

ADDENDUM NO. 3
March 04, 2026

NOTICE TO BIDDERS OF PROJECT NO. 20223
RAY WILLIAMSON POOL IMPROVEMENTS – PHASE 2

Attention is called to the following items effective per date of this addendum.
This addendum shall become part of the Contract Documents and modifies the original Bidding Documents for Project No. 20223
Bainbridge Island Metro Park & Rec District: Ray Williamson Pool Improvements
Acknowledge receipt of this Addendum by inserting its number in the space provided on the Bid Form.
Failure to do so will be subject the Bidder to disqualification.

Please incorporate the following revisions to the Specifications and Contract Drawings:

Refer to the following Attachments for descriptions of additional addenda items that pertain to this project.

ATTACHMENTS

DRAWINGS:

1. Sheet C-1.0	DRAINAGE PLAN	1 page
2. Sheet A-0.3	ALTERNATE 1 WATER -DIVERSION	1 page
3. Sheet AD-1.0	POOL DEMOLITION PLAN	1 page
4. Sheet A-1.0	POOL PLAN	1 page
5. Sheet A-1.1	POOL EQUIPMENT PLAN	1 page
6. Sheet A-1.3	REFLECTED CEILING PLAN	1 page
7. Sheet A-2.0	EXTERIOR ELEVATIONS	1 page
8. Sheet A-5.0	SCHEDULES	1 page
9. Sheet SD-1.0	1 ST FLOOR DEMO PLAN	1 page
10. Sheet SD-3.0	DEMO DETAILS	1 page
11. Sheet S-1.0	1ST FLOOR POOL DECK AND SLAB PLAN	1 page
12. Sheet S-3.0	DETAILS	1 page
13. Sheet S-3.3	DETAILS	1 page
14. Sheet M0.1	MECHANICAL GENERAL NOTES AND LEGENDS	1 page
15. Sheet M0.3	MECHANICAL POOL SCHEDULES	1 page
16. Sheet MD2.1	FIRST FLOOR MECHANICAL DEMOLITION PLAN	1 page
17. Sheet M4.0	FIRST FLOOR PIPING PLAN	1 page
18. Sheet M4.1	FIRST FLOOR MECHANICAL PLAN	1 page
19. Sheet M5.0	MECHANICAL ROOF PLAN	1 page

SPECIFICATIONS

1. Section 08 71 00 Door Hardware	17 pages
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2. Section 13 11 03 Swimming Pool Plaster	6 pages
3. Section 23 05 93 Testing, Adjusting, and Balancing	12 pages
4. Section 23 07 12 Duct Insulation.pdf	7 pages
5. Section 23 08 00 Commissioning of HVAC.pdf	3 pages
6. Section 23 33 00 Air Duct Accessories.pdf	6 pages
7. Section 23 34 16 Centrifugal HVAC Fans.pdf	4 pages
8. Section 23 37 13.23 Registers and Grilles.pdf	2 pages

CHANGES TO SPECIFICATIONS:

DIVISION 00:

S1: SECTION 00 11 00 TABLE OF CONTENTS, Volume 2, Division 02 through 33,

ADD the following specification sections to DIVISION 23—Heating, Ventilation, and Air Conditioning:

- a) Section 23 05 93 Testing, Adjusting, Balancing
- b) Section 23 07 12 Duct Insulation
- c) Section 23 08 00 Commissioning of HVAC
- d) Section 23 33 00 Air Duct Accessories
- e) Section 23 34 16 Centrifugal HVAC Fans
- f) Section 23 37 13.23 Registers and Grilles

DIVISION 01:

S2: SECTION 01 23 00 BASE BID AND OPTIONAL FORMS, Part 1 - General, 1.04 Schedule of Optional Bid items, **ADD** item:

“A. ADDITIVE Alternate No. 1: At Ray Williamson Pool Building, grade and install waterproofing and drainage at the exterior west and south sides. Refer to Drawings and Specifications (including all Addenda) for additional detail. Coordinate with all other trades to provide a complete and functional installation.”

DIVISION 08:

S3: **DELETE** Section 08 71 00 Door Hardware and **REPLACE** with Section 08 71 00 Door Hardware in its entirety, attached in Addendum No. 3 herein.

DIVISION 13:

S4: **DELETE** Section 13 11 03 Swimming Pool Plaster and **REPLACE** with Section 13 11 03 Swimming Pool Plaster in its entirety, attached in Addendum No. 3 herein.

DIVISION 23:

S5: Under DIVISION 23, **ADD** the following sections, attached in Addendum No. 3 herein:

- A. **ADD** “Section 23 05 93 Testing, Adjusting, and Balancing” in its entirety.
- B. **ADD** “Section 23 07 12 Duct Insulation” in its entirety.
- C. **ADD** “Section 23 08 00 Commissioning of HVAC” in its entirety.
- D. **ADD** “Section 23 33 00 Air Duct Accessories” in its entirety.
- E. **ADD** “Section 23 34 16 Centrifugal HVAC” Fans in its entirety.
- F. **ADD** “Section 23 37 13.23 Registers and Grilles” in its entirety.

DIVISION 26:

S6: SECTION 26 05 26 GROUNDING AND BONDING, Part 3 - Execution, 3.02 Grounding, **ADD 3.02 D** to read:

“Grounding for swimming pool area and accessories shall comply with NEC Article 680. All swimming pool fittings, handrails, and accessories installed in the pool deck within five feet (5ft) horizontally and twelve feet (12ft) vertically of the pool wall must be bonded to the main bonding grid using a solid copper conductor (minimum 8 AWG) to prevent electrical shock. Refer to Sheet E-4.0 in the drawings. #8 AWG is the minimum size for solid copper conductors per NEC requirements. Provide a larger solid copper conductor where larger sizes are indicated on Swimming Pool Grounding Detail on Sheet E-4.0.”

CHANGES TO DRAWINGS:

C: CIVIL

- 1. **DELETE** sheet C-1.0 DRAINAGE PLAN ALTERNATE 1 and **REPLACE** with sheet C-1.0 Drainage Plan Alternate DRAINAGE PLAN ALTERNATE 1, attached in Addendum No. 3 herein.

A: ARCHITECTURAL

- 1. **DELETE** sheet A-0.3 SITE PLAN ALTERNATE 1 WATERPROOFING and **REPLACE** with sheet A-0.3 SITE PLAN ALTERNATE 1 WATER DIVERSION, attached in Addendum No. 3 herein.
- 2. **DELETE** sheet AD-1.0 POOL DEMOLITION PLAN and **REPLACE** with sheet A-0.3 AD-1.0 POOL DEMOLITION PLAN, attached in Addendum No. 3 herein.
- 3. **DELETE** sheet A-1.0 POOL PLAN and **REPLACE** with sheet A-1.0 POOL PLAN, attached in Addendum No. 3 herein.
- 4. **DELETE** sheet A-1.1 POOL EQUIPMENT PLAN and **REPLACE** with sheet A-1.1 POOL EQUIPMENT PLAN, attached in Addendum No. 3 herein.
- 5. **DELETE** sheet A-1.3 REFLECTED CEILING, PLAN and **REPLACE** with sheet A-1.3 REFLECTED CEILING PLAN, attached in Addendum No. 3 herein.
- 6. **DELETE** sheet A-2.0 EXTERIOR ELEVATIONS and **REPLACE** with sheet A-2.0 EXTERIOR ELEVATIONS, attached in Addendum No. 3 herein.
- 7. **DELETE** sheet A-5.0 SCHEDULES and **REPLACE** with sheet A-5.0 SCHEDULES, attached in Addendum No. 3 herein.

STRUCTURAL

1. **DELETE** sheet SD-1.0 1ST FLOOR DEMO PLAN and **REPLACE** with sheet SD-1.0 1ST FLOOR DEMO PLAN, attached in Addendum No. 3 herein.
2. **DELETE** sheet SD-3.0 DEMO DETAILS and **REPLACE** with sheet SD-3.0 DEMO DETAILS, attached in Addendum No. 3 herein.
3. **DELETE** sheet S-1.0 - 1ST FLOOR POOL DECK AND SLAB PLAN and **REPLACE** with sheet S-1.0 - 1ST FLOOR POOL DECK AND SLAB PLAN, attached in Addendum No. 3 herein.
4. **DELETE** sheet S-3.0 DETAILS and **REPLACE** with sheet S-3.0 DETAILS, attached in Addendum No. 3 herein.
5. **DELETE** sheet S-3.3 DETAILS and **REPLACE** with sheet S-3.3 DETAILS, attached in Addendum No. 3 herein.

M: MECHANICAL

1. **DELETE** Sheet M0.1 Mechanical General Notes and Legend and **REPLACE** with sheet M0.1 Mechanical General Notes and Legend attached in Addendum No. 3 herein.
2. **DELETE** Sheet M0.3 Mechanical Pool Schedules and **REPLACE** with sheet M0.3 Mechanical Pool Schedules attached in Addendum No. 3 herein.
3. **DELETE** Sheet MD2.1 First Floor Mechanical Demolition Plan and **REPLACE** with sheet MD2.1 First Floor Mechanical Demolition Plan attached in Addendum No. 3 herein.
4. **DELETE** Sheet M4.0 First Floor Piping Plan and **REPLACE** with sheet M4.0 First Floor Piping Plan attached in Addendum No. 3 herein.
5. **ADD** Sheet M4.1 FIRST FLOOR MECHANICAL PLAN in its entirety.
6. **ADD** Sheet M5.0 MECHANICAL ROOF PLAN in its entirety.

PRE-BID QUESTIONS:

Q1: Who is responsible for decommissioning the two existing monitoring wells, PG-1 and PG-2, or do these wells need to be protected and remain?

