN EC MOTOR WITH DIAL, UL/UL 705 LISTED, NEMA-1 DISCONNECT, JUNCTION BOX MOUNTED & WIRED, WD-330-PB-14X14 DAMPER SHIPPED LOOSE, MOTOR COVER, SPRING HANGING KIT
- BACKWARD INCLINED ALUMINUM WHEEL - ALUMINUM CURB CAP WITH PREPUNCHED MOUNTING HOLES - DRAIN THROUGH - BALL BEARING MOTOR, MOTOR ISOLATED ON SHOCK MOUNTS - CORROSION RESISTANT FASTENERS, VARI-GREEN EC MOTOR W/PERMANENT DIAL AND 0-10VDC INPUT, UL/UL 762 LISTED, NEMA-3R DISCONNECT, JUNCTION BOX MOUNTED & WIRED, SEISMIC RATED TO DESIGN CATEGORY F, SLOPING ROOF CURB-GALV., GPR-30-G24, FINAL ROOF CURB HEIGHT MINIMUM 12" ABOVE FINISHED ROOF, HINGED BASE (ATTACHED), HIGH TEMP CURB SEAL RATED FOR CONTINUOUS DUTY, TRAP (PN 475538), GALVANIZED BIRDSCREEN, CLEAN-OUT PORT

RELIEF FAN SCHEDULE

SYMBOL	AREA SERVED	GREENHECK MODEL #	CFM	E.S.P. "WC	FAN RPM	MAX. SONES	MOTOR HP / RPM	VOLT/ PHASE	OP. WGT.	ACC
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	CIRCULATION / STUDENT HUB	SQ-120-VG	1,500	0.5"	1,662	12.3	1/2, 1,725	115 / 1	79 LBS	①
	MULTI-PURPOSE ROOM	SQ-120-VG	1,800	0.375"	1,725	13.5	1/2, 1,725	115 / 1	79 LBS	①







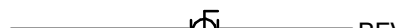




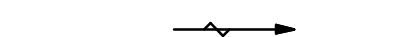

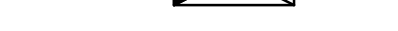



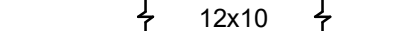
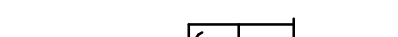

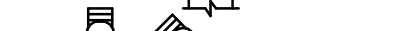












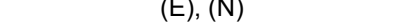



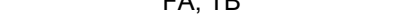



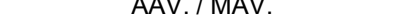
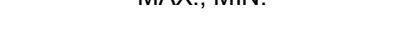



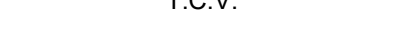


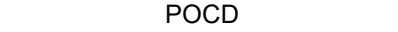

ACCESSORIES:

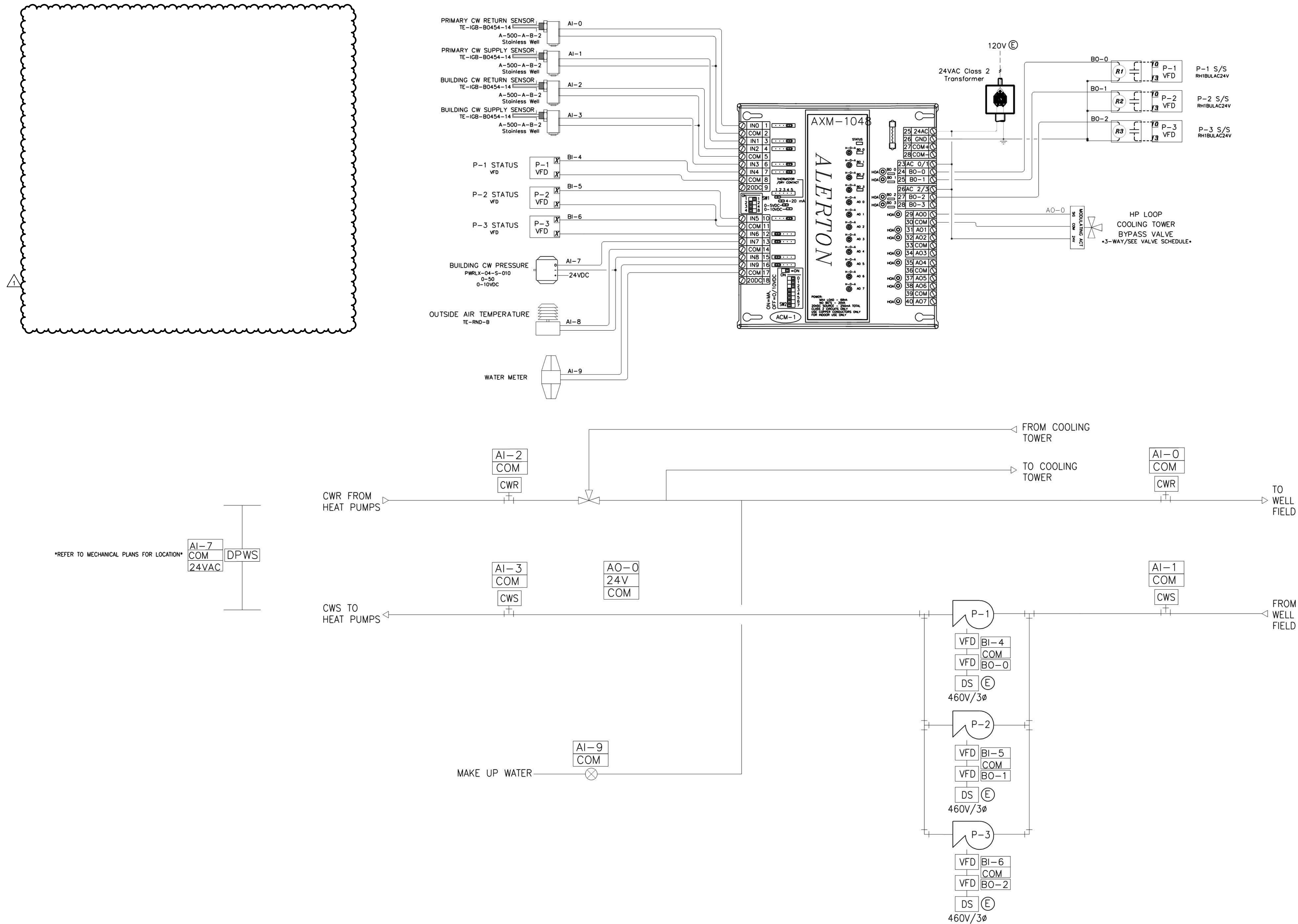
- BACKWARD INCLINED ALUMINUM WHEEL, BALL BEARING MOTORS, VARI-GREEN EC MOTOR WITH DIAL, UL/UL 705 LISTED, NEMA-1 DISCONNECT, JUNCTION BOX MOUNTED & WIRED, WD-330-PB-16X16 DAMPER SHIPPED LOOSE, MOTOR COVER, SPRING HANGING KIT

HEAT PUMP CLOSET MOCK-UP

MECHANICAL CONTRACTOR SHALL PROVIDE A FULL SIZE MOCKUP OF A TYPICAL CLASSROOM VERTICAL HEAT PUMP CLOSET, INCLUDING ALL EQUIPMENT, VALVES, AND APPURTENANCES. THIS MOCKUP SHALL BE REVIEWED AND APPROVED BY THE WCSO FACILITIES MAINTENANCE DEPARTMENT PRIOR TO HEAT PUMP INSTALLATION WITHIN THE BUILDING. MECHANICAL CONTRACTOR SHALL COORDINATE WITH WCSO FACILITIES MAINTENANCE ON WHERE THIS MOCKUP SHALL BE CONSTRUCTED AND SHALL INCORPORATE ANY REQUIRED MODIFICATIONS INTO THE FINAL TYPICAL VERTICAL HEAT PUMP INSTALLATION.

MECHANICAL LEGEND

	RETURN OR EXHAUST AIR DUCT
	SUPPLY AIR DUCT
	HEAT PUMP RETURN LINE
	HEAT PUMP SUPPLY LINE
	CONDENSATE DRAIN LINE
	FLEXIBLE CONNECTION
	GATE VALVE
	BALL VALVE
	BUTTERFLY VALVE
	BALANCE VALVE
	CHECK VALVE
	LEVER HANDLE GAS COCK
	PETES PLUG
	THERMOMETER, PRESSURE GAUGE
	OUTSIDE AIR INTO LOUVER
	RETURN OR EXHAUST AIR DUCT SECTION
	SUPPLY AIR DUCT SECTION
	DUCT (FIRST FIGURE SIDE SHOWN SECOND FIGURE SIDE NOT SHOWN)
	TURNING VANES
	FLEXIBLE DUCTWORK
	MANUAL VOLUME DAMPER
	RISE OR DROP IN DIRECTION OF ARROW
	ROOM THERMOSTAT
	TEMPERATURE SENSOR
	DIAMETER
	HUMIDIFIER
	HUMIDISTAT
	ROOM NAME AND NUMBER
	AIR CONDITIONING
	ACCESS DOOR, ACCESS PANEL
	CUBIC FEET OF AIR PER MINUTE EXISTING, NEW
	EXHAUST AIR, OUTSIDE AIR & RETURN AIR DAMPER
	TRANSFER AIR, TRANSFER GRILLE, RELIEF AIR GRILLE
	EXHAUST FAN
	DEGREES FAHRENHEIT
	FROM ABOVE, TO BELOW
	FROM BELOW, TO ABOVE
	FIRE DAMPER / COMBINATION FIRE SMOKE DAMPER
	GAUGE
	GALVANIZED
	AUTOMATIC / MANUAL AIR VENT
	MAXIMUM, MINIMUM
	PITCH DOWN IN DIRECTION OF ARROW
	PRESSURE REDUCING VALVE
	RETURN AIR, EXHAUST AIR
	SUPPLY AIR, OUTSIDE AIR
	TEMPERATURE CONTROL VALVE
	TEMPERATURE CONTROL PANEL
	TYPICAL
	UNLESS NOTED OTHERWISE
	PRODUCTS OF COMBUSTION DETECTOR



HEAT PUMP LOOP CONTROL DIAGRAM 1
SCALE: NONE TC004

PLUMBING FIXTURE SCHEDULE	
WC-1	WATER CLOSET: "AMERICAN STANDARD" AFWALL MODEL 2257.101 WALL MOUNTED ADA HEIGHT VITREOUS CHINA TOILET WITH ELONGATED BOWL. FURNISH WITH "SLOAN" ROYAL 111-1.28 FLUSH VALVE AND "OLSONITE" MODEL #10SSCT TOILET SEAT.
WC-2	WATER CLOSET: "AMERICAN STANDARD" AFWALL MODEL 2257.101 WALL MOUNTED STANDARD HEIGHT VITREOUS CHINA TOILET WITH ELONGATED BOWL. FURNISH WITH "SLOAN" ROYAL 111-1.28 AND "OLSONITE" MODEL #10SSCT TOILET SEAT.
UR-1	URNAL: "AMERICAN STANDARD" WASHBROOK MODEL 6590.001 WALL MOUNTED VITREOUS CHINA URINAL WITH ELONGATED RIM. FURNISH WITH "SLOAN" ROYAL 186-0.5 FLUSH VALVE.
L-1	LAVATORY: "AMERICAN STANDARD" LUCERNE MODEL 0355.012 WALL HUNG VITREOUS CHINA LAVATORY. FURNISH WITH "CHICAGO" MODEL 420-E2805ABCP FAUCET AND GRID DRAIN. INSULATE HOT AND COLD WATER PIPING AND WASTE PIPING BELOW FIXTURE WITH "TRUE-BRO" LAV GUARD PROTECTIVE MOLDED CLOSED CELL VINYL PIPE COVERS, WITH VANDAL RESISTANT SNAP-CLIP FASTENERS AND AN ASTM E-84 SMOKE TEST RATING OF 0.
L-2	LAVATORY: "BRADLEY" MODEL ELX-2 EXPRESS LAVATORY SYSTEM. NSD NO SOAP DISPENSER/NO DRILLING. ALP-WHT ALPINE WHITE COLOR, NBS NO BACKSPLASH, COAL ACCESS PANEL AND IW-CHROME CHROME-PLATED INDIVIDUAL WASTE ASSEMBLY. FURNISH WITH "CHICAGO" MODEL 802-VE2805-665CP FAUCET.
L-3	LAVATORY: "BRADLEY" MODEL ELX-3 EXPRESS LAVATORY SYSTEM WITH IR-DCD INFARED FAUCET BATTERY. NSD NO SOAP DISPENSER/NO DRILLING. ALP-WHT ALPINE WHITE COLOR, NBS NO BACKSPLASH, COAL ACCESS PANEL AND IW-CHROME CHROME-PLATED INDIVIDUAL WASTE ASSEMBLY. FURNISH WITH "CHICAGO" MODEL 802-VE2805-665CP FAUCET.
S-1	CLASSROOM SINK: INTEGRAL BOWL (SEE ARCHITECTURAL) WITH "CHICAGO" MODEL 50-GN8AE3ABCP GOOSENECK FAUCET AND "HAWK" MODEL 5054LF BUBBLER. PROVIDE L-ADA-25-FS FLAT STRAINER WITH OFFSET. INSULATE HOT AND COLD WATER PIPING AND WASTE PIPING BELOW FIXTURE WITH "TRUE-BRO" LAV GUARD PROTECTIVE MOLDED CLOSED CELL VINYL PIPE COVERS, WITH VANDAL RESISTANT SNAP-CLIP FASTENERS AND AN ASTM E-84 SMOKE TEST RATING. S-1A LESS BUBBLER.
S-2	KITCHEN SINK: "JUST" MODEL DLN-ADA-2143-A-GR 18 GAUGE TYPE 304 STAINLESS STEEL DOUBLE BOWL SINK WITH INTEGRAL DRAIN SYSTEM. PROVIDE "CHICAGO" MODEL 201-A317VPCABCP DECK MOUNTED FAUCET WITH 8" FIXED CENTERS AND 4" VANDAL PROOF WRISTBLADES. PROVIDE CRUMB CUP STRAINERS WITH OFFSET. BOWLS TO BE 5-1/2" DEEP.
S-3	SINK: "ADVANCE TABCO" MODEL 7-PS-EC-SP-1X STAINLESS STEEL SINK WITH 4" O.C. ECONOMY SPLASH MOUNTED LEAD FREE COMPLIANT GOOSENECK FAUCET. CHROME PLATED & FURNISHED WITH AERATOR. INSULATE HOT AND COLD WATER PIPING AND WASTE PIPING BELOW FIXTURE WITH "TRUE-BRO" LAV GUARD PROTECTIVE MOLDED CLOSED CELL VINYL PIPE COVERS, WITH VANDAL RESISTANT SNAP-CLIP FASTENERS AND AN ASTM E-84 SMOKE TEST RATING.
S-4	SINK: INTEGRAL BOWL(NIC) WITH "CHICAGO" MODEL 50-GN8AE3ABCP GOOSENECK FAUCET, "HAWK" MODEL 5054LF BUBBLER AND JR SMITH MODEL 8710T FLOOR MOUNTED SOLIDS INTERCEPTOR. PROVIDE CRUMB CUP STRAINER WITH OFFSET. INSULATE HOT AND COLD WATER PIPING AND WASTE PIPING BELOW FIXTURE WITH "TRUE-BRO" LAV GUARD PROTECTIVE MOLDED CLOSED CELL VINYL PIPE COVERS, WITH VANDAL RESISTANT SNAP-CLIP FASTENERS AND AN ASTM E-84 SMOKE TEST RATING.
S-5	SINK: "ADVANCE TABCO" MODEL 94-63-54-24L 14 GAUGE 304 STAINLESS STEEL THREE COMPARTMENT SINK WITH ONE DRAINBOARD, 18" x 24" x 14" DEEP. PROVIDE "ELKAY" MODEL LK943AF 14C 8" CENTERSET WALL MOUNT FAUCET, 44 INCH FLEXIBLE HOSE W/ 1.6 GPM SPRAY HEAD AND 2 INCH LEVER HANDLES. FURNISH WITH WATTS MODEL LFUSG-8-4-2 THERMOSTATIC MIXING VALVE SET TO 110°.
S-6	STAINLESS SINK: HOUZER MODEL PCG-3600W PERCELAIN ENAMEL STEEL UNDERMOUND SINK 28"X15"X9" DEEP SINK, FURNISH WITH CHICAGO MODEL 201-AE35-317ABCP 8"CENTER FAUCET, ZURN MODEL Z1190 SOLIDS INTERCEPTOR AND HOUZER BG-3650 STRAINER
SHO-1	SHOWER: "MOEN" MODEL T8348EP 15 SINGLE-HANDLE POSI-TEMP HANDHELD SHOWER SYSTEM WITH MODEL 8371HD CARTRIDGE
MS-1	MOP SINK: CECO MODEL 871 CORNER SERVICE SINK 28"X28" ENAMELED CAST IRON WITH CHROME FLAT STRAINER. FURNISH WITH CHICAGO MODEL 897-CP FAUCET WITH VACUUM BREAKER AND WALL SUPPORT.
SS-1	SERVICE SINK: FLORESTONE MODEL #96 24x24 TERRAZZO MOP RECEPTOR COMPLETE WITH #MR-370 HOSE AND CLAMP, #MR-373 RIM GUARDS, #MR-375 CHROME FLAT STRAINER AND #MR-377 WALL GUARDS. FURNISH WITH MOEN #8124 FAUCET WITH VACUUM BREAKER AND HOSE THREAD END.
DF-1	DRINKING FOUNTAIN/BOTTLE FILLER: "ELKAY" MODEL LZSTLBWSLK HIGH/LOW FILTERED DRINKING FOUNTAIN WITH BOTTLE FILLING STATION. PROVIDE WITH MODEL #ACCESS12X38-5 FRONT ACCESS PANEL. MOUNT UNIT WITH BUBBLER AT HEIGHT AS INDICATED ON ARCHITECTURAL DRAWINGS.
DF-2	DRINKING FOUNTAIN/BOTTLE FILLER: "ELKAY" MODEL LZSRWSSP SINGLE ADA FILTERED DRINKING FOUNTAIN WITH BOTTLE FILLING STATION. PROVIDE WITH MODEL #ACCESS12X38-5 FRONT ACCESS PANEL. MOUNT UNIT WITH BUBBLER AT HEIGHT AS INDICATED ON ARCHITECTURAL DRAWINGS.
RB	REFRIGERATOR BOX: "GUY GRAY MANUFACTURING CO." MODEL MB1HAAB METAL POWDER COATED ICE MAKER OUTLET BOX WITH BRASS QUARTER TURN HAMMER ARRESTER VALVE AND 1/2" SWEAT CONNECTION.
WB	WASHER BOX: "GUY GRAY MANUFACTURING CO." MODEL #T-200. 2" DRAIN.
DN	DOWNSPOUT COVER: "ZURN" MODEL Z-199-BRASS DOWNSPOUT
HS-1	HYDRATION STATION: ELKAY MODEL #LZWSSM BOTTLE FILLING STATION, SURFACE MOUNTED, FILTERED NON-REFRIGERATED 115V.
DN-1	DOWNSPOUT NOZZLE: "ZURN" MODEL Z-199 DOWNSPOUT NOZZLE

GREASE INTERCEPTOR CALCULATION			
PER 2018 UPC TABLE 1014.3.6			
FIXTURE	QUANTITY	FIXTURE UNIT VALUE	TOTAL FIXTURE UNITS
2" FLOOR DRAIN	1	2	2
2" FLOOR SINK	2	4	8
HAND SINK	1	1	1
4" TRENCH DRAIN	2	8	16
FIXTURE UNIT TOTAL:			27
PROVIDE 1,000 GALLON GREASE INTERCEPTOR			

MAXIMUM FIXTURE UNIT LOADING FOR WATER PIPE									
NOMINAL PIPE SIZE (INCHES)	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
FIXTURE UNITS (WITHOUT FLUSH VALVES)	6	10	21	34	127	245	431	875	3150
FIXTURE UNITS (WITH ONE OR MORE FLUSH VALVES)	-	5	10	20	48	124	295	850	3150
NOTES	1. USE ABOVE DATA ONLY WHEN PIPE SIZES ARE NOT OTHERWISE SIZED ON THE DRAWINGS 2. FIXTURE UNITS ARE AS LISTED FOR PUBLIC USE IN UNIFORM PLUMBING CODE.								

PLUMBING FIXTURE CONNECTION SCHEDULE								
FIXTURE	SYMBOL	WASTE		VENT	COLD WATER		HOT WATER	
		BRANCH	OUTLET		BRANCH	OUTLET	BRANCH	OUTLET
WATER CLOSET (F.V.)	WC	4"	4"	2"	1 1/4"	1"	-	-
URNAL	UR	2"	2"	1 1/2"	1"	3/4"	-	-
LAVATORY	L	2"	1 1/2"	1 1/2"	1 1/2"	1/2"	1/2"	1/2"
DRINKING FOUNTAIN	DF	2"	1 1/2"	1 1/2"	1/2"	1/2"	-	-
MOP SINK	MS	3"	3"	2"	1/2"	1/2"	1/2"	1/2"
SERVICE SINK	SS	3"	3"	2"	1/2"	1/2"	1/2"	1/2"
FLOOR SINK	FS	2"	2"	1 1/2"	-	-	-	-
SINK	S	2"	1 1/2"	1 1/2"	1/2"	1/2"	1/2"	1/2"
FLOOR DRAIN	FD	2"	2"	1 1/2"	-	-	-	-
HOSE BIBB	HB	-	-	-	3/4"	3/4"	-	-
WASHER BOX	WB	2"	2"	1 1/2"	3/4"	1/2"	1/2"	1/2"
DRINKING FOUNTAIN	DF	2"	1 1/2"	1 1/2"	1/2"	1/2"	-	-
SHOWER	SHO	2"	1 1/2"	1 1/2"	1/2"	1/2"	1/2"	1/2"
NOTES	1. WATER BRANCH LINES WHERE LESS THAN 10'-0" LONG MAY BE SAME SIZE AS OUTLETS SCHEDULED ABOVE.							

GENERAL NOTES	
1. ALL WALL SHALL COMPLY WITH ALL APPLICABLE CODES, SPECIFICATIONS, LOCAL ORDINANCES, AND INDUSTRY STANDARDS. 2. ALL PIPING SHALL NOT OBSTRUCT ACCESS OR REMOVAL OF MECHANICAL EQUIPMENT. 3. ALL WATER PIPING IN EXTERIOR WALLS SHALL BE INSULATED AND INSTALLED INSIDE THE BUILDING INSULATION. 4. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION. 5. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF PLUMBING FIXTURES TO MEET ADA REQUIREMENTS. 6. HANDICAP WATER CLOSETS SHALL HAVE WATER ROUGH-IN LOCATED TO PROVIDE FLUSH VALVE HANDLE FACING WIDE SIDE OF ENCLOSURE. 7. ALL SEWER AND WASTE SHALL BE SLOPED AT 1/4" = 1'-0". 8. PROVIDE WALL CLEANOUT FOR ALL SINKS AND URINALS. 9. COORDINATE EXACT LOCATION OF EQUIPMENT AND PENETRATIONS THROUGH ROOF, FLOORS AND WALLS WITH STRUCTURAL DRAWINGS PRIOR TO ANY ROUGH-IN. 10. COORDINATE THE ROUTING OF DUCTWORK WITH PLUMBING AND ELECTRICAL SECTIONS PRIOR TO BEGINNING WORK. 11. ALL ROOF PENETRATIONS SHALL BE FLASHED AND COUNTER FLASHED WATER TIGHT. 12. ALL MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. 13. PROVIDE ALL PLUMBING FIXTURES AND EQUIPMENT WITH ACCESSIBLE STOPS. 14. COORDINATE CLEANOUT LOCATIONS WITH ALL TRADES. PROVIDE SIZES AND TYPE TO SUIT FLOORING AS SPECIFIED. 15. ALL BALANCE VALVES SHALL BE SET AT 0.5 GPM UNLESS NOTED OTHERWISE. 16. ALL FLOOR DRAIN LOCATIONS SHALL BE AS PER DIMENSIONED ARCHITECTURAL DRAWINGS.	

EQUIPMENT SCHEDULE	
DWH 1	DOMESTIC WATER HEATER: "LOCHINVAR" MODEL SNA286-125 COMMERCIAL, WATERTUBE HEAT EXCHANGER GAS WATER HEATER. STORAGE TANK SHALL BE GLASS-LINED, ASME CONSTRUCTION AND WITH A CAPACITY OF 120 GALLONS. WATER HEATER SHALL HAVE A RECOVER RATE OF 332 GALLONS PER HOUR AT A 100 DEGREE TEMPERATURE RISE WITH AN INPUT RATING OF 285,000 BTU/H. THE WATER HEATER SHALL BE CAPABLE OF FULL MODULATION FIRING DOWN TO 20% OF RATED INPUT WITH A TURN DOWN RATIO OF 5:1. PROVIDE WITH ASME TEMPERATURE AND PRESSURE RELIEF VALVE, CON-X-US REMOTE CONNECTIVITY, CONCENTRIC VENT KIT AND CONDENSATE NEUTRALIZATION KIT. OPERATING WEIGHT=1632 LB. PROVIDE EMERGENCY SHUTDOWN SWITCH & DISCONNECT SWITCH.
DWH 2	DOMESTIC WATER HEATER: "LOCHINVAR" MODEL SNA286-125 COMMERCIAL, WATERTUBE HEAT EXCHANGER GAS WATER HEATER. STORAGE TANK SHALL BE GLASS-LINED, ASME CONSTRUCTION AND WITH A CAPACITY OF 120 GALLONS. WATER HEATER SHALL HAVE A RECOVER RATE OF 332 GALLONS PER HOUR AT A 100 DEGREE TEMPERATURE RISE WITH AN INPUT RATING OF 285,000 BTU/H. THE WATER HEATER SHALL BE CAPABLE OF FULL MODULATION FIRING DOWN TO 20% OF RATED INPUT WITH A TURN DOWN RATIO OF 5:1. PROVIDE WITH ASME TEMPERATURE AND PRESSURE RELIEF VALVE, CON-X-US REMOTE CONNECTIVITY, CONCENTRIC VENT KIT AND CONDENSATE NEUTRALIZATION KIT. OPERATING WEIGHT=1632 LB. PROVIDE EMERGENCY SHUTDOWN SWITCH & DISCONNECT SWITCH.
CP 1	CIRCULATING PUMP: "TACO" MODEL #2400-40-SP LEAD-FREE STAINLESS STEEL CIRCULATOR INLINE CENTRIFUGAL PUMP FOR HOT WATER RETURN. PUMP SHALL BE CAPABLE OF SUPPLYING 18 GPM @ 10' TDH WITH A 1/8 HP MOTOR, 120V/60HZ/1PH APPROX. WEIGHT = 14 LBS.
CP 2	CIRCULATING PUMP: "TACO" MODEL #2400-10-SP LEAD-FREE STAINLESS STEEL CIRCULATOR INLINE CENTRIFUGAL PUMP FOR HOT WATER RETURN. PUMP SHALL BE CAPABLE OF SUPPLYING 2 GPM @ 10' TDH WITH A 1/10 HP MOTOR, 120V/60HZ/1PH APPROX. WEIGHT = 14 LBS.
TMV 1	THERMOSTATIC MIXING VALVE: LEONARD NEXT GENERATION HIGH LOW THERMOSTATIC WATER MIXING VALVE, MODEL TM-1520B-LF-DT-HT WITH A CAPACITY OF 48 GPM AT A 5 PSI PRESSURE DROP. VALVE SHALL BE EQUIPPED WITH INLET THERMOMETERS. FURNISH WITH MODEL #BWE-EXP BAKED WHITE ENAMEL EXPOSED LOCKABLE CABINET.
ET 1	EXPANSION TANK: "WATTS" MODEL DETA-20 DOMESTIC WATER EXPANSION TANK.
SP 1	ELEVATOR SUMP PUMP: "ZOELLER" MODEL 137-0039 N137 SUBMERSIBLE NON AUTO PUMP. "ZOELLER" MODEL 10-1994 DOUBLE PEGGYBACK MECHANICAL FLOAT SWITCH AND "ZOELLER" MODEL 10-4013 A-PAK ALARM TO BE LOCATED WITHIN MECHANICAL B119M). 50 GPM AT 10 FT. TDH. PUMP SHALL BE EQUIPPED WITH A 1/2 HP, 120V, 1 PHASE, 60 Hz MOTOR.
EHT 1	ELECTRIC HEAT TRACE: "RAYCHEM" XL-TRACE MODEL 5XL-2-40 DEGRESS F. SELF REGULATING ELECTRIC HEAT TRACE FREEZE PROTECTION (5 WATTS/FT). APPLY AT 1 FT/LF AT ROOF DRAIN BASINS, OVERFLOW ROOF DRAIN BASINS, RAIN AND OVERFLOW RAINWATER LEADERS AS SHOWN ON DRAWINGS. 277 V/1PH. FURNISH WITH POWER CONNECTION KIT, GLASS ADHESIVE TAPE, THERMOSTAT AND LABELS FOR A COMPLETE SYSTEM.
CMS 1	CARBON MONOXIDE SENSOR: PROVIDE A CARBON MONOXIDE SENSOR AND ALARM ON THE NORTH WALL OF MECHANICAL ROOM B119. THE CARBON MONOXIDE SENSOR SHALL BE MOUNTED AT 5 FEET ABOVE FINISHED FLOOR. THE SENSOR SHALL BE A SENVA MODEL TGW AC, OR APPROVED EQUAL. SENSOR AND ALARM ARE NOT REQUIRED TO BE INTERFACED WITH THE DDC SYSTEM AND ARE INTENDED FOR LOCAL DISPLAY AND ALARM ONLY. PROVIDE AN AUDIBLE/VISIBLE ALARM THAT IS CONNECTED TO THE CARBON MONOXIDE SENSOR AND IS MOUNTED AT 7'-6" ABOVE FINISHED FLOOR DIRECTLY ABOVE THE SENSOR LOCATION. THE AUDIBLE/VISIBLE ALARM SHALL BE 24 VOLT AMSECO MODEL CSHB BG WITH ALARM SETPOINT EQUAL BY KELE ASSOCIATES. ALARM SETPOINT SHALL BE 30 PPM FOR CARBON MONOXIDE.
EGSV 1	EMERGENCY GAS SHUTOFF VALVE: PROVIDE AN EMERGENCY 2" GAS EMERGENCY SHUTOFF VALVE WHERE THE GAS LINE ENTERS MECHANICAL ROOM B119. THE VALVE SHALL BE ALSO 5001, HONEYWELL MAXON, OR APPROVED EQUAL. A 2" STRAINER SHALL BE INSTALLED UPSTREAM OF THE EMERGENCY GAS SHUTOFF VALVE. STRAINER SHALL BE TITAN YS-12-DI, OR APPROVED EQUAL. WITH 40 MESH STRAINER AND BUNA GASKET. THE VALVE TO BE INTERLOCKED WITH THE BOILER SHUT DOWN SWITCH.

PLUMBING LEGEND	
	SOIL OR WASTE LINE BELOW GRADE
	SOIL OR WASTE LINE ABOVE GRADE
	INDIRECT WASTE LINE
	COLD WATER LINE
	HOT WATER LINE
	HOT WATER RETURN LINE
	GAS LINE
	GREASE WASTE LINE
	VENT LINE
	RAINWATER LEADER LINE
	OVERFLOW RAINWATER LEADER LINE
	FIRE LINE
	GATE VALVE
	BALL VALVE
	BALANCE VALVE
	CHECK VALVE
	LEVER HANDLE GAS COCK
	THERMOMETER
	UNION
	TEMPERATURE AND PRESSURE RELIEF LINE
	ABOVE CEILING
	UNDER FLOOR
	UNDER COUNTER
	CLEANOUT TO FLOOR
	CLEANOUT TO GRADE
	CLEANOUT, WALL CLEANOUT
	COLD WATER (DROP) (RISER)
	HOT WATER (DROP) (RISER)
	WASTE, WASTE DROP
	FROM ABOVE, TO BELOW
	FROM BELOW, TO ABOVE
	INVERT ELEVATION
	EXISTING, NEW
	VENT, VENT RISER, VENT THRU ROOF
	ROOF DRAIN
	OVERFLOW ROOF DRAIN
	RAINWATER LEADER
	OVERFLOW RAINWATER LEADER
	HOSE BIB
	WALL HYDRANT
	DIAMETER
	TYPICAL
	FLOOR DRAIN
	DEMAND
	FIXTURE UNITS
	GALLONS PER MINUTE
	ROUGH IN ONLY
	UNLESS NOTED OTHERWISE
	NORMALLY CLOSED
	ON CENTER
	ABOVE FINISH FLOOR
	ABOVE FINISHED GRADE
	ROOMNAME
	ROOM NAME AND NUMBER

DRAWING SHEET INDEX	
P001	PLUMBING - LEGEND, NOTES AND SCHEDULES
P010	PLUMBING - SITE PLAN
P110	PLUMBING - OVERALL FIRST FLOOR PLAN
P120	PLUMBING - OVERALL SECOND FLOOR PLAN
P131	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA A1
P132	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA A1
P133	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B2
P134	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B3
P135	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B4
P136	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C1
P137	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C2
P138	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C3
P139	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C4
P140	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C5
P141	PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C6
P142	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA A1
P143	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B1
P144	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B2
P145	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B3
P146	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B4
P147	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C1
P148	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C2
P149	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C3
P150	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C4
P151	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C5
P152	PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C6
P160	PLUMBING - OVERALL ROOF PLAN
P501	PLUMBING - DETAILS
P502	PLUMBING - DETAILS

Professional Seal

Date Revision

1 11/17/21 Addendum 3



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Rio Wrangler Elementary School

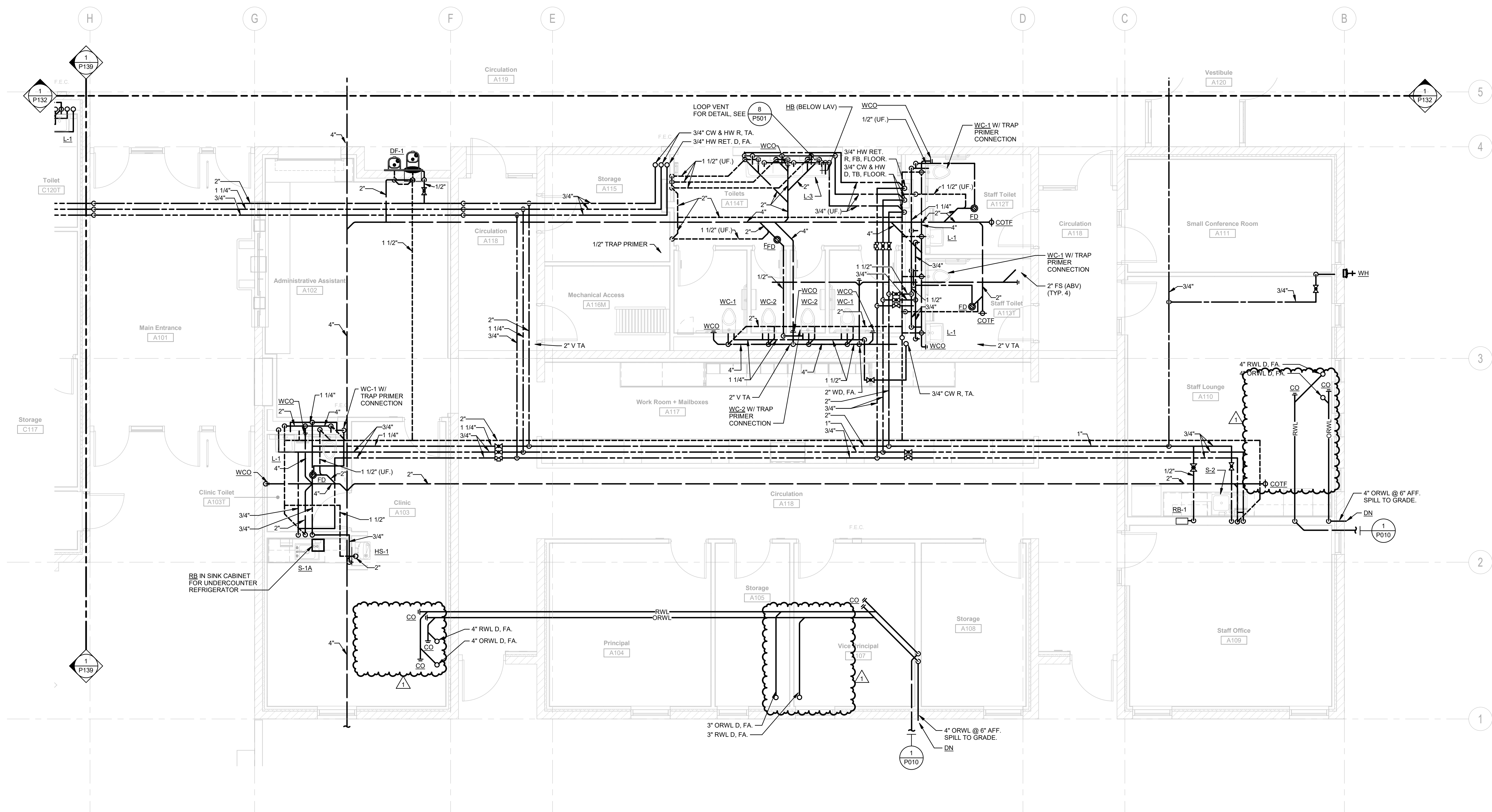
10600 Green Pasture Drive
Reno, Nevada 89521

PLUMBING - LEGEND,
NOTES AND
SCHEDULES

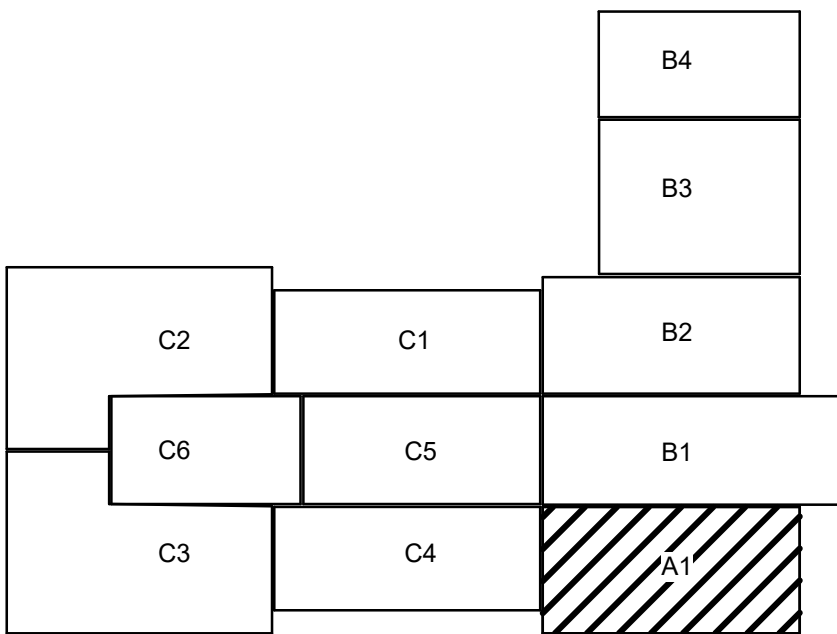
October 13, 2021
H+K Project No: 2001

P001





PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA A1
 SCALE: 1/4" = 1'-0" P131



KEY PLAN

Professional Seal
 1 11/17/21 Addendum 3

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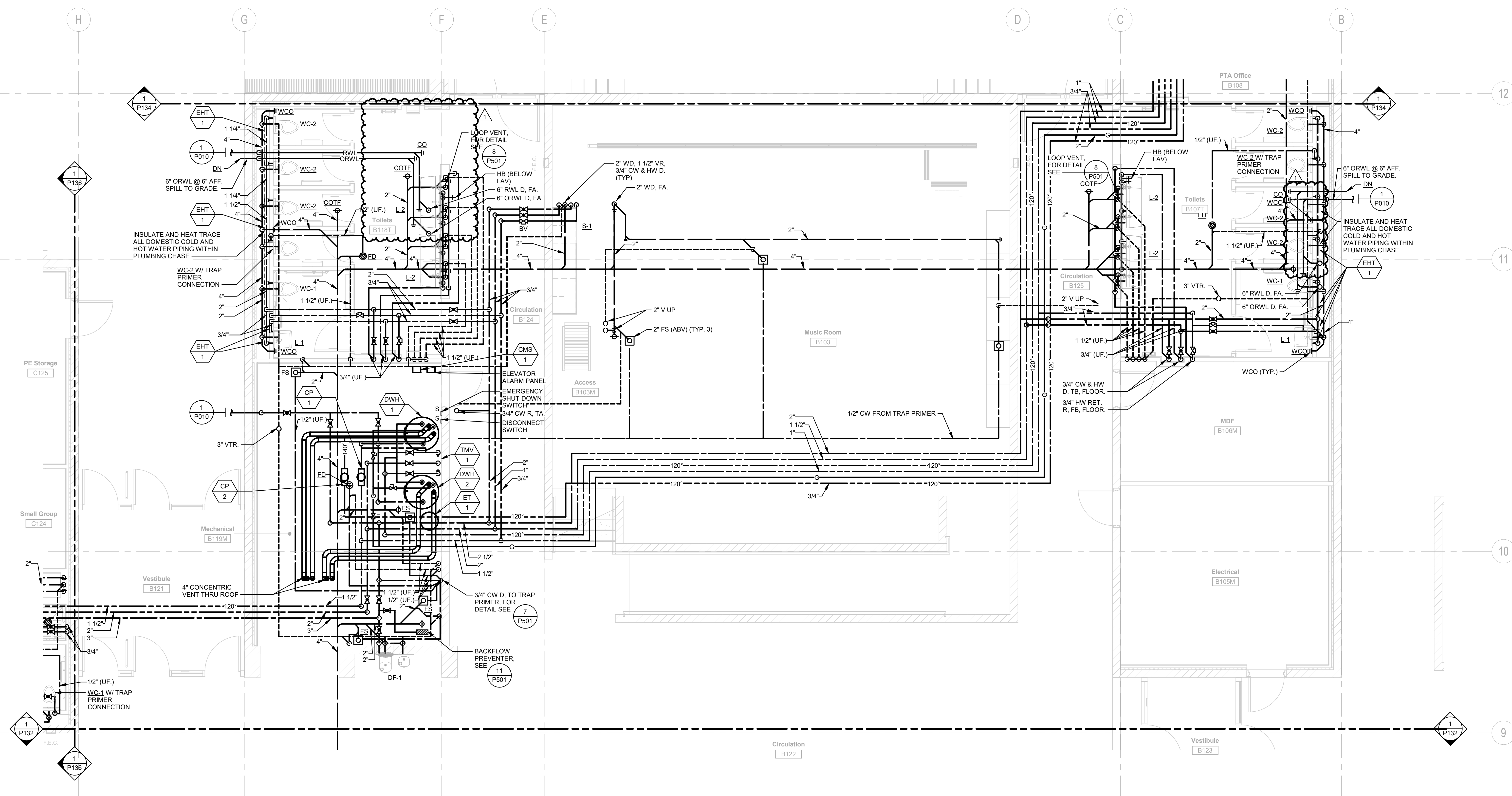
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 10600 Green Pasture Drive
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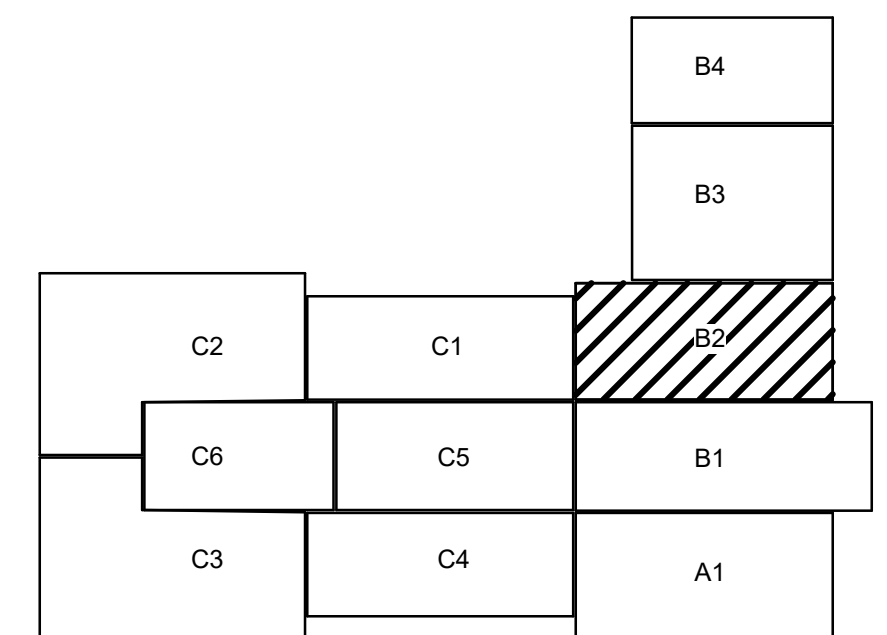
PLUMBING - PARTIAL
 FIRST FLOOR PLAN -
 AREA A1
 October 13, 2021
 H+K Project No: 2001

P131





PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B2
SCALE: 1/4" = 1'-0"



KEY PLAN

11/10/2021 4:21:18 PM

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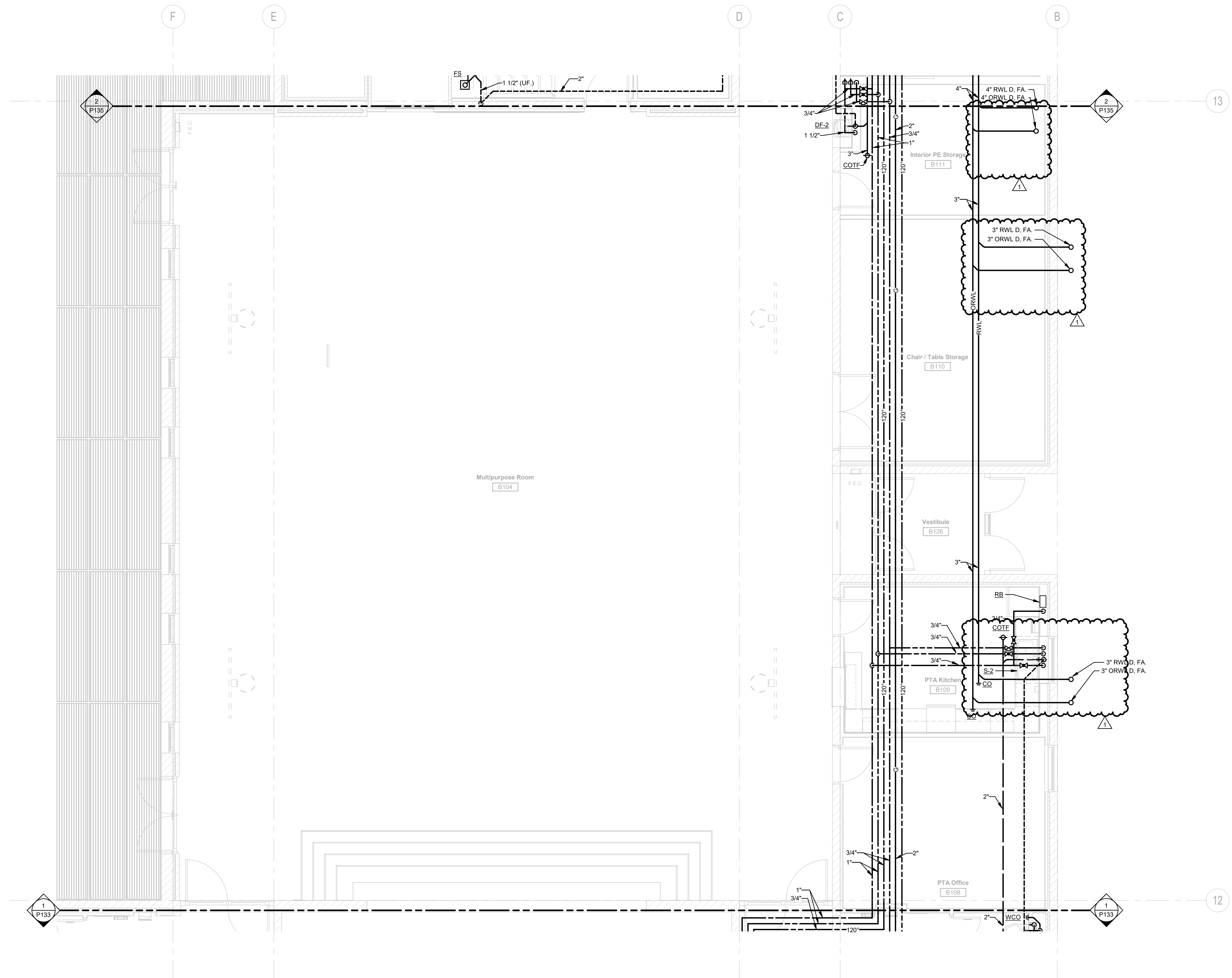
JOB: 2020-003

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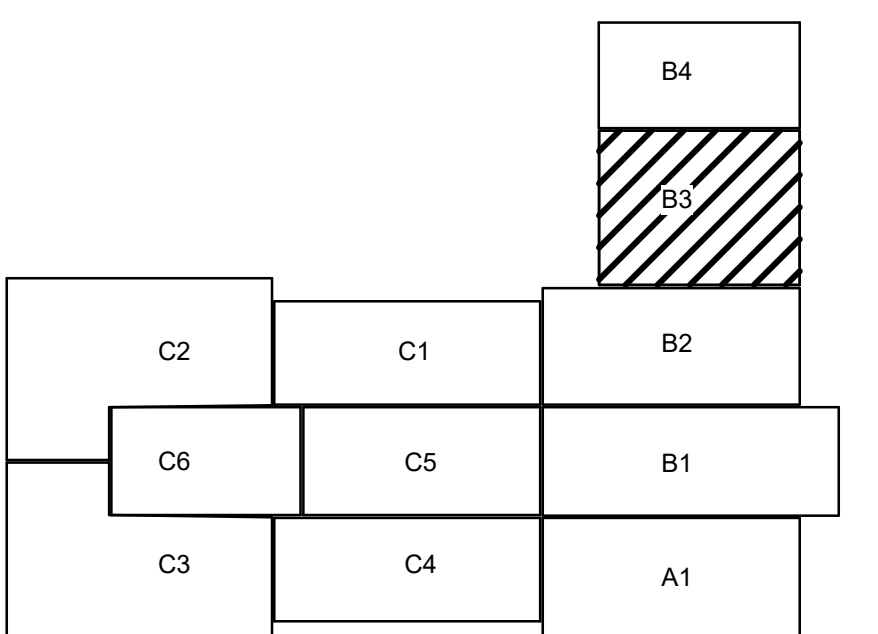
Washoe County School District
Rio Wrangler Elementary School
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Reno, Nevada 89521

PLUMBING - PARTIAL
FIRST FLOOR PLAN -
AREA B2
October 13, 2021
H+K Project No: 2001
P133





PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B3
 SCALE: 1/4" = 1'-0" 1 P134



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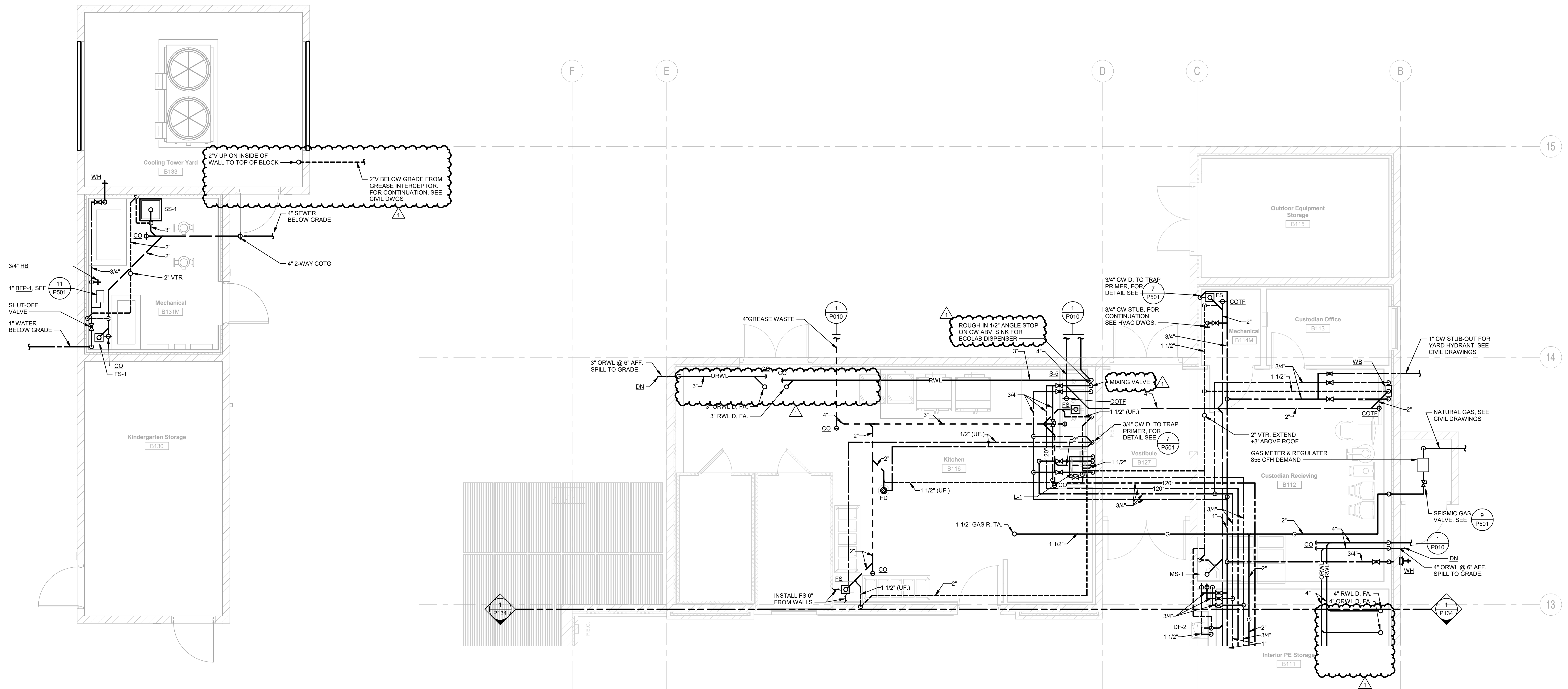
10600 Green Pasture Drive
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PLUMBING - PARTIAL
 FIRST FLOOR PLAN -
 AREA B3

October 13, 2021
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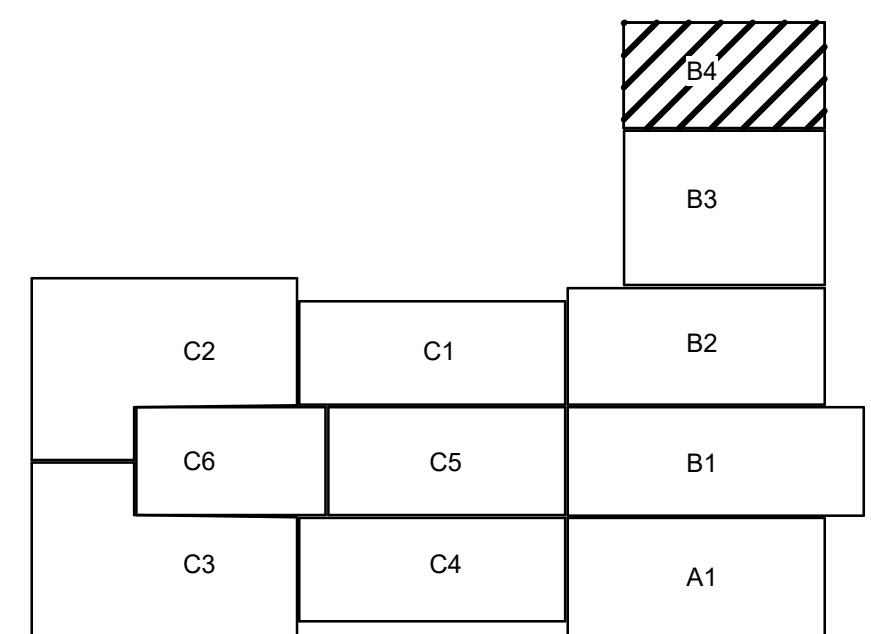
P134



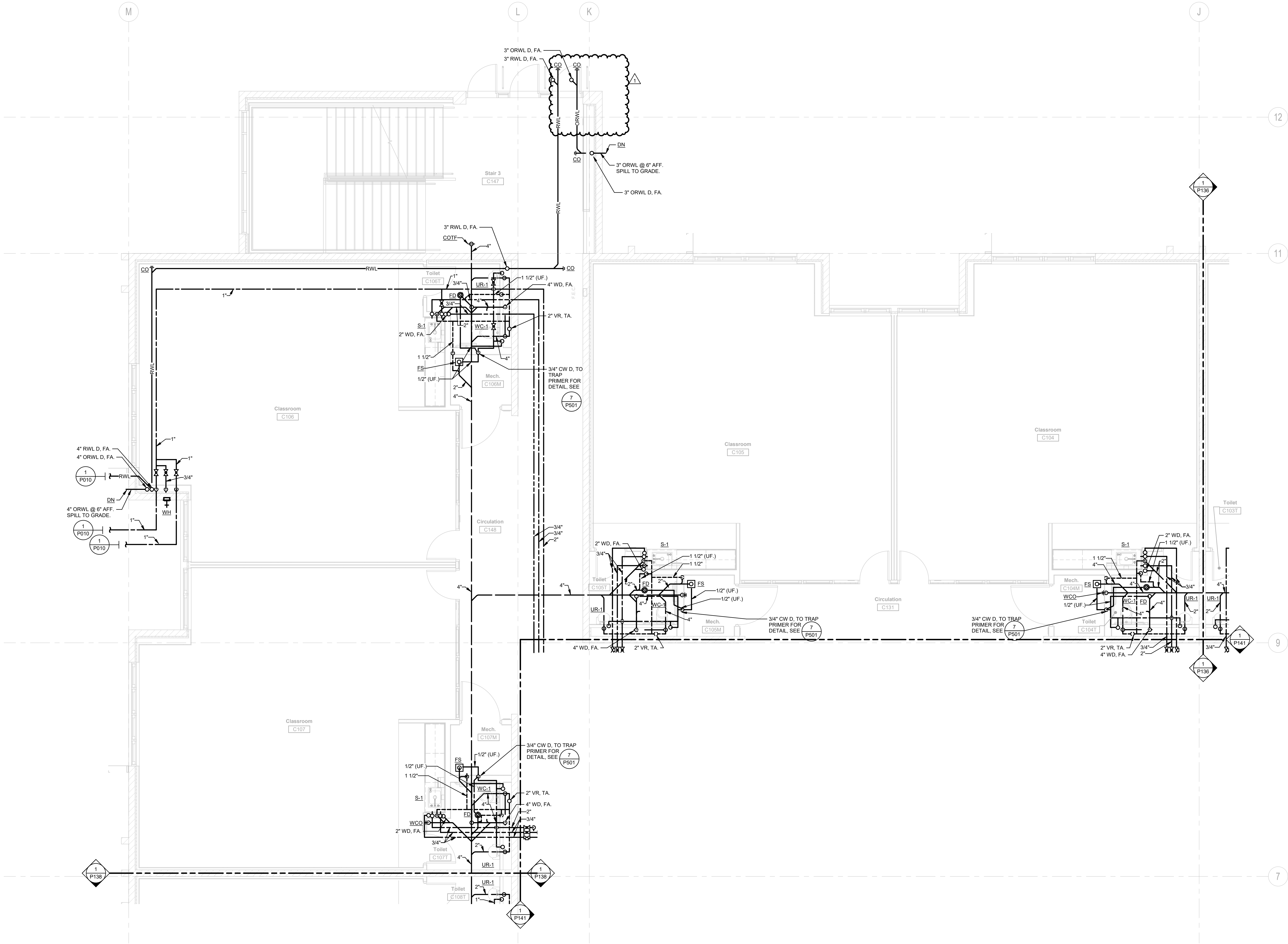


COOLING TOWER YARD MECH ROOM PLUMBING PAN 1
SCALE: 1/4" = 1'-0" P135

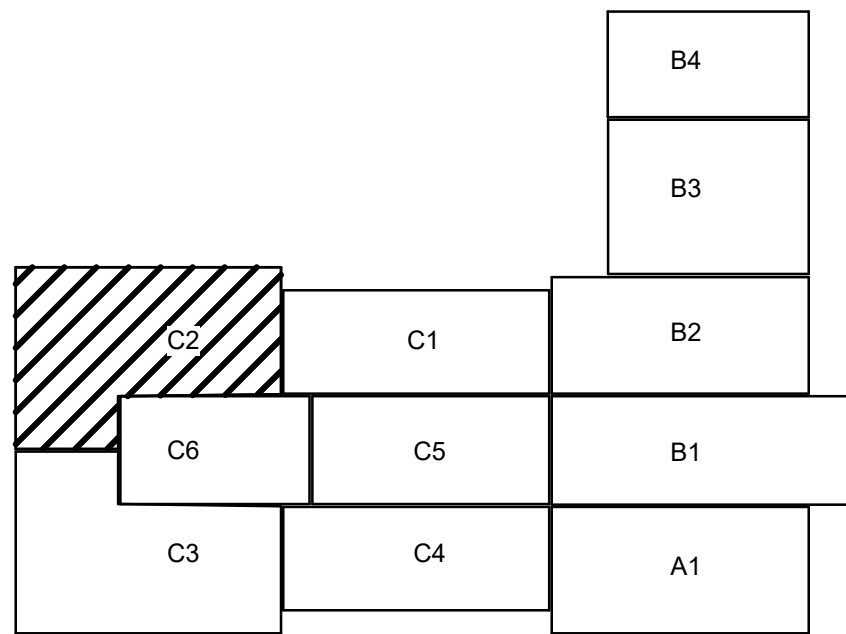
PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B4 2
SCALE: 1/4" = 1'-0" P135



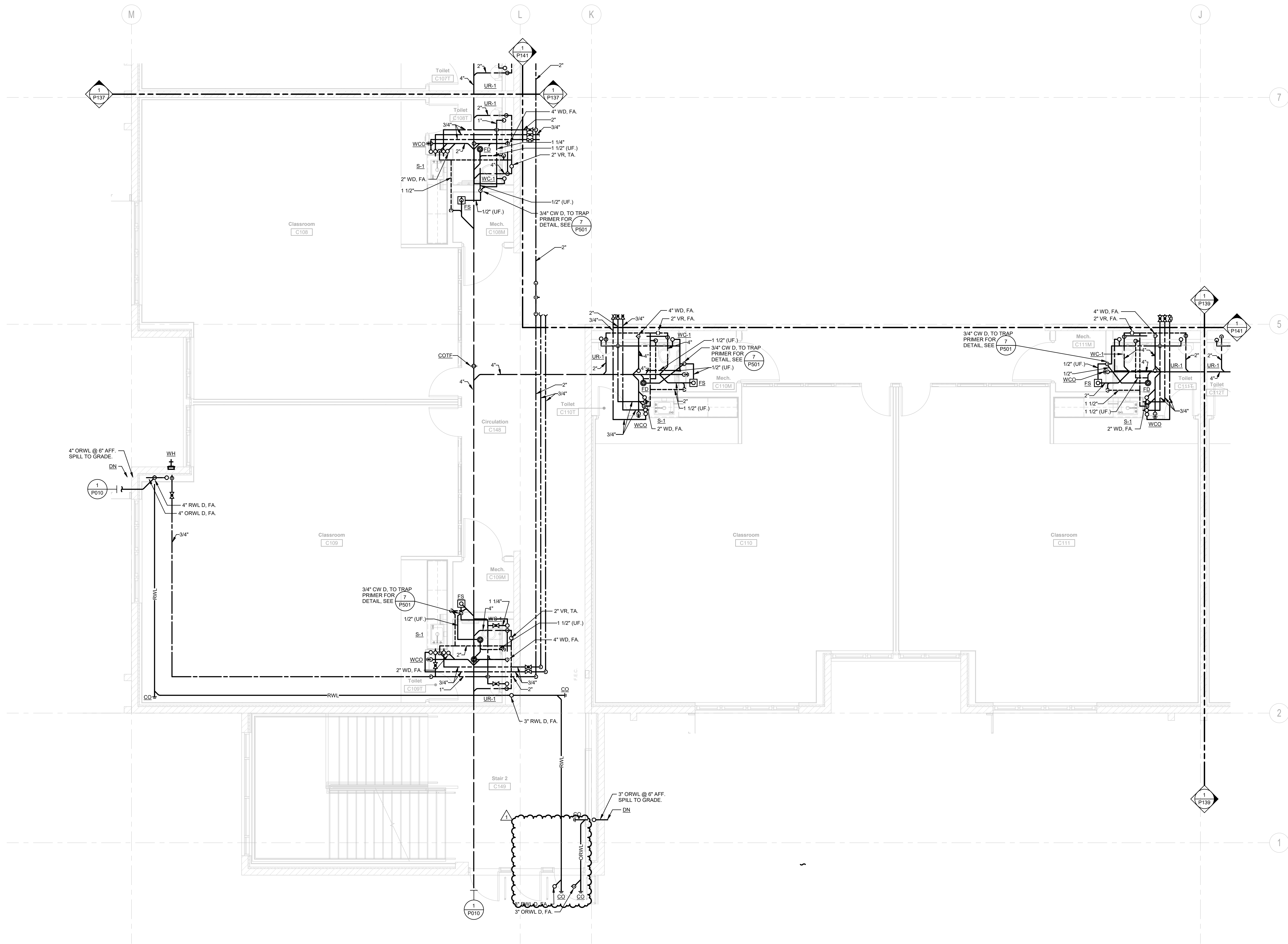
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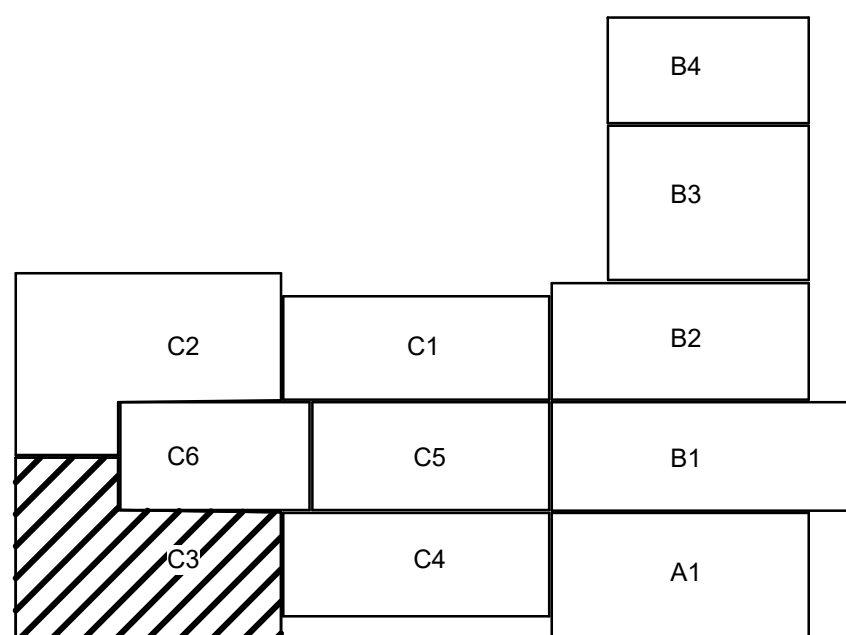
PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C2
SCALE: 1/4" = 1'-0" 1 P137



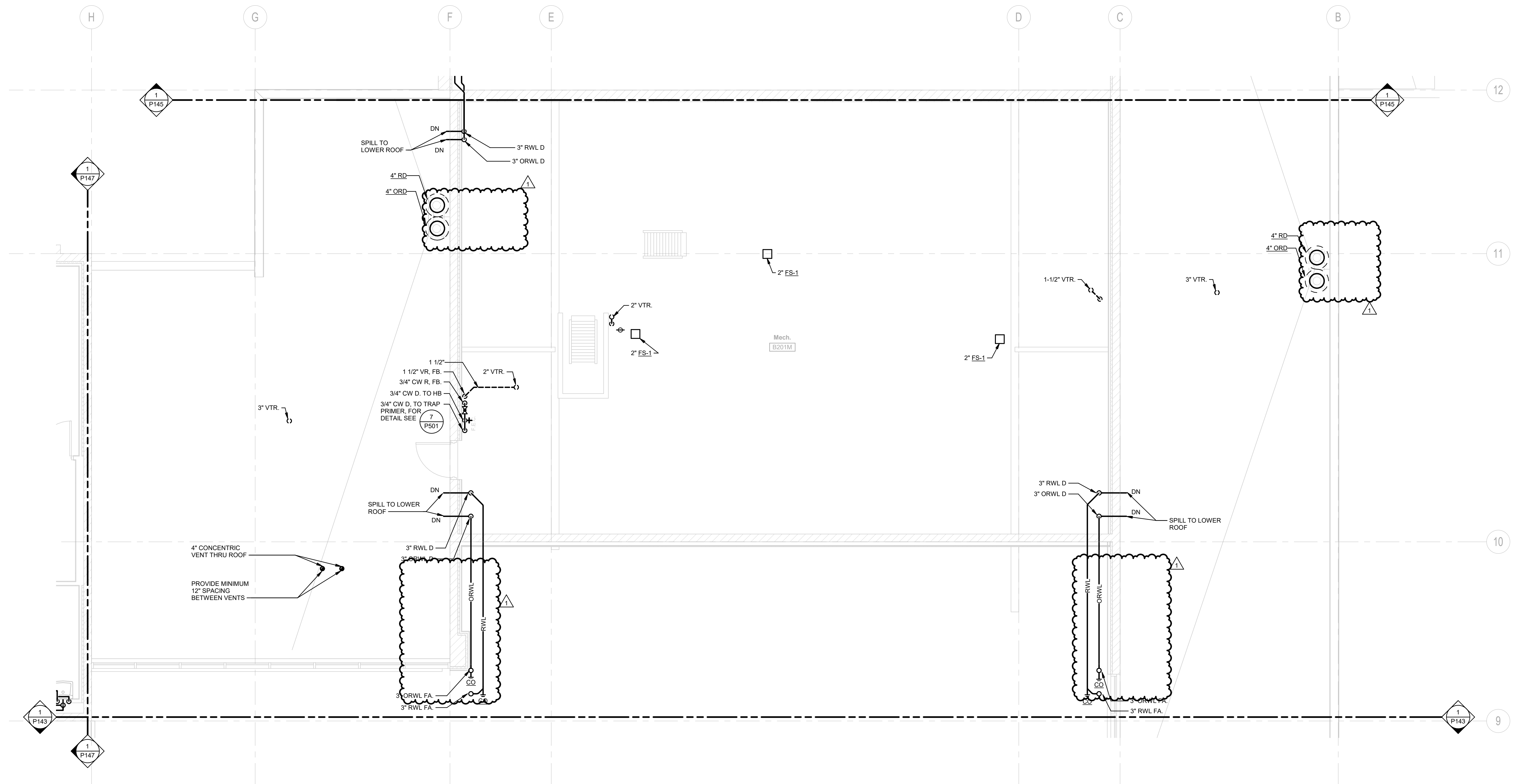
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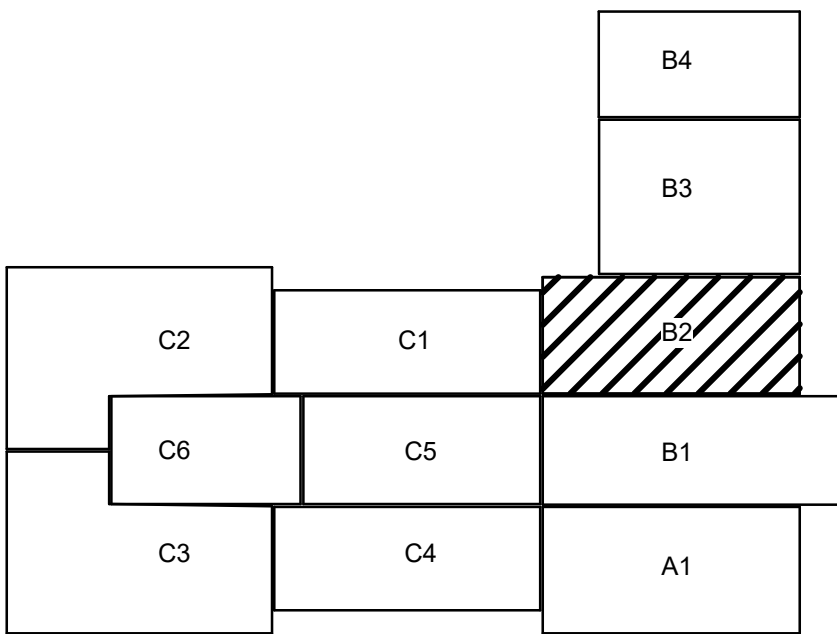
PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA C3
 SCALE: 1/4" = 1'-0" 1 P138



KEY PLAN



PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B2
 SCALE: 1/4" = 1'-0"



KEY PLAN

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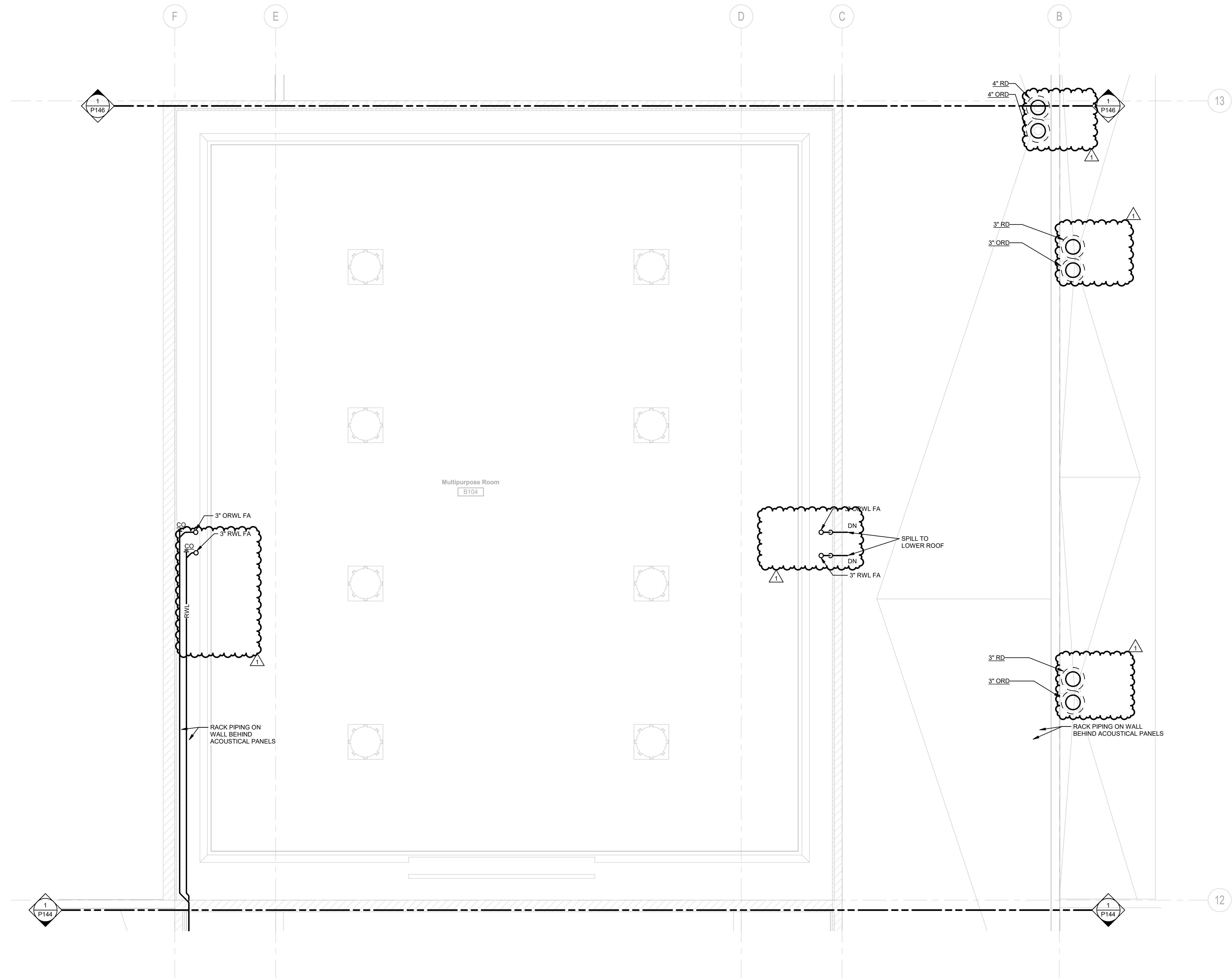
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PLUMBING - PARTIAL
 SECOND FLOOR PLAN -
 AREA B2

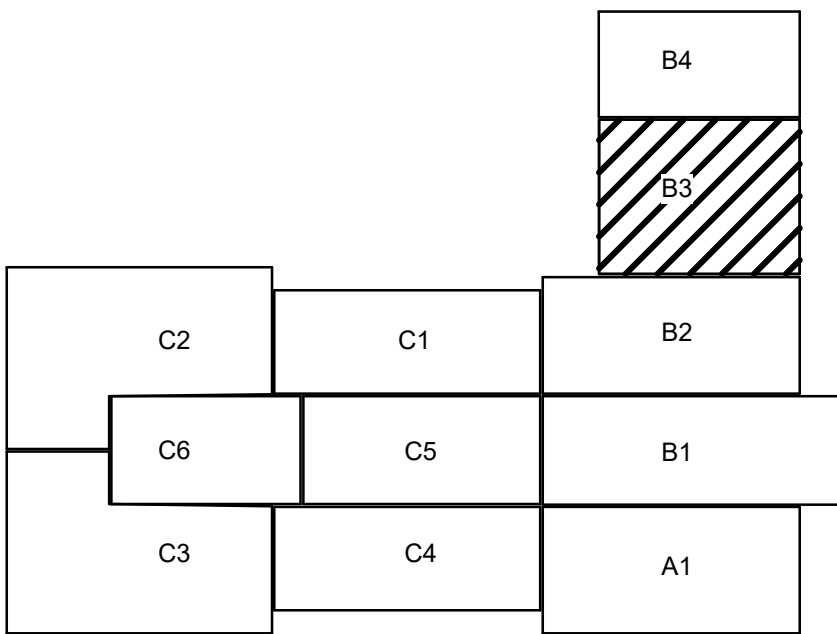
October 13, 2021
 H+K Project No: 2001

P144





PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B3
SCALE: 1/4" = 1'-0"



KEY PLAN

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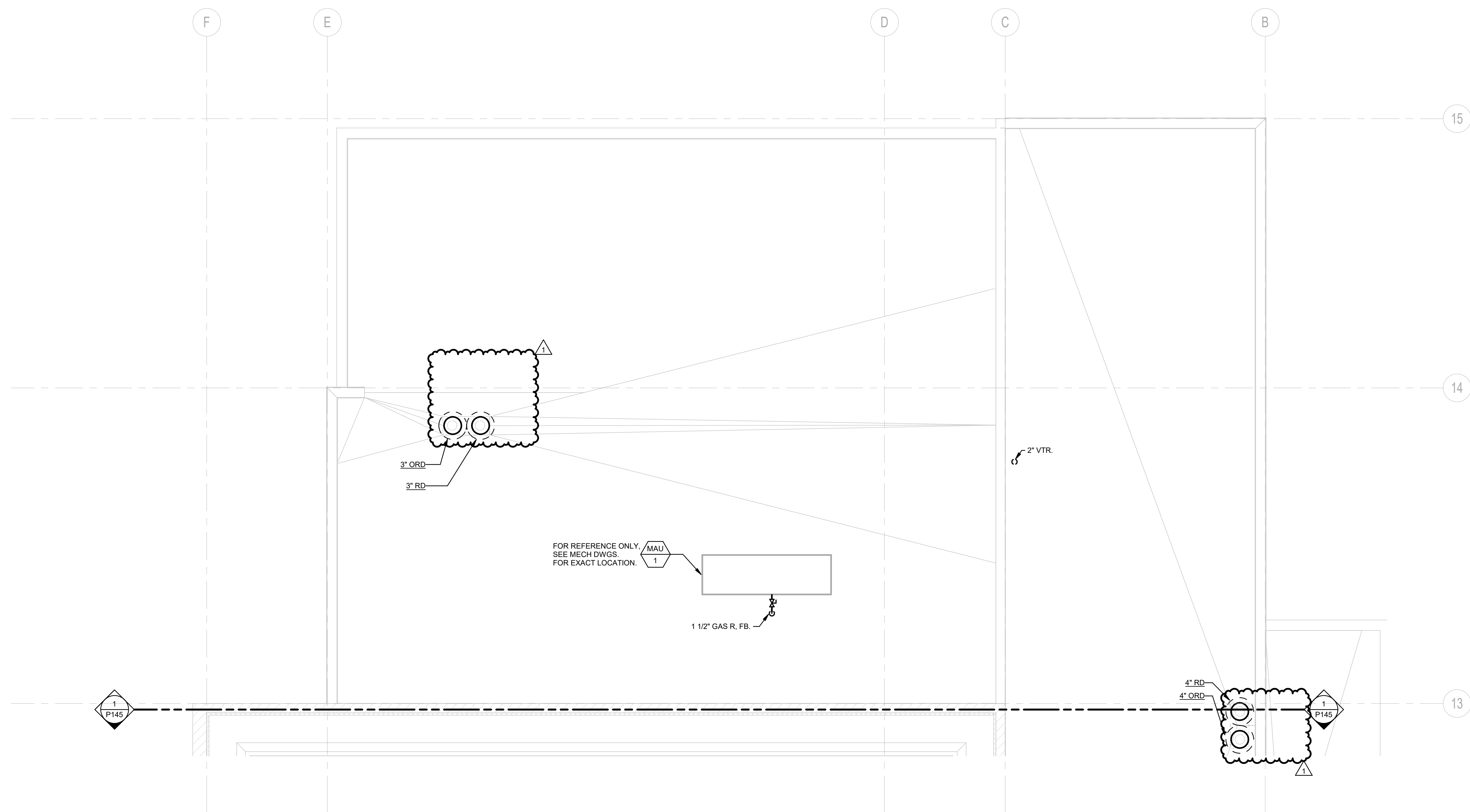
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PLUMBING - PARTIAL
SECOND FLOOR PLAN -
AREA B3

October 13, 2021
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P145

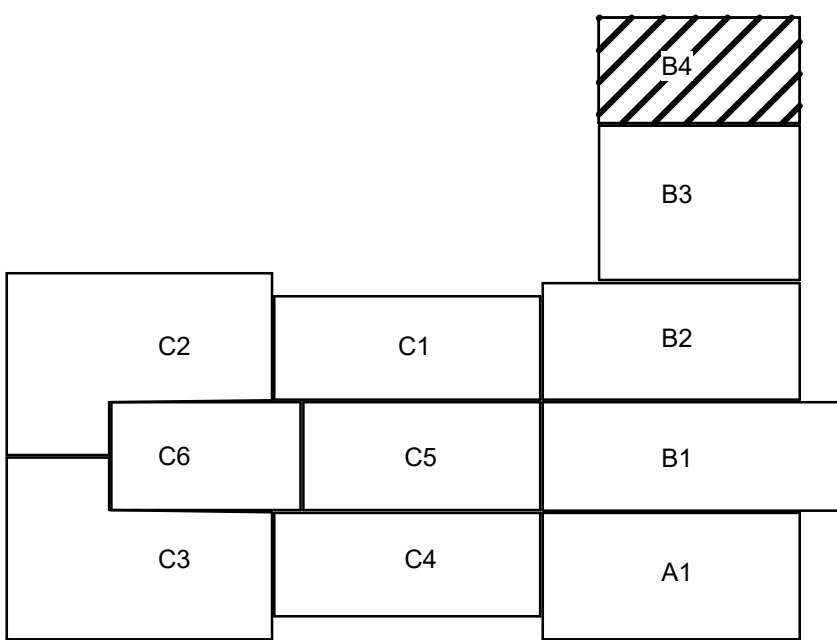




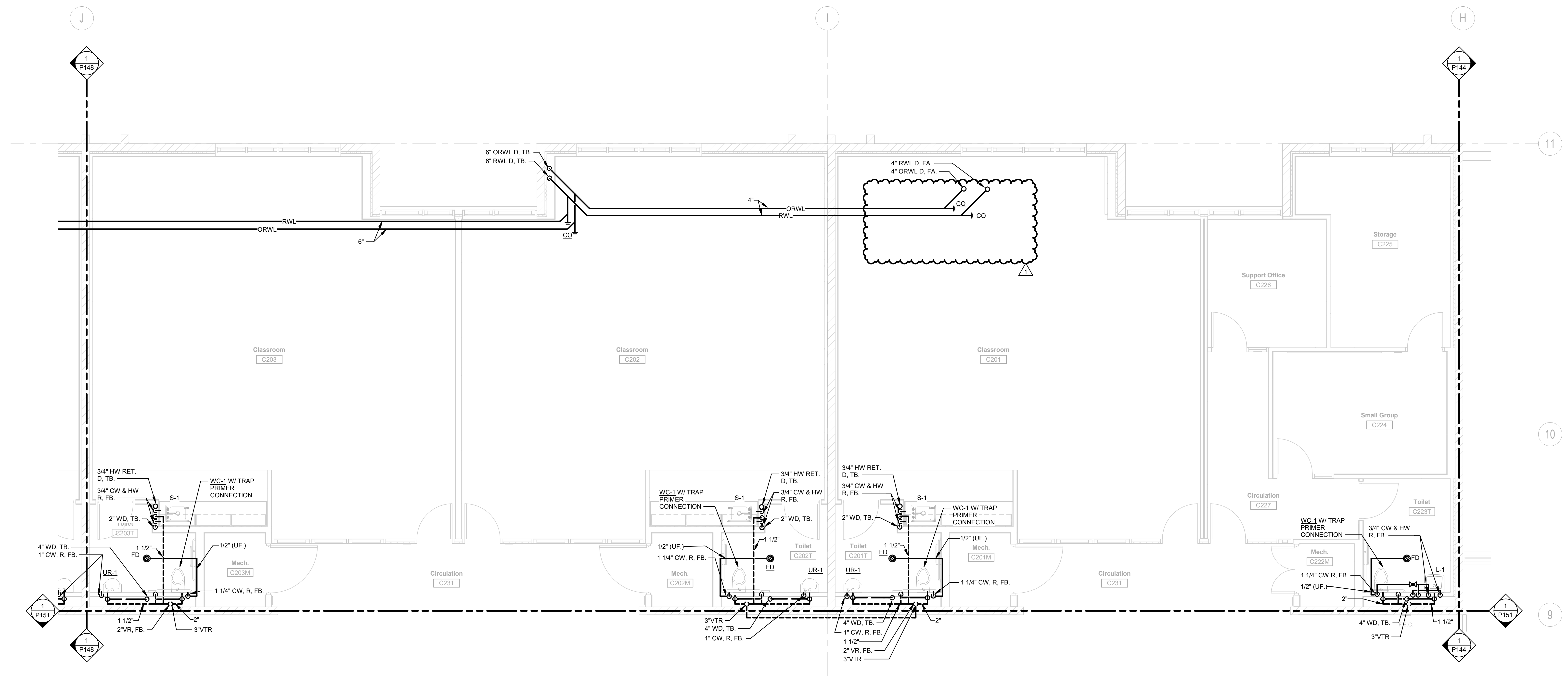
PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA B4

1 P146

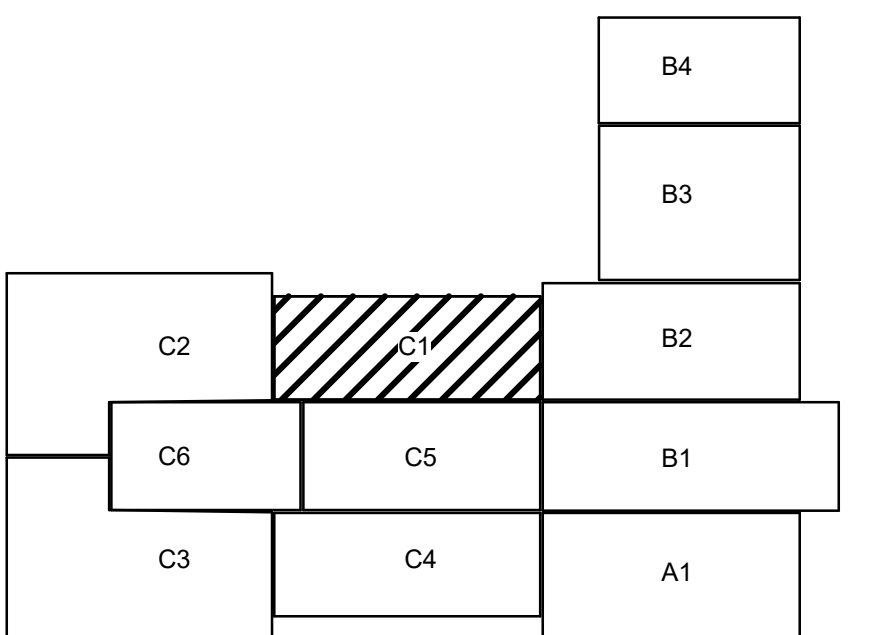
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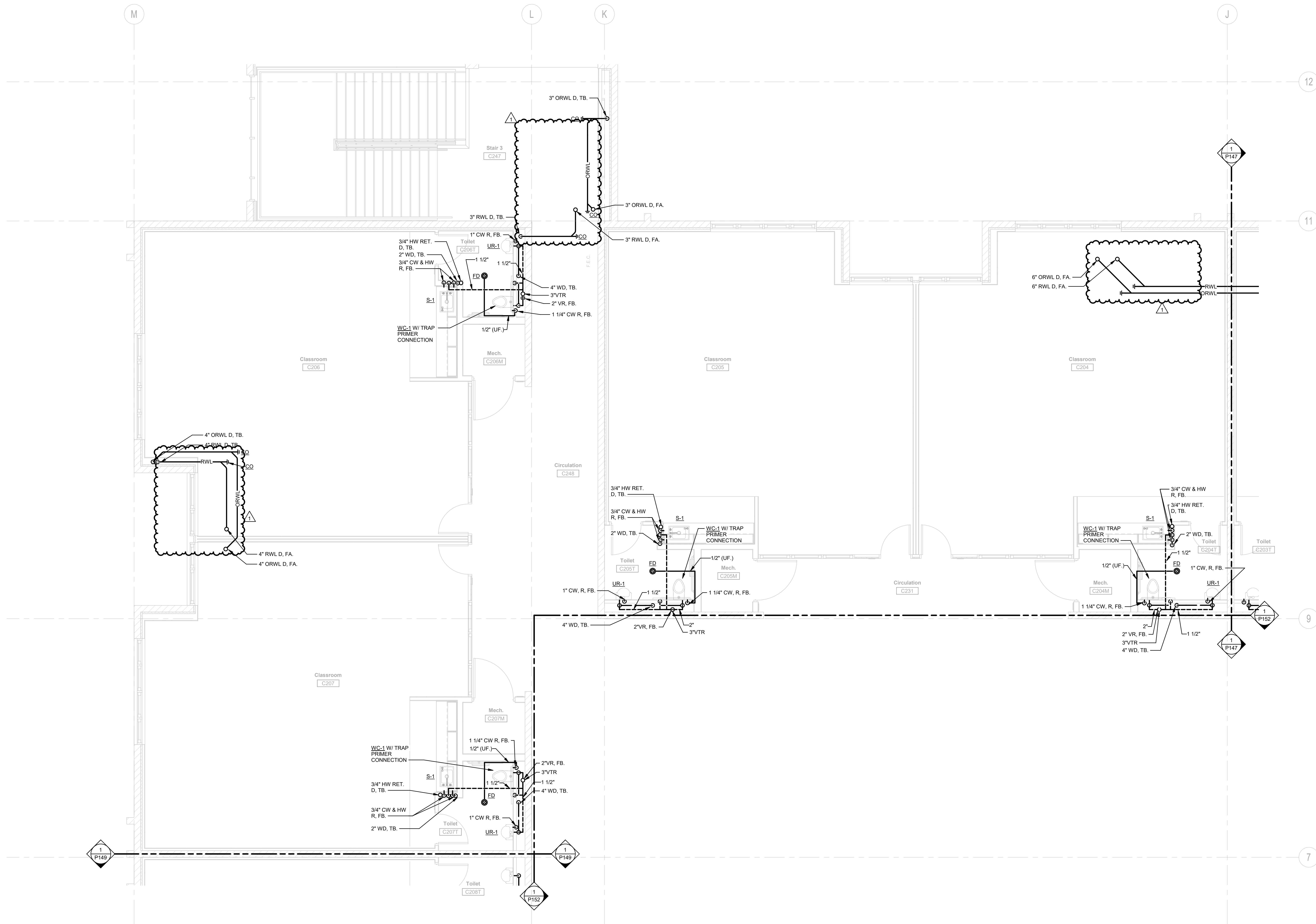
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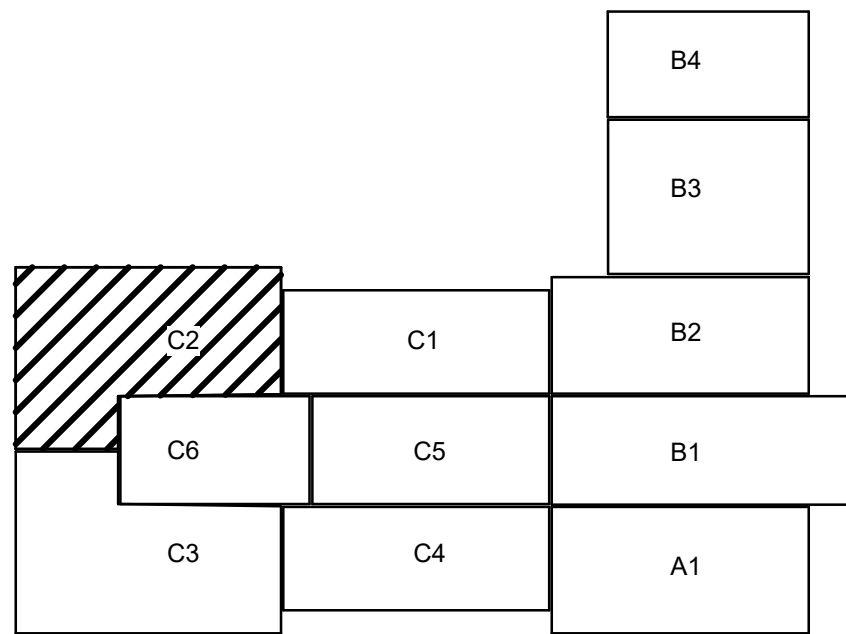
PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C1
SCALE: 1/4" = 1'-0"



KEY PLAN



PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C2



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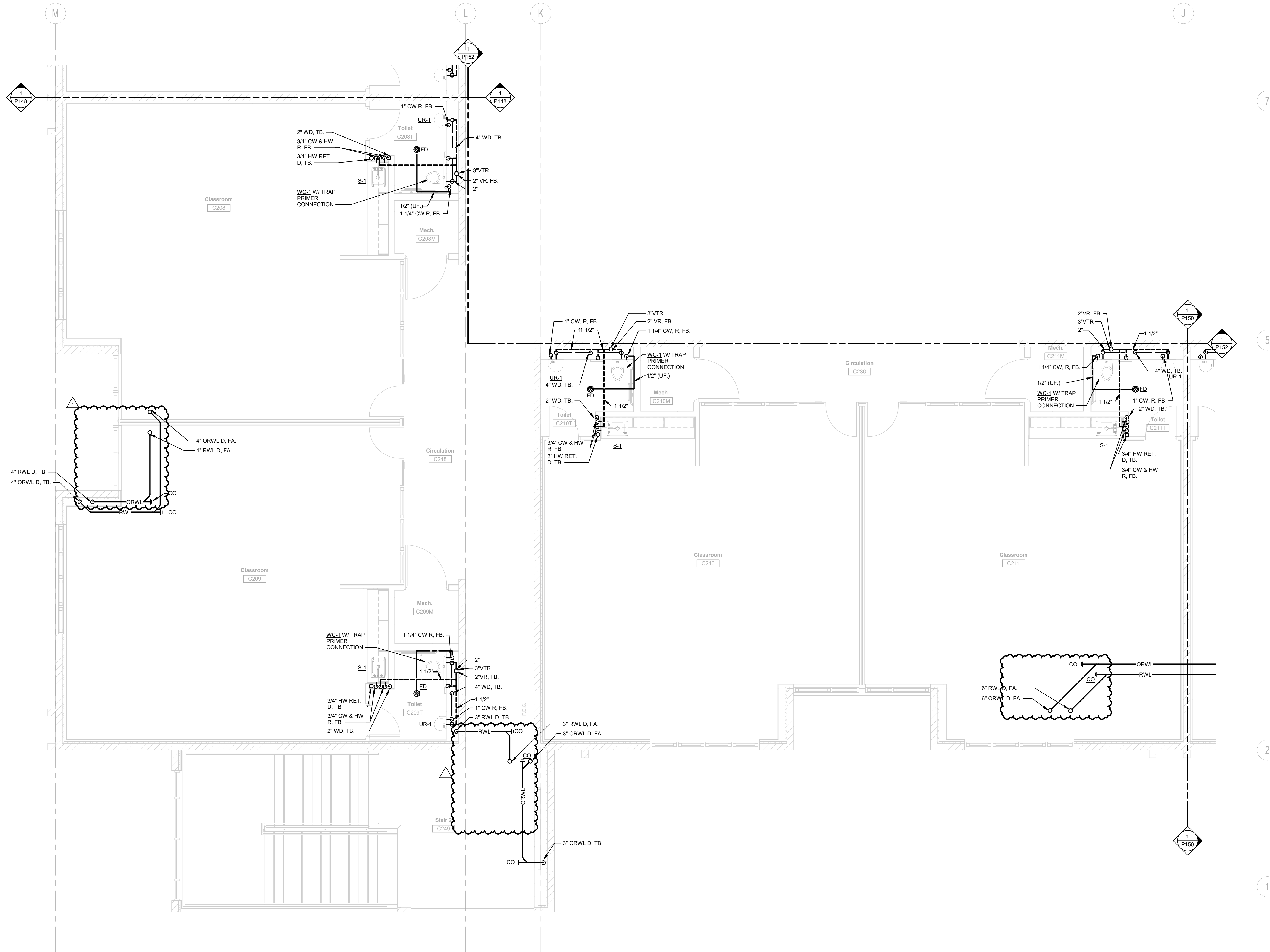
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PLUMBING - PARTIAL
SECOND FLOOR PLAN -
AREA C2
October 13, 2021
H+K Project No: 2001