A1: *The wells would be decommissioned during construction by the dewatering contractor. Wells PG-1 and PG-2 do not need to remain unless the dewatering contractor wants to use them for groundwater monitoring levels during dewatering.*

Q2: Per specification section 03 01 30 Engineer shall define area of removal as shown on the drawings. It appears that there are two areas noted on drawing S1.0 (note #1), is it possible to get a better detail of the area or square footage of the repair at each location?

A2: *Approximately 8 sf, total. See revised sheet S1.0, attached in Addendum No. 3 herein.*

Q3: Please clarify where specification section 03 65 13 Chemical Grouting is applicable, I do not see this work identified anywhere in the drawings?

A3: *This specification was included for an 'as needed' basis, no specific areas known.*

Q4: Are the Safety Rails below the Glu-lam beams to be aluminum rails per spec section 05 73 00?

A4: *Yes, safety rails below glue-lam beams shall be aluminum per spec section 05 73 00.*

Q5: The location of the Footing Drains and Waterproofing for Alternate #1 differs between Sheet C1.0 and Sheet A0.3, please clarify which is correct?

A5: *See revised sheets A-0.3 and C-1.0, attached in Addendum No. 3 herein.*

Q6: Details 2 & 3 Sheet A0.3 shows the EPDM extending 3'-0" below slab, turning, and running horizontally, please provide clarification on how far the EPDM is to extend horizontally.

A6: *Extend EPDM 18 inches horizontally.*

Q7: Per Sheet A0.3 detail #2 covers the whole west side waterproofing, Detail #2 shows installation at the patio edge, but a large portion of the waterproofing is outside the patio area in dirt, how is this work to be accomplished at that location?

A7: *See revised sheets A-0.3, attached in Addendum No. 3 herein.*

Q8: Per General Note #2 on Sheet AD1.0 we are to protect existing Natatorium equipment. Can you please provide a list of equipment the owner will remove and a list of equipment which will remain and need to be protected during construction?

A8: *Owner will remove starting blocks, polo equipment, swim club equipment, bleachers, and other items in the storage areas for access.*

Contractor to protect new lights, water fountain, any fire sensors, and HVAC intake during construction.

Q9: Is there any information on the existing thickness if the existing pool fiberglass liner to be removed?

A9: *A core sample taken prior to this project work indicates that the existing plaster liner is 1-2" thick.*

Q10: Is there any information on the existing thickness, material, assembly of the pool basin where it is to be removed for new drains and piping?

A10: *A previous core sample taken prior to this project work indicates the pool basin material is composed of fiberglass coating over 1-2" of plaster, adhered to a gunite pool basin. The core sample did not include thickness of the pool basin; however, assumptions based on visual observation only indicates the thickness of basin may be approximately 6 inches.*

Q11: On Sheet A1.0 there is a Keynote #4 on the West patio pointing to the fence, this appears to be an incorrect callout as Note #4 is for interior handrails. Please clarify?

A11: *Note #4 on west patio was a typo; discard note at this location. See revised sheets A-1.0, attached in Addendum No. 3 herein.*

Q12: Per Sheet A1.1, Special Note #1 we are to provide inserts and anchors and blocking for all existing fixtures to be reinstalled. Please provide information on existing fixtures to be installed, type of fixture mount/insert required, and number amount of inserts to be provided.

A12: There are 6 starting block anchors and 4 handrail anchors/ inserts. Ref. Sheet A1.1 and spec section 13 11 00 Specialty Facility Components.

Q13: Sheet A1.3 shows removing and replacing acoustical ceiling at north end of the natatorium (gridline 1), this appears to be an ACT soffit (bottom & side) not ceiling tiles like other two locations. Can you please provide vertical dimensions of this soffit face?

A13: Soffit dimension is 4'-1/2" x 12".

Q14: The ACT details on Sheet A1.3 only cover suspended grid, please provide detail for vertical section at soffit face along gridline 1.

A14: See sheet A-1.3 attached in this addendum for vertical soffit detail.

Q15: Detail 3/A3.0, 5/A3.0, 7/A3.0, appears to show new weather barrier wrapping existing glu-lam beam with flashings at Storefront Head and where glu-lam beam meets roof soffit, but no siding, is the weather barrier exposed in these locations, or is there some sort of siding?

A15: Weather barrier is covered by F.F. GSM flashing as shown in the details in Sheet A3.0.

Q16: Detail 7/A3.0 shows installing new weather barrier and flashings at exterior of new louver. This louver is completely enclosed and sealed by ductwork at this location, please advise how this should be installed, should ductwork be removed?

A16: The duct will be removed to install sounds traps at HVAC unit. Refer to mechanical documents this addendum. Flashings at louver can be installed during this work.

Q17: Sheet S1.3 calls for dowels where new sidewalk meets existing sidewalk at the West and East ends. Please provide detail on number of dowels, size of dowels, and embedment at these locations.

A17: Exterior expansion joint detail to include drill & epoxy condition at existing paving interface, see 3/S-3.3, attached in Addendum No. 3 herein.

Q18: Spec section 03 64 23 states repair of crack shall be performed on a unit cost basis, please provide a quantity of crack repair which should be included in the base bid.

A18: Most of the crack repair occurs at the steps/bleachers around the pool and in the storage/mechanical area. Assume approximately 80 lf of crack repair for slabs around 6" in depth.

Q19: Is Simpson SET3G an approved equivalent to Hilti HY-200 for epoxy adhesive anchors?

A19: Submit a substitution request for Simpson product.

Q20: Will the Parks Department be responsible for shutting down and purging the Gas Chlorine System so changes can be made to pipe? It is my understanding that this system can be lethal if there is an accidental release of chlorine gas.

A20: Owner will isolate and purge the Ray pool chlorine injector pump loop which is separate from the gas line. The owner will need the gas system in operation for the other pools. Gas chlorine system to be discussed in detail with owner once contractor selection is confirmed.

Q21: Keynote 11 AD-1.0 - DEMO (E) POOL FIBERGLASS LINER; DO NOT DAMAGE (E) PLASTER UNDERNEATH; PREP (E) PLASTER FOR NEW PLASTER LINER. FOR BIDDING PURPOSES, ASSUME A MINIMUM OF 300 SF OF PATCH/ REPAIR REQUIRED AT THE (E) PLASTER BASIN

- a. Is there a particular reason why the plaster layer underneath needs to be saved?
- b. There is no guarantee that this plaster layer won't be damaged during the fiberglass layer demolition.
- c. We do not know how well the new plaster will adhere to this existing plaster layer. This case differs from other overlay jobs because the fiberglass liner is installed over the existing plaster layer.
- d. Do we know how many plaster layers are underneath the fiberglass liner?

A21: 21a. Review of the existing condition suggests the existing plaster layer may be difficult to remove from the gunite basin; therefore, the existing plaster layer is to remain.

21b. Contract documents indicate repair/patch of the plaster and basin with bid quantity shown; Refer to AD1.0 and SD1.0, including addendum items.

21c. Refer to contract documents for adhesion test for the existing plaster.

21d. A core sample taken prior to this project indicates thickness of 1-2 inches of existing plaster beneath the fiberglass.

Q22: What goes in the blank highlighted section on the attached Bid Bond form?

A22: Use the name of the principal (bidder).

Q23: The epoxy injection and polyurethane injection scopes are called out in the specifications, but there are no quantities given. Is there an assumed LF you would like us to bid?

A23: Assume 100 L.F for epoxy injection; for polyurethane injection assume 20 L.F.

Q24: The concrete repair and galvanic anode installation & verification: this is a scope that is directly in our wheelhouse as well. However, there are no given quantities. Would you like a unit price for this as well? If so, I would like to price out a 2'x2' so that we can capture 15" O.C. frequencies for the anodes.

A24: Provide unit pricing; assume 8 S.F.

END OF ADDENDUM NO. 3

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Automatic operators.
 - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 01 Section "General Conditions".
 - 2. Division 06 Section "Rough Carpentry".
 - 3. Division 06 Section "Finish Carpentry".
 - 4. Division 08 Section "Operations and Maintenance".
 - 5. Division 08 Section "Hollow Metal Doors and Frames".
 - 6. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
 - 7. Division 08 Section "Automatic Door Operators".
 - 8. Division 26 Section "Electrical"
- D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 - 8. State Building Codes, Local Amendments.

- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.
 4. UL 305 - Panic Hardware.
 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and

special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures

- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check

Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.

- b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
 5. Manufacturers:
 - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
 2. Manufacturers:
 - a. Pemko (PE).

2.4 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Pulls shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
 6. Manufacturers:
 - a. Rockwood (RO).

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Match Facility Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent

markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.7 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.

2.8 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

- B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.9 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper

- fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide exit devices with functions and features as follows:
 - a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
 - b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
 - c. No catch points: addition of applied deflectors or other added components are not allowed.
 - d. No visible plastic.
 - e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
 - f. Constructed of all stainless steel.
 - g. Stainless steel pullman type latch with deadlock feature.
 - h. Narrow or wide style exterior trim as specified in the hardware sets.
 - i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
 - j. Ten-year limited warranty for mechanical features.
 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.

2.10 SURFACE DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 - a. Norton Rixson (NO) - 7500 Series.

2.11 ELECTROMECHANICAL DOOR OPERATORS

- A. Electromechanical Door Operators (High Traffic, Door Mounted, Regenerative): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that are ETL tested to UL325 and UL10C certified and comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 91% (plug-in) and 100% (wireless) when compared to similar products. Operators shall accommodate openings up to 250 pounds and 48" wide. Provide accessories such as custom templates, special mounting brackets, spacers and drop plates as needed for proper installation. Operators shall accommodate openings up to 200 pounds and 48" wide. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide operators with features as follows:
 - a. Non-handed with push and pull side mounting.
 - b. Regenerative drive or continuous duty operation.
 - c. Radio frequency stainless steel wall switches with integral radio frequency receiver.
 - d. Shock absorbing arm.

- e. Auxiliary activation input port and 24VDC input port.
 - f. Two-year limited warranty.
2. Operators shall have the following functionality:
- a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
 - b. Dynamic Braking: Braking or slowing of the door if excessive door speed occurs resulting from a wind load or an abusive open condition.
 - c. Emergency Interface Relay: Door closes and ignores any activation input until signal is discontinued. Only available when used with Wireless Interface Module.
 - d. Latch Assist: At closed position, after an activation, the door is pulled in. After the door has closed, the door is pulled in to assist with latch release/engagement.
 - e. Obstruction Detection: Door closes if it hits an obstruction while opening. Door will stop once it hits an obstruction and will rest against the obstruction until obstruction is removed.
 - f. On/Off Switch: Disables operator activation.
 - g. Open Delay: Delays operator opening for locking hardware. Only available when used with Wireless Interface Module.
 - h. Outside Wall Switch Disable: When contact is closed, outside wall switch is disabled. Only available when used with Wireless Interface Module.
 - i. Power Close: Additional force to assist door closing between 90° and 70° and 10° and 0°.
 - j. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
 - k. Single Relay Output: Closes to indicate a valid activation. Only available when used with Wireless Interface Module.
3. Manufacturers:
- a. Norton Rixson (NO) - 5800 Series.

2.12 ARCHITECTURAL TRIM AND ACCESSORIES

- A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1" less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide protective trim with functions and features as follows:
- a. Meets ADA requirements for smooth bottom door surfaces.
 - b. UL Classified options for use on fire-rated doors up to 3 hours.
 - c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
 - d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
 - e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
 - f. Fasteners included; adhesive-backed options available for select models.
 - g. Ten-year limited warranty.

2. Manufacturers:
 - a. Rockwood (RO).

2.13 DOOR STOPS AND HOLDERS

- A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Rockwood (RO).
- B. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (NO).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. Pemko (PE).

2.15 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

Hardware Sets

Set: 1.0

Doors: 3, 4

Description: Exterior Alum. Single - Exit Device-Nightlatch function, Closer, Overhead Stop

1	Continuous Hinge	CFM__SLF-HD1-M		PE
1	Rim Exit Device, Nightlatch	PED4257T K157ET C6 x Clear Powder Coat (SPAR #_____)	630	RU
1	Offset Door Pull	BF158	US32D-316	RO
1	Conc Overhead Stop (Alum Storefront)	6-X36	630	RF
1	Door Closer	PR7500 (7788 6891 as required)	600x689	NO
1	Gasketing	by door mfg.		
1	Sweep	18062CNB		PE
1	Threshold	158A MSES25SS		PE

Notes: Exit device requires a minimum door stile of 4-1/2".

Set: 2.0

Doors: 6

Description: Interior Alum. Pair - Auto Operator, Exit Devices-Nightlatch function,Closer, Overhead Stops

2	Continuous Hinge	CFM__SLF-HD1-M		PE
1	Concealed Vert Rod Exit	PED4850T PED159 C6 x Clear Powder Coat (SPAR #_____)	630	RU
1	Concealed Vert Rod Exit, Exit Only	PED4801 EO x Clear Powder Coat (SPAR #_____)	630	RU
2	Offset Door Pull	BF158	US32D-316	RO
2	Conc Overhead Stop (Alum Storefront)	6-X36	630	RF
1	Door Closer	PR7500 (7788 6891 as required)	600x689	NO
1	Automatic Opener	5845xWIM	600x689	NO ↘
1	Gasketing	by door mfg.		
2	Sweep	315CN		PE
1	Threshold	Per Detail		PE
2	Wall Switch	700		NO ↘

Notes: Exit device requires a minimum door stile of 4-1/2".

Operation description:

1. Doors normally closed and secure. Exit device latches can be held retracted when Auto Operator is in use.

3. ADA access by actuator switch.
4. Egress free for immediate exit. While exit device latches are held retracted, ADA egress by actuator switch.
5. Keyed cylinder override for emergency access.

Set: 3.0

Doors: 5

Description: Interior Alum. Pair - Exit Devices-Nightlatch function, Closers, Overhead Stops

2	Continuous Hinge	CFM__SLF-HD1-M		PE
1	Concealed Vert Rod Exit	PED4850T PED159 C6 x Clear Powder Coat (SPAR #_____)	630	RU
1	Concealed Vert Rod Exit, Exit Only	PED4801 EO x Clear Powder Coat (SPAR #_____)	630	RU
2	Offset Door Pull	BF158	US32D-316	RO
2	Conc Overhead Stop (Alum Storefront)	6-X36	630	RF
2	Door Closer	PR7500 (7788 6891 as required)	600x689	NO
1	Gasketing	by door mfg.		
2	Sweep	315CN		PE
1	Threshold	Per Detail		PE

Notes: Exit device requires a minimum door stile of 4-1/2".

Set: 4.0

Doors: 1, 2

Description: Interior Single - Entrance Lockset, Closer

3	Hinge, Full Mortise	TA2314 (NRP)	US32D	MK
1	Entrance Lock	ML2054 PSA C6 x Clear Powder Coat (SPAR #_____)	626	RU
1	Surface Closer	7500 / P7500 mounting as required	600x689	NO
1	Kick Plate	K1050 10" high BEV CSK	US32D-316	RO
1	Wall Stop	409	US32D	RO
1	Gasketing	S88BL		PE

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide a proprietary aggregate plaster finish, Diamond Brite, to the pool structures. A ceramic tile trim shall be furnished and installed on the pool perimeter tile band, vertical tile band, floor, walls, stairs, nosings, depth markings, wall targets, floor lane markings and all other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- B. Provide water analysis and pre-fill requirements.

1.02 REFERENCES

- A. ASTM International
 1. ASTM D7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
 2. ASTM C150 – Standard Specification for Portland Cement
 3. ASTM C206 – Standard Specification for Finishing Hydrated Lime

1.03 SUBMITTALS

- A. Samples
 1. Prepare 12-inch square panel at the site showing color and texture for pool plaster. Finished plaster work shall match the approved sample panel.
- B. Certificates
 1. Submit certificates attesting that the materials furnished meet the requirements specified herein.
- C. Test Reports
 1. Submit results of domestic water analysis and calculation of amounts of chemicals required to balance pool water on initial fill of pool.
 2. Report results from adhesion testing of existing plaster finish to concrete substrate per ASTM D7234.

1.04 PRODUCT DELIVERY AND STORAGE

- A. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep cementitious materials dry until ready to be used and stored off the ground, under cover and away from damp surfaces.

1.05 JOB CONDITIONS

- A. Apply plaster in swimming pool only when ambient temperature is above 40 degrees F and below 90 degrees F, and protect applied plaster from rapid drying by sun or wind until curing is completed or pool is filled with water. Confirm and comply with all applicable manufacturers installation requirements.

1.06 QUALITY ASSURANCE

- A. Plaster installers shall have two years' experience in similar pool projects which the Owner may require written proof thereof and proper tools to install plaster.

PART 2 – PRODUCTS

2.01 GENERAL MATERIALS AND REQUIREMENTS

- A. Portland Cement
 - 1. ASTM C150, type I white Portland cement.
- B. Hydrated Lime
 - 1. ASTM C206, type S.
- C. Aggregates for Conventional Pool Plaster Finish Coat
 - 1. White marble aggregates uniformly graded within following limits, all passing the no. 30 sieve (percentage retained (by weight plus or minus 2%) on each sieve):

<u>Sieve Size</u>	<u>Minimum</u>	<u>Maximum</u>
No. 30	0	0
No. 50	25	50
No. 100	75	90
No. 200	90	100

- D. Water
 - 1. Clean, fresh, from domestic potable source.
- E. Bonding Agent
 - 1. A multicoat scratch coat system super bonding, synthetic resin modified cementitious bond coating is to be provided. As manufactured by Multicoat Corporation, or approved equal.
- F. Proportions and Mixing
 - 1. Materials are specified on a volume basis and shall be measured in approved containers which will ensure that the specified proportions will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels ("shovel count") is not permitted.
 - 2. Conventional White Marble Pool Plaster Finish Coat: Mix finish in proportion of one part by volume of white Portland cement to not more than two parts by volume of aggregates (specified white marble dust).
 - 3. Mixing
 - a. Perform mixing in approved mechanical mixers of the type in which quantity of water can be controlled accurately and uniformly. While mixer is in continuous operation, charge approximately 90% of estimated quantity of water, half of sand, all cement, and the other one-half of the sand into mixer in that sequence and mix thoroughly with remainder of water until mixture is uniform in color and consistency. Avoid excess mixing to prevent hasty solution of cement resulting in accelerated set. Discard plaster that has begun to set before it is used; re-tempering

is not allowed. Do not use any caked or lump materials. Completely empty mixer and mixing boxes after each batch is mixed and keep free of old plaster.

2.02 DIAMOND BRITE

- A. The CONTRACTOR shall install a slip-resistant proprietary plaster finish in the areas indicated on the drawings. Description: Diamond Brite finish shall be a blend of selected quartz aggregates and fortified white Portland cement. Color and texture shall be selected by the Architect. Confirm all installation requirements with the manufacturer.
- B. Surface Preparation
 - 1. Surface shall be structurally sound and free of any foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease or other foreign materials. Sound and remove all loose concrete to firm substrate. Surfaces shall be roughened by sand blasting, water jetting, shot blasting, scarifying, or grinding. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate shall be patched per manufacturer's recommendations. Lightly moisten walls and floors prior to application of Diamond Brite.
- C. Bond Coat
 - 1. Multicoat scratch coat system super bonding, synthetic resin modified cementitious bond coating. As manufactured by Multicoat Corporation, O.A.E.
- D. Mixing
 - 1. Thoroughly mix Diamond Brite to a homogeneous lump-free consistency using 1-1/2 to 2 gallons of potable water per 80 lb. bag.
- E. Application
 - 1. Diamond Brite shall be applied to a uniform thickness of 3/8" to 1/2" over the entire surface. The walls shall be scratch-coated followed by a finish coat. Material applied to the floor after the walls have been applied shall be accelerated to assure uniform setting time throughout the pool surface.
- F. Coverage
 - 1. Each 80 lb. bag shall cover approximately 25 square feet to a thickness of 3/8".
- G. Proprietary plaster finish is to be applied by a licensed applicator as approved by the manufacturer.