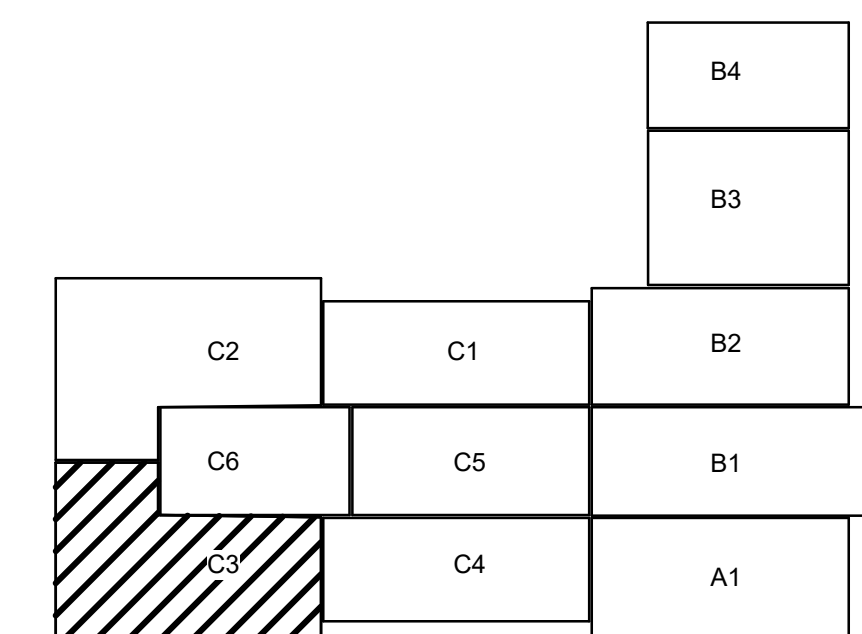
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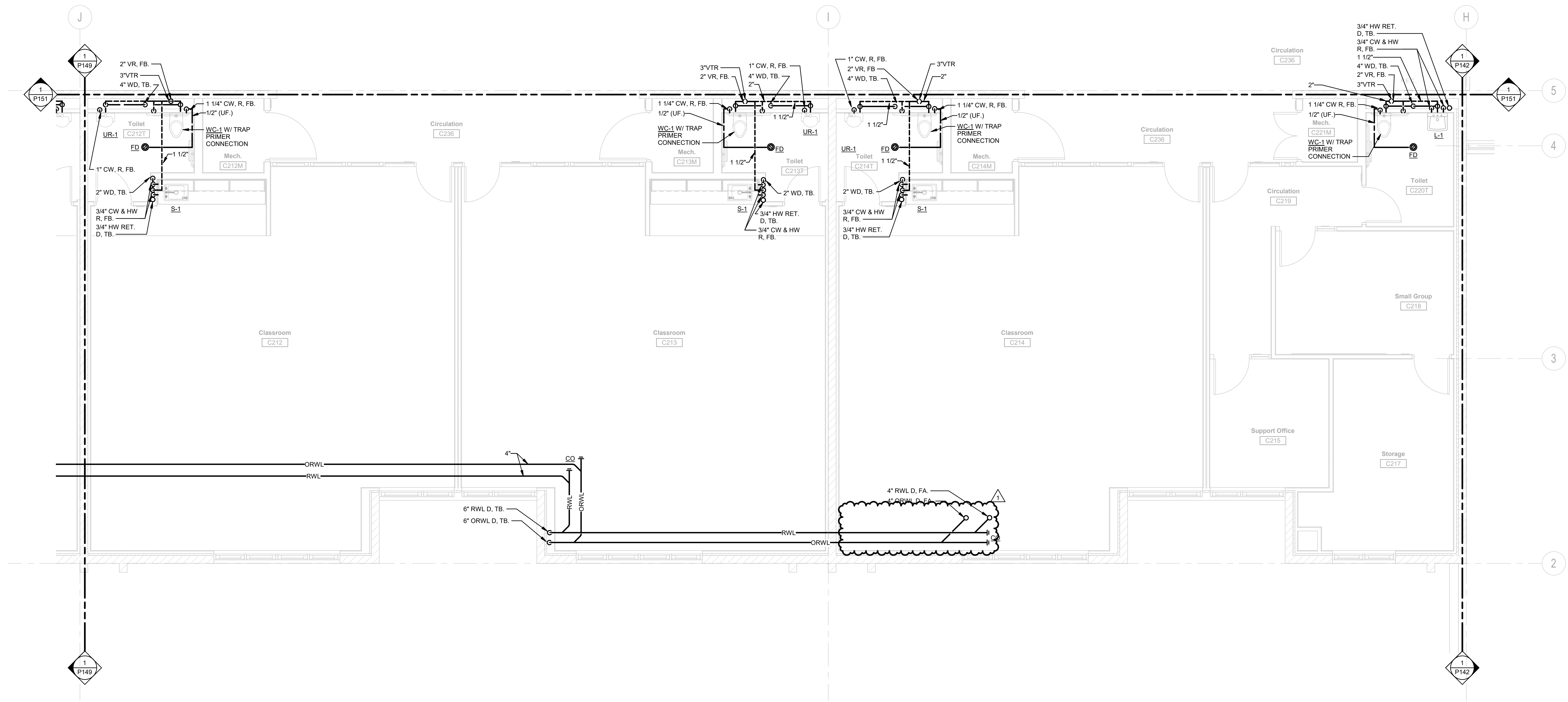


PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C3

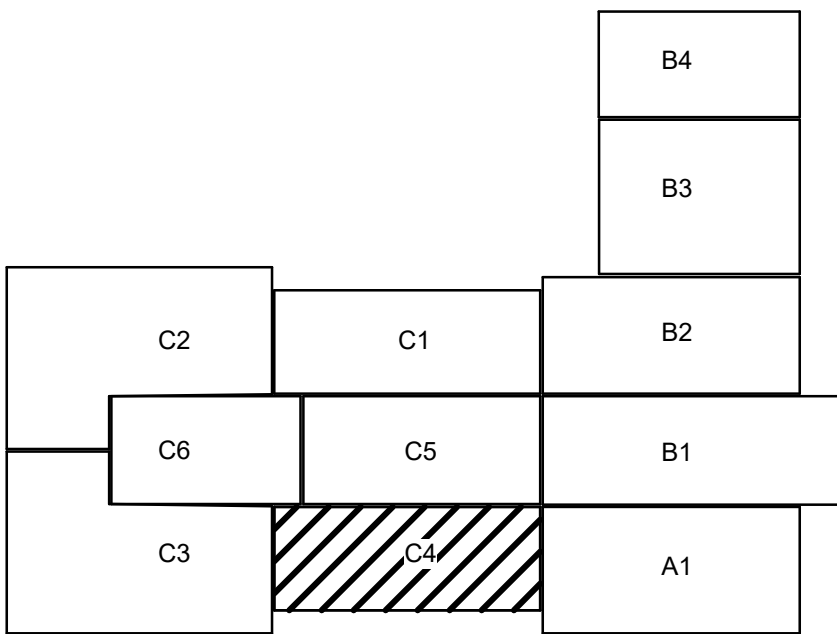
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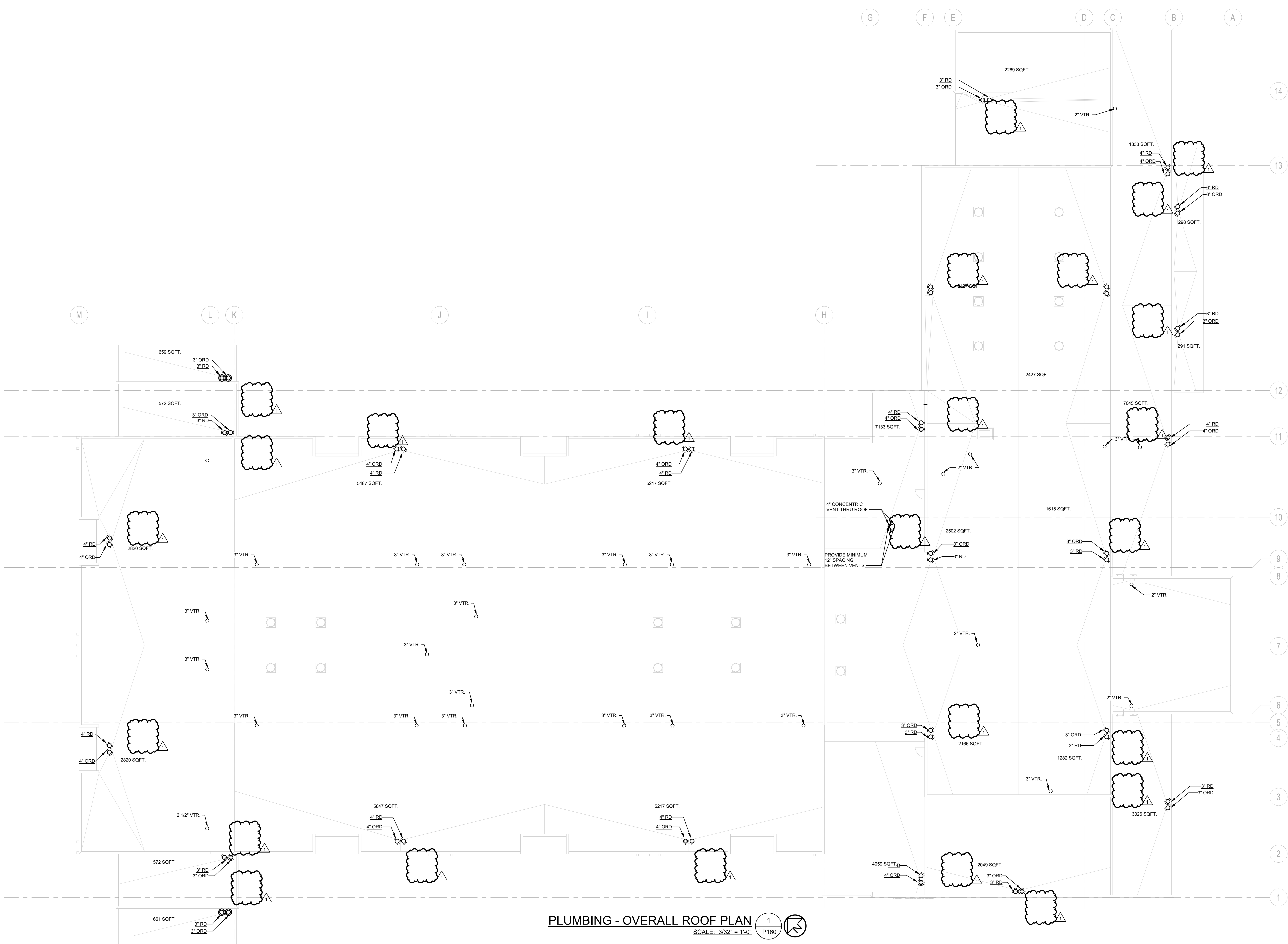
KEY PLAN



PLUMBING - PARTIAL SECOND FLOOR PLAN - AREA C4
SCALE: 1/4" = 1'-0"



KEY PLAN



PLUMBING - OVERALL ROOF PLAN 1
SCALE: 3/32" = 1'-0" P160

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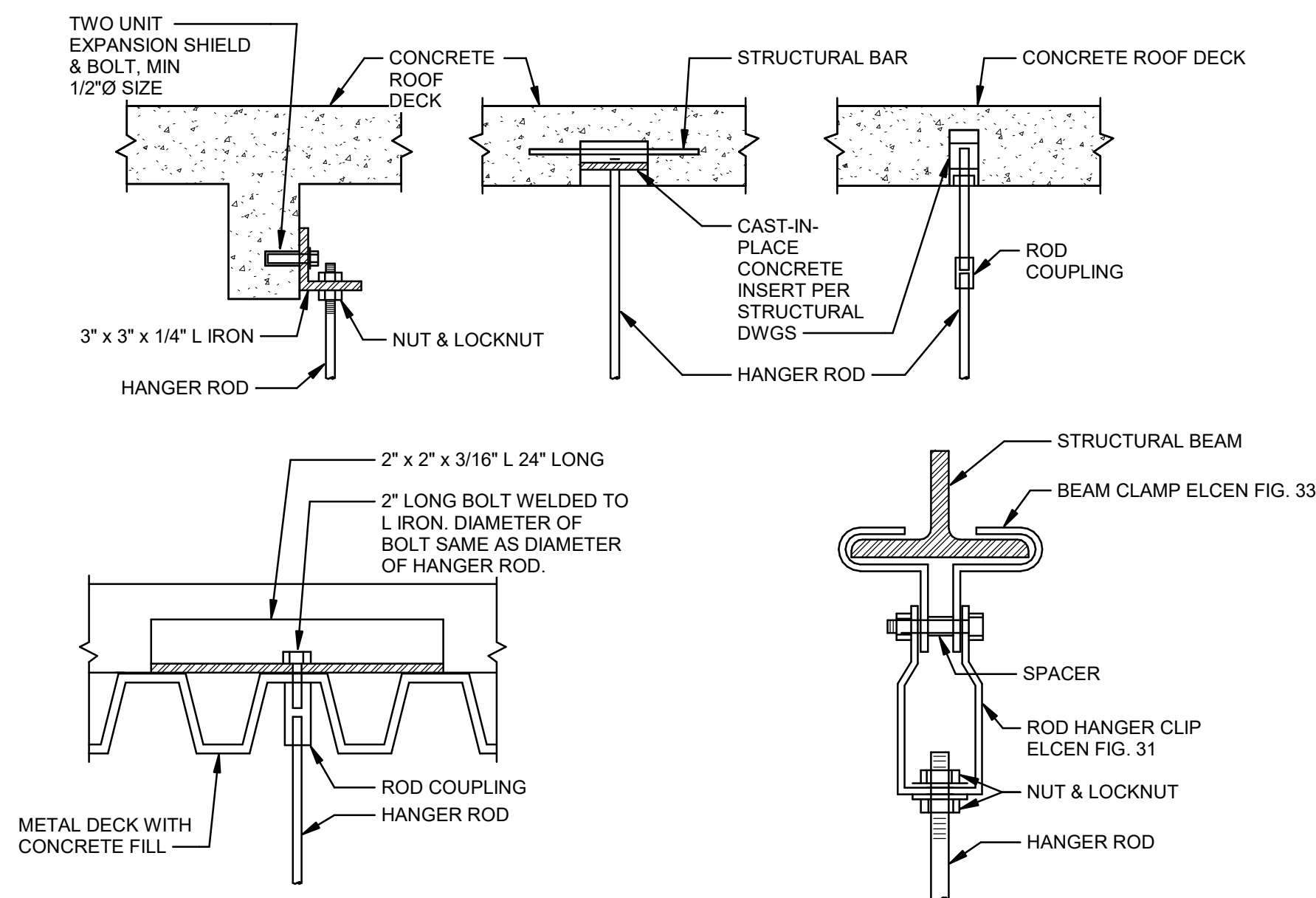
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PLUMBING - OVERALL
ROOF PLAN

October 13, 2021
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P160

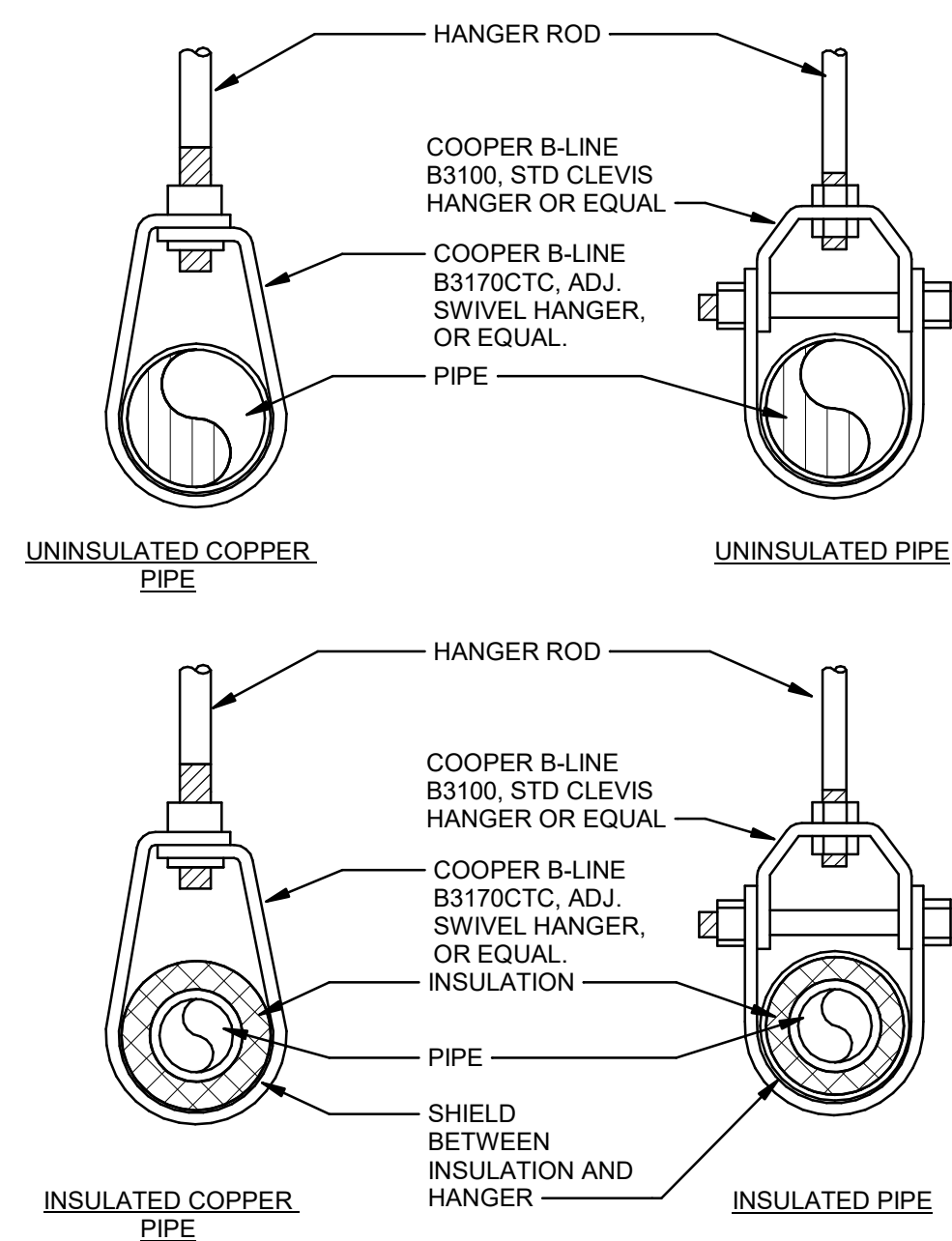




HANGER ROD SCHEDULE	
PIPE SIZE	ROD SIZE
1/2" TO 4"	3/8"Ø
5" TO 8"	1/2"Ø
10" TO 12"	5/8"Ø

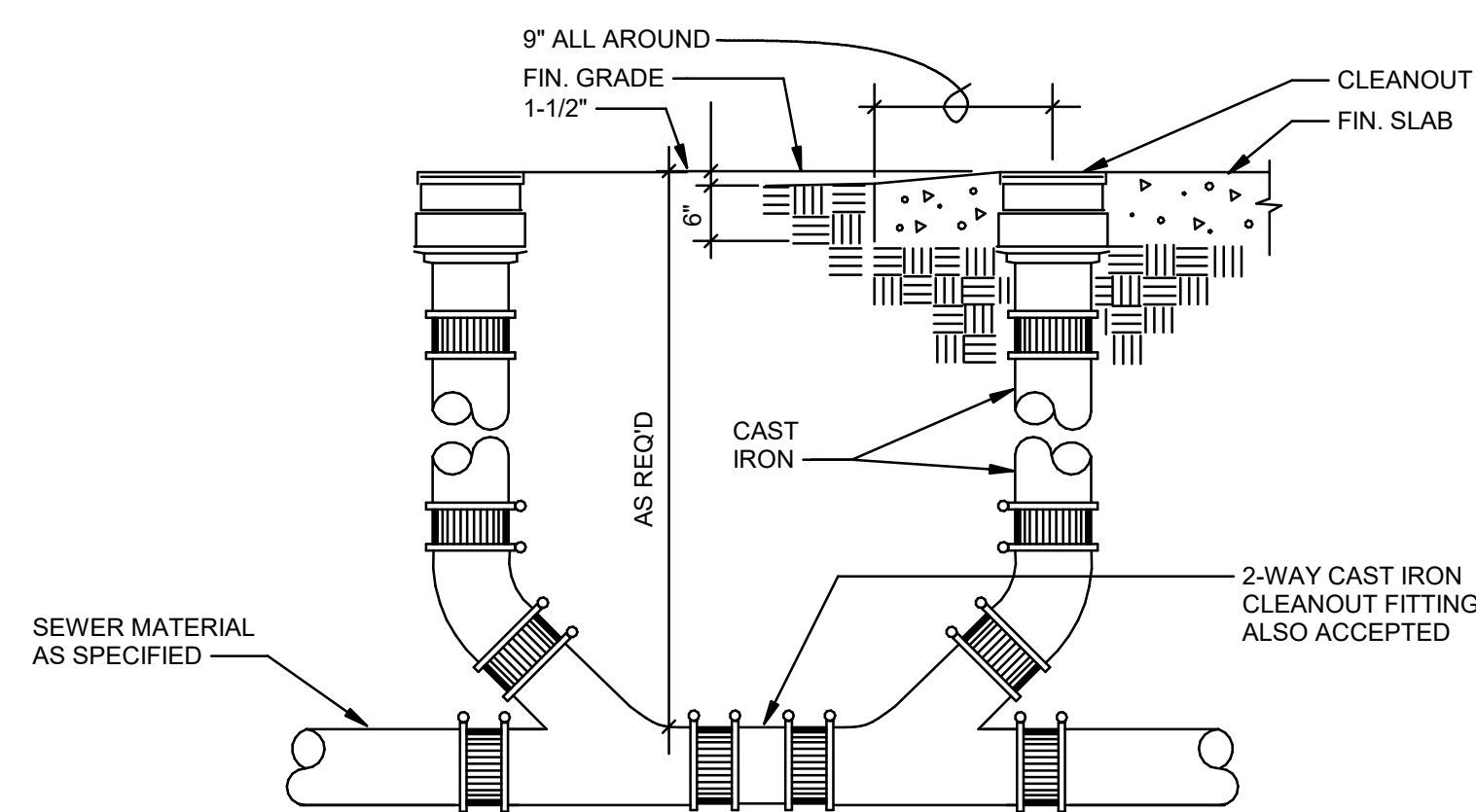
NOTES:
SEE STRUCTURAL DRAWINGS FOR
MAXIMUM WEIGHT AND SPACING
REQUIREMENTS.
REFERENCE SHEET S032 FOR
MECHANICAL SUPPORT
REQUIREMENTS.

HANGER ROD SUPPORT 1
SCALE: NONE P501

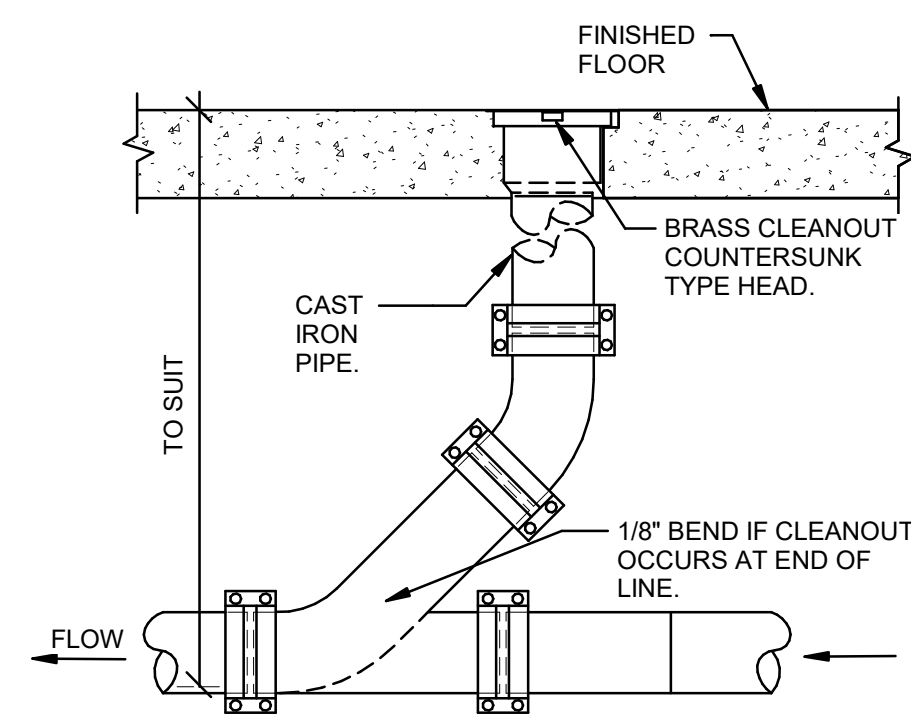


NOTE: FOR HANGER ROD SIZES SEE SUPPORT DETAIL

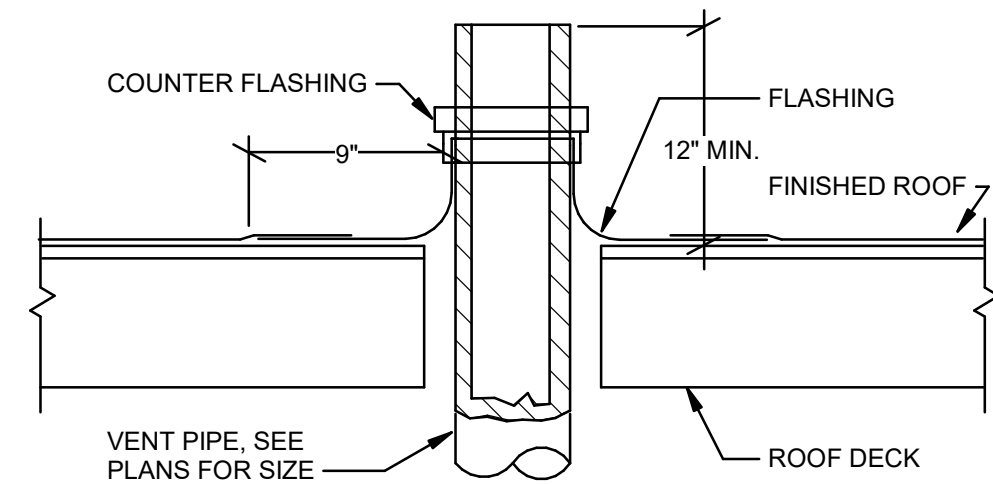
PIPE HANGER 2
SCALE: NONE P501



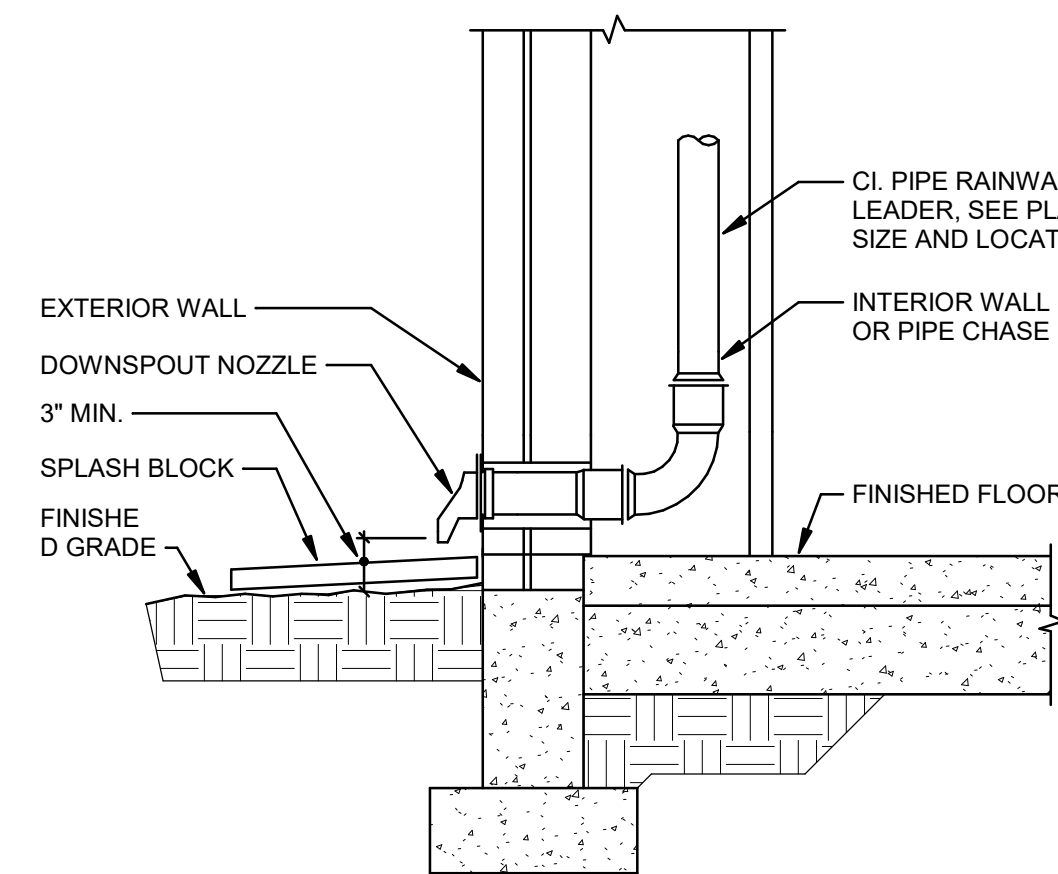
2-WAY CLEANOUT AT GRADE 3
SCALE: NONE P501



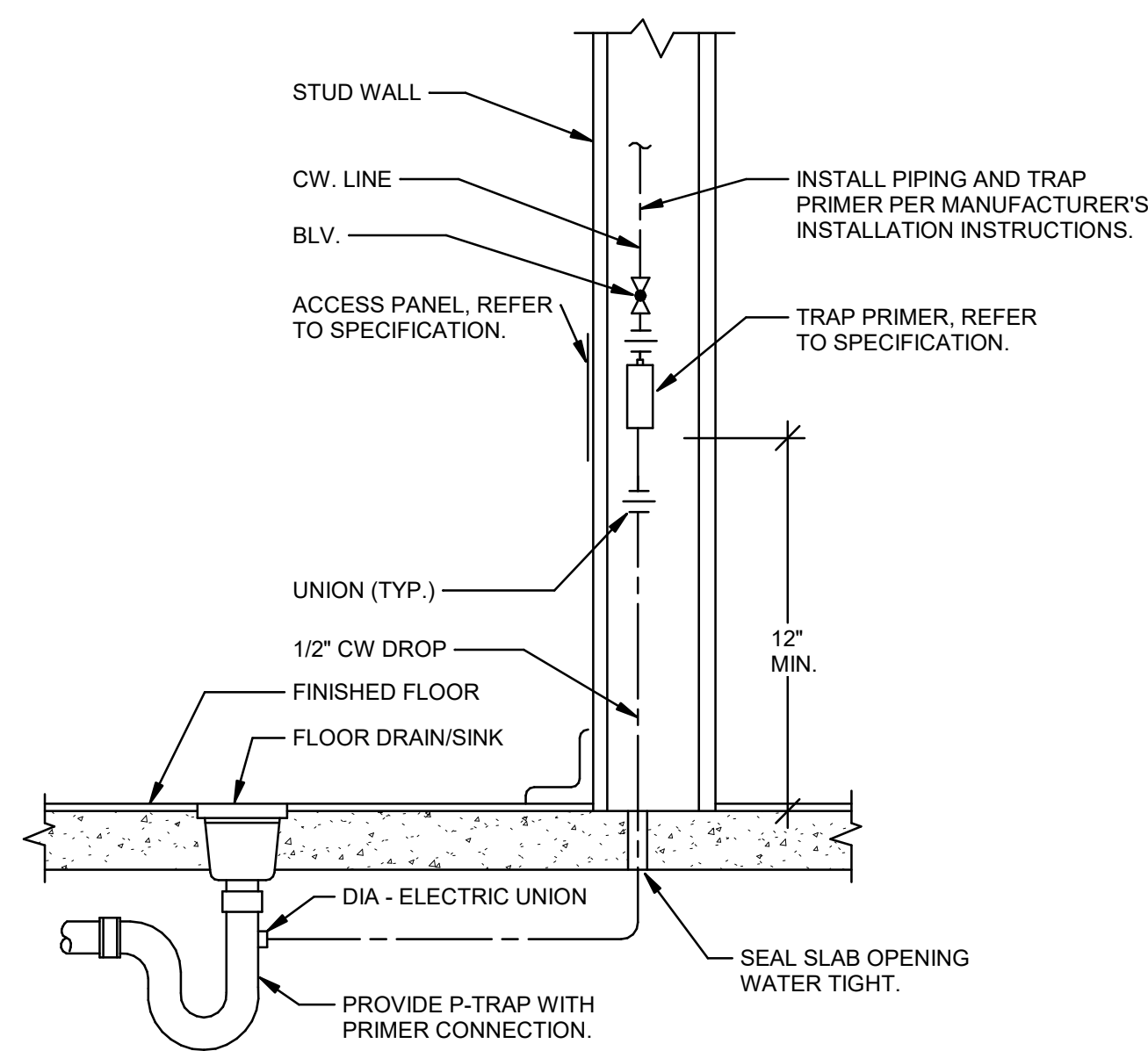
CLEANOUT TO FLOOR 4
SCALE: NONE P501



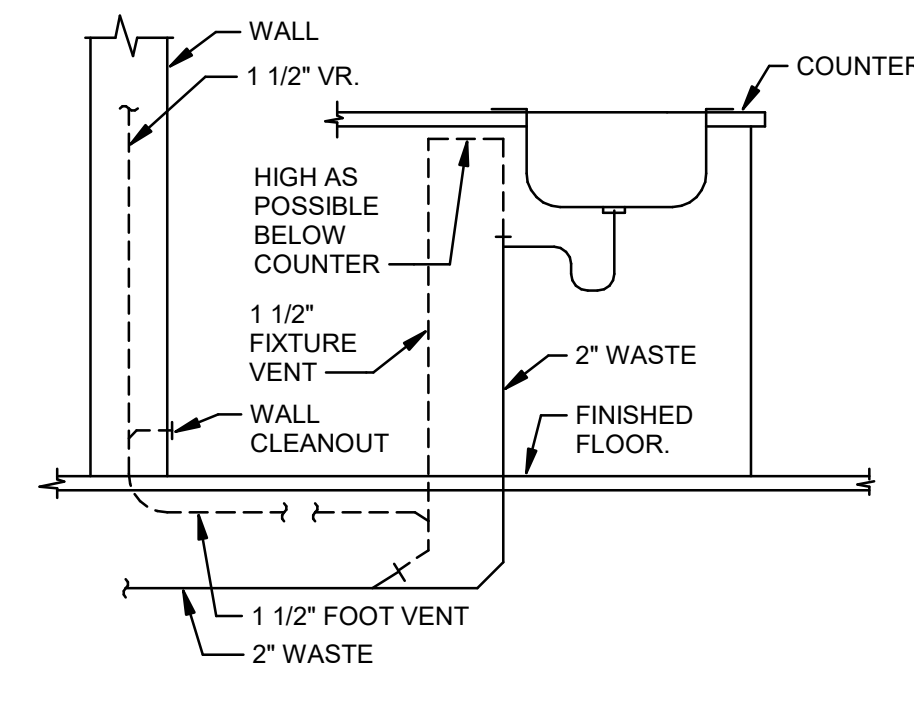
TYPICAL VENT THRU ROOF DETAIL 5
SCALE: NONE P501



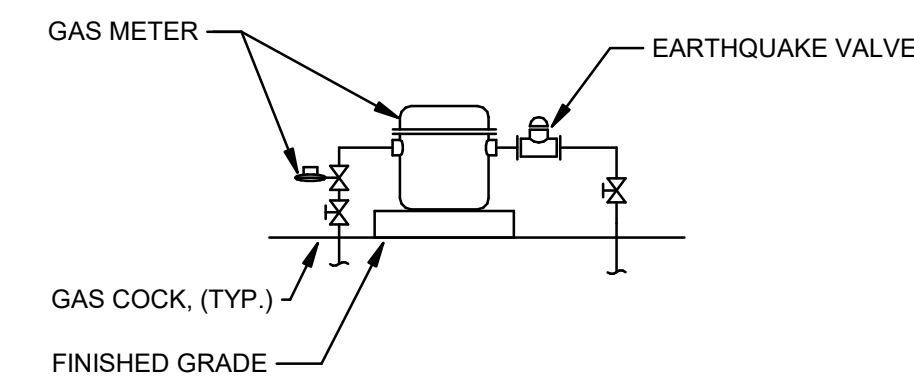
OVERFLOW RAINWATER LEADER DOWNSPOUT 6
SCALE: NONE P501



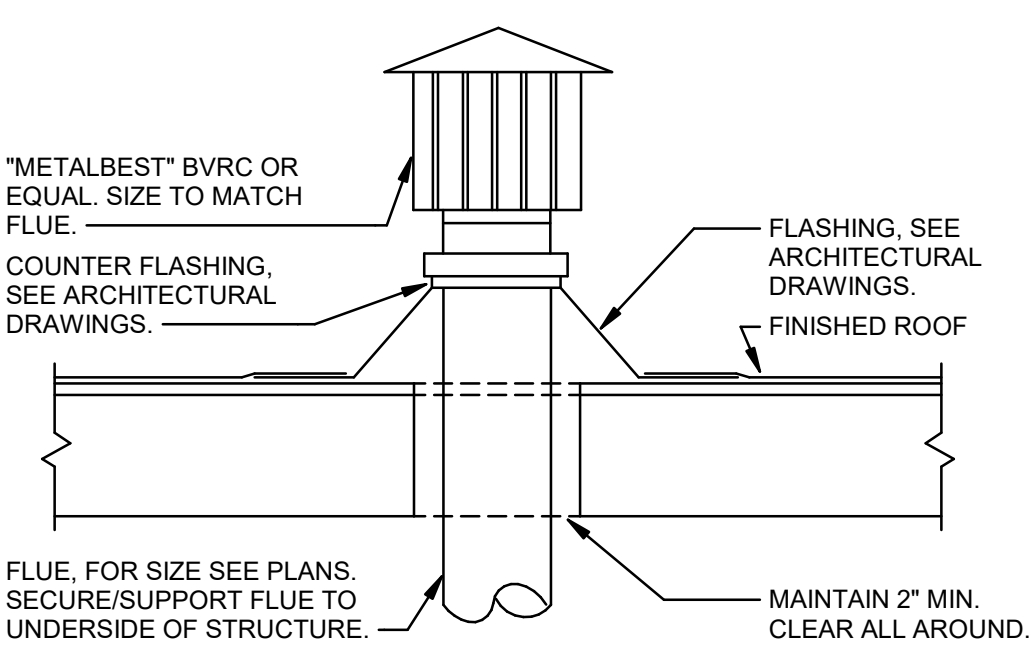
TRAP PRIMER TO FLOOR DRAIN 7
SCALE: NONE P501



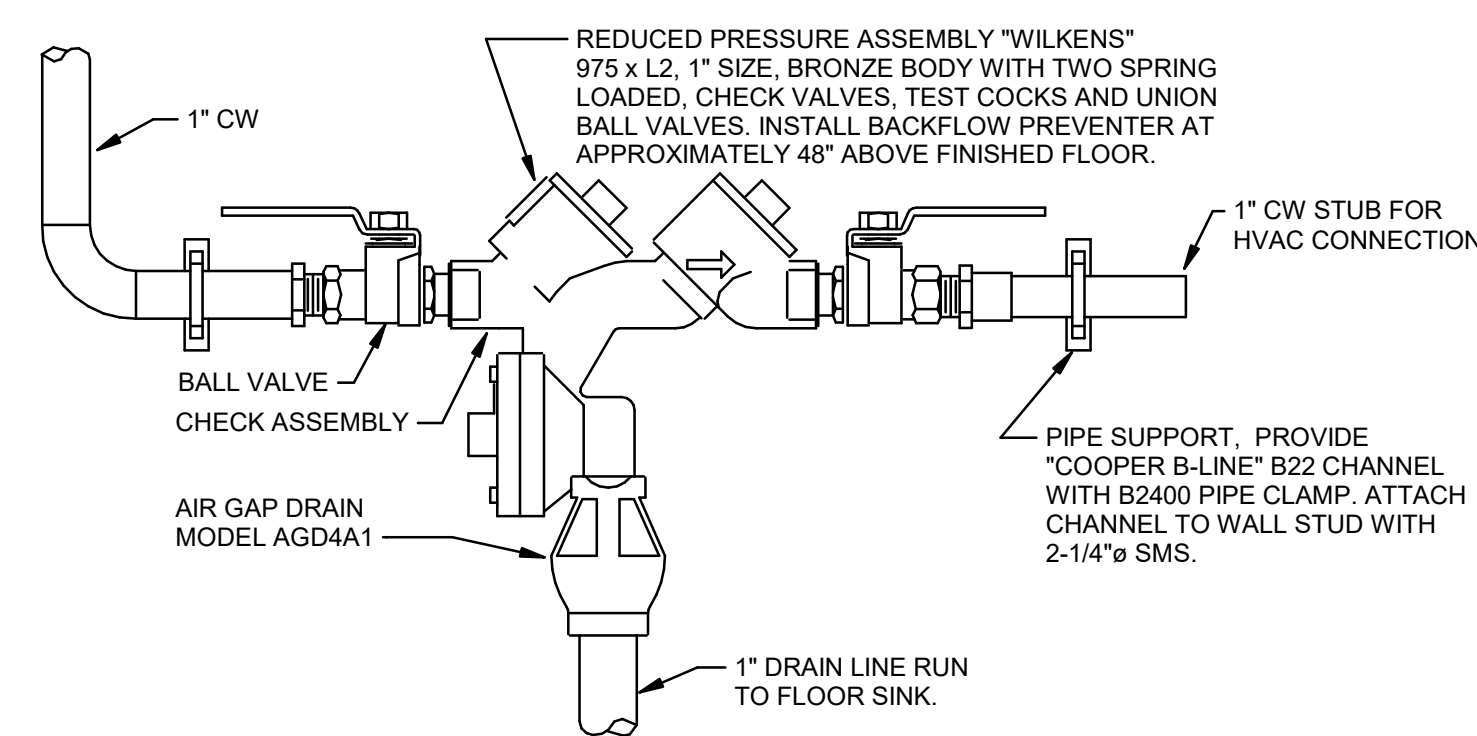
LOOP VENT 8
SCALE: NONE P501



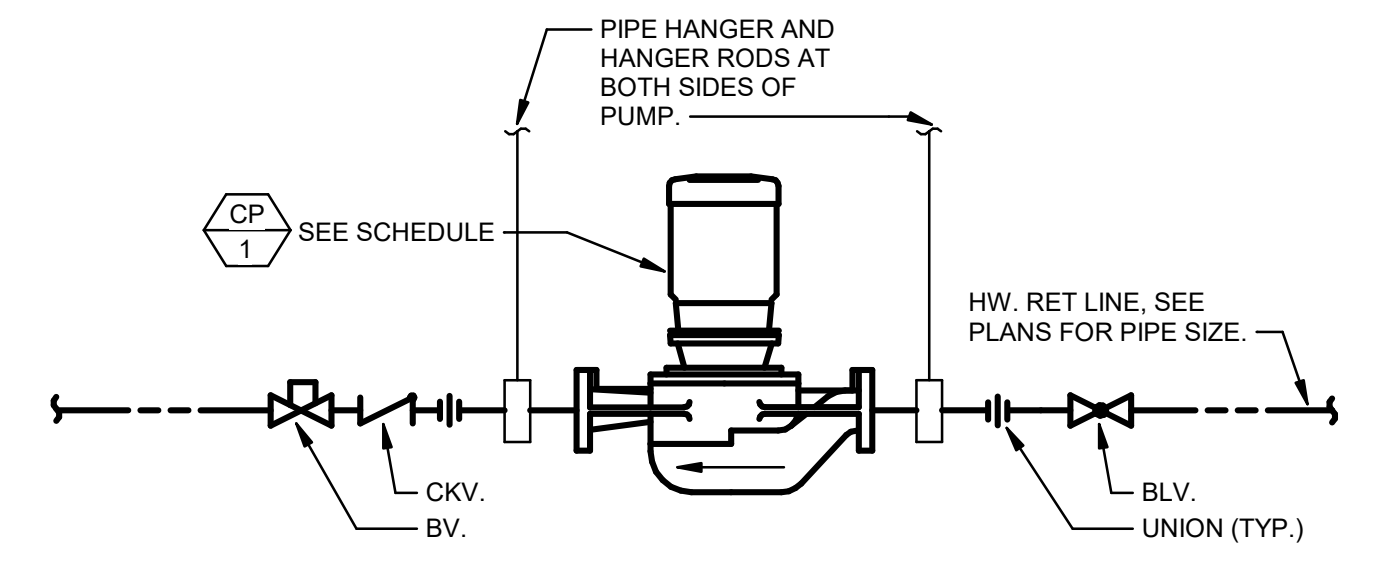
GAS METER SEISMIC VALVE DETAIL 9
SCALE: NONE P501



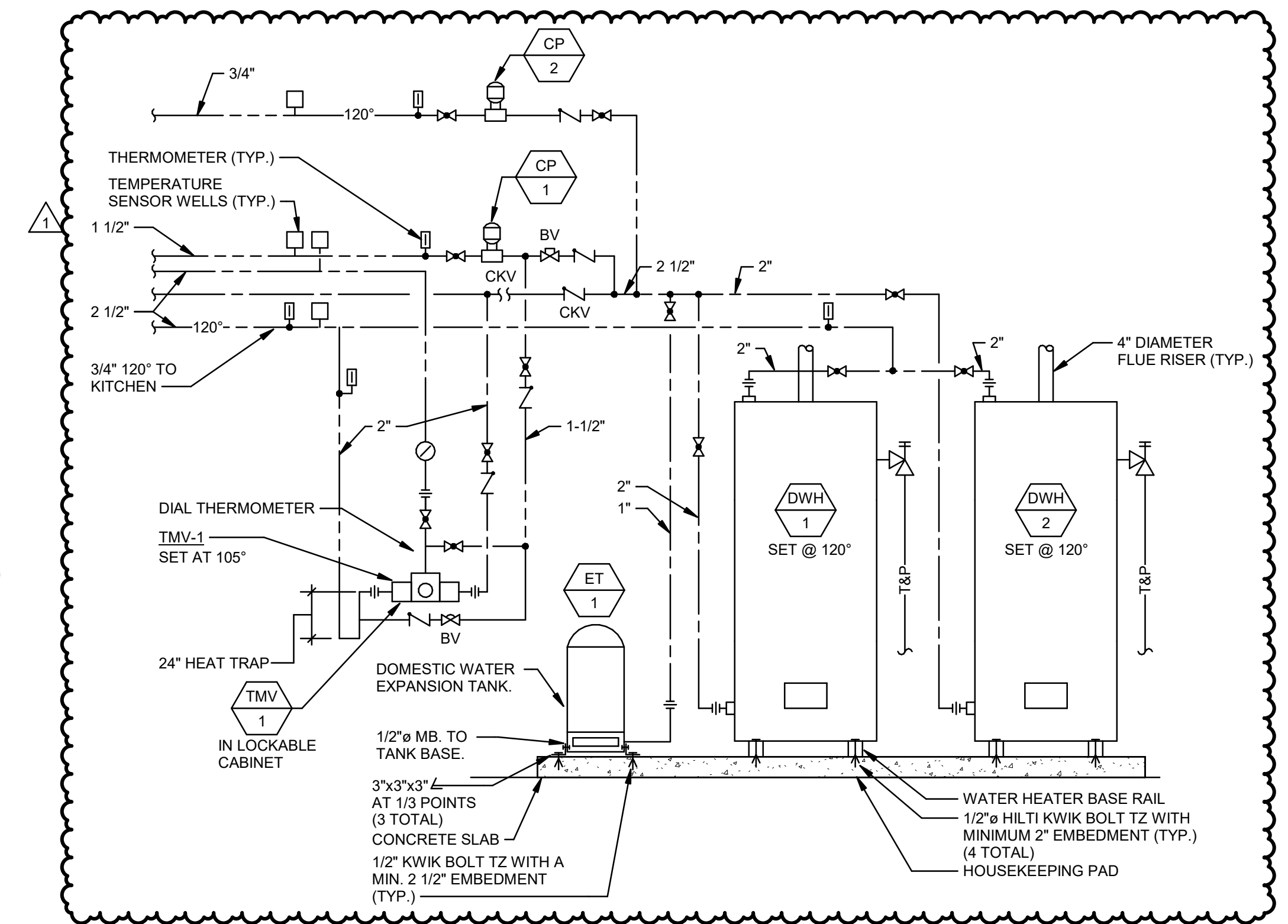
FLUE THRU ROOF DETAIL 10
SCALE: NONE P501



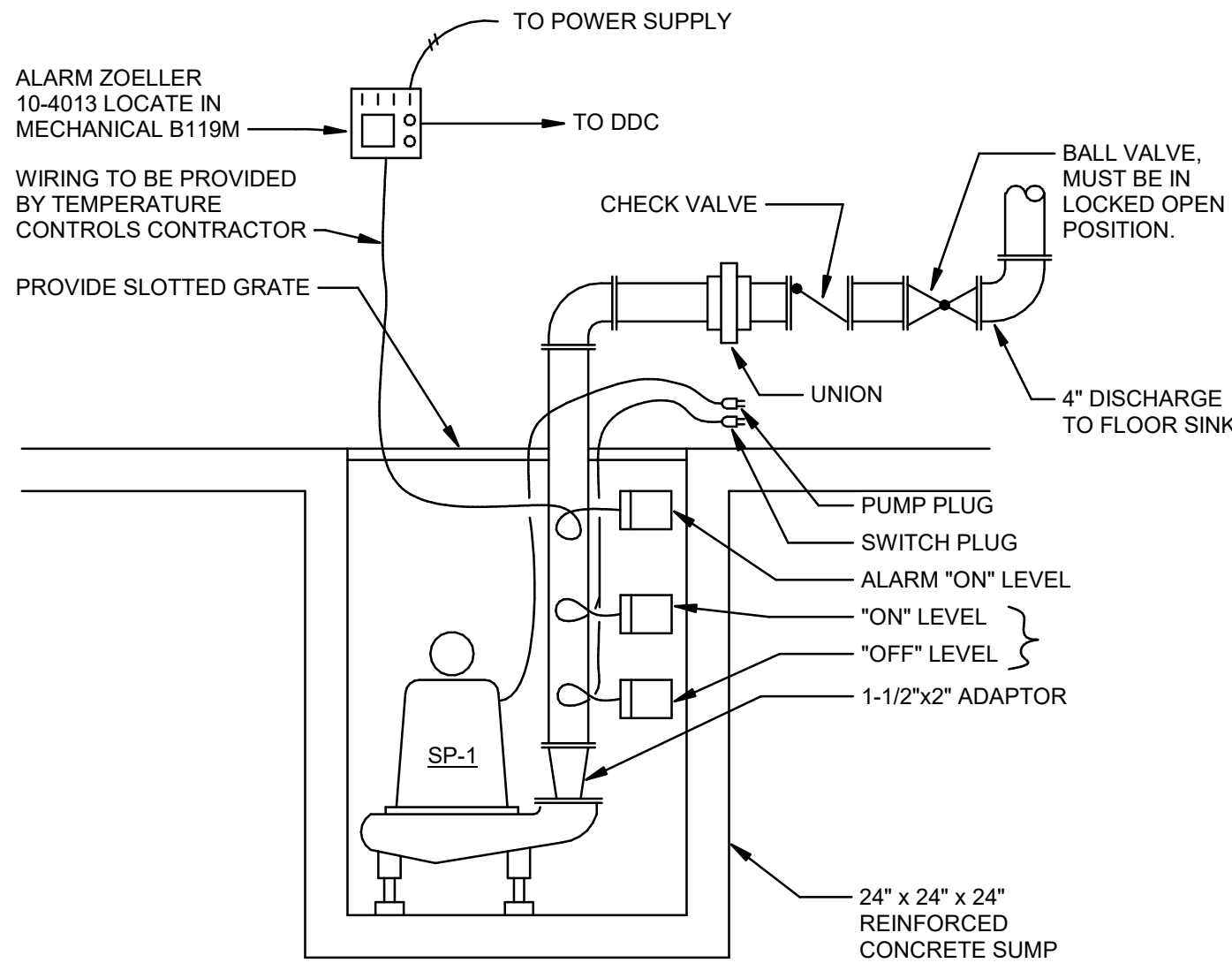
BACKFLOW PREVENTER ASSEMBLY 11
SCALE: NONE P501



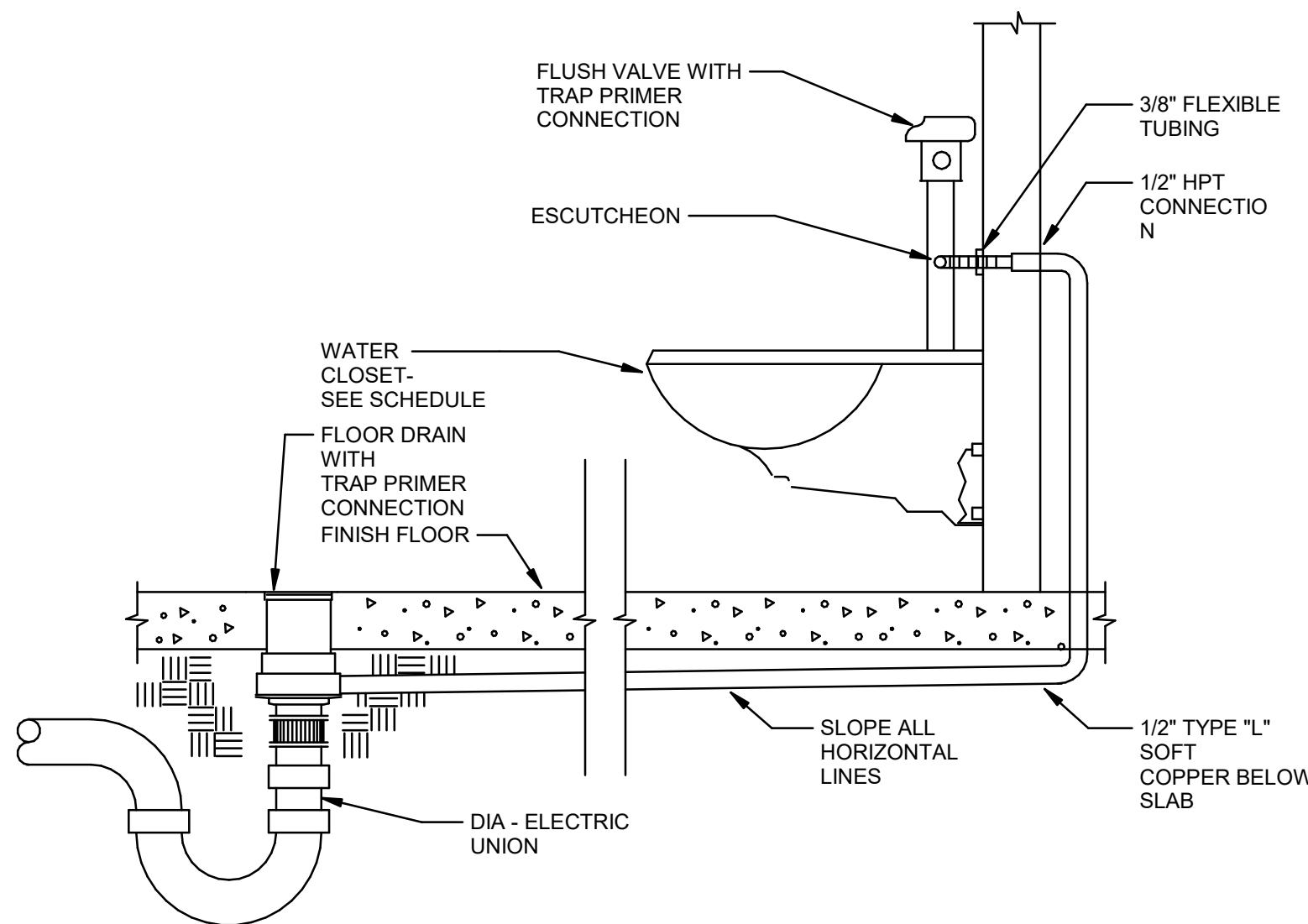
CIRCULATING PUMP PIPING DETAIL 12
SCALE: NONE P501



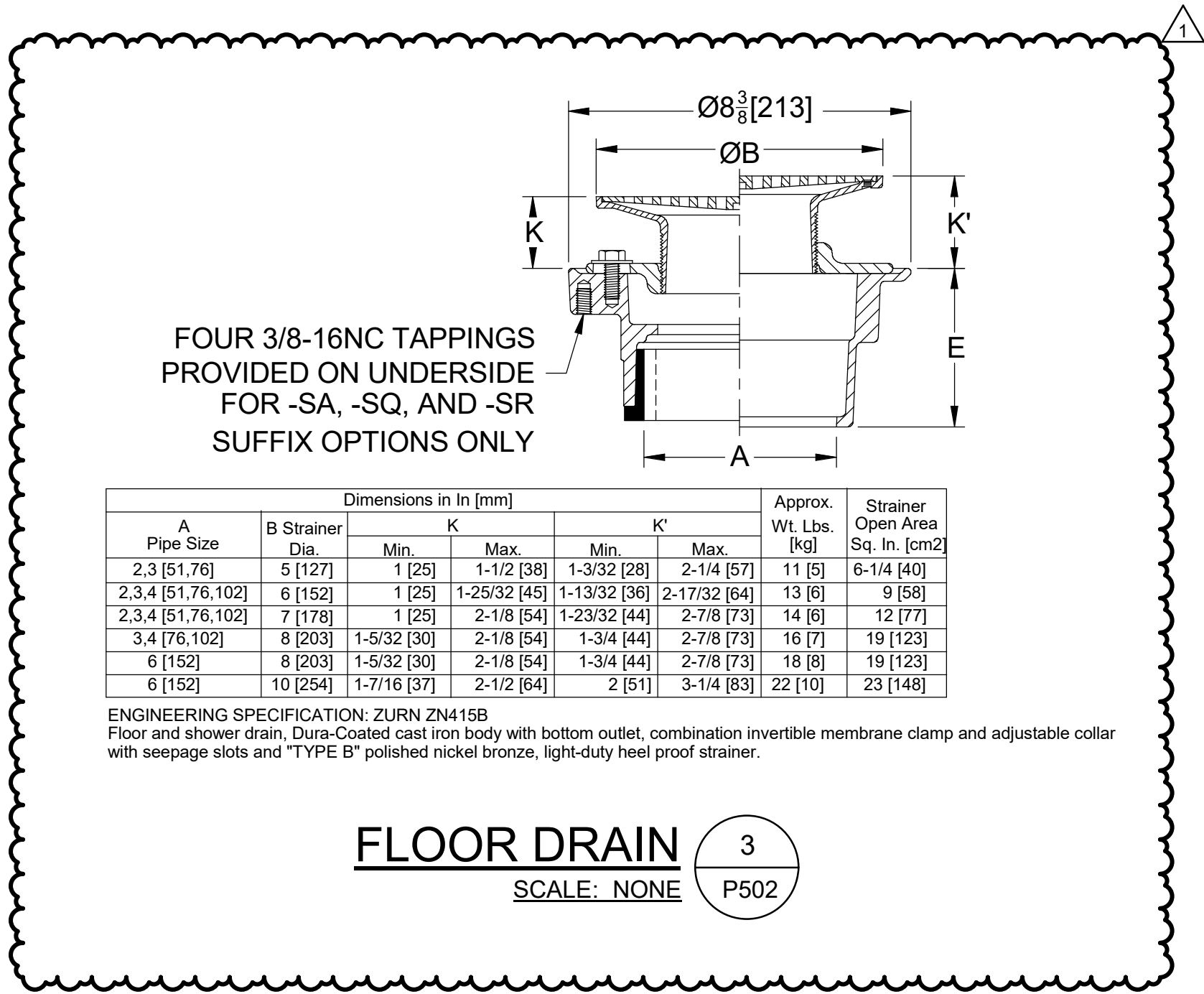
DOMESTIC WATER HEATER/TEMPERING VALVE PIPING 13
SCALE: NONE P501



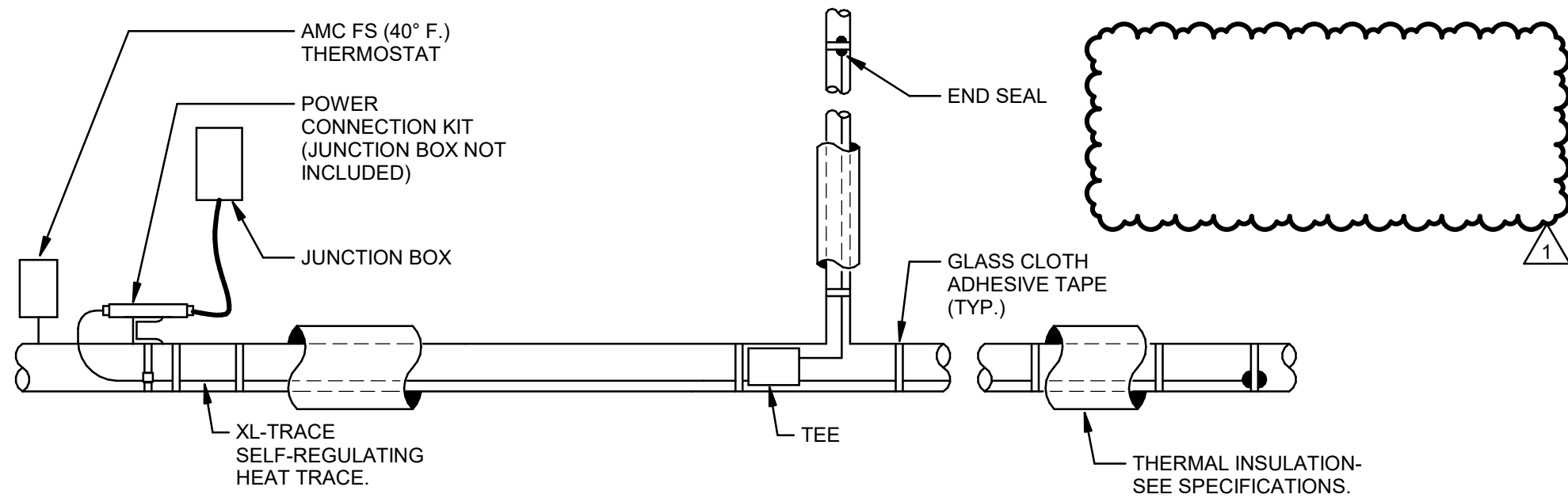
ELEVATOR SUMP PUMP
SCALE: NONE P502



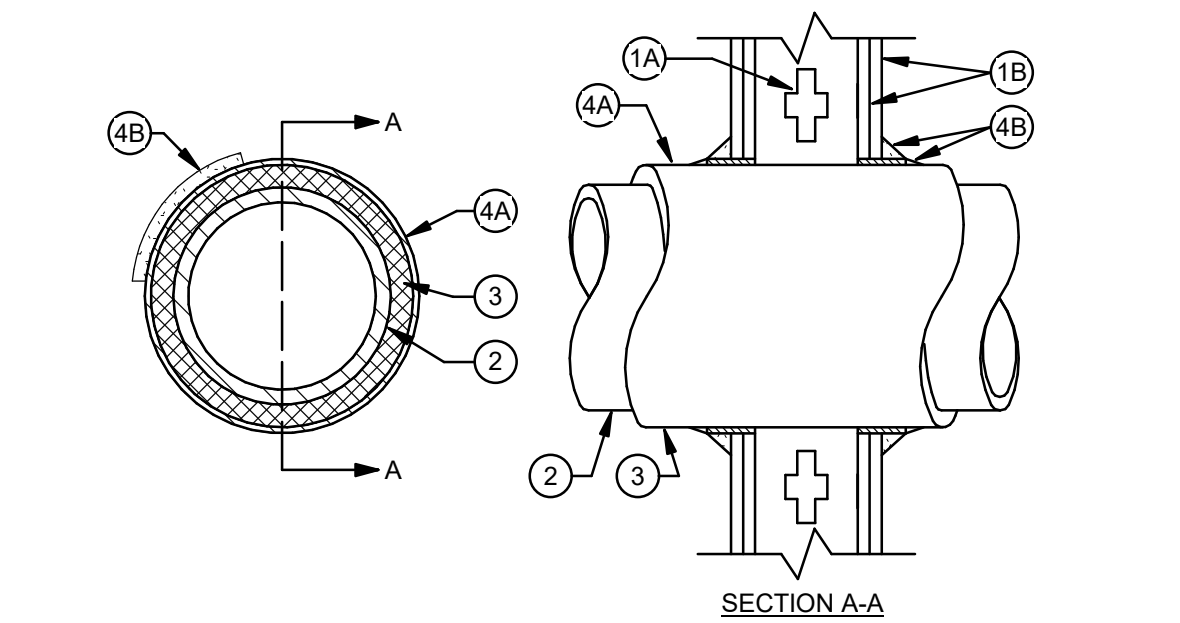
FLUSH VALVE/TRAP PRIMER
SCALE: NONE P502



FLOOR DRAIN
SCALE: NONE P502



FREEZE PROTECTION HEAT TRACE
SCALE: NONE P502

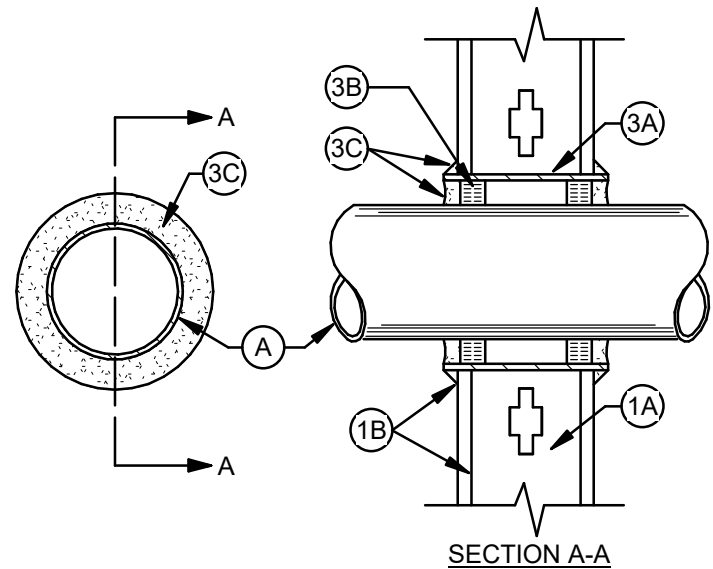


- WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY.
 - STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS.
 - GYPSUM BOARD - NOM 5/8" THICK, 4 FT. WIDE WITH SQUARE OR TAPERED EDGES.
- THROUGH PENETRANT - ONE METALLIC PIPE, TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
 - STEEL PIPE - NOM 12" DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
 - COPPER TUBING - NOM 6" DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
- PIPE COVERING - NOM 1" OR 2" THICK HOLLOW CYNDRICAL HEAVY DENSITY GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET.
- SHEETING MATERIAL (NOT SHOWN) - USED IN CONJUNCTION WITH ITEM 3. SERVICE JACKET MATERIAL SHALL BE WRAPPED AROUND THE OUTER CIRCUMFRENCE OF THE PIPE COVERING MATERIAL (ITEM 3) WITH KRAFT SIDE EXPOSED.
- FILL, VOID OR CAVITY MATERIALS - CAULK OR SEALANT - MIN 1/4" DIAM CONTINOUS BEAD - APPLIED TO THE WRAP STRIP/WALL INTERFACE AND TO THE EXPOSED EDGE OF THE WRAP STRIP LAYER APPROX 3/4" FROM THE WALL SURFACE.

(UL SYSTEM NO. W-L-5001)
(F RATING - 1 HR)

- NOTES: 1. FIRE RATED ASSEMBLY DETAIL FOR REFERENCE ONLY.
2. EXACT WALL CONDITIONS AT PENETRATIONS SHALL BE VERIFIED PRIOR TO INSTALLATION AND THE APPROPRIATE ASSEMBLY SHALL BE USED FOR THE TYPE OF PENETRATION.
3. FIRESTOPPING SHALL BE INSTALLED STRICTLY PER MANUFACTURER'S INSTALLATION INSTRUCTIONS

PIPE THRU 1 HOUR RATED WALL (INSULATED)
SCALE: NONE P502

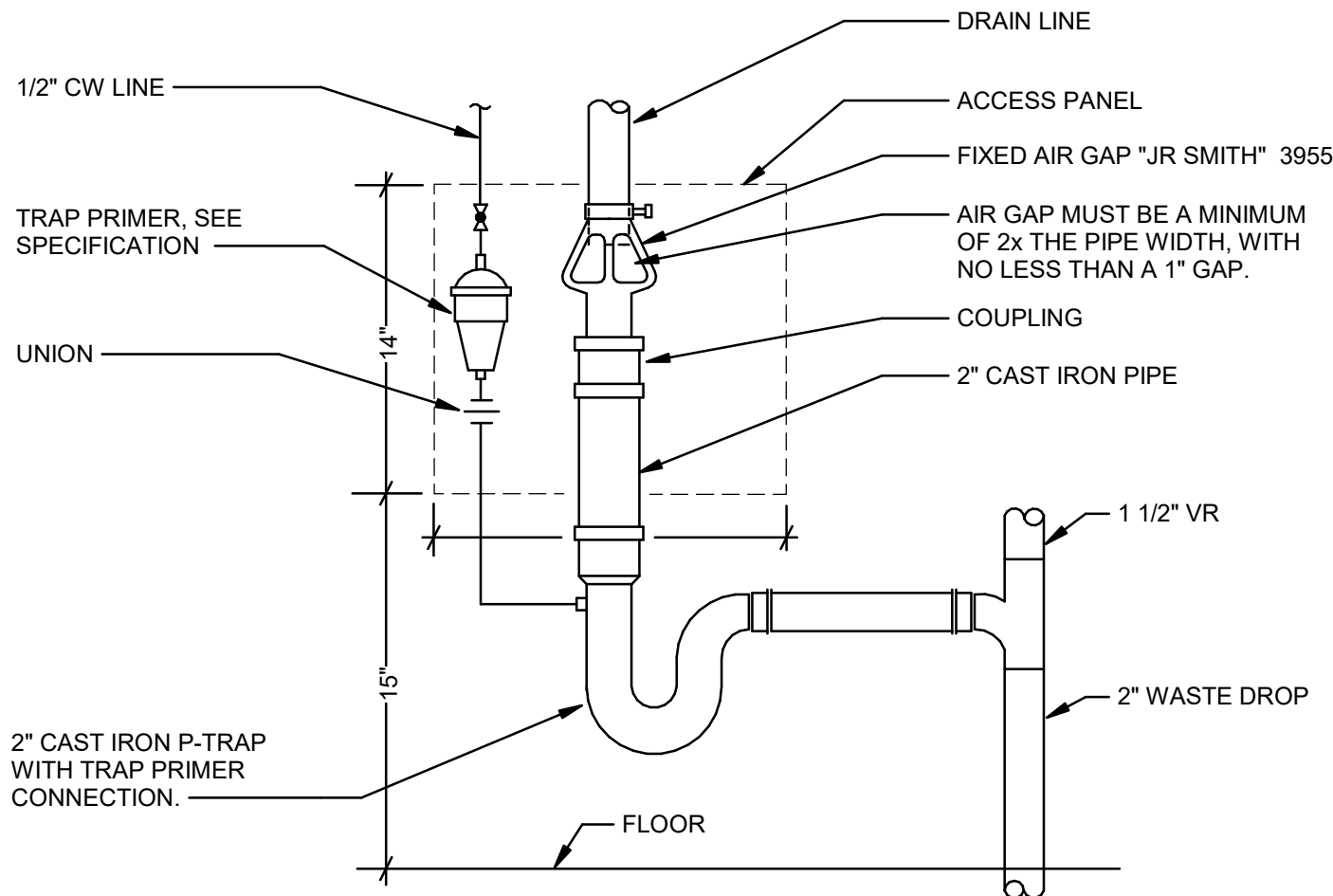


- WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY.
 - STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS.
 - GYPSUM BOARD - NOM 5/8" THICK, 4 FT. WIDE WITH SQUARE OR TAPERED EDGES.
- THROUGH PENETRANT - ONE METALLIC PIPE, TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
 - STEEL PIPE - NOM 12" DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
 - IRON PIPE - NOM 12" DIAM (OR SMALLER) SERVICE WEIGHT (OR HEAVIER) CAST IRON SOIL PIPE, NOM 12" DIAM (OR SMALLER).
 - COPPER TUBING - NOM 6" DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
- FIRESTOP SYSTEM - INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE DETAILS OF THE FIRESTOP SYSTEM SHALL BE AS FOLLOWS:
 - STEEL SLEEVE - CNLINDRICAL SLEEVE FABRICATED FROM MIN 0.019" THICK (NO 28 GAUGE) GALV SHEET STEEL. LENGTH OF STEEL SLEEVE TO BE EQUAL TO THICKNESS OF WALL PLUS 1" TO 4".
 - PACKING MATERIAL - MIN 1" THICKNESS OF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO STEEL SLEEVE ON BOTH SIDES OF WALL ASSEMBLY AS PERMANET FORMS.
 - FILL, VOID OR CAVITY MATERIALS - CAULK OR SEALANT - WHEN MINERAL WOOL BATT INSULATION IS USED, APPLIED TO FILL THE STEEL SLEEVE TO A MIN DEPTH OF 1/2" ON BOTH SIDES OF THE WALL ASSEMBLY.

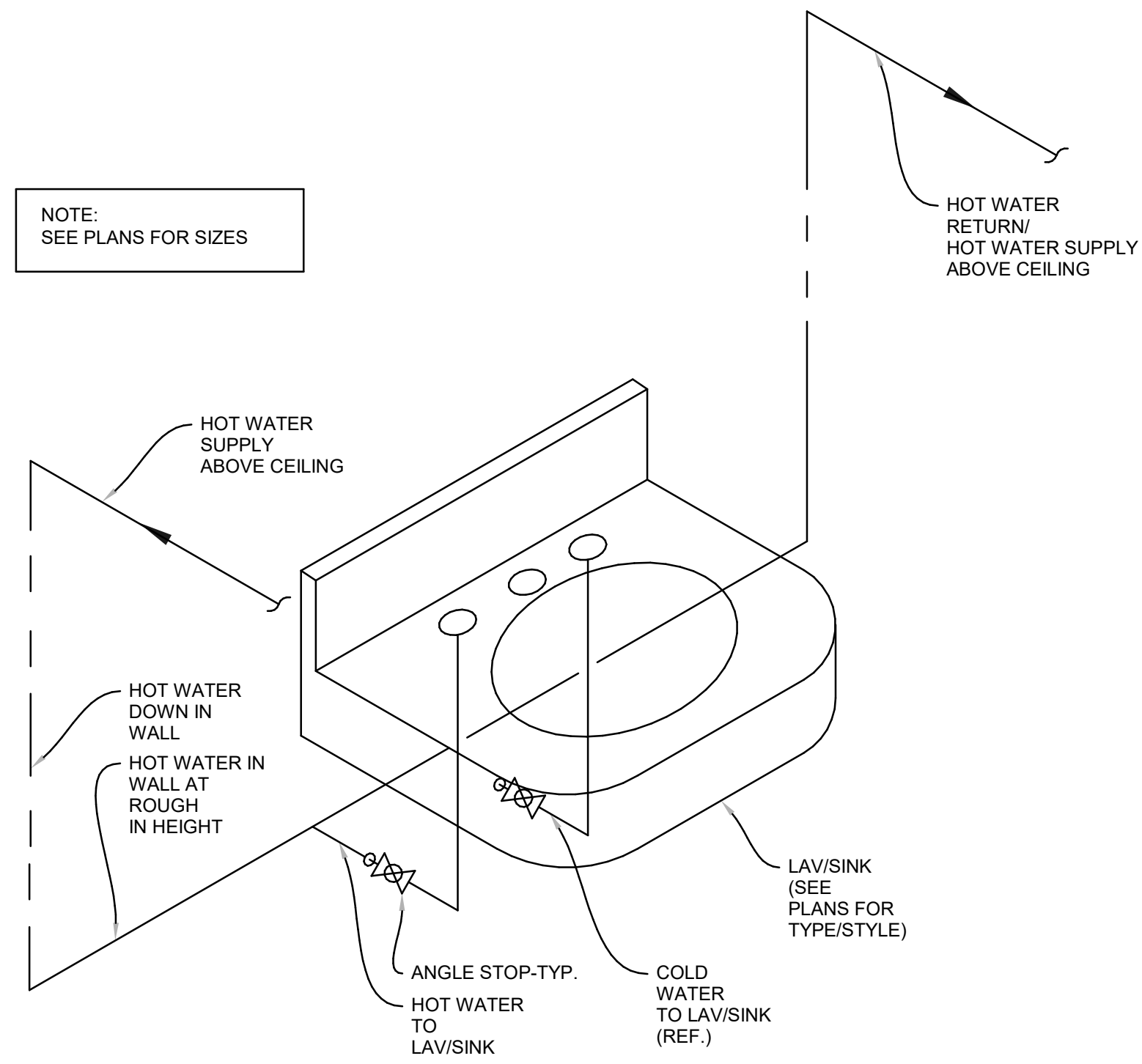
(UL SYSTEM NO. W-L-1003)
(F RATING - 1 HR)

- NOTES: 1. FIRE RATED ASSEMBLY DETAIL FOR REFERENCE ONLY.
2. EXACT WALL CONDITIONS AT PENETRATIONS SHALL BE VERIFIED PRIOR TO INSTALLATION AND THE APPROPRIATE ASSEMBLY SHALL BE USED FOR THE TYPE OF PENETRATION.
3. FIRESTOPPING SHALL BE INSTALLED STRICTLY PER MANUFACTURER'S INSTALLATION INSTRUCTIONS

PIPE THRU 1 HOUR RATED WALL
SCALE: NONE P502



FIXED AIR GAP FITTING
SCALE: NONE P502



HOW WATER PIPING BEHIND LAVS/SINKS
SCALE: NONE P502

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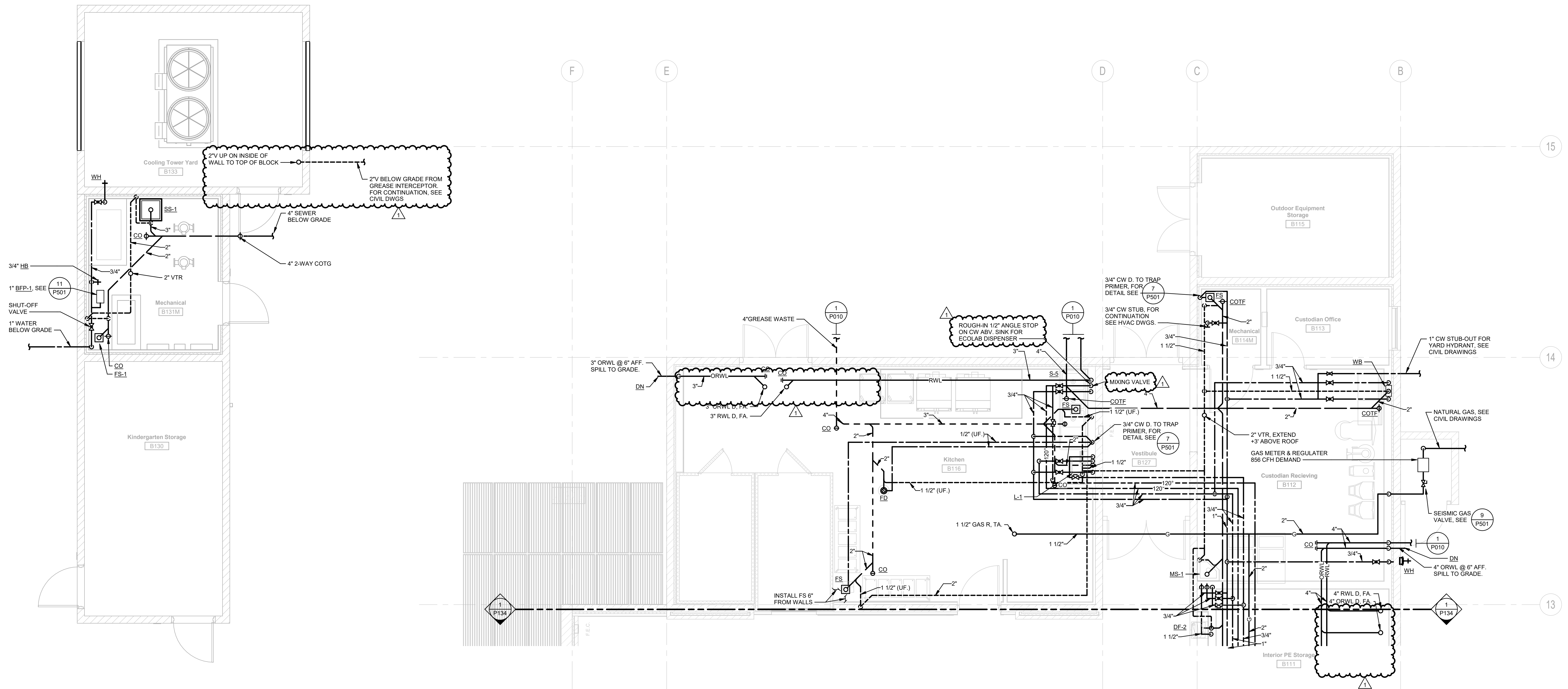
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PLUMBING - DETAILS

October 13, 2021
H+K Project No: 2001

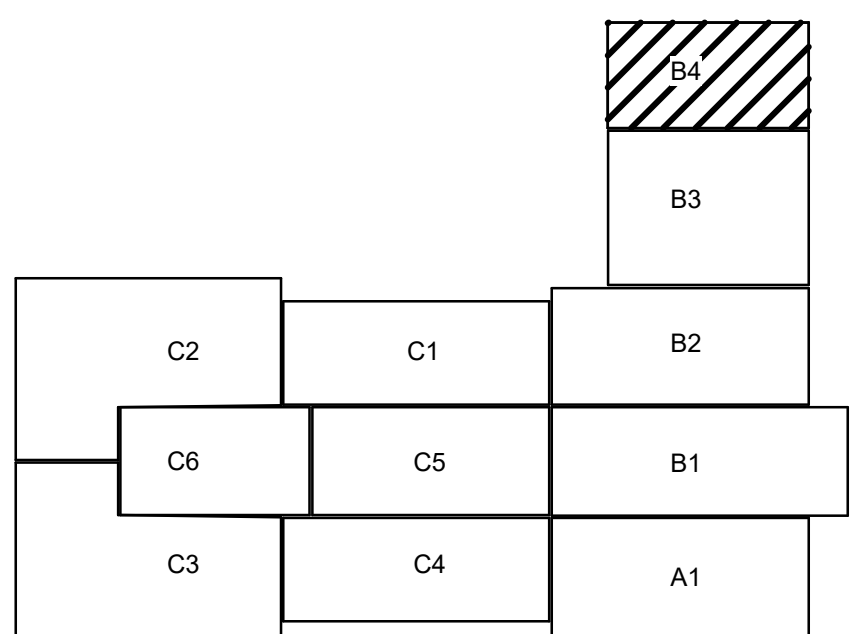
P502





COOLING TOWER YARD MECH ROOM PLUMBING PAN 1
SCALE: 1/4" = 1'-0" P135

PLUMBING - PARTIAL FIRST FLOOR PLAN - AREA B4 2
SCALE: 1/4" = 1'-0" P135



KEY PLAN

Professional Seal
Date
Revision
1 11/17/21 Addendum 3



AINSWORTH ASSOCIATES
MECHANICAL ENGINEERS
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TEL: 775-329-9100 TEL: 916-737-6014
www.aa-me.com

Consultant

H+K ARCHITECTS
5485 Reno Corporate Drive, Suite 100
Reno, Nevada 89511-2262
P 775+332+6640
F 775+332+6642
hkarchitects.com

Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

PLUMBING - PARTIAL
FIRST FLOOR PLAN -
AREA B4

October 13, 2021
H+K Project No: 2001

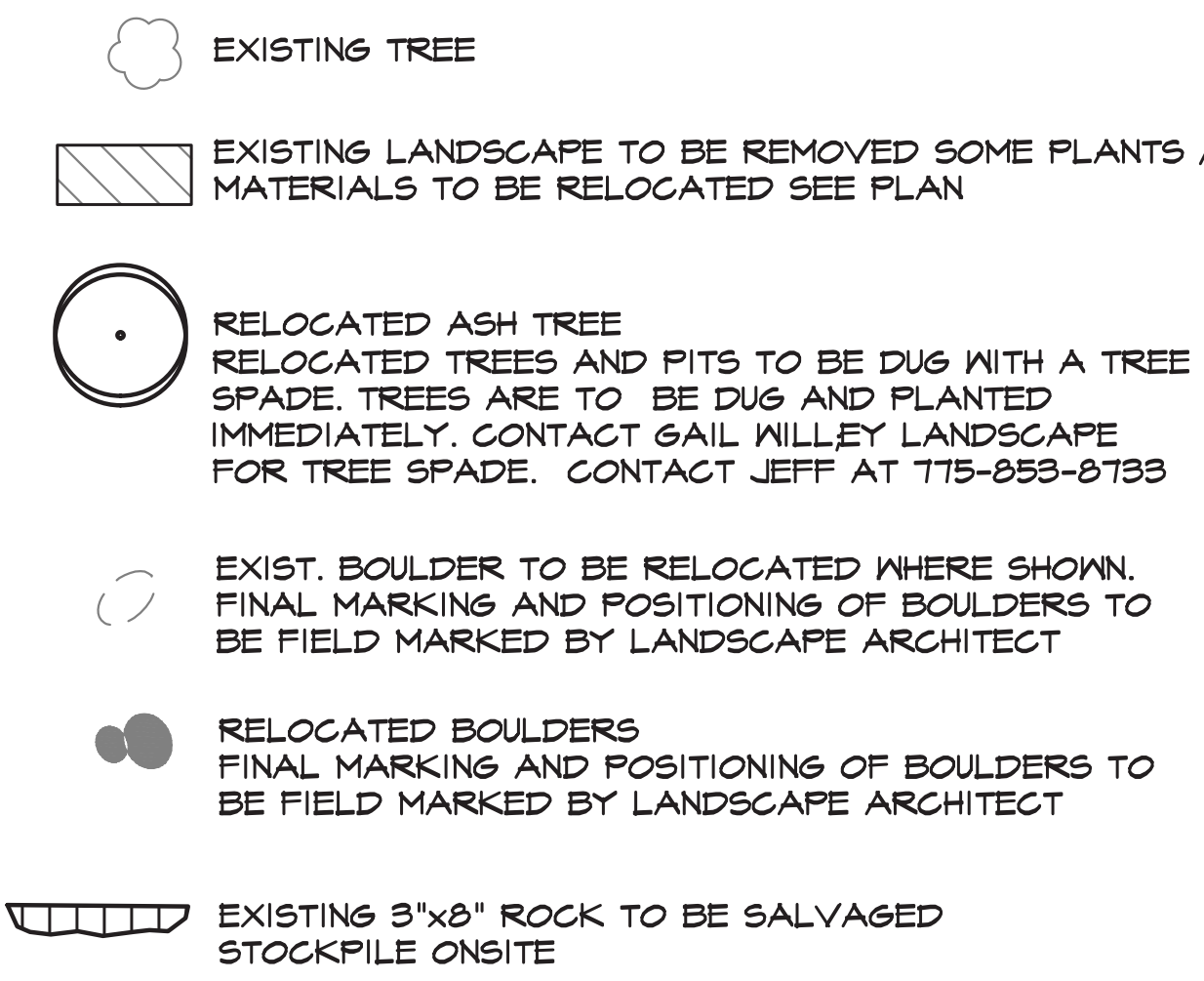
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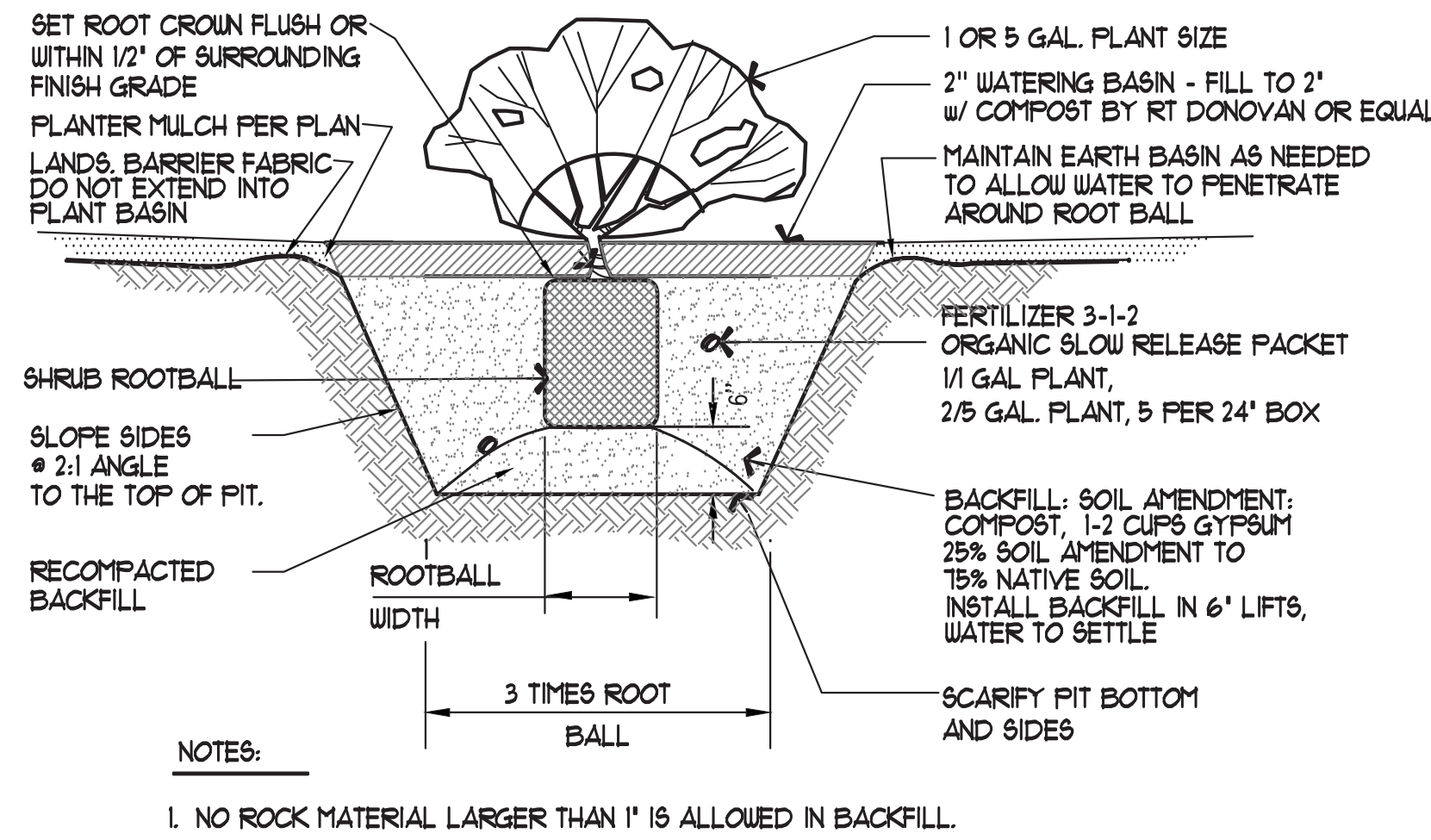
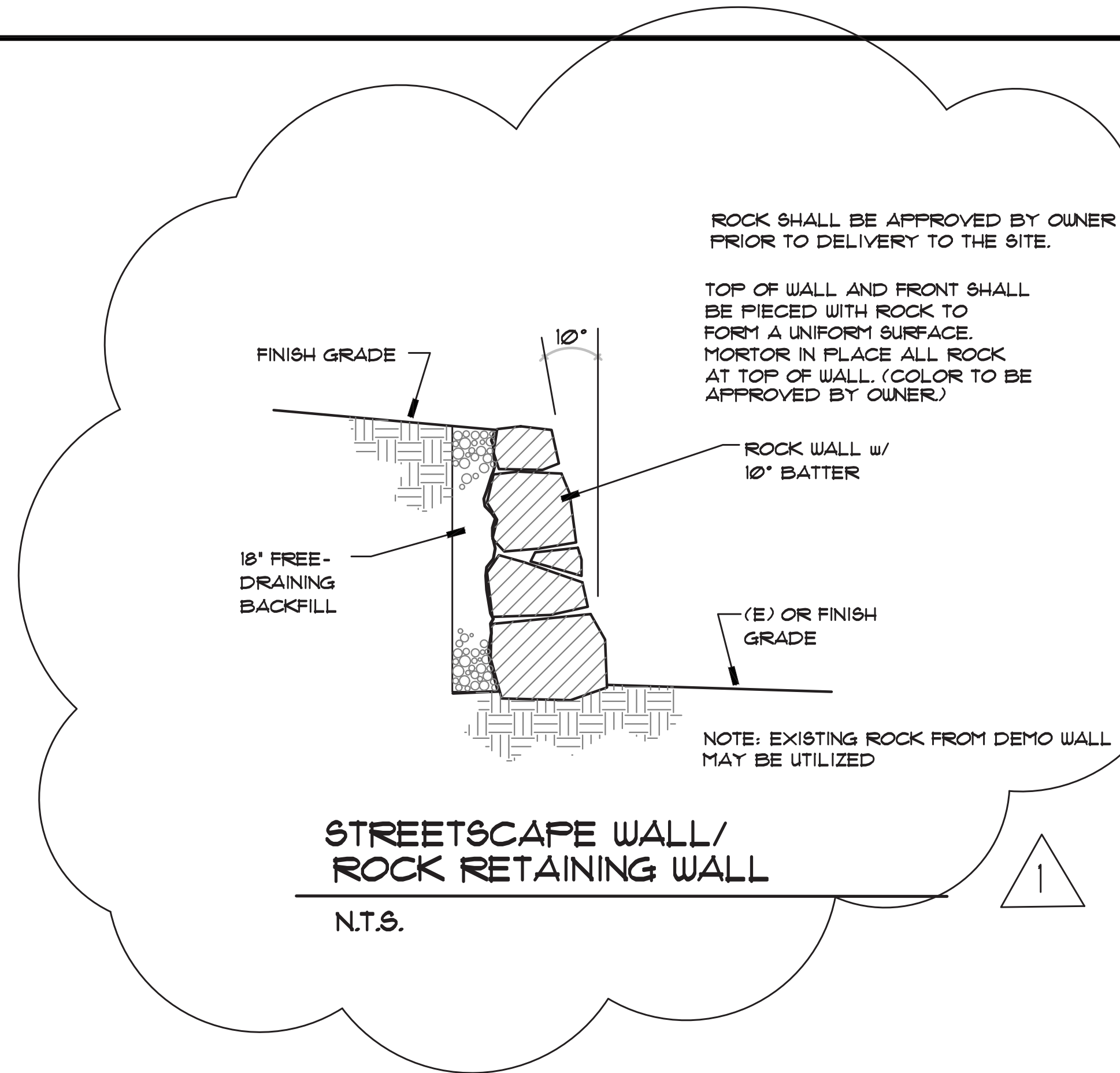
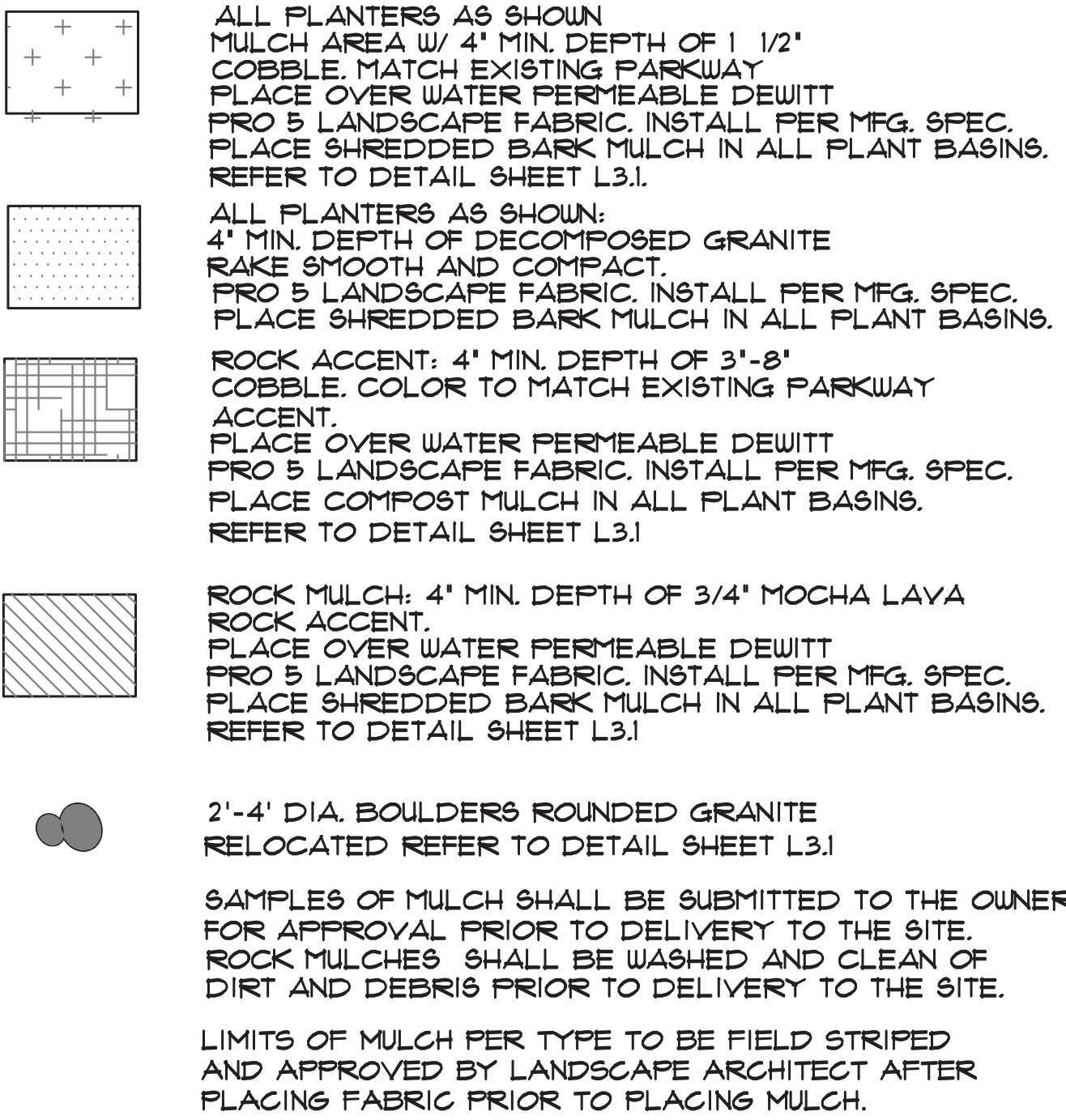
GENERAL LANDSCAPE NOTES

1. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES (IE:PAVING, PLUMBING, ELECTRICAL, ETC.)
2. ALL GRADES SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE AFTER IRRIGATION MAINS AND FINAL GRADING IS COMPLETE PRIOR TO PLANTING.
3. ALL WEEDS AND DEBRIS SHALL BE REMOVED FROM THE EXISTING SOIL. THE EXISTING SOIL SHALL BE TILLED TO A MINIMUM OF 12" DEPTH TO LOOSEN. THE CONTRACTOR SHALL AMEND THE SHRUB BED SOILS WITH A MINIMUM OF 15' OF DAMONTE RANCH BLEND SOIL ESSENCE AS AVAILABLE FROM FULL CIRCLE COMPOST. (775) 261-5305. THE SOIL AMENDMENTS SHALL BE INCORPORATED INTO THE TOP 12" OF EX. SOIL. IN ADDITION, ALL PLANT PIT BACKFILL SHALL BE AMENDED AT AN EQUIVALENT AMOUNT OF 10% OF SOIL ESSENCE. ALL PLANTS SHALL BE SPRAYED WITH VERMA-FLEX OR EQUAL FOLIAR FERTILIZER AFTER INSTALLATION. VERMA-FLEX IS AVAILABLE FROM FULL CIRCLE COMPOST.
4. GRADING OF CATCH SLOPES IN DEMO AREA IS PER CIVIL GRADING PLANS. FINAL FINISH GRADING IS BY LANDSCAPE CONTRACTOR. ALL SLOPES TO BE RAKED SMOOTH TRANSITIONS ROUNDED SMOOTH.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND PROVIDE PLANT MATERIAL AS SPECIFIED ON THIS PLAN. THE CONTRACTOR MAY SUBMIT A REQUEST TO PROVIDE SUBSTITUTIONS FOR THE SPECIFIED PLANT MATERIAL UNDER THE FOLLOWING CONDITIONS:
A. ANY SUBSTITUTIONS PROPOSED SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE WITHIN TWO WEEKS OF THE AWARD OF CONTRACT. SUBSTITUTIONS MUST MEET EQUIVALENT DESIGN AND FUNCTIONAL GOALS OF THE ORIGINAL PLANT MATERIAL AS DETERMINED BY THE LANDSCAPE ARCHITECT. ANY CHANGES MUST HAVE THE APPROVAL OF THE LANDSCAPE ARCHITECT.
B. THE REQUEST MUST BE ACCOMPANIED BY AT LEAST THREE NOTICES FROM PLANT SUPPLIERS THAT THE PLANT MATERIAL SPECIFIED IS NOT AVAILABLE PRIOR TO THE CONSTRUCTION PHASE.
6. ALL PLANTS NOT MEETING OR EXCEEDING REQUIREMENTS AND RECOMMENDATIONS OF ANSI 260.1 'AMERICAN STANDARD FOR NURSERY STOCK' SHALL BE REJECTED. THE CONTRACTOR SHALL RECEIVE ON-SITE APPROVAL OF PLANT MATERIAL BY THE LANDSCAPE ARCHITECT PRIOR TO PLANTING. FAILURE TO RECEIVE APPROVAL PRIOR TO PLANTING MAY RESULT IN REJECTION AND THE CONTRACTOR SHALL REPLACE ALL REJECTED PLANT MATERIAL AT HIS EXPENSE. THE OWNER RESERVES THE RIGHT TO INSPECT AND EVALUATE PLANT MATERIAL THROUGHOUT THE CONSTRUCTION AND MAINTENANCE PERIOD.
7. ALL PLANT SUBSTITUTIONS SHALL BE REVIEWED AND ACTION TAKEN BY THE LANDSCAPE ARCHITECT. THE CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR FOR PLANT REVIEW AND APPROVAL 48 HRS. PRIOR TO DELIVERY. ANY MATERIAL NOT ACCEPTABLE SHALL BE REMOVED IMMEDIATELY FROM THE SITE. THE OWNER'S REPRESENTATIVE MAY AT ANYTIME UNTIL FINAL ACCEPTANCE DIRECT THE CONTRACTOR TO REMOVE UNACCEPTABLE MATERIAL WITHOUT COST TO THE OWNER.
8. THE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR ONE FULL YEAR UPON FINAL ACCEPTANCE OF THE PROJECT. ANY PLANTS REPLACED UNDER THIS GUARANTEE SHALL BE GUARANTEED FOR ONE FULL YEAR FROM THE DATE OF REPLACEMENT.
9. THE LANDSCAPE CONTRACTOR SHALL INSURE POSITIVE DRAINAGE IN ALL PLANTER AREAS PER CIVIL ENGINEER'S GRADING PLAN AFTER LANDSCAPE IMPROVEMENTS ARE COMPLETE.
10. REMOVE ALL WEEDS AND DEBRIS IN AND AROUND NEWLY INSTALLED PLANT MATERIAL. A PRE-EMERGENT HERBICIDE SHALL BE APPLIED TO ALL PLANTER AREAS PRIOR TO INSTALLATION OF MULCHES.
11. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE OWNER/LA A MIN. OF 48 HOURS IN ADVANCE FOR THE FOLLOWING SITE OBSERVATIONS AND/OR MEETINGS:
A. PLANT MATERIAL ON SITE, SOIL PREP, INSTALLATION
B. DRIP IRRIGATION IN PLACE PRIOR TO PLACING FABRIC AND MULCH
C. FINAL PROJECT WALK-THROUGH
D. ADDITIONAL SITE OBSERVATIONS DETERMINED BY THE OWNER'S REPRESENTATIVE OR CONTRACTOR.
12. REFER TO PLANTING DETAILS THIS SHEET.
13. PROVIDE 1 DIGITAL COPY OF SUBMITTAL PACKAGE OF ALL LANDSCAPE AND IRRIGATION COMPONENTS AND MATERIALS FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO COMMENCING WORK.
14. ALL MOUTSTRIPS SHALL BE 6" X 6" SQ. CONCRETE, EXTRUDED IN PLACE. TOP OF MOUTSTRIPS AT SIDE WALKS OR OR CURBS SHALL MATCH TOP OF EXISTING PAVING. MOUTSTRIPS NOT ADJACENT TO SIDEWALKS OR CURBING SHALL BE RECESSED IN FINISHED GRADE PER CIVIL ENGINEER'S DRAWINGS. INSTALLATION OF THE MOUTSTRIPS SHALL NOT COMMENCE UNTIL FINAL GRADING OF THE PLANTER AREAS AND IS COMPLETE. THE SUBGRADE FOR THE MOUTSTRIP SHALL BE COMPACTED TO 90% RELATIVE COMPACTION. THE CONCRETE MIX SHALL INCLUDE COLLATED, FIBRILLATED POLYPROPYLENE FIBERS AS MFR. BY: FIBERFRESH OR APPROVED EQUAL. ADD 1-1/2 LBS. FIBERFRESH PER CUBIC YARD OF CONCRETE. CONTRACTION TOOL JOINTS SHALL BE PROVIDED A MIN. OF EVERY 3 LF. HEADER TO BE 15' ABOVE EXISTING TURF.

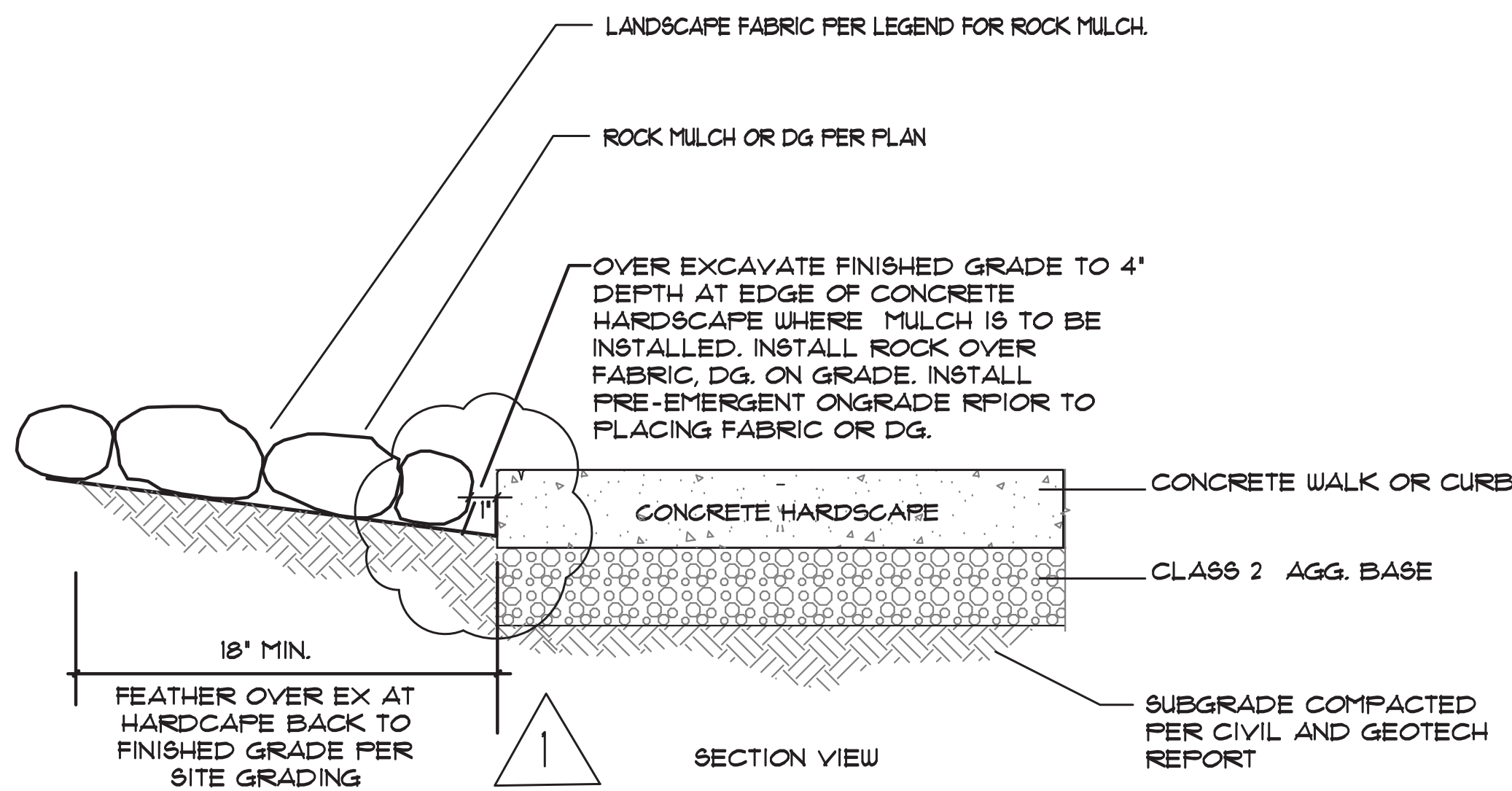
LEGEND



MULCH LEGEND



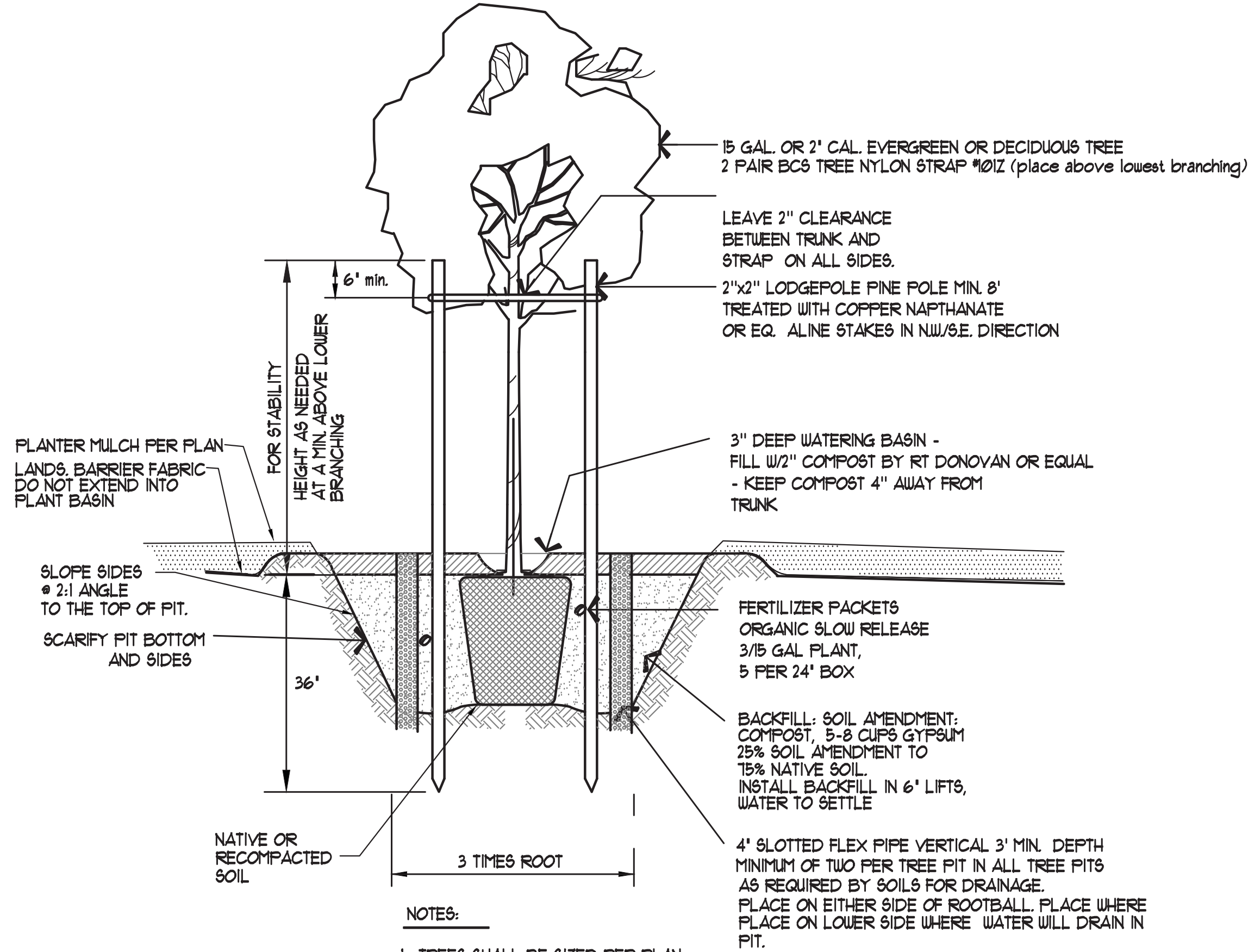
SHRUB PLANTING DETAIL



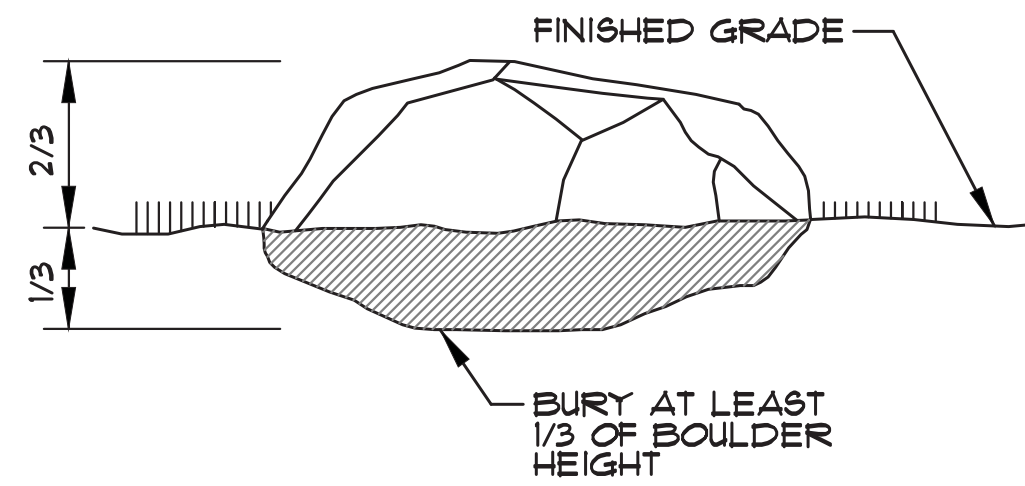
ROCK MULCH AT PAVING EDGE

NOT TO SCALE

NOTE:
RAKE FINISHED GRADE SMOOTH AND REMOVE ALL DEBRIS AND ROCK ON SOIL OVER 1" DIA. TREAT ALL SOIL SURFACES WITH A PRE-EMERGENT HERBICIDE PER MFG. DIRECTION ON ALL SOILS UNDER MULCHES. (PRIOR TO PLACING FABRIC OR DG)
OVER LAP FABRIC PIECES PER MFG. DIRECTION. WIRE STAPLE IN PLACE IF INSTALLED ON A SLOPE.



TREE PLANTING DETAIL



BOULDER PLACEMENT DETAIL

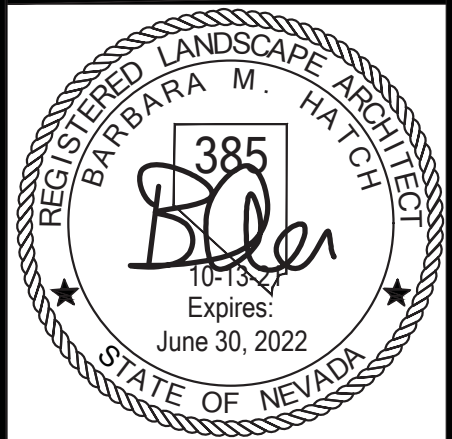
NOT TO SCALE

REV.	DATE	DESCRIPTION	BY	APP'D
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LANDSCAPE PLAN	NEVADA
RIO WRANGLER	
IMPROVEMENT PLANS	
WASHOE COUNTY,	
RENO,	

GreenDesign
Landscape Architects, Inc.

1461 Popple Drive
Reno, NV.
p: 775.925.1364
email: brad@00@charter.net

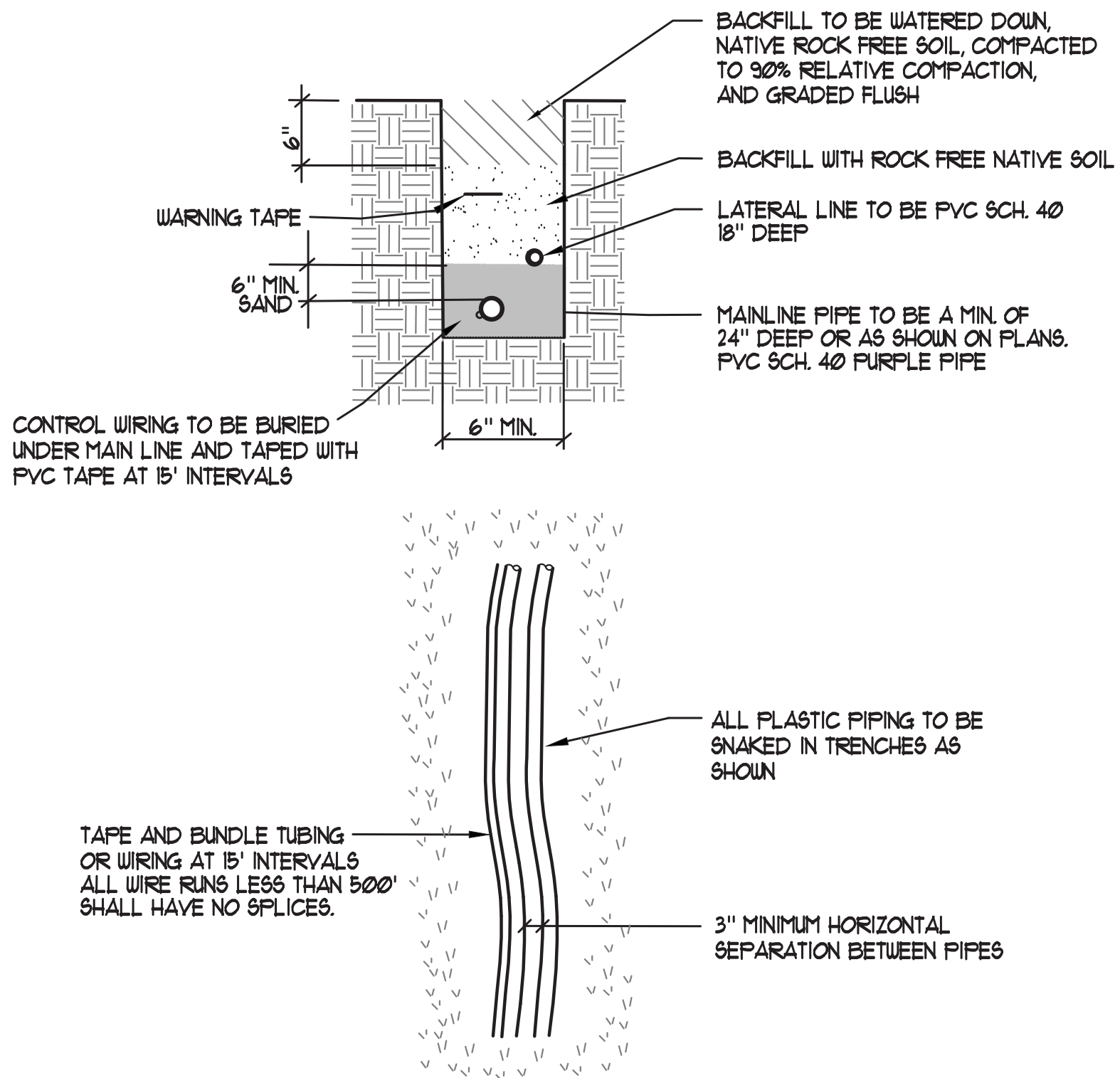
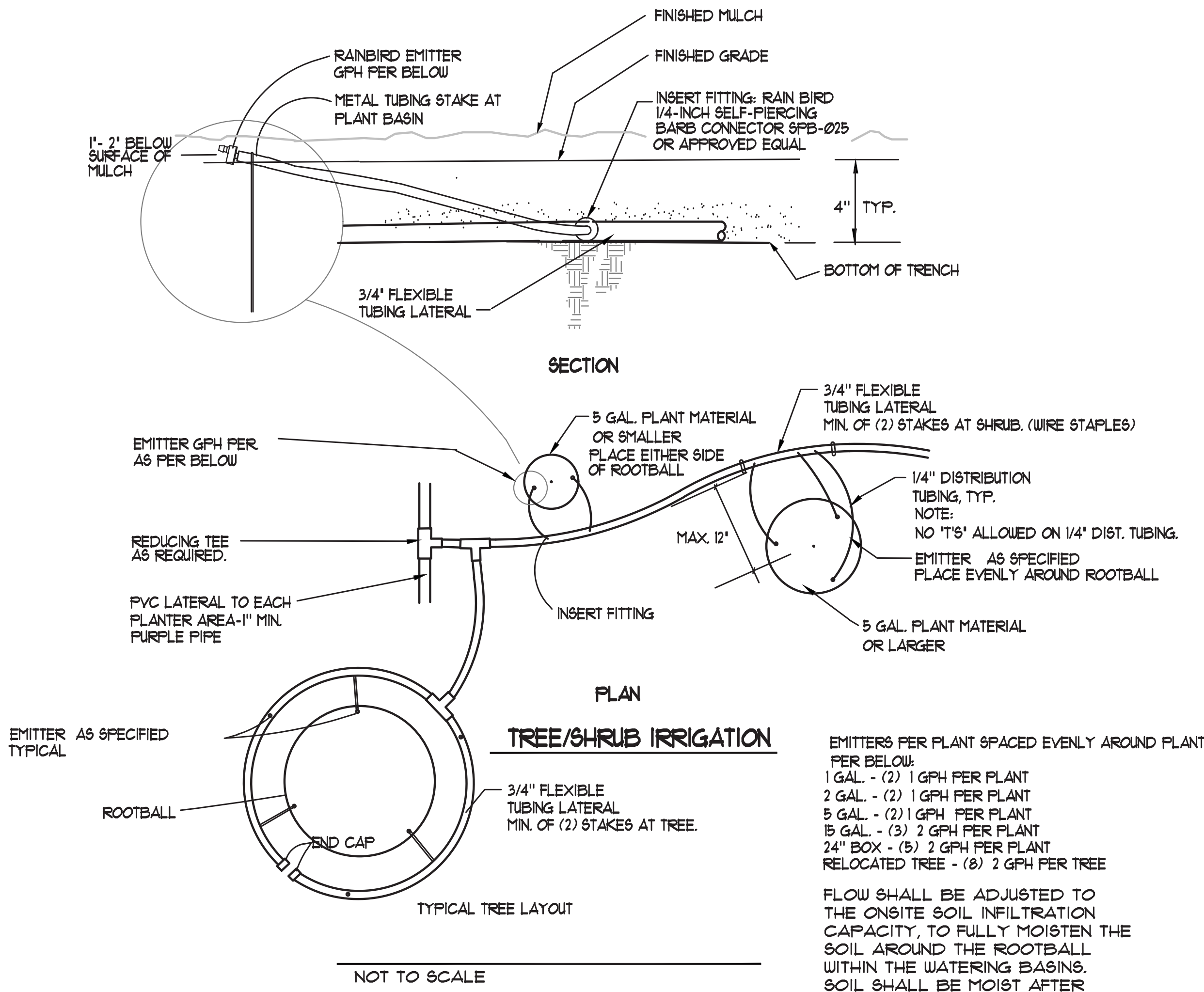


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SHEET

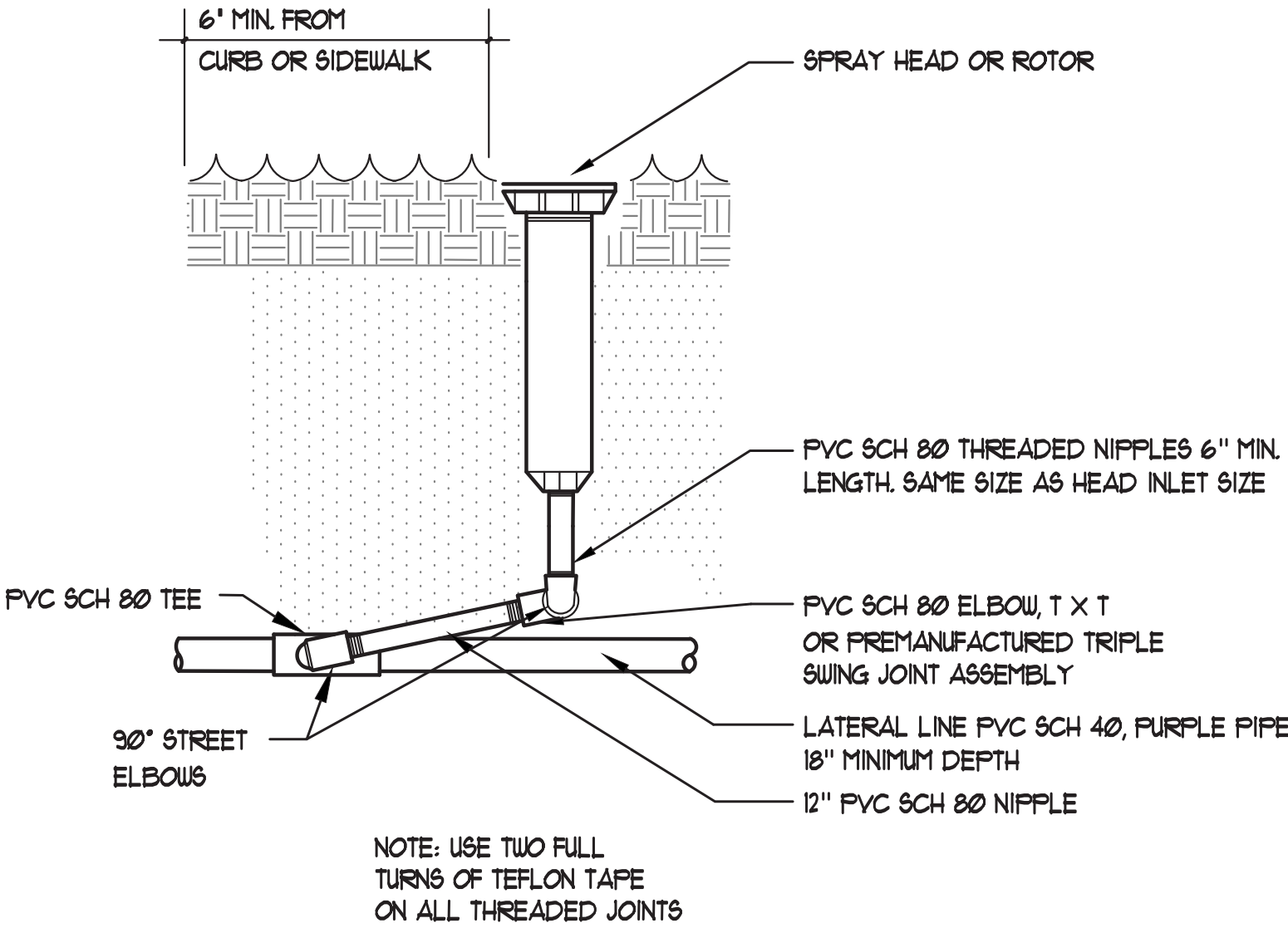
L101

GENERAL IRRIGATION NOTES

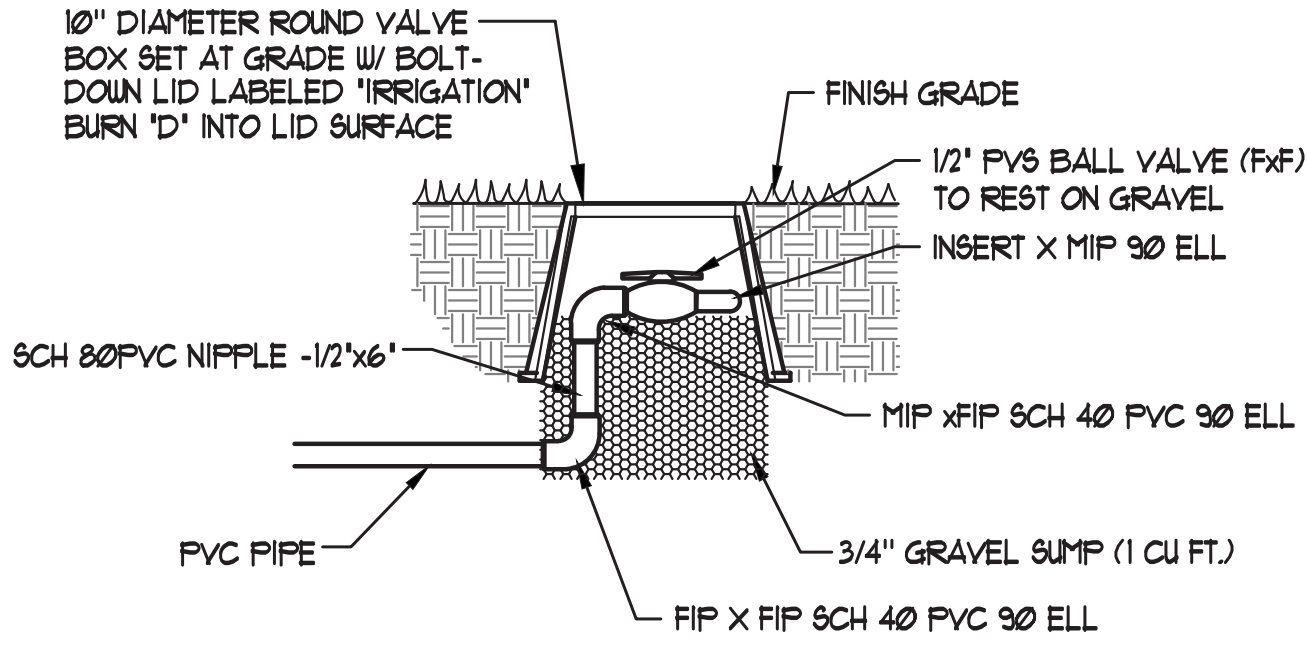
1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THESE PLANS, THE REQUIREMENTS OF THE CITY, THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS, CONSTRUCTION, LOCAL BUILDING CODES, ORDINANCES, AND OTHER CODES OR REGULATIONS THAT APPLY.
2. ALL PIPING AND WIRING UNDER PAVING SHALL BE INSTALLED IN SLEEVES. PIPING AND CONTROL WIRES UNDER PAVEMENT SHALL BE INSTALLED IN SEPARATE SLEEVES. SLEEVE SIZE SHALL BE A MINIMUM OF TWICE (2X) O.D. DIAMETER OF THE PIPE TO BE SLEEVED. CONTROLLER WIRE SLEEVES SHALL BE OF SUFFICIENT SIZE FOR THE REQUIRED NUMBER OF WIRES.
3. MAINLINE SLEEVES UNDER PAVEMENT SHALL BE INSTALLED 24" BELOW TOP PAVEMENT. THE TRENCH SHALL BE CLEANED FREE OF ALL ROCK & DEBRIS, AND BACKFILLED WITH SAND TO A MINIMUM DEPTH OF 6" OVER THE SLEEVE.
4. ALL MAIN LINES SHALL BE PRESSURE TESTED AT 150 PSI FOR A MINIMUM 2.5 HOUR PERIOD PRIOR TO BACKFILLING OF TRENCHES. IF ANY LEAKS ARE PRESENT THEY SHALL BE CORRECTED AND LINES SHALL BE RE-TESTED PRIOR TO BACKFILLING TRENCHES.
5. PIPE SIZES SHALL CONFORM TO THOSE SHOWN ON THE DRAWINGS. NO SUBSTITUTIONS OF SMALLER PIPE SIZES SHALL BE PERMITTED, BUT SUBSTITUTIONS OF LARGER SIZES MAY BE APPROVED. ALL DAMAGED AND REJECTED PIPE SHALL BE REMOVED FROM THE SITE AT THE TIME OF SAID REJECTION.
6. THE IRRIGATION CONTRACTOR SHALL FLUSH ALL LATERALS PRIOR TO INSTALLING EMITTERS AND OR TURF HEADS
7. THIS DESIGN IS DIAGRAMMATIC. ALL PIPING, VALVES, ETC., SHOWN OUTSIDE OF THE PLANTER AREAS IS FOR DESIGN CLARIFICATION ONLY AND SHALL BE INSTALLED IN THE PLANTER AREAS.
8. IT IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR TO FAMILIARIZE HIMSELF WITH ALL GRADE DIFFERENCES, LOCATION OF WALLS, RETAINING WALLS, STRUCTURES AND UTILITIES. THE IRRIGATION CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED BY HIS WORK. HE SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS, FOR THE LOCATION AND INSTALLATION OF PIPE SLEEVES AND LATERALS UNDER ROADWAYS AND PAVING.
9. SHOULD DISCREPANCIES IN THE PLANS OR FIELD MODIFICATIONS BE REQUIRED, CONTACT THE LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION FOR RESOLUTION OR CLARIFICATION.
10. DO NOT WILLFULLY INSTALL THE IRRIGATION SYSTEM AS SHOWN ON THE DRAWINGS WHEN IT IS OBVIOUS IN THE FIELD THAT UNKNOWN OBSTRUCTIONS, GRADE DIFFERENCES OR DIFFERENCES IN THE AREA DIMENSIONS EXIST THAT MIGHT NOT HAVE BEEN CONSIDERED IN THE ENGINEERING. SUCH OBSTRUCTIONS OR DIFFERENCES SHOULD BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. IN THE EVENT THIS NOTIFICATION IS NOT PERFORMED, THE IRRIGATION CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY REVISIONS NECESSARY.
11. ALL IRRIGATION EQUIPMENT NOT OTHERWISE DETAILED OR SPECIFIED SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.
12. THE CONTRACTOR SHALL AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND UTILITIES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO THE SAME.
13. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER AND/OR TELEPHONE, WATER, GAS AND SEWER FACILITIES SO AS TO SAFELY PROTECT ALL UTILITIES, PERSONNEL, AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR RECONSTRUCTED SATISFACTORY TO THE OWNER AT THE EXPENSE OF THE CONTRACTOR.
15. ALL VALVE CONTROL WIRE SHALL BE SIZED PER CONTROLLER AND VALVE MANUFACTURER'S RECOMMENDATIONS, BUT NOT TO BE LESS THAN NO. 14 AWG COPPER UL APPROVED FOR DIRECT BURIAL IN GROUND. CONNECT WIRES AS DETAILED PER MANUFACTURER'S SPECIFICATIONS. RUN ONE (1) EXTRA CONTROL WIRE OF DIFFERENT COLOR THROUGH ALL VALVE LOCATIONS FROM THE CONTROLLER. EACH WIRE AT VALVES SHALL HAVE 24" EXCESS COILED LOOP IN VALVE BOXES, TAPE WIRES TO MAINLINE EVERY FIFTEEN FEET (15').
16. ALL BACKFILL MATERIAL, OTHER THAN SAND AROUND THE MAINLINE, SHALL BE FREE OF ROCKS, CLODS AND OTHER EXTRANEOUS MATERIALS, COMPACT BACKFILL TO ORIGINAL DENSITY.
17. RECORD ALL FIELD CHANGES FOR ASBUILT TO OWNER.
18. ALL IRRIGATION INSTALLATION AND EQUIPMENT SHALL GUARANTEED FOR A PERIOD OF ONE YEAR.



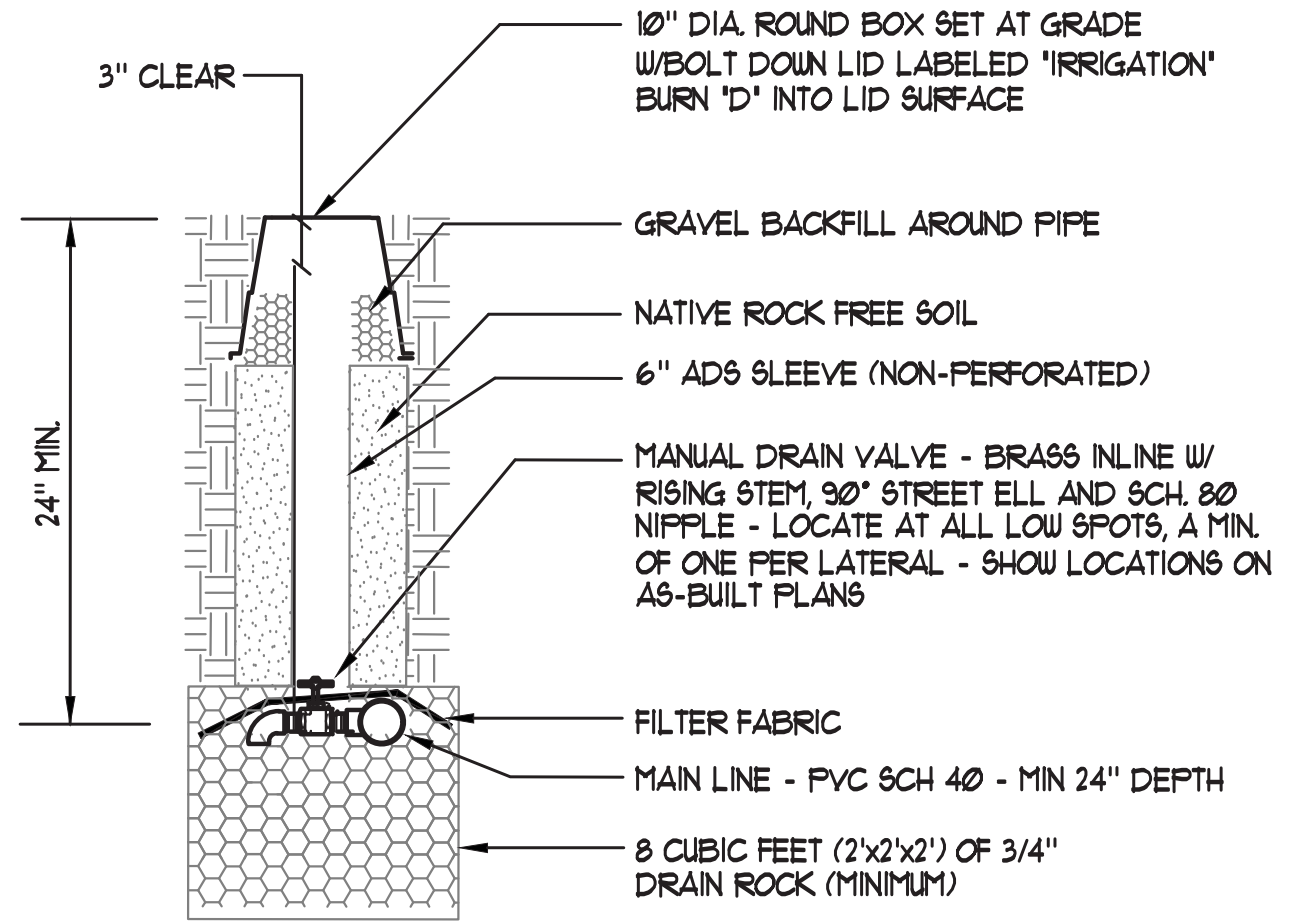
Trench Detail - Lateral or Mainline
NOT TO SCALE (WITH WIRING)



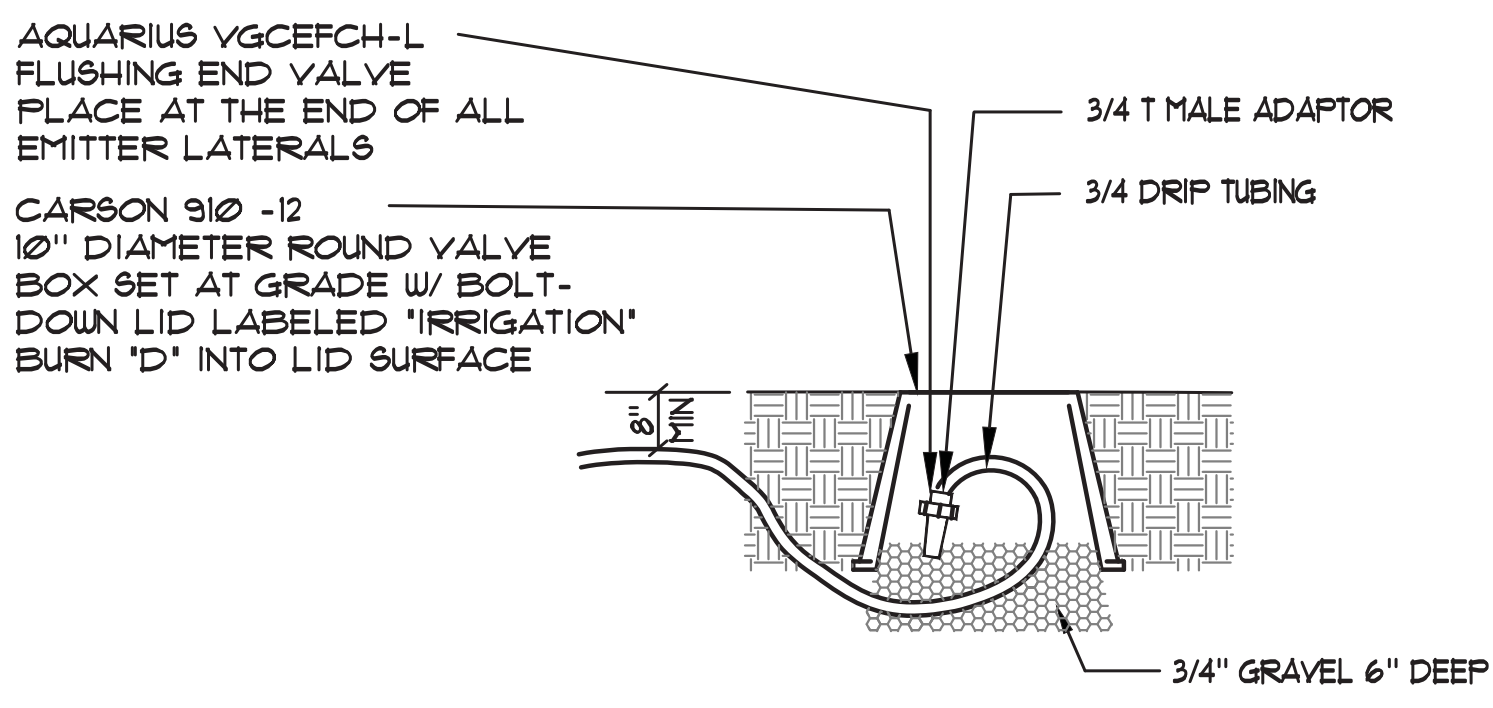
SPRAY OR ROTOR HEAD DETAIL
NOT TO SCALE



Dripline Blow-Out (Add to Relocated Drip Valve)
NOT TO SCALE



MANUAL DRAIN VALVE (LOCATE AT ALL LOW SPOTS MAINLINE)
NOT TO SCALE



FLUSHING END PLUG
NOT TO SCALE

REV.	DATE	CITY	DESCRIPTION	BY	APP'D
1	10.13.21				

DATE:	DRAWN BY:	DESIGNED BY:	CHECKED BY:

IRRIGATION PLAN
RIO WRANGLER
IMPROVEMENT PLANS

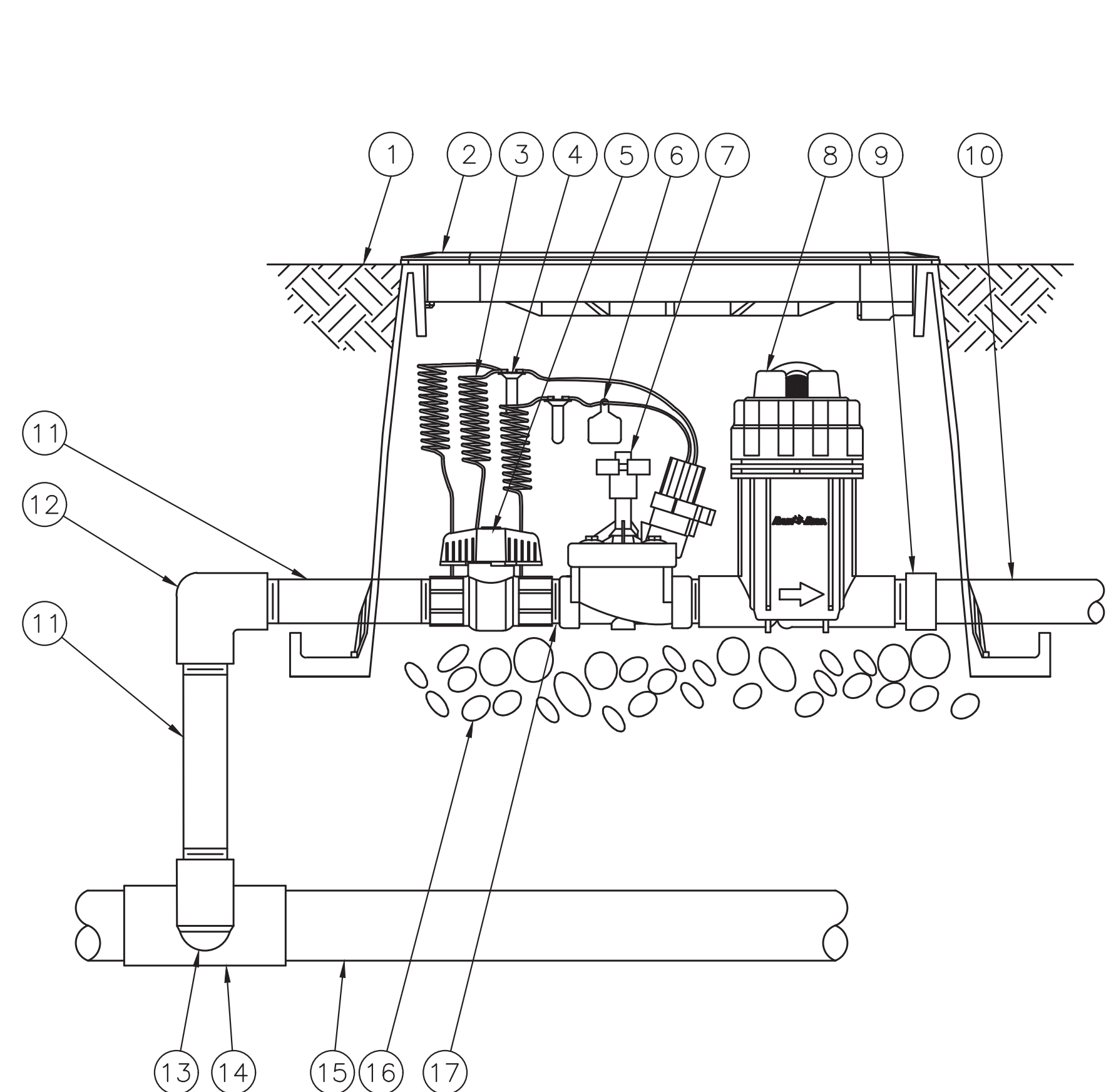
NEVADA
WASHOE COUNTY.

GreenDesign
Landscape Architects, Inc.
1464 Pringle Drive
Reno, NV
P: 775.923.1364
email: thad@thadco.com

REGISTERED LANDSCAPE ARCHITECT
385
10-15-21
Expires: June 30, 2022
STATE OF NEVADA

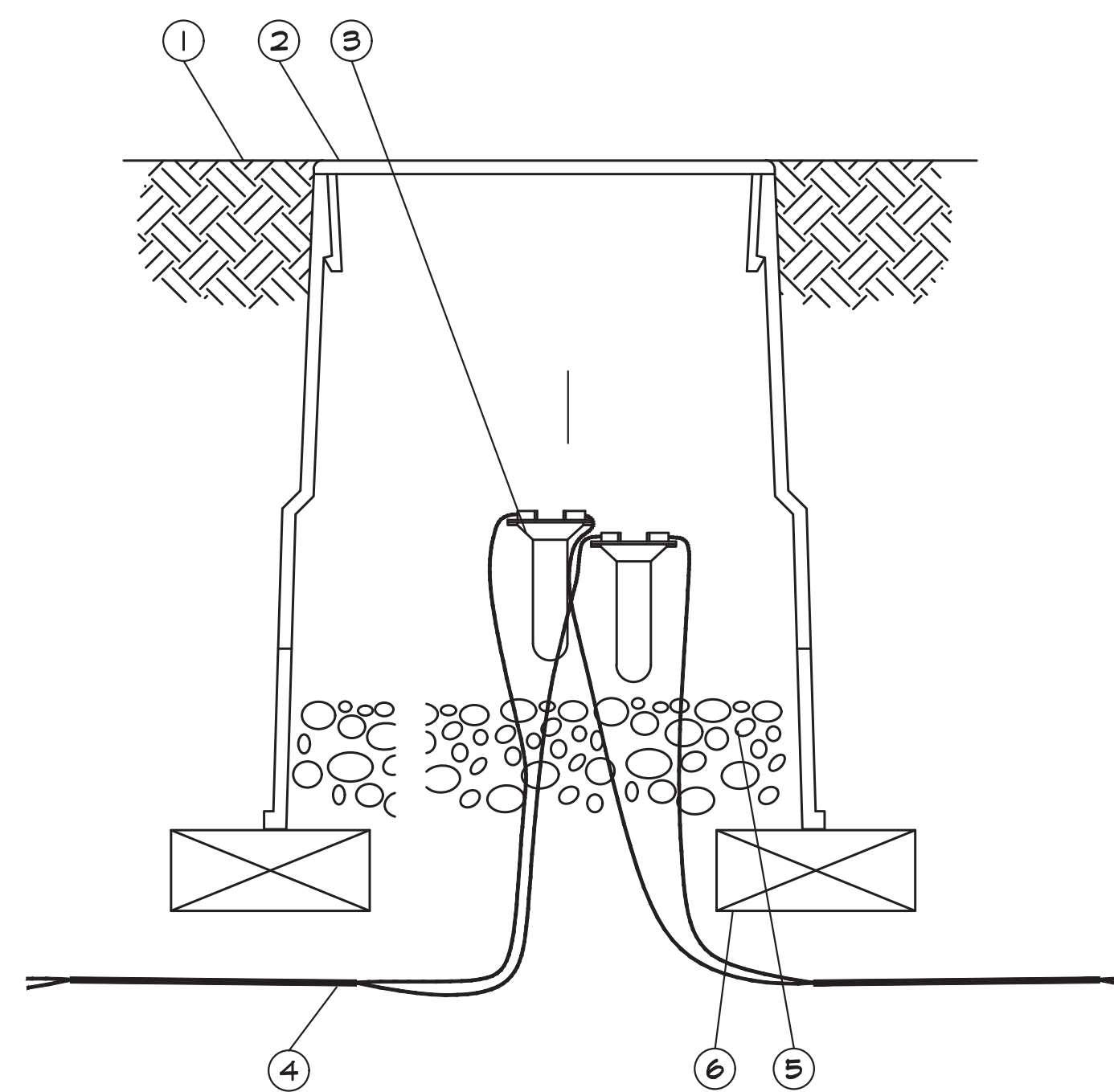
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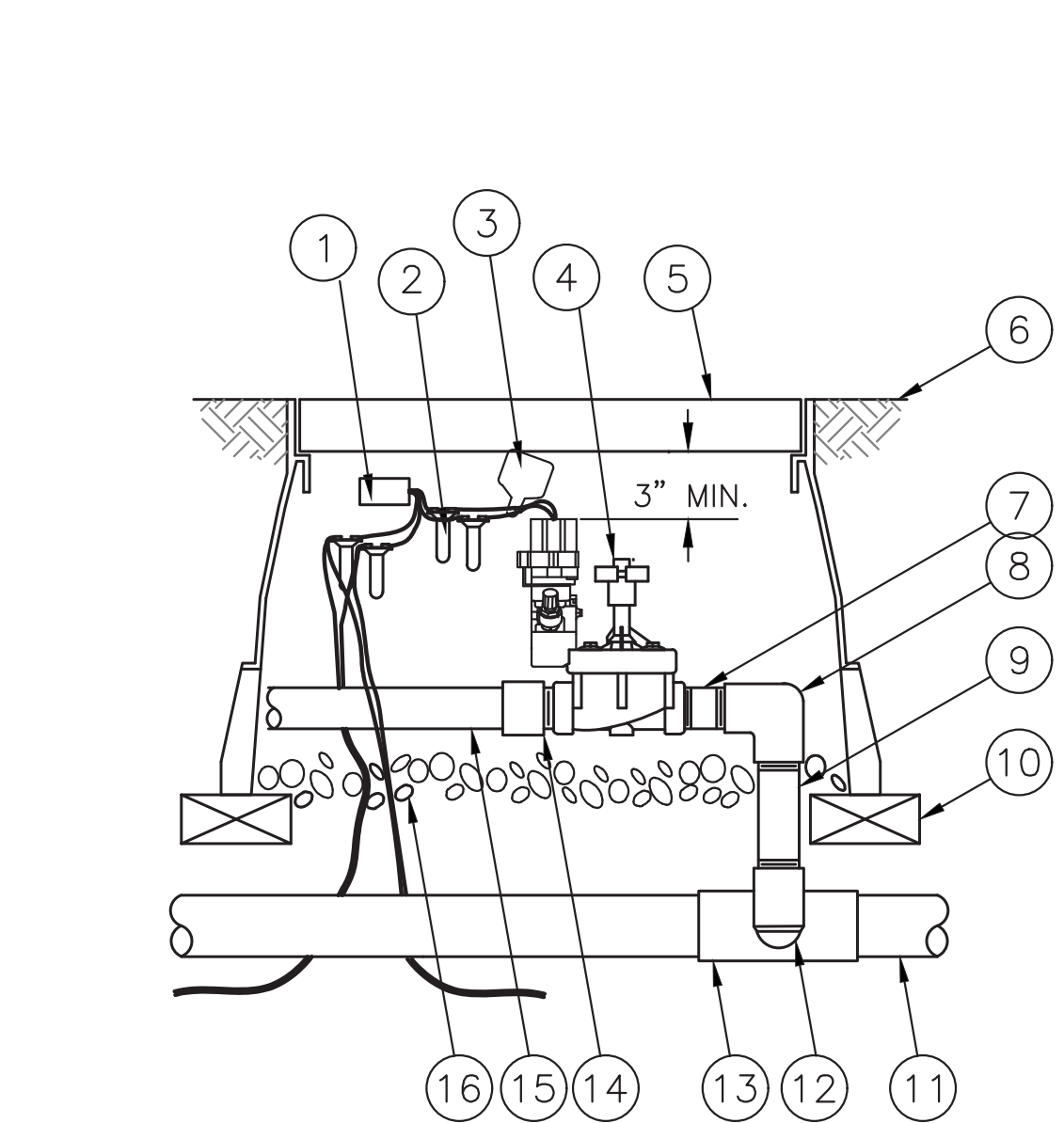
DRIP IRRIGATION VALVE DETAIL
NOT TO SCALE

- 1 FINISH GRADE/TOP OF MULCH
- 2 VALVE BOX WITH COVER: RAIN BIRD VB-STD
- 3 24-INCH LINEAR LENGTH OF WIRE, COILED
- 4 WATERPROOF CONNECTION: RAIN BIRD DB SERIES
- 5 1-INCH BALL VALVE (INCLUDED IN XCZ-FRB-100-COM KIT)
- 6 ID TAG
- 7 REMOTE CONTROL VALVE: RAIN BIRD FESB (INCLUDED IN XCZ-FRB-100-COM KIT)
- 8 PRESSURE REGULATING QUICK CHECK BASKET FILTER: RAIN BIRD FRB-QCHK-100 (INCLUDED IN XCZ-FRB-100-COM KIT)
- 9 PVC SCH 40 FEMALE ADAPTOR
- 10 LATERAL PIPE
- 11 PVC SCH 80 NIPPLE (LENGTH AS REQUIRED)
- 12 PVC SCH 40 ELL
- 13 PVC SCH 80 NIPPLE (2-INCH LENGTH, HIDDEN) AND PVC SCH 40 ELL
- 14 PVC SCH 40 TEE OR ELL
- 15 MAINLINE PIPE
- 16 4-INCH MINIMUM DEPTH OF 3/4-INCH WASHED GRAVEL
- 17 PVC SCH 80 NIPPLE, CLOSE (INCLUDED IN XCZ-FRB-100-COM KIT)



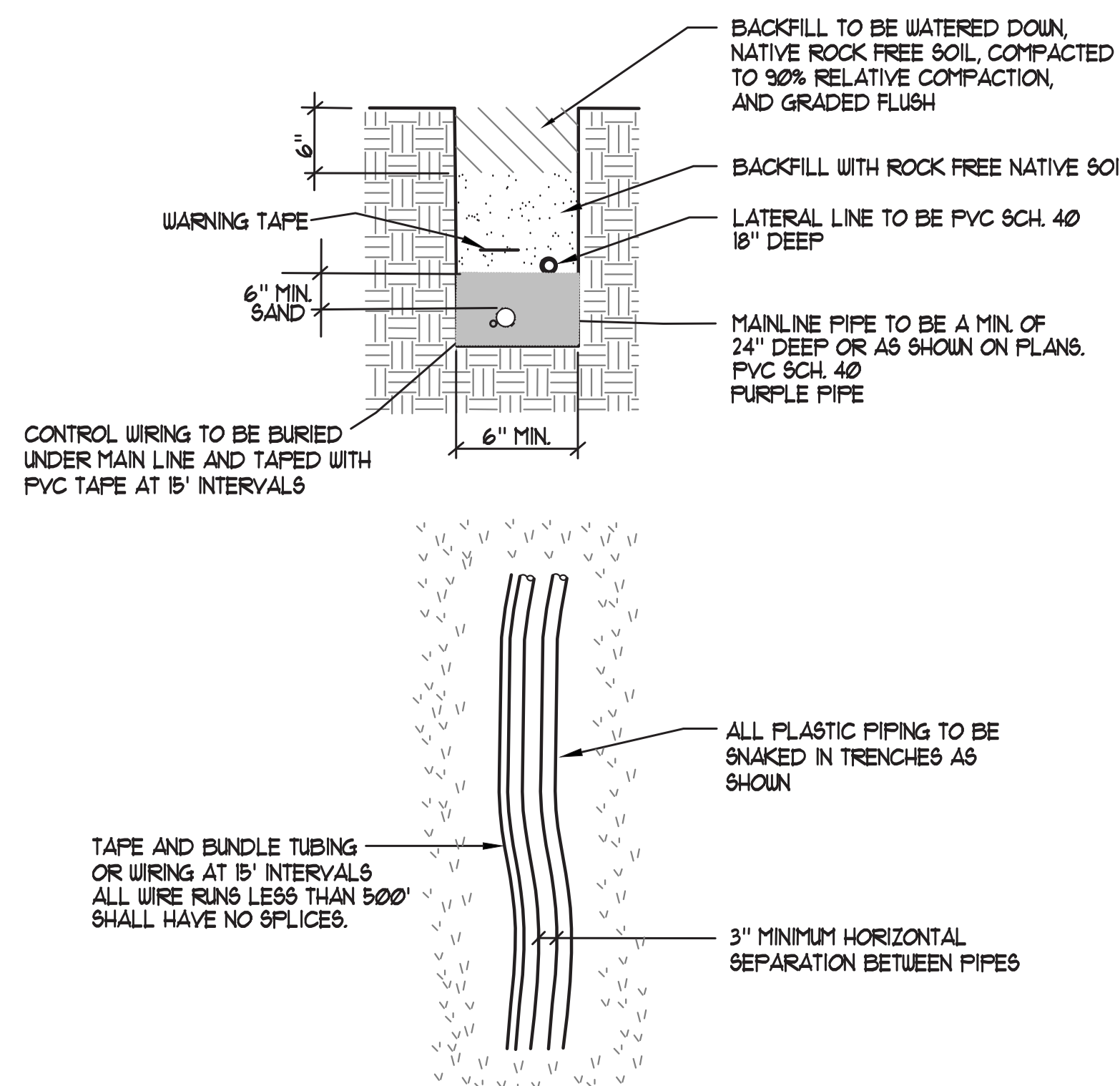
WIRE SPLICE
NOT TO SCALE

- 1 FINISH GRADE OR TOP OF MULCH
- 2 10-INCH VALVE BOX WITH COVER: RAIN BIRD VB-10RND
- 3 DB SERIES WIRE CONNECTOR: RAIN BIRD DBTWC25 (1 OF 2)
- 4 COMMUNICATION WIRE FROM VALVE(S) TO ESP-LXME CONTROLLER
- 5 4-INCH MINIMUM DEPTH OF 3/4-INCH WASHED GRAVEL
- 6 BRICK (1 OF 2)

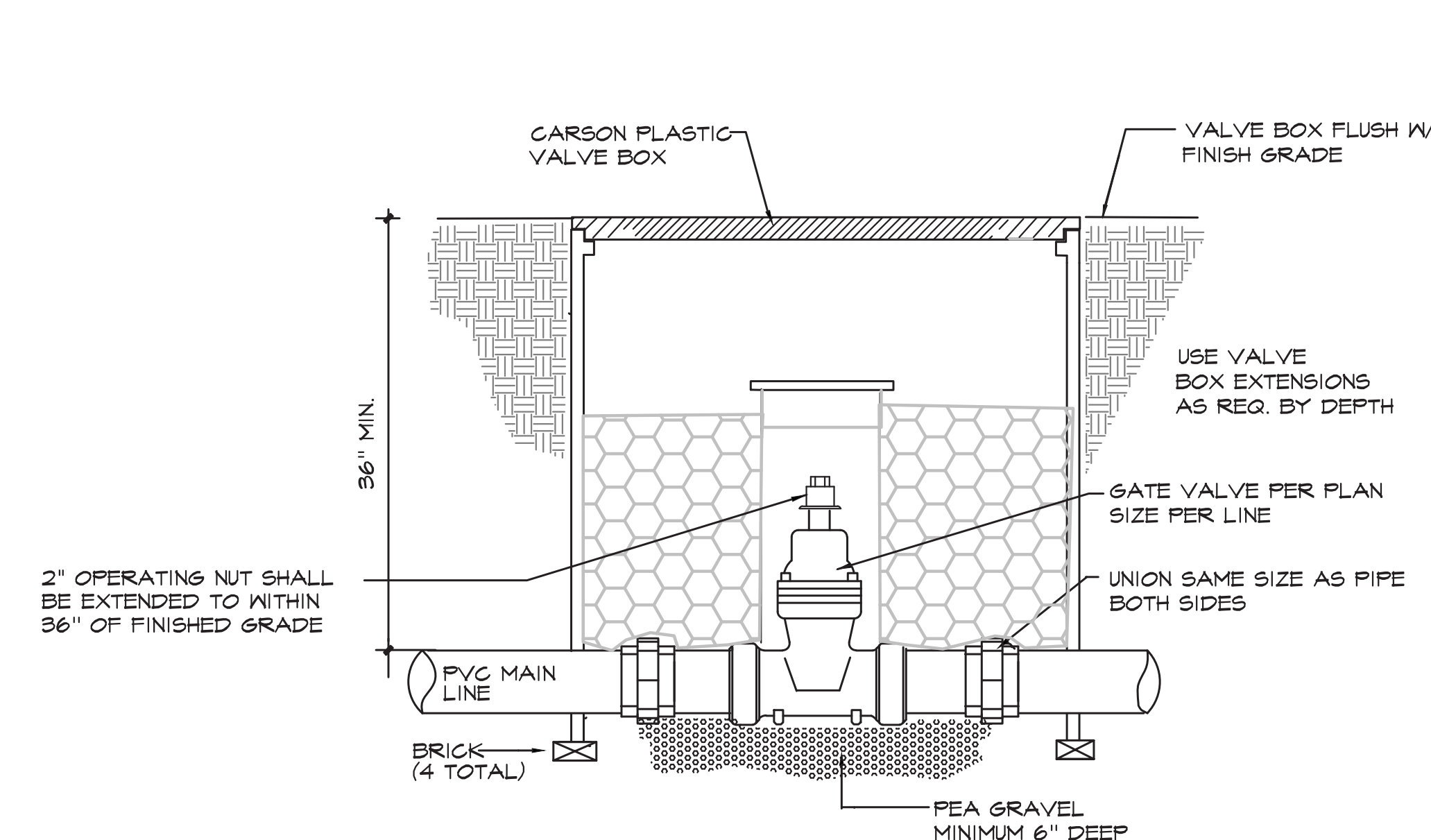


ELECTRIC CONTROL VALVE DETAIL
NOT TO SCALE

- 1 DECODER REFER TO DETAIL SHEET L33
- 2 WATERPROOF CONNECTION: RAIN BIRD SPLICE-1 (1 OF 2)
- 3 ID TAG: RAIN BIRD VID SERIES
- 4 REMOTE CONTROL VALVE: RAIN BIRD FESB-FRS-D WITH NP-HAN
- 5 VALVE BOX WITH COVER: RAIN BIRD VB-STD
- 6 FINISH GRADE/TOP OF MULCH
- 7 PVC SCH 80 NIPPLE (CLOSE)
- 8 PVC SCH 40 ELL
- 9 PVC SCH 80 NIPPLE (LENGTH AS REQUIRED)
- 10 BRICK (1 OF 4)
- 11 PVC MAINLINE PIPE
- 12 SCH 80 NIPPLE (2-INCH LENGTH, HIDDEN) AND SCH 40 ELL
- 13 PVC SCH 40 TEE OR ELL
- 14 PVC SCH 40 MALE ADAPTER
- 15 PVC LATERAL PIPE
- 16 4-INCH MINIMUM DEPTH OF 3/4-INCH WASHED GRAVEL



TRENCH DETAIL - LATERAL AND/OR MAINLINE (WITH WIRING)
NOT TO SCALE



- NOTES:
1. INSTALL GATE VALVES FOR ISOLATION OF MAIN.
 2. GATE VALVE SHALL BE CAST IRON WITH SCREW-IN BONNET, WILKINS OR EQUAL.
 3. PROVIDE 2 KEYS PER PROJECT PRIOR TO ACCEPTANCE BY THE OWNER.

Gate Valve
NOT TO SCALE

REV.	DATE	DESCRIPTION	BY	APP'D
1	10.13.21			

DATE:	DRAWN BY:	DESIGNED BY:	CHECKED BY:

IRRIGATION PLAN

RIO WRANGLER

IMPROVEMENT PLANS

WASHOE COUNTY, NEVADA

RENO.

GreenDesign

Landscape Architects, Inc.

1464 Pegasus Drive
Reno, NV
p. 775.823.1364
email: bhatch@ghdesigner.net

REGISTERED LANDSCAPE ARCHITECT

385

10-13-21

Expires: June 30, 2022

STATE OF NEVADA

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VERT. _____
JOB NO. _____
SHEET

L202



COMcheck Software Version 4.1.5.1

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2018 IECC
Project Title: Rio Wrangler Elementary School
Project Type: New Construction

Construction Site: 10600 Green Pasture Drive
Reno, NV 89521
Owner/Agent: Washoe County School District
425 East 9th St.
Reno, NV 89512
775-348-0200
Designer/Contractor: PK Electrical Inc.
681 Sierra Rose Dr
Suite B
Reno, NV 89511
775-826-9010

Additional Efficiency Package(s)

Unspecified

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft ²)	C Allowed Watts / ft ²	D Allowed Watts (B X C)
1-Interior (School/University)	88134	0.81	69768
Total Allowed Watts =			69768

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Interior (School/University)				
L1: LED Linear Pendant: Other:	1	732	26	19032
L14: LED Linear Pendant: Other:	1	29	13	377
L2: LED Downlight: Other:	1	74	16	1184
L3: LED Linear Recessed: Other:	1	68	16	1088
L4: LED 1x4 Recessed: Other:	1	44	36	1584
L5: LED Linear Recessed: Other:	1	192	25	4800
L6: LED 2x4: Other:	1	119	45	5355
L7: LED 2x4: Other:	1	12	36	432
L8: LED Strip: Other:	1	101	36	3636
L9: LED Downlight: Other:	1	29	9	261
L10: LED Linear Recessed: Other:	1	2	51	102
L11: LED Pendant: Other:	1	4	165	660
L12: LED Pendant: Other:	1	12	75	900
L13A: LED Pendant: Other:	1	6	151	906
L13: LED Pendant: Other:	1	29	43	1247
L14: LED High-Bay: Other:	1	20	130	2600
L18: LED 2x4: Other:	1	14	30	420
L20: LED Surface Mount: Other:	1	37	42	1554
L21: LED Downlight: Other:	1	8	12	96
Total Proposed Watts =			46234	

Interior Lighting PASSES: Design 34% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2018 IECC requirements in COMcheck Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Inverter: INV-1A

Location: Electrical B105M

Model: MYERS 6-IE-9-G-BD2008-ND2007-6- Z-2YW (OR APPROVED EQUAL)

Input Voltage: 277V/1PH A/C Rating: 35KAIC

Output Voltage: 277V/1PH

#	Description	Type	Tripo	Poles	Load	Notes
1	AREA 1/AAREA B	L	20 A	1	586 VA	NORMALLY OFF
2	LEVEL 1 AREA C	L	20 A	1	261 VA	NORMALLY OFF
3	LEVEL 2 AREA C	L	20 A	1	252 VA	NORMALLY OFF
4	SPARE	--	20 A	1	0 VA	NORMALLY OFF
5	AREA A CORRIDORS	L	20 A	1	1261 VA	NORMALLY ON
6	LEVEL 1 AREA B EXTERIOR	L	20 A	1	410 VA	NORMALLY ON
7	LEVEL 1 AREA C CORRIDOR	L	20 A	1	1427 VA	NORMALLY ON
8	LEVEL 1 AREA C CORRIDOR	L	20 A	1	1184 VA	NORMALLY ON
9	LEVEL 2 AREA C CORRIDORS	L	20 A	1	1478 VA	NORMALLY ON
10	LEVEL 2 AREA C CORRIDORS	L	20 A	1	1393 VA	NORMALLY ON
11	ELECTRIC ROOM	L	20 A	1	216 VA	NORMALLY OFF
12	SPARE	--	20 A	1	0 VA	NORMALLY ON
13	SPARE	--	20 A	1	0 VA	NORMALLY ON
14	SPARE	--	20 A	1	0 VA	NORMALLY OFF
15	SPARE	--	20 A	1	0 VA	NORMALLY OFF
16						
17						
18						
19						
20						
21						
22						
23						
24						
Total Load:					7881 VA	

Notes: 90 MIN BACKUP, MAINTENANCE BYPASS, AND SEISMIC MOUTING.

LIGHTING FIXTURE SCHEDULE

LIGHTING FIXTURE CATALOG NUMBERS ARE SERIES TYPE ONLY. PROVIDE TRIMS, BALLASTS, MOUNTING EQUIPMENT, FITTINGS AND LAMPS AS REQUIRED BY THE SPECIFICATIONS AND PROJECT CONDITIONS FOR A COMPLETE INSTALLATION. THIS IS NOT A STANDALONE SCHEDULE AND FIXTURES MUST INCORPORATE ALL WORK INDICATED OR IMPLIED THROUGHOUT THE DRAWINGS AND SPECIFICATIONS.

TYPE SYMBOL DESCRIPTION AND MANUFACTURER

L1		LED, LINEAR PENDANT, INDIRECT/DIRECT, 2' 5" SQUARE PROFILE, LENGTH PER PLANS, EXTRUDED ALUM. HOUSING, DIE-FORMED STEEL INTERNAL COMPONENTS, SURE-FIT ALIGNMENT SYSTEM, HIDDEN CONNECT DESIGN, DIRECT OPTICS, EDGE LIT PMMA ACRYLIC LIGHT GUIDE FOR HIGH EFFICIENCY LIGHT OUTPUT, SECONDARY ACRYLIC DIFFUSER PROVIDES MINIMAL GLARE, INDIRECT OPTICS, INJECTION MOLDED ACRYLIC LENS WITH 135 DEGREE ULTRA-WIDE BATWING DISTRIBUTION - 40UP/80 DN, DAYLIGHT SENSORS WHERE SHOWN, ADJUSTABLE AIRCRAFT CABLE 3' LONG, 0-10V DIMMING TO 1%.
13W/LF		LAMP: LED, 4000K, 1200 LUMENS/LF, 80CRI VOLTAGE: 277V MANUFACTURER: LUMATO SQ2-PLANS-H-46-27-40-T1-W-0-10V (DS) SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L1A		LED, LINEAR PENDANT, INDIRECT/DIRECT, 5' SQUARE PROFILE, LENGTH PER PLANS, EXTRUDED ALUM. HOUSING, DIE-FORMED STEEL INTERNAL COMPONENTS, SURE-FIT ALIGNMENT SYSTEM, HIDDEN CONNECT DESIGN, DIRECT OPTICS, EDGE LIT PMMA ACRYLIC LIGHT GUIDE FOR HIGH EFFICIENCY LIGHT OUTPUT, SECONDARY ACRYLIC DIFFUSER PROVIDES MINIMAL GLARE, INDIRECT OPTICS, INJECTION MOLDED ACRYLIC LENS WITH 135 DEGREE ULTRA-WIDE BATWING DISTRIBUTION - 40UP/80 DN, DAYLIGHT SENSORS WHERE SHOWN, ADJUSTABLE AIRCRAFT CABLE LENGTH AS REQ'D PER PLANS, 0-10V DIMMING TO 1%.
13W/LF		LAMP: LED, 4000K, 1200 LUMENS/LF, 80CRI VOLTAGE: 277V MANUFACTURER: LUMATO SQ5-PLANS-H-27-27-40-HC-W-SD-0-10V (DS) SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L2		LED DOWNLIGHT, 4" SQUARE APERTURE, 2" DEEP REGRESSED DIE-CAST ALUM. BEVEL, WHITE FINISH & TRIM, "ALWAYS SQUARE HOUSING" FOR ALIGNMENT, FIELD REPLACEABLE LIGHT ENGINE & DIMMING DRIVER, 0-10V DIMMING TO 1%, 70 DEGREE BEAM SPREAD.
16		LAMP: LED, 4000K, 1245 DELIVERED LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: USAI 3110-B2-S-10-LSTD4-9016-C3-40KS-C70-NC-277-DIML2-CB27 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L3		LED, LINEAR RECESSED (HARD CEILING) OVERLAP FLANGE, 3" APERTURE LENGTH PER PLANS, EXTRUDED ALUM. HOUSING WITH DIE-FORMED STEEL INTERNAL COMPONENTS, SURE FIT ALIGNMENT SYSTEM, BACK LIT EXTRUDED ACRYLIC LENS FOR HIGH EFFICIENCY LIGHT OUTPUT AND EVEN ILLUMINATION & MINIMAL GLARE, WHITE FINISH, 0-10V DIMMING TO 1%.
4W/LF		LAMP: LED, 4000K, 400 LUMENS/LF VOLTAGE: 277V MANUFACTURER: LUMATO R3-PLANS-L01-27-40-OF-W-0-10 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L4		LED, RECESSED 1X4, PATTERN #12 ACRYLIC LENS, FLANGED
L5		LAMP: LED, 4000K, 3500 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA GTL-4-F-33L-EZ1-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L6		LED, 2' LONG RECESSED LINEAR, GRID CEILING, 3" APERTURE, OTHERWISE SAME AS TYPE L3.
L7		LAMP: LED, 4000K, 2400 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LUMATO R3-2-H2-01-27-40-T1-W-0-10 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L8		LED, 2X4 RECESSED GRID, VOLUMETRIC LUMINAIRE, CENTER BASKET, 0-10V DIMMING TO 1%, WHITE FINISH
L9		LAMP: LED, 4000K, 5200 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA 2BTL4-48L-ADSMT-EZ1-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L10		LED, 2X4 RECESSED TROFFER, PATTERN #12 PRISMATIC LENS, WHITE FINISH
L11		LAMP: LED, 4000K, 4800 LUMENS VOLTAGE: 277V MANUFACTURER: LITHONIA 2GTL4-48LM-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L12		LED, LOW PROFILE 4" STRIP, FLAT DIFFUSE LENS, CHAIN HUNG, WIRE GUARD
L13		LAMP: LED, 4000K, 5000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA 2GTL4-40L-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L14		LED, 2' SURFACE MOUNTED AT 8' AFF, LINEAR STRIP LIGHT WITH ACRYLIC ROUND DIFFUSE LENS, COLD-ROLLED STEEL HOUSING, STANDARD EFFICIENCY.
L15		LAMP: LED, 4000K, 445 LUMENS/LF, 80 CRI VOLTAGE: 277V MANUFACTURER: PHILIPS GARDCO PWS 140, 450 NW-G2 2 UNV - TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L16		LED, 2X4 RECESSED TROFFER, PATTERN #12 PRISMATIC LENS, WHITE FINISH, 0-10V DIMMING TO 1%.
L17		LAMP: LED, 4000K, 4000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA 2GTL4-40L-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L18		LED, 2' SURFACE MOUNTED AT 8' AFF, LINEAR STRIP LIGHT WITH ACRYLIC ROUND DIFFUSE LENS, COLD-ROLLED STEEL HOUSING, STANDARD EFFICIENCY.
L19		LAMP: LED, 4000K, 5000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA CLX-L48-5000LM-SEF-FDL-MVOLT-EZ1-40K-80CRI-WH-HC36-WGLX48WH SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L20		SAME AS L2 EXCEPT LUMEN PACKAGE AND 40 DEGREE BEAM SPREAD.
L21		LAMP: LED, 4000K, 715 DELIVERED LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: USAI 3110-B2-S-10-LSTD4-9009-C3-40KS-C4- NC277-DIML2-GB27 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L22		LED, LINEAR RECESSED (HARD CEILING) OVERLAP FLANGE, 3" APERTURE 4" LENGTH SECTION, EXTRUDED ALUM. HOUSING WITH DIE-FORMED STEEL INTERNAL COMPONENTS, SURE FIT ALIGNMENT SYSTEM, BACK LIT EXTRUDED ACRYLIC LENS FOR HIGH EFFICIENCY LIGHT OUTPUT AND EVEN ILLUMINATION & MINIMAL GLARE, WHITE FINISH, 0-10V DIMMING TO 1%.
L23		LAMP: LED, 4000K, 1200 LUMENS/LF, 80 CRI VOLTAGE: 277V MANUFACTURER: LUMATO R3-4-H2-01-27-40-OF-W-0-10 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L24		LED PENDANT MOUNT LUMINOUS DRUM, 48" DIAMETER, 7.5" DRUM HEIGHT, WHITE FINISH, ANSI BINNING STANDARDS, MATTE OPAL DIFFUSER, 0-10V DIMMING TO 1%.
L25		LAMP: LED, 4000K, 13,018 DELIVERED LUMENS VOLTAGE: 277V MANUFACTURER: SPI AP11863 1165W PT02 120-277V 4000K H07.5 FB00 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL

LIGHTING SYSTEM FOOTCANDLE LEVELS ARE BASED ON THE UTILIZATION OF STANDARD REFLECTANCES OF 80-90-20 (CEILING-WALL-FLOOR, PER I.E.S. (ILLUMINATED ENGINEERING SOCIETY). THE ROOM SURFACES ARE USED AS AN INTEGRAL COMPONENT OF THE LIGHTING SYSTEMS. THE REFLECTANCE OF THE SURFACE PAINT COLOR, MATERIAL, AND OTHER ROOM SURFACES DIRECTLY AFFECTS THE DELIVERY OF LIGHT TO THE WORK PLANE. A SIGNIFICANT DROP IN OVERALL LIGHTING LEVELS WILL OCCUR IF REFLECTANCES ARE LOWERED. THE ARCHITECT/OWNER SHALL NOTIFY THE ENGINEER IMMEDIATELY IF FINISHES DO NOT FALL IN LINE WITH THE REFLECTANCES MENTIONED ABOVE.

TYPE SYMBOL DESCRIPTION AND MANUFACTURER

L12		LED PENDANT MOUNT LUMINOUS RING, 48" DIAMETER, 5" RING WIDTH WITH 5" RING HEIGHT, WHITE FINISH, MATTE OPAL DIFFUSER, 0-10V DIMMING TO 1%.
75		LAMP: LED, 4000K, 7.701 DELIVERED LUMENS VOLTAGE: 277V MANUFACTURER: SPI AP11848 L75W PT02 120-277V 4000K H05 FB00 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
L12A		LAMP: LED, 4000K, 15,403 DELIVERED LUMENS VOLTAGE: 277V MANUFACTURER: SPI AP11848 L151W PT02 120-277V 4000K H05 FB00 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
151		10" CYLINDER PENDANT DOWNLIGHT, HEAVY GAUGE ALUM. HOUSING, 10.5" HEIGHT, 6" APERTURE WITH CLEAR MATTE DIFFUSE TRIM & FINISH, 60 DEGREE BEAM, 0-10V DIMMING DRIVER, RIGID PENDANT MOUNT, MATTE WHITE FINISH, WITH 3/8" STEM AND CANOPY FOR 5 DEGREE HANG STRAIGHT SWIVEL - LENGTH AS REQUIRED PER PLANS
L13		LAMP: LED, 4000K, 5000 LUMENS VOLTAGE: 120/277 MANUFACTURER: GOTHAM ICO CYL 6050 6AR LD 60D MVOLT EZ10 PM DWHG CYS SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
43		LED HIGH-BAY, WIDE DISTRIBUTION WITH 11" HIGH FROSTED PRISMATIC ACRYLIC REFLECTOR AND DROP LENS WITH CLAMP BAND, POWDER COAT FINISH 0-10V DIMMING.
L14		LAMP: LED, 4000K, 14900 LUMENS VOLTAGE: 277 MANUFACTURER: RAB HAYBAY 130ND10/E2 REFLECTOR: R16PF + DL16 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
130		LED DOWNLIGHT, 4" SQUARE APERTURE, SELF-FLANGED, WET LOCATION LISTED, WHITE FINISH AND TRIM, ALWAYS SQUARE HOUSING FOR ALIGNMENT, 60 DEGREE BEAM SPREAD.
L15		LAMP: LED, 4000K, 515 LUMENS VOLTAGE: 277 MANUFACTURER: LIGHTOLIER AS-4 UNV-P4S-DL-05-840-CC-Z10-U SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
7		LED, WALL SCONCE WITH COMFORT LENS AND TYPE 2 DISTRIBUTION - BUG RATING B1-U0-G1, VERIFY FINISH PRIOR TO ORDERING, 10' AFF MOUNTING HEIGHT.
L16		LAMP: LED, 4000K, 2448 DELIVERED LUMENS VOLTAGE: 277 MANUFACTURER: PHILIPS GARDCO PWS 140, 450 NW-G2 2 UNV - TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
22		SAME AS L16 EXCEPT WITH INTEGRAL MOTION SENSOR AND PHOTOCCELL.
L16A		LAMP: LED, 4000K, 2448 DELIVERED LUMENS VOLTAGE: 277 MANUFACTURER: PHILIPS GARDCO PWS 140, 450 NW-G2 2 UNV MMRI PCB - TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
22		LED, 4" DIRECT RECESSED LINEAR FIXTURE WITH FLUSH FLANGE, IP65 WET LOCATION LISTED, UV STABILIZED GASKETED LENS, RECESSED MOUNTED IN METAL PAN OVERHANG WITH SURFACE FLANGE, 1779 DELIVERED LUMENS, 4000K COLOR TEMP, 80CRI.
L17		LAMP: LED, 4000K, 445 LUMENS/LF, 80 CRI VOLTAGE: 277V MANUFACTURER: FINELITE HP-4-WL-R-8-940-F-277V-SC-VF SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
18.4		LED, 2X4 RECESSED TROFFER, PATTERN #12 PRISMATIC LENS, WHITE FINISH, 0-10V DIMMING TO 1%.
L18		LAMP: LED, 4000K, 4000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA 2GTL4-40L-LP840 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
30		LED, 2' SURFACE MOUNTED AT 8' AFF, LINEAR STRIP LIGHT WITH ACRYLIC ROUND DIFFUSE LENS, COLD-ROLLED STEEL HOUSING, STANDARD EFFICIENCY.
L20		LAMP: LED, 4000K, 5000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA CLX-L24-5000LM-SEF-FDL-MVOLT-40K-80CRI SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
42		LED DOWNLIGHT, 4" SQUARE APERTURE, 1" DEEP REGRESSED DIE-CAST ALUM. BEVEL, WHITE FINISH & TRIM, "ALWAYS SQUARE HOUSING" FOR ALIGNMENT, FIELD REPLACEABLE LIGHT ENGINE & DIMMING DRIVER, 0-10V DIMMING TO 1%, 90 DEGREE BEAM SPREAD.
L21		LAMP: LED, 4000K, 1125 DELIVERED LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: USAI 3110-B1-S-10-LSTD4-9012-C3-40KS-90-FT-C70-NC277-DIML2-GB27 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
12		LED, EMERGENCY BATTERY BACKUP EXIT FIXTURE, SINGLE FACE WITH GREEN LETTERS, DIE CAST ALUMINUM HOUSING, MATTE BLACK & BRUSHED ALUMINUM FINISH, UNIVERSAL MOUNT AND ARROWS.
X1		LAMP: LED VOLTAGE: 277 MANUFACTURER: LITHONIA LOC 1 G ELN SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
1		SAME AS TYPE X1 EXCEPT DOUBLE FACE.
X2		LAMP: LED VOLTAGE: 277 MANUFACTURER: LITHONIA LOC 2 G ELN SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
1		

SUBSTITUTION DEFINITIONS
● OR EQUAL = EQUAL OR SUPERIOR TO SPECIFIED IN ALL RESPECTS WILL BE ALLOWED. ENGINEER'S PRE-BID APPROVAL IS NOT REQUIRED. PROPOSED EQUAL FIXTURES ARE SUBJECT TO REVIEW DURING THE STANDARD SUBMITTAL PROCESS.

● NO EQUAL = PROVIDE SPECIFIED FIXTURE. SUBSTITUTIONS ARE NOT ALLOWED.

● SUBJECT TO REVIEW = EQUAL OR SUPERIOR TO SPECIFIED IN ALL RESPECTS MAY BE ALLOWED ONLY WITH ENGINEER'S APPROVAL. ALL SUBSTITUTIONS MUST BE SUBMITTED AS REQUIRED BY SPECIFICATIONS AND ACCOMPANIED WITH POINT BY POINT LIGHTING CALCULATIONS. DETERMINATION OF EQUAL IS ENGINEER'S SOLE DISCRETION. PRE-BID REVIEWS ARE NOT A SUBMITTAL REVIEW. SUBMITTALS SHALL INCLUDE THESE PROVISIONS.

TYPE SYMBOL DESCRIPTION AND MANUFACTURER

X3		LAMP: LED, 4000K, 925 DELIVERED LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: USAI 3110-B1-S-10-LSTD4-9009-C3-40KS-90-NC277-DIML2-G327 SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
9		LED THERMOPLASTIC EMERGENCY "BUG-EYE" WITH 90-MINUTE BATTERY AND SELF DIAGNOSTICS, WHITE FINISH.
X4		LAMP: LED VOLTAGE: 277V MANUFACTURER: LITHONIA ELM LED SD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
2		LED, LOW PROFILE 4" STRIP, SNAP ON FROSTED DIFFUSER, SURFACE MOUNT TIGHT TO CEILING OR RAFTER, EMERGENCY INVERTED CIRCUIT.
X5		LAMP: LED, 4000K, 5000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA CLX-L48-5000LM-SE-FDL-MVOLT-EZ1-40K-80CRI-WH SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
35		LED, 4" UTILITY FIXTURE, IMPACT RESISTANT POLYCARBONATE HOUSING, FROSTED IMPACT RESISTANT LENS, SURFACE MOUNT TIGHT TO WALL OR CEILING, WET LOCATION LISTED.
X6		LAMP: LED, 4000K, 4000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA VAP-4000LM-FST-MD-277-G210-40K-80CRI SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
34		SAME AS X6, EXCEPT CEILING MOUNTED.
X7		LAMP: LED, 4000K, 4000 LUMENS, 80 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA VAP-4000LM-FST-MD-277-G210-40K-80CRI SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
34		LED, SINGLE HEAD POLE MOUNTED AREA LIGHT, FORWARD THROW MEDIUM OPTICS, PROVIDE WITH BI-LEVEL/MOTION/AMBIENT SENSOR, CONFIRM COLOR BEFORE ORDERING. PROVIDE ON 15'-6" SQ. STEEL POLE WITH VIBRATION DAMPENERS.
S1		LAMP: LED, 4000K, 12575 LUMENS, 70 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA DSX1 LED P3 40K TFM MVOLT SPA PIRH1FC3V TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
102		LED, SINGLE HEAD POLE MOUNTED AREA LIGHT, TYPE 5 WIDE OPTICS, PROVIDE WITH BI-LEVEL/MOTION/AMBIENT SENSOR, CONFIRM COLOR BEFORE ORDERING. PROVIDE ON 15'-6" SQ. STEEL POLE WITH VIBRATION DAMPENERS.
S2		LAMP: LED, 4000K, 12870 LUMENS, 70 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA DSX1 LED P3 40K T5W MVOLT SPA PIRH1FC3V TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
102		LED, SINGLE HEAD POLE MOUNTED AREA LIGHT, BACKLIGHT CONTROL OPTICS, PROVIDE WITH BI-LEVEL/MOTION/AMBIENT SENSOR, CONFIRM COLOR BEFORE ORDERING. PROVIDE ON 15'-6" SQ. STEEL POLE WITH VIBRATION DAMPENERS.
S3		LAMP: LED, 4000K, 14944 LUMENS, 70 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA DSX1 LED P1 40K BLC MVOLT SPA PIRH1FC3V TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
38		LED, SINGLE HEAD POLE MOUNTED AREA LIGHT, TYPE 5 WIDE OPTICS, PROVIDE WITH BI-LEVEL/MOTION/AMBIENT SENSOR, CONFIRM COLOR BEFORE ORDERING. PROVIDE ON 15'-6" SQ. STEEL POLE WITH VIBRATION DAMPENERS.
S4		LAMP: LED, 4000K, 13056 LUMENS, 70 CRI VOLTAGE: 277V MANUFACTURER: LITHONIA DSX1 LED P3 40K T5W MVOLT SPA PIRH1FC3V TBD SUBSTITUTIONS: <input type="radio"/> OR EQUAL <input checked="" type="radio"/> SUBJECT TO REVIEW <input type="radio"/> NO EQUAL
125		LED, SINGLE HEAD POLE MOUNTED AREA LIGHT, TYPE 5 MEDIUM OPTICS WITH HOUSESIDE SHIELD, PROVIDE WITH BI-LEVEL/MOTION/AMBIENT SENSOR, CONFIRM COLOR BEFORE ORDERING. PROVIDE ON 15'-6" SQ. STEEL POLE WITH VIBRATION DAMPENERS.
S5		LAMP: LED, 4000K, 9236 LUMENS, 70 CRI VOLTAGE: 27

1. PANELBOARD AND BREAKER INTERRUPTING CAPACITIES (AIC) SHALL BE FULLY RATED AS AN ASSEMBLY. SERIES RATING OF BREAKER DEVICES AND EQUIPMENT IS NOT PERMITTED.
2. ALL CONDUCTOR SIZES ARE BASED ON COPPER. ALUMINUM IS NOT PERMITTED.
3. INSTALL NVE TRANSFORMER PAD, CONDUIT, ETC. PER UTILITY REQUIREMENTS. SEE UTILITY DRAWINGS FOR ALL WORK REQUIRED. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK, INCLUDING THAT REQUIRED BY CONTRACTOR IN BID. COORDINATE WITH NVE.
4. ALL SWITCHBOARDS AND DISTRIBUTION BOARDS SHALL BE FULLY BUSSED.
5. ALL CONTRACTOR PROVIDED EQUIPMENT SHALL COMPLY WITH NV ENERGY SPECIFICATIONS AND REQUIREMENTS.
6. DO NOT SPLICE FEEDER CONDUCTORS UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE ENGINEER.
7. INDIVIDUAL AIC RATINGS OF BREAKERS SHALL MATCH THE AIC RATING OF THE SWITCHGEAR OR PANELBOARD IN WHICH THEY ARE LOCATED.

P25 CONNECT SHUNT TRIP STATION ON EXTERIOR OF MECHANICAL B131M TO MAIN CIRCUIT BREAKER OF PANEL
P26 30A/3P ENCLOSED SHUNT TRIP CIRCUIT BREAKER, NEMA 1 CONSTRUCTION, 600V RATED, PROVIDE WITH
DISCONNECT POSTION ON CONTACTS. COORDINATE WITH ELEVATOR CONTRACTOR, SEE FLOOR PLANS FOR
LOCATION. SEE ONLINE DIAGRAM FOR CONDUIT AND WIRING REQUIREMENTS.

P58 PROVIDE SPD INTEGRAL TO SWITCHBOARD WITH DISCONNECT SWITCH OR BREAKER. MATCH TYPE PROVIDED
IN SERVICE ENTRANCE SWBD.

P75 15KV/4.80KV-208Y/120V TRANSFORMER AND INTEGRAL PANELBOARD, SQUARE D MINI POWER ZONE
TRANSFORMER, 600V/120V RATIO, 400 AMP, 480V/208V/120V, 3PH/4W/3GND, 15KV/4.80KV TRANSFORMER.

P75 15KVA 480V-208Y/120V TRANSFORMER AND INTEGRAL PANELBOARD, SQUARE D MINI POWER ZONE

#MPZB15T2F OR EQUAL. PROVIDE GROUNDING PER NEC 250 AT TRANSFORMER.