PART 3 – EXECUTION

3.01 PULL-OFF ADHESION TESTING

- A. Perform pull-off adhesion testing of the existing plaster coating per ASTM D7234 at three (3) locations within the pool with three (3) tests at each location, for a total of nine (9) tests. Two (2) of the test locations shall be on separate wall surfaces, and one (1) location shall be on the slab. The selected locations must be flat surfaces large enough to accommodate the

number of tests and spaced far enough within the test location area to accommodate the detaching apparatus.

- B. Score the existing plaster coating down to the surface of the concrete substrate using a core bit with an interior diameter equivalent to the round loading fixture, or the closest larger size available.
- C. Bond the loading fixture to the existing plaster coating to be tested with a two-part epoxy with a minimum bond strength of 2,500 psi.
- D. Refer to ASTM D7234 for the description of the appropriate testing apparatus and safety measures, testing method, surface preparation, test procedure, testing documentation, calculation of results, and reporting. In addition to the requirements noted above:
 - a. Provide test results in psi.
 - b. Ensure that all specimen substrate and successive layers within the sample are documented.
 - c. Ensure the failure layer for each sample is documented.
 - d. Retain all test samples for review by the Engineer.
- E. Anticipated tensile failures should be in the range of 200 to 500 psi.
- F. Approval by the Engineer is required before preparing the substrate for new plaster coating.

3.02 PREPARATION OF SURFACES AND BOND COAT

- A. Clean base surfaces of projections, dust, loose particles, grease, bond breakers, and foreign matter; make sufficiently rough to provide a strong mechanical bond. Wash entire concrete pool shell with acidic solution within 24 hours of plastering. Do not apply plaster directly to the surfaces of masonry or concrete that is coated with any acidic solution compound or similar agent until compound or agent is completely removed by water blasting. Thoroughly wash entire surface with 2,000 psi high-pressure water immediately prior to plastering. Wet cementitious base surfaces with a fine fog water spray to produce a uniformly moist condition and check screeds, pool equipment, and accessories for correct alignment before plastering is started. Do not apply plaster to base surfaces containing frost. Install temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.
- B. Scrub bond coat into the prepared concrete surface immediately prior to plastering. Use stiff bristle brush to ensure total coverage and penetration of the bond coat slurry.

3.03 APPLICATION OF PLASTER

- A. General
 - 1. Confirm all application requirements with the manufacturer. Apply finish plaster to the properly prepared substrate at the minimum thickness required by the manufacturer, but no less than 3/8-inch thickness at any location. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add

additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:

- a. Place cone on level, dry non-absorptive base plate.
- b. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release all air bubbles.
- c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.
- d. Place cone in a vertical position adjacent to freed plaster sample suing care not to jiggle base plate.
- e. Lay straightedge across top of cone being careful not to vibrate cone; measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.

B. Workmanship

1. Unless otherwise required by the manufacturer, apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another. Finish proprietary plaster as required by the manufacturer.

C. Curing

1. Curing plaster with fine fog water spray applied to finish coat as frequently as required to prevent dry- out of plaster. Keep plaster damp until pool is filled. Prevent damage or staining of plaster by troweling or curing.

D. Patching, Pointing, and Clean Up

1. Upon completion, cut out and patch loose, cracked, damaged, or defective plaster; patches matching existing plaster in texture, color, and finish, flush with adjoining plaster. Perform pointing and patching of surfaces and plasterwork abutting or adjoining any other finish work in a neat and workmanlike manner. If 10 percent or more of the pools plaster finish is found to be defective, the plaster shall be removed and replaced complete from all surfaces. Remove plaster droppings or spattering from all surfaces. Leave plaster surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

3.04 PRE-FILL SPECIFICATION

- A. Contractor shall employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date, and shall employ a swimming pool experienced water chemistry consultant to determine types and quantities of chemicals required to ensure calcium- balanced water immediately upon the completion of

water filling. Comply with commercial pool water filling requirements for water safety, chemical balance, filling methods, and infrastructure protection. Coordinate with Bainbridge Island Metropolitan Pool District Representatives prior to pool filling. Have on hand quantities of the chemicals as determine above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid are in addition to standard bromine/chlorine products and alkalizer/pH control products required elsewhere.

- B. The pool(s) shall not be plastered until directed by the Owner's representative and the filtration system and chlorination system are complete and ready for start-up. The Contractor shall supply all chemicals required for treatment of the pool water.
- C. The Contractor shall submit domestic water analysis to the Owner and/or Architect at least 2 weeks prior to filling the pool(s).

END OF SECTION

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. Testing, Adjusting, and Balancing of Air Systems:
 - a. Constant-volume air systems.
 - b. Natatorium Dehumidification
 - c. Natatorium Source Capture
 - d. DOAS System
 - e. VRF Systems
 - 2. Testing, adjusting, and balancing of condensate piping systems.
 - 3. Testing, adjusting, and balancing of equipment.
 - 4. Duct leakage tests verification.
 - 5. Pipe leakage tests verification.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.
- G. UFAD: Underfloor air distribution.

1.4 ACTION SUBMITTALS

- A. Sustainable Design Submittals:
 - 1. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
 - 2. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.5 INFORMATIONAL SUBMITTALS

- A. Certified TAB reports.
- B. Sample report forms.
- C. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.6 QUALITY ASSURANCE

- A. TAB Specialists Qualifications, Certified by AABC:
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
 - 2. TAB Technician: Employee of the TAB specialist and certified by AABC.
- B. TAB Specialists Qualifications, Certified by NEBB:
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB.
 - 2. TAB Technician: Employee of the TAB specialist and certified by NEBB.

- C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
 - 1. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."
- E. Code and AHJ Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

1.7 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 TAB SPECIALISTS

- A. Must carry NEBB Certification.
- B. Subject to compliance with requirements, engage one of the following:
 - 1. Neudorfer .
 - 2. Hardin and Sons
 - 3. Or Accepted equal.

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for HVAC to verify that they are properly separated from adjacent areas and sealed.
- F. Examine equipment performance data, including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.

- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainer baskets are installed and clean.
- L. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine operating safety interlocks and controls on HVAC equipment.
- P. Examine control dampers for proper installation for their intended function of isolating, throttling, diverting, or mixing air flows.
- Q. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

- A. Prepare a TAB plan that includes the following:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
 - b. Duct systems are complete with terminals installed.
 - c. Volume, smoke, and fire dampers are open and functional.
 - d. Clean filters are installed.
 - e. Fans are operating, free of vibration, and rotating in correct direction.
 - f. Variable-frequency controllers' startup is complete and safeties are verified.
 - g. Automatic temperature-control systems are operational.
 - h. Ceilings are installed.
 - i. Windows and doors are installed.
 - j. Suitable access to balancing devices and equipment is provided.
 - 2. Hydronics:
 - a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
 - b. Piping is complete with terminals installed.
 - c. Water treatment is complete.
 - d. Systems are flushed, filled, and air purged.
 - e. Strainers are pulled and cleaned.
 - f. Control valves are functioning in accordance with the sequence of operation.
 - g. Shutoff and balance valves have been verified to be 100 percent open.
 - h. Pumps are started and proper rotation is verified.
 - i. Pump gauge connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.

- j. Variable-frequency controllers' startup is complete and safeties are verified.
- k. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system in accordance with the procedures contained in AABC's "National Standards for Total System Balance" ASHRAE 111 NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Where holes for probes are required in piping or hydronic equipment, install pressure and temperature test plugs to seal systems.
 - 4. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 TESTING, ADJUSTING, AND BALANCING OF HVAC EQUIPMENT

- A. Test, adjust, and balance HVAC equipment indicated on Drawings, including, but not limited to, the following:
 - 1. Motors.
 - 2. Pumps.
 - 3. Fans and ventilators.
 - 4. Terminal units.
 - 5. Condensing units.
 - 6. Energy-recovery units.
 - 7. Heating and ventilating units.
 - 8. Variable-refrigerant-flow systems.

3.6 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' Record drawings duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.

3.7 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses close to the fan and prior to any outlets, to obtain total airflow.
 - c. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - 2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
 - 3. Review Contractor-prepared shop drawings and Record drawings to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 4. Obtain approval from Commissioning Authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
 - 1. Measure airflow of submain and branch ducts.
 - 2. Adjust submain and branch duct volume dampers for specified airflow.
 - 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
 - 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 - 2. Measure inlets and outlets airflow.
 - 3. Adjust each inlet and outlet for specified airflow.
 - 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
 - 1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
 - 2. Re-measure and confirm that total airflow is within design.
 - 3. Re-measure all final fan operating data, speed, volts, amps, and static profile.
 - 4. Mark all final settings.
 - 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
 - 6. Measure and record all operating data.
 - 7. Record final fan-performance data.

3.8 PROCEDURES FOR MOTORS

- A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.