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P78 THE GFPE DEVICE MUST BE FIELD TESTED PRIOR TO BEING PUT INTO SERVICE, AS REQUIRED BY NEC 230.95(C). SUCH TESTING MUST BE PERFORMED BY AN AGENCY THAT IS APPROVED BY THE BUILDING



FEEDER	AMPERE	WIRE (CU)	BOND (CU)	CONDUIT
154	15	(2) 12	12	1/2"
204	20	(4) 12	12	1/2"
304	30	(4) 10	10	1/2"
404	40	(4) 8	10	3/4"
504	50	(4) 6	10	1"
604	60	(4) 4	8	1 1/4"
704	70	(4) 4	8	1 1/4"
804	80	(4) 3	8	1 1/4"
1004	100	(4) 2	6	1 1/2"
1254	125	(4) 1	6	1 1/2"
1504	150	(4) 1/0	6	2"
1754	175	(4) 2/0	6	2"
2004	200	(4) 3/0	6	2"
2254	225	(4) 4/0	4	2 1/2"
2504	250	(4) 250K	4	2 1/2"
3004	300	(4) 350K	3	3"
3504	350	(4) 400K	3	3"
4004	400	(4) 500K	3	4"
5004	500	(8) 250K	(2) 1	(2) 1 1/2"
6004	600	(8) 350K	(2) 1/0	(2) 3"
8004	800	(8) 500K	(2) 1/0	(2) 4"
10004	1000	(12) 400K	(3) 2/0	(3) 3"
12004	1200	(12) 600K	(3) 3/0	(3) 4"
16004	1600	(16) 600K	(4) 4/0	(4) 4"
20004	2000	(20) 600K	(5) 250K	(5) 4"



10600 Green Pasture Drive
Reno, Nevada 89521

October 13, 2021
H+K Project No: 2001

E004



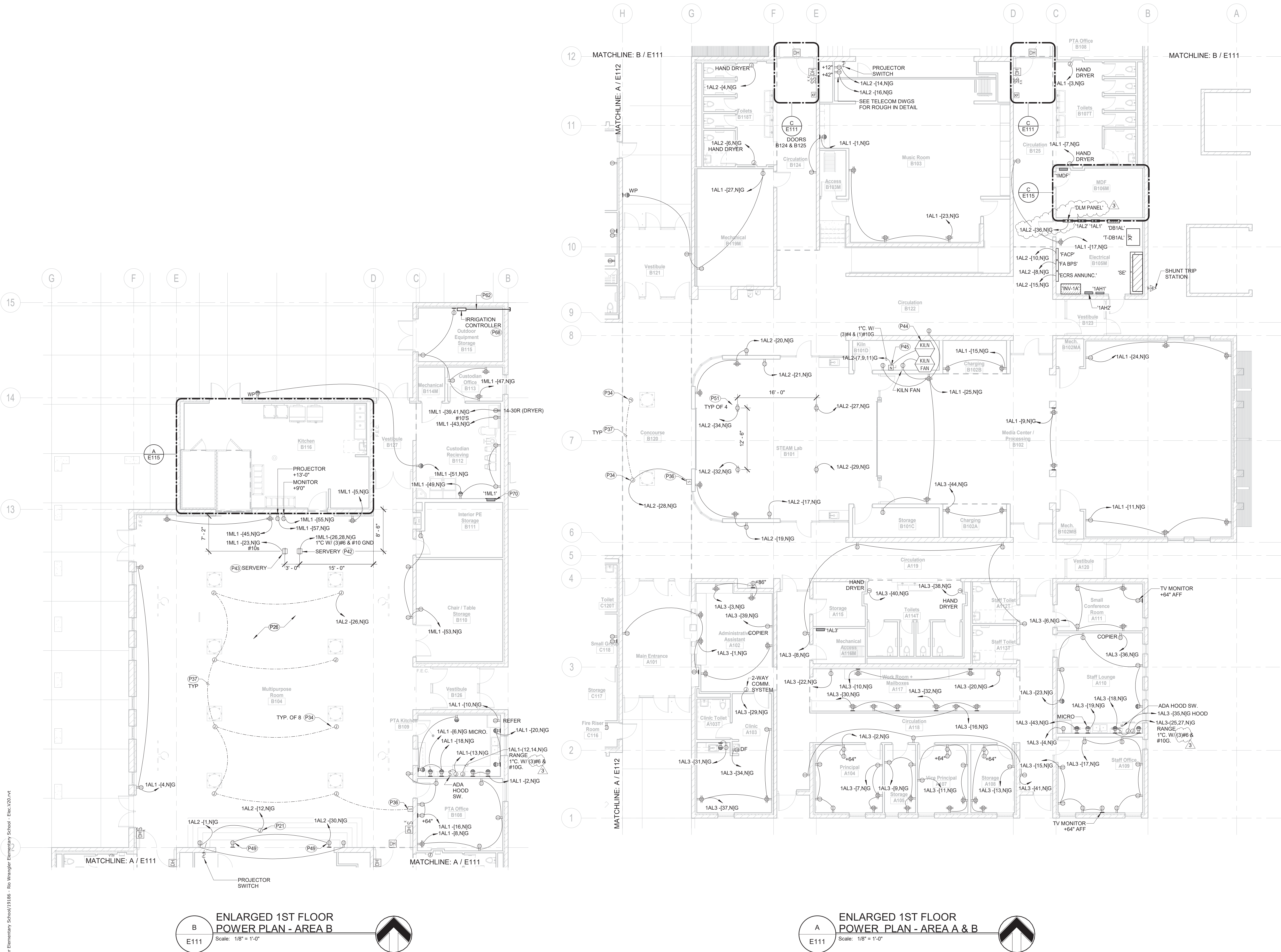
Panel: 2CH1							Location: Electrical C239M						
Type	Description	Trip	Poles	#	A	B	C	#	Poles	Trip	Description	Type	
L	LEVEL 2 AREA C	20	1	1	3312	0		2	--	--	SPACE	--	
L	LEVEL 2 AREA C	20	1	3		2244	0		4	--	--	SPACE	
--	SPARE	20	1	5			0	0	6	--	--	SPACE	
--	SPARE	20	1	7	0	0			8	--	--	SPACE	
--	SPARE	20	1	9		0	0		10	--	--	SPACE	
--	SPARE	20	1	11				0	12	--	--	SPACE	
--	SPARE	20	1	13	0	0			14	--	--	SPACE	
--	SPARE	20	1	15		0	0		16	--	--	SPACE	
--	SPARE	20	1	17				0	18	--	--	SPACE	
--	SPARE	20	1	19	0	0			20	--	--	SPACE	
--	SPARE	20	1	21		0	0		22	--	--	SPACE	
--	SPARE	20	1	23				0	24	--	--	SPACE	
Total Load:					3312 VA	2244 VA	0 VA						
Total Amps:					13 A	9 A	0 A						
Load Classification	NEC Reference	Connected Load	Demand Factor	Est. Demand	Load Totals								
L Lighting	NEC 220.42	5516 VA	100.00%	5516 VA	Total Connected Load: 5516 VA								
R Receptacle	NEC 220.44				Total Demand Load: 5516 VA								
E Equipment					480/277 Wye System Current								
M Motor	NEC 430.24				Connected Amps: 7 A								
K Kitchen	NEC 220.56				Demand Amps: 7 A								
H Heating	NEC 220.51												
Copper Bus Size	125	Ground	Standard <th>Notes:</th> <td colspan="8"></td>	Notes:									
Voltage	480/277 Wye	Mounting	Surface										
Phase	3	Enclosure	NEMA 1										
Wire	4	# of 1-Pole Circuits	24										
Lugs	MLO	Neutral	100.00%										
Breaker AIC Rating	25,000	Feeder OCPD Size	125										

Panel: 2MH2										Location: Mech. B201M									
Type	Description		Trip	Poles	#	A	B	C	#	Poles	Trip	Description	Type						
M	RM	B201 HP-8	20	3	3	1745	3269		2										
					5		1745	3269	4	3	20	RM B201 HP-7	M						
					7	5152	2798		6										
M	RM	B201 HP-4	25	3	9		5152	2798	8	3	20	RM B201 HP-9	M						
					11			5152	2798	10									
					13	1551	1551		12										
M	RM	B201 HP-56	20	3	15		1551	1551	14										
					17			1551	1551	16	3	20	RM B201 HP-10	M					
					19	5152	0		18										
M	RM	B201 HP-3	25	3	21		5152	0	20	3	20	SPARE	--						
					23			5152	0	22									
					25	2799	0		24										
M	RM	B201 HP-5	20	3	27		2799	0	26	1	20	SPARE	--						
					29			2799	0	28									
					31	2798	0		30	1	20	SPARE	--						
M	RM	B201 HP-6	20	3	33		2798	0	32	--	--	SPACE	--						
					35			2798	0	34	--	SPACE	--						
					37	0	0		36	--	--	SPACE	--						
					39				38	--	--	SPACE	--						
--	SPARE		20	3	39		0	0	40	--	--	SPACE	--						
					41			0	42	--	--	SPACE	--						
Total Load:						26815 VA	26815 VA	26815 VA											
Total Amps:						97 A	97 A	97 A											
Load Classification		NEC Reference		Connected Load		Demand Factor		Est. Demand		Load Totals									
L Lighting		NEC 220.42								Total Connected Load: 80444 VA									
R Receptacle		NEC 220.44								Total Demand Load: 84308 VA									
E Equipment																			
M Motor		NEC 430.24		80444 VA		104.80%		84308 VA		480/277 Vye System Current									
K Kitchen		NEC 220.56								Connected Amps: 97 A									
H Heating		NEC 220.51								Demand Amps: 101 A									
Copper Bus Size		Z25		Ground		Standard		Notes:											
Voltage		480/277 Wye		Mounting		Surface													
Phase		3		Enclosure		NEMA 1													
Wire		4		# of 1-Phase Circuits		42													
Lugs		MLO		Neutral		100.00%													
Breaker A/C Rating		25,000		Feeder OCPD Size		125.00%													

Panel: 2MH1										Location: Mech. A201M									
Type	Description	Trip	Poles	#	A	B	C	#	Poles	Trip	Description	Type							
M	RM A201 HP-13	20	3	3	3269 1551	3269 1551		2	3	20	RM A201 HP-17	M							
				5			3269 1551	6											
				7	2799 1551			8											
M	RM A201 HP-16	20	3	9		2799 1551		10	3	20	RM A201 HP-19	M							
				11			2799 1551	12											
				13	2799 0			14											
M	RM A201 HP-18	20	3	15		2799 0		16	--	--	SPACE	--							
				17			2799 0	18	--	--	SPACE	--							
M	RM A201 HP-14	20	1	19	1501 0			20	--	--	SPACE	--							
M	RM A201 HP-15	20	1	21		2382 0		22	--	--	SPACE	--							
M	RM A201 HP-21	20	1	23			2382 0	24	--	--	SPACE	--							
--	SPARE	20	3	25	0 0			26	--	--	SPACE	--							
				27		0 0		28	--	--	SPACE	--							
				29			0 0	30	--	--	SPACE	--							
				31	0 0			32	--	--	SPACE	--							
--	SPARE	20	3	33		0 0		34	--	--	SPACE	--							
				35			0 0	36	--	--	SPACE	--							
--	SPARE	20	1	37	0 0			38	--	--	SPACE	--							
--	SPARE	20	1	39		0 0		40	--	--	SPACE	--							
--	SPARE	20	1	41			0 0	42	--	--	SPACE	--							
Total Load:					13470 VA		14351 VA												
Total Amps:					49 A		52 A												
Load Classification		NEC Reference		Connected Load		Demand Factor		Est. Demand		Load Totals									
L Lighting		NEC 220.42								Total Connected Load: 42173 VA									
R Receptacle		NEC 220.44								Total Demand Load: 44625 VA									
E Equipment																			
M Motor		NEC 430.24		42173 VA		105.61%		44625 VA		480/277 Wye System Current									
K Kitchen		NEC 220.56								Connected Amps: 51 A									
H Heating		NEC 220.51								Demand Amps: 54 A									
Copper Bus Size		125		Ground		Standard		Notes:											
Voltage		480/277 Wye		Mounting		Surface													
Phase		3		Enclosure		NEMA 1													
Wire		4		# of 1-Pole Circuits		42													
Lugs		MLO		Neutral		100.00%													
Breaker AIC Rating		14,000		Feeder OCPD Size		125													

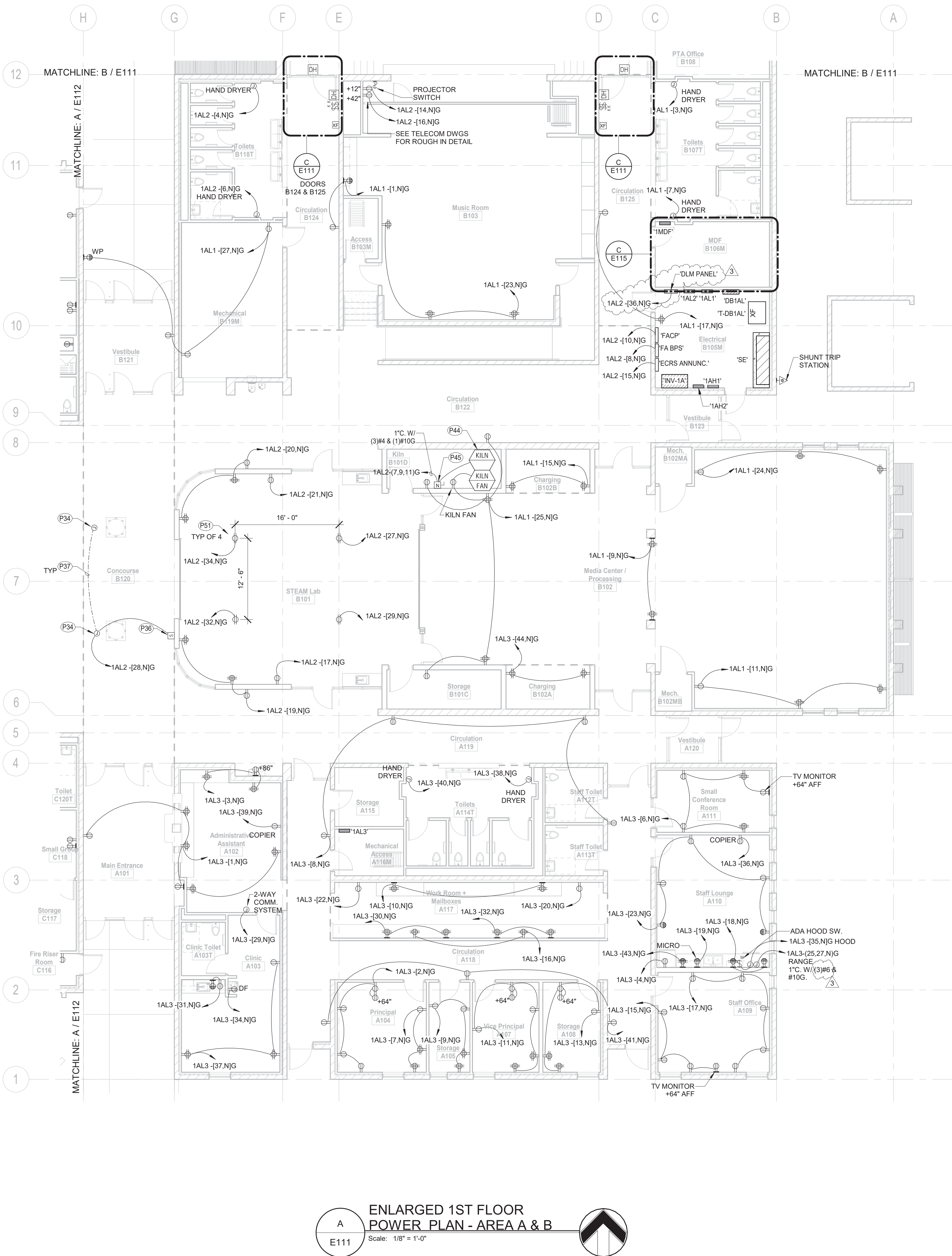
Panel: 1AL3										Location: Mechanical Access A116M									
Type	Description	Trip	Poles	#	A	B	C	#	Poles	Trip	Description	Type							
R	RM A101, A102, A211	20	1	1	1080 360			2	1	20	RM A104	R							
R	RM A102, CIRCULATION A118	20	1	3		900 1500		4	1	20	[1] RM A110 REFER	R							
R	RM A118	20	1	5			720 1080	6	1	20	RM A111	R							
R	RM A104	20	1	7	900 720			8	1	20	RM A112, A113, A118, A119	R							
R	RM A105, A105C, HALL	20	1	9		1080 720		10	1	20	RM A117	R							
R	RM A107	20	1	11			1440 1200	12	1	20	RM B101, B102 DESTRAIT FAN	M							
R	RM A108	20	1	13	1260 1200			14	1	20	RM B101 DESTRAIT FAN	M							
R	RM A109, HALL	20	1	15		360 720		16	1	20	RM A117 WORK RM COUNTER	R							
R	RM A109	20	1	17			720 360	18	1	20	RM A110 COUNTER	R							
E	RM A110 MICRO	20	1	19	1400 900			20	1	20	RM A117 COPIER	R							
R	RM A201M	20	1	21		720 900		22	1	20	RM A117 COPIER	R							
R	RM A110	20	1	23			900 1152	24	1	20	RM B102 ROLL-UP DOOR	M							
E	[1]RM A110 RANGE	50	2	25	4450 1152			26	1	20	RM B101 ROLL-UP DOOR	M							
E	2-WAY COMM. EQUIPMENT	20	1	29		4450 1200		28	1	20	RM A119 ROLL-UP DOOR	M							
R	A103 REFER	20	1	31	480 720			30	1	20	RM A117	R							
E	[1]CIRC A119 DF	20	1	33		600 500		34	1	20	[1] NURSE OFFICE DF	R							
M	A110 HOOD	20	1	35			400 1200	36	1	20	RM A110	R							
R	RM A103T	20	1	37	900 1400			38	1	20	A114T HAND DRYER	M							
R	RM A102	20	1	39		1200 1400		40	1	20	A114T HAND DRYER	M							
R	RM A118 CIRCULATION	20	1	41			540 400	42	1	20	EF-4	M							
R	A110 COUNTER	20	1	43	180 720			44	1	20	RM B102A	R							
--	SPARE	20	1	45		0 0		46	1	20	SPARE	--							
--	SPARE	20	1	47			0 0	48	1	20	SPARE	--							
--	SPARE	20	1	49	0 0			50	1	20	SPARE	--							
--	SPARE	20	1	51		0 0		52	1	20	SPARE	--							
--	SPARE	20	1	53			0 0	54	1	20	SPARE	--							
--	SPARE	20	1	55	0 0			56	1	20	SPARE	--							
--	SPARE	20	1	57		0 0		58	1	20	SPARE	--							
--	SPARE	20	1	59			0 0	60	1	20	SPARE	--							
Total Load:		17822 VA		16250 VA		11012 VA													
Total Amps:		155 A		142 A		92 A													
Load Classification	NEC Reference	Connected Load	Demand Factor	Est. Demand		Load Totals													
L Lighting	NEC 220.42					Total Connected Load: 45894 VA													
R Receptacle	NEC 220.44	24500 VA	70.41%	17250 VA		Total Demand Load: 38184 VA													
E Equipment		11080 VA	100.00%	11080 VA															
M Motor	NEC 430.24	9504 VA	103.68%	9854 VA															
K Kitchen	NEC 220.56																		
H Heating	NEC 220.51																		
Copper Bus Size	225	Ground	Standard	Notes:															
Voltage	120/208 Wye	Mounting		[1] INDICATES GFCI BREAKER (CLASS A)															
Phase	3	Enclosure	NEMA 1																
Wire		# of 1-Pole Circuits	5																
Lugs	MLO	Neutral	100.00%																
Breaker AIC Rating	10,000	Feeder OCPD Size	225																

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ENLARGED 1ST FLOOR
POWER PLAN - AREA B

Scale: 1/8" = 1'-0"



ENLARGED 1ST FLOOR
POWER PLAN - AREA A & B

Scale: 1/8" = 1'-0"

GENERAL NOTES

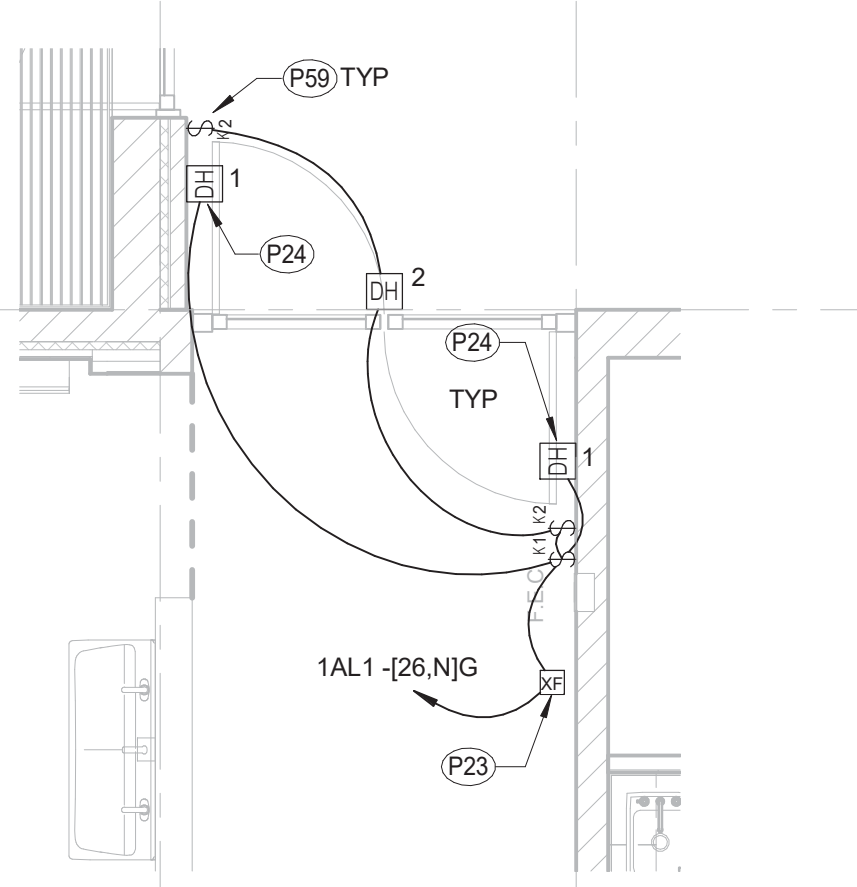
- CONTRACTOR SHALL COORDINATE FINAL RECEPTACLE LOCATIONS WITH TELECOM OUTLETS PRIOR TO ROUGH-IN. EACH TELECOM OUTLET SHALL HAVE A RECEPTACLE LOCATED WITHIN 12" MEASURED FROM CENTER OF DEVICES.
- COORDINATE EXACT MOUNTING HEIGHTS AND LOCATIONS OF GENERAL RECEPTACLES, SPECIAL OUTLETS AND DISCONNECT SWITCHES IN SHOP AREAS WITH OWNER AND EQUIPMENT SUPPLIERS PRIOR TO ROUGH-IN.
- CONDUITS FOR ROOF-MOUNTED DEVICES AND EQUIPMENT SHALL BE RUN BELOW ROOF DECK/SYSTEM. ROOF MOUNTED CONDUITS WILL ONLY BE CONSIDERED AND APPROVED IN WRITING BY THE ARCHITECT/ENGINEER.
- VERIFY EXACT ELECTRICAL REQUIREMENTS, PLUG CONFIGURATIONS, ETC., AND FINAL LOCATIONS OF OWNER-PROVIDED EQUIPMENT WITH OWNERS REPRESENTATIVE PRIOR TO ORDERING OF MATERIALS AND ROUGH-IN.
- REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

SHEET NOTES

- P21 PROVIDE JUNCTION BOX FOR CONNECTION TO PROJECTOR SCREEN. COORDINATE EXACT MOUNTING LOCATION AND REQUIREMENTS WITH AV INSTALLER. FIELD VERIFY.
- P23 PROVIDE AND INSTALL LOW VOLTAGE TRANSFORMER FEEDING DOOR HOLDERS IN ADJOINING SPACE. CONTRACTOR SHALL MOUNT ABOVE ACCESSIBLE GRID CEILING. COORDINATE EXACT MOUNTING HEIGHT, LOCATION AND REQUIREMENTS WITH ARCHITECTURAL DRAWINGS AND DOOR HARDWARE SUPPLIER PRIOR TO ROUGH-IN. FIELD VERIFY.
- P24 PROVIDE CONDUIT, BACKBOX, AND WIRING FOR DOOR MAG HOLDER. COORDINATE WITH ARCHITECTURAL SPECIFICATIONS FOR DOOR HARDWARE.
- P26 PROVIDE STAINLESS STEEL FACE PLATES FOR ALL WIRING DEVICES IN MULTIPURPOSE AND KITCHEN AREAS.
- P34 PROVIDE JUNCTION BOX AND FLEXIBLE CONECTION FOR POWER AND CONTROL WIRING AT SOLATUBE. REFER TO MANUFACTURERS INSTALLATION AND WIRING DIAGRAMS. SEE ARCHITECTURAL DRAWINGS FOR SPECIFICATIONS.
- P36 PROVIDE SKYLIGHT SOLATUBE 0-10V DIMMING KEYED CONTROL STATION COMPATIBLE WITH SYSTEM. VERIFY REQUIREMENTS WITH MANUFACTURER. VERIFY LOCATION WITH WCSD PRIOR TO INSTALLATION.
- P37 ALL POWER AND CONTROL WIRING (0-10V) TO BE INSTALLED IN SEPARATE CONDUITS. REFER TO MANUFACTURER INSTALLATION INSTRUCTIONS. PROVIDE (1) 165 CLASS-2 POWER CABLE, AND (1) 18/2 CLASS 2 0-10V CONTROL CABLE BETWEEN EACH SOLATUBE IN A ZONE.
- P42 PROVIDE WIRE MOLD EVOLUTION EFB45-OG FLOOR BOX. EFB45-50A ADAPTER. PROVIDE EFB45-CTR CONCRETE RING FOR FLUSH INSTALLATION AND EFB45BTL FLUSH COVER IN POLISHED CONCRETE WITH BRUSHED ALUMINUM FINISH. PROVIDE (1) NEMA 14-50R RECEPTACLE IN BOX. PROVIDE 3/4" SPARE CONDUIT TO PANEL 1ML1.
- P43 PROVIDE WIRE MOLD EVOLUTION EFB45-OG FLOOR BOX WITH FLUSH COVER IN POLISHED CONCRETE WITH BRUSHED ALUMINUM FINISH. PROVIDE QTY (2) NEMA 5-20R RECEPTACLES IN BOX. PROVIDE 3/4" SPARE CONDUIT TO PANEL 1ML1.
- P44 COORDINATE ROUGH-IN LOCATION OF KILN FAN CONNECTION AND HARDWIRED CONNECTION TO KILN WITH KILN ROOM LAYOUT FROM ARCHITECT AND MECHANICAL CONTRACTOR. KILN TO BE HARDWIRED, PROVIDE FLEXIBLE WHIP TO KILN FED FROM LOCKABLE DISCONNECT IN ROOM.
- P45 60A/3P/NON-FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 250V RATED.
- P49 120V/20A RECEPTACLE FOR AV SPEAKERS AT STAGE. SEE TELECOM DRAWINGS FOR MOUNTING LOCATION.
- P51 PROVIDE 120V/20A DUPLEX RECEPTACLE (VERTICALLY) ON STEEL POST (SEE STRUCTURAL) FOR CORO REEL. MOUNT CORO REEL (ERICKSON #F3233545200 GFCI 20A) TO BOTTOM OF STEEL POST ON HORIZONTAL PLATE. MATCH ELEVATION WITH ADJACENT LINEAR FIXTURE. VERIFY LOCATIONS WITH ALL OTHER DISCIPLINES PRIOR TO INSTALLATION FOR CLEARANCES OF EQUIPMENT.
- P59 INSTALL MOMENTARY KEY-SWITCH FOR MAG HOLD OPEN RELEASE. PROVIDE ALL WIRING AS REQUIRED. COORDINATE WITH DOOR HARDWARE SUPPLIER.
- P62 PROVIDE 2" C STUBOUT, 5' FROM BUILDING FOR IRRIGATION CONTROLS WIRING. CORRDINATE WITH IRRIGATION CONTRACTOR.
- P68 PROVIDE CONDUIT TO RAIN SENSOR ON EXTERIOR. COORDINATE WITH LANDSCAPE DRAWINGS.
- P70 PROVIDE (1) 3/4" C. PER 3 SPARE CIRCUITS IN PANEL TO ACCESSIBLE SPACE. MINIMUM OF 4 CONDUITS.

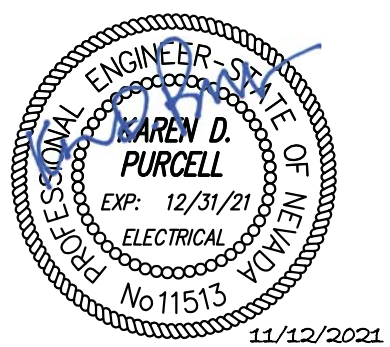
DOORS B124 & B125 SEQUENCE OF OPERATION

- DOOR MAG '1' SHALL BE NORMALLY ENERGIZED AND RELEASE DOORS ON CODE RED OR KEY SWITCH '1'. LABEL SWITCH 'DOOR CLOSE'.
- DOOR MAG '2' SHALL NOT BE NORMALLY ENERGIZED AND SHALL ENERGIZE ON CODE RED ACTIVATION. KEY SWITCH '2' SHALL RELEASE DOOR MAG '2'. LABEL SWITCH 'CODE RED UNLOCK'.



ENLARGED 1ST FLOOR
POWER PLAN - AREA A & B

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



Professional Seal

Date

3 11/16/21

Revision

Addendum 3

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**Washoe County School District
Rio Wrangler Elementary School**

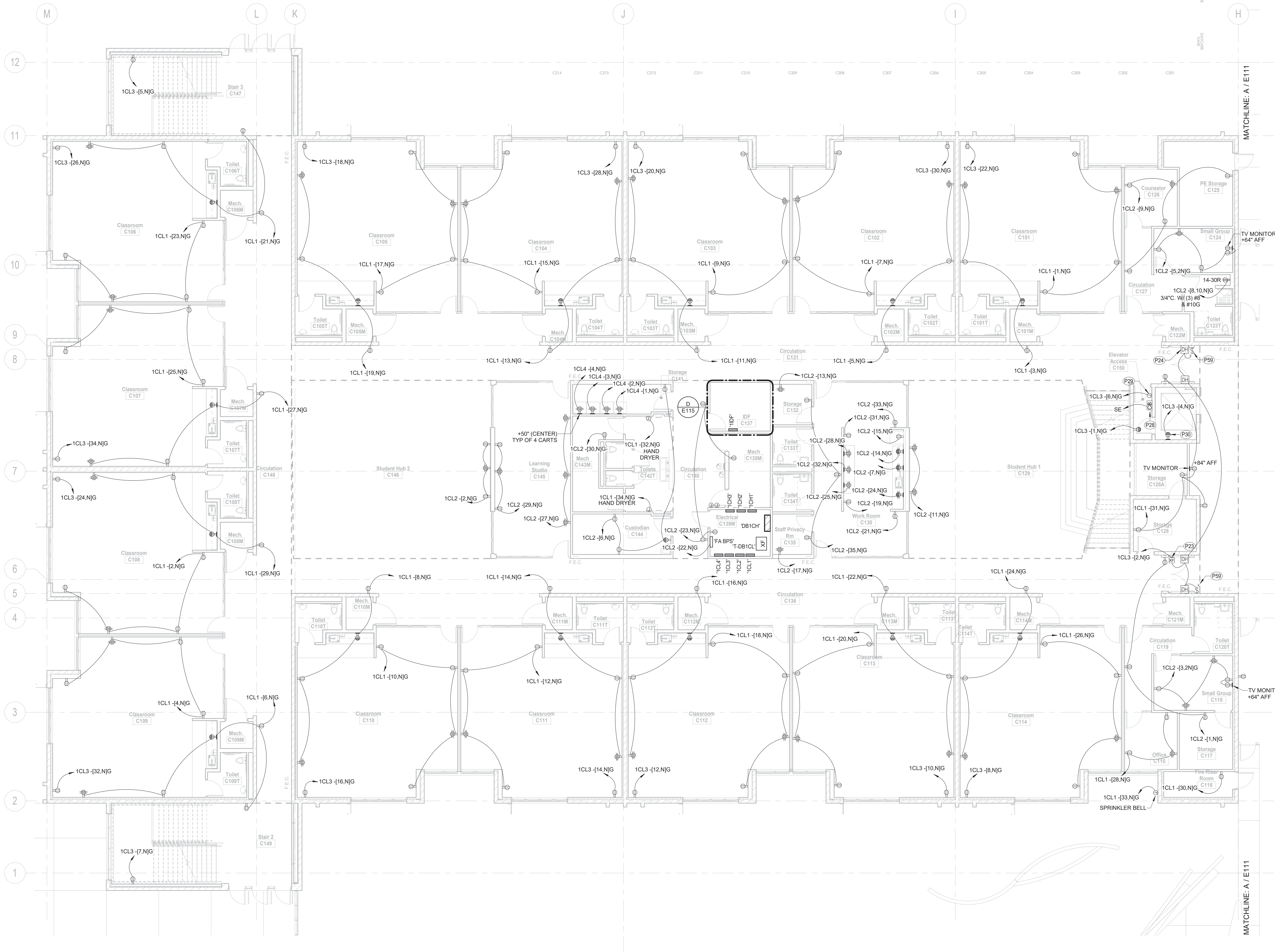
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ENLARGED 1ST FLOOR
POWER PLAN - AREAS A
& B

October 13, 2021
H+K Project No: 2001

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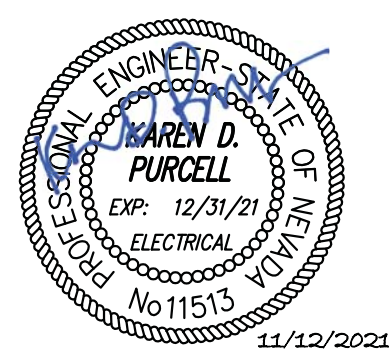




A
E112
ENLARGED 1ST FLOOR
POWER PLAN - AREA C
Scale: 1/8" = 1'-0"

- GENERAL NOTES**
- CONTRACTOR SHALL COORDINATE FINAL RECEPTACLE LOCATIONS WITH TELECOM OUTLETS PRIOR TO ROUGH-IN. EACH TELECOM OUTLET SHALL HAVE A RECEPTACLE LOCATED WITHIN 12" MEASURED FROM CENTER OF DEVICES.
 - COORDINATE EXACT MOUNTING HEIGHTS AND LOCATIONS OF GENERAL RECEPTACLES, SPECIAL OUTLETS AND DISCONNECT SWITCHES IN SHOP AREAS WITH OWNER AND EQUIPMENT SUPPLIERS PRIOR TO ROUGH-IN.
 - CONDUITS FOR ROOF-MOUNTED DEVICES AND EQUIPMENT SHALL BE RUN BELOW ROOF DECK/SYSTEM, ROOF MOUNTED CONDUITS WILL ONLY BE CONSIDERED AND APPROVED IN WRITING BY THE ARCHITECT/ENGINEER.
 - VERIFY EXACT ELECTRICAL REQUIREMENTS, PLUG CONFIGURATIONS, ETC., AND FINAL LOCATIONS OF OWNER-PROVIDED EQUIPMENT WITH OWNER'S REPRESENTATIVE PRIOR TO ORDERING OF MATERIALS AND ROUGH-IN.
 - REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

- SHEET NOTES**
- P23 PROVIDE AND INSTALL LOW VOLTAGE TRANSFORMER FEEDING DOOR HOLDERS IN ADJOINING SPACE. CONTRACTOR SHALL MOUNT ABOVE ACCESSIBLE GRID CEILING. COORDINATE EXACT MOUNTING HEIGHT, LOCATION AND REQUIREMENTS WITH ARCHITECTURAL DRAWINGS AND DOOR HARDWARE SUPPLIER PRIOR TO ROUGH-IN. FIELD VERIFY.
- P24 PROVIDE CONDUIT, BACKBOX, AND WIRING FOR DOOR MAG HOLDER. COORDINATE WITH ARCHITECTURAL SPECIFICATIONS FOR DOOR HARDWARE.
- P28 50A/3P ENCLOSED SHUNT TRIP CIRCUIT BREAKER, NEMA 1 CONSTRUCTION, 600V RATED. PROVIDE WITH OPEN/CLOSE POSITION CONTACTS. COORDINATE WITH ELEVATOR CONTRACTOR. SEE FLOOR PLANS FOR LOCATION. SEE ONLINE DIAGRAM FOR CONDUIT AND WIRING REQUIREMENTS.
- P29 120V SHUNT TRIP CIRCUIT BREAKER CONTROL CIRCUIT. COORDINATE WITH FIRE ALARM CONTRACTOR.
- P30 MOUNT WIRING DEVICE IN ELEVATOR PIT. COORDINATE EXACT LOCATION WITH ELEVATOR INSTALLER PRIOR TO ROUGH-IN. FIELD VERIFY.
- P59 INSTALL MOMENTARY KEY-SWITCH FOR MAG HOLD OPEN RELEASE. PROVIDE ALL WIRING AS REQUIRED. COORDINATE WITH DOOR HARDWARE SUPPLIER.



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3 11/16/21
Revision
Addendum 3



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Washoe County School District
Rio Wrangler Elementary School

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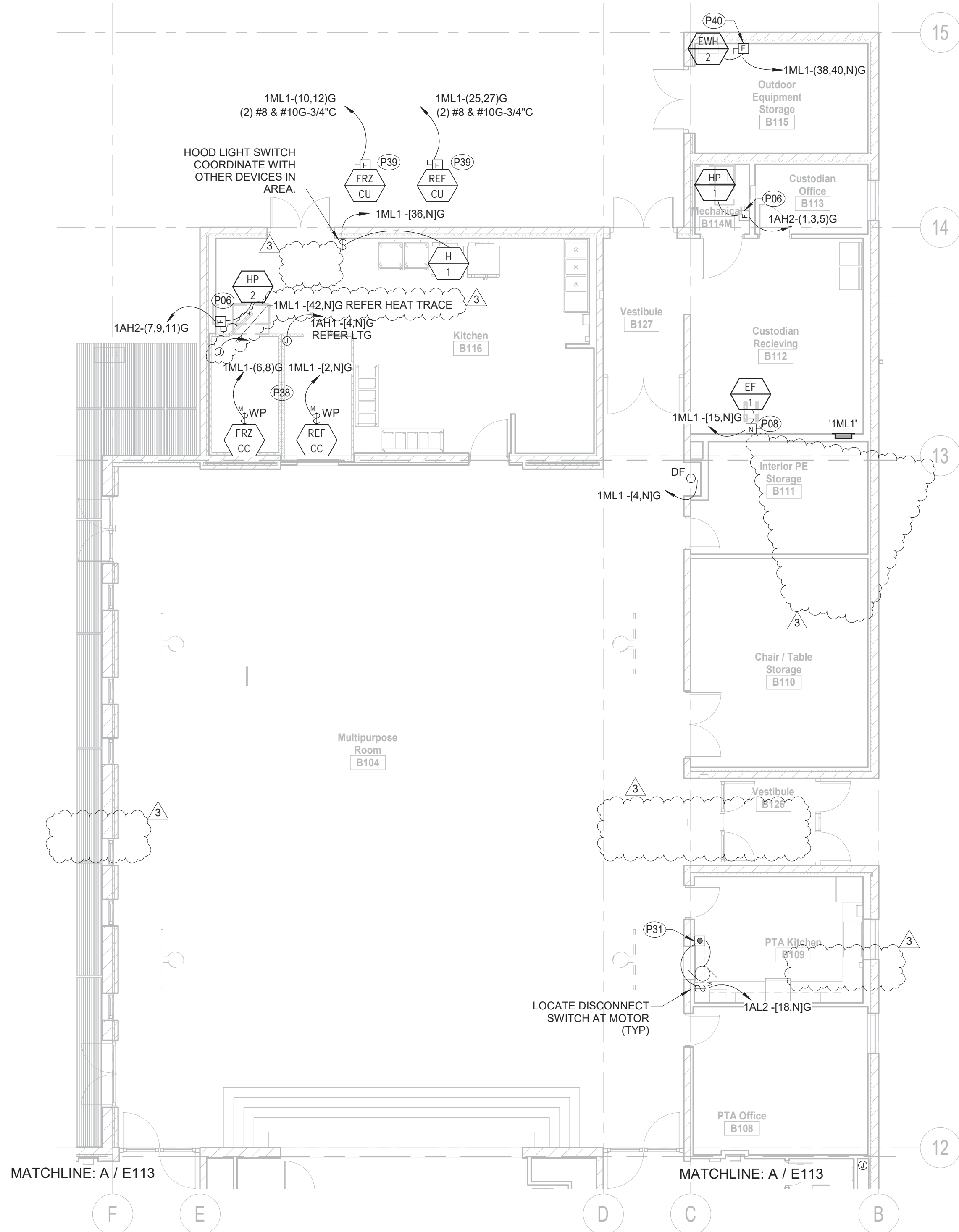
ENLARGED 1ST FLOOR
POWER PLAN - AREA C

October 13, 2021
H+K Project No: 2001

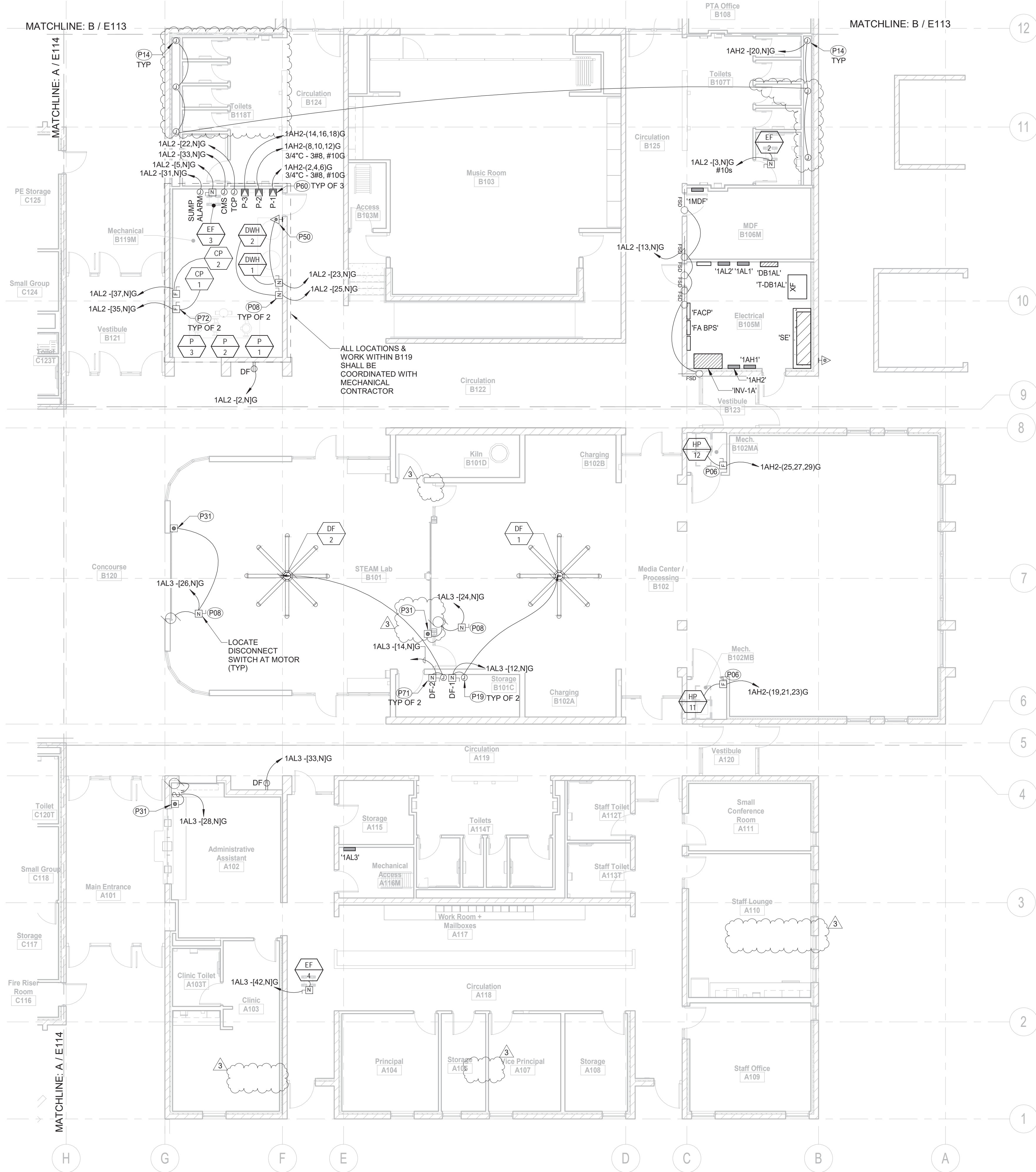
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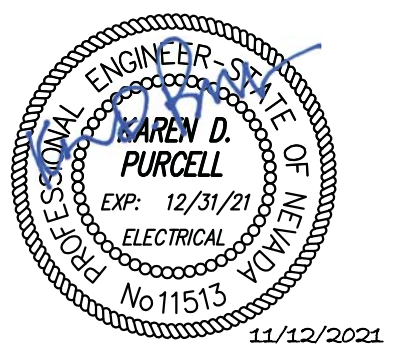
ENLARGED 1ST FLOOR MECHANICAL POWER PLAN - AREA B
Scale: 1/8" = 1'-0"



ENLARGED 1ST FLOOR MECHANICAL POWER PLAN - AREA A & B
Scale: 1/8" = 1'-0"

- GENERAL NOTES**
1. THE CONTRACTOR SHALL OBTAIN ALL WIRING DIAGRAMS ASSOCIATED WITH THE MECHANICAL EQUIPMENT CONTROLS FROM THE MECHANICAL/CONTROLS CONTRACTOR. CONTROL WIRING SHALL BE PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR. ANY CONDUIT REQUIRED FOR CONTROL WIRING SHALL BE PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR AND SHALL BE COMPLETED UNDER THE SUPERVISION OF THE MECHANICAL/CONTROLS CONTRACTOR.
 2. REFER TO MECHANICAL DRAWINGS FOR MECHANICAL UNIT MODEL NUMBERS AND SPECIFIC ELECTRICAL REQUIREMENTS, OPTIONS AND ACCESSORIES.
 3. INFORMATION ON ARCHITECTURAL AND MECHANICAL DRAWINGS SUPERSEDES INFORMATION SHOWN ON ELECTRICAL DRAWINGS. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ROUGH-IN.
 4. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR VERIFYING ELECTRICAL REQUIREMENTS FOR FINAL MECHANICAL EQUIPMENT INSTALLED. SHOULD THERE BE ANY DISCREPANCY BETWEEN ACTUAL EQUIPMENT INSTALLED AND ELECTRICAL OR MECHANICAL DRAWINGS, CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY FOR CLARIFICATION AND FURTHER DIRECTION.
 5. LOCATE ALL DISCONNECTS, STARTERS AND DRIVES WHERE ACCESSIBLE. PROVIDE ACCESS AND CLEARANCE AS REQUIRED PER NEC. PROVIDE ACCESS HATCH IF LOCATED ABOVE HARD LID CEILING.
 6. DISCONNECT SWITCHES, STARTERS OR DRIVES PROVIDED BY MECHANICAL AND SHIPPED LOOSE ARE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO INSTALL.
 7. PIPING AND / OR DUCTWORK SHALL NOT BE ROUTED IN THE DEDICATED ELECTRICAL EQUIPMENT SPACE AT OR ABOVE ELECTRICAL SWITCHBOARDS, DISTRIBUTION BOARDS, PANELBOARDS, ETC. (PER 2011 NEC 110.26). PROVIDE DEPTH AND WIDTH OF WORKING SPACE FOR ELECTRICAL EQUIPMENT AS REQUIRED PER 2011 NEC 110.26.
 8. REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

- SHEET NOTES**
- P06 30A/3P/FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P08 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 250V RATED.
- P14 PROVIDE JUNCTION BOX FOR CONNECTION TO RAYCHEM HEAT TRACE CABLE 5XL240. COORDINATE EXACT MOUNTING LOCATION AND REQUIREMENTS WITH PLUMBING CONTRACTOR AND RAYCHEM DESIGN GUIDES.
- P19 PROVIDE JUNCTION BOX AND RACEWAY FOR DESTRATIFICATION FANS CONTROLLER. COORDINATE EXACT REQUIREMENTS AND LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. FIELD COORDINATE.
- P31 ROLL-UP DOOR CONTROL STATION. COORDINATE WIRING REQUIREMENTS WITH DOOR SUPPLIER AND MANUFACTURER. CONNECT ALL CONTROLS PER WIRING DIAGRAMS, INCLUDING BUT NOT LIMITED TO LIMIT SWITCHES, DOOR CONTACTS, ETC. COORDINATE EXACT LOCATION WITH ARCHITECT/DCSD PRIOR TO ROUGH-IN. REFER TO SPEC 083313 FOR ADDITIONAL INFORMATION.
- P38 PROVIDE CONDUIT SEAL-OFFS AT ALL CONDUITS LEAVING COOLER AND FREEZER. INSTALL ALL COMPONENTS FOR COMPLETE SYSTEM, INCLUDING SWITCHES, LIGHTING, AND HEAT TRACE (SUPPLIED BY VENDOR. COORDINATE ALL WORK WITH FOODSERVICE VENDOR).
- P39 60A/2P/FUSED DISCONNECT SWITCH, NEMA 3R CONSTRUCTION, 250V RATED.
- P40 30A/2P/FUSED DISCONNECT SWITCH, NEMA 3R CONSTRUCTION, 250V RATED.
- P50 PROVIDE EMERGENCY POWER OFF PUSH BUTTON WITH COVER. EPO SHALL DISCONNECT 120V POWER FOR BOTH DWH-1 DWH-2 AND CLOSE GAS VALVE (PROVIDE 4-POLE 120V 20A CONTACTOR IN ENCLOSURE AS REQUIRED). VERIFY LABELING REQUIREMENTS WITH MECHANICAL CONTRACTOR. PROVIDE PLASTIC ENGRAVED NAMEPLATE. COORDINATE WIRING REQUIREMENTS WITH MECHANICAL.
- P60 VFD PROVIDED BY OTHERS. CONNECT PER MANUFACTURER'S INSTRUCTIONS AND WIRING DIAGRAMS. ROUTE VFD SECONDARY CONDUCTORS TO PUMPS LOCATED BY MECHANICAL.
- P71 PROVIDE LOCKABLE MOTOR RATED DISCONNECT SWITCH FOR HVLS FAN. COORDINATE WITH MECHANICAL.
- P72 30A/1P FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 250V RATED.



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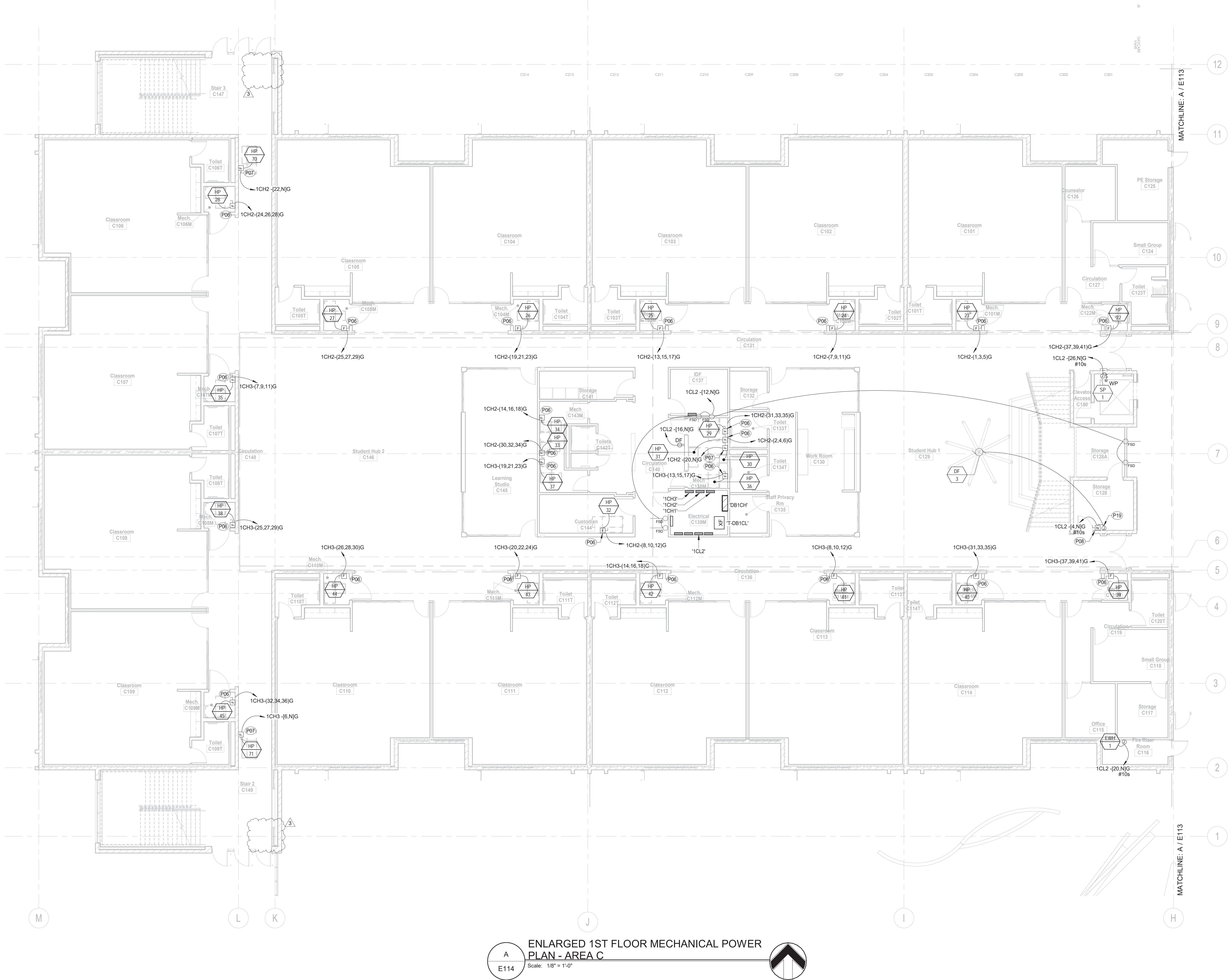
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ENLARGED 1ST FLOOR
MECHANICAL POWER
PLAN - AREAS A & B

October 13, 2021
H+K Project No: 2001
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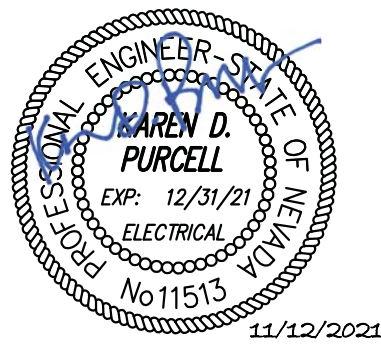
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ENLARGED 1ST FLOOR MECHANICAL POWER PLAN - AREA C
Scale: 1/8" = 1'-0"

- GENERAL NOTES**
1. THE CONTRACTOR SHALL OBTAIN ALL WIRING DIAGRAMS ASSOCIATED WITH THE MECHANICAL EQUIPMENT CONTROLS FROM THE MECHANICAL/CONTROLS CONTRACTOR. CONTROL WIRING SHALL BE PROVIDED AND INSTALLED BY CONTROLS CONTRACTOR. ANY CONDUIT REQUIRED FOR CONTROL WIRING SHALL BE PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR AND SHALL BE COMPLETED UNDER THE SUPERVISION OF THE MECHANICAL/CONTROLS CONTRACTOR.
 2. REFER TO MECHANICAL DRAWINGS FOR MECHANICAL UNIT MODEL NUMBERS AND SPECIFIC ELECTRICAL REQUIREMENTS, OPTIONS AND ACCESSORIES.
 3. INFORMATION ON ARCHITECTURAL AND MECHANICAL DRAWINGS SUPERSEDE INFORMATION SHOWN ON ELECTRICAL DRAWINGS. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ROUGH-IN.
 4. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR VERIFYING ELECTRICAL REQUIREMENTS FOR FINAL MECHANICAL EQUIPMENT INSTALLED. SHOULD THERE BE ANY DISCREPANCY BETWEEN ACTUAL EQUIPMENT INSTALLED AND ELECTRICAL OR MECHANICAL DRAWINGS, CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY FOR CLARIFICATION AND FURTHER DIRECTION.
 5. LOCATE ALL DISCONNECTS, STARTERS AND DRIVES WHERE ACCESSIBLE. PROVIDE ACCESS AND CLEARANCE AS REQUIRED PER NEC. PROVIDE ACCESS HATCH IF LOCATED ABOVE HARD LID CEILING.
 6. DISCONNECT SWITCHES, STARTERS OR DRIVES PROVIDED BY MECHANICAL AND SHIPPED LOOSE ARE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO INSTALL.
 7. PIPING AND / OR DUCTWORK SHALL NOT BE ROUTED IN THE DEDICATED ELECTRICAL EQUIPMENT SPACE AT OR ABOVE ELECTRICAL SWITCHBOARDS, DISTRIBUTION BOARDS, PANELBOARDS, ETC. (PER 2011 NEC 110.26E). PROVIDE DEPTH AND WIDTH OF WORKING SPACE FOR ELECTRICAL EQUIPMENT AS REQUIRED PER 2011 NEC 110.26.
 8. REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

- LEGEND SHEET NOTES**
- P06 30A/3P FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P07 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P08 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 250V RATED.
- P19 PROVIDE JUNCTION BOX AND RACEWAY FOR DESTRATIFICATION FANS CONTROLLER. COORDINATE EXACT REQUIREMENTS AND LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. FIELD COORDINATE.



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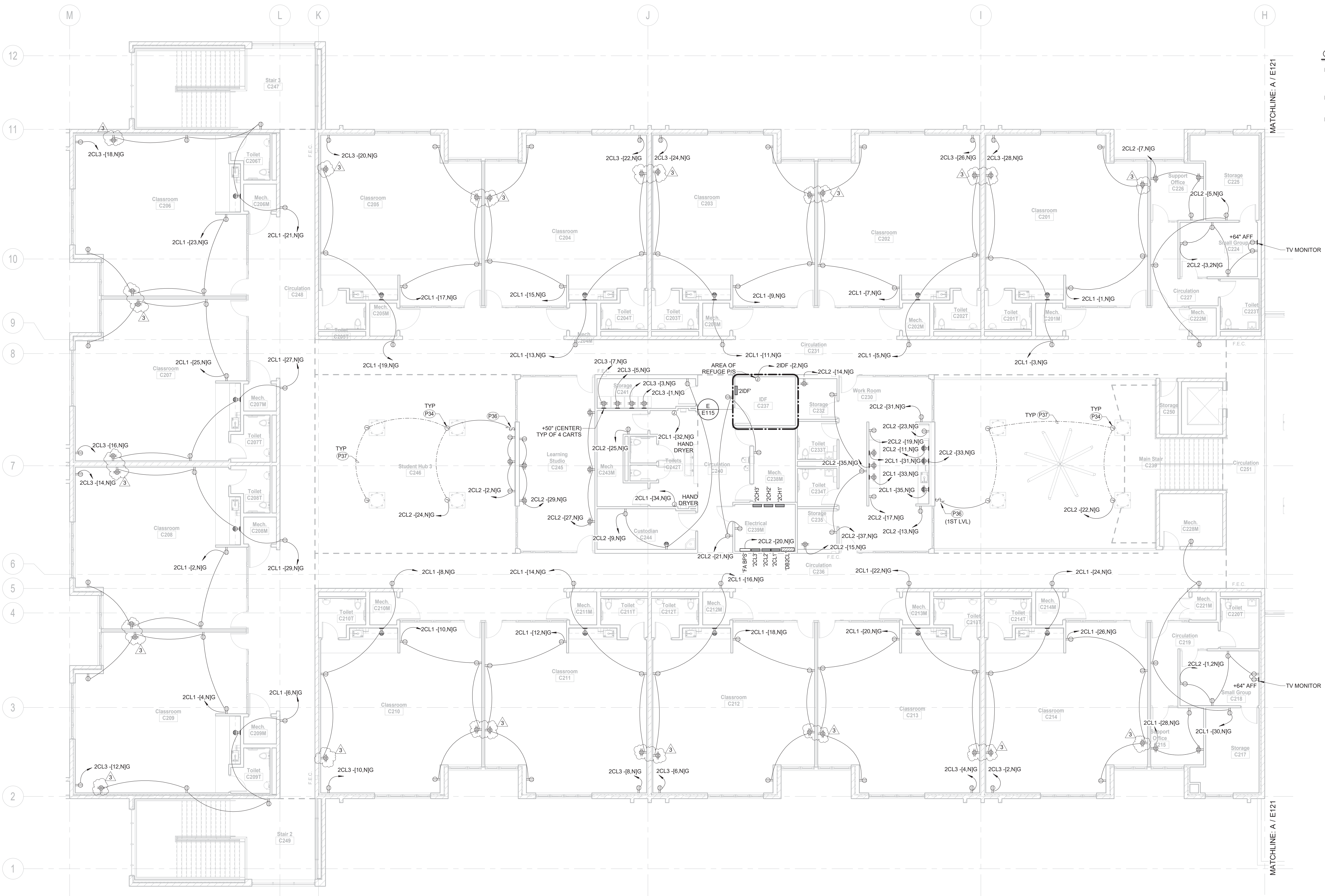
ENLARGED 1ST FLOOR
MECHANICAL POWER
PLAN - AREA C

October 13, 2021
H+K Project No: 2001
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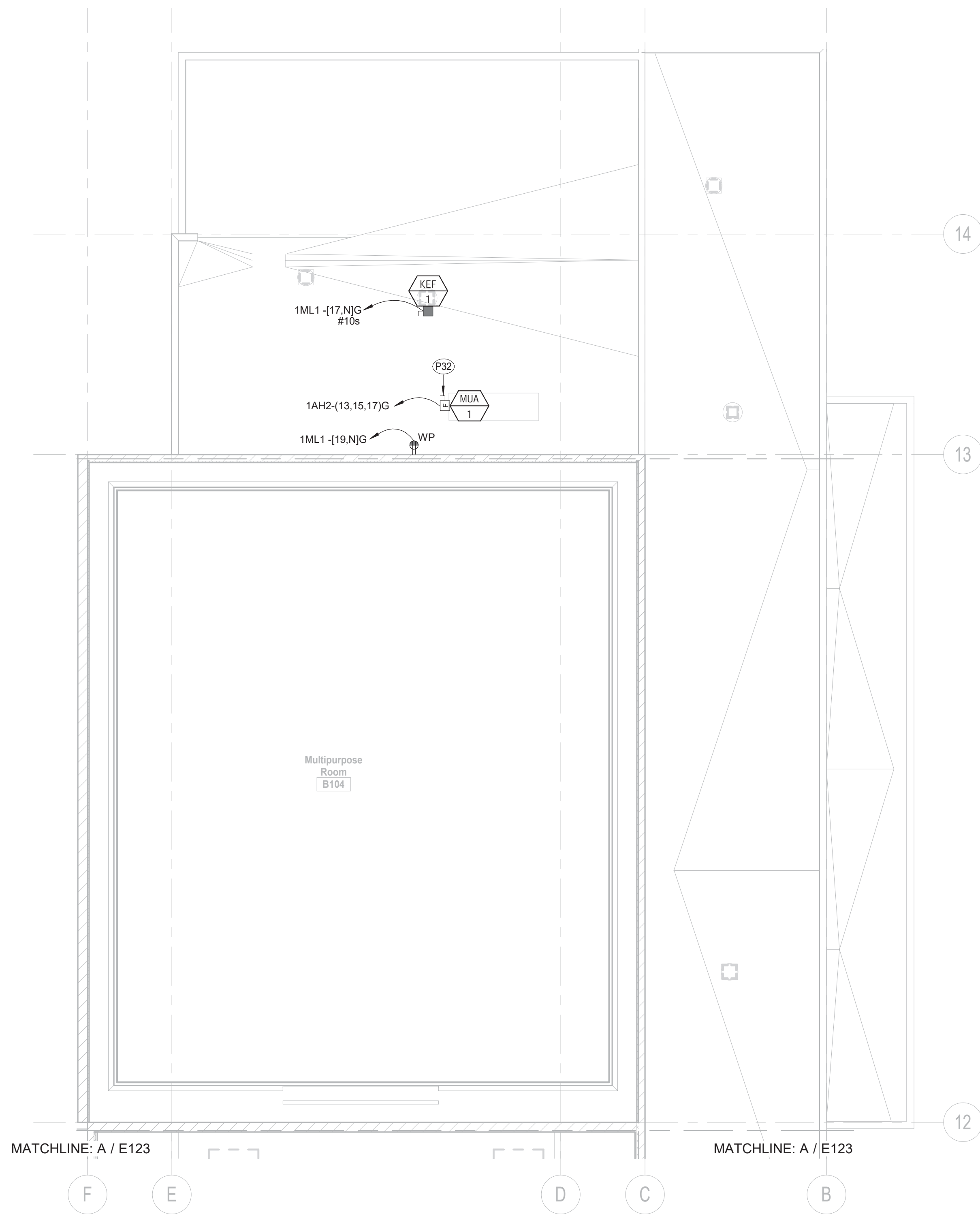


- GENERAL NOTES
1. CONTRACTOR SHALL COORDINATE FINAL RECEPTACLE LOCATIONS WITH TELECOM OUTLETS PRIOR TO ROUGH-IN. EACH TELECOM OUTLET SHALL HAVE A RECEPTACLE LOCATED WITHIN 12", MEASURED FROM CENTER OF DEVICES.
 2. COORDINATE EXACT MOUNTING HEIGHTS AND LOCATIONS OF GENERAL RECEPTACLES, SPECIAL OUTLETS, AND DISCONNECT SWITCHES IN SHOP AREAS WITH OWNER AND EQUIPMENT SUPPLIERS PRIOR TO ROUGH-IN.
 3. CONDUITS FOR ROOF-MOUNTED DEVICES AND EQUIPMENT SHALL BE RUN BELOW ROOF DECK/SYSTEM. ROOF MOUNTED CONDUITS WILL ONLY BE CONSIDERED AND APPROVED IN WRITING BY THE ARCHITECT/ELECTRICIAN.
 4. VERIFY EXACT ELECTRICAL REQUIREMENTS, PLUG CONFIGURATIONS, ETC., AND FINAL LOCATIONS OF OWNER-PROVIDED EQUIPMENT WITH OWNER'S REPRESENTATIVE PRIOR TO ORDERING OF MATERIALS AND ROUGH-IN.
 5. REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

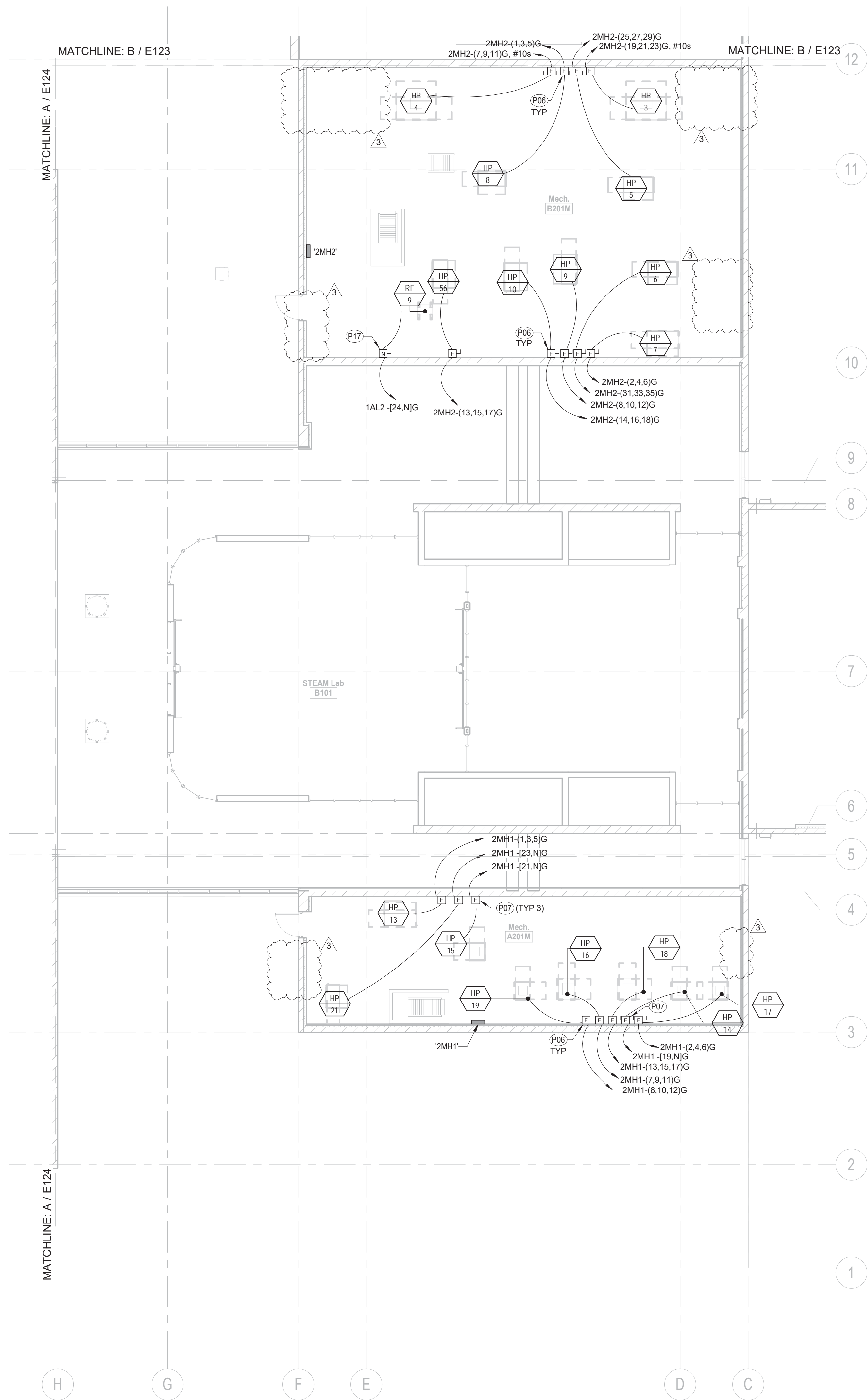
- SHEET NOTES
- P34 PROVIDE JUNCTION BOX AND FLEXIBLE CONECTION FOR POWER AND CONTROL WIRING AT SOLATUBE. REFER TO MANUFACTURERS INSTALLATION AND WIRING DIAGRAMS. SEE ARCHITECTURAL DRAWINGS FOR SPECIFICATIONS.
- P36 PROVIDE SKYLIGHT SOLATUBE 0-10V DIMMING KEYED CONTROL STATION COMPATIBLE WITH SYSTEM. VERIFY REQUIREMENTS WITH MANUFACTURER. VERIFY LOCATION WITH WCSD PRIOR TO INSTALLATION.
- P37 ALL POWER AND CONTROL WIRING (0-10V) TO BE INSTALLED IN SEPARATE CONDUITS. REFER TO MANUFACTURER INSTALLATION INSTRUCTIONS. PROVIDE (1) 16/3 CLASS-2 POWER CABLE, AND (1) 18/2 CLASS 2 0-10V CONTROL CABLE BETWEEN EACH SOLATUBE IN A ZONE.



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PLAN - AREA B
Scale: 1/8" = 1'-0"



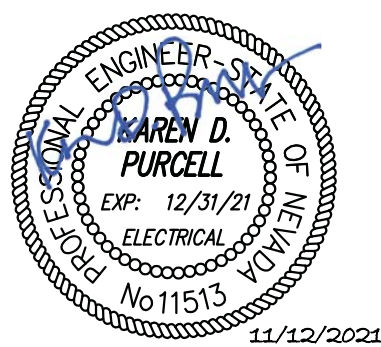
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E123
ENLARGED 2ND FLOOR MECHANICAL POWER
PLAN - AREA A & B
Scale: 1/8" = 1'-0"

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LEG SHEET NOTES

- P06 30A/3P FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P07 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P17 30A/1P DISCONNECT SWITCH, NEMA 3R CONSTRUCTION, 250V RATED.
- P32 30A/3P FUSED DISCONNECT SWITCH, NEMA 3R CONSTRUCTION, 600V RATED.



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PLAN - AREAS A & B

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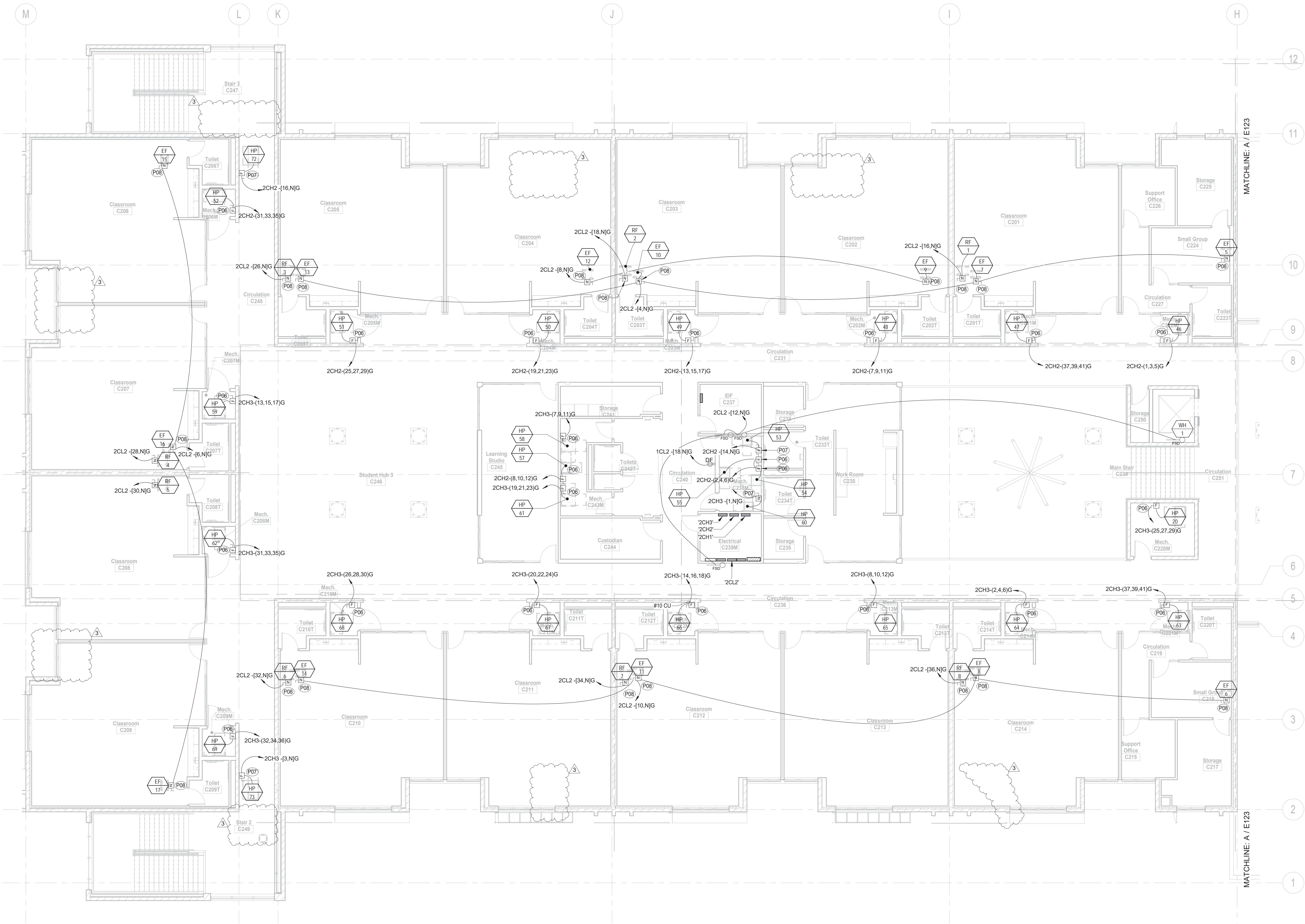


GENERAL NOTES

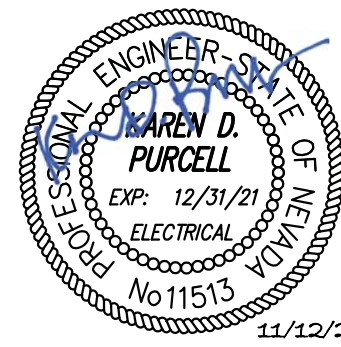
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8. REFER TO SPECIFICATION 26 05 19 FOR VOLTAGE DROP AND WIRE SIZING REQUIREMENTS.

SHEET NOTES

- P06 30A/3P/FUSED DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P07 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 600V RATED.
- P08 30A/1P DISCONNECT SWITCH, NEMA 1 CONSTRUCTION, 250V RATED.



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PLAN - AREA C
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PLAN - AREA C

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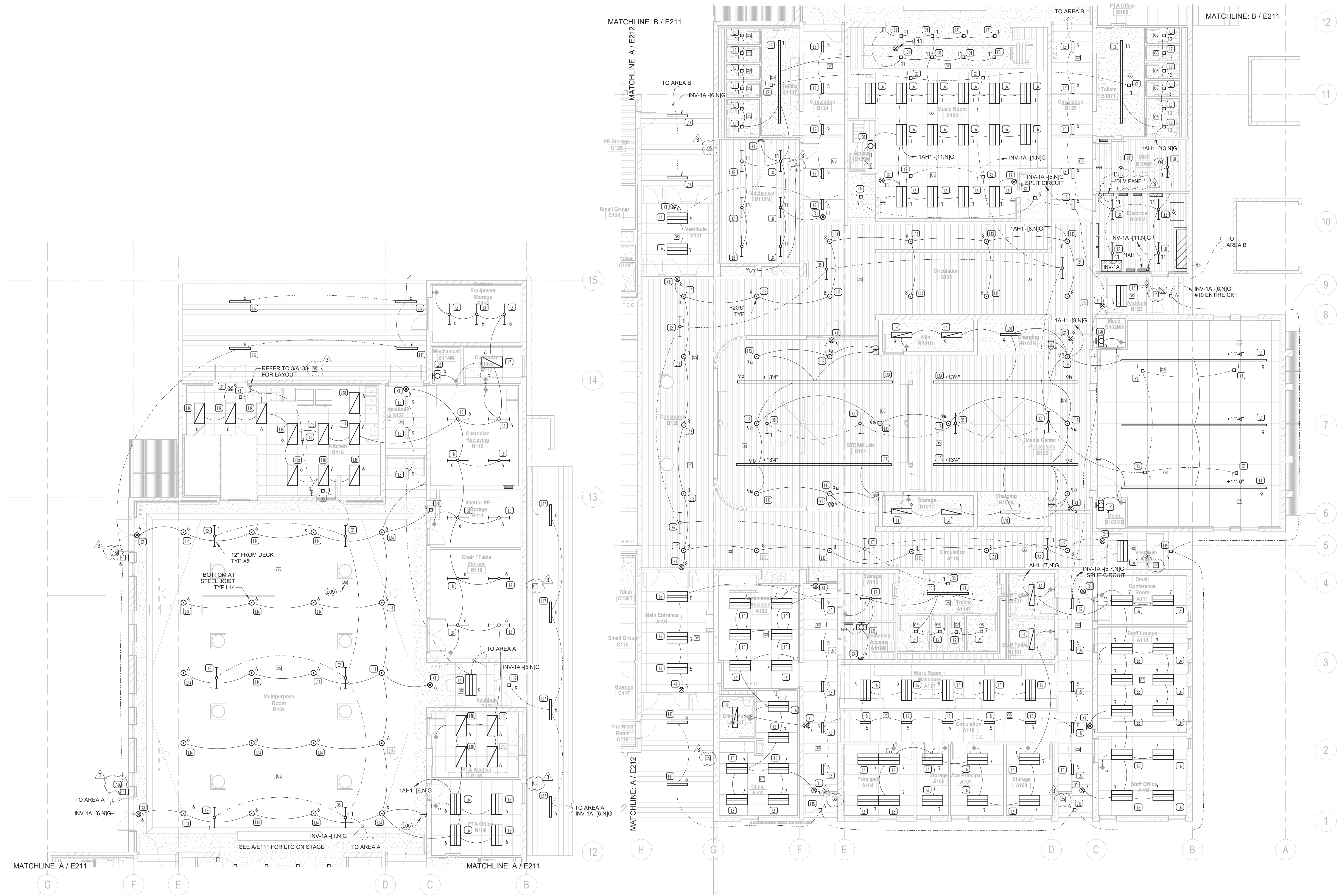


GENERAL NOTES

1. LIGHTING FIXTURES DESIGNATED AS "EMERGENCY" SHALL BE WIRED TO OPERATE WITH LOCAL SWITCHING UNDER NORMAL POWER CONDITIONS AND SHALL OPERATE VIA EMERGENCY BATTERY PACK OR INVERTER UPON LOSS OF BUILDING UTILITY POWER ONLY, UNLESS NOTED OTHERWISE.
2. EXIT SIGNS SHALL BE WIRED AHEAD OF LOCAL SWITCHING AND LIGHTING CONTROL PANEL FOR CONTINUOUS OPERATION. EXIT SIGNS SHALL BE WALL-MOUNTED ABOVE DOORS WHERE PRACTICAL. PROVIDE ADDITIONAL EXIT SIGNS AS NECESSARY FOR APPROVAL BY THE AUTHORITY HAVING JURISDICTION, PER ARCHITECT'S FINAL PATH OF EGRESS / EXITING PLAN.
3. ELECTRICAL CONDUITS SHALL BE RUN CONCEALED WHERE BUILDING CONSTRUCTION ALLOWS. ANY EXPOSED CONDUIT SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION. ANY EXPOSED CONDUIT, FITTING, SUPPORTS, ETC. SHALL BE PAINTED TO MATCH THE SURFACE ON WHICH THEY ARE INSTALLED.
4. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, ETC. FOR EXACT LOCATION OF LIGHTING FIXTURES.
5. EXACT LOCATION AND MOUNTING HEIGHT OF EXTERIOR BUILDING-MOUNTED FIXTURES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGH-IN.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FINAL FIXTURE LOCATIONS, ABOVE-CEILING HOUSING CLEARANCES, ETC. WITH MECHANICAL, PLUMBING, SPRINKLER CONTRACTOR AND OTHER TRADES PRIOR TO ROUGH-IN.
7. PROVIDE MULTIPLE-GANG FACEPLATES AS NECESSARY WHERE TWO OR MORE LIGHT SWITCHES ARE INDICATED IN A COMMON LOCATION. SINGLE-GANG FACEPLATES FOR A GROUP OF LIGHT SWITCHES ARE NOT PERMITTED.
8. PROVIDE STAINLESS STEEL DEVICE PLATES IN KITCHEN AND ROUGH-SERVICE AREAS.
9. CONDUIT FOR BUILDING-MOUNTED LIGHT FIXTURES SHALL BE ROUTED THROUGH INTERIOR OF BUILDING. LIGHT FIXTURE BACKBOXES SHALL BE RECESSED.
10. REFER TO LIGHTING CONTROL DIAGRAM AND NOTES ON SHEET E003.

SHEET NOTES

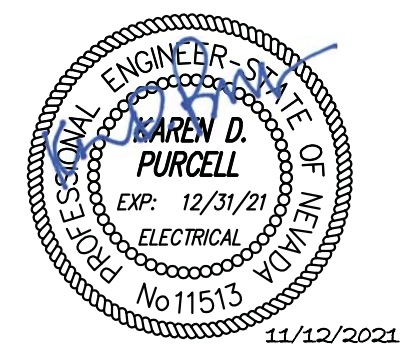
- L04 COORDINATE LIGHTING LAYOUT WITH TELECOM EQUIPMENT AND CABLE TRAY.
- L05 PROVIDE KEYS DIMMER/ON/OFF CONTROL SWITCH FOR MULTIPURPOSE ROOM LIGHTING. REFER TO LIGHTING CONTROL SEQUENCE OF OPERATIONS.
- L09 COORDINATE DAYLIGHT SENSOR LOCATION WITH SKYLIGHT INSTALLATION AND MECHANICAL DUCT WORK LOCATION.
- L10 INTEGRAL SELF-ILLUMINATING (PHOTOLUMINESCENT) EXIT SIGN, PROVIDED WITH ACCORDION DOOR.



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E211
ENLARGED 1ST FLOOR
LIGHTING PLAN - AREA B
Scale: 1/8" = 1'-0"

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LIGHTING PLAN - AREA A & B
Scale: 1/8" = 1'-0"

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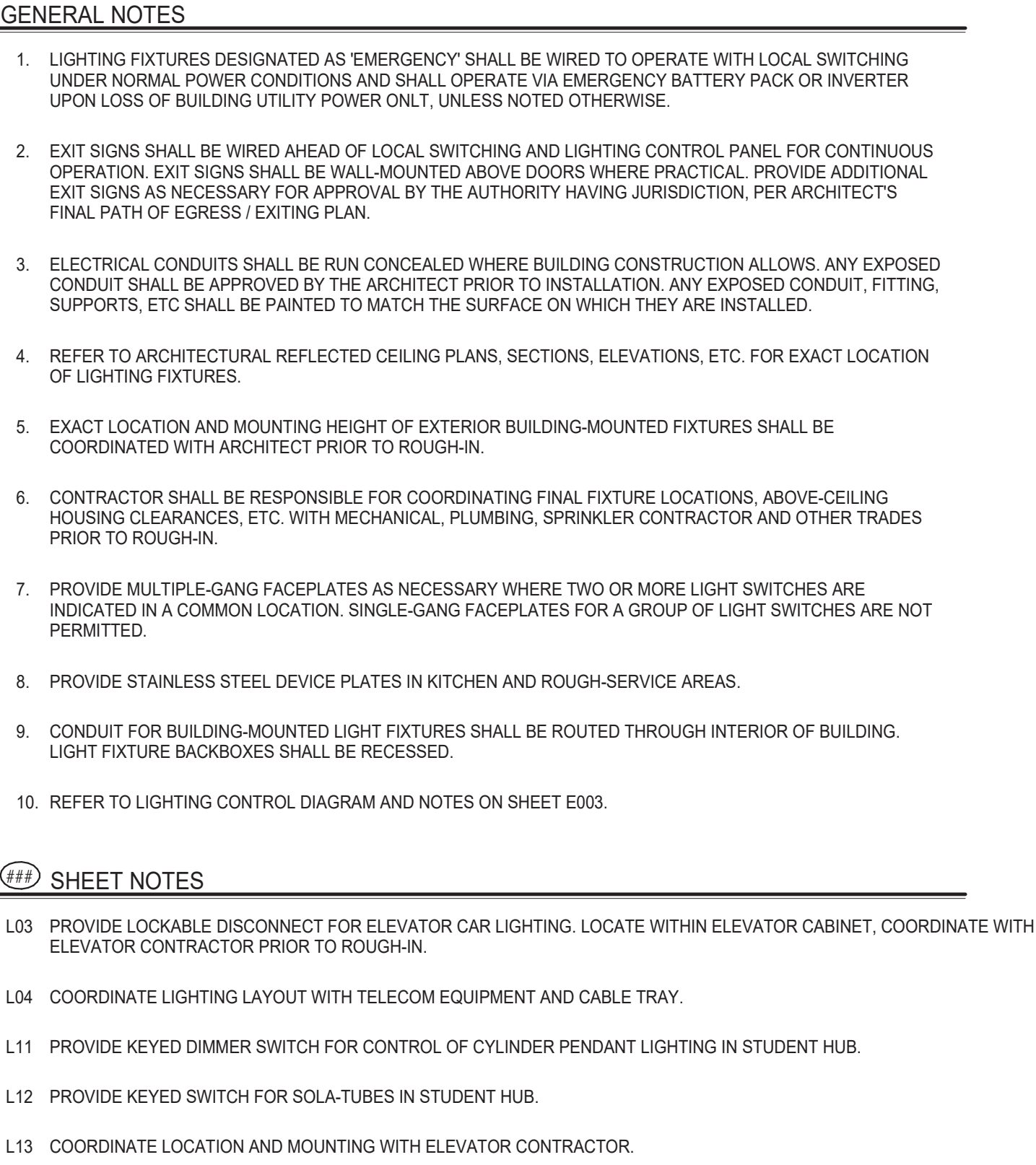
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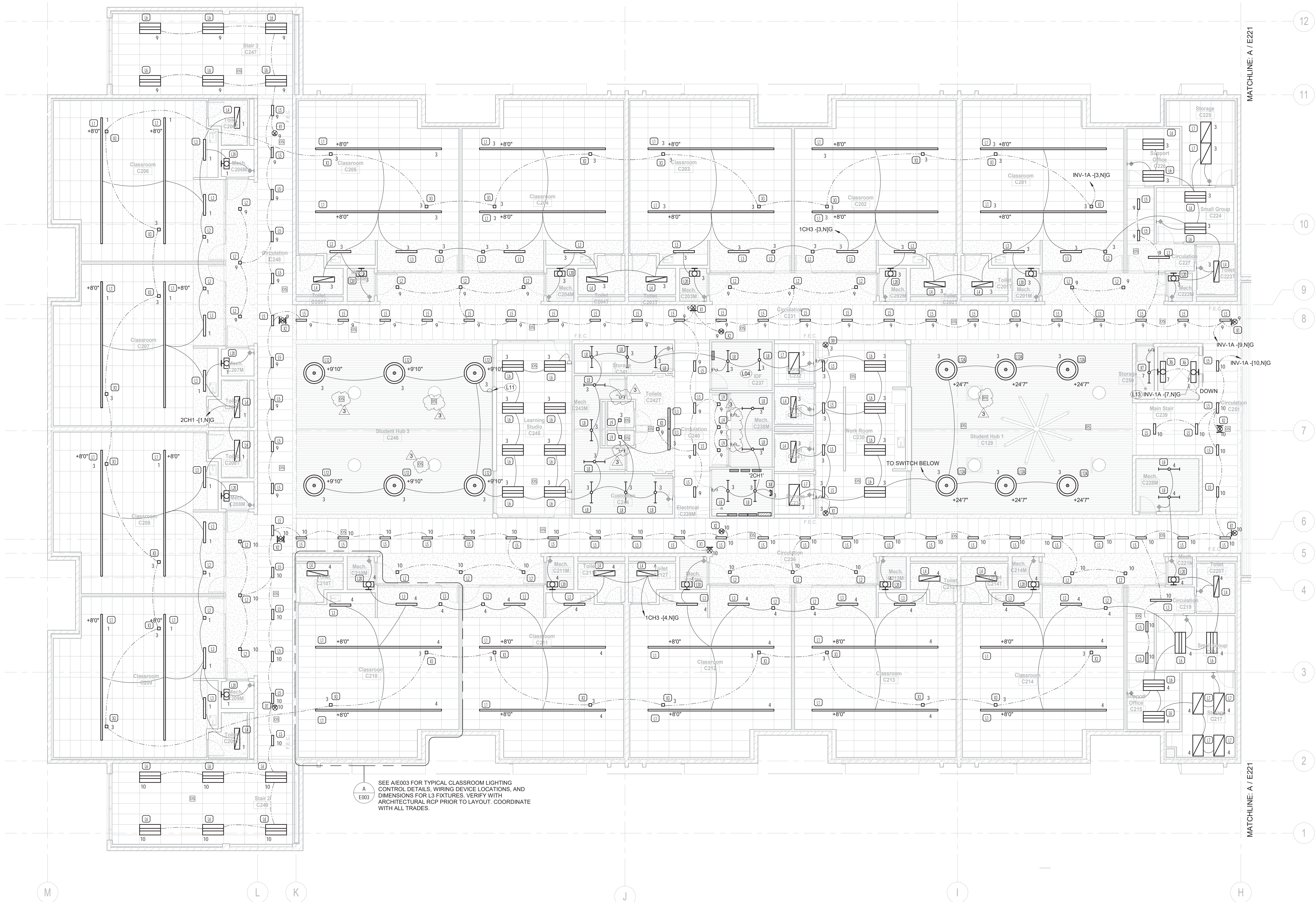
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GENERAL NOTES

1. LIGHTING FIXTURES DESIGNATED AS 'EMERGENCY' SHALL BE WIRED TO OPERATE WITH LOCAL SWITCHING UNDER NORMAL POWER CONDITIONS AND SHALL OPERATE VIA EMERGENCY BATTERY PACK OR INVERTER UPON LOSS OF BUILDING UTILITY POWER ONLY, UNLESS NOTED OTHERWISE.
2. EXIT SIGNS SHALL BE WIRED AHEAD OF LOCAL SWITCHING AND LIGHTING CONTROL PANEL FOR CONTINUOUS OPERATION. EXIT SIGNS SHALL BE WALL-MOUNTED ABOVE DOORS WHERE PRACTICAL. PROVIDE ADDITIONAL EXIT SIGNS AS NECESSARY FOR APPROVAL BY THE AUTHORITY HAVING JURISDICTION, PER ARCHITECTS FINAL PATH OF EGRESS / EXITING PLAN.
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4. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, ETC. FOR EXACT LOCATION OF LIGHTING FIXTURES.
5. EXACT LOCATION AND MOUNTING HEIGHT OF EXTERIOR BUILDING-MOUNTED FIXTURES SHALL BE COORDINATED WITH ARCHITECT PRIOR TO ROUGH-IN.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING FINAL FIXTURE LOCATIONS, ABOVE-CEILING HOUSING CLEARANCES, ETC. WITH MECHANICAL, PLUMBING, SPRINKLER CONTRACTOR AND OTHER TRADES PRIOR TO ROUGH-IN.
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8. PROVIDE STAINLESS STEEL DEVICE PLATES IN KITCHEN AND ROUGH-SERVICE AREAS.
9. CONDUIT FOR BUILDING-MOUNTED LIGHT FIXTURES SHALL BE ROUTED THROUGH INTERIOR OF BUILDING. LIGHT FIXTURE BACKBOXES SHALL BE RECESSED.
10. REFER TO LIGHTING CONTROL DIAGRAM AND NOTES ON SHEET E003.

SHEET NOTES

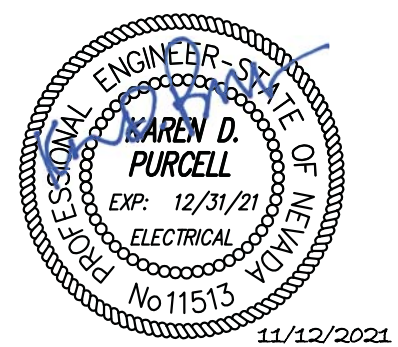
- L04 COORDINATE LIGHTING LAYOUT WITH TELECOM EQUIPMENT AND CABLE TRAY.
- L11 PROVIDE KEYED DIMMER SWITCH FOR CONTROL OF CYLINDER PENDANT LIGHTING IN STUDENT HUB.
- L13 COORDINATE LOCATION AND MOUNTING WITH ELEVATOR CONTRACTOR.



SEE A/E003 FOR TYPICAL CLASSROOM LIGHTING CONTROL DETAILS, WIRING DEVICE LOCATIONS, AND DIMENSIONS FOR L3 FIXTURES. VERIFY WITH ARCHITECTURAL RSP PRIOR TO LAYOUT. COORDINATE WITH ALL TRADES.

ENLARGED 2ND FLOOR
LIGHTING PLAN - AREA C

Scale: 1/8" = 1'-0"



Professional Seal
Date: 11/16/21
Revision: Addendum 3



PK Electrical, Inc.
Engineering Design Consulting
883 Sierra Rose Dr., Ste. B | Reno, Nevada 89511 | 775.826.9010
5385 DTC Parkway, Suite 420 | Greenwood Village, Colorado 80111 | 720.481.3290
pkelctrical.com © 2008-2016 PK Electrical, Inc. 19186

Consultant

H+K ARCHITECTS
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Reno, Nevada 89511-2262
P 775+332+6640
F 775+332+6642
hkarchitects.com

Washoe County School District
Rio Wrangler Elementary School

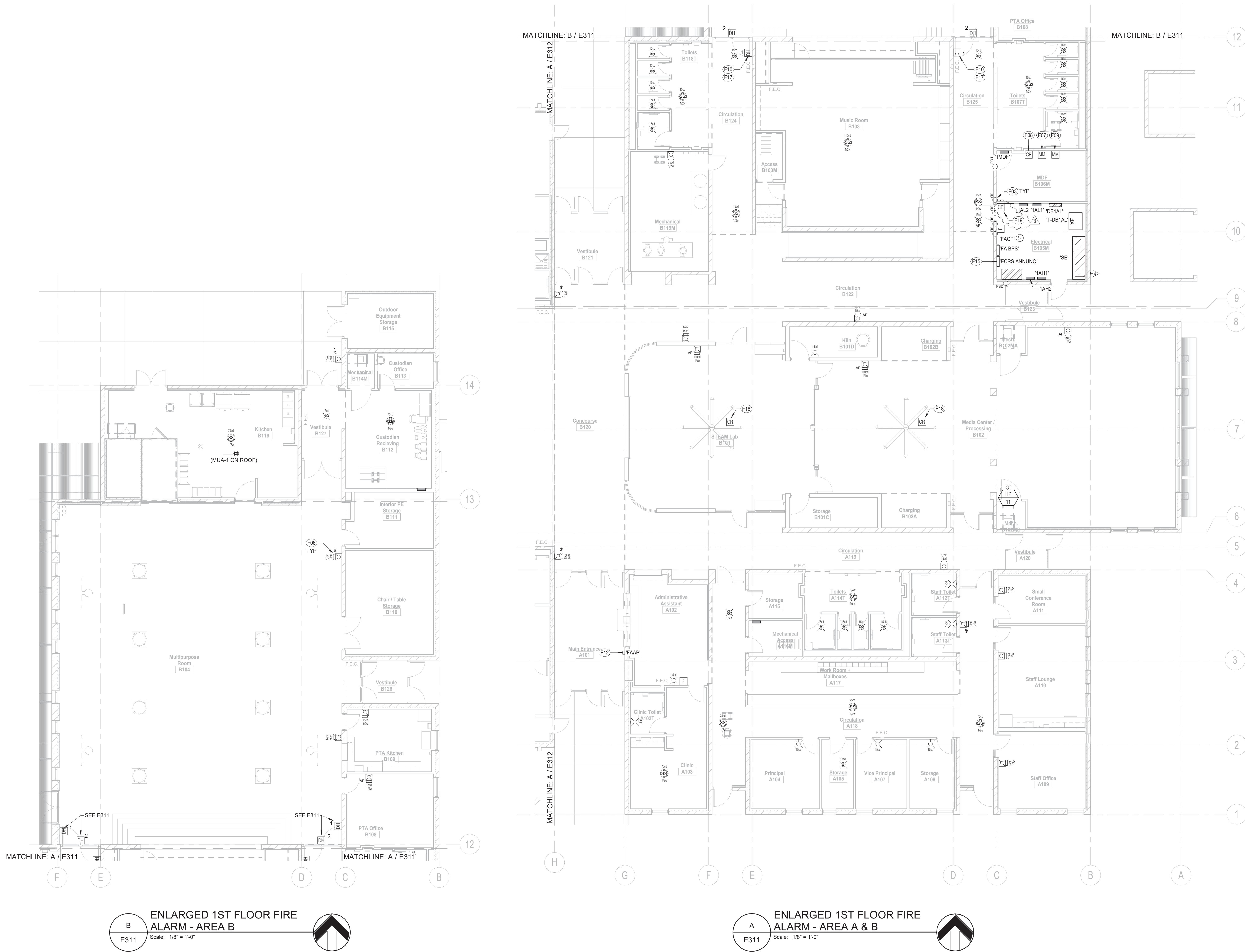
10600 Green Pasture Drive
Reno, Nevada 89521

ENLARGED 2ND FLOOR
LIGHTING PLAN - AREA C

October 13, 2021
H+K Project No: 2001

E222





GENERAL NOTES

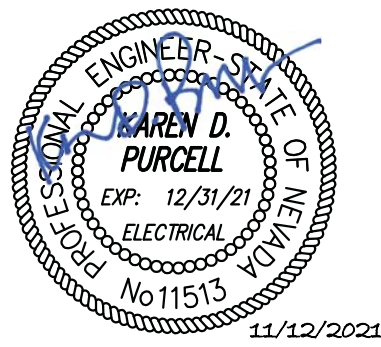
1. ALL DETECTION DEVICES FOR MECHANICAL EQUIPMENT (HEAT PUMPS, DAMPERS, ETC) SHALL BE CAREFULLY COORDINATED WITH THE MECHANICAL DRAWINGS AND CONTRACTOR FOR INSTALLATION. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL TERMINATIONS, WIRING, AND CONNECTIONS FOR UNIT SHUTDOWN AND CONTROL.
2. COORDINATE DEVICE PLACEMENT IN CEILING WITH OTHER TRADES, SUCH AS LIGHTING, TELECOM, MECHANICAL, ETC. ALL FIRE ALARM DEVICES LOCATED IN CEILING TILES SHALL BE LOCATED IN THE CENTER OF THE CEILING TILE, OR AS DIRECTED BY THE ARCHITECT.
3. INFORMATION ON ARCHITECTURAL AND MECHANICAL DRAWINGS SUPERSEDE INFORMATION SHOWN ON ELECTRICAL DRAWINGS. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ROUGH-IN.
4. SEE FIRE ALARM MASTER LEGEND AND GENERAL NOTES.
5. COORDINATE TAMPER AND FLOW SWITCH LOCATIONS AND REQUIREMENTS WITH FIRE PROTECTION CONTRACTOR.
6. SEE TELECOM DRAWINGS FOR CODE RED SYSTEM OPERATION INTENT. CONTRACTOR RESPONSIBLE FOR MONITORING OF CODE RED AND EMERGENCY RESPONDER SYSTEMS.

SHEET NOTES

- F03 COMBINATION FIRE/SMOKE DAMPER. PROVIDE SMOKE DETECTION IN ACCORDANCE WITH IBC 717. COORDINATE ALL WORK AND LOCATIONS WITH MECHANICAL CONTRACTOR.
- F06 PROVIDE PROTECTIVE WIRE GUARD CAGE ON DEVICE.
- F07 PROVIDE (3) MONITOR MODULE POINTS FOR MONITORING OF EMERGENCY RESPONDER RADIO SYSTEM EQUIPMENT. COORDINATE WITH TELECOM DRAWINGS.
- F08 PROVIDE CONTROL RELAY TO PA SYSTEM WHEN FIRE ALARM SYSTEM IS ACTIVE (ALARM).
- F09 PROVIDE MONITOR MODULE TO PA SYSTEM FOR MONITORING OF CODE RED ACTIVATION.
- F10 PROVIDE RELAY FOR DOOR MAG LOCKS. COORDINATE WITH DOOR HARDWARE SUPPLIER AND POWER PLANS. DOOR MAG LOCKS TO BE INTEGRATED WITH FIRE ALARM SYSTEM/CODE RED.
- F12 PROVIDE FLUSH MOUNTED REMOTE ANNUNCIATOR WITH MICROPHONE FOR REMOTE PAGING CAPABILITIES.
- F15 PROVIDE MONITORING OF EMERGENCY RADIO SYSTEM ANNUNCIATOR BY FACP. COORDINATE WITH MANUFACTURER AND TELECOM DRAWINGS.
- F17 DOOR MAG HOLDS. SEE POWER PLANS FOR CIRCUITING. TYPICAL OF DOORS B124 & B125. DOOR MAGS MARKED '1' TO BE NORMALLY ENERGIZED AND RELEASE ON KEYSWITCH AND CODE RED ACTIVATION. DOOR MAG 2 SHALL ENERGIZE ON CODE RED ACTIVATION ONLY. MOMENTARY KEYSWITCH '2' SHALL DISABLE MAG HOLD. SEE POWER PLANS FOR ADDITIONAL INFORMATION.
- F18 PROVIDE CONTROL RELAY TO SHUT DOWN HVALS FAN UPON FIRE ALARM SYSTEM ACTIVATION. COORDINATE WITH BMS CONTRACTOR FOR LOCATION AND REQUIREMENTS.
- F19 PROVIDE RELAY INPUT TO NETWORK LIGHTING SYSTEM. FACP 'ALARM' SIGNAL SHALL FORCE ALL SYSTEM LIGHTING CONTROLS TO FULL BRIGHT OUTPUT.

B
E311
ENLARGED 1ST FLOOR FIRE
ALARM - AREA B
Scale: 1/8" = 1'-0"

A
E311
ENLARGED 1ST FLOOR FIRE
ALARM - AREA A & B
Scale: 1/8" = 1'-0"



Professional Seal
3 Date 11/16/21 Revision Addendum 3



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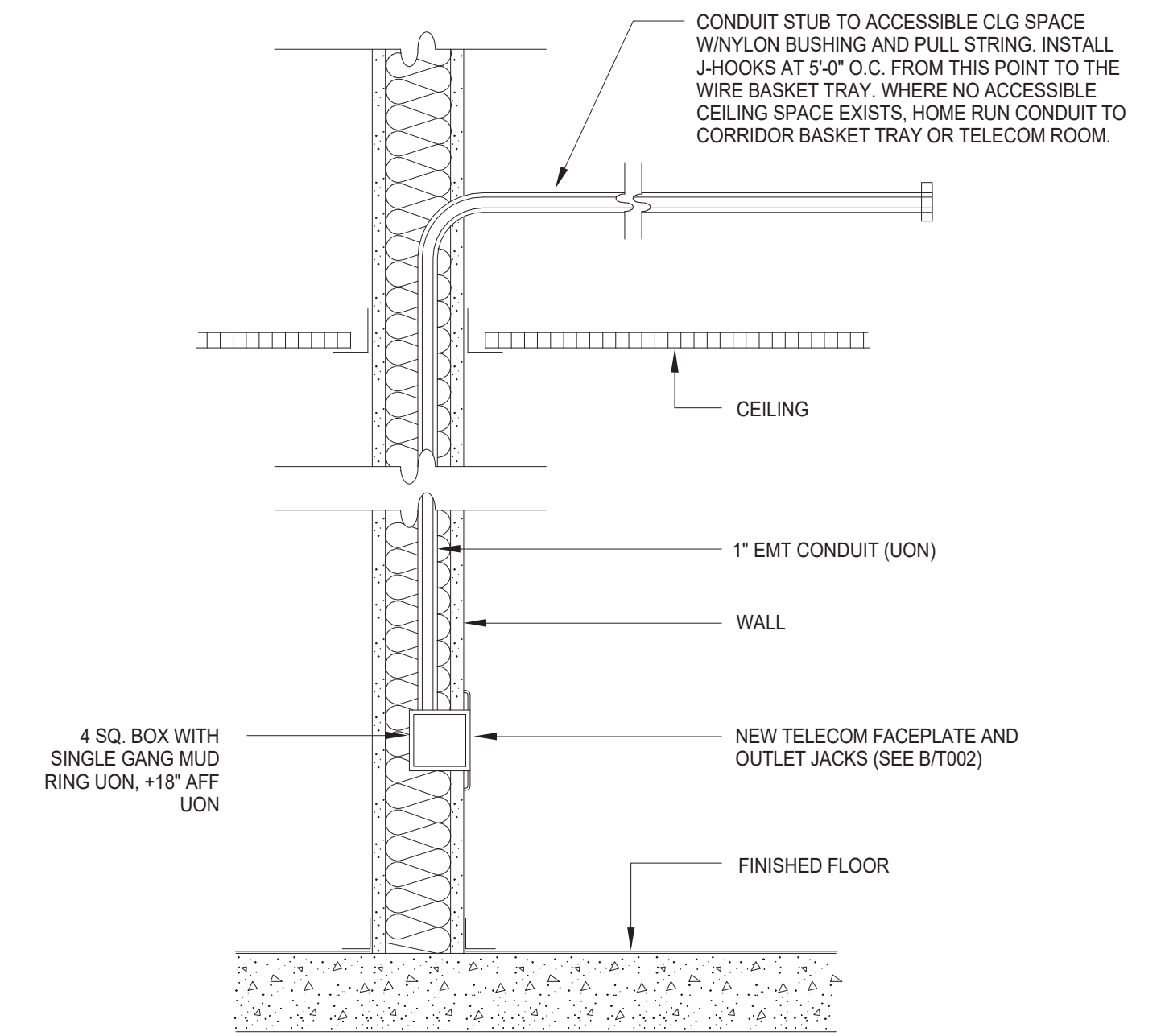
10600 Green Pasture Drive
Reno, Nevada 89521

ENLARGED 1ST FLOOR
FIRE ALARM - AREAS A
& B

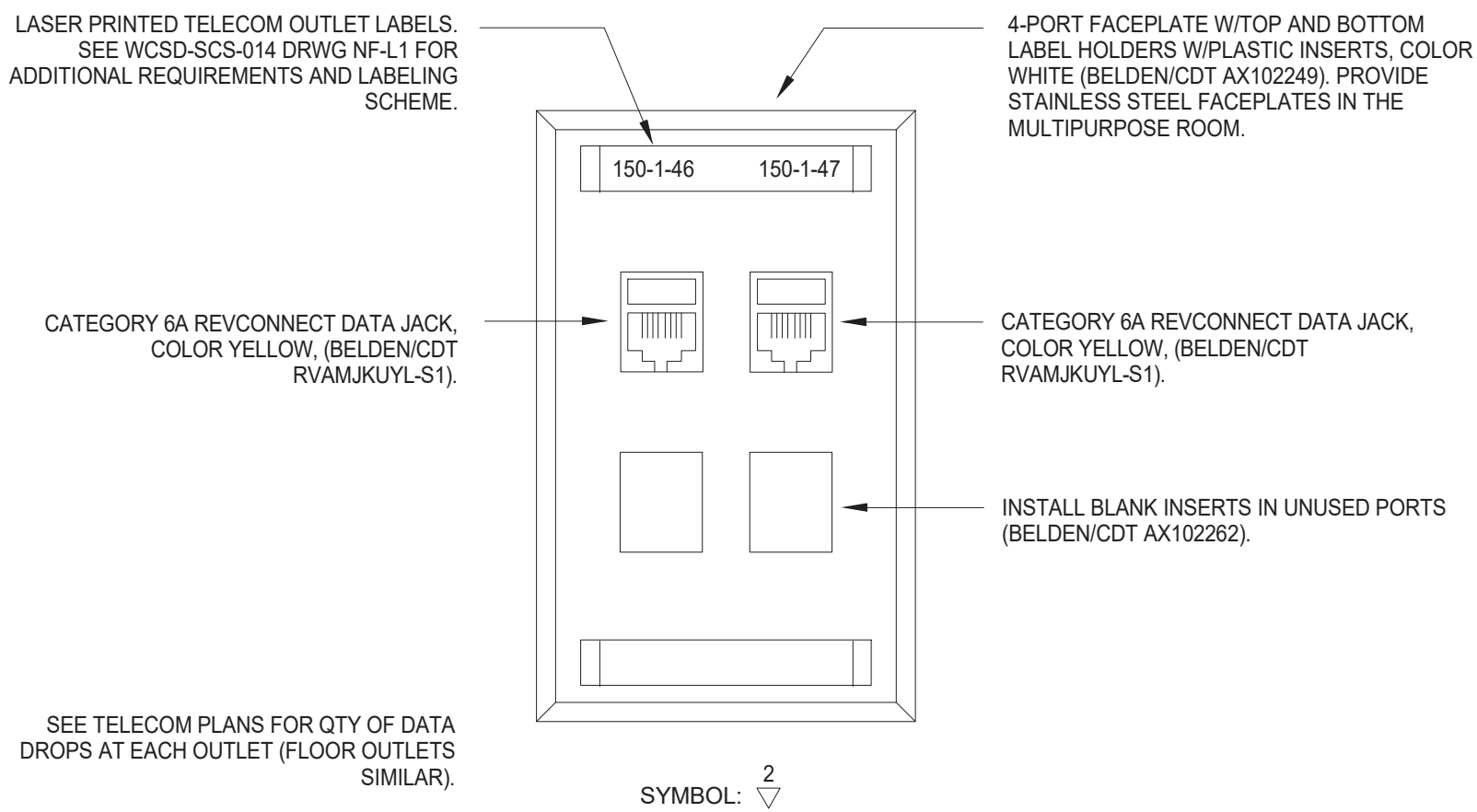
October 13, 2021
H+K Project No: 2001

E311

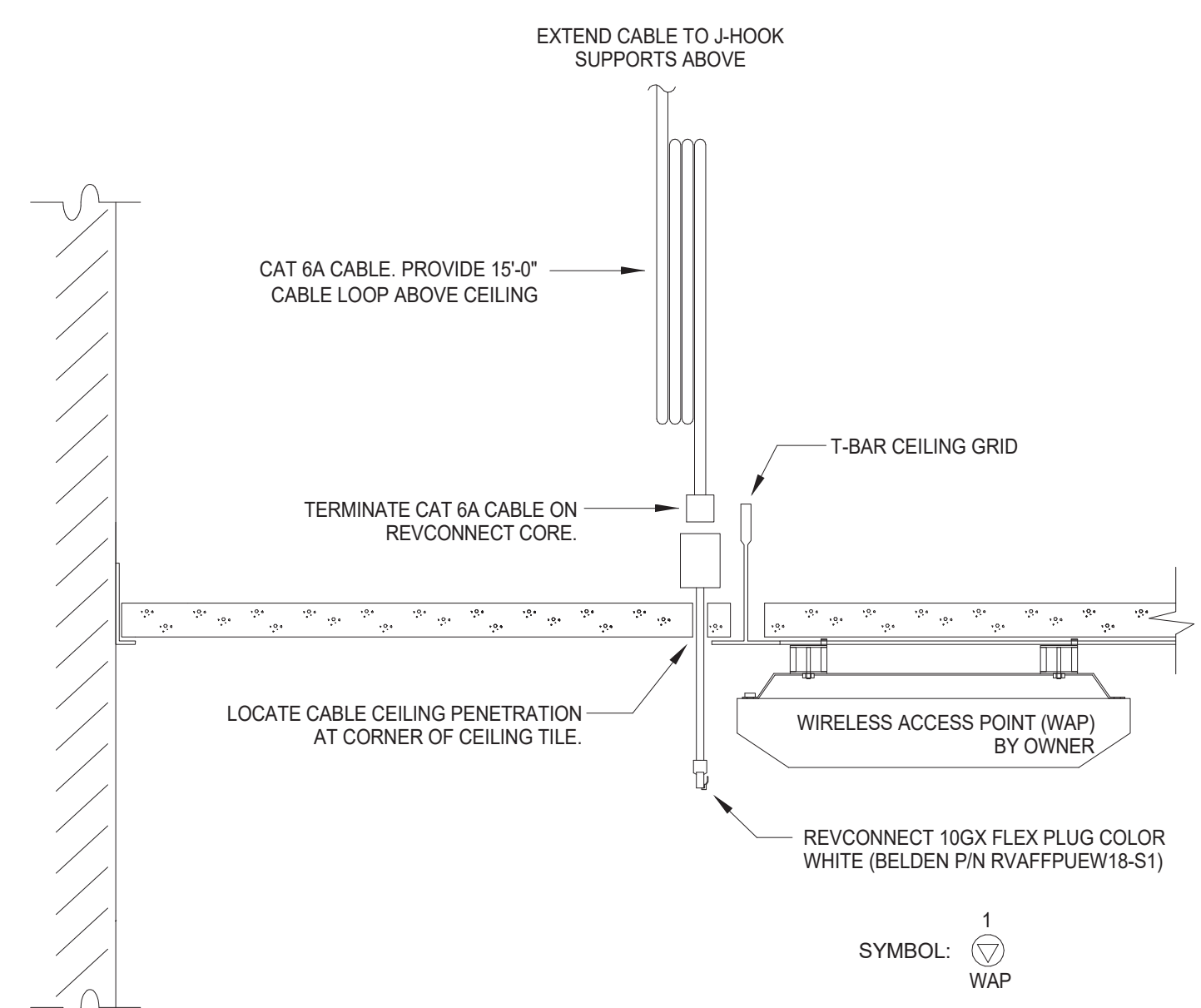




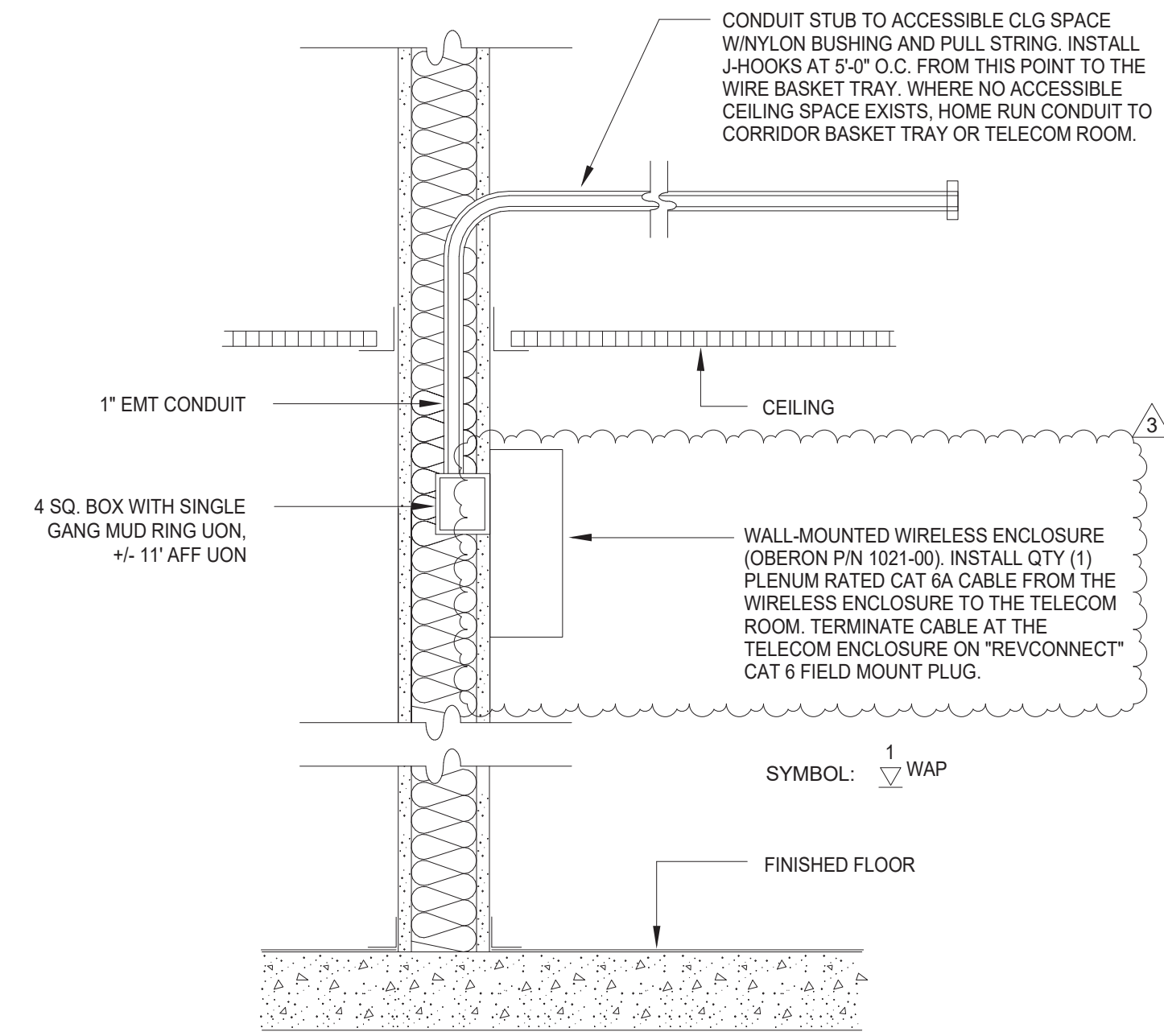
A TELECOM WORK AREA BOX ROUGHIN
T002 SCALE: NONE



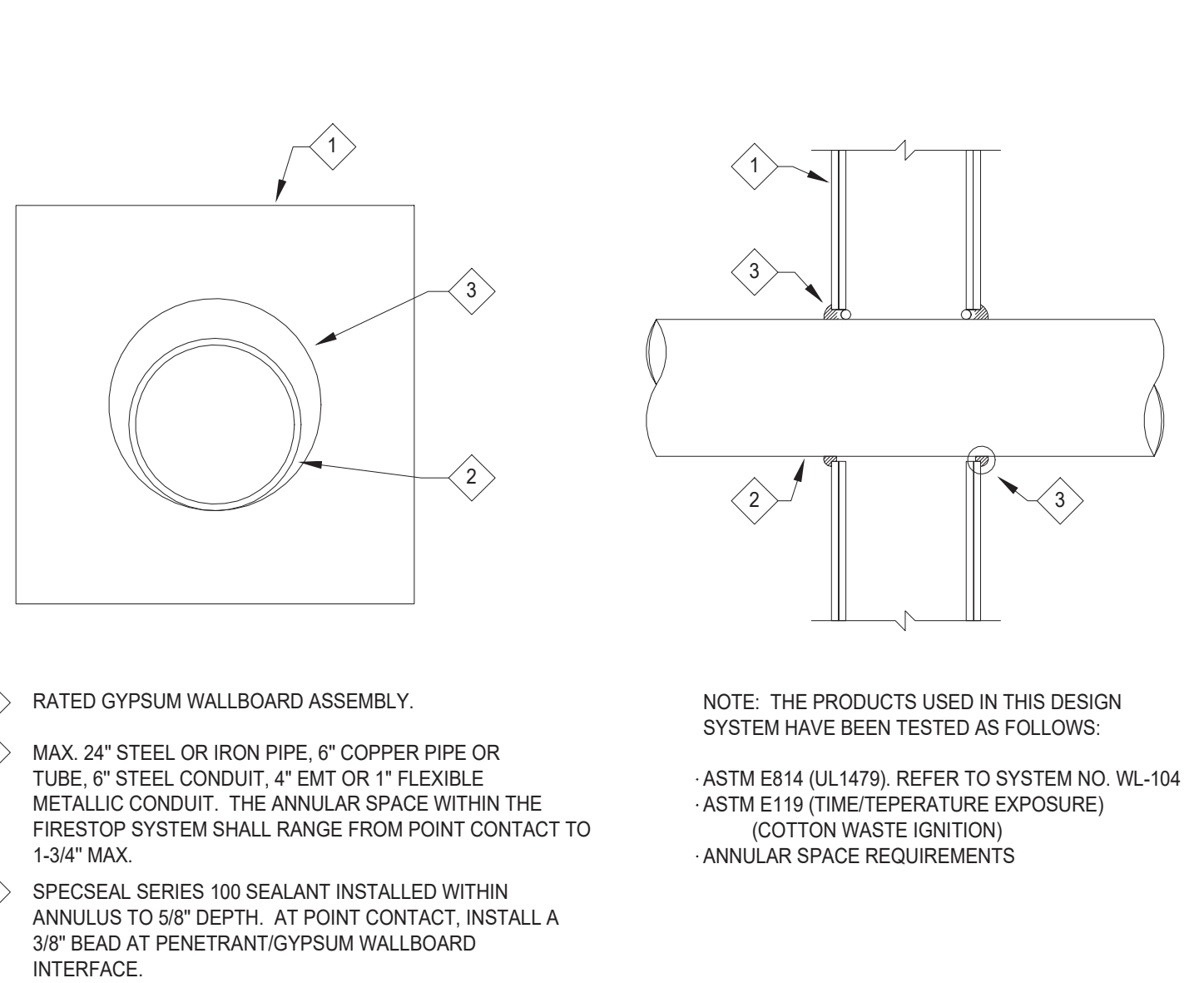
B TELECOM OUTLET DETAILS
T002 SCALE: NONE



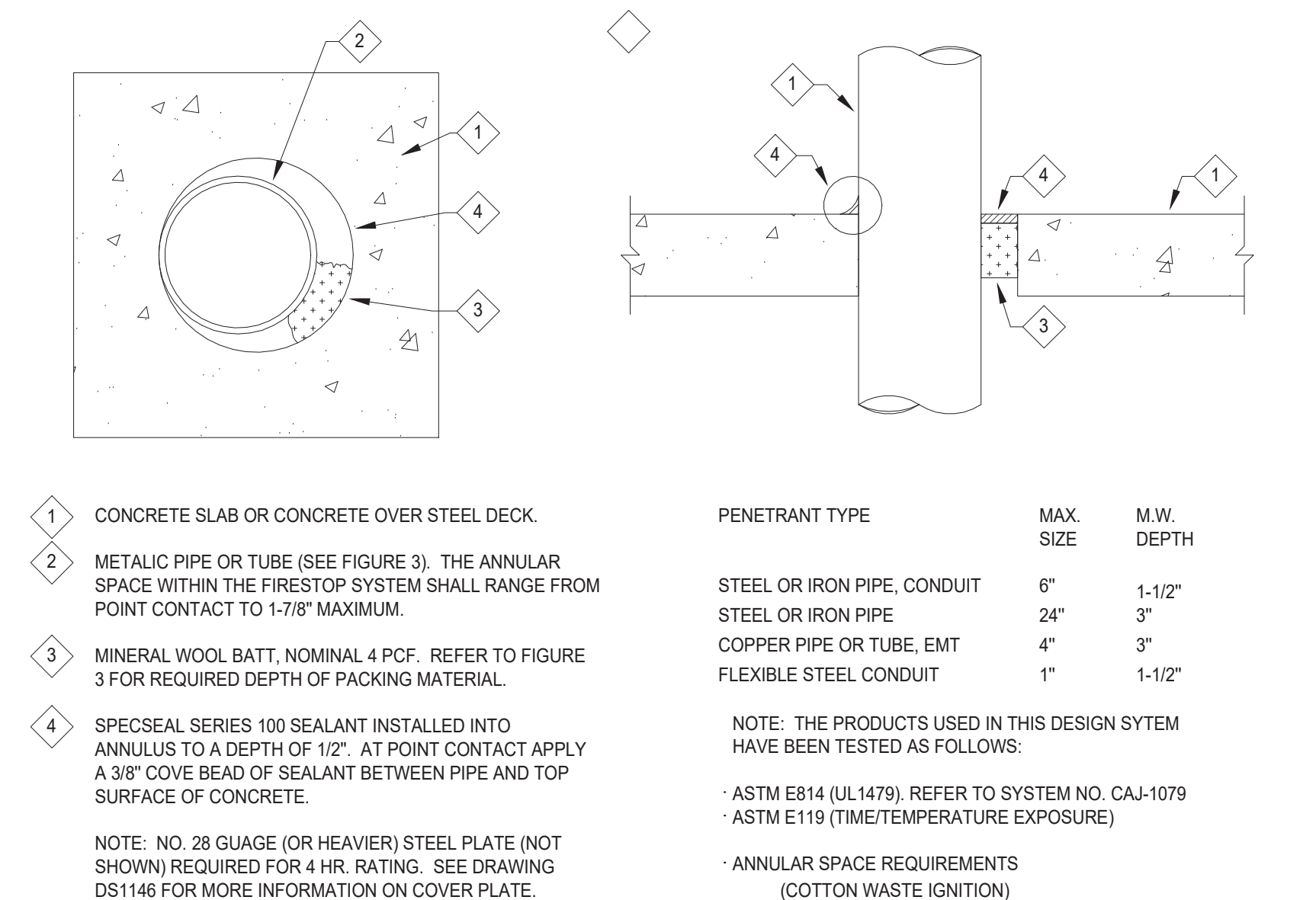
C CEILING MOUNTED WIRELESS ACCESS POINT (WAP)
T002 SCALE: NONE



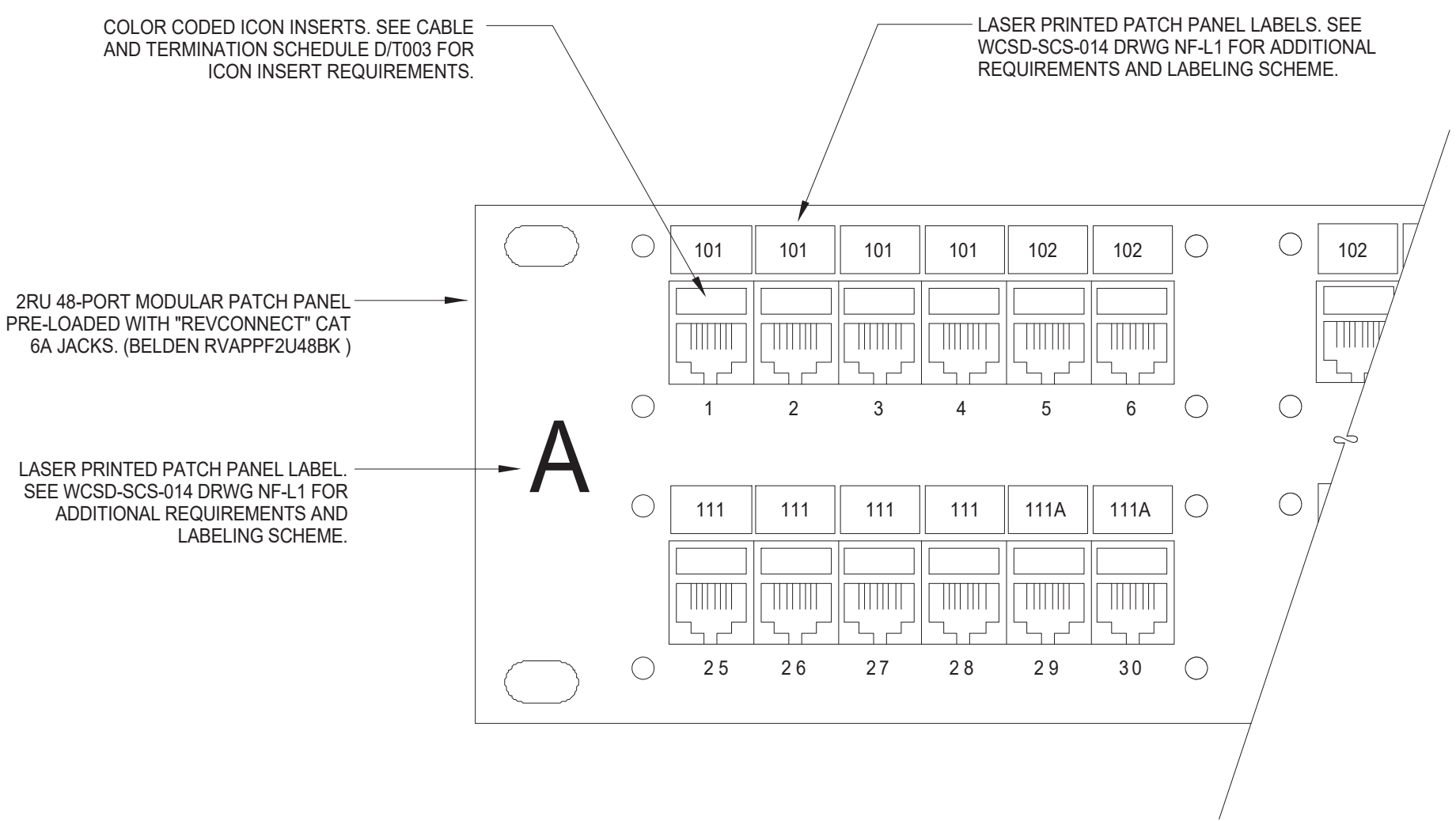
D WALL MOUNTED WIRELESS ENCLOSURE
T002 SCALE: NONE



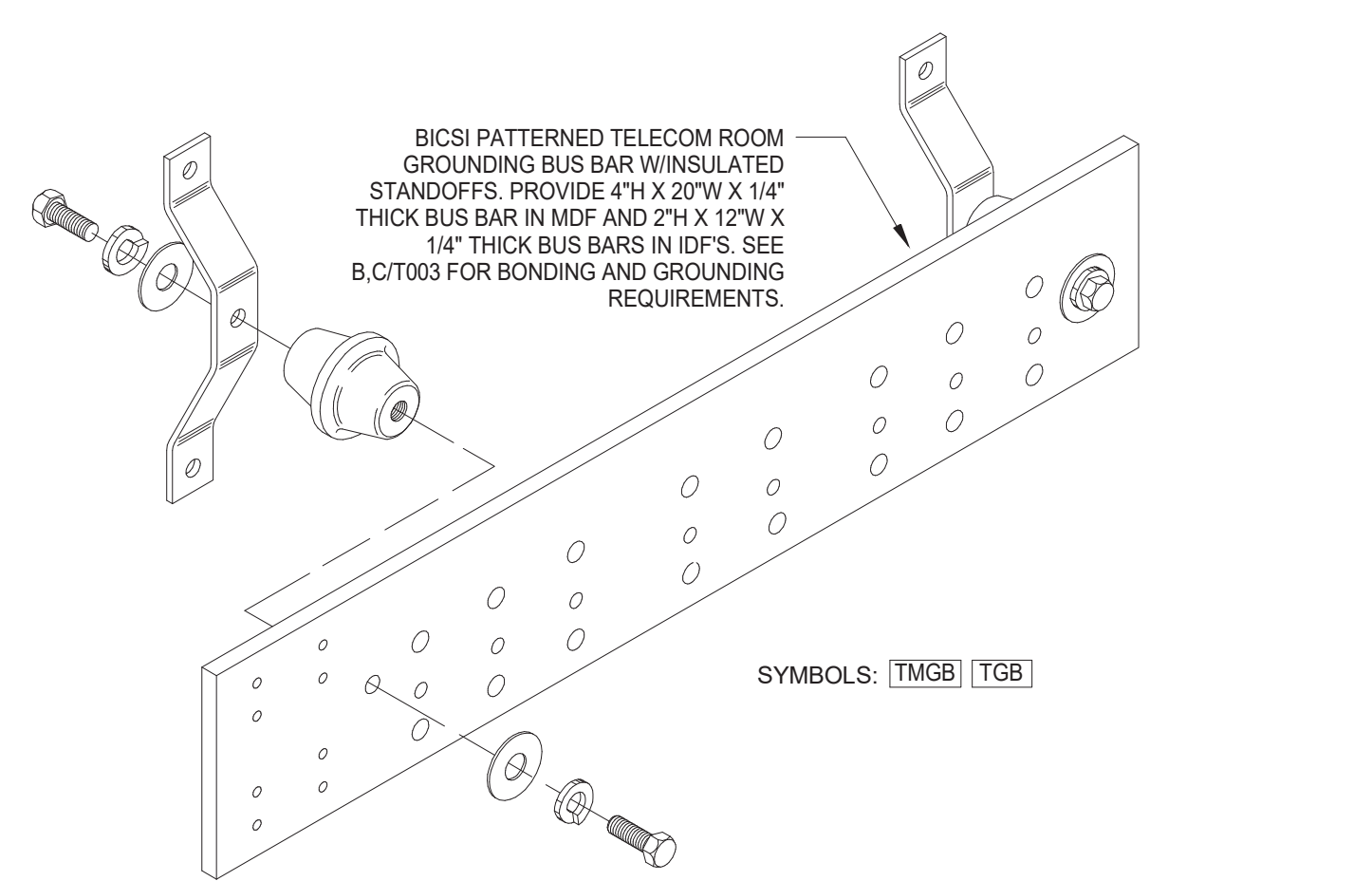
E 1 OR 2 HOUR RATED GYPBOARD WALL PENETRATION
T002 SCALE: NONE



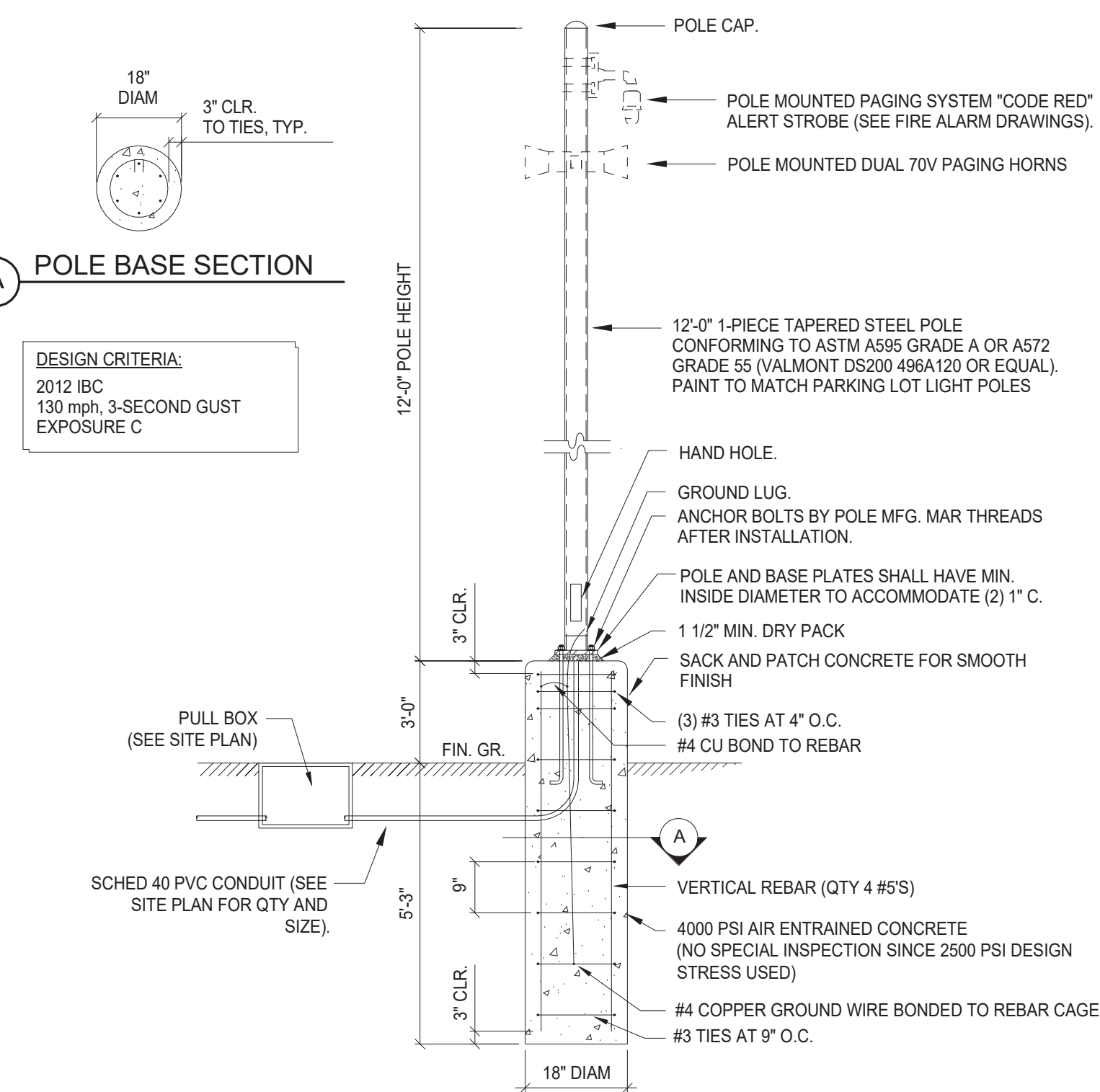
F 2 OR 4 HOUR RATED CONCRETE SLAB PENETRATION
T002 SCALE: NONE



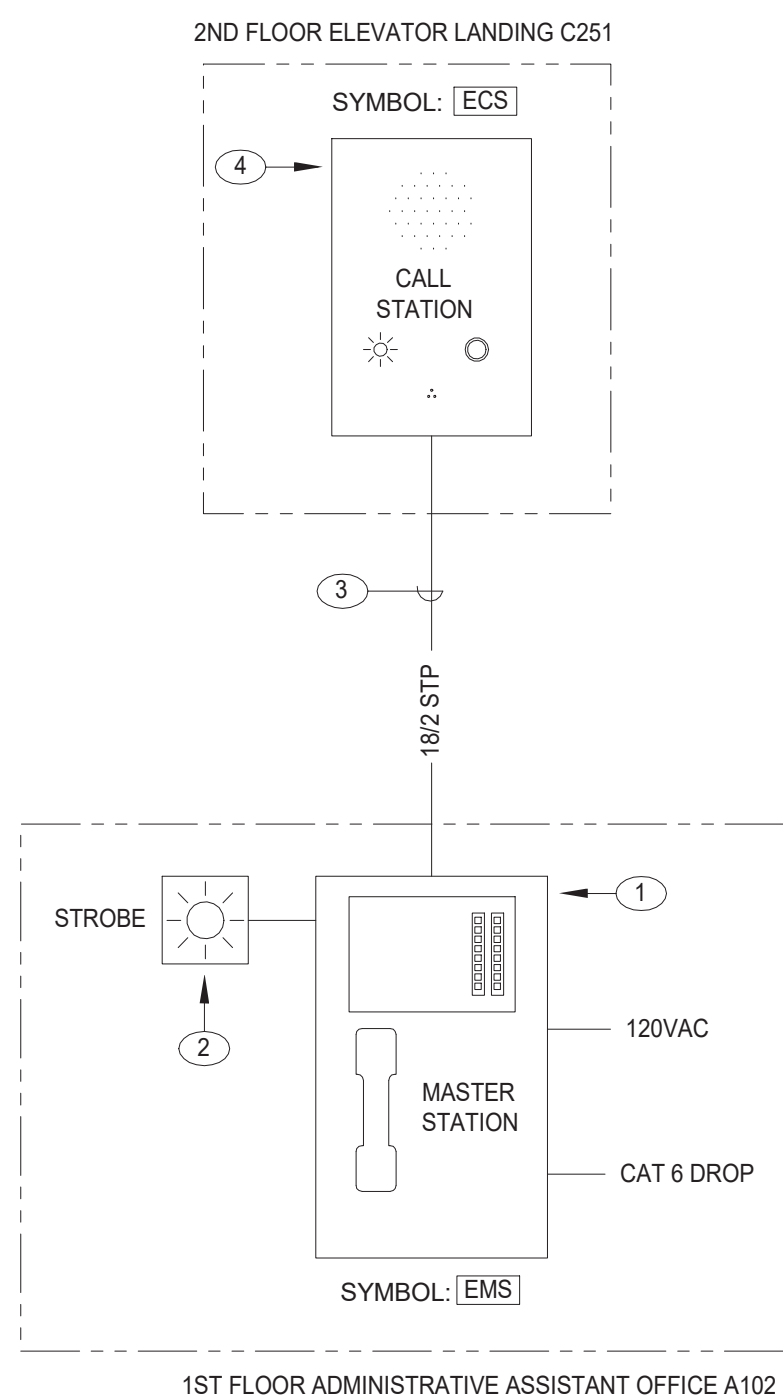
G 48 PORT CAT 6A PATCH PANEL
T002 SCALE: NONE



H TELECOM GROUNDING BAR
T002 SCALE: NONE



I DEDICATED SECURITY POLE
T002 SCALE: NONE



J ELEVATOR LANDING 2-WAY COMM SYSTEM
T002 SCALE: NONE

ELEVATOR LANDING 2-WAY COMM GENERAL NOTES

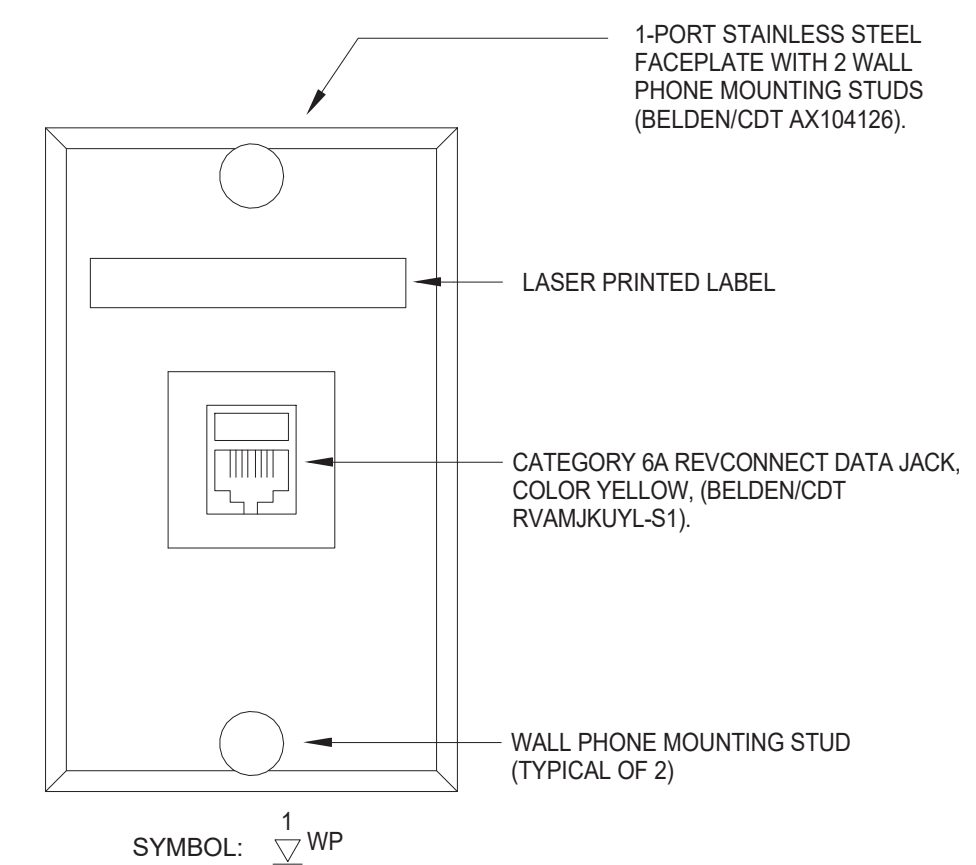
1. PROVIDE 2-WAY COMMUNICATION SYSTEM BETWEEN THE 2ND FLOOR ELEVATOR LANDING C251 AND ADMINISTRATIVE ASSISTANT OFFICE A102. PROVIDE FLUSH MOUNTED HANDS FREE PUSH BUTTON CALL STATIONS AT THE 2ND FLOOR ELEVATOR LANDING. WHEN A CALL IS INITIATED FROM THE ELEVATOR LANDING CALL STATION, THE CALL SHALL BE PLACED TO THE MASTER STATION LOCATED IN ADMINISTRATIVE ASSISTANT OFFICE A102. IF THE CALL IS NOT ANSWERED AT THE MASTER STATION AFTER A PRESET NUMBER OF RINGS, THE MASTER STATION SHALL REDIRECT THE CALL TO 911. THE MASTER STATION SHALL BE CAPABLE OF PLACING CALLS TO THE ELEVATOR LANDING CALL STATION.

ELEVATOR LANDING 2-WAY COMM SHEET NOTES

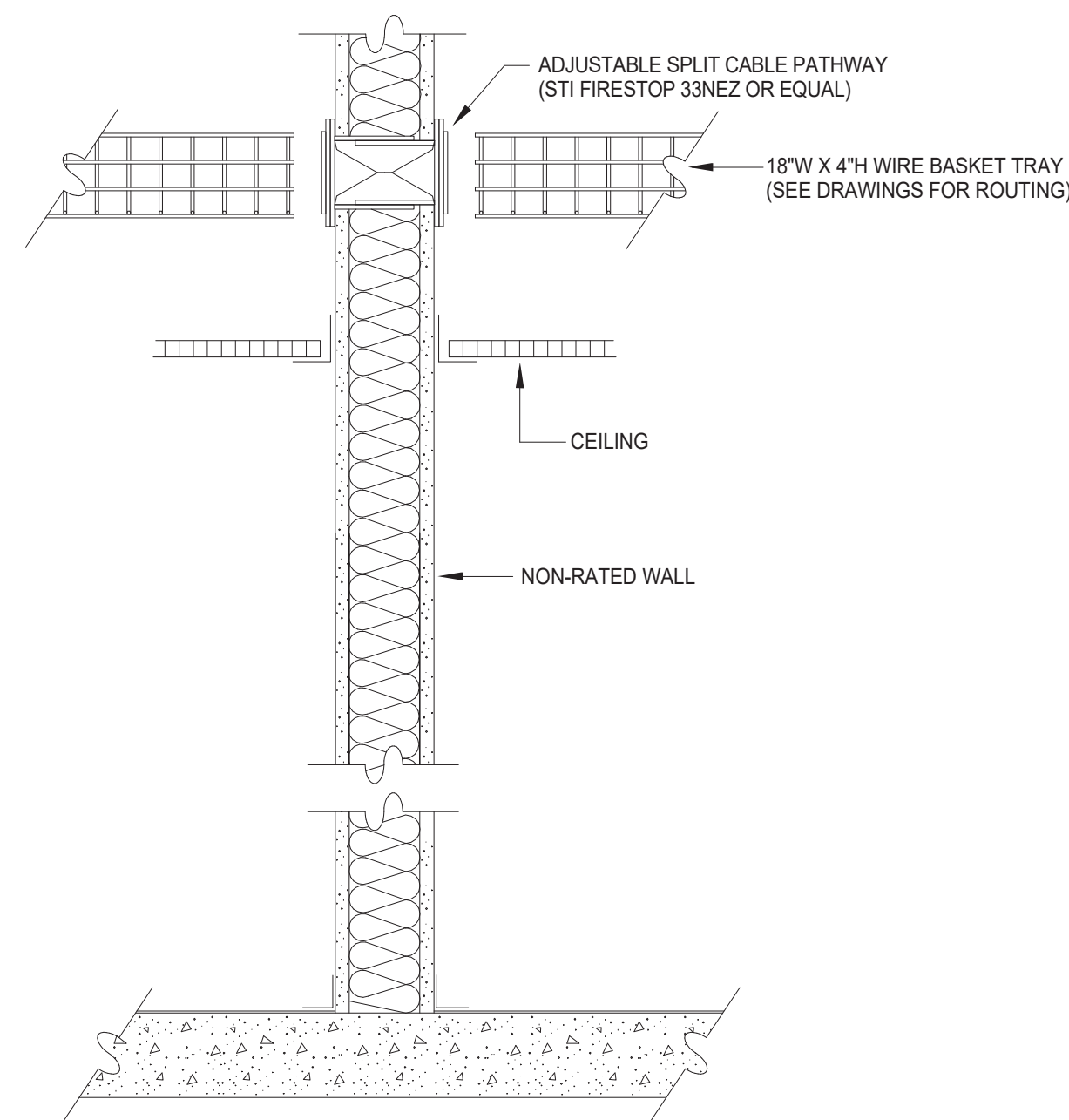
1. FLUSH WALL MOUNTED MASTER STATION LOCATED IN ADMINISTRATIVE ASSISTANT OFFICE A102 (TALKPHONE AOR-8). INSTALL CAT 6 CABLE DROP FROM MASTER STATION TO MDF FOR CONNECTION TO OUTSIDE TELEPHONE LINE.
2. MOUNT STROBE / SOUNDER IN 4\"/>

2-WAY COMM SYSTEM LEGEND

SYMBOL	DESCRIPTION
[EMS]	EMERGENCY MASTER STATION: FLUSH WALL MOUNTED WITH PLENUM CAT 6 DROP.
[ECS]	EMERGENCY CALL STATION: FLUSH WALL MOUNTED HANDS FREE STAINLESS STEEL CALL STATION LOCATED AT 2ND FLOOR ELEVATOR LANDING.



K WALL PHONE OUTLET
T002 SCALE: NONE



L CABLE PATHWAYS AT CABLE TRAY NON-RATED WALL PENETRATIONS
T002 SCALE: NONE

SITE NOTES:

1. ALL CONSTRUCTION SHALL CONFORM TO THE STANDARD SPECIFICATIONS, AND THE LATEST STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION 2012 EDITION (AND ANY APPURTENANT SUPPLEMENTS) SPONSORED AND DISTRIBUTED BY RENO, SPARKS, AND WASHOE COUNTY, AND THE GEOTECHNICAL INVESTIGATION ENTITLED "GEOTECHNICAL INVESTIGATION UPDATE DAMONTE RANCH ELEMENTARY SCHOOL," DATED JANUARY 6, 2020.
2. THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTION WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES DURING CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POT-HOLING PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POT-HOLING PRIOR TO CONSTRUCTION.
4. ALL REQUIRED UTILITY SHUT-DOWNS SHALL BE COORDINATED WITH APPROPRIATE UTILITY COMPANY AND LEGISLATIVE PERSONNEL.
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE, PERMIT AND IMPLEMENT A STORM WATER POLLUTION PREVENTION PLAN IN CONFORMANCE WITH FEDERAL, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR SHALL MAINTAIN EXISTING BMP IMPROVEMENTS THAT ARE IN PLACE, AND SHALL PROVIDE AND MAINTAIN ADDITIONAL BMP'S AS REQUIRED TO IMPLEMENT HIS SWPPP.
6. THE CONTRACTOR SHALL OBTAIN AND THE OWNER SHALL PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.
7. THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, NEVADA ENERGY, CITY OF RENO, AND THE TRUCKEE MEADOWS WATER AUTHORITY 48 HOURS PRIOR TO COMMENCEMENT OF WORK.
8. ALL DIMENSIONS ARE TO FRONT FACE OF CURB UNLESS NOTED OTHERWISE.
9. ALL STRIPING AND SIGNAGE SHALL CONFORM TO THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS PREPARED BY THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION.

GENERAL NOTES:

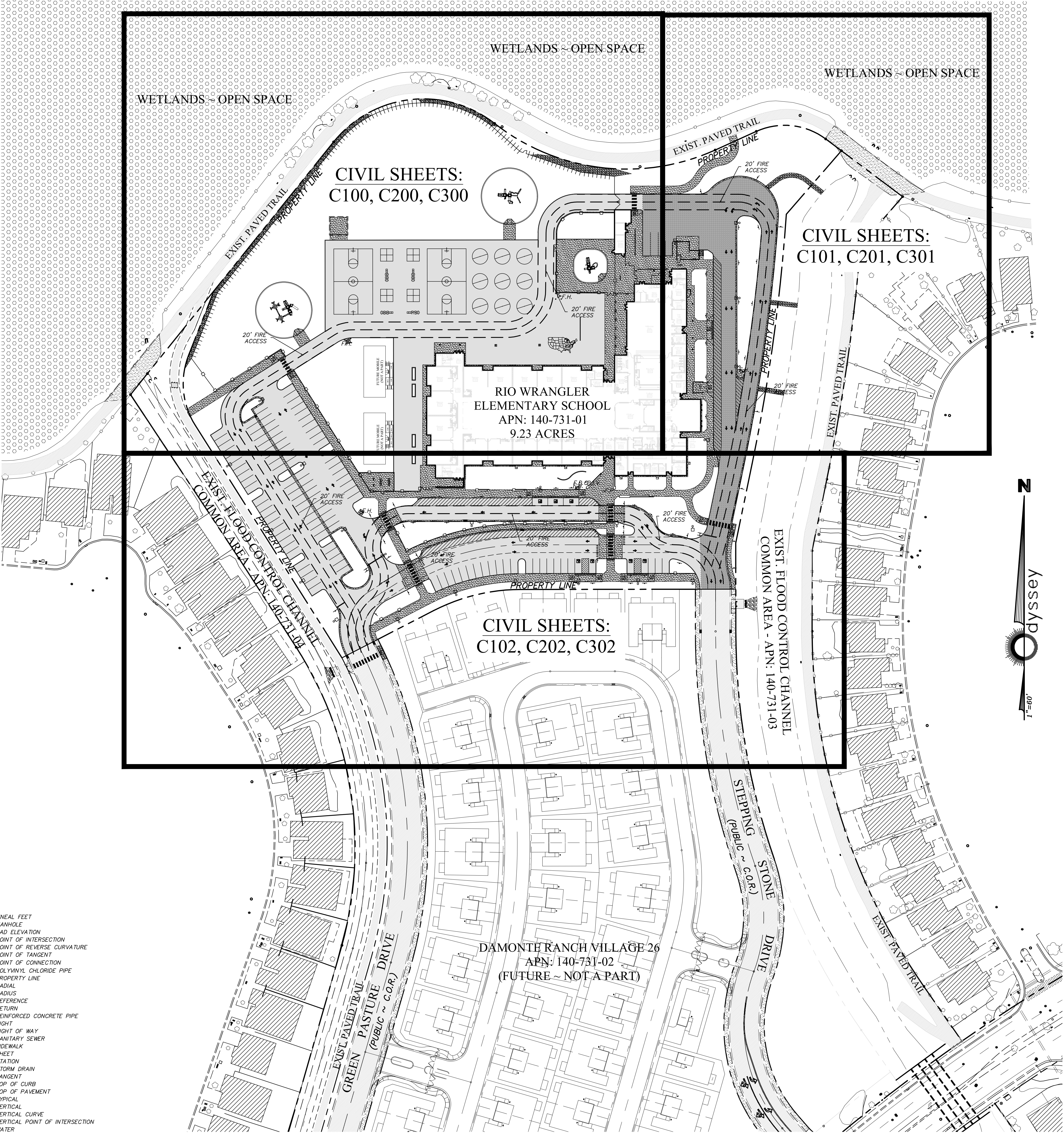
1. ALL CONSTRUCTION SHALL BE PER UNIFORM STANDARD SPECIFICATIONS AND DRAWINGS, RENO NEVADA.
2. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION.
3. THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTION WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES DURING CONSTRUCTION.
4. THE CONTRACTOR SHALL MAINTAIN A DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS. THE CONTRACTOR SHALL ALSO MAINTAIN CONFORMITY WITH SECTION 040.030 OF THE WASHOE COUNTY AIR POLLUTION REGULATIONS.
5. THE CONTRACTOR SHALL MAINTAIN AN ON-GOING PROCESS OF REMOVAL OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.
6. LAND GRADING SHALL BE DONE IN A METHOD TO PREVENT DUST FROM TRAVERSING THE PROPERTY LINE.
7. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.
8. THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, CITY OF RENO, NV ENERGY, AND TMAA 48 HOURS PRIOR TO COMMENCEMENT OF WORK.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POT-HOLING PRIOR TO CONSTRUCTION.
10. ADD 4,400 FEET TO ALL SPOT ELEVATIONS.
11. REFERENCE GEOTECHNICAL REPORT BY BLACK EAGLE CONSULTING, INC. FOR SITE PREP AND GRADING RECOMMENDATIONS.
12. ALL UTILITIES ARE PRIVATELY OWNED AND MAINTAINED.
13. AN ENCROACHMENT/EXCAVATION PERMIT WILL BE REQUIRED AND OBTAINED FROM CITY OF RENO PUBLIC WORKS PRIOR TO ANY CONSTRUCTION WITHIN ANY PUBLIC EASEMENT OR RIGHT-OF-WAY.

SWPPP GENERAL NOTES:

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF THE CITY OF SPARKS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE TRUCKEE MEADOWS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES HANDBOOK.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO STORMWATER GENERAL PERMIT NVR100000, SECTION 1.B.1.b(2).
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPs WEEKLY, PRIOR TO A FORECASTED RAIN EVENT AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS FROZEN GROUND CONDITIONS OR SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO STORMWATER GENERAL PERMIT NVR100000, SECTION 1.B.1.g.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.
6. SWPPP TO BE PROVIDED BY THE GENERAL CONTRACTOR

LIST OF ABBREVIATIONS:

A.C.	ASPHALTIC CONCRETE	L.F.	LINEAL FEET
B.C.	BEGIN CURVE	M.H.	MANHOLE
B.V.C.	BEGIN VERTICAL CURVE	P.	PAID ELEVATION
B.S.	BACK OF SIDEWALK	P.I.	POINT OF INTERSECTION
C.B.	CATCH BASIN	P.R.C.	POINT OF REVERSE CURVATURE
C.	CENTERLINE	P.O.T.	POINT OF TANGENT
CH	CHORD	P.O.C.	POINT OF CONNECTION
C.M.P.	CORRUGATED METAL PIPE	P.V.C.	POLYVINYL CHLORIDE PIPE
CONC.	CONCRETE	R	RADIAL
CONST.	CONSTRUCT	(R)	RADIUS
C.P.	CONCRETE PIPE	R	RADIUS
D.I.	DROP INLET	REF.	REFERENCE
DET.	DETAILS	RET.	RETURN
ELEV.	ELEVATION	R.C.P.	REINFORCED CONCRETE PIPE
E.C.	END OF CURVE	RT.	RIGHT
E.V.C.	END VERTICAL CURVE	R/W	RIGHT OF WAY
EXIST.	EXISTING	S.S.	SANITARY SEWER
E.G.	EXISTING GRADE	S.W.	SIDEWALK
F.F.	FINISH FLOOR	SHT.	SHEET
F.F.C.	FRONT FACE CURB	STA.	STATION
F.G.	FINISH GRADE	S.D.	STORM DRAIN
F.H.	FIRE HYDRANT	T.	TANGENT
F.	FLOW LINE	T.C.	TOP OF CURB
G.	GAS	T.P.	TOP OF PAVEMENT
G.B.	GRADE BREAK	TYP.	TYPICAL
HORIZ.	HORIZONTAL	VERT.	VERTICAL
INT.	INTERSECTION	V.C.	VERTICAL CURVE
I.E.	INVERT ELEVATION	V.P.I.	VERTICAL POINT OF INTERSECTION
L.T.	LEFT	W	WATER
L.	LENGTH		



CONSTRUCTION HOURS:

HOURS OF CONSTRUCTION, INCLUDING GRADING, SHALL BE BETWEEN THE HOURS OF 7:00 a.m. AND 6:00 p.m., MONDAY THROUGH FRIDAY, AND BETWEEN 8:00 a.m. AND 6:00 p.m. ON SATURDAY. THERE SHALL BE NO CONSTRUCTION ON SUNDAYS. A SIGN WITH THE CONSTRUCTION HOURS SHALL BE PLACED ON-SITE DURING CONSTRUCTION. IF THE CONSTRUCTION HOURS ARE VARIED FOR POURING OF CONCRETE SLABS OR WALL PANELS, A PLAN DETAILING THE CONSTRUCTION OPERATIONS SHALL BE SUBMITTED AND APPROVED TO THE SATISFACTION OF THE ADMINISTRATOR.

PARCEL INFORMATION:

APN: 140-731-01
OWNER: WASHOE COUNTY SCHOOL DISTRICT
PARCEL: 9.32 Ac
ZONING/MASTER PLAN: PUD
SITE ADDRESS: 10600 GREEN PASTURE DRIVE, RENO, NV 89521

FLOOD ZONE NOTE:

SITE LIES WITHIN AN AREA DESIGNATED BY FEMA AS ZONE X (UNSHADED) AS SHOWN ON FEMA FIRM MAP PANEL 32031C3261G, EFFECTIVE DATE 3/16/2009.

BASIS OF BEARING:

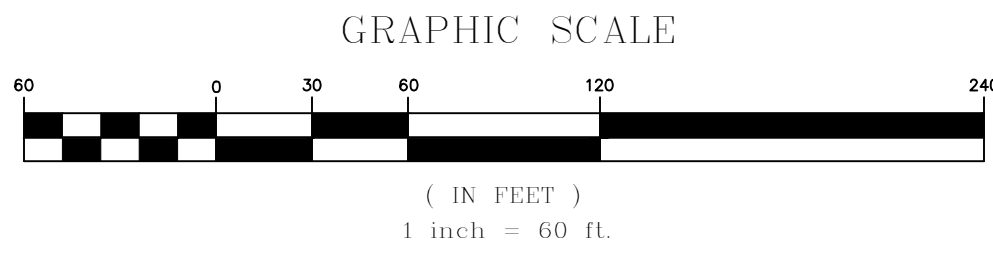
THE BASIS OF BEARINGS AND COORDINATES FOR THIS SURVEY WAS ESTABLISHED USING THE PUBLISHED COORDINATES (NAD 83/94, NEVADA WEST ZONE) FOR "WSGPS" AND "TRUCKEE" AS SHOWN HEREON. A COMBINED SCALE FACTOR OF 1.000197939 WAS USED. ALL DISTANCES ON THIS MAP ARE GROUND DISTANCES.

BASIS OF ELEVATION:

U.S.C. & G.S. REFERENCE MARK MONUMENT "RP#3" FOR "BROWN 2", BEING A 3 1/4" BRASS CAP SET IN CONCRETE SET IN 1955; ELEVATION TAKEN AS 4574.61 (13.33 FEET BELOW NAVD83 DATUM PER TIES TO CITY OF RENO BENCHMARKS 2315 AND 2340).

PARKING SUMMARY:

PARKING REQUIRED: 1 PER CLASSROOM, PLUS 1 PER 100 STUDENTS (PER CITY OF RENO MUNICIPAL CODE)
28 CLASSROOMS, 745 STUDENTS: 1(28) + 745/100 = 36 SPACES REQUIRED (4 ACCESSIBLE)
PARKING PROVIDED: 118 SPACES, 6 ACCESSIBLE, 6 OF WHICH ARE VAN ACCESSIBLE.
PARKING REQUIREMENTS PER CITY OF RENO MUNICIPAL CODE.



CIVIL SHEET INDEX:

- C000 - KEY MAP
- C100 - SITE PLAN
- C101 - SITE PLAN
- C102 - SITE PLAN
- C200 - GRADING PLAN
- C201 - GRADING PLAN
- C202 - GRADING PLAN
- C300 - UTILITY PLAN
- C301 - UTILITY PLAN
- C302 - UTILITY PLAN
- C400 - SIGNAGE AND STRIPING PLAN
- C500 - EROSION CONTROL PLAN
- C600 - SAFE ROUTE TO SCHOOL DISPLAY
- C601 - SAFE ROUTE TO SCHOOL DISPLAY
- C700 - HYDROLOGY DISPLAY
- C800 - FENCING PLAN
- C900 - FIRE PREVENTION PLAN
- C1000 - DETAIL SHEET
- C1001 - DETAIL SHEET
- C1002 - DETAIL SHEET
- C1003 - DETAIL SHEET
- C1004 - DETAIL SHEET
- C1005 - DETAIL SHEET
- C1006 - DETAIL SHEET
- C1007 - DETAIL SHEET
- C1008 - DETAIL SHEET
- C1009 - DETAIL SHEET
- C1010 - DETAIL SHEET

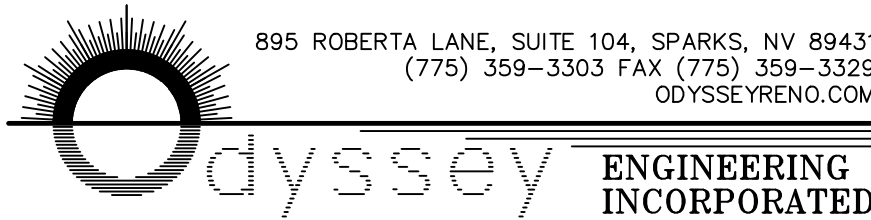
LEGEND:

- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG
64-28HV 3" AC W/ 6" TYPE 2
CLASS B AGG. BASE AT 95%
RELATIVE COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG
64-28HV 4" AC W/ 6" TYPE 2
CLASS B AGG. BASE AT 95%
RELATIVE COMPACTION
- GLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.f. W/ TIEBARS
OVERLAYING 4" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCUT LINE
- PROPOSED FENCE (6" CHAINLINK)
- EXISTING FENCE (6" CHAINLINK)

Professional Seal

Date Revision
1. 11/16/21 ADDENDUM #3

Consultant



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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
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CIVIL KEY MAP AND
GENERAL NOTES

October 13, 2021
H+K Project No.: 2001

C000



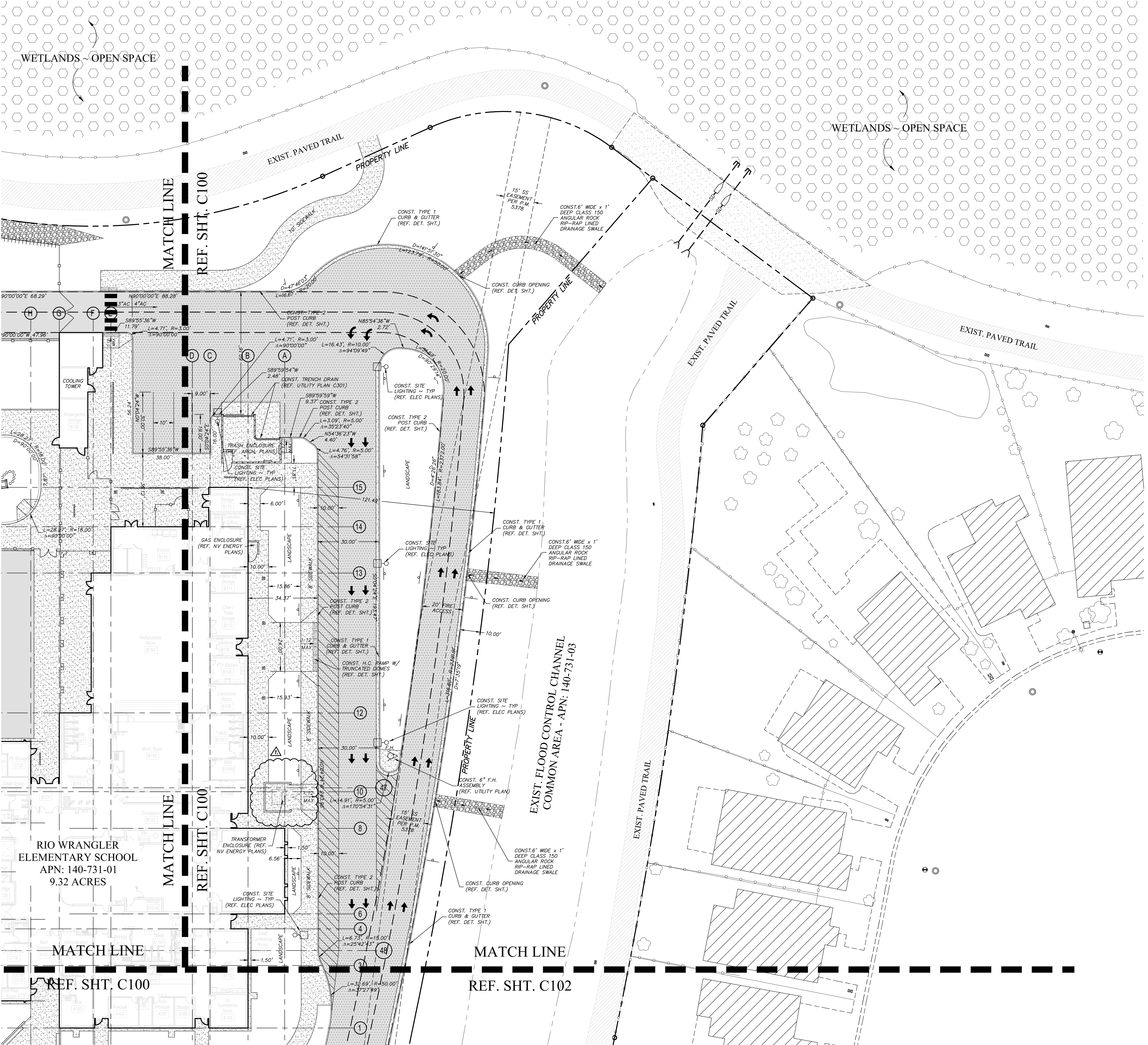
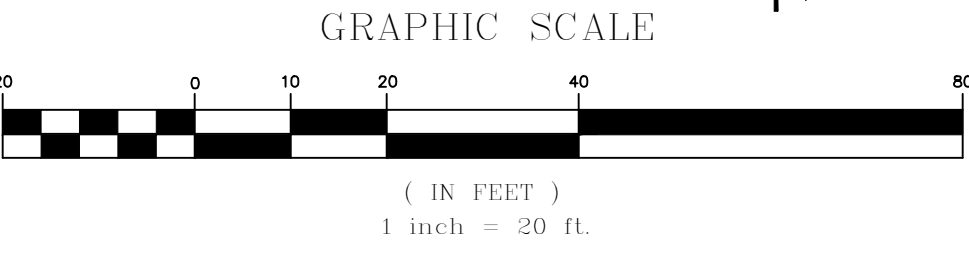
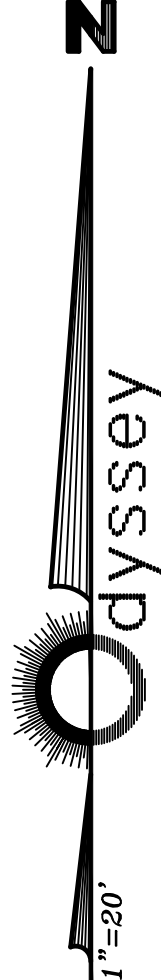
LEGEND:

- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
3" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
4" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- CLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.i. W/FIBERMESH
OVERLAYING 4" TYPE 2 CLASS B AGG. BASE
AT 95% RELATIVE COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCUT LINE
- PROPOSED FENCE (6' CHAINLINK)
- EXISTING FENCE (6' CHAINLINK)

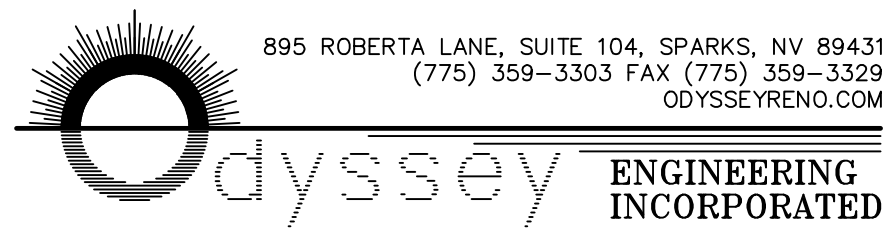
FENCING NOTE:
REFERENCE SHEET C800
FOR FENCING INFO.

SIGNAGE AND STRIPING NOTE:
REFERENCE SHEET C400 FOR ALL
SIGNAGE AND STRIPING INFO.

MAN DOOR NOTE:
REFERENCE SHEET C1001 FOR
THICKENED EDGE SLAB AND DOWEL
DETAIL AT ALL MAN DOORS



Professional Seal
Date
11/16/21
Revision
ADDENDUM #3



Consultant
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hkarchitects.com

**Washoe County School District
Rio Wrangler Elementary School**

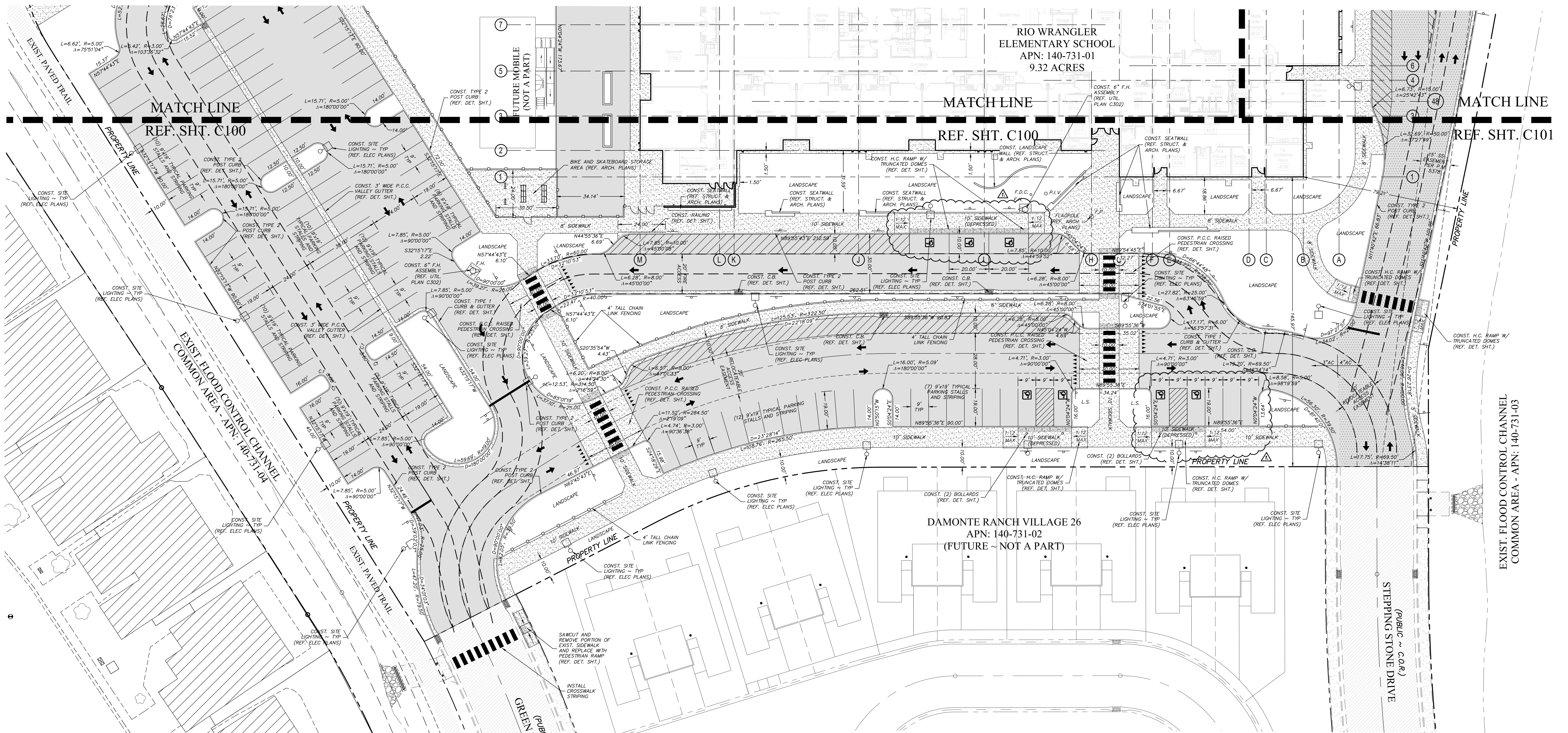
10600 Green Pasture Drive
Reno, Nevada 89521

CIVIL SITE PLAN

October 13, 2021
H+K Project No.: 2001

C101





CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C1	4.71'	3.00'	90°0'00"

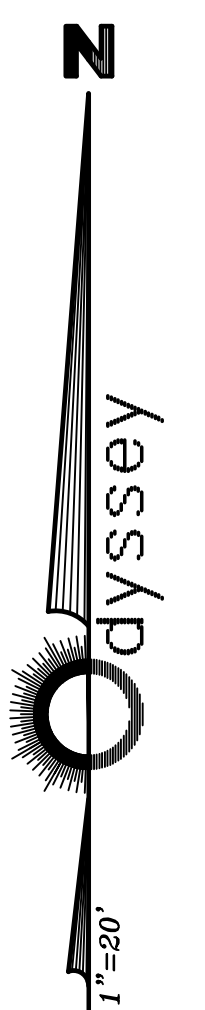
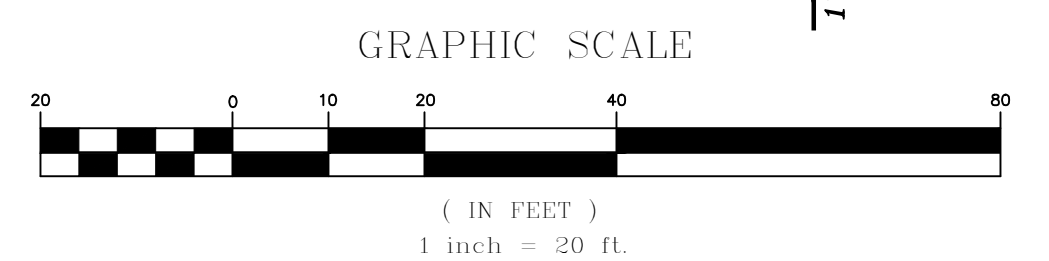
LEGEND:

- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28BV
3" AG W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28BV
4" AG W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- CLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.i. W/FIBERMESH
OVERLAYING 4" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCUT LINE
- PROPOSED FENCE (6' CHAINLINK)
- EXISTING FENCE (6' CHAINLINK)

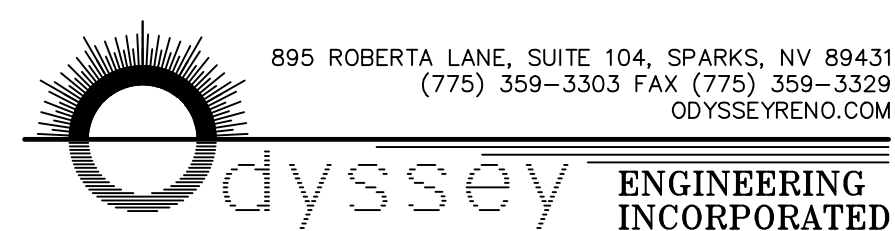
MAN DOOR NOTE:
REFERENCE SHEET C1001 FOR
THICKENED EDGE SLAB AND DOWEL
DETAIL AT ALL MAN DOORS

FENCING NOTE:
REFERENCE SHEET C800
FOR FENCING INFO.

SIGNAGE AND STRIPING NOTE:
REFERENCE SHEET C400 FOR ALL
SIGNAGE AND STRIPING INFO.



Professional Seal
1. 11/16/21
Date
Revision
ADDENDUM #3



Consultant

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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

CIVIL SITE PLAN

October 13, 2021
H+K Project No.: 2001

C102



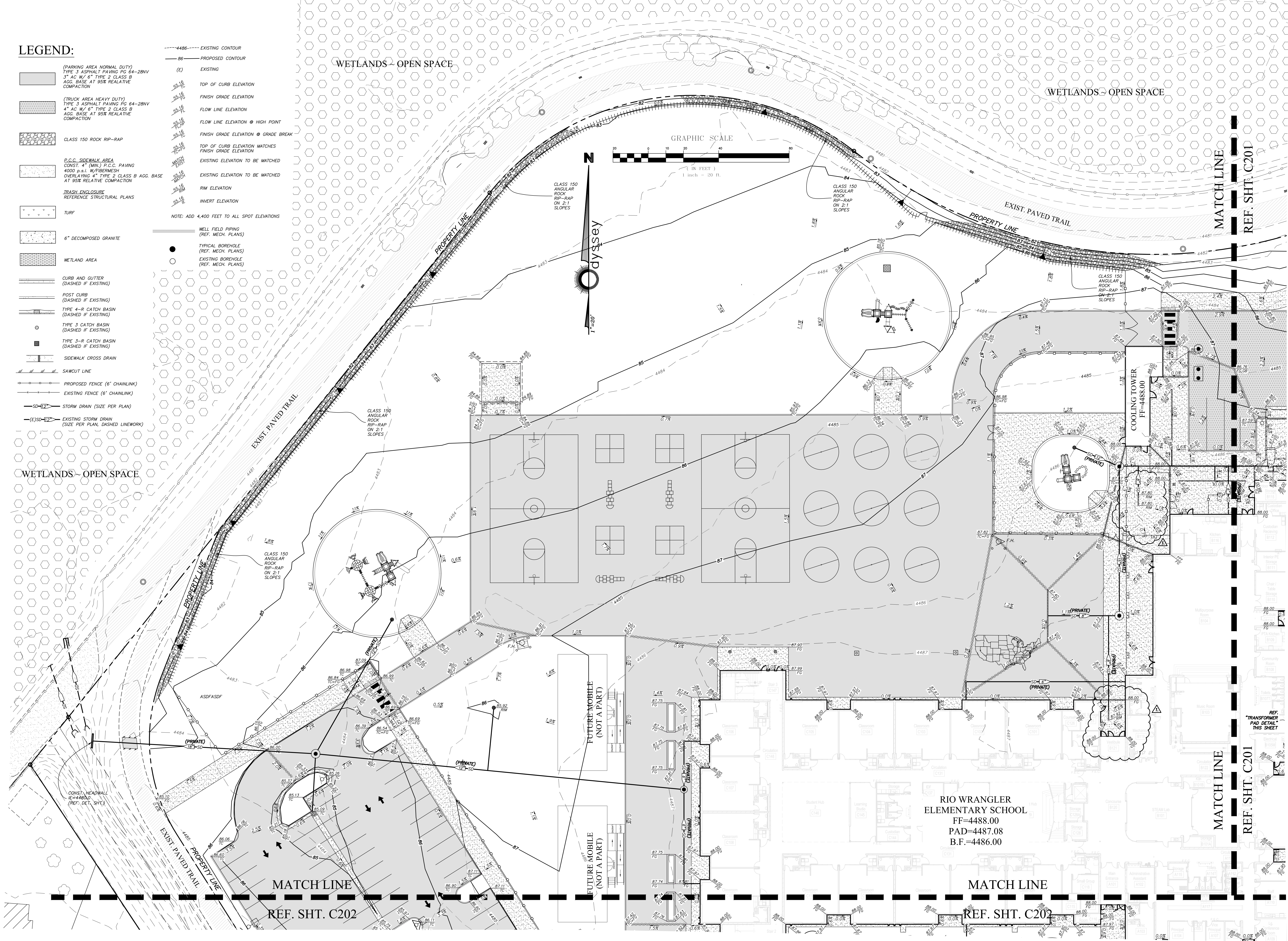
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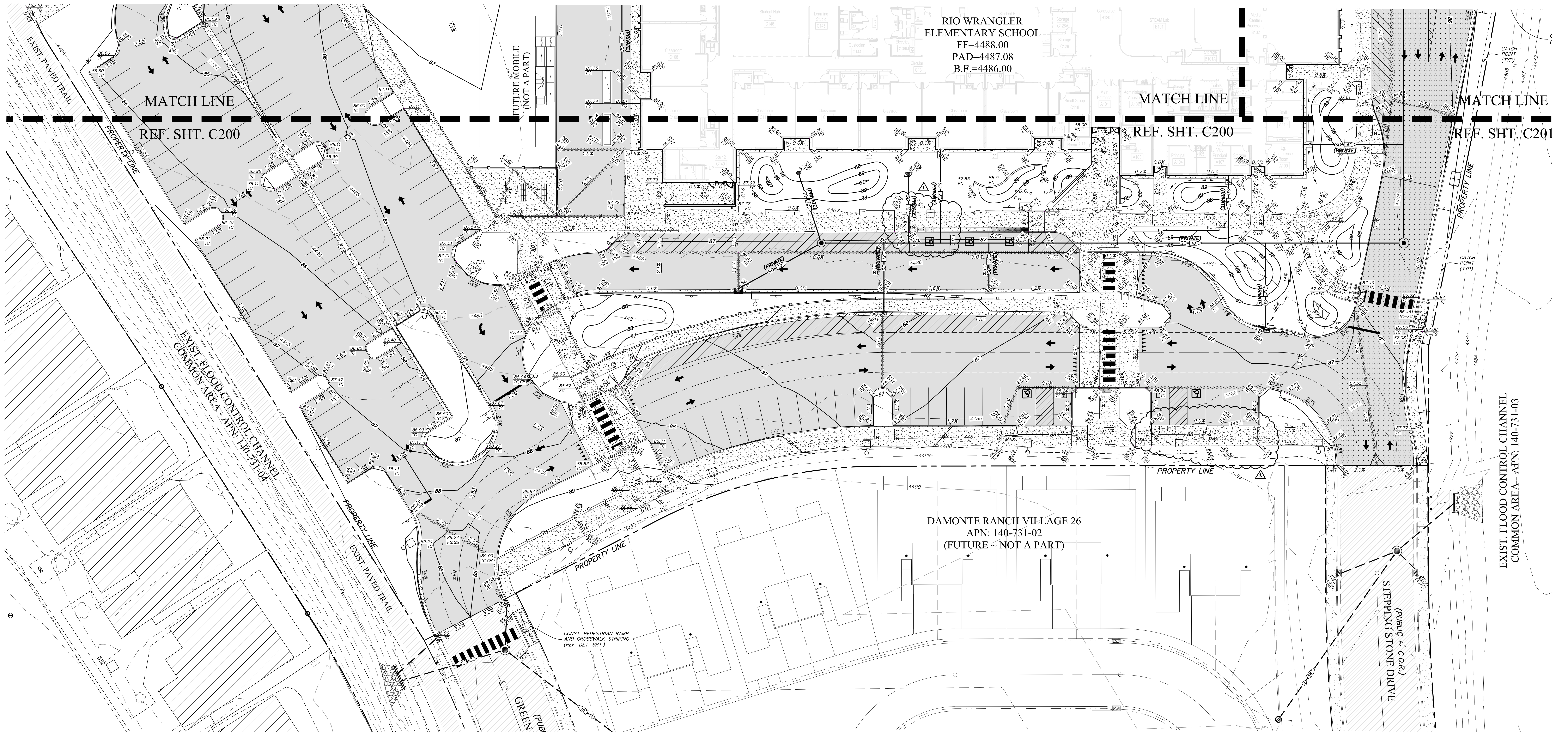
- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28BV
1" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28BV
4" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- CLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.i. W/FIBERMESH
OVERLAYING 4" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCLUT LINE
- PROPOSED FENCE (6" CHAINLINK)
- EXISTING FENCE (6" CHAINLINK)
- SD-12 STORM DRAIN (SIZE PER PLAN)
- (E)SD-12 EXISTING STORM DRAIN
(SIZE PER PLAN, DASHED LINEWORK)
- 4486--- EXISTING CONTOUR
- 86--- PROPOSED CONTOUR
- (E) EXISTING
- TOP OF CURB ELEVATION
- FINISH GRADE ELEVATION
- FLOW LINE ELEVATION
- FLOW LINE ELEVATION @ HIGH POINT
- FINISH GRADE ELEVATION @ GRADE BREAK
- TOP OF CURB ELEVATION MATCHES
FINISH GRADE ELEVATION
- EXISTING ELEVATION TO BE MATCHED
- RIM ELEVATION
- INVERT ELEVATION
- NOTE: ADD 4,400 FEET TO ALL SPOT ELEVATIONS
- WELL FIELD PIPING
(REF. MECH. PLANS)
- TYPICAL BOREHOLE
(REF. MECH. PLANS)
- EXISTING BOREHOLE
(REF. MECH. PLANS)

WETLANDS ~ OPEN SPACE

WETLANDS ~ OPEN SPACE

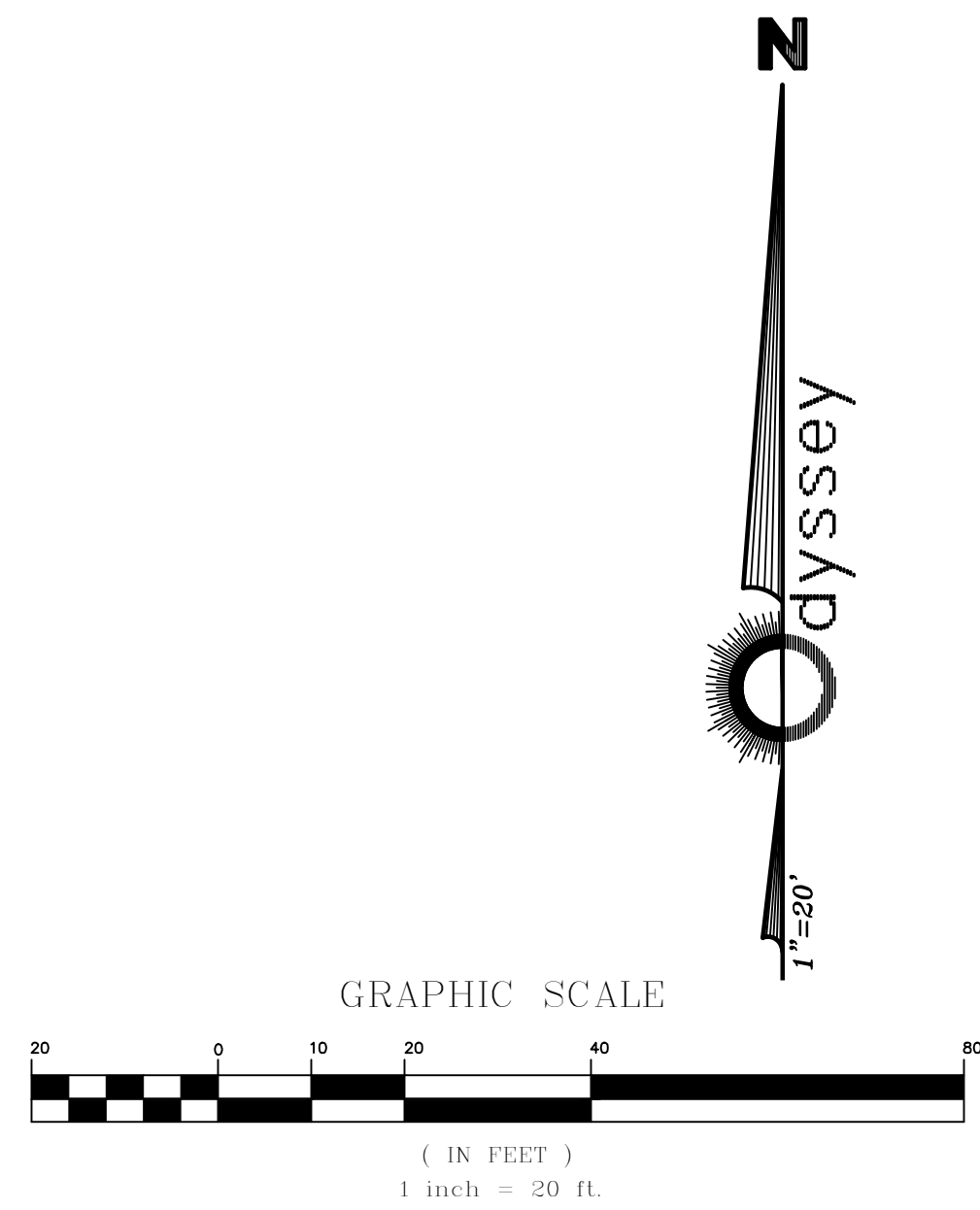
WETLANDS ~ OPEN SPACE



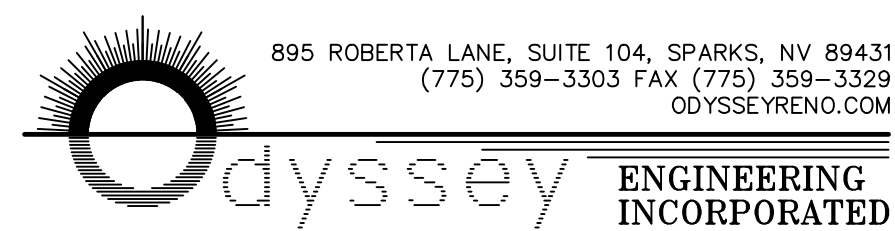


LEGEND:

- | | | | | | |
|--|---|--|--|--|---|
| | (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
3" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION | | CURB AND GUTTER
(DASHED IF EXISTING) | | (E) EXISTING |
| | (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
4" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION | | POST CURB
(DASHED IF EXISTING) | | TOP OF CURB ELEVATION |
| | CLASS 150 ROCK RIP-RAP | | TYPE 4-R CATCH BASIN
(DASHED IF EXISTING) | | FINISH GRADE ELEVATION |
| | P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.f. W/FIBERMESH
OVERLAYING 4" TYPE 2 CLASS B AGG. BASE
AT 95% RELATIVE COMPACTION | | TYPE 3 CATCH BASIN
(DASHED IF EXISTING) | | FLOW LINE ELEVATION |
| | TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS | | TYPE 3-R CATCH BASIN
(DASHED IF EXISTING) | | FLOW LINE ELEVATION @ HIGH POINT |
| | TURF | | SIDEWALK CROSS DRAIN | | FINISH GRADE ELEVATION @ GRADE BREAK |
| | 6" DECOMPOSED GRANITE | | SAWCUT LINE | | TOP OF CURB ELEVATION MATCHES
FINISH GRADE ELEVATION |
| | WETLAND AREA | | PROPOSED FENCE (6" CHAINLINK) | | EXISTING ELEVATION TO BE MATCHED |
| | | | EXISTING FENCE (6" CHAINLINK) | | FINISH GRADE ELEVATION |
| | | | STORM DRAIN (SIZE PER PLAN) | | EXISTING ELEVATION TO BE MATCHED |
| | | | EXISTING STORM DRAIN
(SIZE PER PLAN, DASHED LINEWORK) | | INVERT ELEVATION |
| | | | WELL FIELD PIPING
(REF. MECH. PLANS) | | NOTE: ADD 4,400 FEET TO ALL SPOT ELEVATIONS |
| | | | TYPICAL BOREHOLE
(REF. MECH. PLANS) | | EXISTING CONTOUR |
| | | | EXISTING BOREHOLE
(REF. MECH. PLANS) | | PROPOSED CONTOUR |



Professional Seal
Date
11/16/21
Revision
ADDENDUM #3



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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

CIVIL GRADING PLAN

October 13, 2021
H+K Project No.: 2001

C202



- (T) CONST. 60.9 L.F. 4" Ø
SDR35 PVC SS LATERAL @
S=0.02 FT./FT.

- (V) CONST. 35 L.F. NDS DURA SLOPE
TRENCH DRAIN WITH HEAL PROOF
GRATE (REF. DET. SHT. C1007)

- CONST. 8.0 L.F. 6" SDR35 PVC
SD LATERAL @ S=0.34 FT./FT.

- SD LATERAL @ S=0.12 FT./FT. (E)SSMH TO REMAIN EXIST

-

-
- EXISTING EXPOSED SEWER LATERAL WITHIN ONE FOOT OF THE MANHOLE

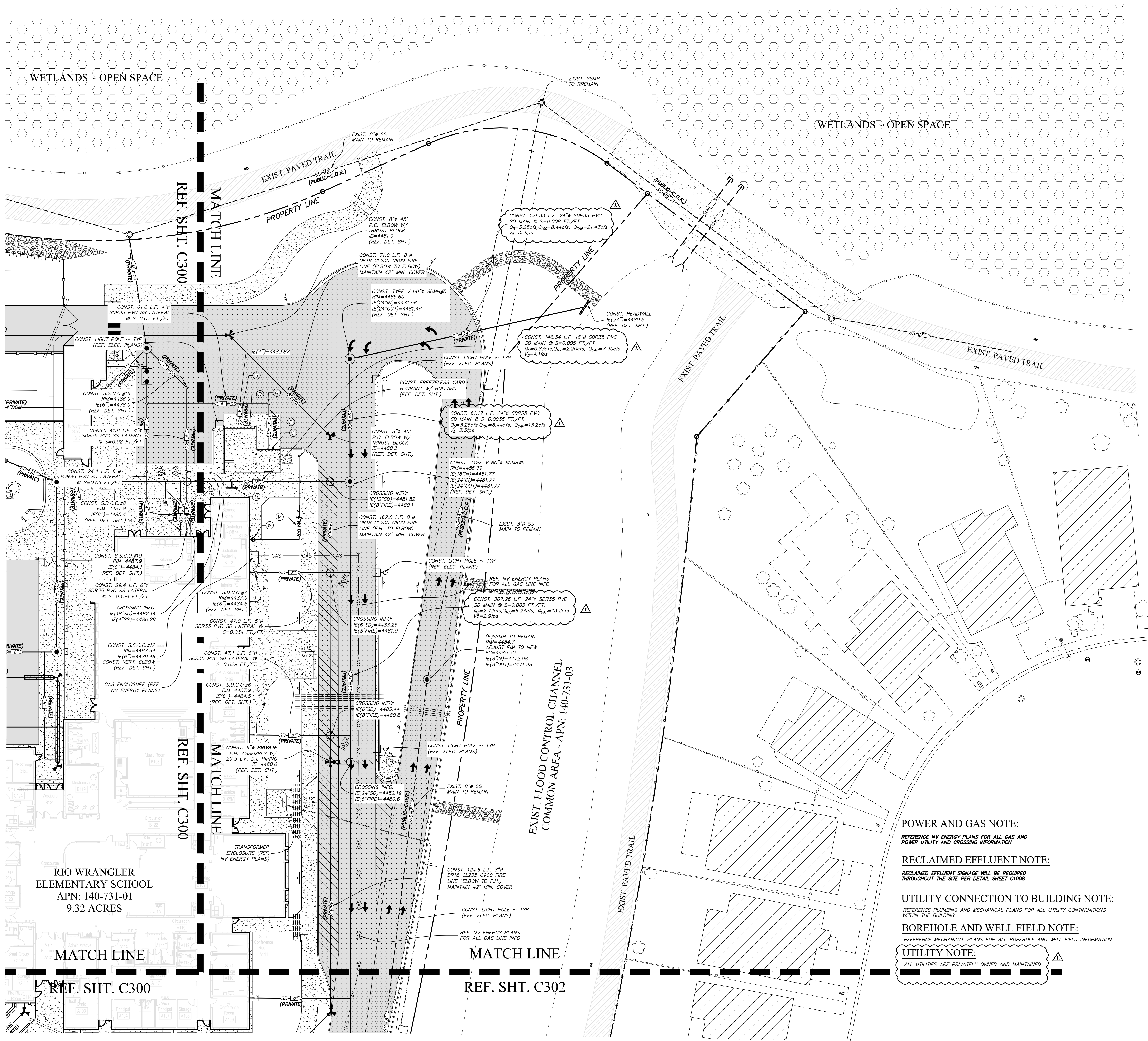
- CONST. 18" Ø HEADWALL
IE=4480.0
(REF. DET. SHT.)