2. Motor horsepower rating.
 3. Motor rpm.
 4. Phase and hertz.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter size and thermal-protection-element rating.
 8. Service factor and frame size.
- B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.9 PROCEDURES FOR AIR-COOLED CONDENSING UNITS

- A. Verify proper rotation of fan(s).
- B. Measure and record entering- and leaving-air temperatures.
- C. Measure and record entering and leaving refrigerant pressures.
- D. Measure and record operating data of compressor(s), fan(s), and motors.

3.10 DUCT LEAKAGE TESTS

- A. Witness the duct leakage testing performed by Installer.
- B. Verify that proper test methods are used and that leakage rates are within specified limits.
- C. Report deficiencies observed.

3.11 PIPE LEAKAGE TESTS

- A. Witness the pipe pressure testing performed by Installer.
- B. Verify that proper test methods are used and that leakage rates are within specified limits.
- C. Report deficiencies observed.

3.12 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 10 percent or minus 5 percent . If design value is less than 100 cfm, within 10 cfm.
 2. Air Outlets and Inlets: Plus 10 percent or minus 5 percent . If design value is less than 100 cfm, within 10 cfm.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.13 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance-measuring and -balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.14 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.

- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents, including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans performance forms, including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Heating coil, dry-bulb conditions.
 - e. Face and bypass damper settings at coils.
 - f. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - g. Variable-frequency controller settings for variable-air-volume systems.
 - h. Settings for pressure controller(s).
 - i. Other system operating conditions that affect performance.
 16. Test conditions for pump performance forms, including the following:
 - a. Variable-frequency controller settings for variable-flow hydronic systems.
 - b. Settings for pressure controller(s).
 - c. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units, include the following:
1. Unit Data:
 - a. Unit identification.

- b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and speed.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan speed.
 - d. Inlet and discharge static pressure in inches wg.
 - e. For each filter bank, filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. List for each internal component with pressure-drop, static-pressure differential in inches wg.
 - j. Outdoor airflow in cfm.
 - k. Return airflow in cfm.
 - l. Outdoor-air damper position.
 - m. Return-air damper position.
- F. Apparatus-Coil Test Reports:
1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.

- d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Refrigerant expansion valve and refrigerant types.
 - i. Refrigerant suction pressure in psig.
 - j. Refrigerant suction temperature in deg F.
 - k. Inlet steam pressure in psig.
- G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
- 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Airflow rate in cfm.
 - i. Face area in sq. ft..
 - j. Minimum face velocity in fpm.
 - 2. Test Data (Indicated and Actual Values):
 - a. Heat output in Btu/h.
 - b. Airflow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
- 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and speed.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.

- b. Total system static pressure in inches wg.
 - c. Fan speed.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
- 1. Report Data:
 - a. System fan and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- J. Air-Terminal-Device Reports:
- 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft..
 - 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary airflow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final airflow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- K. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
- 1. Unit Data:
 - a. System and air-handling-unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Entering-water temperature in deg F.
 - c. Leaving-water temperature in deg F.

- d. Water pressure drop in feet of head or psig.
- e. Entering-air temperature in deg F.
- f. Leaving-air temperature in deg F.
- L. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves, and include the following:
 - 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump speed.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - l. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.
 - d. Full-open flow rate in gpm.
 - e. Full-open pressure in feet of head or psig.
 - f. Final discharge pressure in feet of head or psig.
 - g. Final suction pressure in feet of head or psig.
 - h. Final total pressure in feet of head or psig.
 - i. Final water flow rate in gpm.
 - j. Voltage at each connection.
 - k. Amperage for each phase.
- M. Instrument Calibration Reports:
 - 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.15 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
- B. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to the lesser of either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day .

- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 20 percent of the total measurements checked during the final inspection, the TAB shall be considered incomplete and shall be rejected.
- E. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:
 - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes shall be tracked to show changes made to previous report.
 - 2. If the second final inspection also fails, Owner may pursue others Contract options to complete TAB work.
- F. Prepare test and inspection reports.

3.16 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed supply and outdoor air.
 - 3. Indoor, concealed return located in unconditioned space.
 - 4. Indoor, exposed return located in unconditioned space.
 - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
 - 7. Outdoor, exposed supply and return.

1.02 ACTION SUBMITTALS

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

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.
 - 1. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.02 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials are applied.
- B. Products do not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.
- D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.
- E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.
- F. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Knauf Insulation.
 - c. Owens Corning.

2.03 ADHESIVES

- A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products, or approved equal.

2. Verify fiberglass adhesive has a VOC content of 80 g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).
- C. PVC Jacket Adhesive: Compatible with PVC jacket.
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Johns Manville; a Berkshire Hathaway company, or approved equal.
 2. Verify adhesive has a VOC content of 80 g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).

2.04 MASTICS AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
 1. VOC Content: 300 g/L or less.
- B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products.
 - c. Knauf Insulation.
 2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Comply with MIL-PRF-19565C, Type II, for permeance requirements
 5. Color: White

2.05 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products, or approved equal.
 2. Materials are compatible with insulation materials, jackets, and substrates.
 3. Fire- and water-resistant, flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 5. Color: Aluminum.
 6. Verify sealant has a VOC content of 420 g/L or less.
- B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products, or approved equal.
 2. Materials are compatible with insulation materials, jackets, and substrates.
 3. Fire- and water-resistant, flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 5. Color: White.
 6. Verify sealant has a VOC content of 420 g/L or less.

2.06 TAPES

- A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. 3M Industrial Adhesives and Tapes Division.
 - b. Ideal Tape Co., Inc., an American Biltrite Company, or approved equal.
 2. Width: 2 inches.
 3. Thickness: 6 mils.
 4. Adhesion: 64 ounces force/inch in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch in width.
- B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 1. Manufacturers: Subject to compliance with requirements, undefined:

- a. Knauf Insulation, or approved equal.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Refer to Mechanical general drawings for additional energy code insulation requirements. All HVAC insulation shall comply with the State Energy Code.
- B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- C. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.
- E. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- F. Install multiple layers of insulation with longitudinal and end seams staggered.
- G. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents [, unless otherwise approved by the engineer of record].
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.03 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 1. Comply with requirements in Section 078400 " Firestopping" for firestopping and fire-resistive joint sealers.
- D. Insulation Installation at Floor Penetrations:
 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078400 " Firestopping."

3.04 INSTALLATION OF GLASS-FIBER AND MINERAL-WOOL INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
- B. Comply with manufacturer's written installation instructions.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.

- f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- C. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover

insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.05 FINISHES

- A. Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099000 "Painting and Coating".
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

3.06 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 1. Indoor, concealed supply and outdoor air.
 2. Indoor, exposed supply and outdoor air.
 3. Outdoor, exposed supply and return.
- B. Items Not Insulated:
 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 2. Factory-insulated plenums and casings.
 3. Flexible connectors.

3.07 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Round and Flat-Oval, Supply-Air Duct Insulation: glass-fiber blanket or polyolefin.
- B. Concealed, Round and Flat-Oval, Return-Air Duct Insulation: glass-fiber blanket or polyolefin.
- C. Concealed, Round and Flat-Oval, Outdoor-Air Duct Insulation: glass-fiber blanket or polyolefin.
- D. Concealed, Round and Flat-Oval, Exhaust-Air Duct Insulation: glass-fiber blanket or polyolefin.
- E. Concealed, Rectangular, Supply-Air Duct Insulation: glass-fiber blanket or polyolefin.
- F. Concealed, Rectangular, Return-Air Duct Insulation: glass-fiber blanket or polyolefin.
- G. Concealed, Rectangular, Outdoor-Air Duct Insulation: glass-fiber blanket or polyolefin.
- H. Concealed, Rectangular, Exhaust-Air Duct Insulation between Isolation Damper and Penetration of Building Exterior: glass-fiber blanket or polyolefin.
- I. Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket or board; thickness as required to achieve two-hour fire rating.
- J. Concealed, Supply-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- K. Concealed, Return-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- L. Concealed, Outdoor-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- M. Concealed, Exhaust-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- N. Exposed, Round and Flat-Oval, Supply-Air Duct Insulation: glass-fiber blanket or polyolefin.
- O. Exposed, Round and Flat-Oval, Return-Air Duct Insulation: glass-fiber blanket or polyolefin..
- P. Exposed, Round and Flat-Oval, Outdoor-Air Duct Insulation: glass-fiber blanket or polyolefin.
- Q. Exposed, Round and Flat-Oval, Exhaust-Air Duct Insulation: glass-fiber blanket or polyolefin.
- R. Exposed, Rectangular, Supply-Air Duct Insulation: glass-fiber blanket or polyolefin.
- S. Exposed, Rectangular, Return-Air Duct Insulation: glass-fiber blanket or polyolefin.
- T. Exposed, Rectangular, Outdoor-Air Duct Insulation: glass-fiber blanket or polyolefin.
- U. Exposed, Rectangular, Exhaust-Air Duct Insulation: glass-fiber blanket or polyolefin.

- V. Exposed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket or board; thickness as required to achieve two-hour fire rating.
- W. Exposed, Supply-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- X. Exposed, Return-Air Plenum Insulation: glass-fiber blanket or polyolefin.
- Y. Exposed, Outdoor-Air Plenum Insulation: glass-fiber blanket or polyolefin.

3.08 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Round and Flat-Oval, Supply-Air Duct Insulation: glass-fiber blanket.
- B. Concealed, Round and Flat-Oval, Return-Air Duct Insulation: glass-fiber blanket.
- C. Concealed, Round and Flat-Oval, Outdoor-Air Duct Insulation: glass-fiber blanket.
- D. Concealed, Rectangular, Supply-Air Duct Insulation: glass-fiber blanket.
- E. Concealed, Rectangular, Return-Air Duct Insulation: glass-fiber blanket.
- F. Concealed, Supply-Air Plenum Insulation: glass-fiber blanket.
- G. Concealed, Return-Air Plenum Insulation: glass-fiber blanket.
- H. Exposed, Round and Flat-Oval, Supply-Air Duct Insulation: glass-fiber blanket.
- I. Exposed, Round and Flat-Oval, Return-Air Duct Insulation: glass-fiber blanket.
- J. Exposed, Rectangular, Supply-Air Duct Insulation: glass-fiber blanket.
- K. Exposed, Rectangular, Return-Air Duct Insulation: glass-fiber blanket.
- L. Exposed, Supply-Air Plenum Insulation: glass-fiber blanket.
- M. Exposed, Return-Air Plenum Insulation: glass-fiber blanket.

3.09 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Concealed:
 - 1. PVC : 20 mils thick, color-coded by system.
- D. Ducts and Plenums, Exposed:
 - 1. Painted aluminum: 0.032 inch thick

3.10 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 - 1. Painted aluminum: 0.04 inch thick.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. General: General Contractor is responsible for performing all commissioning activities required by Washington State Energy Code Section C408.
- B. Section Includes
 - 1. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- C. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.2 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority. General Contractor shall be the commissioning authority and perform the commissioning work themselves.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. General Contractor shall ensure participation by their mechanical sub-contractor in the following activities:
 - 1. Attend construction phase controls coordination meeting.
 - 2. Attend testing, adjusting, and balancing review and coordination meeting.
 - 3. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
 - 4. Provide information requested by the CxA for final commissioning documentation.
 - 5. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.4 MECHANICAL CONTRACTORS RESPONSIBILITIES

- A. Include cost of commissioning requirements in the contract price.
- B. Commissioning work of Division 23 shall include, but not be limited to:
 - 1. Testing and start-up of the equipment.
 - 2. Cooperation with the Commissioning Authority.
 - 3. Providing qualified personnel for participation in commissioning tests, including seasonal testing required after the initial testing.
 - 4. Providing equipment, materials, and labor as necessary to correct construction and/or equipment deficiencies found during the commissioning process.
 - 5. Providing operation and maintenance manuals, and as-built drawings to the Commissioning Authority for verification.
 - 6. Providing training and demonstrations for the systems specified in this Division.
- C. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems, and sub-systems. The following equipment and systems shall be evaluated:
 - 1. Exhaust Fans
 - 2. Electric Unit Heaters
 - 3. Fin Tube Radiators
 - 4. Air Compressor
 - 5. VRF System

6. Split System Heat Pump
7. Heat Recovery Ventilator
8. DDC integration with Division 23 systems

1.5 SUBMITTALS

- A. Refer to 01 91 13 General Commissioning Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TESTING PREPARATION

- A. The controls integration meetings (CIM) shall be conducted after the building automation and lighting controls submittals are complete and the CxA has reviewed the submittals. The meeting is to be conducted prior to finalizing the functional test procedures and shall be lead by the CxA and attended by the BAS control contractor, the VRF control contractor, the lighting controls contractor, the mechanical/electrical engineers and a representative of the Owner's F&I group at a minimum; Owner's maintenance group shall be invited however attendance is optional.
- B. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- C. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- D. Certify that testing, adjusting, and balancing (TAB) procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- E. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- F. Inspect and verify the position of each device and interlock identified on checklists.
- G. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- H. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 GENERAL TESTING REQUIREMENTS

- A. Functional performance testing shall demonstrate the correct installation and operation of each component, system and system-to-system relationship in accordance with approved plans and specifications. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.
- B. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions as described in the Sequence of Operations. Verify proper response of building automation system controllers and sensors.
- C. The CxA along with the HVAC&R Subcontractor, testing and balancing Subcontractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- D. Tests will be performed using design conditions whenever possible.
- E. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

- F. The CxA may direct that set points be altered when simulating conditions is not practical.
- G. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- H. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, re-schedule tests.
- I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.3 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.
- B. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

3.4 DEFICIENCY RESOLUTION

- A. In some systems, improper adjustments, misapplied equipment, and/or deficient performance under varying loads will result in additional work being required to commission the systems. This work shall be completed under the direction of the User, with input from the contractor, equipment supplier, and Commissioning Authority. Whereas all members shall have input and the opportunity to discuss, debate, and work out problems, the Design Professional shall have final jurisdiction over any additional work done to achieve performance.
- B. Corrective work shall be completed in a timely fashion to permit the completion of the commissioning process. Experimentation to demonstrate system performance may be permitted. If the Commissioning Authority deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Authority shall notify the User, indicating the nature of the problem, expected steps to be taken, and suggested deadline(s) for completion of activities. If the deadline(s) pass without resolution of the problem, the User reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs incurred to solve the problems in an expeditious manner shall be the contractor's responsibility.

3.5 OPERATING AND MAINTENANCE TRAINING

- A. The HVAC&R Contractor, and appropriate sub-contractors, shall provide comprehensive operating and maintenance instruction on building systems in accordance with the Contract Documents prior to delivery.
- B. The contractor shall be responsible for organizing, arranging, and delivering in a manner and on a schedule agreeable to the User.
- C. Refer to specification section 01 79 00 for training timeline requirements.

END OF SECTION 230800

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Backdraft and pressure relief dampers.
 - 2. Manual volume dampers.
 - 3. Control dampers.
 - 4. Fire dampers.
 - 5. Turning vanes.
 - 6. Duct Silencers.
 - 7. Duct-mounted access doors.
 - 8. Flexible connectors.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For duct silencers, include pressure drop, dynamic insertion loss, and self-generated noise data. Include breakout noise calculations for high-transmission-loss casings.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 90A and NFPA 90B.
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Warming and Ventilating; a Mestek Architectural Group company.
 - 2. Greenheck Fan Corporation.
 - 3. Ruskin Company.
- B. Description: Gravity balanced.
- C. Performance:
 - 1. Maximum Air Velocity: 2000 fpm.
 - 2. Maximum System Pressure: 2 inches wg.
 - 3. AMCA Certification: Test and rate in accordance with AMCA 511.
 - 4. Leakage:
 - a. Class IA: Leakage shall not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.
 - b. Class I: Leakage shall not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.
 - c. Class II: Leakage shall not exceed 10 cfm/sq. ft. against 1-inch wg differential static pressure.
 - d. Class III: Leakage shall not exceed 40 cfm/sq. ft. against 1-inch wg differential static pressure.
- D. Construction:
 - 1. Frame:
 - a. Hat shaped.
 - b. 16-gauge- thick, galvanized sheet, with welded or mechanically attached corners and mounting flange.
 - 2. Blades:

- a. Multiple single-piece blades.
- b. Center] pivoted, maximum 6-inch width, 16-gauge- thick, galvanized sheet steel with sealed edges.
- 3. Blade Action: Parallel.
- E. Blade Seals: Neoprene or vinyl, mechanically locked].
- F. Return Spring: Adjustable tension.
- G. Damper Actuator – Gravity/Counterweight:
- H. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Screen Mounting:
 - a. mounted in sleeve.
 - 1) Sleeve Thickness: 20 gauge minimum.
 - 2) Sleeve Length: 6 inches minimum.
 - 3. Screen Material: [Galvanized steel] [Aluminum].
 - 4. Screen Type: Bird Insect.

2.03 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Warming and Ventilating; a Mestek Architectural Group company.
 - b. Greenheck Fan Corporation.
 - c. Ruskin Company.
 - 2. Performance:
 - a. Leakage Rating Class III: Leakage not exceeding 40 cfm/sq. ft. against 1-inch wg differential static pressure.
 - 3. Construction:
 - a. Linkage out of airstream.
 - b. Suitable for horizontal or vertical airflow applications.
 - 4. Frames:
 - a. Hat-shaped, 16-gauge- thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized steel; 16 gauge thick.
 - e. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.
 - 6. Tie Bars and Brackets: Galvanized steel.
 - 7. Locking device to hold damper blades in a fixed position without vibration.
- B. Jackshaft:
 - 1. Size: 0.5 inch diameter.
 - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle, made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.

2.04 CONTROL DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Warming and Ventilating; a Mestek Architectural Group company.
 - 2. Greenheck Fan Corporation.
 - 3. Ruskin Company.
- B. General Requirements:
 - 1. Unless otherwise indicated, use parallel-blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed-blade configuration.
 - 2. Factory or field assemble multiple damper sections to provide a single damper assembly of size required by the application.
- C. Performance:
 - 1. AMCA Certification: Test and rate in accordance with AMCA 511.
 - 2. Leakage:
 - a. Class IA: Leakage shall not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.
 - b. Class I: Leakage shall not exceed 4 cfm/sq. ft. against 1-inch wg differential static pressure.
 - c. Class II: Leakage shall not exceed 10 cfm/sq. ft. against 1-inch wg differential static pressure.
 - d. Class III: Leakage shall not exceed 40 cfm/sq. ft. against 1-inch wg differential static pressure.
 - 3. Pressure Drop: 0.05 inch wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500-D, Figure 5.3.
 - 4. Velocity: Up to 3000 fpm.
 - 5. Temperature: Minus 25 to plus 180 deg F.
 - 6. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.
- D. Construction:
 - 1. Linkage out of airstream.
 - 2. Suitable for horizontal or vertical airflow applications.
 - 3. Frames:
 - a. Hat, U, or angle shaped.
 - b. 16 gauge- thick, galvanized sheet steel.
 - c. Mitered and welded corners.
 - d. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 4. Blades:
 - a. Multiple blade with maximum blade width of 6 inches.
 - b. Parallel or Opposed blade design per 2.4.B.1.
 - c. Galvanized steel.
 - d. 16-gauge- thick single skin.
 - 5. Blade Edging Seals:
 - a. Replaceable Closed-cell neoprene.
 - 6. Blade Jamb Seal: Flexible stainless steel, compression type.
 - 7. Blade Axles: 1/2-inch diameter; galvanized steel.
 - 8. Blade-Linkage Hardware: Zinc-plated steel and brass; ends sealed against blade bearings. Linkage mounted out of air stream.
- E. Damper Actuator - Electric:
 - 1. Electric - 24 V ac or 120 V as applicable.
 - 2. UL 873, plenum rated.
 - 3. Two position or fully modulating, with spring return as applicable. Refer to sequence of operations on plans for applicability of actuator type.
 - a. Sufficient motor torque and spring torque to drive damper fully open and fully closed with adequate force to achieve required damper seal.