- CONST. 122.6 L.F. 18" Ø
SDR35 PVC SD MAIN @

- CONST. TYPE 3-R C.B.#1

- 
- MANNE TRAIL
40-731-1

-



LEGEND:

- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
3" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28NV
4" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- CLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN.) P.C.C. PAVING
4000 p.s.i. W/FIBERGLASS
OVERLAYING 4" TYPE 2 CLASS B AGG. BASE
AT 95% RELATIVE COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCUT LINE
- PROPOSED FENCE (6" CHAINLINK)
- EXISTING FENCE (6" CHAINLINK)
- D.I. DUCTILE IRON WATER PIPING
- 2"IRR IRRIGATION SERVICE LINE ~ REF.
L.S. PLANS
(DASHED IF EXISTING)
- DOMESTIC WATER SERVICE
LINE ~ REF. T.M.V. PLANS
(DASHED IF EXISTING)
- FIRE FIRE SERVICE LINE
(DASHED IF EXISTING)
- GAS GAS LINES ~ REF. NV ENERGY
PLANS
(DASHED IF EXISTING)
- ELEC POWER/ELECTRICAL LINES ~
REF. NV ENERGY PLANS
(DASHED IF EXISTING)
- SD-12 STORM DRAIN
(DASHED IF EXISTING)
- SS-8" SANITARY SEWER
(DASHED IF EXISTING)
- WELL FIELD PIPING
(REF. MECH. PLANS)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- TYPICAL BOREHOLE
(REF. MECH. PLANS)
- EXISTING BOREHOLE
(REF. MECH. PLANS)
- PROPOSED LIGHT POLE
(REF. ELEC. PLANS)
- PROPOSED LIGHT POLE
(REF. ELEC. PLANS)
- EXISTING LIGHT POLE
- IRRIGATION SLEEVE (REF. L.S. PLANS)

POWER AND GAS NOTE:

REFERENCE NV ENERGY PLANS FOR ALL GAS AND
POWER UTILITY AND CROSSING INFORMATION

RECLAIMED EFFLUENT NOTE:

RECLAIMED EFFLUENT SIGNAGE WILL BE REQUIRED
THROUGHOUT THE SITE PER DETAIL SHEET C1008

UTILITY CONNECTION TO BUILDING NOTE:

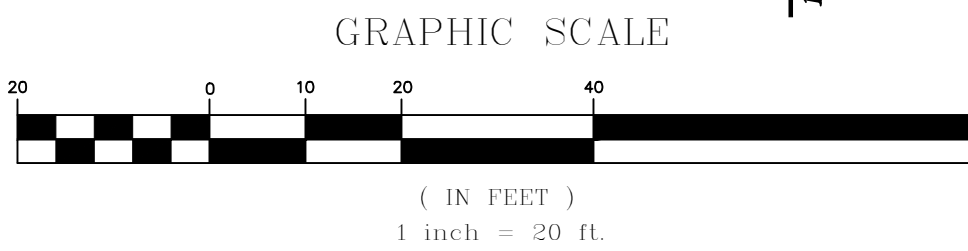
REFERENCE PLUMBING AND MECHANICAL PLANS FOR ALL UTILITY CONTINUATIONS
WITHIN THE BUILDING

BOREHOLE AND WELL FIELD NOTE:

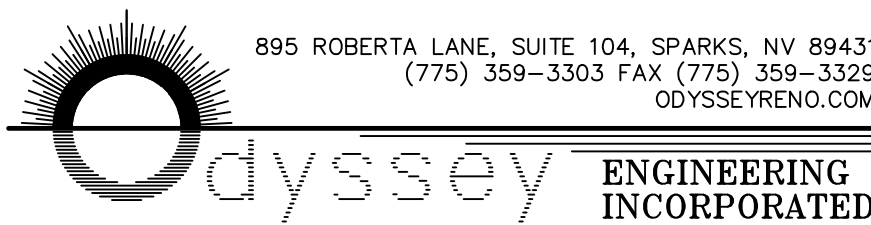
REFERENCE MECHANICAL PLANS FOR ALL BOREHOLE AND WELL FIELD INFORMATION

UTILITY NOTE:

ALL UTILITIES ARE PRIVATELY OWNED AND MAINTAINED



Professional Seal
Date 11/16/21
Revision ADDENDUM #3



Consultant

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h+karchitects.com

Washoe County School District
Rio Wrangler Elementary School

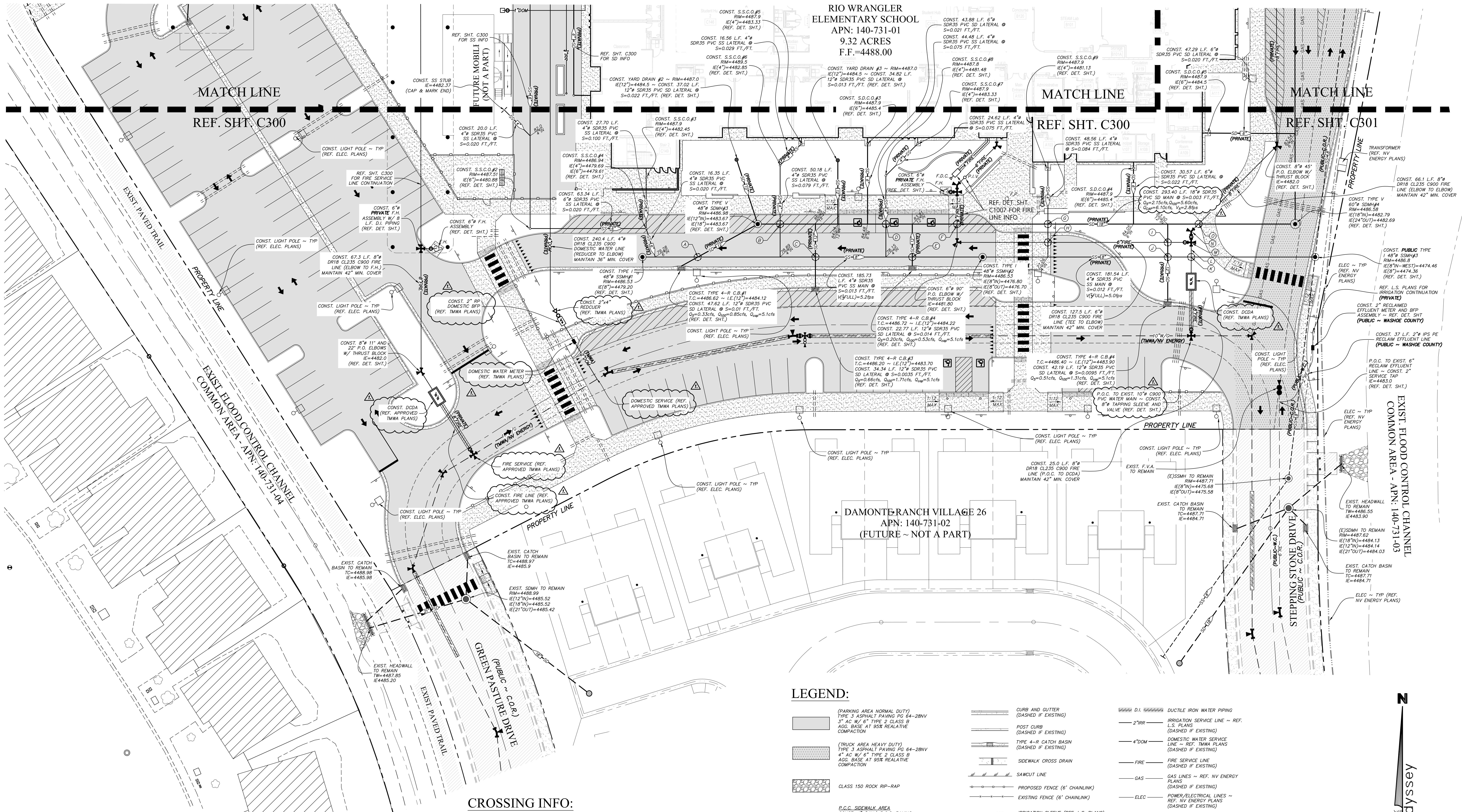
10600 Green Pasture Drive
Reno, Nevada 89521

CIVIL UTILITY PLAN

October 13, 2021
H+K Project No.: 2001

C301





LEGEND:

(PARKING AREA NORMAL DUTY) TYPE 3 ASPHALT PAVING PG 64-28NIV 3" AG W/ 6" TYPE 2 CLASS 9 AGG. BASE AT 95% RELATIVE COMPACTION	CURB AND GUTTER (DASHED IF EXISTING)	D.I. DUCTILE IRON WATER PIPING
(TRUCK AREA HEAVY DUTY) TYPE 3 ASPHALT PAVING PG 64-28NIV 4" AG W/ 6" TYPE 2 CLASS 9 AGG. BASE AT 95% RELATIVE COMPACTION	POST CURB (DASHED IF EXISTING)	2"RRR IRRIGATION SERVICE LINE ~ REF. L.S. PLANS (DASHED IF EXISTING)
CLASS 150 ROCK RIP-RAP	TYPE 4-R CATCH BASIN (DASHED IF EXISTING)	4"DOM DOMESTIC WATER SERVICE LINE ~ REF. TMWA PLANS (DASHED IF EXISTING)
D.C.C. SIDEWALK AREA CONST. 4" (MIN.) T.C.C. PAVING 4000 P.S.I. W/FIBERMESH OVERLAYING 4" TYPE 2 CLASS 9 AGG. BASE AT 95% RELATIVE COMPACTION	SIDEWALK CROSS DRAIN	FIRE FIRE SERVICE LINE (DASHED IF EXISTING)
TRASH ENCLOSURE REFERENCE STRUCTURAL PLANS	SAWCUT LINE	GAS GAS LINES ~ REF. NV ENERGY PLANS (DASHED IF EXISTING)
TURF	PROPOSED FENCE (6" CHAINLINK)	ELEC POWER/ELECTRICAL LINES ~ REF. NV ENERGY PLANS (DASHED IF EXISTING)
6" DECOMPOSED GRANITE	EXISTING FENCE (6" CHAINLINK)	SD-12 STORM DRAIN (DASHED IF EXISTING)
WETLAND AREA	IRRIGATION SLEEVE (REF. L.S. PLANS)	SS-8 SANITARY SEWER (DASHED IF EXISTING)
	TYPE 3 CATCH BASIN (DASHED IF EXISTING)	WELL FIELD PIPING (REF. MECH. PLANS)
	TYPE 3-R CATCH BASIN (DASHED IF EXISTING)	
	TYPICAL BOREHOLE (REF. MECH. PLANS)	
	EXISTING BOREHOLE (REF. MECH. PLANS)	
	PROPOSED LIGHT POLE (REF. ELEC. PLANS)	
	PROPOSED LIGHT POLE (REF. ELEC. PLANS)	
	EXISTING LIGHT POLE	

CROSSING INFO:

A IE(12"SD)=4484.02 IE(8"SS)=4478.81	H IE(6"FI)=4481.40 IE(4"SS)=4477.62	L CONST. 16.4 L.F. 8" DR18 CL235 C900 FIRE LINE (D.C.D.A. TO TEE) MAINTAIN 42" MIN. COVER
B IE(18"SD)=4483.64 IE(4"SS)=4479.64	I IE(6"FI)=4481.00 IE(12"SD)=4483.60	M CONST. 6" 45" POW/LG TEE W/ THRUST BLOCK IE=4481.00 (REF. DET. SHT.)
C IE(12"SD)=4483.13 IE(8"SS)=4477.98	O IE(12"SD)=4483.67 IE(8"SS)=4475.46	N CONST. 6" 45" P.O. ELBOW W/ THRUST BLOCK IE=4481.00 (REF. DET. SHT.)
D IE(18"SD)=4483.46 IE(4"SS)=4479.50	P IE(8"FI)=4481.00 IE(8"SS)=4475.30	
E IE(12"SD)=4484.16 IE(8"SS)=4477.30	Q IE(8"FI)=4481.00 IE(18"SD)=4482.94	
F IE(18"SD)=4483.35 IE(6"FI)=4481.77		
G IE(18"SD)=4483.19 IE(4"SS)=4478.49		

POWER AND GAS NOTE:

REFERENCE NV ENERGY PLANS FOR ALL GAS AND
POWER UTILITY AND CROSSING INFORMATION
WITHIN THE BUILDING

RECLAIMED EFFLUENT NOTE:

RECLAIMED EFFLUENT SIGNAGE WILL BE REQUIRED
THROUGHOUT THE SITE PER DETAIL SHEET C1008

UTILITY CONNECTION TO BUILDING NOTE:

REFERENCE PLUMBING AND MECHANICAL PLANS FOR ALL UTILITY CONTINUATIONS
WITHIN THE BUILDING

BOREHOLE AND WELL FIELD NOTE:

REFERENCE MECHANICAL PLANS FOR ALL BOREHOLE AND WELL FIELD INFORMATION

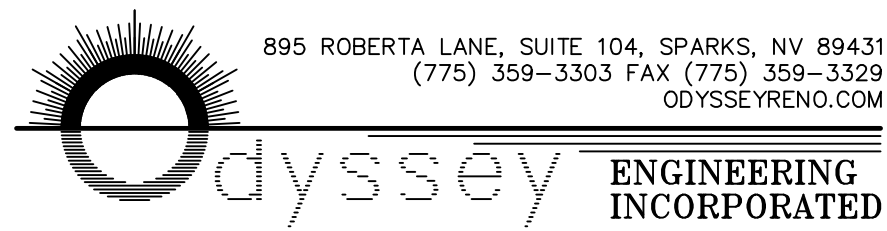
UTILITY NOTE:

ALL UTILITIES ARE PRIVATELY OWNED AND MAINTAINED

Professional Seal

Date Revision
1. 11/16/21 ADDENDUM #3

Consultant



895 ROBERTA LANE, SUITE 104, SPARKS, NV 89431
(775) 359-3303 FAX (775) 359-3329
ODYSSEYENGINEERING.COM

ENGINEERING
INCORPORATED

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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

CIVIL UTILITY PLAN

October 13, 2021
H+K Project No.: 2001

C302



RECLAIMED EFFLUENT NOTE:

RECLAIMED EFFLUENT SIGNAGE WILL BE REQUIRED
THROUGHOUT THE SITE PER DETAIL SHEET C1008

LEGEND:

- (PARKING AREA NORMAL DUTY)
TYPE 3 ASPHALT PAVING PG 64-28MV
1" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- (TRUCK AREA HEAVY DUTY)
TYPE 3 ASPHALT PAVING PG 64-28MV
4" AC W/ 6" TYPE 2 CLASS B
AGG. BASE AT 95% RELATIVE
COMPACTION
- CLASS 150 ROCK RIP-RAP
- P.C.C. SIDEWALK AREA
CONST. 4" (MIN) P.C.C. PAVING
4000 p.s.i. W/FIBERMESH
OVERLAYING AT TYPE 2 CLASS B AGG. BASE
AT 95% RELATIVE COMPACTION
- TRASH ENCLOSURE
REFERENCE STRUCTURAL PLANS
- TURF
- 6" DECOMPOSED GRANITE
- WETLAND AREA
- CURB AND GUTTER
(DASHED IF EXISTING)
- POST CURB
(DASHED IF EXISTING)
- TYPE 4-R CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3 CATCH BASIN
(DASHED IF EXISTING)
- TYPE 3-R CATCH BASIN
(DASHED IF EXISTING)
- SIDEWALK CROSS DRAIN
- SAWCUT LINE
- PROPOSED FENCE (6" CHAINLINK)
- EXISTING FENCE (6" CHAINLINK)
- ADA CONNECTIVITY ROUTE

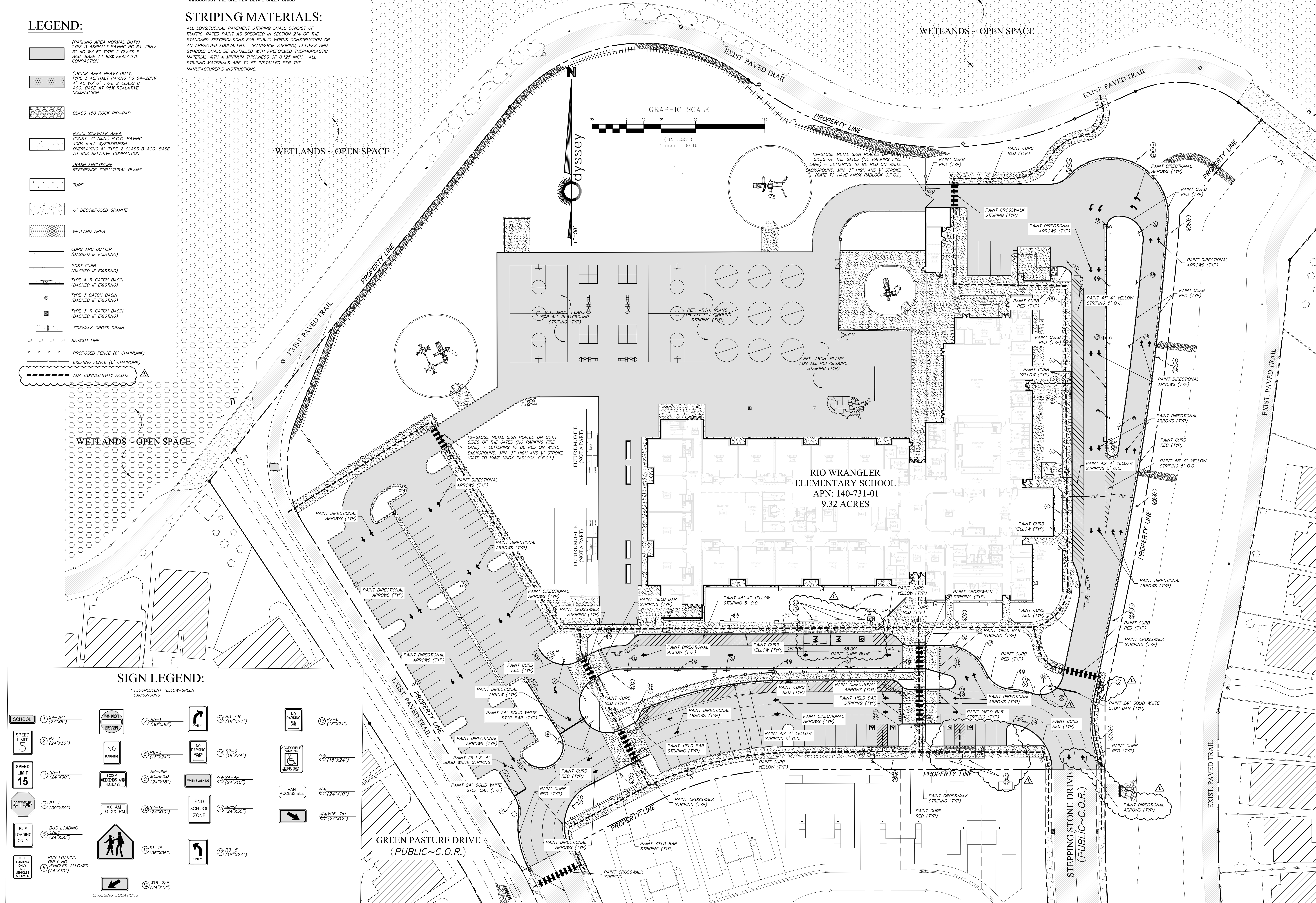
STRIPING MATERIALS:

ALL LONGITUDINAL PAVEMENT STRIPING SHALL CONSIST OF
TRAFFIC-RATED PAINT AS SPECIFIED IN SECTION 214 OF THE
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OR
AN APPROVED EQUIVALENT. TRANSVERSE STRIPING, LETTERS AND
SYMBOLS SHALL BE INSTALLED WITH PREFORMED THERMOPLASTIC
MATERIAL WITH A MINIMUM THICKNESS OF 0.125 INCH. ALL
STRIPING MATERIALS ARE TO BE INSTALLED PER THE
MANUFACTURER'S INSTRUCTIONS.

SIGN LEGEND:

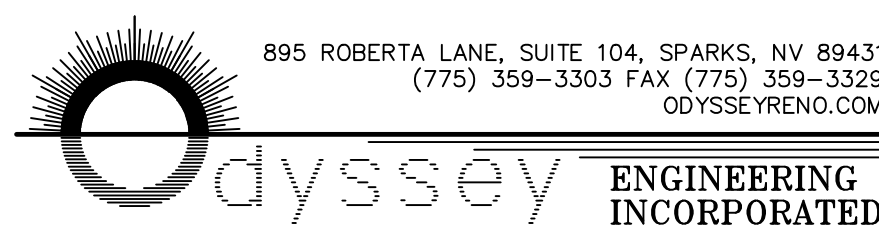
* FLUORESCENT YELLOW-GREEN
BACKGROUND

SCHOOL 1 S4-3P* (24"x30")	NO RIGHT TURN 2 B5-1 (30"x30")	ONLY 3 B3-5R (18"x24")	NO PARKING 4 B7-6 (18"x24")
SPEED LIMIT 5 5 B2-1 (24"x30")	NO PARKING 6 B8-7 (16"x24")	NO PARKING LOADING 7 B7-6 (18"x24")	ACCESSIBLE PARKING 8 B7-6 (18"x24")
SPEED LIMIT 15 9 S5-1 (24"x30")	EXCEPT WEEKENDS AND HOLIDAYS 10 S8-3P MODIFIED (24"x16")	WHEN FLASHING 11 S4-4P (24"x10")	VAN ACCESSIBLE 12 S4-4P (24"x10")
STOP 13 B1-1 (30"x30")	XX AM TO XX PM 14 S4-1P (24"x10")	END SCHOOL ZONE 15 S5-2 (24"x30")	16 W6-7P* (24"x12")
BUS LOADING ONLY 17 B5-1 (24"x30")	BUS LOADING ONLY 18 B5-1 (24"x30")	BUS LOADING ONLY 19 B5-1 (24"x30")	
BUS LOADING ONLY 20 B5-1 (24"x30")	BUS LOADING ONLY 21 B5-1 (24"x30")	BUS LOADING ONLY 22 B5-1 (24"x30")	
CROSSING LOCATIONS			



Professional Seal

Date Revision
1. 11/16/21 ADDENDUM #3



Consultant

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10600 Green Pasture Drive
Reno, Nevada 89521

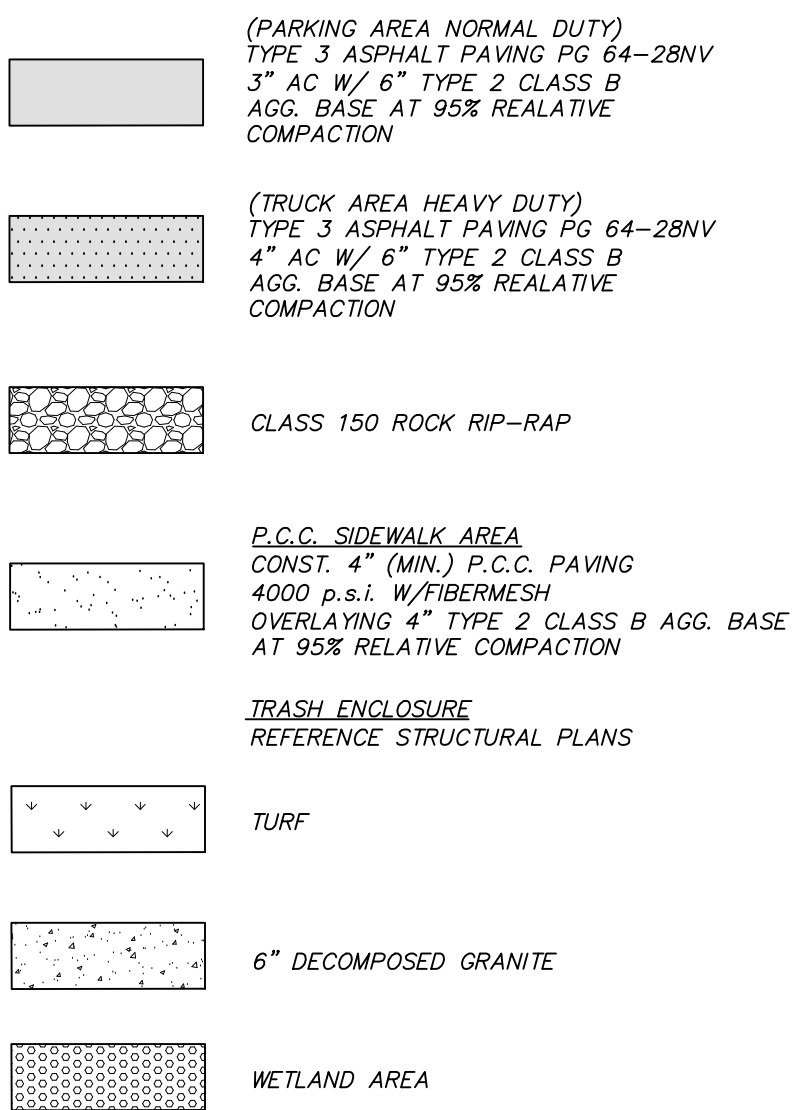
CIVIL SIGNAGE AND STRIPING PLAN

October 13, 2021
H+K Project No.: 2001

C400



LEGEND:

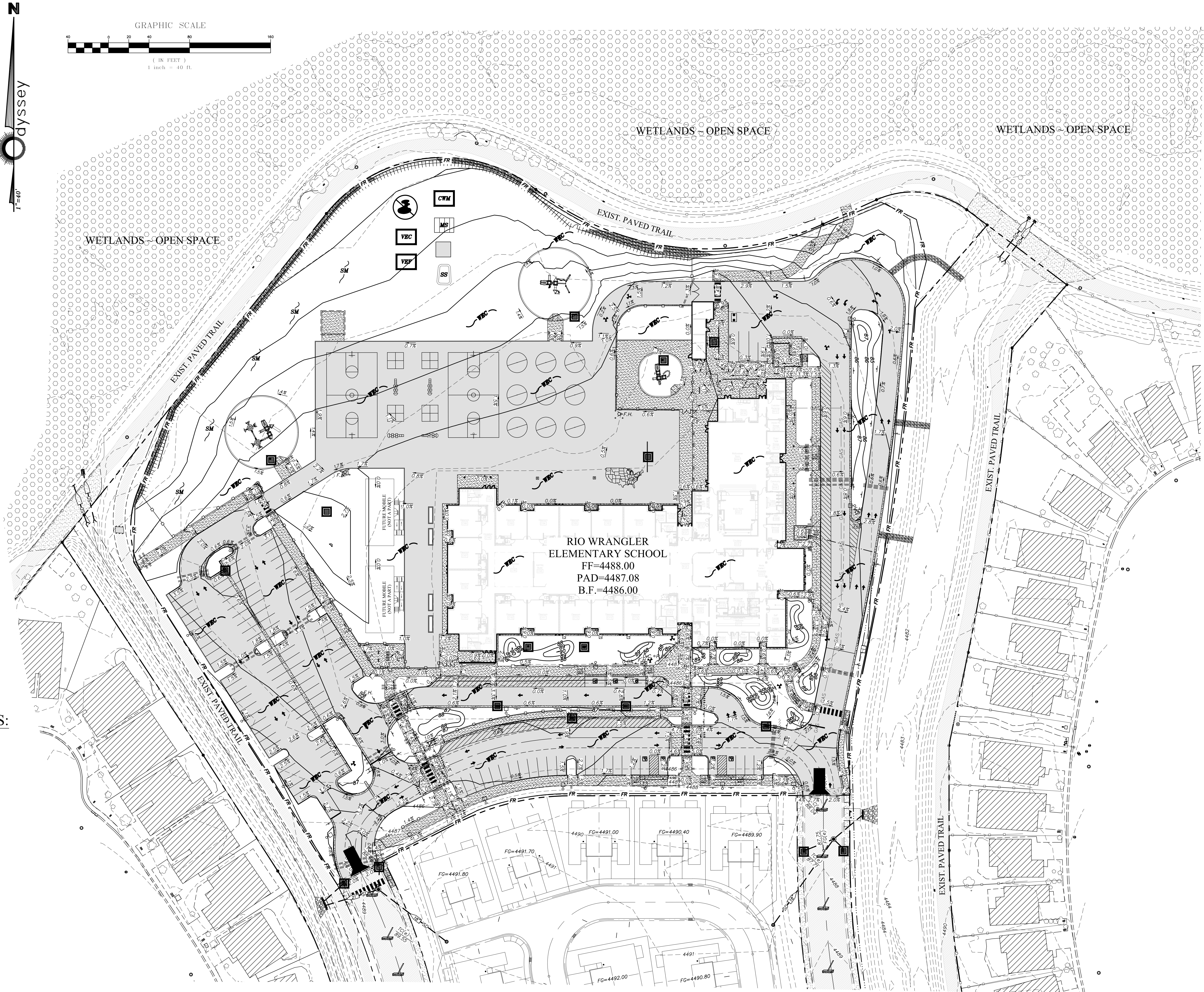


BMP LEGEND:

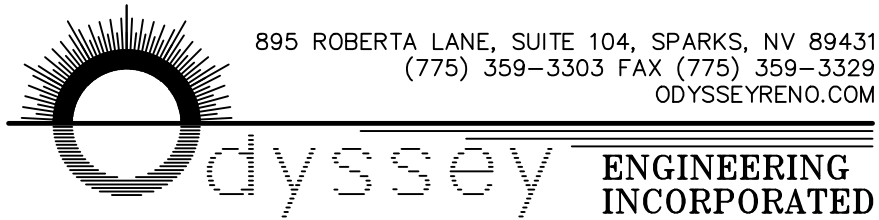
BMP NAME	BMP NUMBER	MAP SYMBOL
WIND EROSION AND DUST CONTROL	EC-5	
RIP-RAP	EC-7	
REVEGETATION	EC-8	
FIBER ROLLS	SC-1	
SILT FENCE	SC-5	
CONSTRUCTION SITE ENTRANCES AND EXITS	SC-8	
STORM DRAIN INLET PROTECTION	DP-3	
STOCKPILE MANAGEMENT	GM-2	
STREET SWEEPING	GM-5	
CHECK DAMS	RC-3	
SPILL PREVENTION AND CONTROL	GM-6	
VEHICLE AND EQUIPMENT CLEANING	GM-7	
VEHICLE AND EQUIPMENT MAINTENANCE AND FUELING	GM-8	
HANDLING AND DISPOSAL OF CONCRETE AND CEMENT	GM-9	
MATERIAL DELIVERY, HANDLING, STORAGE, AND USE	GM-10	
PAVEMENT CONSTRUCTION MANAGEMENT	GM-12	
SANITARY/SEPTIC WASTE MANAGEMENT	GM-14	

WASHOE COUNTY STANDARD NOTES:

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHT OF WAYS OF WASHOE COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED BY THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN WASHOE COUNTY ORDINANCE NO. 1223 AND THE TRUCKEE MEADOWS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES HANDBOOK.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO STORMWATER GENERAL PERMIT NP100000, SECTION 1 B.1.b.(2).
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE, AND EXIT LOCATIONS AND ALL BMPs WEEKLY PRIOR TO A FORECASTED RAIN EVENT AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS FROZEN GROUND CONDITIONS OR SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO STORMWATER GENERAL PERMIT NP100000, SECTION 1 B.1.b.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 30 PERCENT OR MORE.



Professional Seal
1. 11/16/21 ADDENDUM #3



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Rio Wrangler Elementary School

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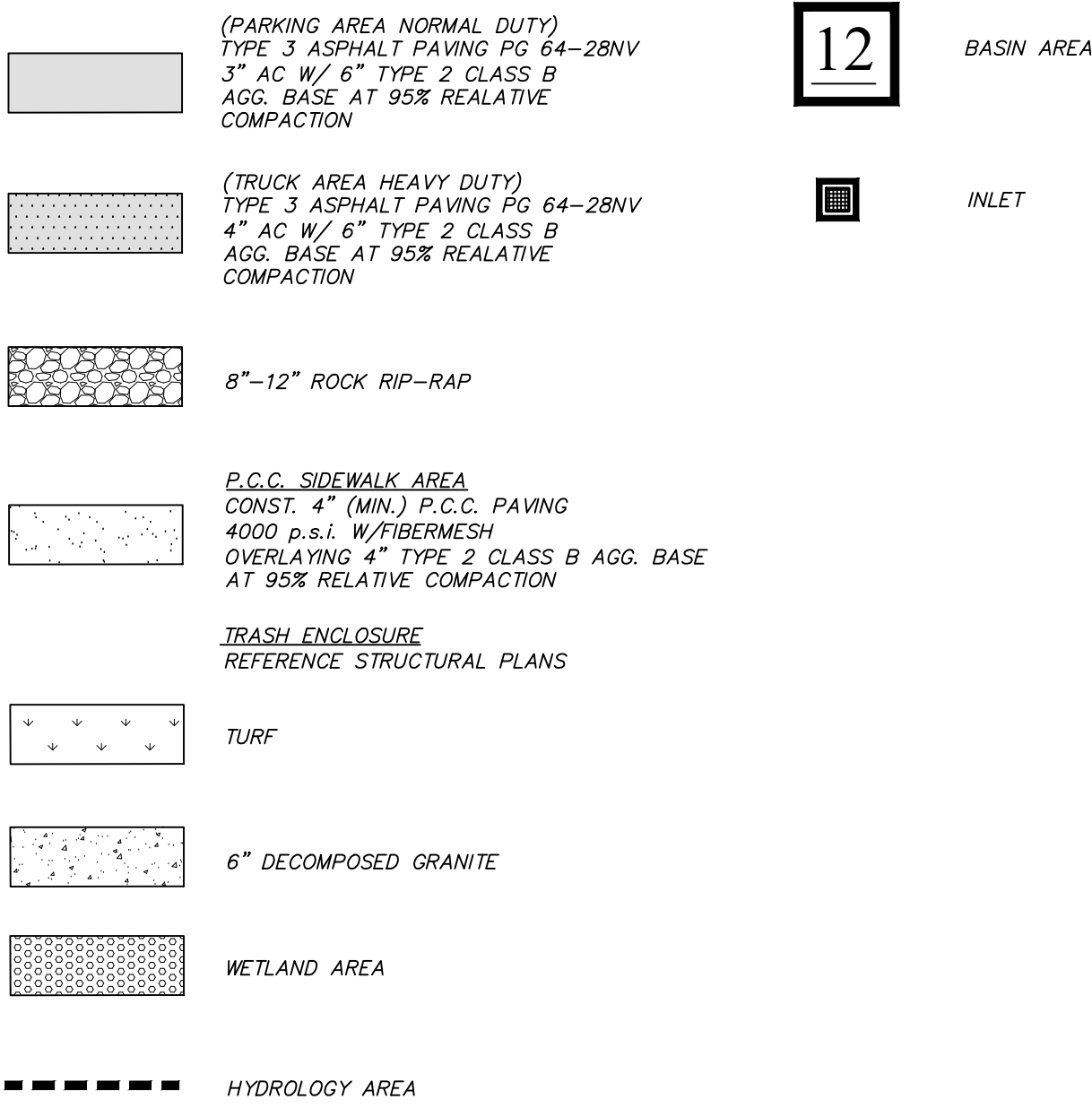
**CIVIL EROSION
CONTROL PLAN**

October 13, 2021
H+K Project No.: 2001

C500



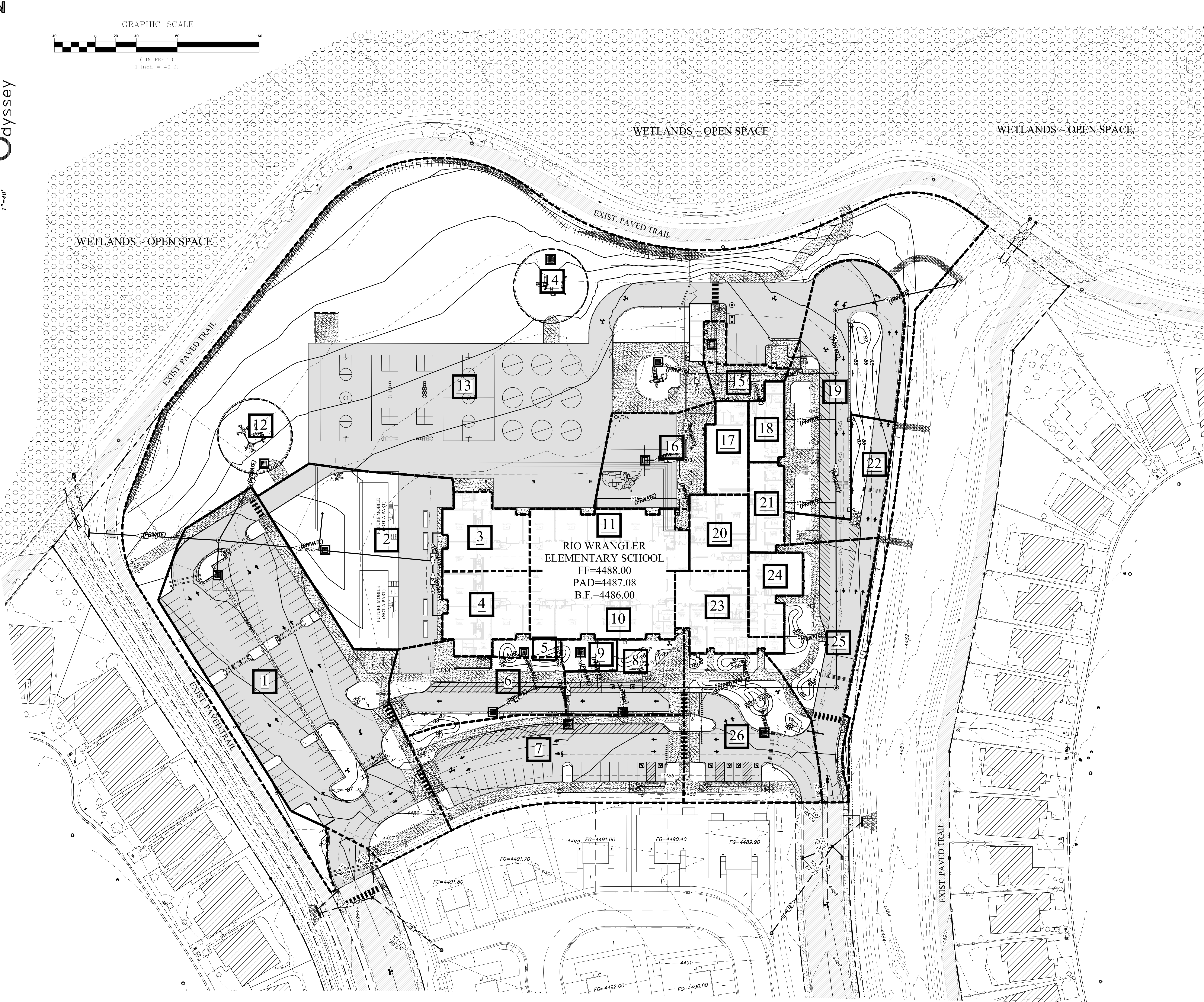
LEGEND:



BASIN	AREA(AC)	C ₅ YEAR	C ₁₀₀ YEAR	i ₅ YEAR (in/hr)	i ₁₀₀ YEAR (in/hr)	Q ₅ YEAR (cfs)	Q ₁₀₀ YEAR (cfs)
1	1.12	0.88	0.93	1.44	3.53	1.42	3.68
2	0.56	0.45	0.75	1.44	3.53	0.36	1.48
3	0.13	0.85	0.87	1.44	3.53	0.16	0.40
4	0.14	0.85	0.87	1.44	3.53	0.17	0.43
5	0.03	0.10	0.35	1.44	3.53	0.00	0.04
6	0.26	0.88	0.93	1.44	3.53	0.33	0.85
7	0.52	0.88	0.93	1.44	3.53	0.66	1.71
8	0.16	0.88	0.93	1.44	3.53	0.20	0.53
9	0.04	0.10	0.35	1.44	3.53	0.01	0.05
10	0.22	0.85	0.87	1.44	3.53	0.27	0.68
11	0.21	0.85	0.87	1.44	3.53	0.26	0.64
12	0.10	0.10	0.35	1.44	3.53	0.01	0.12
13	3.74	0.45	0.75	1.44	3.53	2.42	9.90
14	0.10	0.10	0.35	1.44	3.53	0.01	0.12
15	0.05	0.88	0.93	1.44	3.53	0.06	0.16
16	0.22	0.88	0.93	1.44	3.53	0.28	0.72
17	0.08	0.85	0.87	1.44	3.53	0.10	0.25
18	0.06	0.85	0.87	1.44	3.53	0.08	0.18
19	0.49	0.88	0.93	1.44	3.53	0.62	1.61
20	0.10	0.85	0.87	1.44	3.53	0.12	0.31
21	0.07	0.85	0.87	1.44	3.53	0.09	0.21
22	0.14	0.88	0.93	1.44	3.53	0.18	0.46
23	0.14	0.85	0.87	1.44	3.53	0.17	0.43
24	0.08	0.85	0.87	1.44	3.53	0.10	0.25
25	0.33	0.88	0.93	1.44	3.53	0.42	1.08
26	0.40	0.88	0.93	1.44	3.53	0.51	1.31

WASHOE COUNTY STANDARD NOTES:

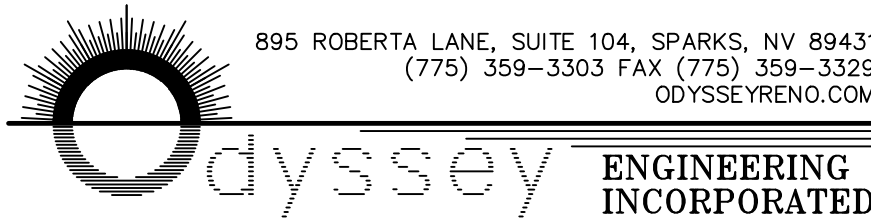
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Professional Seal

Date
11/16/21

Revision
ADDENDUM #3



Consultant

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CIVIL HYDROLOGY
DISPLAY

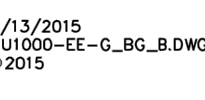
October 13, 2021
H+K Project No.: 2001


C700





	STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION	DRAWING No.
	CULVERT HEADWALL	R-225
	APPROVED BY: JF	DATE: 1/2013



$\triangle 1.$ 

TRUCKEE MEADOWS WATER

A U T H O R I T Y

1355 CAPITAL BLVD. / PO BOX 30013
 RENO, NEVADA 89502-3013
 PH 775-834-8000 / FX 775-834-8003

**RIO WRANGLER ELEMENTARY_COM SVC
RENO, NEVADA
TITLE SHEET**

WE- 1

1 OF 4

C2000



IF INITIAL TEST DONE BY TMWA FIELD PERSONNEL FAILS, RE-TESTING OF BACKFLOW PREVENTION ASSEMBLY IS REQUIRED WITHIN 7-10 DAYS AFTER METER IS SET OR SERVICE ACTIVATION. A COPY OF TEST RESULTS ARE TO BE FORWARDED TO TMWA WATER QUALITY/BACKFLOW PREVENTION PERSONNEL BY A CERTIFIED ASSEMBLY TESTER.



WORK ORDER NO. 21-8237
DESIGNED: ODYSSEY
DRAWN: CML/D
DATE: 10-01-21
CHECKED: _____
SUBMITTED: _____
RECOMMENDED: _____
APPROVED: _____

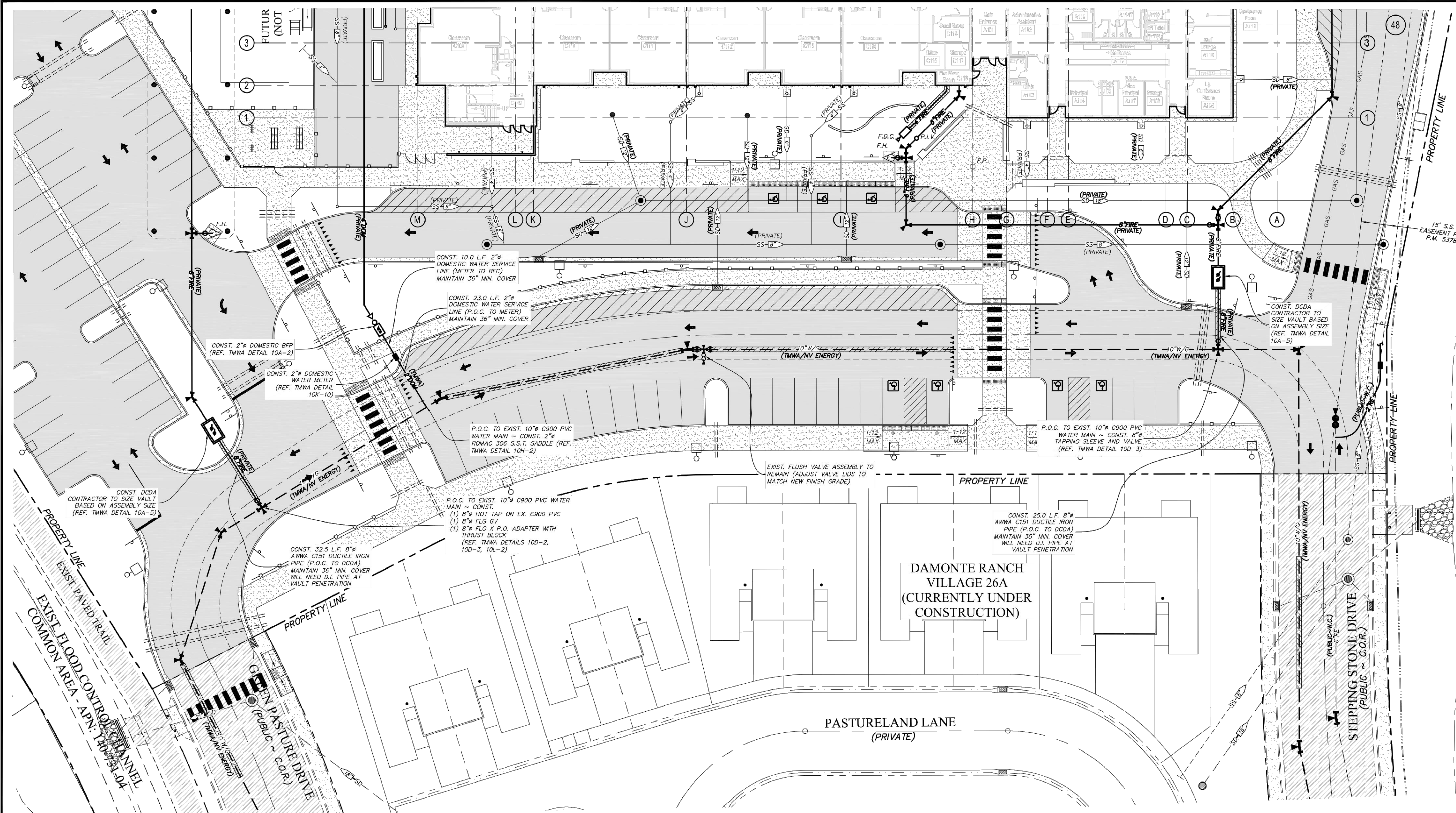
TRUCKEE MEADOWS WATER
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1855 CAPITAL BLVD. / PO. BOX 50013
RENO, NV 89507-0013
TEL: 775-834-8000 / FAX: 775-834-8003

RIO WRANGLER ELEMENTARY, COM SVC
RENO, NEVADA
WATER PLAN

WE-2

2 OF 4

EXIST. FLOOD CONTROL CHANNEL
COMMON AREA - APN: 140-731-03



- LEGEND:**
- WATER MAIN (DASHED IF EXISTING)
 - FIRE HYDRANT ASSEMBLY
 - TEE W/ VALVE
 - CROSS
 - 11" ELBOW
 - 22" ELBOW
 - 45" ELBOW
 - 90" ELBOW
 - FLUSH VALVE ASSEMBLY
 - REDUCER
 - AIR VAC
 - DUAL SERVICE
 - SINGLE SERVICE

WATER SERVICE CROSSING NOTE:
WHERE WATER SERVICE CROSSES OVER SEWER MAINS BY LESS THAN 18", OR UNDER OR OVER SEWER MAINS BY MIN. 6", REF. TMWA DET 10L-13. WATER SERVICE LATERALS SHALL BE CTS HDPE TUBING, AND SEWER MAINS SHALL BE SDR 35 PVC.

MITIGATED CROSSING NOTE:
AT ALL WATER MAIN/LATERAL CROSSINGS REQUIRING MITIGATION, THE "SEWER" SYSTEM SHALL CONSIST OF THE FOLLOWING MATERIAL:
SS LATERALS: SDR35 PVC PIPE
SS MAINS: SDR35 PVC PIPE
SD LATERALS: SDR35 PVC PIPE
SD MAINS: SDR35 PVC PIPE
NON POTABLE IRRIGATION LINES: HDPE TUBING, NO JOINTS WITHIN 10' OF CROSSING

NOTE:
TRACER WIRE TO BE INSTALLED WITH ALL SERVICE LATERALS AND A.R.V. LINES THAT DO NOT REMAIN PERPENDICULAR TO MAIN. A 3 POUND ANODE AT THE MAIN. TRACER WIRE TO EXTEND INTO METER BOX AND 12" MIN. ABOVE FINISH GRADE

NOTE:
ALL SERVICES TO HAVE PRESSURE REGULATING VALVES

NOTE:
TMWA WILL NOT ACCEPT ANY PIPE MANUFACTURED FROM JM PIPE OR ANY SUBSIDIARY OF JM PIPE

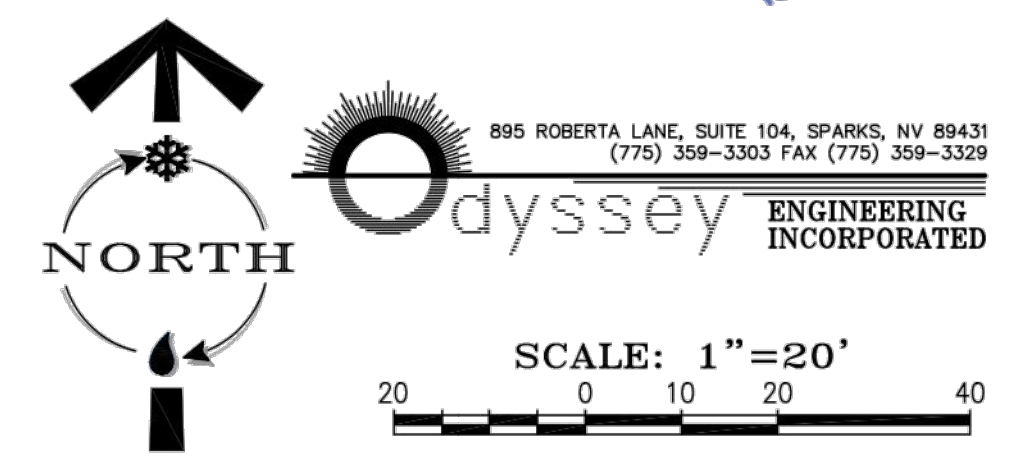
NOTE:
ALL METER ENCLOSURES WITHIN ROLLED CURB AREAS OR WITHIN 3' OF DRIVEWAY APRON SHALL BE TRAFFIC RATED

NOTE:
ALL TEES AND ELBOWS TO HAVE THURST BLOCKS PER 10L-2.

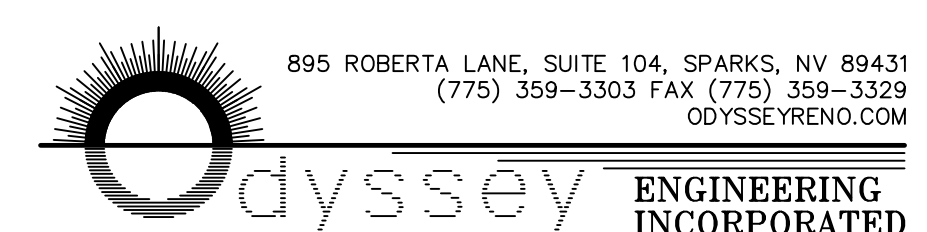


FIRE HYDRANT NOTE:
FIRE HYDRANT LOCATIONS SHOWN AS APPROVED BY CITY OF RENO FIRE DEPT.

TMWA NOTES:
ALL PIPE LENGTHS ARE MEASURED FROM CENTER OF TEES, ELBOWS, ETC.



Professional Seal
Date: 11/16/21
Revision: ADDENDUM #3



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Rio Wrangler Elementary School

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Reno, Nevada 89521

CIVIL TMWA PLAN

October 13, 2021
H+K Project No.: 2001


C2001



TAP SIZE - FLANGED BRANCH							
MAIN SIZE	VENDOR	MAIN TYPE	4"	6"	8"	10"	12"
4"	SM	ROM	D/C 1683-04800400-20P				
		PVC	SST-4.90 x 4" FL				
6"	SM	ROM	D/C 1683-06630400-0083-006630600-20P				
		PVC	SST-7.00 x 4" FL SST-7.00 x 6" FL				
8"	SM	TR	683-(00)0400-0083-(00)0600-20P				
		ROM	SST-(00) x 4" FL SST-(00) x 6" FL				
8"	SM	ROM	D/C 1683-09050400-0083-09050800-20P				
		PVC	SST-9.06 x 4" FL SST-9.06 x 6" FL SST-9.06 x 8" FL				
10"	SM	ROM	683-(00)0400-0083-(00)0600-0083-(00)0800-20P				
		TR	SST-(00) x 4" FL SST-(00) x 6" FL SST-(00) x 8" FL				
10"	SM	ROM	SCH 683-08630400-0083-08630800-20P				
		PVC	40 SST-8.63 x 4" FL SST-8.63 x 6" FL SST-8.63 x 8" FL				
12"	SM	ROM	SCH 683-11100400-0083-11100800-0083-11101000-20P				
		PVC	40 SST-11.45 x 4" FL SST-11.45 x 6" FL SST-11.45 x 8" FL SST-11.45 x 10" FL				
12"	SM	ROM	SCH 683-10750400-0083-10750800-0083-10751000-20P				
		PVC	40 SST-11.13 x 4" FL SST-11.13 x 6" FL SST-11.13 x 8" FL SST-11.13 x 10" FL				
12"	SM	ROM	SCH 683-12750400-0083-12750800-0083-12751000-20P				
		STEEL	40 SST-12.85 x 4" FL SST-12.85 x 6" FL SST-12.85 x 8" FL SST-12.85 x 10" FL SST-12.85 x 12" FL				

NOTES:

- MAXIMUM TEST PRESSURE IS 300 PSI FOR LISTED MANUFACTURERS.
- FLANGES (FL) SHALL BE STAINLESS STEEL ASTM A 240, TYPE 304.
- VENDOR (VENDOR): SM = SMITH-BLAIR, ROM = ROMAC INDUSTRIES
- (OD) = PIPE OUTSIDE DIAMETER. CHECK WITH MANUFACTURER FOR CATALOG NUMBER FOR OTHER SIZES.
- FOR TAPS ON TRANSITE MAINS OD MUST BE FIELD MEASURED PRIOR TO ORDERING PARTS.



TRUCKEE MEADOWS WATER
AUTHORITY

DATE:
7/20/11
REV

APPENDIX 10D
DISTRIBUTION TAP INSTALLATION
WATER TAPPING SLEEVES

DRAWING NUMBER

10D-2

- NOTES:
1. MAXIMUM TEST PRESSURE IS 300 PSI FOR LISTED MANUFACTURERS.
 2. FLANGES (FL) SHALL BE STAINLESS STEEL ASTM A 240, TYPE 304.
 3. VENDOR (MANUFACTURER); SM = SMITH-BLAIR, ROM = ROMAC INDUSTRIES
 4. (OD) = PIPE OUTSIDE DIAMETER. CHECK WITH MANUFACTURER FOR CATALOG NUMBER FOR OTHER SIZES.
 5. FOR TAPS ON TRANSITE MAINS OD MUST BE FIELD MEASURED PRIOR TO ORDERING PARTS.

DATE	APPENDIX 10D	DRAWING NUMBER
7/2011	DISTRIBUTION TAP INSTALLATION	10D-2
REV	WATER TAPPING SLEEVES	
9/2016		

DATE	APPENDIX 10F	DRAWING NUMBER
7/2001	FIRE PROTECTION INSTALLATIONS	10F-4
REV	6" FIRE HYDRANT SERVICE OFF EXISTING MAIN	
9/2016		

DATE	APPENDIX 10J	DRAWING NUMBER
1/2002	DISTRIBUTION VALVE INSTALLATION	10J-2
REV	IN-LINE GATE VALVE WITH CONCRETE COLLAR	
7/2011		

DATE	APPENDIX 10A	DRAWING NUMBER
7/2001	BACKFLOW PREVENTION ASSEMBLIES	10A-5
REV	FIRE - CLASS 1, 2 & 3 DOUBLE CHECK VALVE DETECTOR ASSEMBLY EXTERNAL - HORIZONTAL BELOW GRADE	
9/2016		

DATE	APPENDIX 10H	DRAWING NUMBER
7/2001	SERVICE TAP INSTALLATIONS	10H-2
REV	FOR 1", 1.25", 1.5" AND 2" SERVICE TAPS	
9/2016		

DATE	APPENDIX 10K	DRAWING NUMBER
6/2004	WATER METERS - SMALL NEW COMMERCIAL INSTALLATION	10K-10
REV	2" SINGLE SERVICE FOR 2" SETTER, METER AND TRANSMITTER	
7/2011		

DATE	APPENDIX 10A	DRAWING NUMBER
7/2001	BACKFLOW PREVENTION ASSEMBLIES	10A-2
REV	REDUCED PRESSURE PRINCIPLE ASSEMBLY FOR DOMESTIC USE EXTERNAL - HORIZONTAL	
9/2016		

WORK ORDER NO. 21-8937
DESIGNED: ODYSSEY
DRAWN: CIVIL3D
DATE: 10-01-21
CHECKED:
SUBMITTED:
RECOMMENDED:
APPROVED:

TRUCKEE MEADOWS WATER
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PH 775-834-8000 / FX 775-834-8003

RIO WRANGLER ELEMENTARY, COM SVC
RENO, NEVADA
DETAIL SHEET

WE-3
3 OF 4

Professional Seal

Date Revision
1. 11/16/21 ADDENDUM #3

Consultant

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Washoe County School District
Rio Wrangler Elementary School

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Reno, Nevada 89521

CIVIL TMWA PLAN

October 13, 2021
H+K Project No.: 2001

C2002

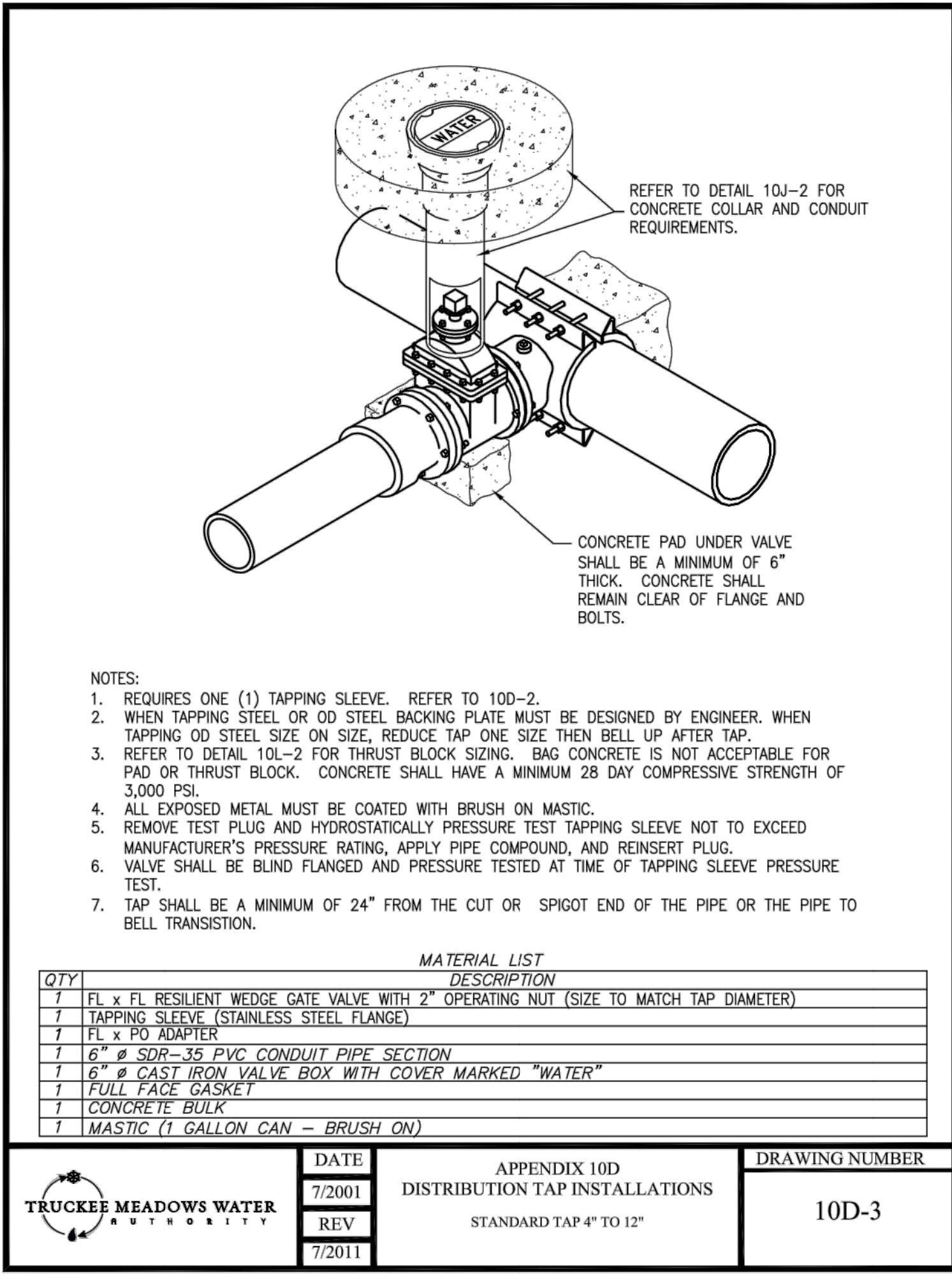
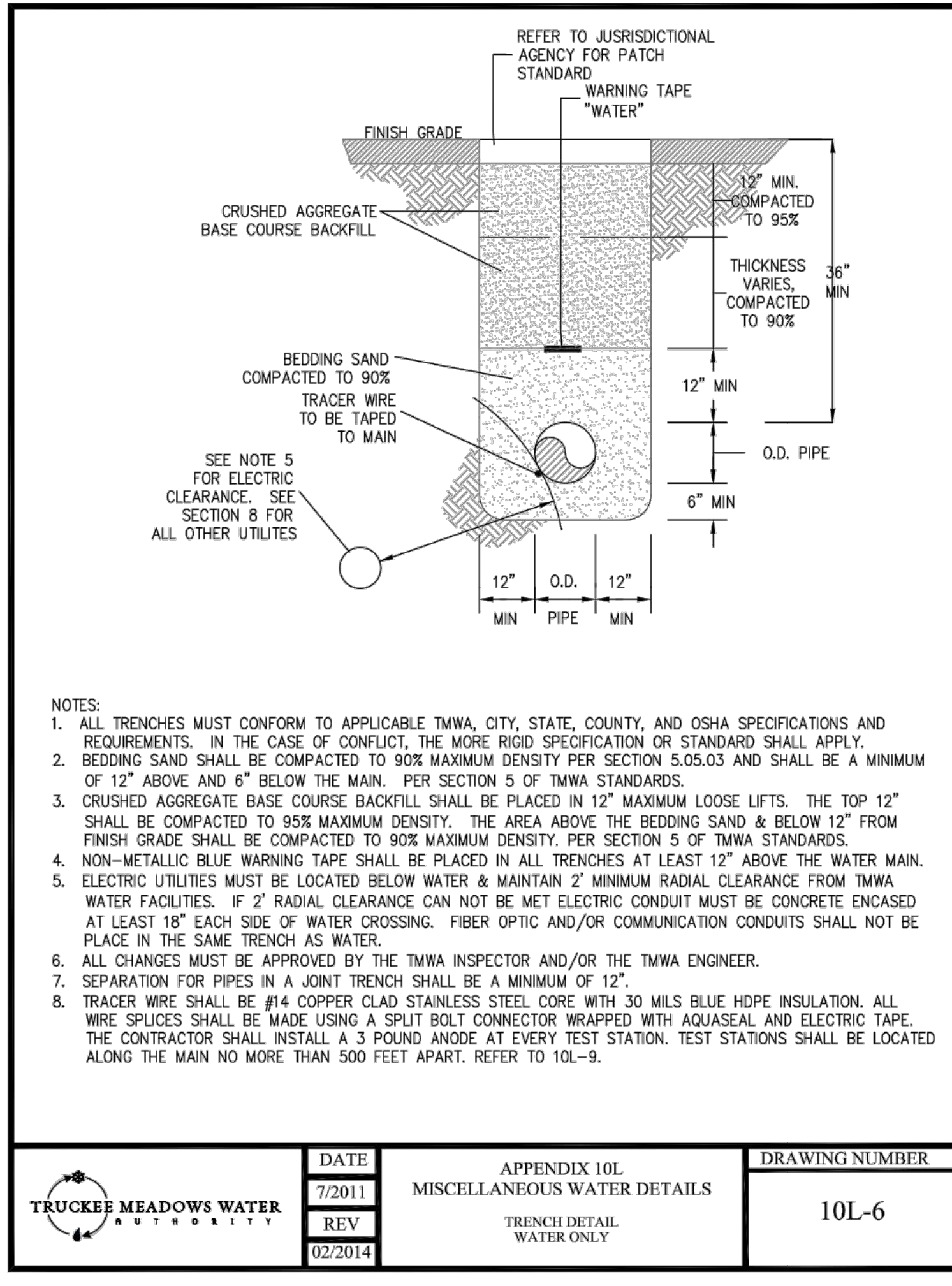
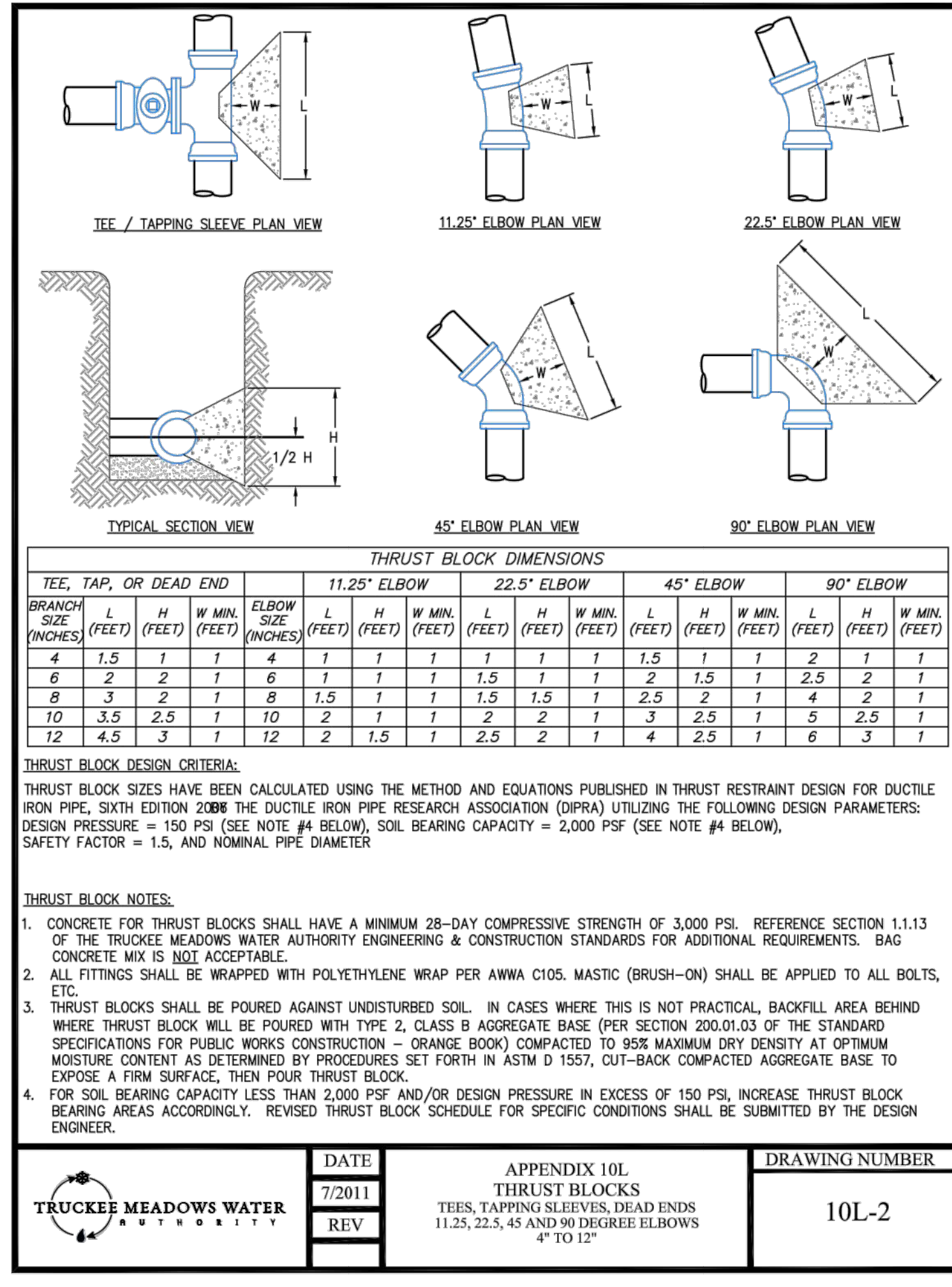
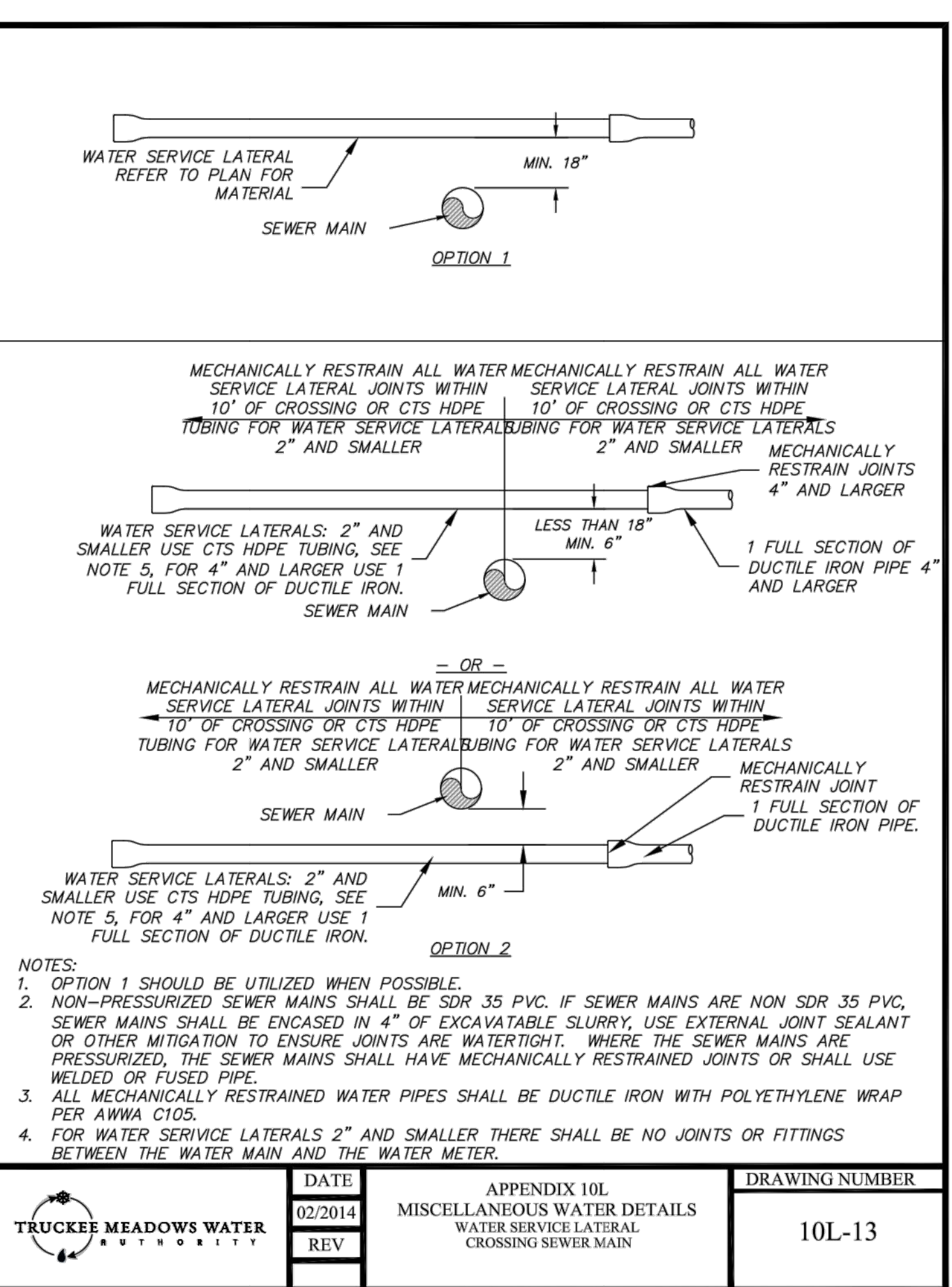
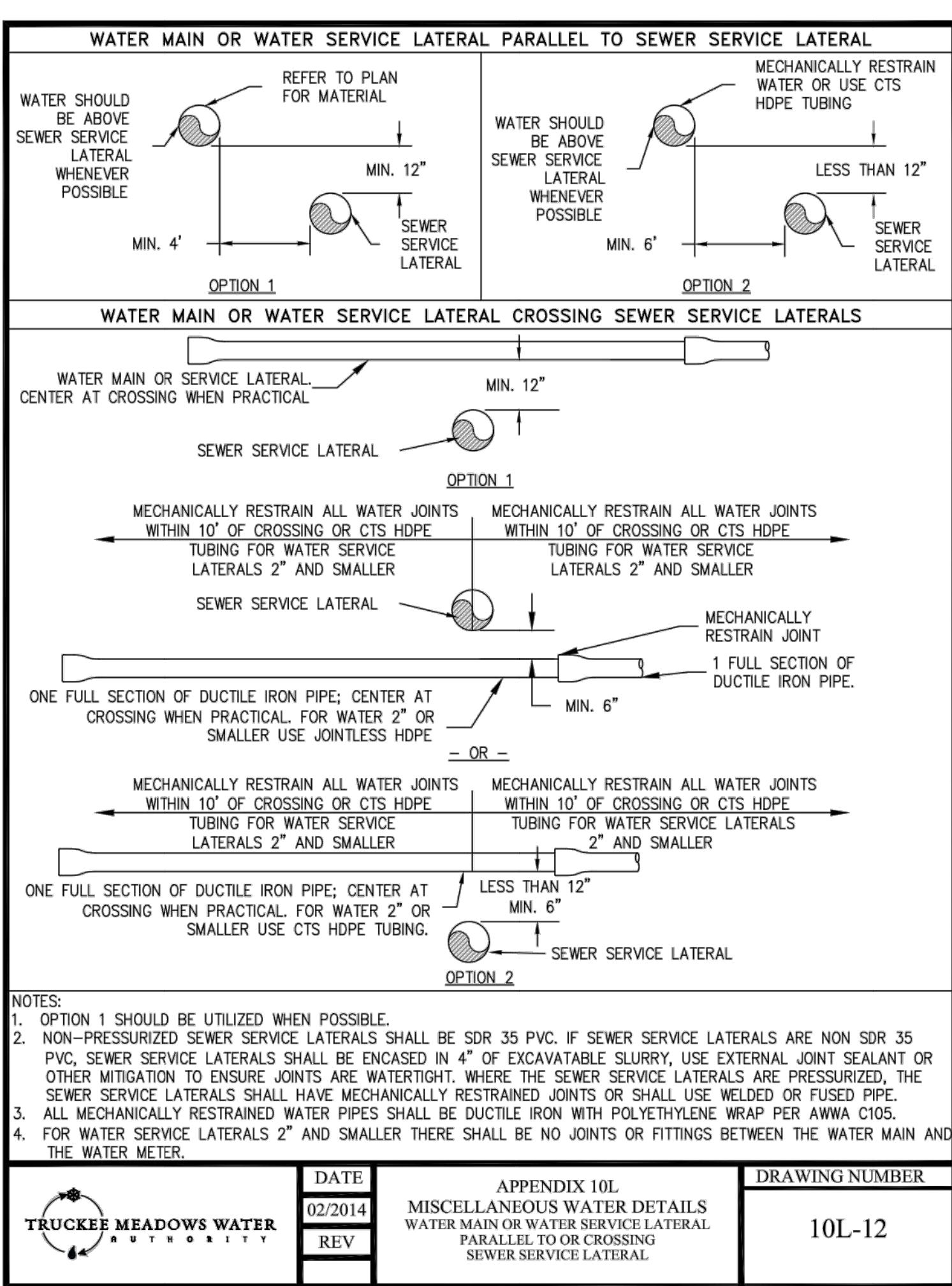
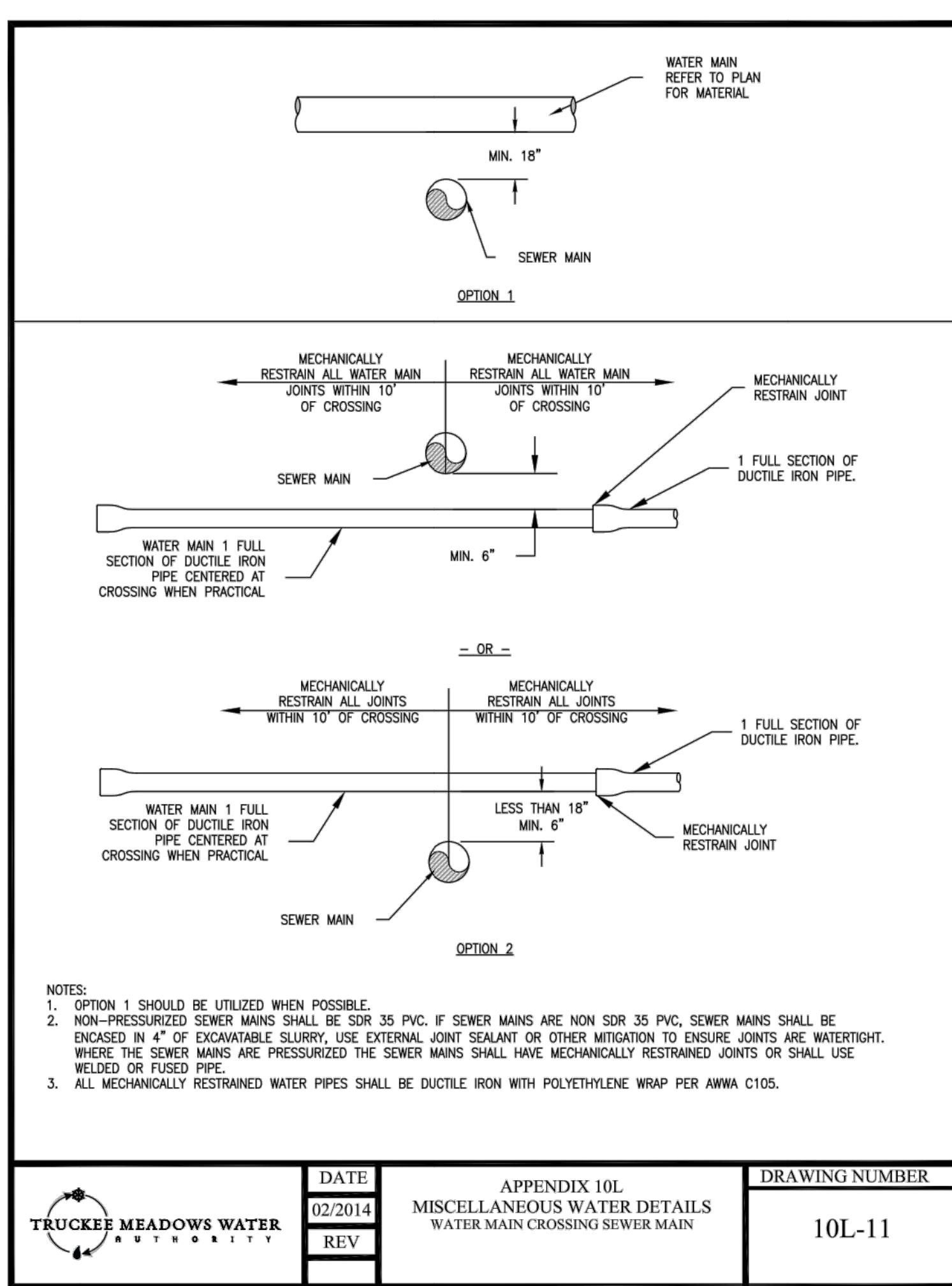
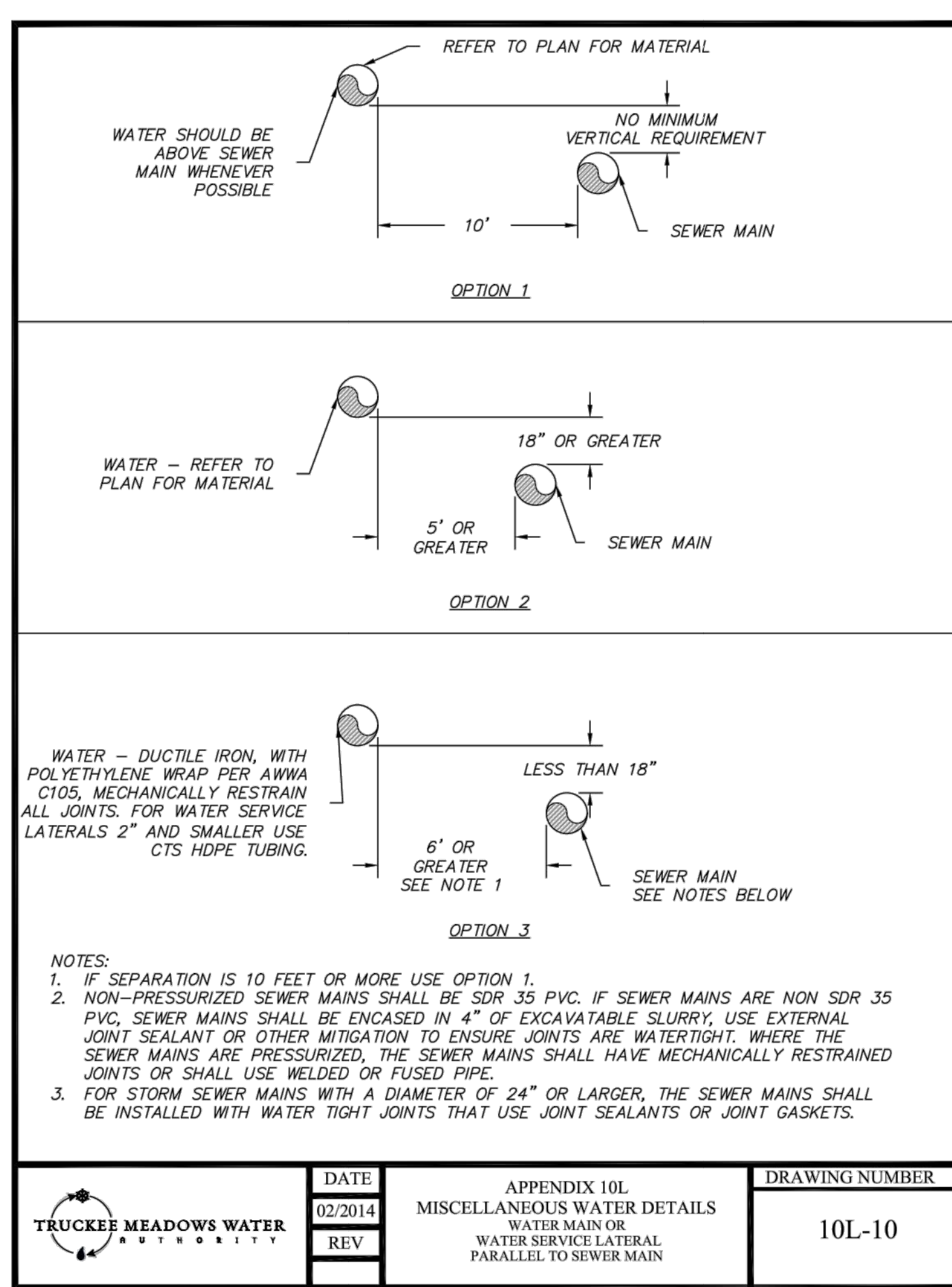


WORK ORDER NO. 21-8237
DESIGNED: CROSSLEY
DRAWN: CIVIL/BD
DATE: 10-01-21
CHECKED:
SUBMITTED:
RECOMMENDED:
APPROVED:

TRUCKEE MEADOWS WATER
A U T H O R I T Y
1885 CAPITAL BLVD. / PO BOX 30013
RENO, NEVADA 89502-8013
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RIO WRANGLER ELEMENTARY, COM SVC
RENO, NEVADA
DETAIL SHEET

WE-4
4 OF 4



Professional Seal

Date: 11/16/21
Revision: ADDENDUM #3

Consultant

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P 775-332-6640
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hkarchitects.com

Washoe County School District
Rio Wrangler Elementary School
10600 Green Pasture Drive
Reno, Nevada 89521

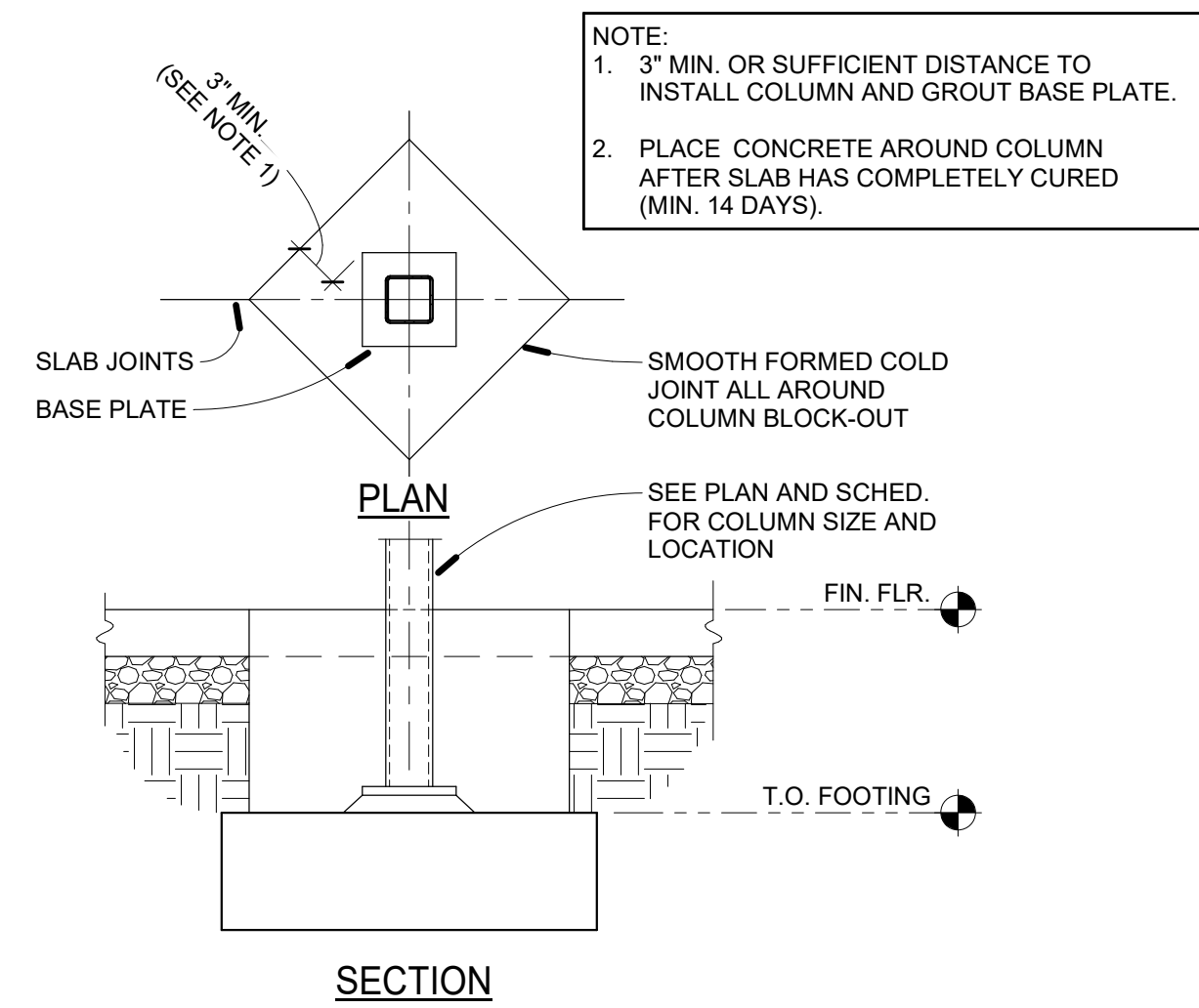
CIVIL TMWA PLAN

October 13, 2021
H+K Project No.: 2001

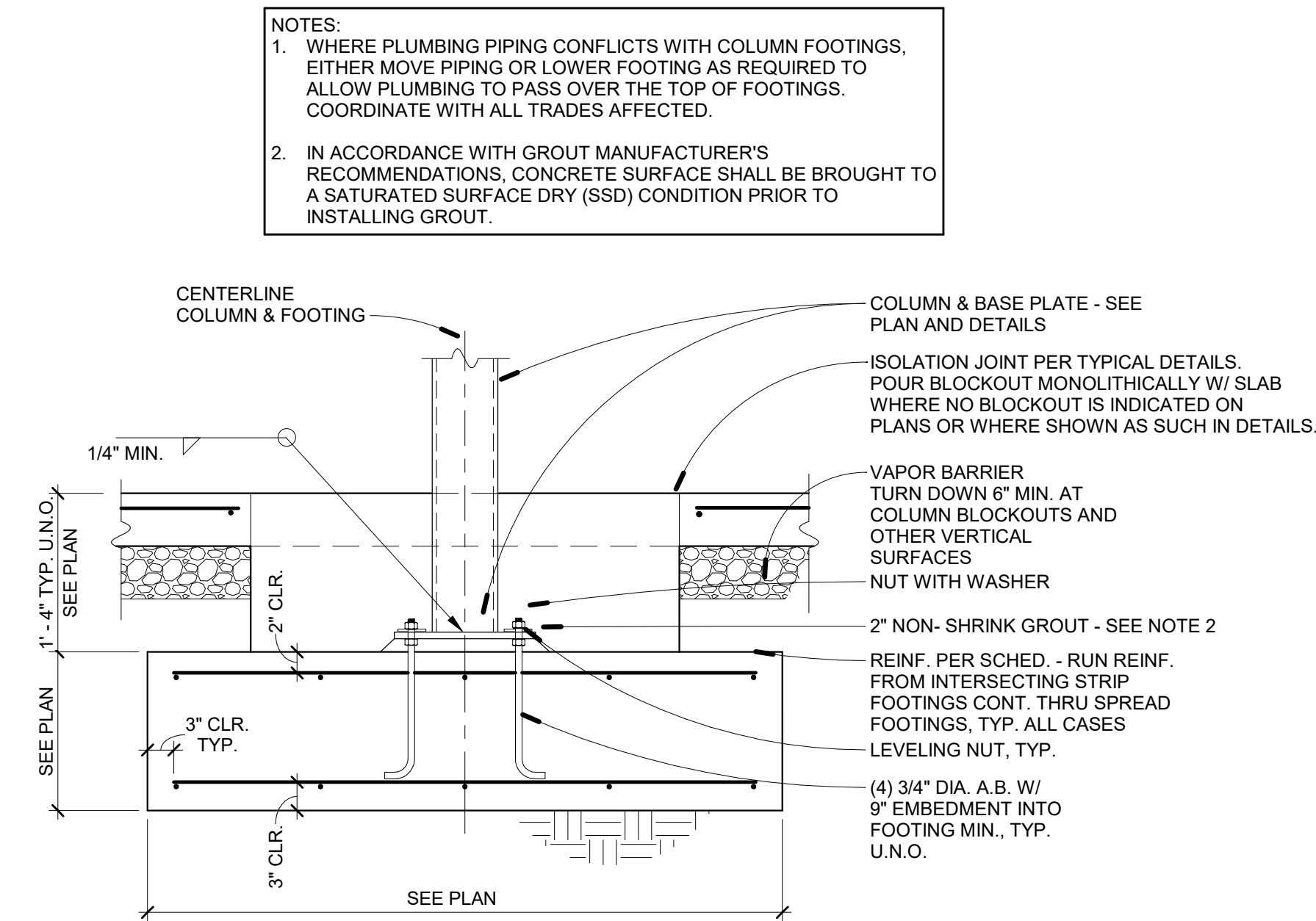
C2003



1 TYPICAL COLUMN BLOCKOUT
S012 NO SCALE



2 TYPICAL TUBE COLUMN FOOTING
S012 NO SCALE

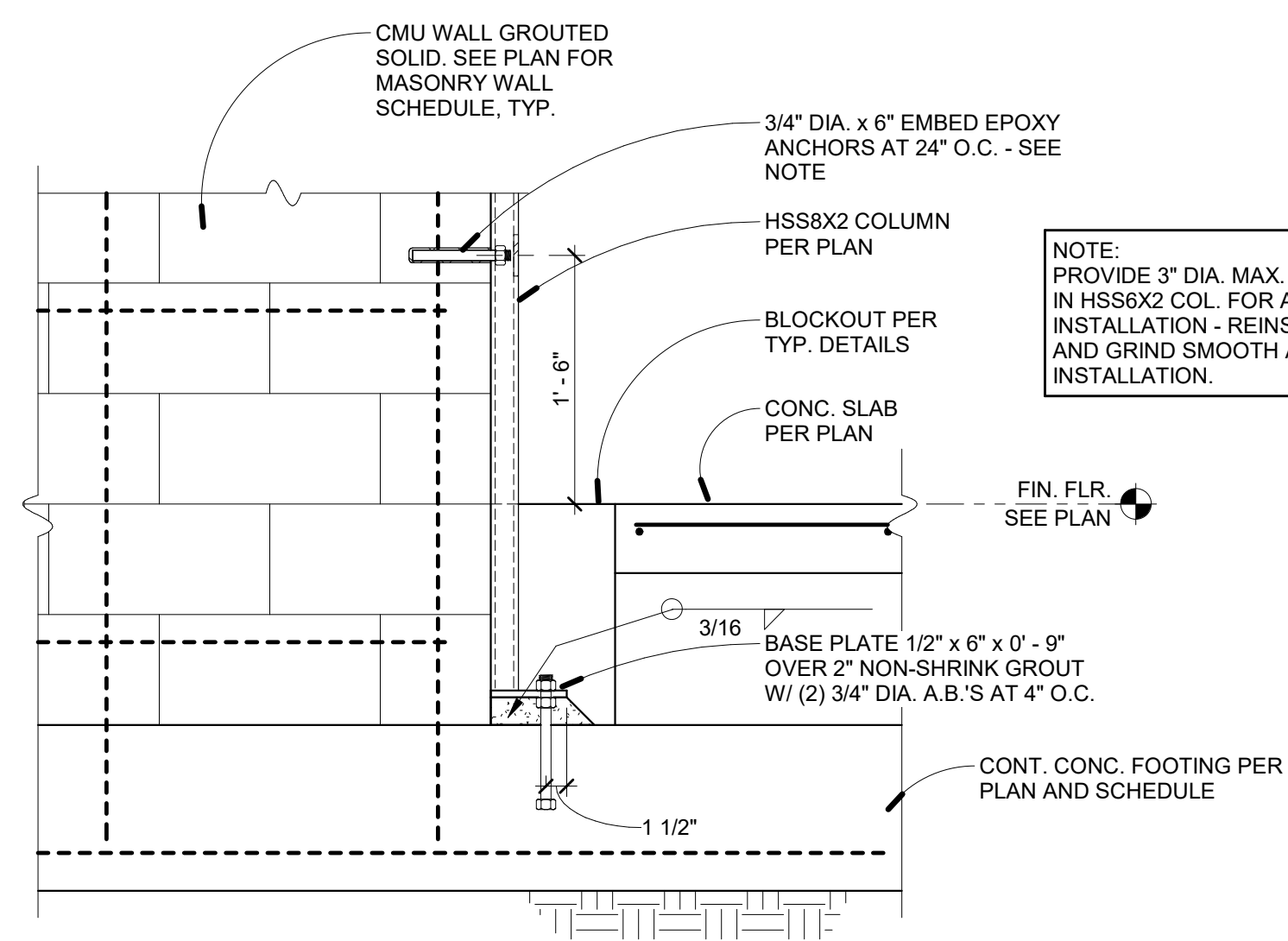


COLUMN	BASE PLATE THICKNESS Y	DETAIL
HSSØX8X3/8	1"	A
HSSØX0.375	1"	B
HSSØX8X1/4	3/4"	A
HSSØX0.312	3/4"	B
HSSØX0.25	1/2"	B
3 1/2" DIA. PIPE STD.	1/2"	B
HSSØX2X3/16	1/2"	SEE 3 / S012

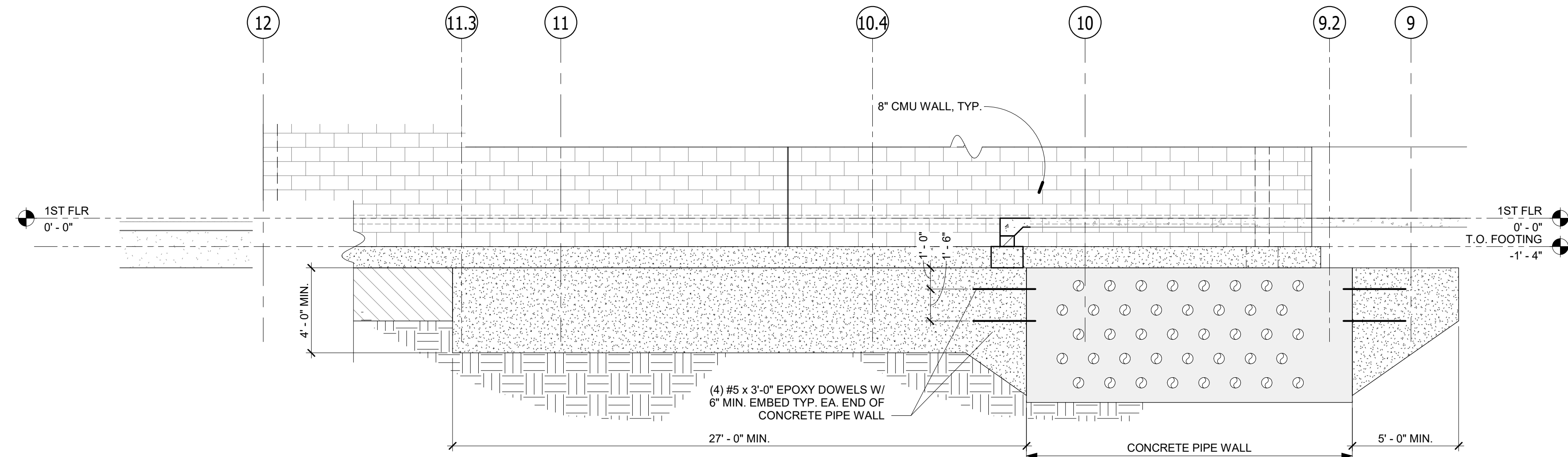
A PLAN SECTION

B PLAN SECTION

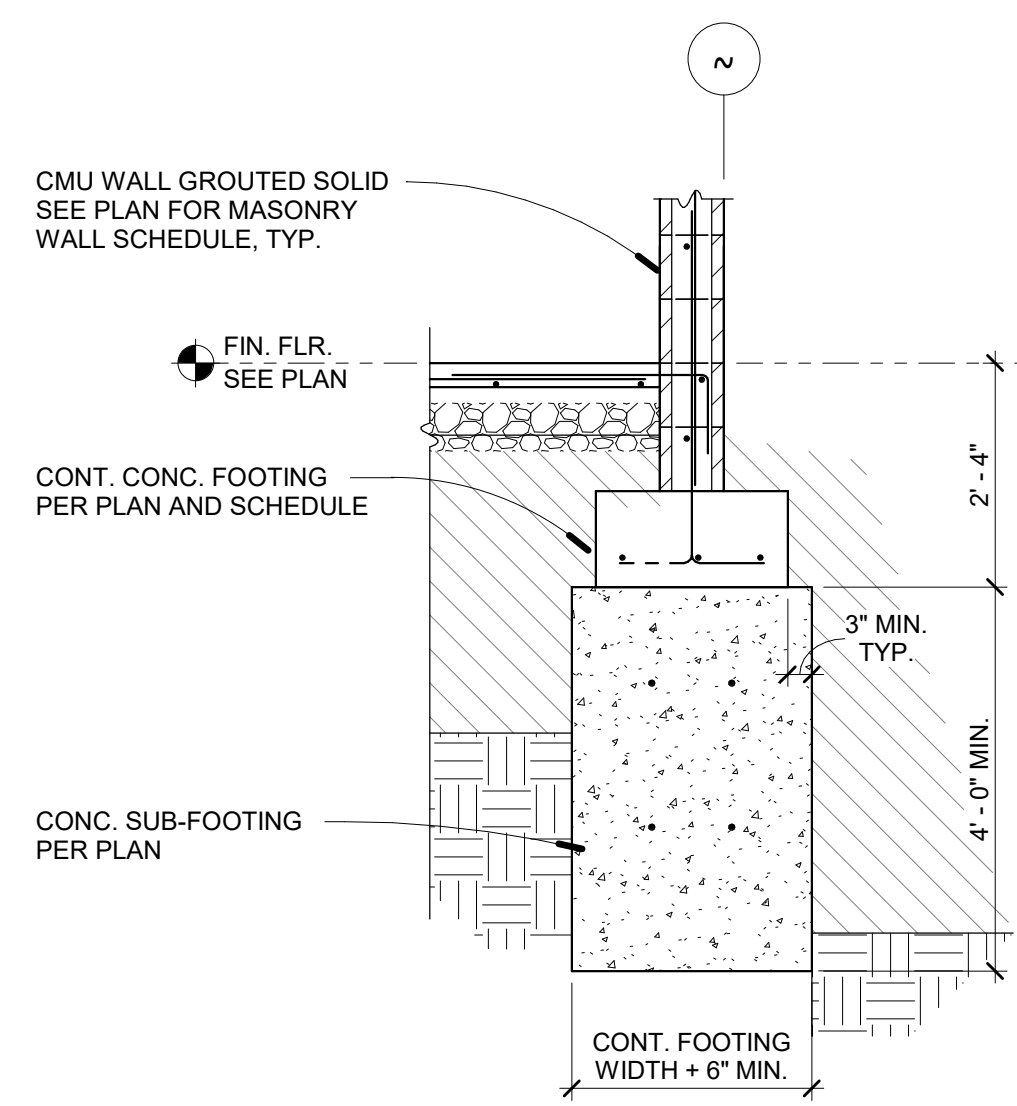
3 TYP. HSS-COLUMN AT CMU JAMB
S012 1" = 1'-0"