- b. Minimum 90-degree drive rotation.
 4. Clockwise or counterclockwise drive rotation as required for application.
 5. Environmental Operating Range:
 - a. Temperature: Minus 40 to plus 130 deg F.
 - b. Humidity: 5 to 95 percent relative humidity noncondensing.
 6. Environmental enclosure: NEMA 2.
 7. Actuator to be factory mounted and provided with a single-point wiring connection.
- F. Controllers, Electrical Devices, and Wiring:
1. Electrical Connection: 24 V, 60 Hz.

2.05 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Duro Dyne Inc, or approved equal.
- B. Manufactured Turning Vanes for Metal Ducts: Fabricate curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 4-3, "Vaness and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- D. Vane Construction:
1. Single wall.
 2. Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.06 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Duro Dyne Inc.
 2. Ruskin Company, or approved equal.
- B. Duct-Mounted Access Doors: Fabricate access panels in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 7-2 (7-2M), "Duct Access Doors and Panels," and Figure 7-3, "Access Doors - Round Duct."
1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - a. 24-gauge- thick galvanized steel or 0.032-inch- thick aluminum frame.

2.07 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Duro Dyne Inc, or approved equal.
- B. Fire-Performance Characteristics: Adhesives, sealants, fabric materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested in accordance with ASTM E84.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. Materials: Flame-retardant or noncombustible fabrics.
- E. Coatings and Adhesives: Comply with UL 181, Class 1.

- F. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd.
 - 2. Tensile Strength: 480 lbf/inch in the warp and [360 lbf/inch] <Insert value> in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- G. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd.
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.
- H. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

2.08 DUCT ACCESSORY HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Duro Dyne Inc, or approved equal.
- B. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.09 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304, and having a No.2 finish for concealed ducts and No.4 finish for exposed ducts.
- C. Aluminum Sheets: Comply with ASTM B209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, one-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless steel ducts.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install duct accessories in accordance with applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116 for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

- D. Where multiple damper sections are necessary to achieve required dimensions, provide reinforcement to fully support damper assembly when fully closed at full system design static pressure.
- E. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- F. Set dampers to fully open position before testing, adjusting, and balancing.
- G. Install test holes at fan inlets and outlets and elsewhere as indicated and as needed for testing and balancing.
- H. Install fire dampers in accordance with UL listing.
- I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream and downstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 7. For grease ducts, install at locations and spacing as required by NFPA 96.
 - 8. Control devices requiring inspection.
 - 9. Elsewhere as indicated.
- J. Install access doors with swing against duct static pressure.
- K. Access Door Sizes:
 - 1. Two-Hand Access: 12 by 6 inches.
- L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- M. Install flexible connectors to connect ducts to equipment.
- N. For fans developing static pressures of 5 inches wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- O. Install duct test holes where required for testing and balancing purposes.
- P. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.02 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that size and location of access doors are adequate to perform required operation.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation and verify that vanes do not move or rattle.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

SECTION 23 34 16
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
1. Backward-inclined centrifugal fans, including airfoil and curved blade fans.
 2. Square in-line centrifugal fans.
 3. Utility set fans.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
 2. Rated capacities, operating characteristics, and furnished specialties and accessories.
 3. Certified fan performance curves with system operating conditions indicated.
 4. Certified fan sound-power ratings.
 5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 6. Material thickness and finishes, including color charts.
 7. Dampers, including housings, linkages, and operators.
 8. Fan speed controllers.
- B. Shop Drawings:
1. Include plans, elevations, sections, and attachment details.
 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include diagrams for power, signal, and control wiring.
 4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Seismic Qualification Data: For fans, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity, and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For centrifugal fans to include in normal operation, emergency operation, and maintenance manuals with replacement parts listing.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Startup."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

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

2.02 SQUARE IN-LINE CENTRIFUGAL FANS

- A. Description: Square in-line centrifugal fans.
- B. Housing:
 - 1. Housing Material: Steel or Aluminum.
 - 2. Housing Coating: Powder-baked enamel.
 - 3. Housing Construction: Side panels shall be easily removable for service. Include inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.
- D. Fan Wheels: Aluminum airfoil blades welded to aluminum hub.
- E. Motor Enclosure: Totally enclosed, fan cooled.
- F. Accessories:
 - 1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
 - 2. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 3. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
 - 4. Companion Flanges: For inlet and outlet duct connections.
 - 5. Fan Guards: 1/2- by 1-inch (13- by 25-mm) mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 - 6. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
 - 7. Side Discharge: Flange connector and attachment hardware to provide right-angle discharge on side of unit.

2.03 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
- B. Where variable-frequency drives are indicated or scheduled, provide fan motor compatible with variable-frequency drive.

2.04 SOURCE QUALITY CONTROL

- A. AMCA Certification for Fan Sound Performance Rating: Test, rate, and label in accordance with AMCA 311.
- B. Operating Limits: Classify fans in accordance with AMCA 99, Section 14.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Install centrifugal fans level and plumb.
- B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.
- D. Equipment Mounting:
 - 1. Install floor- or roof-mounted centrifugal fans on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Support duct-mounted and other hanging centrifugal fans directly from the building structure, using suitable hanging systems as specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
 - 3. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- E. Curb Support, Field Built-Up: Install roof curb on roof structure, level and secure, according to "The NRCA Roofing and Waterproofing Manual," detail "Equipment Support Curb," number

- "SPF-9" (page 1409) and detail "Equipment Support Curb," number "SPF-9S" (page 1410). Install and secure centrifugal fans on curbs, and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.
- F. Curb Support, Prefabricated: Rail-type wood support provided by fan manufacturer.
 - G. Unit Support: Install centrifugal fans level on structural curbs. Coordinate with duct connections. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.
 - H. Isolation Curb Support: Install centrifugal fans on isolation curbs, and install flexible duct connectors and vibration-isolation and seismic-control devices.
 - 1. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
 - I. Install units with clearances for service and maintenance.
 - J. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."
- 3.02 DUCTWORK AND PIPING CONNECTIONS
- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."
 - B. Install ducts adjacent to fans to allow service and maintenance.
- 3.03 ELECTRICAL CONNECTIONS
- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 - B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
 - C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
 - D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
- 3.04 CONTROL CONNECTIONS
- A. Install control and electrical power wiring to field-mounted control devices.
 - B. Connect control wiring according to Division 25.
- 3.05 STARTUP SERVICE:
- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks in accordance with manufacturer's written instructions.
 - 2. Verify that shipping, blocking, and bracing are removed.
 - 3. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 4. Verify that cleaning and adjusting are complete.
 - 5. For direct-drive fans, verify proper motor rotation direction and verify fan wheel free rotation and smooth bearing operation.
 - 6. For belt-drive fans, disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 7. Adjust belt tension.
 - 8. Adjust damper linkages for proper damper operation.
 - 9. Verify lubrication for bearings and other moving parts.
 - 10. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.

11. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 12. Shut unit down and reconnect automatic temperature-control operators.
 13. Remove and replace malfunctioning units and retest as specified above.
- 3.06 ADJUSTING
- A. Adjust damper linkages for proper damper operation.
 - B. Adjust belt tension.
 - C. Lubricate bearings.
 - D. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."
- 3.07 CLEANING
- A. After completing system installation and testing, adjusting, and balancing and after completing startup service, clean fans internally to remove foreign material and construction dirt and dust
- 3.08 FIELD QUALITY CONTROL
- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
 - B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
 - C. Perform tests and inspections with the assistance of a factory-authorized service representative.
 1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Fans and components will be considered defective if they do not pass tests and inspections.
 - D. Prepare test and inspection reports.
- 3.09 DEMONSTRATION
- A. Train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Adjustable blade face registers and grilles.
 - 2. Fixed face registers and grilles.
- B. Related Requirements:
 - 1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
 - 2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.02 ACTION SUBMITTALS

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

PART 2 PRODUCTS

2.01 REGISTERS

- A. Adjustable Blade Face Register
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anemostat Products; a Mestek company.
 - b. Price Industries.
 - c. Titus; brand of Johnson Controls International plc, Global Products.
 - 2. Material: Aluminum.
 - 3. Finish: Baked enamel, color selected by Architect.
 - 4. Face Blade Arrangement: Horizontal spaced 1/2 inch apart.
 - 5. Core Construction: Removable.
 - 6. Rear-Blade Arrangement: Horizontal spaced 1/2 inch apart.
 - 7. Frame: 1 inch wide.
 - 8. Mounting: As required by specific application.
 - 9. Damper Type: Adjustable opposed blade.
 - 10. Accessories:
 - a. -blade gang operator.
- B. Fixed Face Register:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anemostat Products; a Mestek company.
 - b. Price Industries.
 - c. Titus; brand of Johnson Controls International plc, Global Products.
 - 2. Material: Aluminum.
 - 3. Finish: Baked enamel, color selected by Architect.
 - 4. Face Blade Arrangement: Horizontal spaced 1/2 inch apart.
 - 5. Core Construction: Removable.
 - 6. Frame: 1 inch wide.
 - 7. Mounting: As required by specific application.
 - 8. Damper Type: Adjustable opposed blade.