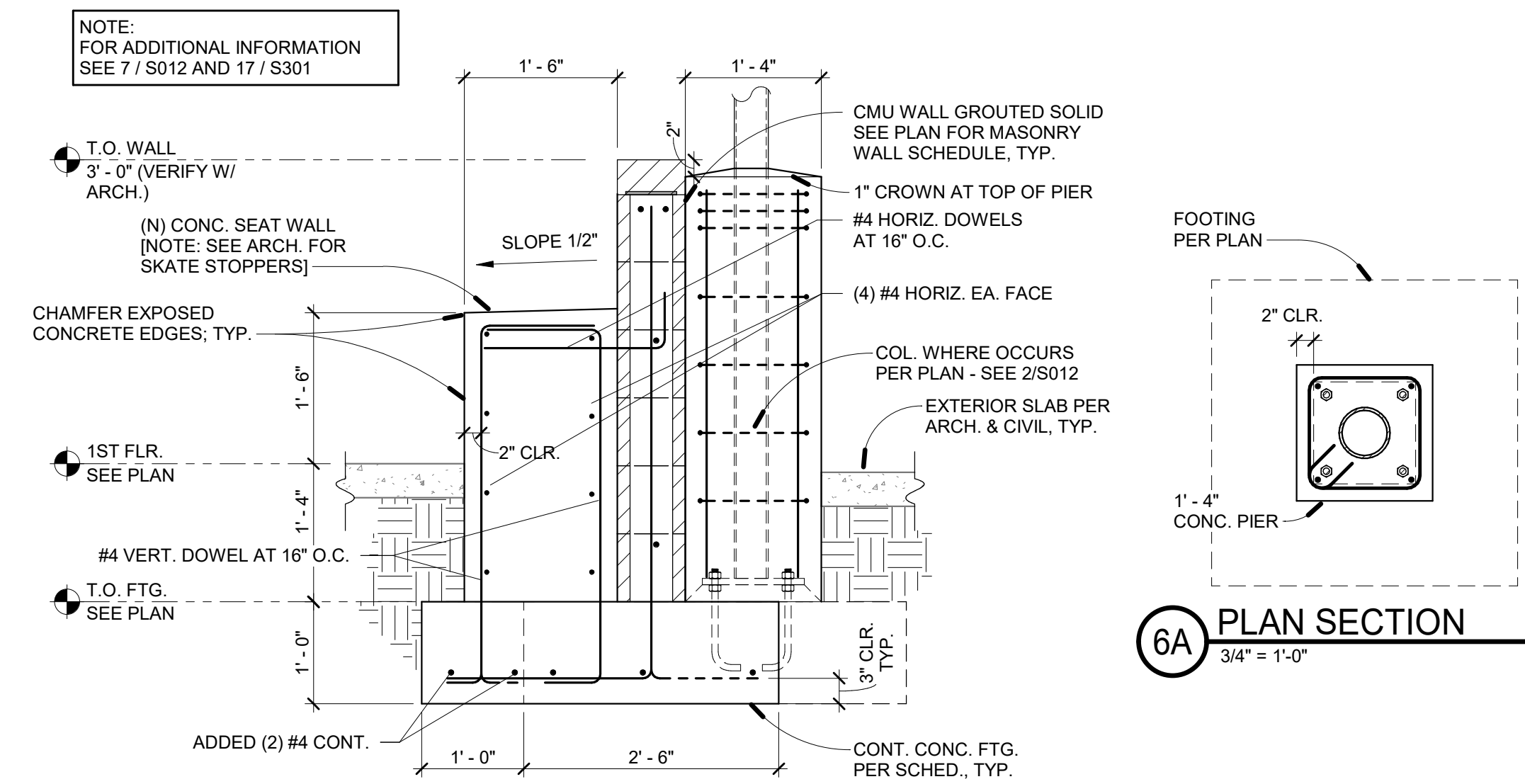
4 EXTENDED PIPE WALL FOOTING
S012 1/4" = 1'-0"



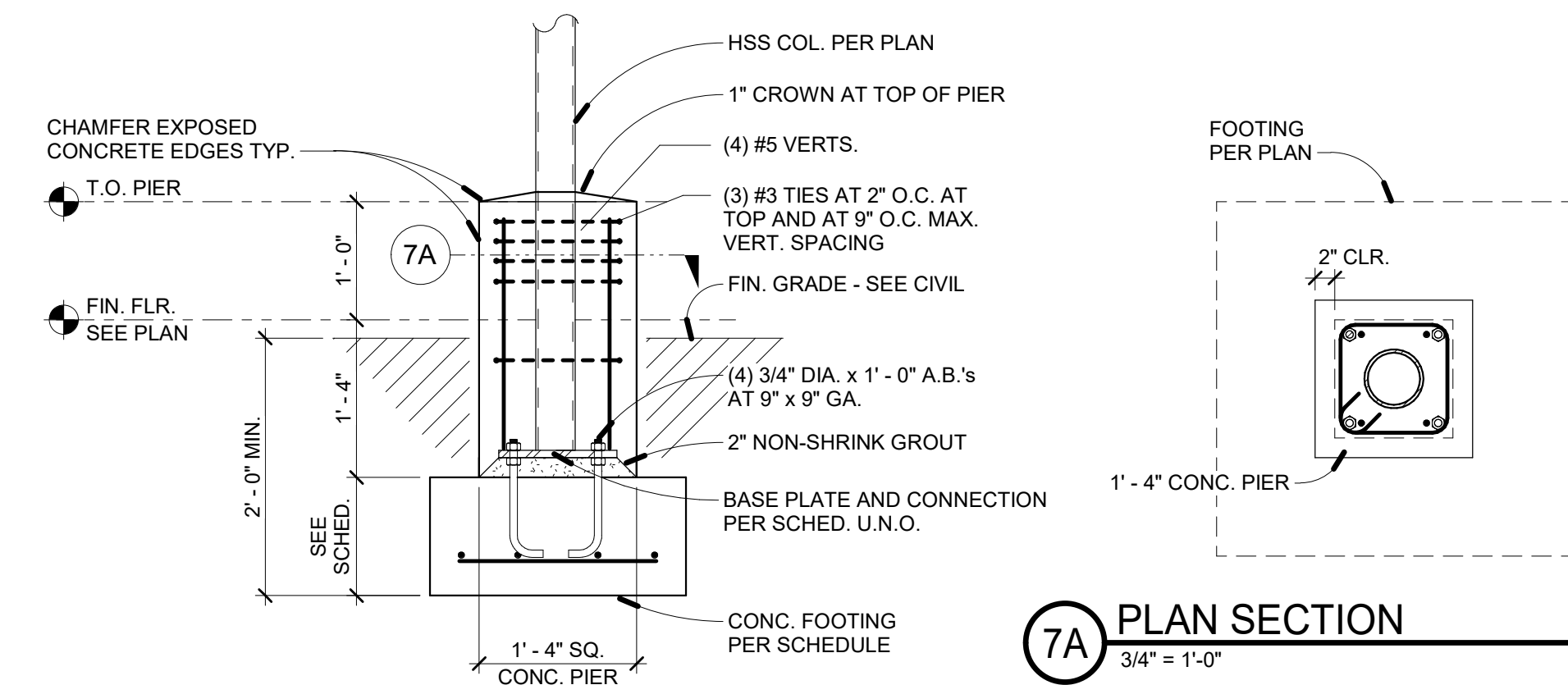
5 CONCRETE SUB-FOOTING SECTION
S012 1/2" = 1'-0"



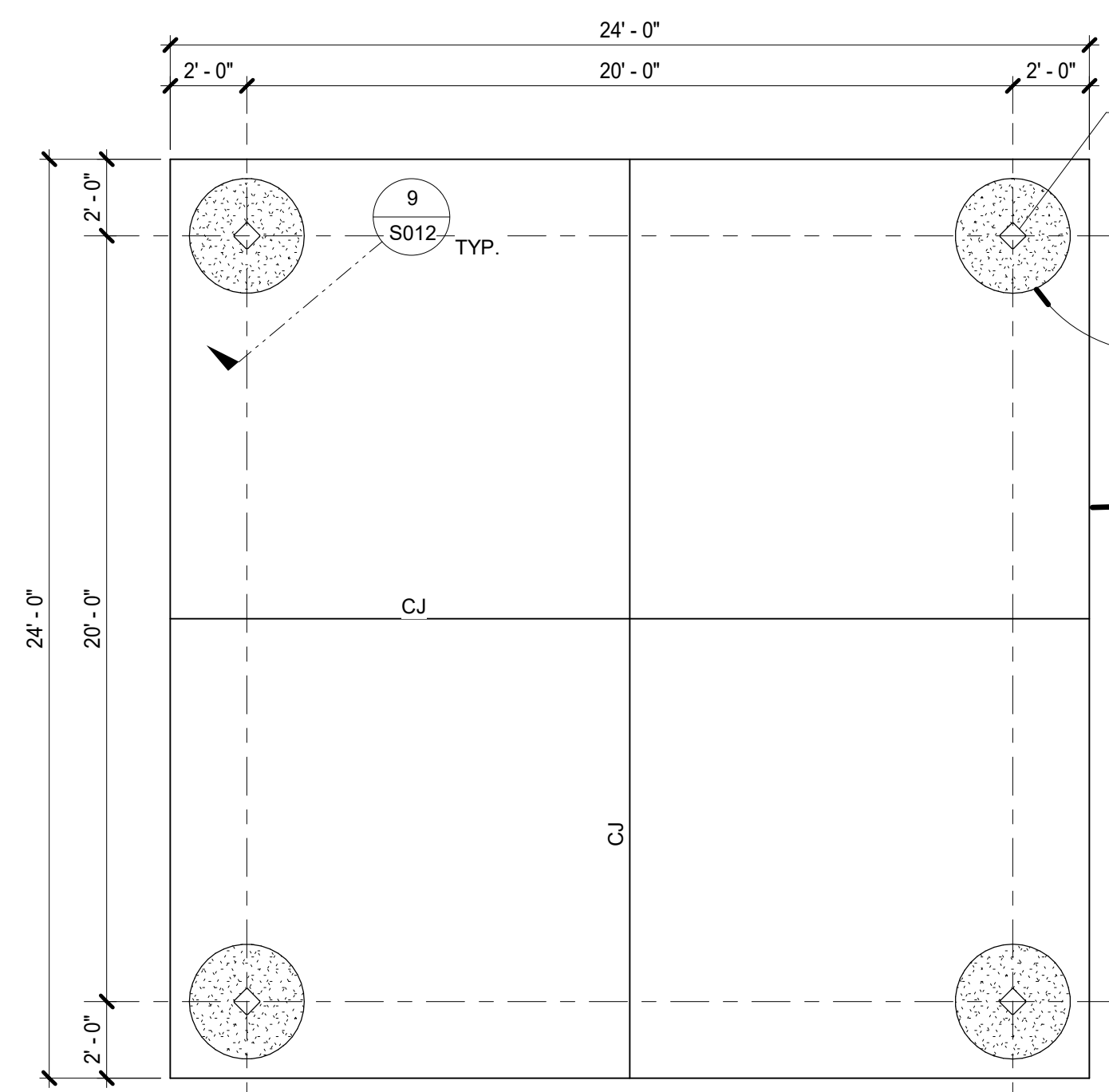
6 SCREENWALL / SEAT FOUNDATION SECTION
S012 3/4" = 1'-0"



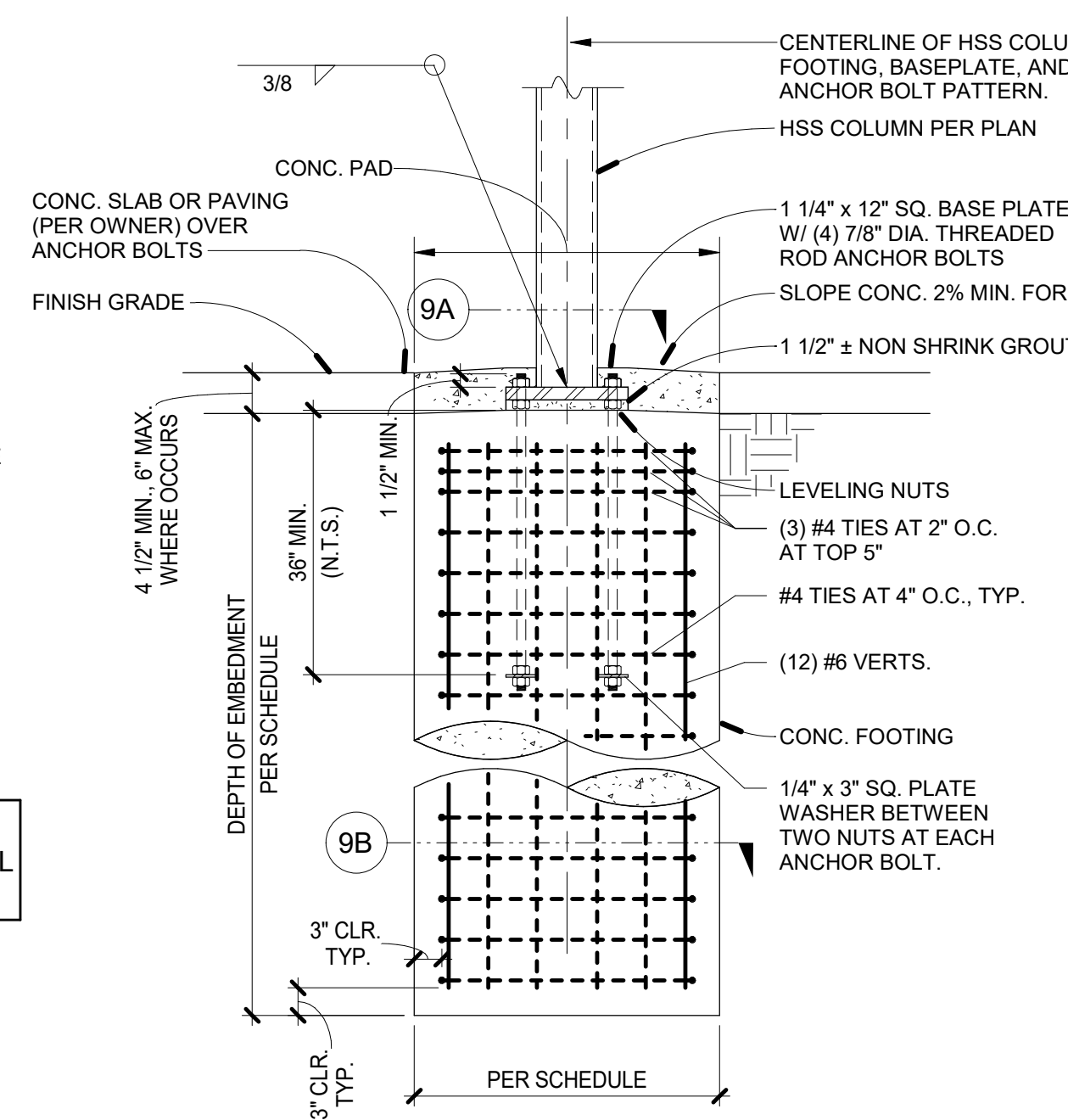
7 TYP. EXTERIOR HSS-COLUMN
PIER FOUNDATION SECTION
S012 3/4" = 1'-0"



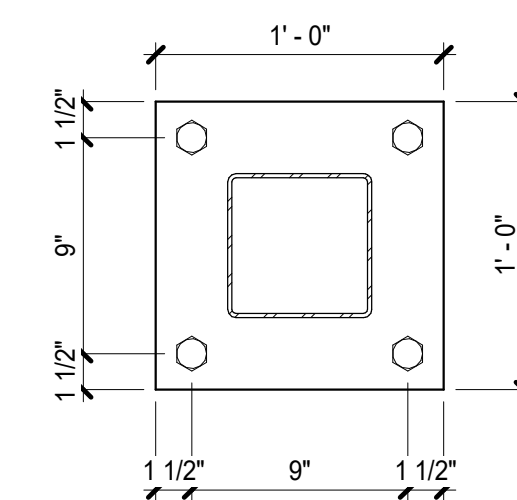
8 24' SHELTER FOUNDATION PLAN
S012 1/4" = 1'-0"



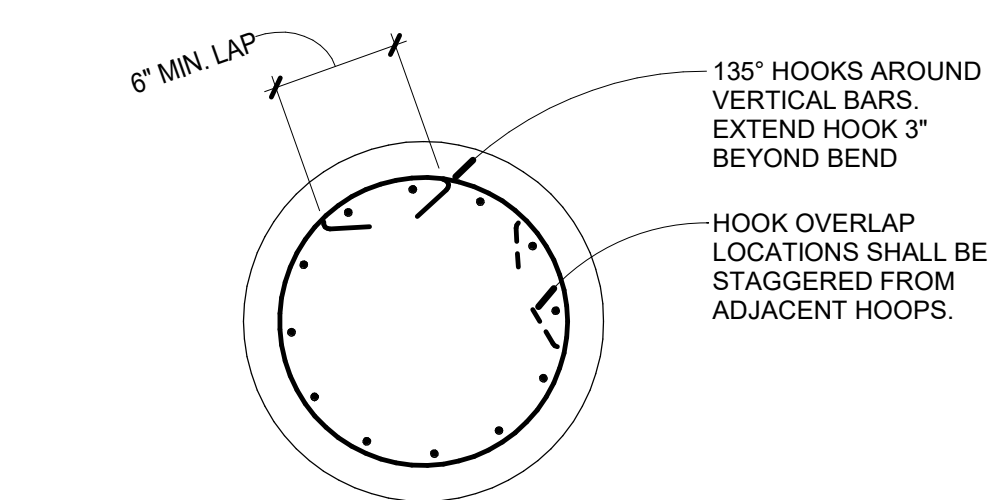
9 FOUNDATION SECTION
S012 3/4" = 1'-0"



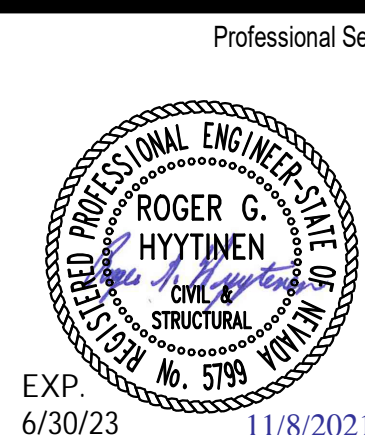
9A PLAN SECTION
1 1/2" = 1'-0"



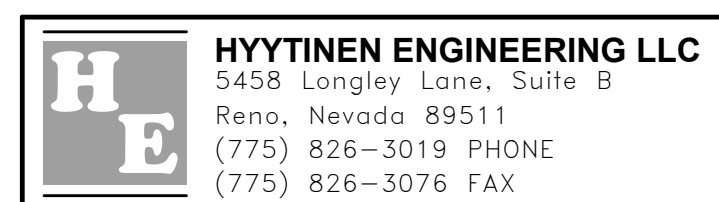
9B PLAN SECTION
3/4" = 1'-0"



PIER FOOTING SCHEDULE	
FOOTINGS MORE THAN 7'-2" (CENTER-TO-CENTER) FROM ADJACENT SHELTER FOOTING	FOOTINGS LESS THAN 7'-2" (CENTER-TO-CENTER) FROM ADJACENT SHELTER FOOTING
3'-0" DIA. x 7'-2" DEEP	3'-0" DIA. x 9'-3" DEEP
NOTES: 1. REQUIRED FOOTING SIZE VARIES BASED ON PROXIMITY TO ADJACENT SHELTER, WHERE OCCURS.	



Date Revision
1 11/16/21 Addendum #3



5-20

Consultant

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Washoe County School District
Rio Wrangler Elementary School

10600 Green Pasture Drive
Reno, Nevada 89521

Typical Concrete Details

October 13, 2021
H+K Project No: 2001

S012





Ameriform LLC
41 Pope Rd
Holliston, MA 01746

9/21/20

TO WHOM IT MAY CONCERN:

Re: Armoroc Cement Bonded Particle Board

Aarmoroc® panels do not meet the ASTM E136-19 test for non-combustibility. Any questions regarding this statement or Armoroc generally should be referred to the brand owner and supplier, Ectek.

Sincerely,

Michael Kavanagh

Michael Kavanagh
President

PRODUCT EVALUATION QUESTIONNAIRE

When proposing to substitute products for those specified or proposing a product to meet a specified performance standard, please furnish the following information to assist the Owner and Architect in evaluating the proposed product.

Bid/Quote #: 22-26-B-10-DA

Project: Rio Wrangler Area Elementary School

Specification Section: 072100

Division: 7

Article #: 2.1

Name of Product: CI Max polyisocyanurate rigid foam insulation

Manufacturer's Name and Address: Johns Manville, 717 17th Street, Denver, CO 80202

1. Attach manufacturer's complete technical data and all information relating to limitations of the product information requiring further testing be deemed necessary by the Architect, the cost of the prescribed test shall be borne by the Contractor. Contractor shall send product samples upon request.
2. Attach a list of projects where comparable use has been made of this product. List the name and location of the project, name of Owner or Architect, Engineer, General Contractor, and Subcontractor (if applicable), and the year installed.
3. List any problems encountered with this product on projects where it has been used. What corrective measures were required?
Patching and sealing with approved tap is hte most common corrective action.
4. Provide a detailed comparison of the proposed substitute product with that of the specified product. Differences are to be highlighted and called out.
5. Submit a detailed specification, conforming to the format of the technical specifications herein contained, tailored to this project for installation of this product.
6. Will the services of an expert field representative be furnished to supervise the installation of this product?
This can be arranged if so desired by the project team.

7. Describe maintenance requirements for this product and availability of expert repair service, if needed.

Product is available to order from msot major distributors.

8. Will the proposed substitution result in a change in Contract price or time of completion? If so, submit itemization of price change and explain effect on time of completion.

No adverse impact to cost or schedule.

9. Will the use of the proposed product necessitate a change in the contract drawings or specifications? No

10. Will the use of this product necessitate the payment of any license fees or royalties? No

11. Furnish information establishing financial responsibility of the manufacturer. (Number of years in business, volume of business, Dunn & Bradstreet rating, etc) Johns Manville is a Berkshire Hathaway company.

12. The Contractor certifies that he or she understands the conditions of use to which this product will be put and he/she warrants this product as stipulated in the General Conditions.

Johns Manville

Name of Contractor

Jeffrey Job, Sr. Specifiers Services Rep.

Signature of Officer, Owner or Partner

Jeffrey Job

Digitally signed by Jeffrey Job
DN: cn=Jeffrey Job, o, ou,
email=futurearch16@yahoo.com, c=US
Date: 2021.11.08 13:18:01 -0700

11/8/2021

Date



A Berkshire Hathaway Company

717 17th Street (80202)
P.O. Box 5108
Denver, CO 80217-5108
303 978 2000
www.jm.com

November 8, 2021

Rio Wrangler Area Elementary School

072100 – 2.1: POLYISOCYANURATE BOARD INSULATION

JM CI Max polyisocyanurate sheathing has physical properties that are comparable to the other product(s) listed below. A complete list of the JM CI Max physical properties is included on the product technical data sheet.

Manufacturer	JM	DuPont (Dow)	Rmax
Product Name	CI MAX	THERMAX ci	TSX-8500
ASTM C 1289 Class	Type I, Class 1 or 2	Type 1, Class 1 or 2	Type I, Class 1 or 2
Facer	1.5 mil embossed acrylic-coated foil plus 12 mil glass mat reinforcement (13.5 mil total both sides)	1.25 mil embossed blue foil on one side, 0.9 mil embossed foil on the other	White reinforced foil on one side, reinforced foil on the other side
Thicknesses	0.5-4.0	0.625, 1.0, 1.55, 2.0	0.5-4.5
R-Value at 1" (ASTM C518)	6.0	6.5	6.0
R-Value at 2" (ASTM C518)	13.0	13.0	13.1
Compressive Strength (ASTM D1621)	16 psi	25 psi	20 psi
Density (ASTM D1622)	2 pcf	2 pcf	2 pcf
Water Absorption (ASTM C209)	<0.5%	0.1%	<1%
Water Vapor Transmission (ASTM E96)	<0.03 perm	<0.04 perm	<0.03 perm
Dimensional Stability (ASTM D2126)	<2%	<2%	<2%
Operational Temperature	-100 - 250° F	<250° F	-40 - 250° F
Flame Spread (ASTM E84)	≤25	25	≤25
Smoke Developed (ASTM E84)	≤450	<450	≤450
IBC	Types I-IV	Types I-V	Type V
Ignition Barrier Required	No	Yes	Yes
Evaluation Service Report	ICC-ESR-3398	ICC-ESR-1659	ICC-ESR-1864
Approved Air Barrier	No	Yes	No
ENERGY STAR	ICC-ESR-3398S	No	No
Miami Dade	No	No	Yes

Data as shown is intended to be used as a general guideline only. The physical and chemical properties of polyisocyanurate foam listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. When manufacturer's published literature varied from Evaluation Report data, ER data governs.

If you require additional information, please feel free to contact me at 303-978-2434.

Best Regards,

Jeffrey Job
Sr. Specifier Services Representative, Johns Manville



Johns Manville

A Berkshire Hathaway Company

717 17th Street (80202)
P.O. Box 5108
Denver, CO 80217-5108
303 978 2000
www.jm.com

November 8, 2021

Rio Wrangler Area Elementary School

Existing Installations

Product: Polyisocyanurate Foam Board Insulation

- Harrison Elementary School – Cottage Grove, OR, 2019; BLRB Architects
- Villanova University Lancaster Student Housing – Villanova, PA, 2017; Voith & MacTavish Architects
- Castle Pines Medical Center – Castle Pines, CO, 2013; White Construction Group

More projects and details are available upon request.

This information was provided as guidance and assistance with the understanding that the comments do not constitute any representations, endorsements of, or an assumption by Johns Manville of any liability for the adequacy of design of the building, performance of the material and/or the building envelope.

DESCRIPTION

Johns Manville CI Max® is a high efficiency rigid foam sheathing designed for exposed interior applications. It is composed of a uniform closed-cell polyisocyanurate foam core bonded on each side to glass-mat-reinforced 1.5 mil embossed aluminum facers. Available in a white or silver finish, CI Max foam sheathing is approved for use without a thermal barrier and provides an attractive and durable interior finish. It is suitable for wall or ceiling applications in residential, commercial, agricultural and industrial buildings.

Polyiso provides a continuous layer of insulation to reduce thermal bridging and improve energy efficiency. CI Max foam sheathing passed NFPA 286 Corner Burn Test for walls only or ceiling only without joint treatment, meeting both the International Code Council's Building Code Section 2603 and Residential Code Section R316.

CI Max foam sheathing is produced with an EPA compliant hydrocarbon-based blowing agent which has zero Ozone Depletion Potential (ODP) and virtually no Global Warming Potential (GWP). It meets CFC- and HCFC-free specification requirements. It also meets acceptance criteria for individual VOCs of concern and formaldehyde for school classrooms, private offices, and single family residences. Polyiso is one of North America's most widely-used insulation products and has been cited by the EPA for its responsible impact on the environment.

USE

CI Max foam sheathing is designed for easy installation where high thermal efficiency is required within both new and retrofit interior construction. It is an excellent interior insulation solution for both residential and Types I-V commercial construction including: masonry or framed walls or ceilings; pre-engineered metal buildings; industrial, agricultural, farm, storage, and parking structures; below-grade basement walls or ceilings; crawlspace walls or ceilings. Follow local building codes for application without a thermal barrier.

INSTALLATION

CI Max foam sheathing is lightweight and can be easily cut with a utility knife or saw. Use maximum board lengths to minimize the number of joints. Butt joints should be centered over framing. Consult local building department for code requirements.

COMPLIANCES

- ASTM C1289 Type 1, Class 1
- CAN/ULC S704, Type 1, Class 1
- ICC- ESR-3398
- California State Insulation Quality Standards
- International Building Code Section 2603 and 803, (2018, 2015, 2012, 2009)
- International Residential Code Section R316 (2018, 2015, 2012, 2009)
- International Energy Conservation Code, Table C402.2, Table R402.1.1, (2018, 2015, 2012, 2009)
- ASHRAE 90.1
- Energy Star Pending

PERFORMANCE STANDARDS

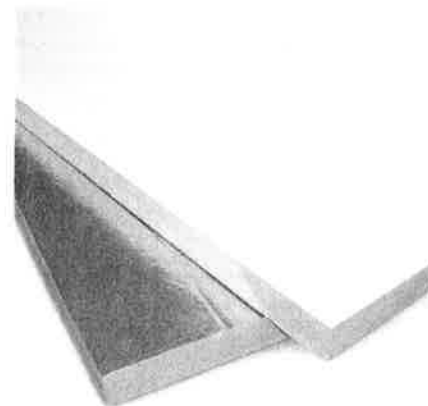
- ASTM C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
- CAN/ULC-S704 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
- ASTM E84, Test for Surface Burning Characteristics of Building Materials
- CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
- VOC Emissions from Building Products, CDPH/EHLB/Standard Method V1.1 (Section 01350)

AVAILABILITY

CI Max foam sheathing is available in the sizes shown in Table 1. For additional information or special size inquiries, please consult a sales representative at 800-654-3103.

COMPANY

Johns Manville, a Berkshire Hathaway company, was founded in 1858. Our ownership by Berkshire Hathaway, one of the most admired companies in the world and one of the most financially secure, allows JM to invest for the future. This enables JM to continue delivering the broadest range of insulation products in the industry and offering innovative solutions that meet your needs.



PERFORMANCE ADVANTAGES

Thermal Insulation: Polyiso has one of the highest R-values per inch of any rigid insulation, making it the product of choice for energy-aware consumers.

R-values for CI Max Polyiso Continuous Insulation are shown in Table 1, and physical properties are shown in Table 2 (see reverse). R means resistance to heat flow. The higher the R-value, the greater the insulating power.

Noncorrosive: does not accelerate corrosion of pipes, wiring or metal studs.

Lightweight: easy to handle, can be cut with a utility knife or saw.

ENERGY, QUALITY & ENVIRONMENT



STORAGE

Store CI Max foam sheathing elevated above the floor or ground and standing water. If stored outdoors, keep dry by covering completely with a waterproof tarpaulin.

LIMITATIONS

CI Max foam sheathing is nonstructural. The walls must be braced in accordance with the requirements of the applicable code. This product is not marketed as a rodent or insect deterrent.

WARRANTY

All Johns Manville products are sold subject to Johns Manville's Limited Warranty and Limitation of Remedy. For a copy of these documents, call 800-654-3103.

WARNING

Check applicable building codes. CI Max foam sheathing must be protected from open flame because the product is combustible. CI Max foam sheathing must be protected from outside elements like wind, rain, and sunlight and should be kept dry at all times.

TECHNICAL SERVICES

Johns Manville can provide technical information to assist in addressing questions regarding CI Max foam sheathing. Please call 800-654-3103 for technical assistance.

PERFORMANCE DATA

Table 1: Thermal Performance

NOMINAL THICKNESS		R-VALUE¹ (°F•ft²•h/BTU)	RSI-VALUE¹ (°K•m²/W)	BOARD SIZE² (ft)
(inches)	(millimeters)			
0.50	13	2.7	0.48	4 x 8
0.77	20	4.5	0.79	4 x 8
0.85	22	5.0	0.88	4 x 8
1.00	25	6.0	1.06	4 x 8
1.50	38	9.3	1.63	4 x 8
1.55	39	9.6	1.69	4 x 8
1.65	42	10	1.81	4 x 8
2.00	51	13	2.21	4 x 8
2.50	64	16	2.79	4 x 8
3.00	76	19	3.36	4 x 8
3.50	89	22	3.94	4 x 8
4.00	102	26	4.52	4 x 8

¹Aged R-value at 75° F in accordance with ASTM C1289.

²Non-standard 9' and 10' long board available as made to order.

Table 2: Physical Properties

PROPERTY	UNITS	TEST METHOD	RESULT
Thermal Resistance, 1 inch	°F•ft²•hr/BTU	ASTM C518*	6.0
Compressive Strength	psi	ASTM D1621	≥ 16
Flexural Strength	psi	ASTM C203	≥ 40
Water Absorption	% by volume	ASTM C209	< 0.6
Water Vapor Permeance	perms	ASTM E96	0.02
Mold Resistance	rating	ASTM D3273	10, no defacement
Surface Burning Characteristics**			
Flame Spread	index	ASTM E84	≤ 25
Smoke Developed	index	ASTM E84	≤ 450
Service Temperature	°F		-100 to 250

*Aged R-value at 75° F in accordance with ASTM C1289.

**Numerical flame spread and smoke developed ratings are not intended to reflect hazards present in actual fire conditions

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Extruded-Polystyrene board insulation.
 - 2. Polyisocyanurate board insulation
 - 3. Glass-fiber blanket insulation.
 - 4. Sound attenuation batts.
- B. Related Sections:
 - 1. Section 061600 "Sheathing" for foam-plastic board sheathing over cold-formed framing.
 - 2. Section 075419 Polyvinyl-Chloride (PVC) Roofing" for insulation specified as part of roofing construction.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 POLYISOCYANURATE BOARD INSULATION

- A. Foil-Faced, Polyisocyanurate Board Insulation for interior application on masonry and concrete substrates: ASTM C 1289, Type I, Class 2, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 1. 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:
 - a. Dow Chemical Company (The); THERMAX Insulation.
 - b. Rmax, Inc: TSX-8500.
- B. Insulation shall meet requirements to allow for exposed use without the need for a thermal barrier. Product must meet NFPA286, FM 4880 or UL1715.
- C. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
 1. Thickness: 2 inches.

2.2 GLASS-FIBER BLANKET INSULATION

- A. 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. CertainTeed Corporation
 2. Johns Manville: a Berkshire Hathaway Company
 3. Owens Corning
- B. Unfaced, Glass-Fiber Blanket Insulation: 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.
- C. Foil-Faced, Glass-Fiber Blanket Insulation: 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.
- D. Thickness: 2-1/2, 3-5/8, 6, or 8 inches as indicated on Drawings.
- E. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 ACOUSTIC BLANKET SOUND INSULATION (SOUND ATTENUATION BATTS)

- A. Unfaced glass fiber acoustical insulation: ASTM C 665, Type I, with maximum flame-spread and smoke-developed indexes of 10 and 10, respectively, per ASTM E 84.
 - 1. 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:
 - a. Owens-Corning EcoTouch Fiberglas Insulation

2.4 GLASS-FIBER ACOUSTICAL BOARD INSULATION

- A. 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. Knauf Insulation; ECOSE Black Acoustical Board
 - 2. Owens Corning; SelectSound Black Acoustic Board
- B. Black Faced Glass-Fiber Acoustical Board Insulation: 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.
- C. Thickness: 1 inch.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foil Faced, Polyisocyanurate Board Insulation:
 - 1. Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
 - 2. Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.4 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.5 INSTALLATION OF ALUMINUM-FRAMED STOREFRONTS INSULATION

- A. Install board insulation in aluminum framed-storefront spandrel construction where indicated on Drawings according to aluminum framed-storefront manufacturer's written instructions.
 - 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to

hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.

2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.6 PROTECTION

- A. Protect installed insulation 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



AP™ Foil-faced Sheathing & CI Max™
(JM Rigid Foam Board 20 Year Limited Warranty)

Johns Manville warrants that the thermal insulation R value of its polyisocyanurate foam insulation products will not at any time after the first (1st) year after purchase, but prior to the start of the twentieth (20th) year after purchase, diminish to less than eighty percent (80%) of the published R value of the Product at the time of purchase. This warranty is expressly made subject to the following terms, conditions, and limitations:

(1) Warranty Limited to One Evaluation: Buyer agrees that the Limited Warranty is based on an evaluation of the Product as hereinafter set forth, and that the Product may be evaluated only one time during the time period for which this Limited Warranty is made. Buyer agrees and understands that the Product may not be evaluated each year, and the Limited Warranty applies to the results of the initial test performed on the product.

(2) Proof of Purchase: As a condition precedent to recover under this Limited Warranty, buyer agrees to retain the original proof of purchase of the Product sale (sales receipt) and to submit the same to Johns Manville in the event of filing a claim hereunder. The original proof of purchase (sales receipt) must clearly establish that it relates to the Johns Manville Product which is subject to the evaluation.

(3) SOLE WARRANTY: THIS LIMITED WARRANTY IS EXCLUSIVE AND LIMITS AS TO DURATION ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED BY LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TO THE TIME PERIOD STATED ABOVE. JOHNS MANVILLE MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND OTHER THAN THE IMPLIED WARRANTY SET FORTH HEREIN. THIS WARRANTY CONTAINS ALL OF THE PROVISIONS OF BUYER'S REMEDIES FROM JOHNS MANVILLE. JOHNS MANVILLE'S LIABILITY IS LIMITED TO THE PROVISIONS OF THIS WARRANTY. WHETHER ANY CLAIM AGAINST JOHNS MANVILLE IS BASED UPON STRICT LIABILITY, NEGLIGENCE, BREACH OF WARRANTY OR ANY OTHER THEORY OR CAUSE OF ACTION. NO PERSON IS AUTHORIZED TO ALTER THIS LIMITED WARRANTY EITHER ORALLY OR IN WRITING. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED LIMITED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

(4) Limitations of Coverage: Johns Manville shall not be liable for and this Limited Warranty does not apply to:

- (a) Product which has been damaged, abused, misused, punctured, crushed, or improperly applied or installed;
- (b) Product which has been harmed by use or environmental conditions such as that the foam cells have been ruptured by excessive heat, cold, and/or humidity;
- (c) Product wherein the moisture content as shown by the moisture content test taken on the sample at the time of evaluation indicates an excess of three percent (3%) moisture by weight;
- (d) Product which has not been handled, stored, or used according to the instructions outlined on Johns Manville labels or Johns Manville product literature in effect at the date of sale.

(5) How to Make Evaluation of R value and Claim: If at any time after the first (1st) year from the date of purchase of the Product, but prior to the twentieth (20th) year, buyer decides to evaluate the Product R value, he shall notify Johns Manville in writing at the address shown below at least sixty (60) days prior to the removal of the installed samples. Buyer agrees that all sampling and testing shall be conducted in accordance with sampling procedures prescribed by Johns Manville and that samples of the Insulation shall only be taken in the presence of an authorized Johns Manville who shall monitor and choose the sampling places, the testing facility, and the testing procedures. Buyer further agrees that a moisture content test shall also be performed under the above terms and conditions. All testing of the insulation samples shall be conducted at a NAVLAP certified testing laboratory approved by Johns Manville and shall be in accordance with ASTM C 518. All sampling and testing costs shall be at the owner's sole expense. Results of the testing will be final and binding on all parties concerned.

(6) Limitations of Liability: If the test results of the Product samples verify that the R value has fallen below eighty percent (80%) of Johns Manville's published specifications in force at the time of original sale, Johns Manville will reimburse buyer a percentage of buyer's original purchase price of the product pursuant to the following schedule.

Year After Purchase Tested	Percent Reimbursement of Original Purchase Price
1 through 10	100%
11	90%
12	80%
13	70%
14	60%
15	50%
16	40%
17	30%
18	20%
19	10%
20	0%

THE AMOUNT ORIGINALLY PAID FOR THE PRODUCT BY THE BUYER SHALL BE EVIDENCED BY THE ORIGINAL PROOF OF PURCHASE. IN NO EVENT SHALL THE AMOUNT OF ANY LIABILITY AND/OR REIMBURSEMENT OF JOHNS MANVILLE BE GREATER THAN THE ORIGINAL PURCHASE PRICE. IN NO INSTANCE SHALL JOHNS MANVILLE BE RESPONSIBLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, AND IN NO EVENT SHALL JOHNS MANVILLE BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE STRUCTURE OR BUILDING UPON WHICH THE PRODUCT IS APPLIED, ITS CONTENTS, OR OCCUPANTS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

(7) Assignment of Limited Warranty: The original purchaser of the Product shall be deemed the "buyer." The buyer may transfer this warranty to new buyers of the building only when title to the real estate is transferred; however, not more than one claim may be filed on any one building.

(8) Authority to Bind Johns Manville: No agent, salesman, employee, or other representative of Johns Manville is empowered to change, alter, or amend this Limited Warranty unless by written document signed by a duly authorized officer of Johns Manville.

ICC-ES Evaluation Report

ESR-3398

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A Subsidiary of the International Code Council®

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation
Section: 07 25 00—Water-Resistive Barriers/Weather Barriers
Section: 07 27 00—Air Barriers

REPORT HOLDER:

JOHNS MANVILLE

EVALUATION SUBJECT:

**JOHNS MANVILLE AP™ FOIL-FACED
POLYISOCYANURATE CONTINUOUS INSULATION
AND CI MAX® CONTINUOUS INSULATION**

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code®* (IBC)
- 2021, 2018, 2015, 2012 and 2009 *International Residential Code®* (IRC)
- 2021, 2018, 2015, 2012 and 2009 *International Energy Conservation Code®* (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Surface-burning characteristics
- Thermal resistance
- Water vapor transmission
- Attic and crawl space installation
- Exterior walls in Types I through IV construction
- Water-resistive barrier
- Air barrier
- Air permeability

1.2 Evaluation to the following green code(s) and/or standards:

- 2019 California Green Building Standards Code (CALGreen), Title 24, Part 11
- 2015, 2012 and 2008 ICC 700 *National Green Building Standard™* (ICC 700-2015, ICC 700-2012 and ICC 700-2008)

Attribute verified:

See Section 3.1

2.0 USES

2.1 AP™ Foil-Faced Continuous Insulation:

AP™ Foil-Faced Continuous Insulation (referred to as "AP™ Foil" in this evaluation report) is used as nonstructural, thermal insulating material in Types I, II, III, IV and V construction (IBC) and dwellings under the IRC. The insulation boards may be used with a thermal barrier within or on interior or exterior walls and ceiling assemblies, and also in attics and crawl spaces with a thermal or ignition barrier. Additionally, the boards may be used at the perimeter of concrete slab on-grade and on the interior side of basement foundation walls, as well as under the slab.

AP™ Foil may be used on the exterior face of exterior walls of any type of construction. When used in exterior walls in Types I, II, III, and IV construction, construction must be in accordance with Section 4.2.2 of this report.

AP™ Foil may be used as an alternative to the water-resistive barrier specified in IBC Section 1404.2 and R703.2 when installed on exterior walls in accordance with Section 4.2.2.3.

2.2 CI Max® Continuous Insulation:

CI Max® Continuous Insulation (referred to as "CI Max®" in this evaluation report) is used as nonstructural, thermal insulating material for use in interior applications in Type I, II, III, IV and V construction (IBC) and dwellings construction under the IRC. CI Max® may be left exposed to the interior of the building without a thermal barrier when installed on either walls only or ceilings only. CI Max® may be left exposed without an ignition barrier in attics and crawl spaces when installed on either walls only or ceilings only. CI Max® must be installed with the nonprinted side exposed. See Section 4.3 for additional information.

CI Max® may be used on the exterior face of exterior walls of any type of construction. When used in exterior walls in Types I, II, III, and IV construction, construction must be in accordance with Section 4.2.2 of this report.

3.0 DESCRIPTION

3.1 AP™ Foil-Faced Continuous Insulation:

AP™ Foil has a closed-cell, rigid polyisocyanurate foam plastic core, bonded on both sides with an aluminum foil and kraft paper laminate. The foam plastic core has a nominal density of 1.7 pcf (28.8 kg/m³). AP™ Foil have square edges and are available in various lengths and widths and in thicknesses between 1/2 inch and 4 1/2 inches (12.7 and

114 mm). AP™ Foil is classified as Type I, Class 1 and 2 material in accordance with ASTM C1289-18.

The attributes of AP™ Foil as an alternative water-resistive barrier have been verified as conforming to the provisions of (i) CALGreen Section 5.407.1 and (ii) ICC 700-2015 Section 602.1.8, 11.602.1.8 and 12.6.602.1.8; (iii) ICC 700-2012 Section 602.1.8, 11.602.1.8 and 12.5.602.1.8; and (iv) ICC 700-2008 Section 602.9 for water-resistive barriers.

The attributes of AP™ Foil have been verified as conforming to the provisions of ICC 700-2008 Section 703.2.1.1.1(c) as an air impermeable insulation.

Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.2 CI Max® Continuous Insulation:

CI Max® has the same closed-cell, rigid polyisocyanurate foam plastic core as AP™ Foil and is bonded on one side with a nonprinted glass-mat laminated with aluminum foil facer and is bonded on the other side with a printed bilaminate (kraft paper laminated with aluminum foil) facer. CI Max® has square edges and are available in various lengths and widths and in thicknesses between 1/2 inch and 4 inches (12.7 and 102 mm). CI Max® is classified as Type I, Class 1 material in accordance with ASTM C1289-18.

3.3 Joint-sealing:

3.3.1 Johns Manville UltraFast® (3M All Weather) Flashing Tape: When the AP™ Foil is installed as an alternate water-resistive barrier or an air barrier, Johns Manville UltraFast® (3M All Weather) Flashing Tape (ESR-2797) nominally 4 inches wide must be used to seal joints between two or more edges of the AP™ Foil. AP™ Foil must be as described in Sections 4.2.2.3 and 4.2.2.4, respectively.

3.3.2 Sealant: A sealant complying with ASTM C920 Type S, Grade NS, Class 100/50, Use NT, M, G, A and O must be used with AP™ Foil to seal exterior penetrations and panel defects, when the AP™ Foil is installed as an alternative water-resistive barrier or an air barrier. AP™ Foil must be as described in Sections 4.2.2.3 and 4.2.2.4, respectively.

3.4 Surface-burning Characteristics:

The foam core of AP™ Foil has a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 at a maximum thickness of 4 1/2 inches (114 mm). The faced CI Max® has a flame-spread index of 25 or less and a smoke-developed index of 450 or less at a maximum thickness of 4 inches (102 mm).

3.5 Thermal Resistance, R-values:

AP™ Foil and CI Max® have the thermal resistances (R-value) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.6 Vapor Retarder:

At a minimum thickness of 1 inch (25.4 mm), AP™ Foil has a vapor permeance of less than 0.1 perm [5.7×10^{-12} kg/(Pa-s-m²)] when tested in accordance with ASTM E96 (desiccant method) (Procedure A), and qualify as a Class I vapor retarder.

3.7 Air Permeability:

At a minimum thickness of 1 inch (25.4 mm), AP™ Foil is considered air-impermeable based on testing in accordance with ASTM E2178.

4.0 INSTALLATION

4.1 General:

AP™ Foil and CI Max® must be installed in accordance with the Johns Manville published installation instructions, the applicable code and this report. The manufacturer's published installation instructions must be available on the jobsite at all times during installation.

4.2 AP™ Foil Continuous Insulation:

At a maximum thickness of 4 1/2 inches (114 mm), AP™ Foil may be used as nonstructural insulating material with a thermal barrier on any or all surfaces (wall or ceiling assembly) in any type of structure. Multiple of AP™ Foil may be stacked together to achieve the desired R-value, but total foam thickness may not exceed 4 1/2 inches (114 mm).

For exterior wall applications, AP™ Foil must be attached with fasteners spaced a maximum of 24 inches (610 mm) on center in the field and 16 inches (406 mm) on center on the perimeter. For interior applications, AP™ Foil must be attached with fasteners spaced a maximum of 24 inches (610 mm) on center along the width of the board and a maximum of 48 inches (1219 mm) on center along the length of the board.

The wall covering must be structurally adequate to resist transverse loads. Fasteners and fastening methods for all exterior wall covering over AP™ Foil should be installed in accordance with 2021 and 2018 IBC Sections 2603.11, 2603.12 or 2603.13 or 2015 IBC Sections 2603.11 and 2603.12, as applicable and 2021, 2018 and 2015 IRC Sections R703.15, R703.16 or R703.17, as applicable. All walls must be braced in accordance with 2021, 2018 and 2015 IBC Section 2308.6 [2012 and 2009 IBC Sections 2308.9.3 and 2308.12.4] or IRC Section R602.10, as applicable.

4.2.1 Attics and Crawl Spaces: When AP™ Foil is installed within attics and crawl spaces, where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in such a manner that the foam plastic insulation is not exposed.

4.2.2 Exterior Walls of Types I, II, III and IV Construction:

4.2.2.1 General: When used on exterior walls of Type I, II, III and IV construction, the assembly must comply with Section 2603.5 of the IBC and this section (Section 4.2), and AP™ Foil must be installed at a maximum thickness of 4 1/2 inches (114 mm). The potential heat of the AP™ Foil boards is 1677 Btu/ft² (19.0 MJ/m²) per inch of thickness when tested in accordance with NFPA 259.

4.2.2.2 Specific Wall Assemblies: Wall assemblies complying with Section 4.2 must be as described in Table 2.

4.2.2.3 Water-resistive Barrier:

AP™ Foil may be used as an alternative to the water-resistive barrier prescribed in 2021, 2018 and 2015 IBC Section 1403.2 (2012 and 2009 IBC 1404.2) and IRC R703.2 when installed on exterior walls in accordance with this section.

AP™ Foil can be installed in Type I, II, III or IV construction greater than 40 feet (12 192 mm) in height under the 2018, 2015 and 2012 IBC when the wall assemblies comply with Section 4.2 and are as described in Table 2.

AP™ Foil can be installed either horizontally or vertically directly to framing spaced a maximum of 24 inches (610 mm) on center or over exterior sheathing. The reflective side of the AP™ Foil must be oriented to the exterior. The edges of the AP™ Foil must be placed tightly together and carefully fitted around openings and penetrations.

When applied directly to framing or over exterior sheathing, the AP™ Foil must be secured with 2-inch (51 mm) capped fasteners with No. 10 self-tapping screws long enough to penetrate framing a minimum of three threads. Fasteners must be spaced a maximum of 16 inches (406 mm) on center around the AP™ Foil perimeter and in the field.

Seams and joints between the AP™ Foil must be completely covered with Johns Manville UltraFast® Flashing Tape applied so that it is centered over the joint or seam. Exterior penetrations must be sealed with either Johns Manville UltraFast® Flashing Tape or a sealant complying with ASTM C920 Type S, Grade NS, Class 100/50, Use NT, M, G, A and O, in accordance with the Johns Manville installation instructions. See Figures 1 and 2.

For window installation, refer to Figure 3. Sill flashing is installed prior to window installation. After window installation, jam flashing is installed, and then head flashing. Window installation must be in accordance with the window manufacturer's instructions.

When installed in accordance with this section, the AP™ Foil must be covered with an approved exterior wall covering within the time set forth in the report holder's published instructions. The wall covering must be installed in accordance with the wall covering manufacturer's instructions.

4.2.2.4 Air Barrier:

4.2.2.4.1 Air Barrier Material: When used as an air barrier material, the AP™ Foil must be installed in accordance with the Johns Manville installation instructions and this report.

4.2.2.4.2 Air Barrier Assembly: When installed on exterior walls as a water-resistive barrier as described in Section 4.2.2.3, AP™ Foil complies with the requirements for an air barrier assembly in accordance with C402.5.1.2.2 of the 2021, 2018 and 2015 IECC [Section C402.4.1.2.2 of the 2012 IECC], based on testing in accordance with ASTM E2357. The assembly qualifies as a continuous air barrier as prescribed in Section C402.5.1 of the 2021, 2018 and 2015 IECC [Section C402.4.1 of the 2012 IECC].

Penetrations in the air barrier assembly must be sealed as described in Section 4.2.2.3 and in accordance with 2012 IECC Section C402.4.2.

Wall coverings must be mechanically attached through the AP™ Foil to wall framing or sheathing.

4.3 CI Max® Continuous Insulation:

4.3.1 General:

4.3.1.1 Application with a Prescriptive Thermal Barrier: At a maximum thickness of 4 inches (102 mm), CI Max® may be used as nonstructural insulation material with a thermal barrier on any or all surfaces (wall or ceiling assembly) in any type of structure. For interior applications, the CI Max® boards must be attached with fasteners spaced a maximum

of 24 inches (610 mm) on center along the width of the CI Max® and a maximum of 48 inches (1219 mm) on center along the length of the CI Max®. CI Max® that is installed in an interior application that will be covered with a prescriptive thermal barrier may be held in place with 1- to 2-inch spots of construction grade adhesive, spaced 16- to 24- inches in each direction.

4.3.1.2 Application without a Prescriptive Thermal Barrier: At a maximum thickness of 4 inches (102 mm), the CI Max® insulation may be installed exposed to the interior of the building without installation of the prescriptive thermal barrier when installed in accordance with this section. The CI Max® must be applied to either the walls only or ceilings only. The CI Max® must be attached with either masonry nails, or No. 6 screws or nails, and 1½-inch metal washers or caps spaced 24 inches (610 mm) on center along the width of the CI Max® and a maximum of 48 inches (1219 mm) on center along the length of the CI Max®. CI Max® must be installed with the non-printed facer exposed to the interior of the building.

4.3.2 Attics and Crawl Spaces:

4.3.2.1 Application with a Prescriptive Ignition Barrier: When CI Max® is installed within attics and crawl spaces, where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC R316.5.3 and R316.5.4 as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in such a manner that the foam plastic insulation is not exposed.

4.3.2.2 Application without a Prescriptive Ignition Barrier: CI Max® may be installed at a maximum thickness of 4 inches (102 mm) to either the walls or the ceilings of attics and crawl spaces without a prescriptive ignition barrier when all of the following conditions apply, as applicable:

1. Attic ventilation is provided when required by 2018 IBC Section 1202.2.1 [2015, 2012 and 2009 IBC Section 1203.2] or IRC Section R806, except air-impermeable insulation is permitted in unvented attics in accordance with 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).
2. Under-floor (crawl space) ventilation is provided when required by 2018 IBC Section 1202.4 [2015 IBC Section 1203.3 (2012 and 2009 IBC Section 1203.3)] or IRC Section R408.1, as applicable, except unvented crawl spaces are permitted under the conditions prescribed in 2018, 2015 and 2012 IRC Section R408.3.
3. Combustion air is provided in accordance with IMC (*International Mechanical Code*) Section 701.

4.3.3 Exterior Walls of Types I, II, III and IV Construction:

4.3.3.1 General: When used on exterior walls of Type I, II, III and IV construction, the assembly must comply with Section 2603.5 of the IBC and this section (Section 4.3), and the CI Max® must be installed at a maximum thickness of 4 inches (102 mm). The potential heat of the CI Max® boards is 1677 Btu/ft² (19.0 MJ/m²) per inch of thickness when tested in accordance with NFPA 259.

4.3.3.2 Specific Wall Assemblies: Wall assemblies complying with Section 4.3 must be as described in Table 2.

5.0 CONDITIONS OF USE

The Johns Manville AP™ Foil and CI Max™ described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 AP™ Foil and CI Max® must comply with this report, the manufacturer's published installation instructions and the applicable code. In the event of a conflict between the manufacturer's published installation instructions and this report, this report governs.
- 5.2 Use of AP™ Foil and CI Max® to resist structural loads is outside the scope of this report. The walls must be braced in accordance with the requirements of the applicable code.
- 5.3 AP™ Foil and CI Max® must not be used as a nailing base for exterior siding materials. All nailing must be into the wall framing as required by the siding manufacturer's instructions or the applicable code.
- 5.4 Jobsite certification and labeling of AP™ Foil and CI Max® must comply with 2021, 2018 or 2015 IRC Sections N1101.10.1 and N1101.10.1.1 [2012 IRC Section N1101.12 or 2009 IRC Section N1101.4]; and 2021, 2018, 2015 and 2012 IECC Section C303.1.1.1, R303.1.1 or 2009 IECC Section 303.1.1, as applicable.
- 5.5 Use of AP™ Foil and CI Max® in areas where the probability of termite infestation is "very heavy" must be in accordance with 2021, 2018, 2015 and 2012 IBC Section 2603.9, 2009 IBC Section 2603.8 or IRC Section R318.4, as applicable. In these areas, the AP™ Foil and CI Max® must not be installed on the exterior of foundation walls or below floor slabs on grade or in contact with soil. Also, in these areas, there must be a clearance of at least 6 inches (152 mm) between the foam plastic insulation and exposed earth.
- 5.6 When AP™ Foil and CI Max® are used on exterior walls of buildings of Type I, II, III or IV construction, installation must be as described in Section 4.2.2 and Table 2.
- 5.7 When AP™ Foil is used in interior assemblies, the interior of the building must be separated from the AP™ Foil with an approved thermal barrier as required in IBC Section 2603.4 or IRC Section R316.4.
- 5.8 When CI Max® is used in interior assemblies, the interior of the building must be separated from the CI Max® with an approved thermal barrier or ignition barrier, as required in IBC Section 2603.4 or IRC Section R316.4 and IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, respectively, except when the installation is in accordance with Section 4.3.1.2 or Section 4.3.2.2, respectively.
- 5.9 A water-resistive barrier complying with the requirements of the applicable code must be provided except when installation is as described in Section 4.2.2.3 for AP™ Foil.
- 5.10 When installed in accordance with Section 4.2.2.3 of this report, AP™ Foil may be used as the interior of two

water-resistive barriers as required in the 2021 IBC Section 2510.6.1(2018, 2015, 2012 and 2009 IBC 2510.6) or 2021, 2018 and 2015 IRC Section R703.7.3 (2012, 2009 and 2006 IRC Section R703.6.3).

- 5.11 AP™ Foil is a Class I vapor retarder as described in Section 3.5 and its use is subject to the requirements of 2021 and 2018 IBC Section 1404.3 [2015, 2012 and 2009 IBC Section 1405.3] and IRC Section R702.7 and R806.5 (2009 IRC Section R601.3 and R806.4).

- 5.12 AP™ Foil and CI Max® are manufactured by Johns Manville in Bremen, Indiana; Cornwall, Ontario, Canada; Fernley, Nevada; Hazle Township, Pennsylvania, and Jacksonville, Florida, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised December 2020).
- 6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Weather-resistive Barriers (AC71), dated February 2003 (editorially revised March 2021) (AP™ Foil only).
- 6.3 Reports of potential heat tests in accordance with NFPA 259 (AP™ Foil only).
- 6.4 Reports of fire propagation characteristics testing in accordance with NFPA 285 (AP™ Foil only).
- 6.5 Engineering analysis addressing use of alternate exterior wall constructions in Types I, II, III, and IV construction based on NFPA 285 testing.
- 6.6 Reports of air leakage tests in accordance with ASTM E2178 and ASTM E2357 (AP™ Foil only).
- 6.7 Reports of fire test for evaluating contribution of wall and ceiling interior finish to room fire growth in accordance with NFPA 286 (CI Max® only).

7.0 IDENTIFICATION

- 7.1 The AP™ Foil and CI Max® continuous insulation described in this report are identified by a label on the boards or on the packaging material bearing the manufacturer's name (Johns Manville), the plant code or address, the product name, the flame spread and smoke developed indices, and the evaluation report number (ESR-3398); except for the AP™ Foil and CI Max® boards that are used in Types I, II, III and IV construction, which must always have the above-noted information printed on the boards themselves.
- 7.2 The report holder's contact information is the following:

JOHNS MANVILLE
717 17TH STREET
DENVER, COLORADO 80202
(303) 978-2000
www.jm.com

TABLE 1—THERMAL RESISTANCE (R-VALUES) FORAP™ FOIL and CI MAX® CONTINUOUS INSULATION

THICKNESS (INCHES)	R-VALUE [° F-ft ² -hr/BTU] at 75° F MEAN TEMPERATURE
1	6.0
1.20	7.5
1.65	10
2	13
4	26
4.5 ¹	28

For SI: 1 inch = 25.4 mm; 1° F-ft²-hr/BTU = 0.176 K-m²/W.

¹Thermal Resistance (R-Value) at 4.5 inches applies to the AP™ Foil Boards only.

TABLE 2—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES IN TYPES I, II, III AND IV CONSTRUCTION WITH JOHNS MANVILLE AP FOIL™ AND CI MAX® CONTINUOUS INSULATION

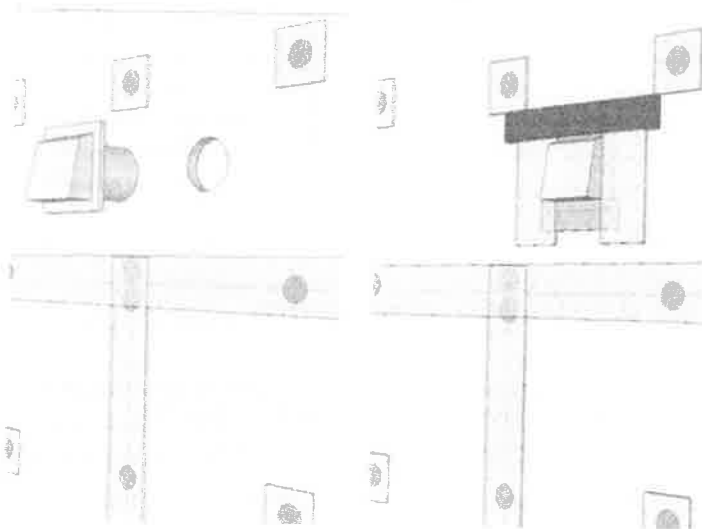
Base wall system – Use either 1, 2 or 3	<ol style="list-style-type: none"> Concrete wall Concrete Masonry wall Steel Studs (Minimum 3⁵/₈-inch-deep, minimum 25-gauge steel studs at a maximum of 24-inch on center) with 1 layer of 5⁵/₈-inch-thick Type X gypsum wallboard (interior face).
Floorline Firestopping	4 lb./ft ³ mineral wool friction fit in each stud cavity and at each floorline.
Cavity Insulation – Use 1, 2, 3, 4, 5 or, 6 when exterior sheathing is used.	<ol style="list-style-type: none"> None Fiberglass batt insulation (faced or unfaced) complying with the applicable code. Fiberglass spray-in insulation. Mineral wool insulation (faced or unfaced). Sprayed cellulosic insulation complying with Section 720 of IBC and ASTM C739. Hybrid systems: spray foam and/or fiberglass insulation or mineral wool insulation (flash and bat insulation systems).
Exterior sheathing – Use either 1, 2 or 3	<ol style="list-style-type: none"> None (for base wall system 1 or 2) Minimum 1/2-inch-thick, exterior type gypsum sheathing complying with the applicable code. (Use only with Exterior Wall Covering 1 through 5) Minimum 5/8-inch-thick, Type X exterior type gypsum sheathing complying with the applicable code.
Water-resistive Barrier Applied to Exterior Sheathing – Use 1, 2, 3, 4, 5, 6 or 7.	<ol style="list-style-type: none"> Perm-A-Barrier® VPS – W.R. Grace Tyvek® CommercialWrap® - DuPont (ESR-2375) Green Guard® Max Building Wrap – Kingspan Weathermate™ – Dow Chemical (ESR-2862) Weathermate™ Plus – Dupont (ESR-3401) Any water-resistive barrier that meets the applicable codes and has a current ICC-ES evaluation report for the intended use. None [When the exterior insulation is installed in accordance with Section 4.2.2.3 with Tape (Section 3.3.1) and Sealant (Section 3.3.2)]. <p>*Note: All barriers to be installed in accordance with manufacturer's installation instructions, the applicable ICC-ES evaluation report and the applicable codes.</p>
Exterior Insulation- Use either 1 or 2	<ol style="list-style-type: none"> Maximum 3 1/2-inch thickness of AP™ Foil board with offsetting joints or nonstaggered. Maximum 3 1/2-inch thickness of CI Max® board with offsetting joints or nonstaggered. <p>Insulation board joints and fastener plates may be covered with 6 inch (maximum) wide acrylic, asphalt or butyl-based flashing tape.</p> <p>Note: AP™ Foil insulation boards thicknesses may be increased to 4 1/2- when using Exterior Wall Covering 1, 2, 3, 4 or 5. CI Max® insulation board thicknesses may be increased to 4.0-inches when using Exterior Wall Covering 1, 2, 3, 4 or 5.</p>
Exterior Wall Covering – Use either 1, 2, 3, 4, 5, 6, 7, 8, or 9	<ol style="list-style-type: none"> Brick. Use standard nominal 4-inch-thick, clay brick. Use standard brick veneer anchors installed vertically on each stud at a maximum of 24 inches o.c. creating a 1-inch maximum air gap between the exterior insulation and brick. Stucco¹. Minimum 3/4-inch-thick, exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the exterior insulation and the lath. The secondary water-resistive barrier shall not be full-coverage asphalt or butyl-based self-adhered membranes. Natural Stone Veneer. Minimum 2-inch-thick (granite, limestone, marble, sandstone) installed using any standard non-open joint installation technique, such as shiplap. Cast Artificial Stone complying with ICC-ES AC51, pre-cast concrete or concrete masonry unit (CMU) -- Minimum 1 1/2-inch-thick installed using any standard nonopen joint installation technique such as shiplap. Terracotta² Cladding -- Minimum 1 1/4-inch-thick installed using any standard non-open joint installation technique such as shiplap. Autoclaved-Aerated Concrete (AAC) panels- Minimum 2-inch thick. Any standard non-open jointed installation technique can be used. Thin Brick System- Minimum 3/4-inch thick clay thin brick system fully adhered with cementitious mortar (standard or polymer modified) to minimum 1/2-inch thick cement backer board or exterior gypsum sheathing. Fiber Cement Board- Minimum 3/4-inch thick fiber cement board qualified as noncombustible per ASTM E136 testing. Any standard non-open jointed installation technique can be used. Solid Metal Panels- Minimum 1/8-inch thick (3 mm), such as steel, aluminum, copper, etc. (zinc shall not be used) having a maximum 2 1/2-inch air gap between the exterior insulation and the panel. Any standard installation technique can be used.

For SI: 1 inch = 25.4 mm.

¹Cladding fasteners must penetrate through the foam plastic into wood or steel framing and the system must be designed to handle cladding load and wind load, per applicable code.

²Fasteners used for securing the terracotta cladding must penetrate through the foam plastic into wood or steel framing and the system must be designed to handle cladding load and wind load, per applicable code.

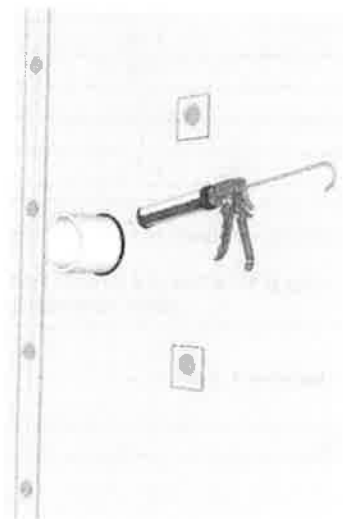
FIGURE 1. TYPICAL PENETRATION
FLASHING DETAIL - FLANGED



1. Install flanged penetration cover.
2. Apply tape in shingle fashion order: lower edge, then sides, then top.

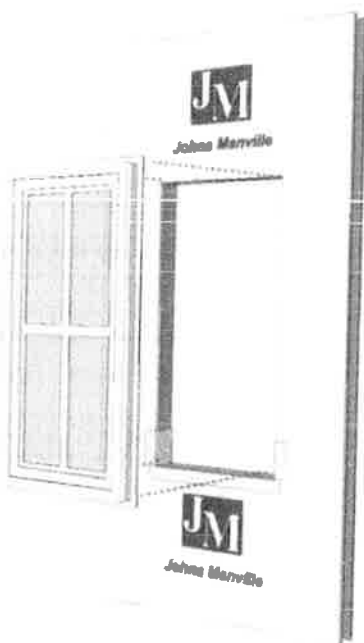
FIGURE 1
(AP™ FOIL ONLY)

FIGURE 2. TYPICAL PENETRATION
FLASHING DETAIL - UNFLANGED

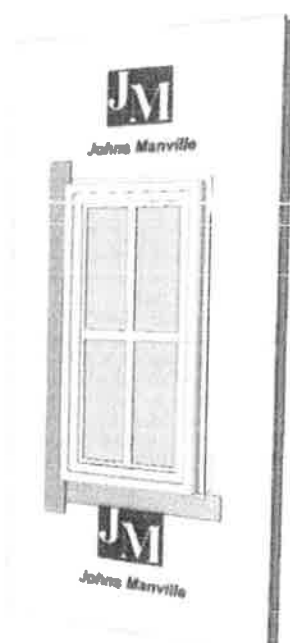


1. Install unflanged item. Apply caulk to seal penetration.

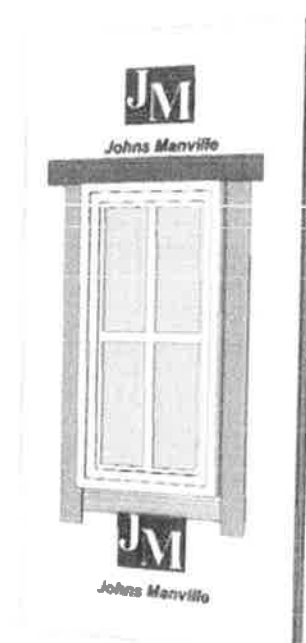
FIGURE 2
(AP™ FOIL ONLY)



1. Install Sill Flashing



2. Install Window, then Jamb Flashing



3. Install Head Flashing

FIGURE 3
(AP™ FOIL ONLY)

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 21 00—Thermal Insulation

Section: 07 25 00—Water-Resistive Barriers/Weather Barriers

Section: 07 27 00—Air Barriers

REPORT HOLDER:

JOHNS MANVILLE

EVALUATION SUBJECT:

JOHNS MANVILLE AP™ FOIL-FACED POLYISOCYANURATE CONTINUOUS INSULATION AND CI MAX®
CONTINUOUS INSULATION

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Johns Manville AP™ Foil-Faced Polyisocyanurate Continuous Insulation and CI Max® Continuous Insulation, described in ICC-ES evaluation report ESR-3398, have also been evaluated for the codes noted below.

Applicable code edition:

- 2019 California Building Code (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of the State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 California Residential Code (CRC)
- 2019 California Energy Code (CEC)

2.0 CONCLUSIONS

2.1 CBC and CRC:

The Johns Manville AP™ Foil-Faced Polyisocyanurate Continuous Insulation and CI Max® Continuous Insulation, described in Sections 2.0 through 7.0 of the evaluation report ESR-3398, comply with the 2019 CBC and CRC, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) and *International Residential Code*® (IRC) provisions noted in the evaluation report.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CEC:

The Johns Manville AP™ Foil-Faced Polyisocyanurate Continuous Insulation and CI Max® Continuous Insulation, described in Sections 2.0 through 7.0 of the evaluation report ESR-3398, comply with the 2019 CEC, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report.

2.2.1 Conditions of Use:

In accordance with Section 110.8 of the 2019 California Energy Code, verification of certification by the Department of Consumer Affairs, Bureau of Household Goods and Services, must be provided to the code official, demonstrating that the insulation conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, "Standards for Insulating Material." The certification must be verified with the DCA Bureau of Household Goods and Services. The following directory link may be used for verification:

https://bhgs.dca.ca.gov/consumers/ti_directory.pdf

This supplement expires concurrently with the evaluation report, reissued December 2020, revised May 2021.

ICC-ES Evaluation Report

ESR-3398 Seal & Insulate with ENERGY STAR® Supplement

Reissued December 2020

Revised May 2021

This report is subject to renewal November 2022.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 21 00—Thermal Insulation

Section: 07 25 00—Water-Resistive Barriers/Weather Barriers

Section: 07 27 00—Air Barriers

REPORT HOLDER:

JOHNS MANVILLE

EVALUATION SUBJECT:

JOHNS MANVILLE AP™ FOIL-FACED POLYISOCYANURATE CONTINUOUS INSULATION AND CI MAX®
CONTINUOUS INSULATION

1.0 EVALUATION SCOPE

Conformance to the following requirements:

Seal and Insulate with ENERGY STAR Program, *Definitions and Testing Requirements for Residential Insulation, Version 1.0*

Properties evaluated:

- Thermal resistance
- Surface-burning characteristics

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to certify that the insulation product described in Sections 2.0 through 7.0 of the master report (ESR-3398) has been reviewed for compliance with the applicable codes noted in Section 1.0 of the master report and with the requirements set forth in the Seal and Insulate with ENERGY STAR Program, *Definitions and Testing Requirements for Residential Insulation, Version 1.0*. The insulation products covered by this supplement are classified as "Board Insulation."

The requirements for testing laboratory qualifications and product sampling, as well as the specific material and test standards and editions used in this evaluation, are as set forth in the applicable documentation noted in Section 6.0 of the master evaluation report.

3.0 DEFINITIONS

The following definitions are from *Definitions and Testing Requirements for Residential Insulation, Version 1.0*, and are applicable to the subject of this report.

3.1 General Definitions

Insulation: Any material mainly used to slow down heat flow. It may be mineral or organic, fibrous, cellular, or reflective (aluminum foil). It may be in rigid, semi-rigid, flexible, or loose-fill form.

3.2 Insulation Product Definitions

Board Insulation: Semi-rigid insulation preformed into rectangular units having a degree of suppleness particularly related to their geometrical dimensions. Typical materials include, but are not limited to fiberglass, expanded polystyrene (EPS), extruded polystyrene (XPS), polyisocyanurate, or polyurethane. The product may or may not be faced.

3.4 Insulation Performance Definitions

R-value: The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. For the purposes of the Seal and Insulate with ENERGY STAR program, Imperial units will only be accepted [(h·ft²·°F)/Btu].

Smoke-Development Index: The characteristic of a material to emit smoke when exposed to flame or fire compared to red oak and inorganic cement.

Flame-Spread Index: The characteristic of a material to resist the spreading of flames when exposed to flame or fire compared to red oak and inorganic cement.

3.5 Thermal Resistance:

The AP™ Foil-Faced Sheathing® insulation has thermal resistance *R*-values as noted in Table 1 of ESR-3398.

3.6 Installation

3.6.1 General: The installation of the insulation must be in accordance with the requirements set forth in the manufacturer's published installation instructions (a copy is reprinted at the end of this supplement). The personal protective equipment (PPE) is described in the manufacturer's published installation instructions, which are reprinted at the end of this supplement. The manufacturer's PPE information is reprinted in this report for informational purposes.

3.6.2 Occupancy Time after Application: There are no specific requirements related to time before re-entry or re-occupancy after installation of the insulation.

3.6.3 Figures: The figures shown represent general installations of the insulation in the following applications: below-grade interior walls; above-grade exterior walls; crawl spaces (vented and unvented); and attics and cathedral/vaulted ceilings (vented, unvented and knee walls). These figures are for illustration purposes and are not to be construed or used as construction documents.

This supplement expires concurrently with the evaluation report, reissued December 2020, revised May 2021.



AP™ Foil-Faced Residential Installation Instructions Below-Grade Interior Walls

Interior Basement Wall

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating interior below grade walls. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). AP™ Foil-Faced insulation is lightweight and easy to install. It can be installed on the interior of a basement wall by either direct attachment or using wood furring strips. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed.

Before You Begin:

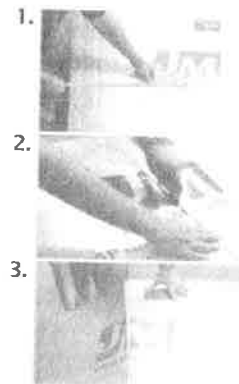
Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by a minimum of ½-inch gypsum board or equivalent 15-minute thermal barrier as required by code. Repair any water leaks or structural cracks in the wall. Gather all materials.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive such as Liquid Nails® or Loctite®
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Mechanical fasteners such as masonry nails with 1-inch metal washers
- Single component, moisture-cure silicone sealant

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board; create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.

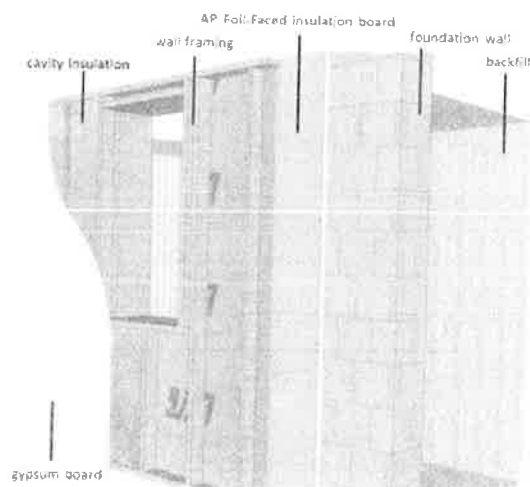


Installation

OPTION 1: Direct Attachment

1. Use maximum board lengths to minimize the number of joints.
2. Install AP™ Foil-Faced insulation over the interior side of foundation walls using construction-grade adhesive or masonry nails or screws with 1-inch washers or caps. Place the reflective side facing the interior, and the nonreflective side facing the foundation wall.
3. Fasteners should penetrate 1 inch minimum into the concrete. Space fasteners approximately 24 inches on center around the perimeter and in the field of each board. Drive fasteners so that the washer is flush with the board surface, but do not countersink.
4. Butt board edges together tightly and carefully fit around penetrations. Patch holes less than 1 inch across with flashing tape or sealant. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
5. Cover AP™ Foil-Faced insulation with a minimum ½-inch gypsum board or equivalent 15-minute thermal barrier as required by local building code.

Figure 1. Below-Grade Interior Direct Attachment





AP™ Foil-Faced Residential Installation Instructions Below-Grade Interior Walls

Installation (continued)

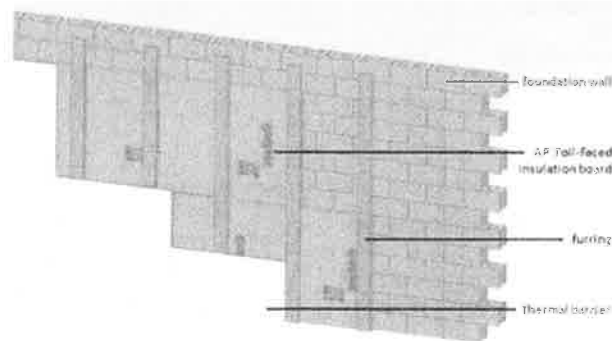
OPTION 1: Direct Attachment - Continued

1. Build a conventional stud wall that firmly presses foam insulation against basement wall.
2. For additional R-value, install insulation between the wall studs. Options for insulating between studs include Johns Manville Formaldehyde-free™ Unfaced fiber glass batts, JM Climate Pro® blown-in fiber glass in the Blow-In-Blanket® system, JM Spider® Plus Blow-in Custom Fiber Glass Insulation System or other approved cavity insulation product.
3. Install ½-inch gypsum board or equivalent 15-minute thermal barrier over wall framing as required by local building code. Tape and finish according to manufacturer's instructions.

OPTION 2: Wood Furring

1. Install AP™ Foil-Faced insulation over the interior side of foundation walls, butting board edges together tightly. Insulation boards can be held in place with 1- to 2-inch spots of construction-grade adhesive, spaced 16–24 inches in each direction. Place the reflective side facing the interior, and the nonreflective side facing the foundation wall.
2. Apply suitable wood furring strips a maximum of 24 inches on center vertically over the insulation. Use appropriate mechanical fasteners, such as masonry nails or screws, spaced 12 inches on center. Fasteners should be long enough to penetrate masonry approximately one inch, and furring strips should cover vertical seams between insulation boards.
3. Install ½-inch gypsum board or equivalent 15-minute thermal barrier over furring strips. Tape and finish according to manufacturer's instructions. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed.

Figure 2. Below Grade Interior Wood Furring Attachment



Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

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AP™ Foil-Faced Residential Installation Instructions Below-Grade Exterior Walls

Exterior Basement Wall

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating exterior below-grade walls. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). AP™ Foil-Faced insulation is lightweight and easy to install. The best time to insulate the exterior of basement walls is before backfilling. If the backfill is already in place, the above-grade portion of the basement wall may be insulated; however, interior insulation may be a better option.

Before You Begin:

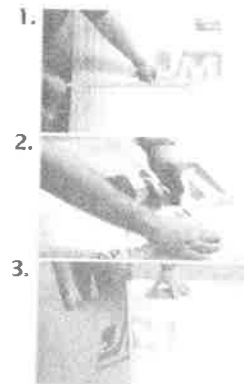
Always follow local building codes. Some codes may not allow foam insulation on the exterior of foundations due to termites. Repair any water leaks or structural cracks in the wall. Gather all materials.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive such as Liquid Nails® or Loctite®
- Mechanical fasteners such as masonry nails with 1-inch metal washers or caps
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Mechanical fasteners such as masonry nails with 1-inch metal washers
- Single component, moisture-cure silicone sealant

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board; create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.



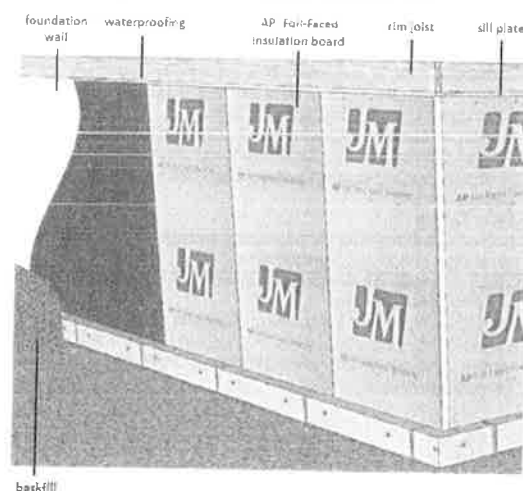
Installation for Exterior Walls

OPTION 1: Vented Crawl Space

1. Install AP™ Foil-Faced insulation boards over dampproofing or waterproofing.
2. Use maximum board lengths to minimize number of joints. Rest the bottom edge of foam insulation on top of footer and extend up to the sill plate.
Insulation may be held in place temporarily with 1- to 2-inch size spots of high-quality construction adhesive, spaced approximately 16 inches each direction.
3. Fasten foam insulation boards to the foundation wall using power-driven masonry nails with 1-inch minimum metal washers or caps, or other suitable masonry fastener. Fasteners should penetrate 1-inch minimum into the concrete. Space fasteners approximately 24 inches on center.
4. Butt board edges together tightly and carefully fit around penetrations.
5. To enhance water drainage and air sealing performance, seal all board seams with approved flashing tape such as 3M 8067, Grace Vycor Pro, Lamatek, or equivalent.
6. Per IECC section 303.2.1, protect foam insulation with a rigid, opaque and weather-resistant protective covering. The protective covering shall cover the exposed exterior insulation and extend not less than 6 inches (153 mm) below grade.

IMPORTANT NOTE: Some applications may require a 2- to 3-inch inspection strip along the top of the foundation wall for termite mitigation. Always adhere to local building codes or pest control requirements.

Figure 1. Below-Grade Exterior Wall



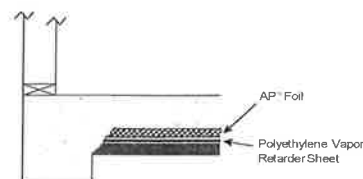


AP™ Foil-Faced Residential Installation Instructions Below-Grade Exterior Walls

Installation for Below Slab

1. Place polyethylene vapor barrier over prepared base of crushed stone, sand, or aggregate.
2. Overlap polyethylene sheets and tape the seams.
3. Install AP™ Foil-Faced — Sheathing on top of the vapor barrier, butting edges together and not allowing for gaps larger than $\frac{1}{4}$ " between boards.

Figure 1. Below Slab Exterior Wall



Notes:

1. Place AP™ Foil-Faced Sheathing on top of the leveled base.
2. Note local code requirements for placement specifications.

Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.



AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Exterior Walls

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating exterior walls. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). When applied to the exterior face of wood, steel, or concrete to cover all structure, sills and headers, Johns Manville AP™ Foil-Faced insulation provides a layer of continuous insulation to prevent heat flow through details not normally covered by insulation products. AP™ Foil-Faced insulation is lightweight and easy to install. It may be installed with seams taped and penetrations sealed to function as an air barrier and water-resistive barrier (WRB), or it may be installed in conjunction with a separate WRB system.

Before You Begin:

Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by a minimum of ½-inch gypsum board or equivalent 15-minute thermal barrier as required by code. Repair any water leaks or structural cracks in the wall. Gather all materials.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Mechanical fasteners such as masonry nails with 1-inch metal washers, or JM Ultrafast CI Plates and JM Ultrafast CI Phillips screws
- Single component, moisture-cure silicone sealant
- Concrete WRB, if desired

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board; create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.

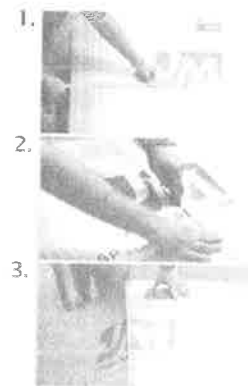


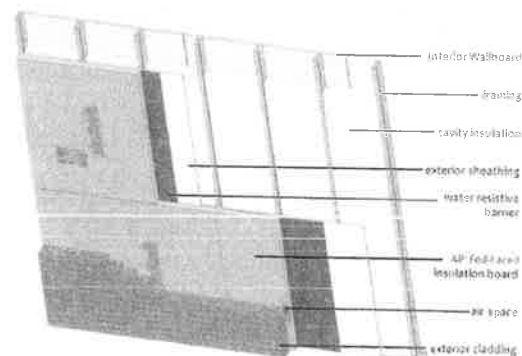
Figure 1. Framed Wall - Separate WRB

Installation

OPTION 1: Framed Wall - Separate WRB

1. If a WRB is already installed over the exterior sheathing, care should be taken to maintain its integrity while installing AP™ Foil-Faced boards. Self-sealing flashing tape should be applied to the WRB where fasteners are expected for insulation or cladding attachment, to prevent fasteners from creating air or water leaks. For liquid/spray/trowel-applied WRB materials, verify manufacturer's recommended cure time before installing foam boards.
2. Install AP™ Foil-Faced boards horizontally or vertically over exterior sheathing. Use maximum board lengths to minimize the number of joints. The insulation board joints should be staggered relative to structural sheathing (OSB or non-insulated sheathing) joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.

EXCEPTION: If vinyl siding is to be installed over AP™ Foil-Faced sheathing, install foam boards with the white nonreflective side toward the vinyl siding.



3. Fasten insulation using 1-inch head plastic cap nails long enough to penetrate framing at least ¾ inch, or ¾ inch head galvanized roofing nails long enough to penetrate at least ¾ inch, or 1-inch crown 16-gauge wire staples long enough to penetrate at least ½ inch. Drive fasteners flush with board, but do not countersink. Suggested fastener spacing is 16 inches on center or less along each stud.



AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

OPTION 1: Framed Wall – Separate WRB - Continued

1. Use a utility knife and straight edge to trim the insulation board to conform to irregular wall angles, projections or wall surfaces. Repair any boards damaged during installation. Patch holes less than 1 inch across with flashing tape. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
2. If a WRB was not installed under the AP™ Foil-Faced sheathing, install WRB over insulation per WRB manufacturer's instructions. Adjust fastener lengths to account for the thickness of the foam sheathing.
3. Brick, wood, hardboard, aluminum or vinyl sidings may be fastened to the wood frame construction through the insulation in accordance with the siding manufacturer's instructions.
4. Cement board, shakes or shingles may also be applied by installing furring strips or a plywood nailer base over the insulation and attaching the siding in accordance with the manufacturer's instructions.
5. Install cladding systems as soon as possible, preferably within 60 days.

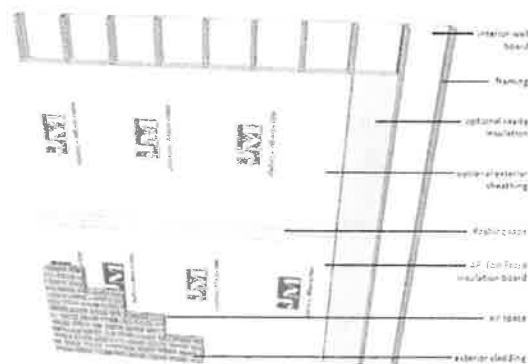
OPTION 2: Framed Wall – AP™ Foil-Faced as WRB

1. Install AP™ Foil-Faced boards either directly to framing or over exterior sheathing. If over exterior sheathing, insulation board joints should be staggered relative to exterior sheathing. Install boards horizontally or vertically using maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the non-reflective white side should be oriented to the interior.

EXCEPTION: If vinyl siding is to be installed over AP™ Foil-Faced sheathing, install foam boards with the white nonreflective side toward the vinyl siding.

2. Secure AP™ Foil-Faced boards using recommended 2-inch capped fasteners with no. 10 self tapping screws long enough to penetrate framing a minimum of three threads. Drive fasteners flush with board, but do not countersink. Suggested fastener spacing is 16 inches on center or less around the board perimeter and in the field.
3. To create an air/water-resistive barrier, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. Create continuous air/water barrier at roof and foundation wall interface using peel-and-stick membrane, or other approved barrier, following manufacturer's application instructions.
4. Seal penetrations and panel defects with recommended sealant.
5. Use a utility knife and straight edge to trim the insulation board to conform to irregular angles, projections or wall surfaces. Repair boards damaged during installation. Patch holes less than 1 inch across with flashing tape and/or sealant. Patch holes greater than 1 inch across with matching board material and seal with flashing tape.

Figure 2. Framed Wall – AP™ Foil-Faced as WRB



6. Brick, wood, hardboard, aluminum, or vinyl sidings may be fastened to the wood frame construction through the insulation in accordance with the siding manufacturer's instructions. Seal penetrations with recommended sealant. This step will help reduce air or water leaks around cladding attachments.
7. Cement board, shakes or shingles may also be applied by installing furring strips or a plywood nailer base over the insulation and attaching the siding in accordance with the manufacturer's instructions. Self-sealing flashing tape should be applied to the AP™ Foil-Faced board under where nailers or furring strips will be installed. This step will help reduce air or water leaks around fasteners used to secure these elements.
8. Install cladding systems as soon as possible, preferably within 60 days.



AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

FIGURE 3: TYPICAL WINDOW FLASHING DETAIL



FIGURE 4: TYPICAL PENETRATION
FLASHING DETAIL - FLANGED

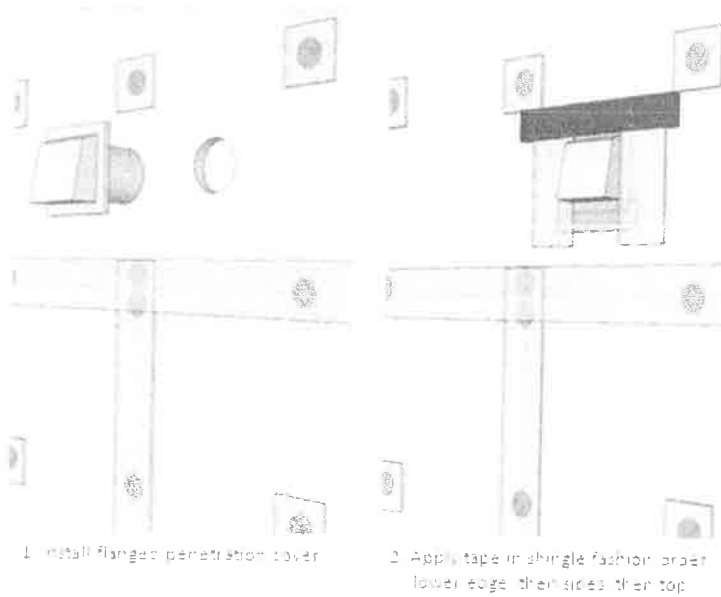
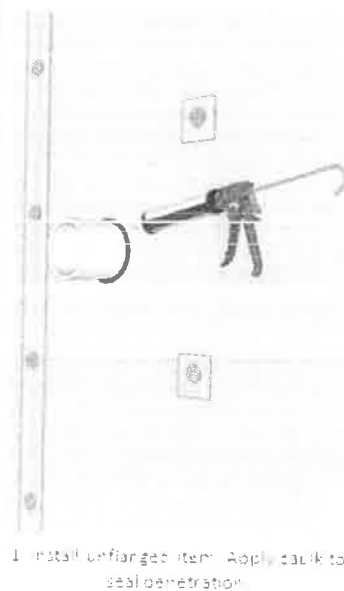


FIGURE 5: TYPICAL PENETRATION
FLASHING DETAIL - UNFLANGED





AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

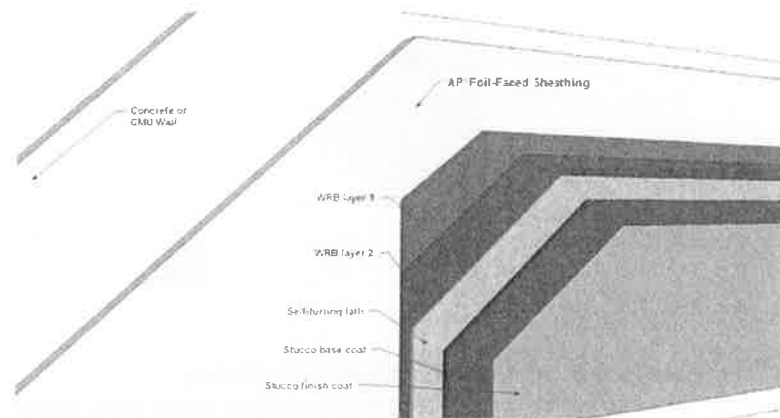
OPTION 3: Concrete/Block Wall – Separate WRB – Stucco – Maximum 1-1/2" Insulation

1. Install AP™ Foil-Faced boards horizontally or vertically over concrete or block wall. Use maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.
2. Insulation may be held in place temporarily with 1- to 2-inch size spots of high-quality construction adhesive, spaced approximately 16 inches each direction.
3. Foam insulation boards must be fastened to the concrete or block wall. This can be done either separately or in conjunction with the lath fasteners. If separately, fasten using power-driven masonry nails with 1-inch minimum metal washers or caps, or other suitable masonry fastener. Fasteners should penetrate 1-inch minimum into the concrete. Space fasteners approximately 24 inches on center.
4. Drive fasteners flush with board (or lath), but do not countersink fasteners or lath into foil facing.
5. Install 2 layers of WRB over AP™ Foil-Faced sheathing per WRB manufacturer's instructions. Adjust fastener lengths to account for the thickness of the foam sheathing.
6. Install self-furring lath through insulation to concrete / block wall in accordance with the lath manufacturer's instructions.
7. Install stucco system over lath in accordance with the stucco manufacturer's instructions.
8. Install stucco system as soon as possible, preferably within 60 days.

Alternate WRB options:

- A. One separate WRB behind AP™ Foil-Faced Sheathing
- B. AP™ Foil-Faced Sheathing taped joints + 1 layer WRB (building paper)

Figure 6. Concrete/Block Wall – Stucco



OPTION 4: Concrete/Block Wall – AP™ Foil as WRB – Stucco – 1-1/2" or greater Insulation

1. Install AP™ Foil-Faced boards horizontally or vertically over concrete or block wall. Use maximum board lengths to minimize the number of joints. Butt board edges together tightly, and carefully fit around openings and penetrations. The reflective side of the board should be oriented to the exterior and the nonreflective white side should be oriented to the interior.
2. Insulation may be held in place temporarily with 1- to 2-inch size spots of high-quality construction adhesive, spaced approximately 16 inches each direction.
3. Foam insulation boards must be fastened to the concrete or block wall. This can be done either separately or in conjunction with the wood furring fasteners. Fasteners should penetrate 1-inch minimum into the concrete (unless otherwise specified by the stucco/lath manufacturer).
4. Fasteners shall not be spaced more than 24 inches on center.



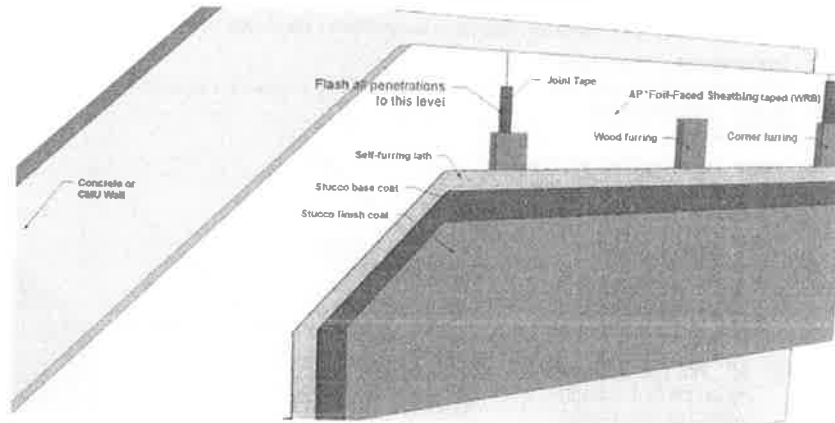
AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

OPTION 4: Concrete/Block Wall – AP™ Foil as WRB – Stucco – 1-1/2" or greater Insulation – Continued

1. To create an air/water-resistive barrier, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. Create continuous air/water barrier at roof and foundation wall interface using peel-and-stick membrane, or other approved barrier, following manufacturer's application instructions.
2. Seal penetrations and panel defects with recommended sealant.
3. Install wood furring and attach fasteners through insulation to concrete / block wall in accordance with manufacturer's instructions. Drive fasteners flush with furring strips, do not countersink or drive wood furring into foil facers.
4. Install self-furring lath to furring strips in accordance with manufacturer's instructions.
5. Install stucco system over lath in accordance with the stucco manufacturer's instructions.
6. Install stucco system as soon as possible, preferably within 60 days.

Figure 7. Concrete/Block Wall – Stucco



OPTION 5: Existing Wall – AP™ Foil-Faced Insulation Over Siding

1. Correct all moisture-related wall problems before proceeding with new siding application. Because each type of siding may require specific application details, consult siding manufacturer's instructions before beginning. Existing siding should be structurally sound; secure loose siding and repair or replace rotted siding, trim, sills and corner posts, etc. before residing. Remove all gutters, downspouts, shutters, molding and old caulking around windows and doors.
2. Fasten AP™ Foil-Faced insulation over existing siding. Secure AP™ Foil-Faced boards using recommended 2-inch capped fasteners with no. 10 self tapping screws long enough to penetrate framing a minimum of three threads. Drive fasteners flush with board, but do not countersink. Suggested fastener spacing is 16 inches on center or less around the board perimeter and in the field. Jamb, frame or sill extenders may be required depending on thickness of insulated sheathing used as well as siding manufacturer's application instructions. It is recommended that AP™ Foil-Faced insulation boards be installed vertically.
3. If the AP™ Foil-Faced insulation will also be used as a WRB, tape all seams, edge and end joints, and thru-wall penetrations with recommended flashing tape as shown in Figures 3 - 5. Install flashing shingle-style with a minimum 4 inch overlap, and follow the tape manufacturer's application instructions. Seal fastener penetrations by applying a minimum 4-inch by 4-inch piece of tape over each plate, smoothing tape edges to create an air-tight seal between the tape and the insulation board. Create continuous air/water barrier at roof and foundation wall interface using peel-and-stick membrane, or other approved barrier, following manufacturer's application instructions.



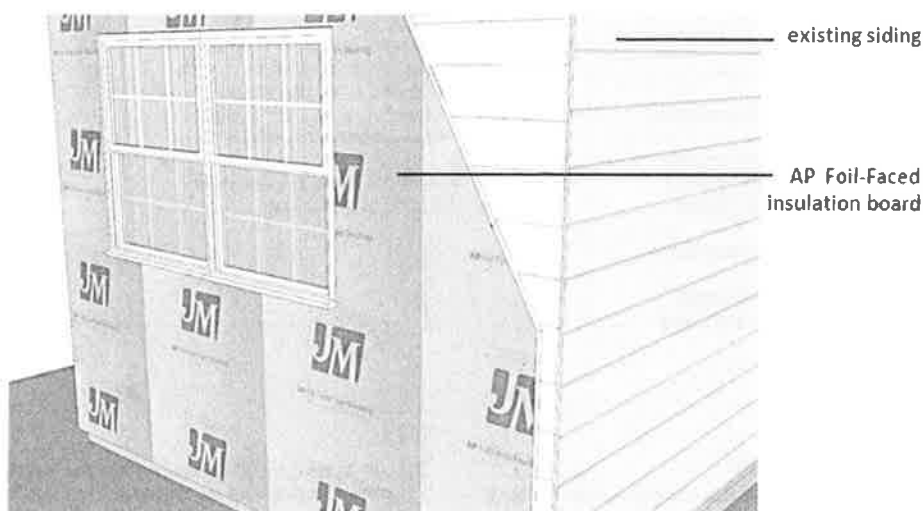
AP™ Foil-Faced Residential Installation Instructions Above-Grade Exterior Walls

Installation (continued)

OPTION 5: Existing Wall – AP™ Foil-Faced Insulation Over Siding - Continued

1. Seal penetrations and panel defects with recommended sealant.
2. Use a utility knife and straight edge to trim the insulation board to conform to irregular wall angles, projections or wall surfaces. Repair any boards damaged during installation. Patch holes less than 1 inch across with flashing tape and/or sealant. Patch holes greater than 1 inch across with matching board material and then seal with flashing tape.
3. New siding is applied in accordance with the manufacturer's instructions. Ensure that fasteners are long enough to penetrate both the AP™ Foil-Faced insulating sheathing and the normal securing substrate to a depth recommended by the siding manufacturer.

Figure 8. Existing Wall – AP™ Foil-Faced Insulation Over Siding



Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.

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AP™ Foil-Faced Residential Installation Instructions Crawl Spaces

Crawl Spaces

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating crawl spaces. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). AP™ Foil-Faced insulation is lightweight and easy to install. It can be installed in both vented and unvented crawl spaces. AP™ Foil-Faced insulation must be covered with an approved thermal barrier and cannot be left exposed. In crawl spaces where entry is made only for service of utilities, AP™ Foil-Faced insulation must be covered with an approved ignition barrier and cannot be left exposed.

Before You Begin:

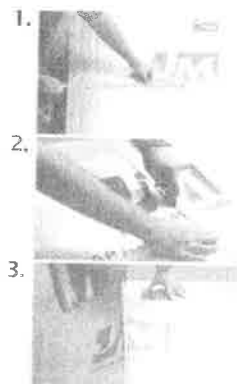
Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by either a thermal barrier or ignition barrier as required by code. Repair any water leaks or structural cracks in the wall, and address any pest problems. Gather all materials and clear work area.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive such as Liquid Nails
- Mechanical fasteners such as masonry nails with 1-inch metal washers or caps
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Single component, moisture-cure silicone sealant
- Canned foam such as Touch'nSeal All Season, Hilti CF 810 or CF-F, Dow Great Stuff or Great Stuff Pro

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board; create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.

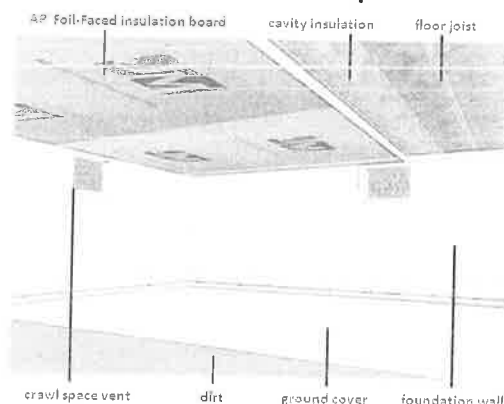


Installation

OPTION 1: Vented Crawl Space

1. The crawl space should be vented in accordance with local building code requirements.
2. If desired, install cavity insulation between the floor joists. Options for insulating between joists include JM Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm™), JM Climate Pro® blown-in fiberglass, JM Spider® Plus, JM Corbond® spray foam, or other approved cavity insulation. Fiberglass batts should be installed without compression. The amount of insulation will depend on the product chosen and the depth of the joists.
3. Fiberglass batts must be secured with wire staves or netting to prevent the insulation from falling out of the joist cavity before foam board insulation is installed.
4. Install AP™ Foil-Faced insulation boards across the bottom of the floor joists. This will prevent future condensation and increase the floor's overall insulation value.
5. Use maximum board lengths to minimize number of joints. Locate joints square to joists and center end joints over joists. Provide additional blocking as necessary. It is not necessary to stagger board joints. Butt board edges together tightly, and carefully fit around openings and penetrations.

Figure 1. Vented Crawl Space





AP™ Foil-Faced Residential Installation Instructions Crawl Spaces

Installation (continued)

OPTION 1: Vented Crawl Space-Continued

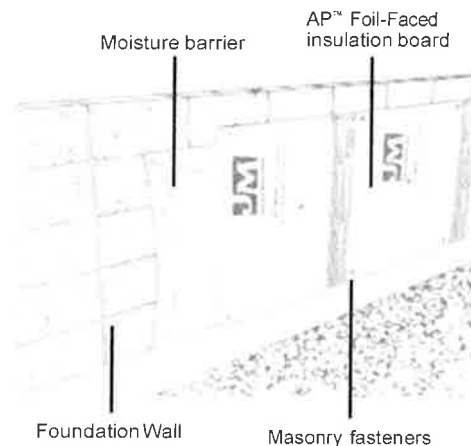
5. Fasten insulation boards to the bottom of the joists using screws or nails with 1-inch minimum washers or caps. Fasteners should be long enough to penetrate in to the joist a minimum of $\frac{3}{4}$ inch. Drive fasteners flush with the board, but do not countersink. Space fasteners approximately 16 inches on center around the perimeter and in the field of each board (16 or 24 inches on center across joists, depending on spacing).
6. To increase air sealing, board edges may be taped and all penetrations sealed with single component, moisture-cure silicone sealant.
7. Cover exposed foam board insulation with either a thermal barrier or ignition barrier as required by local building code and occupancy of the crawl space.
8. In cold climates, be sure to insulate any plumbing lines that extend below the crawl space insulation.
9. All heating and cooling ducts in the crawl space should be sealed and insulated appropriately.
10. A ground cover must be installed to reduce moisture levels in the crawl space.

OPTION 2: Unvented Crawl Space

IMPORTANT NOTE: Some applications may require a 2- to 3-inch inspection strip along the top of the foundation wall for termite mitigation. Always adhere to local building codes.

1. Install wall section of crawl space moisture barrier. Barrier should consist of 6 mil minimum polyethylene sheeting wide enough to extend from the top of the foundation wall to at least 12 inches onto the ground.
2. Install AP™ Foil-Faced insulation from the top of the footing to the top of the foundation wall.
3. Fasten AP™ Foil-Faced boards to the interior of the foundation wall using power-driven masonry nails with $1\frac{1}{2}$ -inch minimum metal washers or caps, or other suitable masonry fastener.
4. Space fasteners approximately 24 inches on center across the short board dimension and 48 inches on center across the long board dimension.
5. Butt board edges together tightly and carefully fit around penetrations.
6. Cover exposed foam board insulation with either a thermal barrier or ignition barrier as required by local building code and occupancy of the crawl space.
7. Air seal the interface between the top of the foundation wall and the mud sill with caulk or expanding foam.
8. Air seal and insulate the inside of the band joist with the following options:
 - a. Seal with expanding canned foam and insulate with JM Formaldehyde-free™ fiberglass batts Unfaced, Faced or ComfortTherm).
 - b. Cut pieces of foam board to fit tightly into each band joist space. Install and seal in place with expanding canned foam. Multiple layers of foam board may be used to achieve the desired R-value. Foam boards in band joists are not required to be covered for fire.

Figure 2. Unvented Crawl Space



- c. Air seal and insulate the band joist with JM Corbond spray foam. Open cell spray polyurethane foam should not be used to insulate band joists in cold climates.
9. A ground cover must be installed to reduce moisture levels in the crawl space.
10. Unvented crawl spaces must include mechanical ventilation to control humidity.

**Johns Manville**
A Berkshire Hathaway Company**AP™ Foil-Faced Residential Installation
Instructions Crawl Spaces****Personal Protective Equipment****Personal Protective Equipment: Eyes/Face**

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.



AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Attics and Cathedral/Vaulted Ceilings

Johns Manville AP™ Foil-Faced insulation sheathing board is an excellent choice for insulating attics and cathedral/vaulted ceilings. Polyiso provides one of the highest R-values per inch of any rigid insulation (R-6 at 1 inch). When applied to the interior face of rafters, Johns Manville AP™ Foil-Faced insulation provides a layer of continuous insulation that eliminates thermal bridging. This prevents heat flow and condensation, thereby increasing the ceiling's overall insulation value. AP™ Foil-Faced insulation is lightweight and easy to install. AP™ Foil-Faced insulation must be covered with an approved thermal or ignition barrier, as required by local building code, and cannot be left exposed.

Before You Begin:

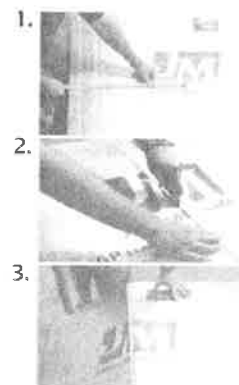
Always follow local building codes. AP™ Foil-Faced sheathing must be separated from the interior of a building by a minimum of ½-inch gypsum board or equivalent 15-minute thermal barrier as required by code. When AP™ Foil-Faced insulation sheathing is installed within an attic where entry is made only for service of utilities, an ignition barrier must be installed in accordance with local building codes. Gather all materials.

Materials Checklist

- Safety glasses and gloves
- Measuring tape and pencil
- Utility knife or handsaw
- Straight edge
- Construction-grade polyurethane adhesive, such as Liquid Nails
- Mechanical fasteners such as masonry nails with 1-inch metal washers or caps
- Flashing tape such as 3M 8067, Grace Vycor Pro, or Lamatek
- Single component, moisture-cure silicone sealant
- Canned foam such as Touch'nSeal All Season, Hilti CF 810 or CF-F, Dow Great Stuff or Great Stuff Pro

Measuring and Cutting

1. Measure the board by dragging a measuring tape hook across the surface of the board; create a crease while holding the tape at the desired length.
2. Using a straight edge as a guide, deeply score the crease. There is no need to cut through.
3. Snap the board along the score line over the edge of a table or workbench.

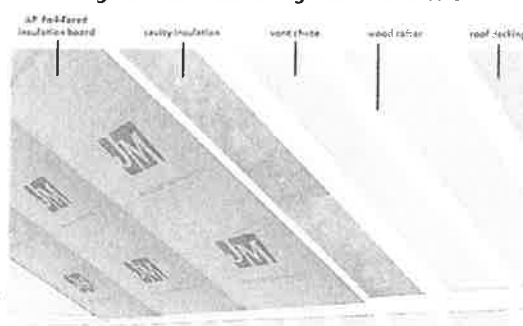


Attic Installation

OPTION 1A: Vented Roof – Foam Board Across Rafters

1. Ensure that proper ventilation is maintained below the roof sheathing, from the soffit vents to the ridge vent at the peak of the roof. This is best accomplished by installing baffles on the underside of the roof sheathing between every rafter prior to installing insulation. Baffles maintain a clear ventilation space and prevent cold air from penetrating into the rafter insulation.
2. If required, install insulation between the rafters. Options for insulating between rafters include Johns Manville Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm®), JM Climate Pro® blown-in fiberglass, JM Spider® Plus, JM Corbond® spray foam or other approved insulation product. Fiberglass batts should not be compressed. installed in the rafter cavity will depend on the product chosen and the depth of the rafters.
3. Install AP™ Foil-Faced foam sheathing across the inside rafter surface. Use maximum board lengths to minimize number of joints. Locate joints square to rafters and center end joints over rafters. Provide additional blocking as necessary. It is not necessary to stagger board joints. Butt board edges together tightly, and carefully fit around openings and penetrations.

Figure 1. Vented Ceiling – Across Rafters





AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Attic Installation (continued)

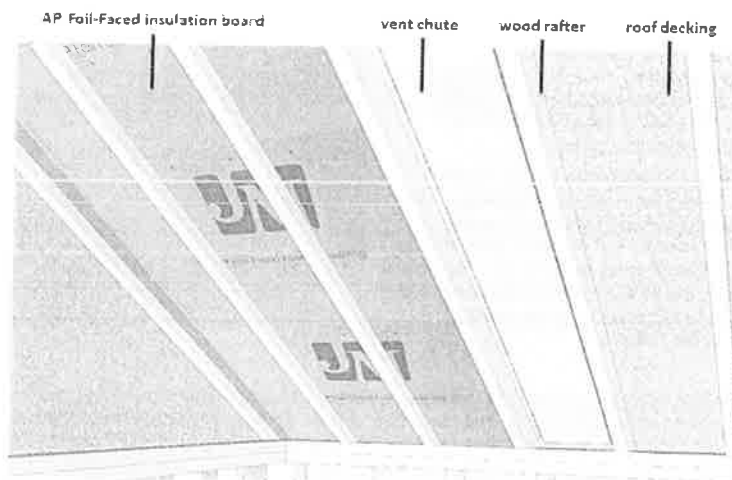
OPTION 1A: Vented Roof – Foam Board Across Rafters - Continued

4. Fasten foam insulation boards to the interior of the rafters using screws or nails with 1-inch minimum washers or caps. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing. Fasteners should be long enough to penetrate in to the rafter a minimum of $\frac{3}{4}$ inch.
5. Space fasteners approximately 16 inches on center around the perimeter and in the field of each board (16 or 24 inches on center across rafters, depending on rafter spacing). Drive fasteners so the washer or stress plate is tight and flush with the board surface, but do not countersink.
6. When installing boards that butt-up at different angles, such as a wall to a sloped ceiling, or sloped ceiling to flat ceiling junctions, mitre the edge of the foam board. This will provide a better fit as well as cover wall headers and other thermal bridges.
7. Cover AP™ Foil-Faced insulation with a 15-minute thermal barrier or ignition barrier as required by local building codes.

OPTION 1B: Vented Roof – Foam Board Between Rafters

1. Ensure that proper ventilation is maintained below the roof sheathing, from the soffit vents to the ridge vent at the peak of the roof. This is best accomplished by installing baffles on the underside of the roof sheathing in between every rafter prior to installing insulation between the rafters. Baffles maintain a clear ventilation space and prevent cold air from penetrating into the rafter insulation.
2. Cut AP™ Foil-Faced foam sheathing to fit snugly between the rafters, and install against the baffles. Properly cut boards should friction-fit between the rafters without falling out. Secure insulation boards and seal all board edges using one-part canned foam.
3. If additional insulation is required, install in the remaining rafter space. Options for insulating the remaining rafter depth include Johns Manville Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm), JM Climate Pro blown-in fiberglass, JM Spider Plus or other approved insulation product. Fiberglass batts should not be compressed. The level of additional insulation will depend on the product chosen and the depth of the rafters. All additional insulation must be secured to hold it in place.
4. If additional insulation is not required, the foil facing of AP™ Foil-Faced foam sheathing can provide additional thermal performance to the attic by functioning as a radiant barrier. The reflective side of the board should be oriented to the interior, and the nonreflective white side should be oriented to the exterior. To gain radiant barrier performance, an air space of at least $\frac{1}{2}$ inch should be left between the foam insulation and the thermal or ignition barrier.
5. Cover AP™ Foil-Faced insulation with a 15-minute thermal barrier or ignition barrier as required by local building code.

Figure 2. Vented Ceiling – Between Rafters





AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Attic Installation (continued)

OPTION 2: Unvented Roof Sheathing

1. Cut AP™ Foil-Faced foam sheathing to fit snugly between the rafters.
2. Install AP™ Foil-Faced foam boards between rafters, directly against the bottom of the roof sheathing. The R-value of the insulation must meet local building code requirements for unvented attics to prevent condensation. Multiple layers of foam board may be required. If multiple layers are installed, stagger board joints.
3. Fasten insulation boards to the roof sheathing per the following options:
 - a. Secure insulation boards between the rafters and seal board edges using one-part canned foam. Properly cut boards should friction-fit between rafters without falling out.
 - b. Use screws or nails with 1-inch minimum washers or caps. Alternate fasteners may be used, with the type and length as recommended by their

manufacturer for securing foam plastic insulating sheathing. Fasteners should be long enough to penetrate in to the roof sheathing a minimum of ½ inch, but not too long as to penetrate through the roof waterproofing. Fasteners are not required around the perimeter of the boards. Space fasteners approximately 24 inches on center in the field.

4. Seal all board edges and penetrations with one-part expanding canned foam to prevent air leakage and water vapor diffusion to the roof sheathing.
5. If additional insulation is required, install in the remaining rafter space. Options to insulate the remaining rafter depth include Johns Manville Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm), JM Climate Pro blown-in fiberglass, JM Spider Plus or other approved insulation product. Fiberglass batts should not be compressed. The level of additional insulation will depend on the product chosen and the depth of the rafters. Additional insulation must be secured.
6. If additional insulation is not required, the foil facing of AP™ Foil-Faced foam sheathing can provide additional thermal performance to the attic by acting as a radiant barrier. The reflective side of the board should be oriented to the interior, and the nonreflective white side should be oriented to the exterior. To gain radiant barrier performance, an air space of at least ½ inch should be left between the foam insulation and the thermal or ignition barrier.
7. Cover AP™ Foil-Faced insulation with a 15-minute thermal barrier or ignition barrier as required by local building code.

OPTION 3: Knee Walls

1. If desired, insulate the knee wall cavity with either Johns Manville Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm), JM Climate Pro blown-in fiberglass, JM Spider Plus, JM Corbond spray foam or other approved insulation product. Fiberglass batts should not be compressed. The amount of insulation will depend on the product chosen and the depth of the framing.
2. There are two options for installing continuous foam board insulation over knee wall framing:
 - a. Use wood lath or strapping fastened to the exterior of the knee wall framing to secure cavity insulation. Install AP™ Foil-Faced insulation as described in section 1A. Ensure that there is a ventilation space below the roof sheathing at the intersection of the knee wall and roof.

Figure 3. Unvented Ceiling – Between Rafters

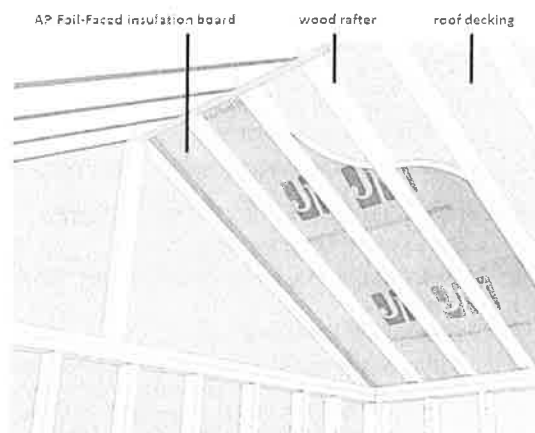
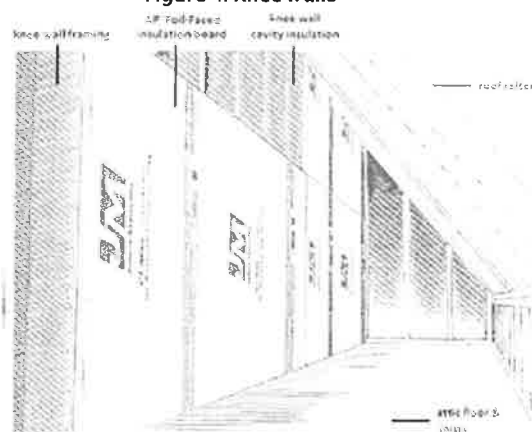


Figure 4. Knee Walls





AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Attic Installation (continued)

OPTION 3: Knee Walls - Continued

- a. Insulate the knee wall framing on the exterior with AP™ Foil-Faced insulation by screwing or nailing insulation boards to the exterior (attic side) of the framing using screws or nails with 1-inch minimum washers or caps. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing. Fasteners should be selected to be long enough to penetrate in to the framing a minimum of $\frac{3}{4}$ inch. To provide air sealing to the knee wall, foam board seams may be taped. Additional sections of board foam should be cut and fit to block off the space between attic floor joists and sealed in place with one-part expanding foam to provide an air seal below the knee wall.
2. Cover AP™ Foil-Faced insulation with a 15-minute thermal barrier or ignition barrier as required by local building code.

Cathedral/Vaulted Ceilings Installation

OPTION 1: Gypsum Board Finish

1. The roof sheathing may be vented or unvented. The following options may be followed prior to installing foam board sheathing:

Vented Roof Sheathing

- a. Ensure that proper ventilation is maintained below the roof sheathing, from the soffit vents to the ridge vent at the peak of the roof. This is best accomplished by installing baffles on the underside of the roof sheathing in between every rafter prior to installing insulation between the rafters. Baffles maintain a clear ventilation space and prevent cold air from penetrating into the rafter insulation.
- b. If desired, install insulation between the rafters. Options for insulating between rafters include Johns Manville Formaldehyde-free™ fiberglass batts (Unfaced, Faced, or ComfortTherm), JM Climate Pro blown-in fiberglass, JM Spider Plus, JM Corbond spray foam, or other approved insulation product. Fiberglass batts should not be compressed. The level of insulation installed in the rafter cavity will depend on the product chosen and the depth of the rafters.

OR

Unvented Roof Sheathing

- c. If desired, install JM Corbond spray foam directly against the bottom of the roof sheathing. The amount of insulation should be sufficient to meet local building code requirements for unvented attic spaces to prevent condensation.
2. Install AP™ Foil-Faced foam sheathing across the inside rafter surface. Use maximum board lengths to minimize number of joints. Locate joints square to rafters and center end joints over rafters. Provide additional blocking as necessary. It is not necessary to stagger board joints. Butt board edges together tightly, and carefully fit around openings and penetrations.
3. Fasten foam insulation boards to the interior of the rafters using screws or nails with 1 inch minimum washers or caps. Alternate fasteners may be used, with the type and length as recommended by their manufacturer for securing foam plastic insulating sheathing. Fasteners should be selected to be long enough to penetrate in to the rafter a minimum of $\frac{3}{4}$ -inch.
4. Space fasteners approximately 16 inches on center around the perimeter and in the field of each board. (16 or 24 inches on center across rafters, depending on spacing). Drive fasteners so the washer or stress plate is tight and flush with the board surface, but do not countersink.
5. AP™ Foil-Faced foam boards qualify as Class I vapor retarders, so no additional vapor retarder is required.
6. Cover AP™ Foil-Faced insulation with a minimum $\frac{1}{2}$ -inch gypsum board or equivalent 15-minute thermal barrier as required by local building code.

OPTION 2: Exposed Beams Finish

1. From the exterior side of the ceiling, install an appropriate vapor retarder over the wood planks.
2. Over the vapor retarder, install wood nailers 3.5 inches wide by the thickness of the foam insulation. Wood nailers are installed parallel to the roof slope on 16- or 24-inch centers and around the perimeter of the roof deck, at valleys, ridges and anywhere flashings will be attached. 2x4 lumber is approximately 1.5 inches thick, so 2x4 lumber may require a strip of plywood or foam insulation under the wood nailer to match the final foam board thickness. Install nailers with additional strips of foam or plywood against the vapor retarder. Screw or nail wood nailers securely to roof deck.



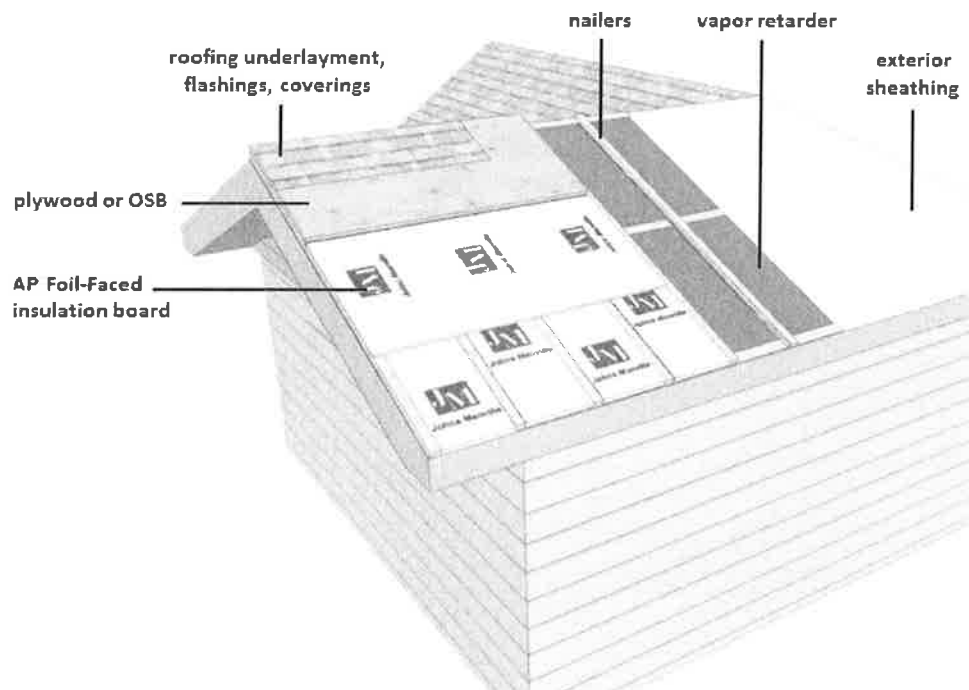
AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Cathedral/Vaulted Ceilings Installation (continued)

OPTION 2: Exposed Beams Finish - Continued

1. Install AP™ Foil-Faced insulation tightly between the wood nailers, nailing minimally.
2. Install a second layer of foam insulation perpendicular to the wood nailers keeping all joints tight and nailing minimally into the wood nailers.
3. If an unvented roof is desired, install plywood/OSB shingle base over the foam insulation, staggering all joints versus foam joints. Run plywood/OSB perpendicular to the wood nailers and ensure end joints in plywood/OSB are located over a wood nailer (wood nailers are under top layer of foam insulation). Secure plywood/OSB to the wood nailers.
4. If a vented roof is desired, install a second set of wood nailers or furring strips over the top layer of foam insulation and directly over existing wood nailers which are below top layer of foam insulation. Fasten top wood nailer into existing wood nailer. Install plywood/OSB shingle base perpendicular to the wood nailers and ensure end joints in plywood/OSB are located over a wood nailer. Secure plywood/OSB to the wood nailers. Vented roofs require vents at the eaves and at the ridge that are connected via the air space under the shingle base.
5. Install roofing underlayment, flashings, and roof coverings.

Figure 5. Cathedral/Vaulted Ceiling Exposed Beams – Unvented





AP™ Foil-Faced Residential Instructions Attics and Cathedral/Vaulted Ceilings

Personal Protective Equipment

Personal Protective Equipment: Eyes/Face

Safety glasses with side shields are recommended to keep dust out of the eyes.

Personal Protective Equipment: Skin

Leather or cotton gloves should be worn to prevent skin contact and irritation.

Personal Protective Equipment: Respiratory

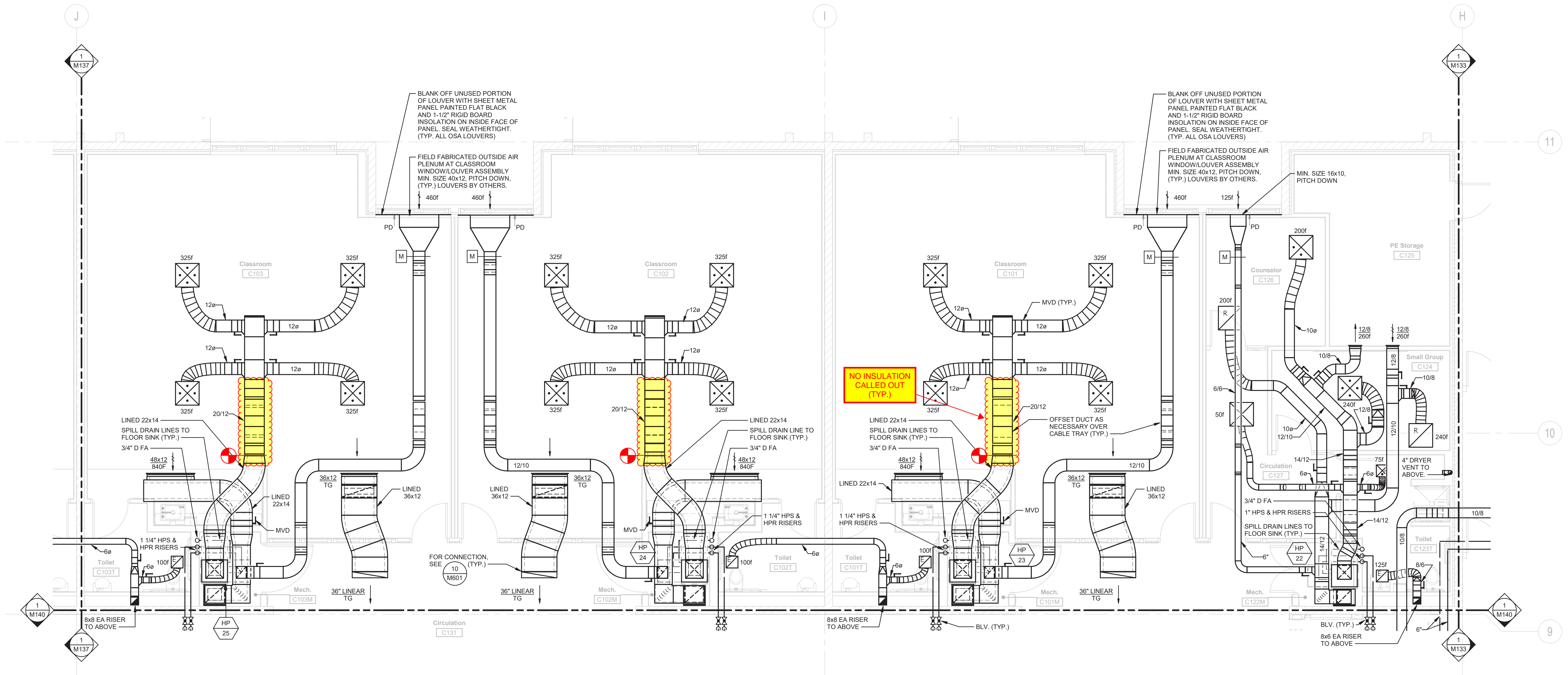
A NIOSH-certified respirator should be used if ventilation is unavailable, or is inadequate for keeping dust levels below the applicable exposure limits.

Ventilation

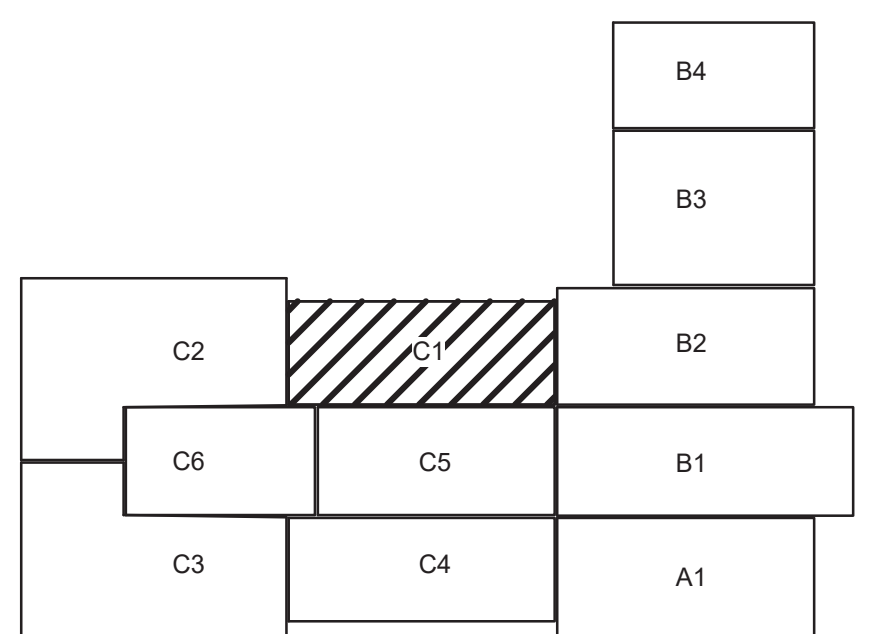
In fixed manufacturing settings, local exhaust ventilation should be provided at areas of cutting to remove airborne dust. General dilution ventilation should be provided as necessary to keep airborne dust below the applicable exposure limits and guidelines. The need for ventilation systems should be evaluated by a professional industrial hygienist, while the design of specific ventilation systems should be conducted by a professional engineer.

Personal Protective Equipment: General

Loose-fitting, long-sleeved clothing should be worn to protect skin from irritation. Work clothing should be washed separately from other clothes, and the washer should be rinsed thoroughly (run empty for a complete wash cycle). This will reduce the chances of dust being transferred to other clothing.



MECHANICAL - PARTIAL FIRST FLOOR PLAN - AREA C1
SCALE: 1/4" = 1'-0"



KEY PLAN

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Professional Seal Date Revision

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Washoe County School District
Rio Wrangler Elementary School

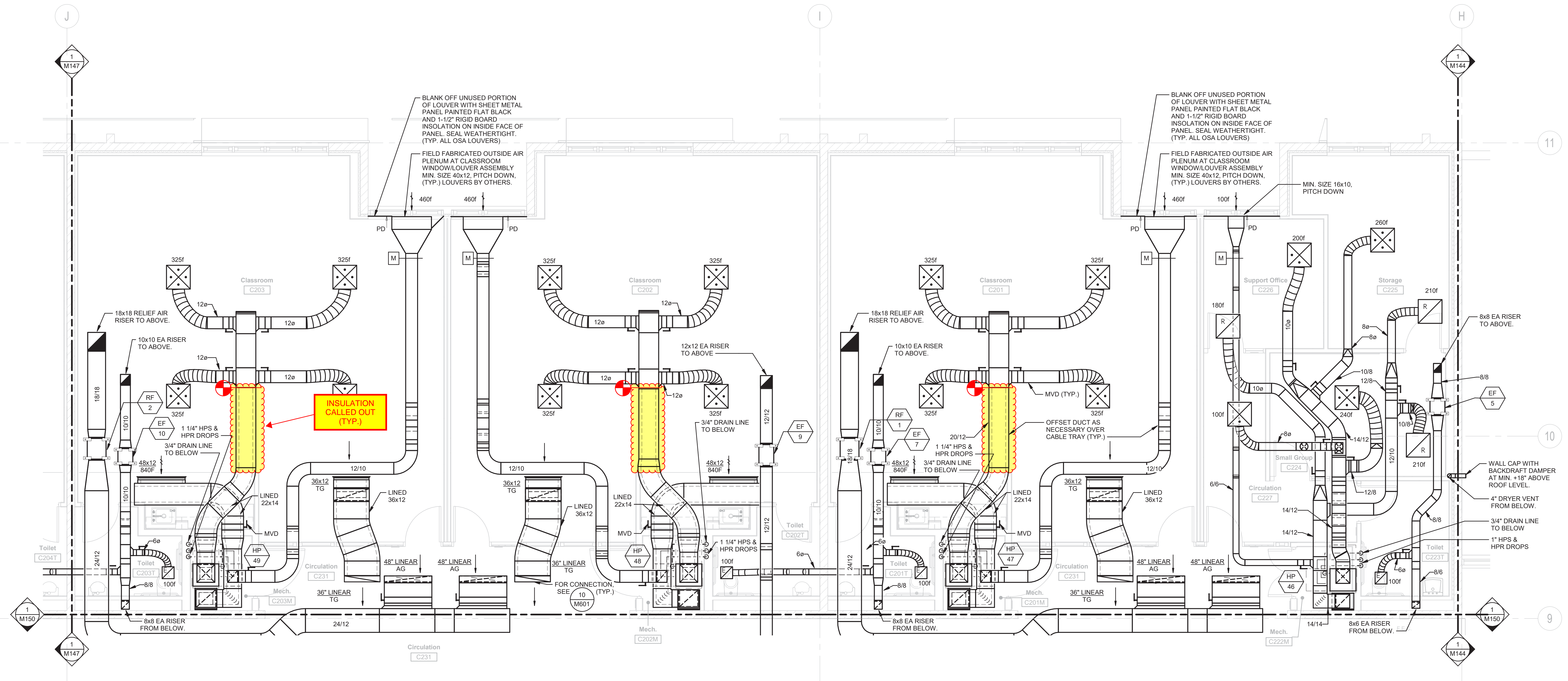
10600 Green Pasture Drive
Reno, Nevada 89521

MECHANICAL - PARTIAL
FIRST FLOOR PLAN -
AREA C1

October 13, 2021
H+K Project No: 2001

M136

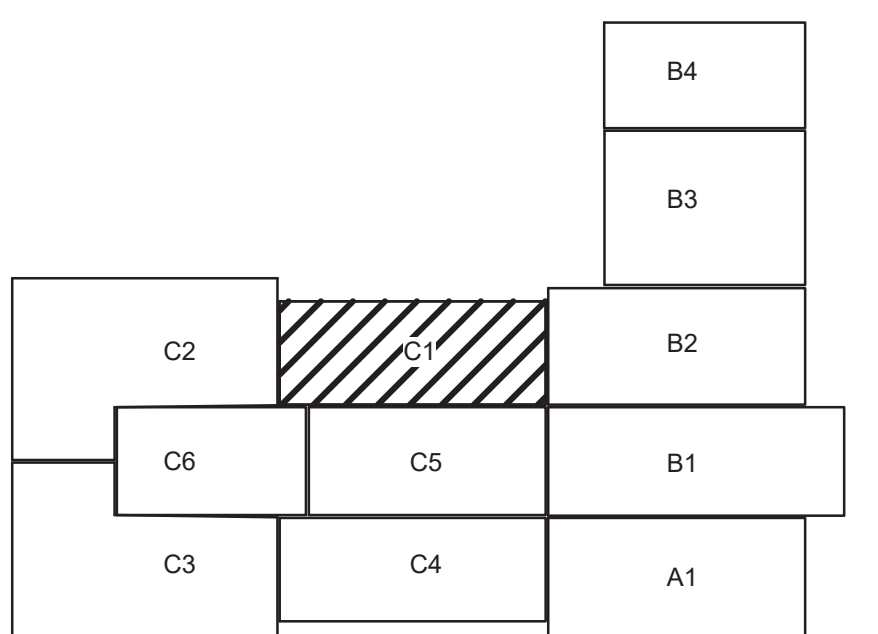




MECHANICAL - PARTIAL SECOND FLOOR PLAN - AREA C1

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

1 M146



KEY PLAN

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Professional Seal

Date

Revision

10/11/2021

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MECHANICAL - PARTIAL
SECOND FLOOR PLAN -
AREA C1

October 13, 2021
H+K Project No: 2001

M146





section 05 44 00

Ultra-Span® Cold Formed Steel Trusses



STEEL

the new green

preserve . protect . inspire

"They are real innovators...
Service and Quality are
hallmarks of their success."*

The Innovative Solution: Pre-Fabricated Roof Trusses.

Computer - generated, factory - built Ultra-Span trusses are **THE** 100% non-combustible, "Green" solution for complex, architectually appealing structural roof systems in commercial/institutional construction.

Aegis Metal Framing is the leading supplier of technology enabled solutions to the cold formed steel building components industry.



Aegis provides a complete package of products and services to manufacturers of pre-fabricated cold formed steel trusses and wall panels, including:

- A full suite of estimating, design, fabrication, and management software
- Proprietary Ultra-Span® steel truss sections
- A complete line of connectors and accessories
- Full-service cold formed component and structure engineering

Aegis Metal Framing is a division of MiTek®, the world's largest supplier of products and software to the pre-fabricated building components industry. MiTek is a subsidiary of Warren Buffett's Berkshire Hathaway.

Table of Contents

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Services We Offer	9
How We Help You	10



The Paideia School | Atlanta, GA

- New \$10 million, 17,000 sq ft Tudor-inspired private school building
- First LEED Silver school project in Atlanta area
- Embraces sustainable, functional “living laboratory” concept with a large campus green space, and Geothermal field for heating/cooling
- 170 Ultra-Span steel trusses framed the roof, with 90% recycled content and 100% recyclable

LEED™ Credits

- Aegis Metal Framing can assist in achieving LEED credits for a building structure.
- With respect to the LEED program's Materials and Resources Credit 4.1 and 4.2, Recycled Content, all Aegis truss materials and accessories are produced from 100 percent prime steel with high percentages of pre-consumer and post-industrial recycled content value.
- In addition, depending upon the specific project location, opportunities may exist for credits under the Materials and Resources Credit 5.1 and 5.2, for Regional Materials.
- Aegis Metal Framing is proud to be a member of the U.S. Green Building Council. The USGBC has recognized cold formed steel framing as an important contributor to environmentally responsible, sustainable structures.

The Crossing, Phase 1 & 2 | San Bruno, California

“... exceeded my expectations, and I wouldn't hesitate to work with their design staff on future projects...”

- Tom Castle, PE, Figgadent Waggener & Castle

- 350 unit, \$170 million apartment/condominium buildings built on former US Navy property near San Francisco International airport
- Originally designed as “stick built”—converted to Ultra-Span pre-fabricated trusses, 97,000 sq ft roof area, more than 4,000 individual trusses, and extensive lateral design for seismic and wind
- Tight job site required precise delivery sequencing between fabricator and installation contractor



Multi-Family

The Magic House | Saint Louis, MO

“They ensured all components fit as designed.”

- Tom Benning, Site Superintendent for Paric Construction

- Main body of the building required 48" on-center scissors trusses with extremely steep pitches on both the top and bottom chords
- Specially designed and fabricated trusses for the 20' diameter by 22' tall "hat"; pre-assembled and decked before lifted into place
- Won Innovative Engineering Design Challenge from the Cold Formed Structural Engineers Institute (CFSEI)



Institutional

Citizens Ball Park | Philadelphia, PA

“With real grass, angled seating, rooftop bleachers and a state-of-the-art design, Citizens Bank Park is destined to be a true fan favorite.” - Citizens Bank Park website

- Home of the Philadelphia Phillies
- \$458 million total project cost, 43,500 seats
- Unique Ultra-Span bow string truss designs with more than 300 individual trusses, built-in gutter trough at both overhangs, and special purlin connection clips for standing seam roof attachment



Sports/Recreation

Projects /Applications

Since 1993, Aegis Ultra-Span trusses have been utilized in hundreds of millions of square feet of commercial, institutional and multi-family construction, including:

- K-12 Education
- Military/Government
- Healthcare
- Offices
- Colleges/Universities
- Multi-Level Buildings
- Correctional Facilities
- Hotels
- Industrial
- Apartment/Condo
- Assisted Living

Building Strong, Sustainable

Trump Park Residences | Yorktown, New York



Senior Living

"Trump Park Residences is one of the most prestigious projects in which my company has participated."

- Michael Kane, Kane Construction

- 141 unit, \$112 million active living adult community; Styled after the grand estates of the Hudson River Valley
- Massive, intricate Ultra-Span truss system presented monumental engineering challenges with 1,200 individual truss types and 2,300 total trusses, 500 hours total engineering time, girder trusses supporting main cupola designed for 15,000 pound point loads every four feet, and more than 30 truckloads of fabricated trusses

Marine Special Operations Command | Camp Lejeune, NC



Military/Government

"The military is spending billions of dollars to enhance and upgrade bases throughout the country. Much of this new construction utilizes cold formed steel trusses."

- Bill Wiley, Military Projects Specialist

- New construction of 4 barracks and a HQ building
- Part of larger, 1 million sq ft, multi-phase development on 225 acres
- Phase consisted of 71,000 sq ft of trusses furnished and installed by Ultra-Span fabricator

Hillsdale Terraces Long Term Care | Oshawa, ON, Canada



Assisted Living

"The Terraces and its surrounding grounds are second to none."

- Administrator Len Cserhati

- 300 bed facility located Northeast of Toronto
- 35,000 sq ft of pre-fabricated Ultra-Span Trusses
- Steep slope and long span (70 feet) trusses required "double piggybacking" for shipping and installation

Benefits of Ultra-Span® Cold Formed Steel Trusses

Ultra-Span® is the most widely used pre-fabricated, cold formed steel truss product on the market. Aegis provides the widest range of profiles to ensure a cost-effective solution - from the smallest mansard trusses to 80 foot plus clear spans.

- 100% non-combustible
- Incredible range of potential profiles and roof lines
- Pre-Engineered, factory-built for quality and precision
- Complete line of connectors, clips and installation products
- Supported by state-of-the-art estimating and design software

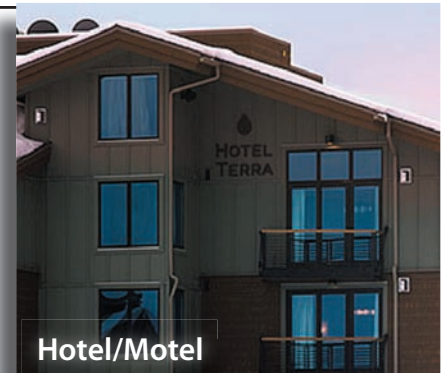
able Structures...

Hotel Terra | Jackson Hole, WY

“On the upper floors of the building we used pre-fabricated systems ...we realized how much faster it would go up and how much energy it would save.”

- Ryan Schoen, Vice President Development, Terra Resort Group

- 6 story, 72 room boutique hotel and ski lodge
- LEED certified project with pre-fabricated cold formed steel components, local natural stone, low VOC paint and double pane, argon-filled windows along with two pipe zoned heating and cooling
- Property-wide recycling and organic products program



Hotel/Motel

Cape Coral RO Water Treatment Plant | Cape Coral, FL

“Excellent. They are real pros.”

- Mike Brown, PM, Poole and Kent, on the Ultra-Span fabricator

- Large new water treatment facility with a total of 5 buildings utilizing Ultra-Span trusses, heavy gauge metal deck, and standing seam metal roof
- 20 foot tall, 92 foot clear span trusses built in 3 sections and field assembled on specially built jigs
- Installer fabricated a special 60 foot spreader bar to hoist the 1,500 pound trusses in to place



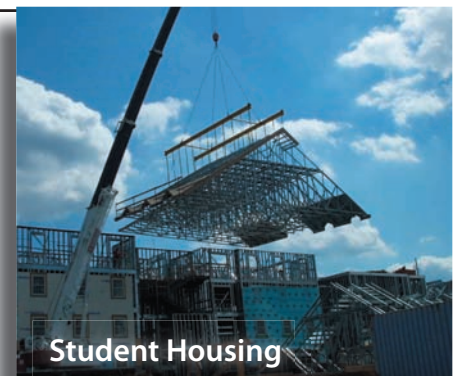
Infrastructure

Bloomsburg University Student Housing | Bloomsburg, PA

“The actual lifting and fastening of the pre-fab sections only took two days per building. We figure we cut 2 weeks or more out of each building with this rafting technique.”

- Tim Clark, Zartman Construction

- \$30 million, 200,000 sq ft new dormitory for 540 students
- 1,600 individual Ultra-Span trusses, many with built in “cat walk” space
- Safer, faster, more cost effective installation with trusses pre-assembled in sections and “rafted” in to place



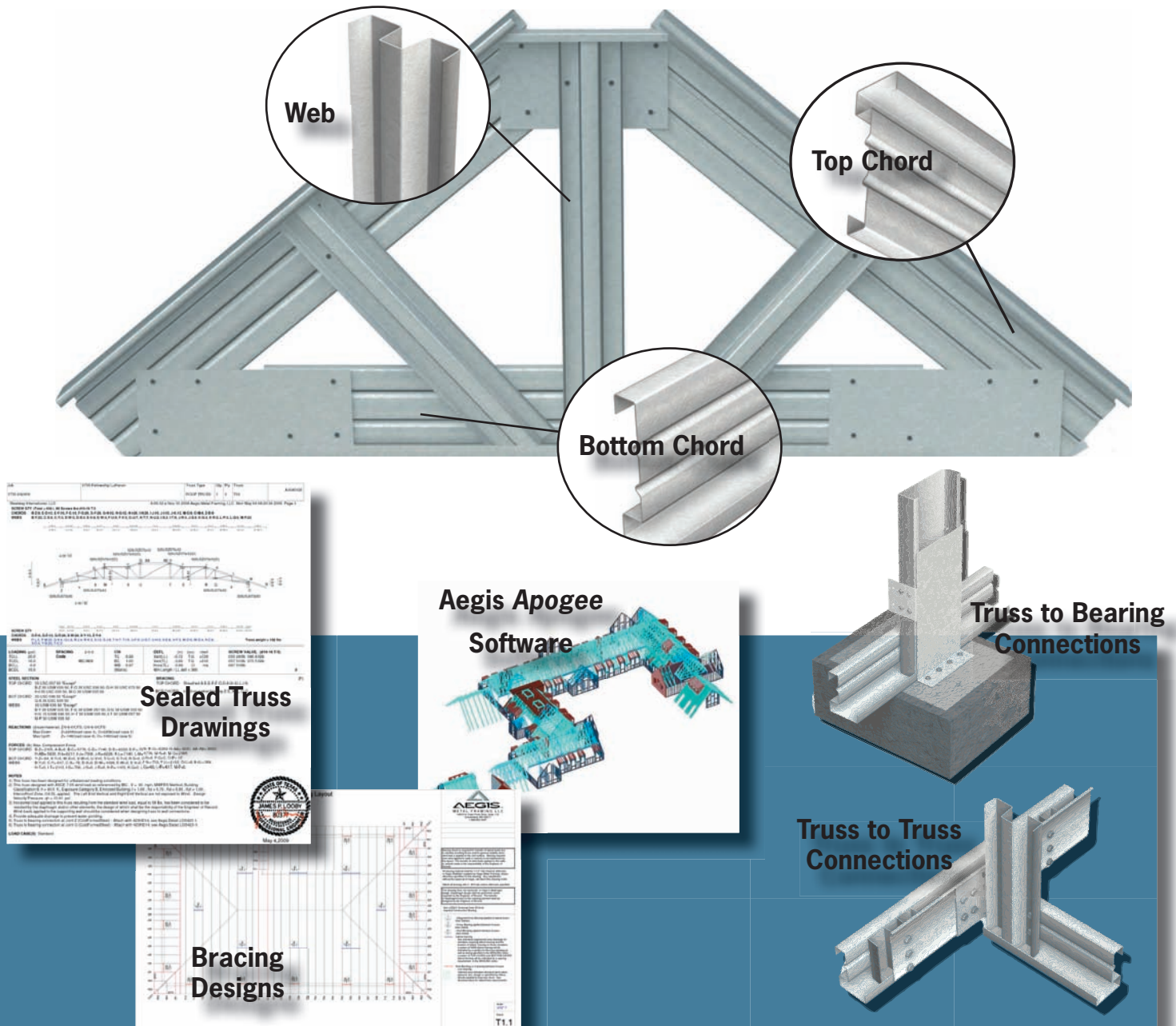
Student Housing

Benefits of Ultra-Span® Cold Formed Steel Trusses

Ultra-Span® is the most widely used pre-fabricated, cold formed steel truss product on the market. Aegis provides the widest range of profiles to ensure a cost-effective solution - from the smallest mansard trusses to 80 foot plus clear spans.

- Distributed via nation-wide network of authorized Aegis fabricators
- Complete truss system engineering, including all bracing, connections and installation documents
- Multiple UL® assemblies available
- 100% Prime Steel
- High recycled content assists towards LEED credits

The Complete Truss Package



Elements of a Complete System - Comparing Steel Truss Proposals

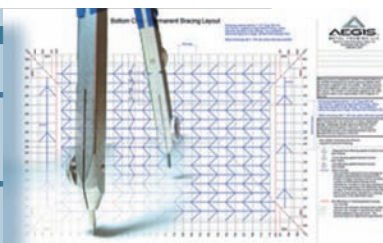
Architects and contractors evaluating truss proposals must be sure the following key elements are provided for by the fabricator and/or engineer of record:

- **Sealed Truss Drawings:**
Provided by the truss fabricator and their engineering supplier (Aegis Metal Framing)
- **Sealed Truss to Truss and Truss to Structure Connections:**
Provided by the truss fabricator and their engineering supplier
- **Permanent Bracing Design:**
Typically the responsibility of the engineer of record, but can also be provided by the truss fabricator and their engineering supplier
- **Bent Metal:**
For hip, ridge, valley, and eaves. Typically provided by the truss fabricator
- **Shear Transfer Framing:**
If required, typically provided by the truss fabricator and their engineering supplier, based on loads provided by the engineer of record.
- **Truss Placement Plan:**
Provided by the truss fabricator

Aegis professional engineers are licensed in all 50 states and all the Canadian provinces. We offer our fabricators and the building design team responsive, cost-effective, certified engineering solutions in all these areas:

- Truss drawings
- Bracing Design
- Shear transfer framing
- Truss connections
- Truss repairs
- Complete cold formed structures

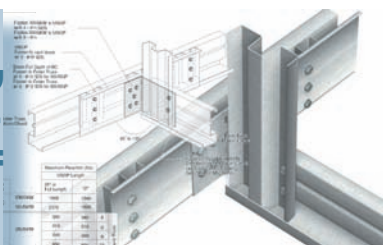
Engineering



Aegis Metal Framing offers a complete line of truss to truss and truss to structure connectors and engineered details. Building designers can reference these details for attaching Ultra-Span trusses to a wide range of structures, including cold formed steel, concrete, CMU, and structural steel.

For more details or a downloadable version of these drawings (PDF, DWG, DXF), please visit our website at <http://www.aegismetallframing.com/Technical/Detail-Library.html>

Details



Specifying Aegis Ultra-Span trusses is just a few clicks away. Just go to our easy to use **Specification Creator**, <http://www.aegismetallframing.com/Technical/Specification-Creator.html>, select "Cold Formed Steel Trusses" and then click on the state in which your project will be built. A full 3-part, section 05 44 00 specification will be created, complete with local Aegis fabricators serving the project area. It's THE easiest way to spec cold formed trusses and identify prospective suppliers!

Specifications



Aegis Ultra-Span trusses offer a number of unique fire resistance assemblies tested and certified by Underwriters Laboratory. These assemblies require only one layer of 5/8" Type C drywall to achieve 1 and 1-1/2 hour ratings vs. two layers or more for wood trusses.

For downloadable versions (Word, PDF) of our cost-effective UL assemblies, please visit our website at <http://www.aegismetallframing.com/Technical/UL-Assemblies.html>.

UL Assembly



Aegis Metal Framing offers useful tools for the complete building process, from estimating to final product. Also, look for our new, comprehensive Technical Resource Binder and design aid.

Architects, engineers, and contractors can find a comprehensive array of product support, educational tools, and training online at www.aegismetallframing.com.

Resources



Value Engineering Services to Reduce Costs

Aegis Metal Framing works hand-in-hand with our fabricator partners to ensure the best-cost solution for non-combustible roof framing needs. Value engineering services include:

- Optimization analysis of truss spacing
- Steel content (and cost) minimization
- Multiple bracing and installation options
- Alternative decking/roofing material selection
- Scope review and competitive quote analysis—making sure all necessary truss system elements are accounted for
- Alternate connection products/details
- Specification review and analysis
- Truss staging/delivery schedule optimization

Architects/Engineers



- Preliminary truss design evaluation—we can help you determine if cold formed steel trusses are the right solution for your roof framing project
- Specification support - our local representatives can assist you in developing a proper cold formed steel specification. Or, you can access our easy-to-use online **Specification Creator**.
- Fire resistant assemblies - Our cost-effective one-layer, one-hour UL® roof and ceiling assemblies offer design flexibility
- Engineering and Technical support - Our staff of licensed professional engineers is available to answer your most challenging cold formed truss and panel inquiries.
- Continuing education credits available on-line or a scheduled office presentation.

Contractors/Sub-Contractors



- Cost-effective solutions—The Aegis Ultra-Span® system is the most competitive cold formed steel truss system available.
- Local fabricator support—Aegis will put you in touch with our authorized fabricators serving your area. You can also access our easy-to-use Fabricator Locator on-line.
- Technical and training tools—our print and online technical resources can help you and your installers achieve an on-time, on-budget performance
- Truss installation aids—you can purchase all your truss clips and connectors, including the industry's only truss spacer/brace all in one, The Stabilizer™, through an authorized Aegis fabricator

Fabricators/Installers



- The most cost-effective designs. Typically, Ultra-Span® designs will use 15 to 30% less steel than competitive systems, offering substantial savings to you and your contractor customers
- Comprehensive design software. The Aegis suite of software can assist you in designing all the elements of a totally cold formed steel framed structure
- A complete range of cold formed steel products Ultra-Span® trusses, TradeReady® joists, and a full line of studs, track, furring channel and accessories. Aegis is the one-stop shop for your cold formed truss and panelization needs.
- Professional engineering services. Our staff of licensed professional engineers can handle all your cold formed steel truss, joist, and panel design requirements.

Join Our Online Network/Community

We have a growing online network and community of building professionals nationwide because we provide the latest information, educational opportunities, and design solutions. We provide resources to assist you in designing sustainable buildings with cold formed steel trusses combined with value engineering to improve your bottom line. You can find us in the following online and print communities:

- Facebook
- YouTube
- Linked In
- Twitter
- Arcat.com
- 4Specs.com
- Blue Book
- Structural Engineer
- Walls and Ceilings
- Metal Architecture
- DesignandBuildwith-Metal.com
- Environmental Design and Construction
- ... and much more...

Solutions We Offer: **Preserve the Environment** **Protect Humanity** **Inspire Design**

Partnering with Aegis and our fabricators means unbeatable quality for your next building project. We take pride in providing a quality product at an attractive price point, delivering the greatest value to the entire building team. And, our extensive professional engineering services will help ensure your project is fabricated to meet all applicable building codes.

Our fabricators can provide a complete system of pre-fabricated cold formed steel trusses, wall panels and floor joists to meet all your framing needs. These factory-built systems allow speedy installation, saving time and money.

When you choose Aegis products you are choosing the most widely used proprietary cold formed steel systems in the market. As the largest provider of such products, Aegis and our fabricators can give you peace of mind that our structural systems have been installed in hundreds of millions of square feet of commercial, institutional, and residential construction.

Serving the Marketplace: **Authorized Fabricators Throughout North America**

Aegis products are marketed throughout North America by an independent network of authorized fabricators. These fabricators specialize in estimating, designing, and manufacturing cold formed trusses and panels for the commercial, institutional, and multi-family markets.

Please visit www.aegismetalframing.com to locate our fabricators serving your market.

Preserve Protect Inspire

As a leading provider of “green” building products and a supporter of the US Green Building Council and its initiatives, Aegis Metal Framing likes to “practice what we preach.” Our focus on the environment includes:

- Barge shipping raw materials to reduce diesel consumption by 400,000 gallons per year
- Recycling 100% of our manufacturing waste and scrap
- Low energy lighting in our manufacturing facility
- Company wide recycling program
- Extensive use of electronic media and communication to reduce paper consumption

As part of our commitment to environmental stewardship, this catalog is printed on 30% recycled paper with soy based ink.



Contact Us

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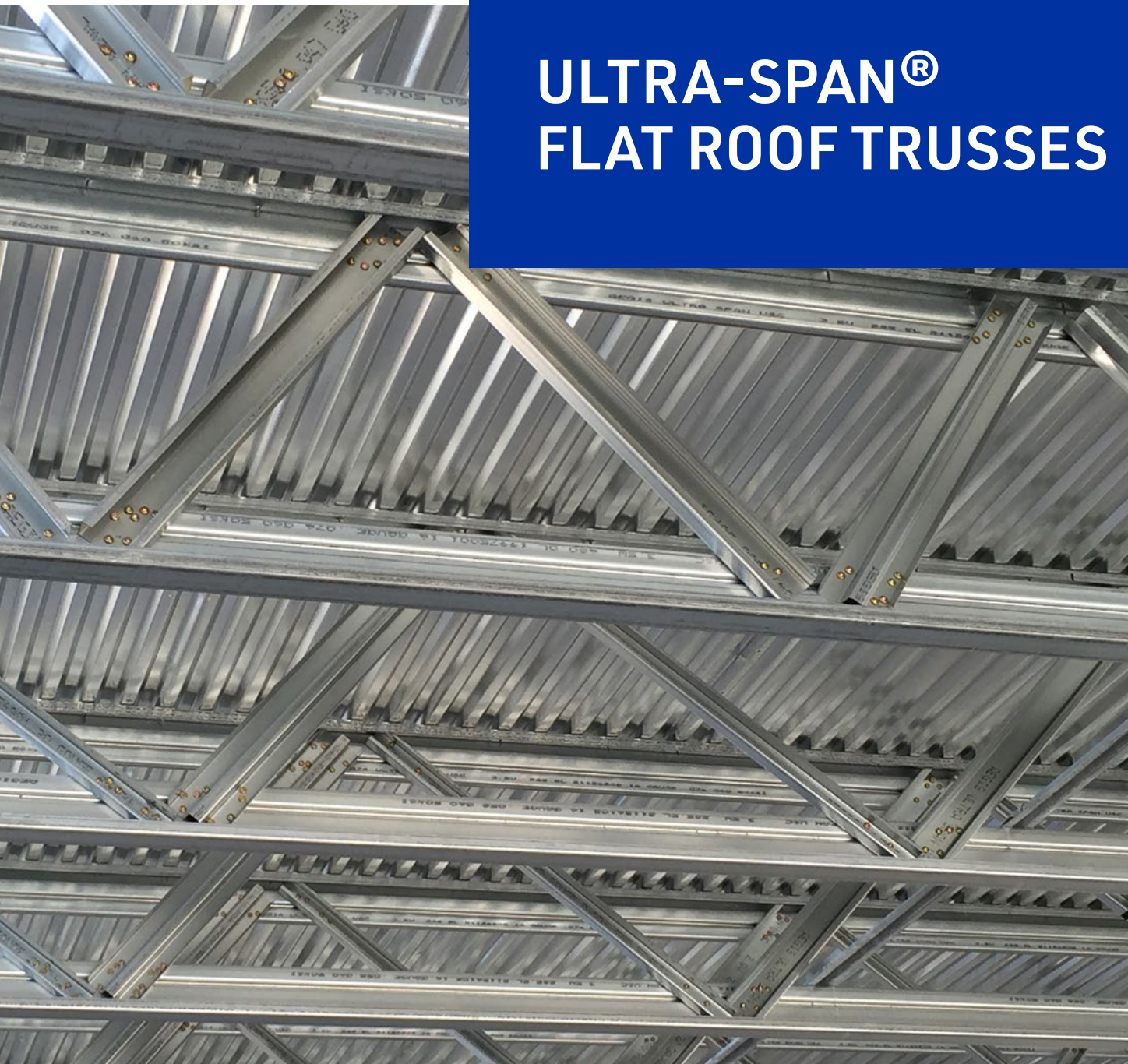
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LinkedIn: www.linkedin.com/companies/aegis-metal-framing
YouTube: www.youtube.com/user/AegisMetalFraming
Twitter: www.twitter.com/Aegis_UltraSpan

COMMERCIAL SOLUTIONS

ULTRA-SPAN® FLAT ROOF TRUSSES



Enable your building to be stronger, longer-lasting, and more resilient for the duration of its design with the strength of our cold-formed steel (CFS) flat roof trusses and industry-leading design software. The proprietary Ultra-Span® CFS Flat Roof Truss chord and web products enable efficient, cost-effective fabrication of an unlimited array of truss spans and profiles.



WHY ULTRA-SPAN® FLAT ROOF TRUSSES

MiTek provides a full range of solutions and services for CFS roof trusses, including modeling and design software, a full line of engineering services, and proprietary connectors and bracing products.

Our nationwide network of authorized fabricators collaborates with your design team to create an economical roof system that meets your construction schedule.

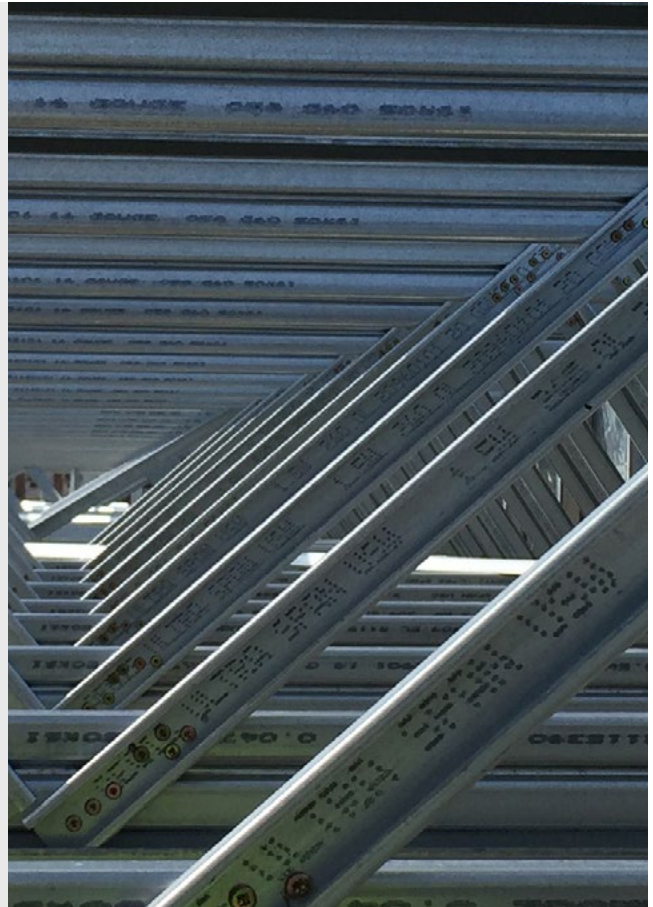


COST-EFFECTIVE

The strength and design flexibility of Ultra-Span® Roof Trusses are well suited for hotels, mid-rise office buildings, senior living, and other flat roof projects. With offsite fabrication, your project can save on yard space, waste removal, and storage space fees.

RELIABLE

The CFS truss industry was revolutionized in 1995 with MiTek's invention of Ultra-Span®. This proprietary truss system, and its companion design software, have become the most widely used CFS trusses in the commercial, institutional, and multi-family construction industries.



KEY BENEFITS

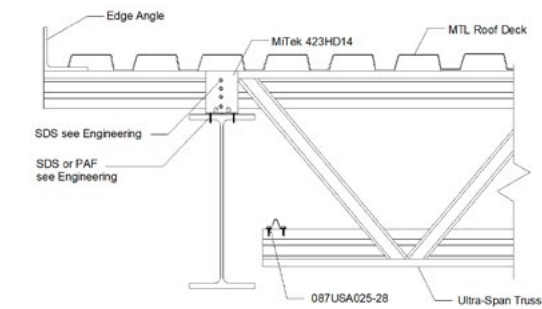
Ultra-Span® Roof Trusses provide many advantages over traditional construction materials such as bar joist, structural steel, and wood trusses. Unlike other flat roof systems that have limits to configurations and architectural detail, Ultra-Span® Roof Trusses can be easily fabricated with slopes for drainage, parapets, soffits, and other details, eliminating the added expense of field construction.

- Lightweight and non-combustible
- Quick delivery times
- One-sided fabrication
- Easy to add slope to control drainage
- Incorporate a mansard or parapet with no additional framing required
- Top or bottom chord bearing
- Bottom chord bearing reduces wall height, uses lighter CFS material, and fewer concrete masonry unit courses of concrete block
- Easily attach roof deck with mechanical fasteners
- Common fasteners at bearings including self-drilling screws and power-actuated fasteners
- User-friendly connection hardware
- Effectively support MEP and other trades
- Fabricated to exact dimensions

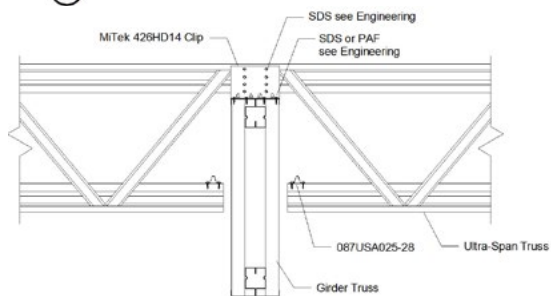


Span	Depth	Load	Spacing	Depth	Load	Spacing	Depth	Load	Spacing
ft	in	psf	ft	in	psf	ft	in	psf	ft
20	13.5	40	4.00	15.5	50	4.00	15.5	60	4.00
25	17.5	40	4.00	17.5	50	4.00	19.5	60	4.00
30	19.5	40	4.00	21.5	50	4.00	23.5	60	4.00
35	23.5	40	4.00	25.5	50	4.00	25.5	60	4.00
40	25.5	41	4.00	25.5	51	3.67	25.5	61	3.00
50	29.5	42	3.00	31.5	52	3.00	31.5	62	2.67
70	41.5	42	2.67	41.5	52	2.00	41.5	64	1.33

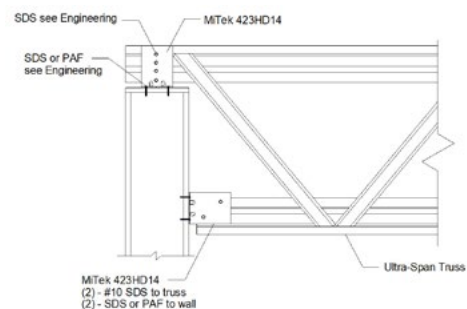
TYPICAL BEARING CONDITIONS



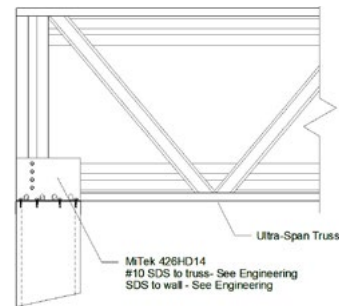
① TYPICAL CONNECTION @ WF BEAM



③ TYPICAL CONNECTION @ TRUSS GIRDER



② TYPICAL CONNECTION @ WF COL



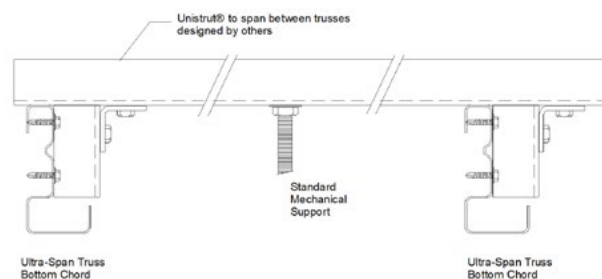
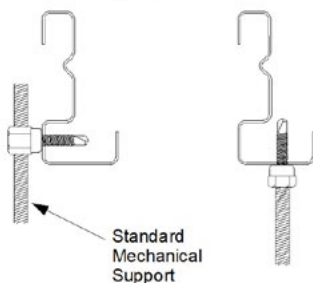
④ TYPICAL CONNECTION @ CFS WALL

SUPPORT MECHANICALS WITH STANDARD PRODUCTS

Ultra-Span Top Chord



Ultra-Span Bottom Chord



MiTek[®]

MII.COM/ULTRA-SPAN

COMMERCIAL SOLUTIONS

ULTRA-SPAN® FLOOR TRUSSES



ADDRESS THE CHALLENGES OF PROVIDING SOUND, COST-EFFECTIVE, COMFORTABLE FLOOR SYSTEMS

Enable your building to be stronger, longer-lasting, and more resilient for the duration of its life with the strength of our cold-formed steel (CFS) floor trusses and industry-leading design software. The proprietary Ultra-Span® CFS Floor Truss chord and web products enable efficient, cost-effective fabrication of an unlimited array of truss spans and profiles.



WHY ULTRA-SPAN® FLOOR TRUSSES

Ultra-Span® Floor Trusses provide the design flexibility, strength, and stability to address the challenges of providing a sound, cost-effective, and comfortable floor system.

Our team provides a full range of solutions and services for CFS floor trusses, including modeling and design software, a full line of engineering services, and proprietary connectors and bracing products.

KEY BENEFITS

- Lightweight and non-combustible
- Fully engineered
- Quick delivery times
- Off-site fabrication for faster installation with no waste
- UL fire-rated assemblies
- IIC and STC sound ratings
- Open web configuration for ease of MEP installation
- Depths as shallow as 12"
- Compatible with a wide variety of bearing materials and conditions
- Truss layout and blocking and bracing details
- Custom designs, including loading conditions specific to your project



PHYSICAL CHARACTERISTICS

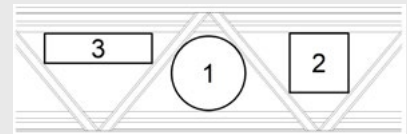
The chart below shows the typical spans for a variety of truss depths, spacing, and loads.

Truss Depth	TCLL = 40 psf				TCLL = 80 psf				TCLL = 125 psf			
	Truss Spacing				Truss Spacing				Truss Spacing			
	12"	16"	19.2"	24"	12"	16"	19.2"	24"	12"	16"	19.2"	24"
12"	26	25	22	20	21	18	18	16	17	16	14	13
14"	29	27	25	23	24	21	20	18	20	18	17	15
16"	33	32	28	26	28	24	22	20	22	20	19	17
18"	36	35	31	29	29	26	24	22	25	22	21	19
20"	40	37	34	31	32	29	27	25	27	24	22	21
22"	44	39	37	34	34	31	29	26	29	26	24	22
24"	47	42	39	36	37	33	31	28	31	28	26	24

TCDL = 10 psf and BCDL = 5 psf

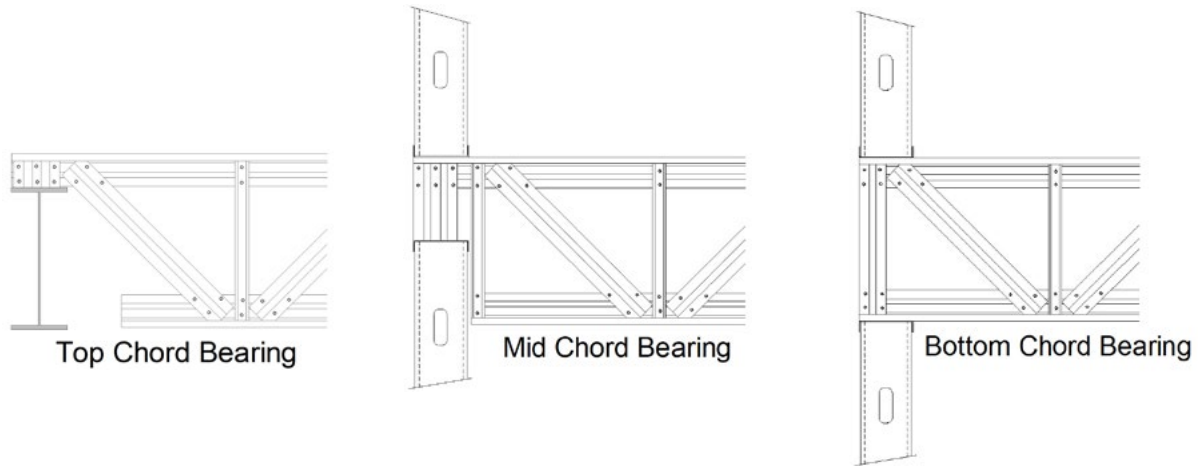
An added advantage is the available space within the truss cavity for MEP installation, as shown.

Truss Depth	Duct 1	Duct 2	Duct 3
12"	n/a	n/a	6" x 8"
14"	4"	6"	8" x 8"
16"	6"	8"	16" x 8"
18"	8"	10"	18" x 8", 12" x 10"
20"	10"	12"	22" x 8", 20" x 10"
22"	12"	14"	28" x 8", 16" x 12"
24"	14"	16"	32" x 8", 24" x 10"



Truss Depth	Duct 1	Duct 2	Duct 3
12"	n/a	n/a	n/a
14"	4"	6" x 6"	8" x 4"
16"	6"	6" x 6"	12" x 4", 8" x 6"
18"	8"	8" x 8"	12" x 6"
20"	10"	8" x 8"	12" x 8"
22"	12"	10" x 10"	16" x 6", 12" x 10"
24"	14"	12" x 12"	20" x 6", 16" x 8"





THE ULTRA-SPAN® TRUSS SYSTEM WAS THE FIRST CFS TRUSS SYSTEM TO ACHIEVE A ONE-HOUR AND TWO-HOUR FIRE RATING AND IS NOW THE FIRST TO COMPLETE SOUND TRANSMISSION TESTING SUCCESSFULLY

FIRE ASSEMBLY RATINGS

- UL G540 one and two hours, restrained and unrestrained
- Concrete on metal deck, one and two layers of 5/8" gypsum ceiling
- UL L565 one hour restrained
- Structural steel fiber floor, one layer of 5/8" gypsum ceiling
- UL L540 one hour unrestrained
- Wood floor, one layer of 5/8" gypsum ceiling

SOUND ASSEMBLY RATINGS

- STC 60, IIC 45
- Gypsum concrete floor, one layer of 1/2" gypsum ceiling
- STC 56, IIC 34
- Normal weight concrete, one layer of 1/2" gypsum ceiling

MiTek[®]

MII.COM/ULTRA-SPAN



section 05 44 00

Ultra-Span® Cold Formed Steel Trusses



STEEL

the new green

preserve . protect . inspire

"They are real innovators...
Service and Quality are
hallmarks of their success."*

The Innovative Solution: Pre-Fabricated Roof Trusses.

Computer - generated, factory - built Ultra-Span trusses are **THE** 100% non-combustible, "Green" solution for complex, architectually appealing structural roof systems in commercial/institutional construction.

Aegis Metal Framing is the leading supplier of technology enabled solutions to the cold formed steel building components industry.



Aegis provides a complete package of products and services to manufacturers of pre-fabricated cold formed steel trusses and wall panels, including:

- A full suite of estimating, design, fabrication, and management software
- Proprietary Ultra-Span® steel truss sections
- A complete line of connectors and accessories
- Full-service cold formed component and structure engineering

Aegis Metal Framing is a division of MiTek®, the world's largest supplier of products and software to the pre-fabricated building components industry. MiTek is a subsidiary of Warren Buffett's Berkshire Hathaway.

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How We Help You	10



The Paideia School | Atlanta, GA

- New \$10 million, 17,000 sq ft Tudor-inspired private school building
- First LEED Silver school project in Atlanta area
- Embraces sustainable, functional “living laboratory” concept with a large campus green space, and Geothermal field for heating/cooling
- 170 Ultra-Span steel trusses framed the roof, with 90% recycled content and 100% recyclable

LEED™ Credits

- Aegis Metal Framing can assist in achieving LEED credits for a building structure.
- With respect to the LEED program's Materials and Resources Credit 4.1 and 4.2, Recycled Content, all Aegis truss materials and accessories are produced from 100 percent prime steel with high percentages of pre-consumer and post-industrial recycled content value.
- In addition, depending upon the specific project location, opportunities may exist for credits under the Materials and Resources Credit 5.1 and 5.2, for Regional Materials.
- Aegis Metal Framing is proud to be a member of the U.S. Green Building Council. The USGBC has recognized cold formed steel framing as an important contributor to environmentally responsible, sustainable structures.

The Crossing, Phase 1 & 2 | San Bruno, California

“... exceeded my expectations, and I wouldn’t hesitate to work with their design staff on future projects...”

- Tom Castle, PE, Figgadent Waggener & Castle

- 350 unit, \$170 million apartment/condominium buildings built on former US Navy property near San Francisco International airport
- Originally designed as “stick built”—converted to Ultra-Span pre-fabricated trusses, 97,000 sq ft roof area, more than 4,000 individual trusses, and extensive lateral design for seismic and wind
- Tight job site required precise delivery sequencing between fabricator and installation contractor



Multi-Family

The Magic House | Saint Louis, MO

“They ensured all components fit as designed.”

- Tom Benning, Site Superintendent for Paric Construction

- Main body of the building required 48" on-center scissors trusses with extremely steep pitches on both the top and bottom chords
- Specially designed and fabricated trusses for the 20' diameter by 22' tall "hat"; pre-assembled and decked before lifted into place
- Won Innovative Engineering Design Challenge from the Cold Formed Structural Engineers Institute (CFSEI)



Institutional

Citizens Ball Park | Philadelphia, PA

“With real grass, angled seating, rooftop bleachers and a state-of-the-art design, Citizens Bank Park is destined to be a true fan favorite.” - Citizens Bank Park website

- Home of the Philadelphia Phillies
- \$458 million total project cost, 43,500 seats
- Unique Ultra-Span bow string truss designs with more than 300 individual trusses, built-in gutter trough at both overhangs, and special purlin connection clips for standing seam roof attachment



Sports/Recreation

Projects /Applications

Since 1993, Aegis Ultra-Span trusses have been utilized in hundreds of millions of square feet of commercial, institutional and multi-family construction, including:

- K-12 Education
- Military/Government
- Healthcare
- Offices
- Colleges/Universities
- Multi-Level Buildings
- Correctional Facilities
- Hotels
- Industrial
- Apartment/Condo
- Assisted Living

Building Strong, Sustainable

Trump Park Residences | Yorktown, New York



Senior Living

“Trump Park Residences is one of the most prestigious projects in which my company has participated.”

- Michael Kane, Kane Construction

- 141 unit, \$112 million active living adult community; Styled after the grand estates of the Hudson River Valley
- Massive, intricate Ultra-Span truss system presented monumental engineering challenges with 1,200 individual truss types and 2,300 total trusses, 500 hours total engineering time, girder trusses supporting main cupola designed for 15,000 pound point loads every four feet, and more than 30 truckloads of fabricated trusses

Marine Special Operations Command | Camp Lejeune, NC



Military/Government

“The military is spending billions of dollars to enhance and upgrade bases throughout the country. Much of this new construction utilizes cold formed steel trusses.”

- Bill Wiley, Military Projects Specialist

- New construction of 4 barracks and a HQ building
- Part of larger, 1 million sq ft, multi-phase development on 225 acres
- Phase consisted of 71,000 sq ft of trusses furnished and installed by Ultra-Span fabricator

Hillsdale Terraces Long Term Care | Oshawa, ON, Canada



Assisted Living

“The Terraces and its surrounding grounds are second to none.”

- Administrator Len Cserhati

- 300 bed facility located Northeast of Toronto
- 35,000 sq ft of pre-fabricated Ultra-Span Trusses
- Steep slope and long span (70 feet) trusses required “double piggybacking” for shipping and installation

Benefits of Ultra-Span® Cold Formed Steel Trusses

Ultra-Span® is the most widely used pre-fabricated, cold formed steel truss product on the market. Aegis provides the widest range of profiles to ensure a cost-effective solution - from the smallest mansard trusses to 80 foot plus clear spans.

- 100% non-combustible
- Incredible range of potential profiles and roof lines
- Pre-Engineered, factory-built for quality and precision
- Complete line of connectors, clips and installation products
- Supported by state-of-the-art estimating and design software

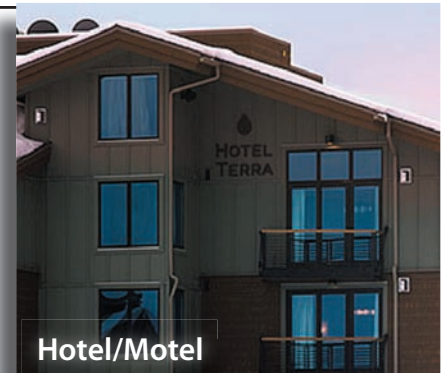
able Structures...

Hotel Terra | Jackson Hole, WY

“On the upper floors of the building we used pre-fabricated systems ...we realized how much faster it would go up and how much energy it would save.”

- Ryan Schoen, Vice President Development, Terra Resort Group

- 6 story, 72 room boutique hotel and ski lodge
- LEED certified project with pre-fabricated cold formed steel components, local natural stone, low VOC paint and double pane, argon-filled windows along with two pipe zoned heating and cooling
- Property-wide recycling and organic products program



Hotel/Motel

Cape Coral RO Water Treatment Plant | Cape Coral, FL

“Excellent. They are real pros.”

- Mike Brown, PM, Poole and Kent, on the Ultra-Span fabricator

- Large new water treatment facility with a total of 5 buildings utilizing Ultra-Span trusses, heavy gauge metal deck, and standing seam metal roof
- 20 foot tall, 92 foot clear span trusses built in 3 sections and field assembled on specially built jigs
- Installer fabricated a special 60 foot spreader bar to hoist the 1,500 pound trusses in to place



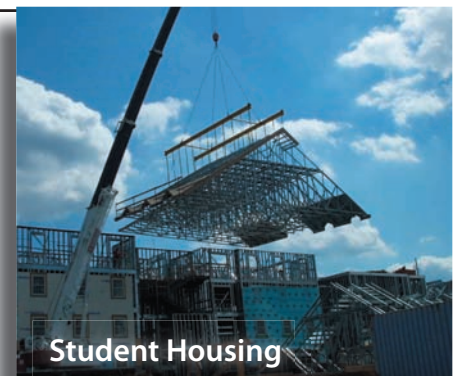
Infrastructure

Bloomsburg University Student Housing | Bloomsburg, PA

“The actual lifting and fastening of the pre-fab sections only took two days per building. We figure we cut 2 weeks or more out of each building with this rafting technique.”

- Tim Clark, Zartman Construction

- \$30 million, 200,000 sq ft new dormitory for 540 students
- 1,600 individual Ultra-Span trusses, many with built in “cat walk” space
- Safer, faster, more cost effective installation with trusses pre-assembled in sections and “rafted” in to place



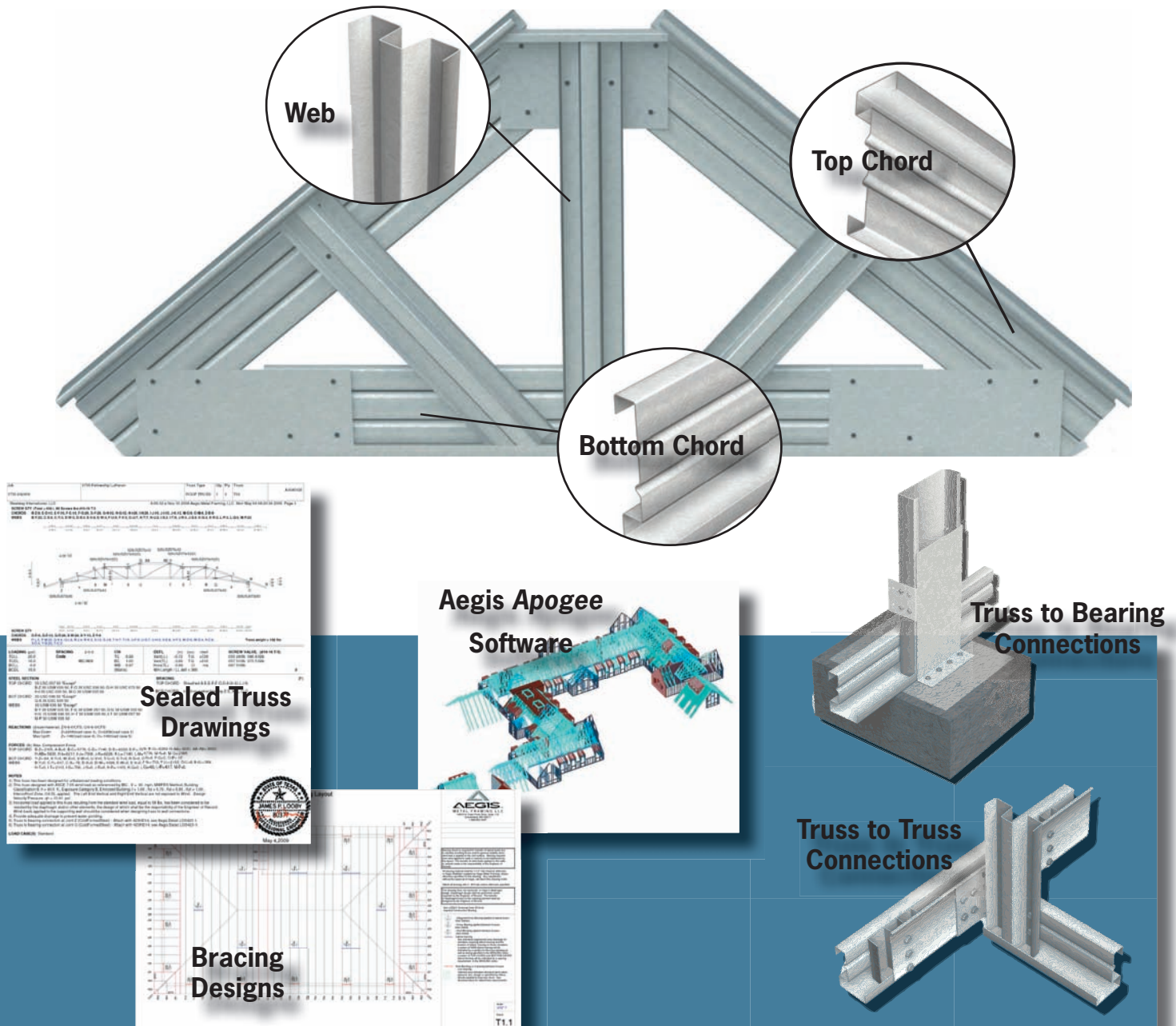
Student Housing

Benefits of Ultra-Span® Cold Formed Steel Trusses

Ultra-Span® is the most widely used pre-fabricated, cold formed steel truss product on the market. Aegis provides the widest range of profiles to ensure a cost-effective solution - from the smallest mansard trusses to 80 foot plus clear spans.

- Distributed via nation-wide network of authorized Aegis fabricators
- Complete truss system engineering, including all bracing, connections and installation documents
- Multiple UL® assemblies available
- 100% Prime Steel
- High recycled content assists towards LEED credits

The Complete Truss Package



Elements of a Complete System - Comparing Steel Truss Proposals

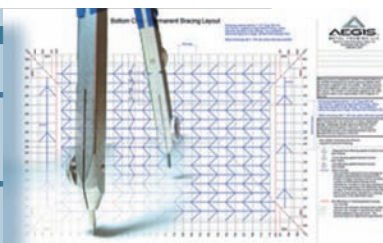
Architects and contractors evaluating truss proposals must be sure the following key elements are provided for by the fabricator and/or engineer of record:

- **Sealed Truss Drawings:**
Provided by the truss fabricator and their engineering supplier (Aegis Metal Framing)
- **Sealed Truss to Truss and Truss to Structure Connections:**
Provided by the truss fabricator and their engineering supplier
- **Permanent Bracing Design:**
Typically the responsibility of the engineer of record, but can also be provided by the truss fabricator and their engineering supplier
- **Bent Metal:**
For hip, ridge, valley, and eaves. Typically provided by the truss fabricator
- **Shear Transfer Framing:**
If required, typically provided by the truss fabricator and their engineering supplier, based on loads provided by the engineer of record.
- **Truss Placement Plan:**
Provided by the truss fabricator

Aegis professional engineers are licensed in all 50 states and all the Canadian provinces. We offer our fabricators and the building design team responsive, cost-effective, certified engineering solutions in all these areas:

- Truss drawings
- Bracing Design
- Shear transfer framing
- Truss connections
- Truss repairs
- Complete cold formed structures

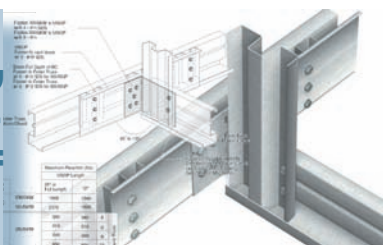
Engineering



Aegis Metal Framing offers a complete line of truss to truss and truss to structure connectors and engineered details. Building designers can reference these details for attaching Ultra-Span trusses to a wide range of structures, including cold formed steel, concrete, CMU, and structural steel.

For more details or a downloadable version of these drawings (PDF, DWG, DXF), please visit our website at <http://www.aegismetalframing.com/Technical/Detail-Library.html>

Details



Specifying Aegis Ultra-Span trusses is just a few clicks away. Just go to our easy to use **Specification Creator**, <http://www.aegismetalframing.com/Technical/Specification-Creator.html>, select "Cold Formed Steel Trusses" and then click on the state in which your project will be built. A full 3-part, section 05 44 00 specification will be created, complete with local Aegis fabricators serving the project area. It's THE easiest way to spec cold formed trusses and identify prospective suppliers!

Specifications



Aegis Ultra-Span trusses offer a number of unique fire resistance assemblies tested and certified by Underwriters Laboratory. These assemblies require only one layer of 5/8" Type C drywall to achieve 1 and 1-1/2 hour ratings vs. two layers or more for wood trusses.

For downloadable versions (Word, PDF) of our cost-effective UL assemblies, please visit our website at <http://www.aegismetalframing.com/Technical/UL-Assemblies.html>.

UL Assembly



Aegis Metal Framing offers useful tools for the complete building process, from estimating to final product. Also, look for our new, comprehensive Technical Resource Binder and design aid.

Architects, engineers, and contractors can find a comprehensive array of product support, educational tools, and training online at www.aegismetalframing.com.

Resources



Value Engineering Services to Reduce Costs

Aegis Metal Framing works hand-in-hand with our fabricator partners to ensure the best-cost solution for non-combustible roof framing needs. Value engineering services include:

- Optimization analysis of truss spacing
- Steel content (and cost) minimization
- Multiple bracing and installation options
- Alternative decking/roofing material selection
- Scope review and competitive quote analysis—making sure all necessary truss system elements are accounted for
- Alternate connection products/details
- Specification review and analysis
- Truss staging/delivery schedule optimization

Architects/Engineers



Contractors/Sub-Contractors



Fabricators/Installers



- Preliminary truss design evaluation—we can help you determine if cold formed steel trusses are the right solution for your roof framing project
- Specification support - our local representatives can assist you in developing a proper cold formed steel specification. Or, you can access our easy-to-use online **Specification Creator**.
- Fire resistant assemblies - Our cost-effective one-layer, one-hour UL® roof and ceiling assemblies offer design flexibility
- Engineering and Technical support - Our staff of licensed professional engineers is available to answer your most challenging cold formed truss and panel inquiries.
- Continuing education credits available on-line or a scheduled office presentation.

- Cost-effective solutions—The Aegis Ultra-Span® system is the most competitive cold formed steel truss system available.
- Local fabricator support—Aegis will put you in touch with our authorized fabricators serving your area. You can also access our easy-to-use Fabricator Locator on-line.
- Technical and training tools—our print and online technical resources can help you and your installers achieve an on-time, on-budget performance
- Truss installation aids—you can purchase all your truss clips and connectors, including the industry's only truss spacer/brace all in one, The Stabilizer™, through an authorized Aegis fabricator

- The most cost-effective designs. Typically, Ultra-Span® designs will use 15 to 30% less steel than competitive systems, offering substantial savings to you and your contractor customers
- Comprehensive design software. The Aegis suite of software can assist you in designing all the elements of a totally cold formed steel framed structure
- A complete range of cold formed steel products Ultra-Span® trusses, TradeReady® joists, and a full line of studs, track, furring channel and accessories. Aegis is the one-stop shop for your cold formed truss and panelization needs.
- Professional engineering services. Our staff of licensed professional engineers can handle all your cold formed steel truss, joist, and panel design requirements.

Join Our Online Network/Community

We have a growing online network and community of building professionals nationwide because we provide the latest information, educational opportunities, and design solutions. We provide resources to assist you in designing sustainable buildings with cold formed steel trusses combined with value engineering to improve your bottom line. You can find us in the following online and print communities:

- Facebook
- YouTube
- Linked In
- Twitter
- Arcat.com
- 4Specs.com
- Blue Book
- Structural Engineer
- Walls and Ceilings
- Metal Architecture
- DesignandBuildwith-Metal.com
- Environmental Design and Construction
- ... and much more...

Solutions We Offer: **Preserve the Environment** **Protect Humanity** **Inspire Design**

Partnering with Aegis and our fabricators means unbeatable quality for your next building project. We take pride in providing a quality product at an attractive price point, delivering the greatest value to the entire building team. And, our extensive professional engineering services will help ensure your project is fabricated to meet all applicable building codes.

Our fabricators can provide a complete system of pre-fabricated cold formed steel trusses, wall panels and floor joists to meet all your framing needs. These factory-built systems allow speedy installation, saving time and money.

When you choose Aegis products you are choosing the most widely used proprietary cold formed steel systems in the market. As the largest provider of such products, Aegis and our fabricators can give you peace of mind that our structural systems have been installed in hundreds of millions of square feet of commercial, institutional, and residential construction.

Serving the Marketplace: **Authorized Fabricators Throughout North America**

Aegis products are marketed throughout North America by an independent network of authorized fabricators. These fabricators specialize in estimating, designing, and manufacturing cold formed trusses and panels for the commercial, institutional, and multi-family markets.

Please visit www.aegismetalframing.com to locate our fabricators serving your market.

Preserve Protect Inspire

As a leading provider of “green” building products and a supporter of the US Green Building Council and its initiatives, Aegis Metal Framing likes to “practice what we preach.” Our focus on the environment includes:

- Barge shipping raw materials to reduce diesel consumption by 400,000 gallons per year
- Recycling 100% of our manufacturing waste and scrap
- Low energy lighting in our manufacturing facility
- Company wide recycling program
- Extensive use of electronic media and communication to reduce paper consumption

As part of our commitment to environmental stewardship, this catalog is printed on 30% recycled paper with soy based ink.



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Twitter: www.twitter.com/Aegis_UltraSpan