2.02 GRILLES

- A. Fixed Face Grille:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anemostat Products.
 - b. Price Industries.
 - c. Titus; brand of Johnson Controls International plc, Global Products.
 - 2. Material: Aluminum.
 - 3. Finish: Baked enamel, color selected by Architect.
 - 4. Face Blade Arrangement: Horizontal; spaced 1/2 inch apart.

5. Core Construction: Removable.
6. Frame: 1 inch wide.
7. Mounting: As required by specific application.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install registers and grilles level and plumb.
- B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.02 ADJUSTING

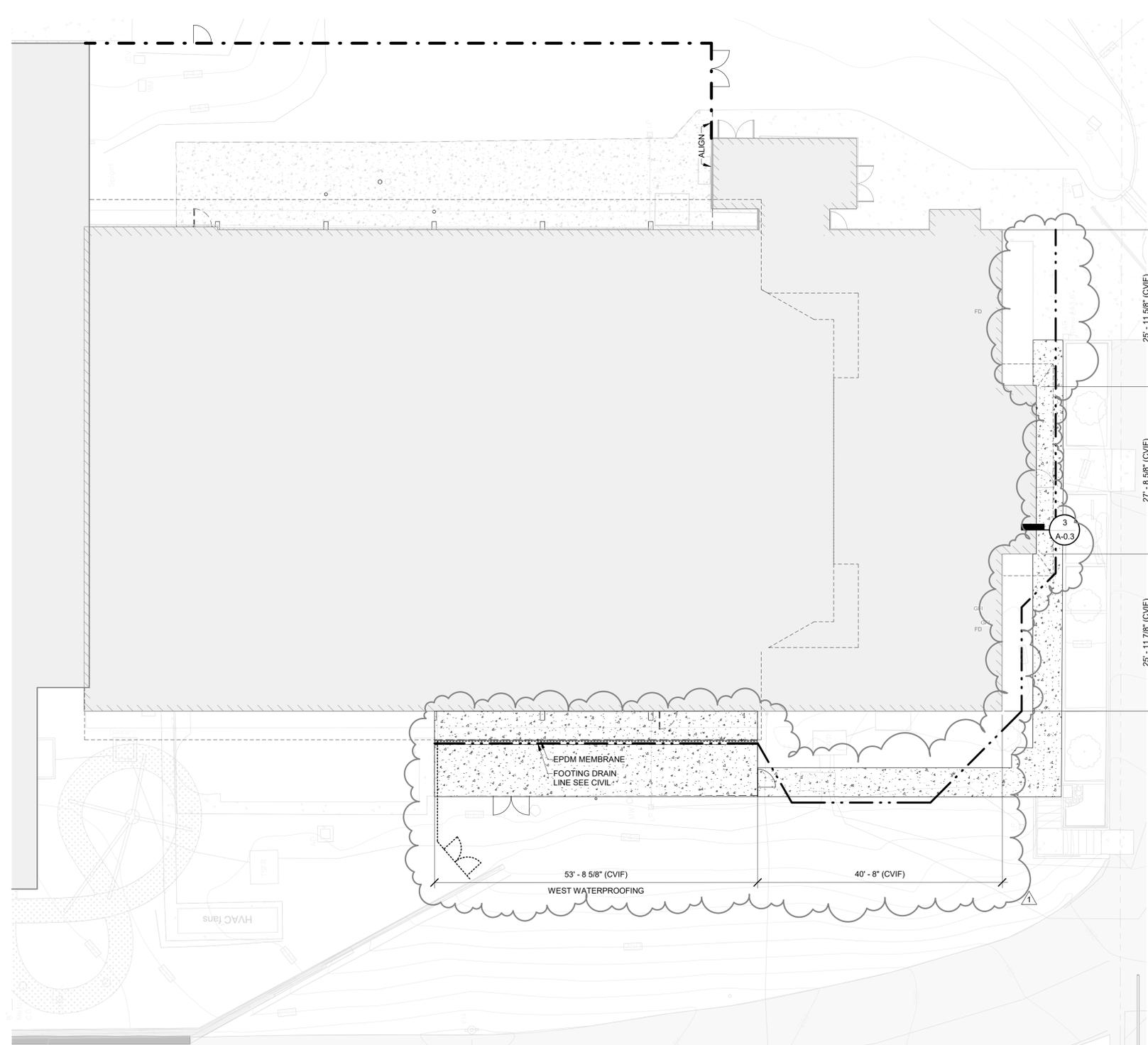
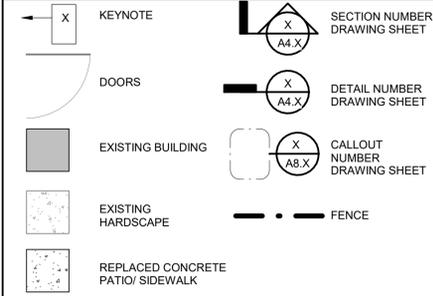
- A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

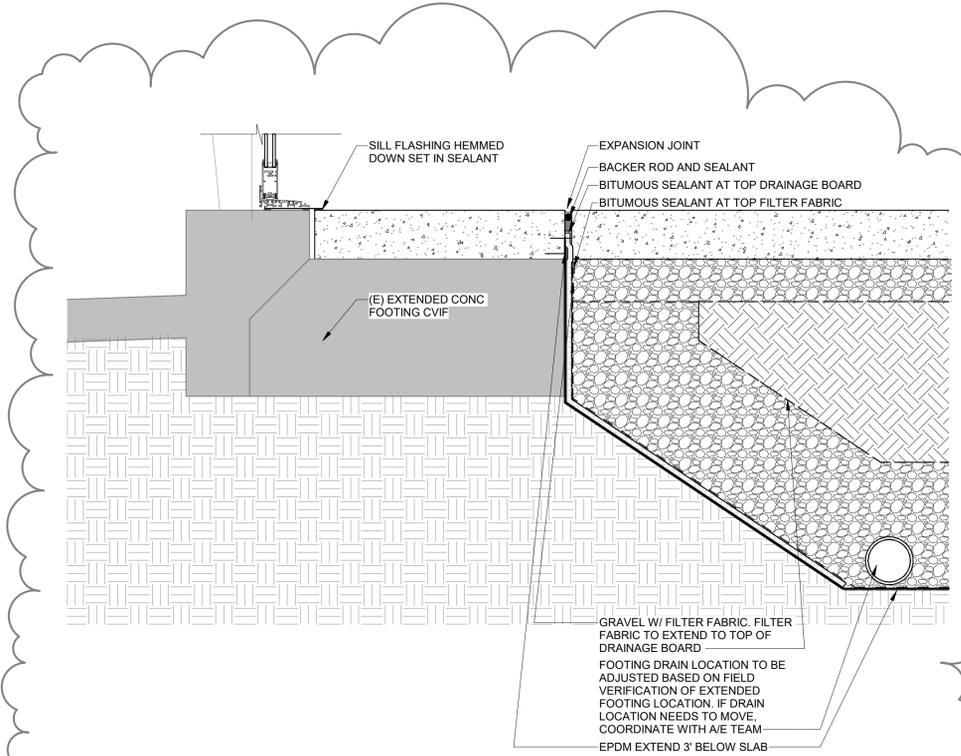
SPECIAL NOTE

1. DUE TO HIGH GROUND WATER LEVELS IN THE VICINITY OF THE SITE, DEWATERING WILL BE NEEDED TO LOWER GROUNDWATER LEVELS TO REDUCE HYDRASTATIC UPLIFT ON THE EXISTING POOL.
2. GROUNDWATER WAS ENCOUNTERED AT 4.9 TO 13.6 FEET BELOW GRADE.
3. REF. SPECIFICATION SECTION 00 31 00 AND HYDROGEOLOGIC REPORT.

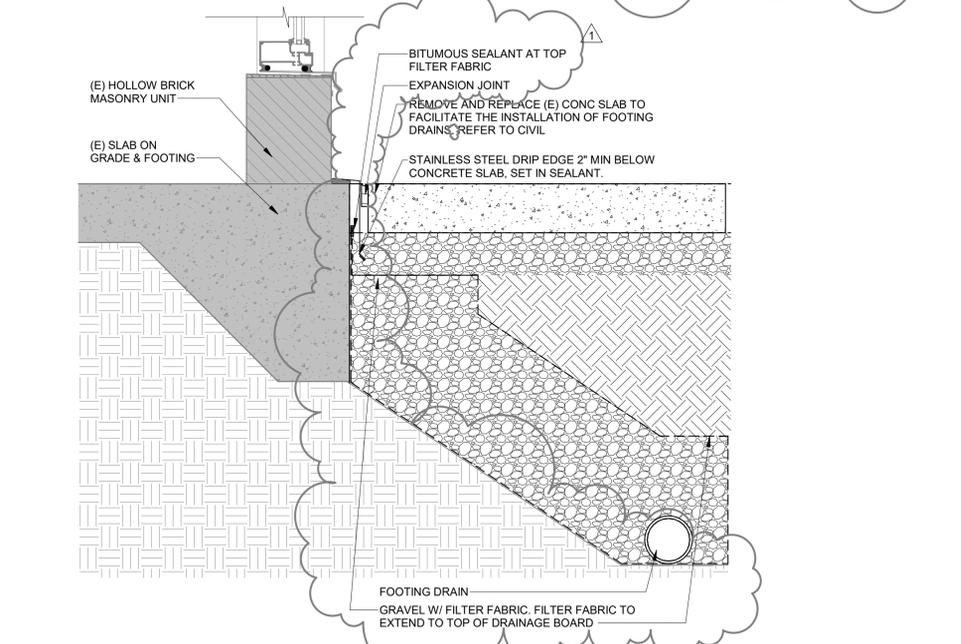
SITE PLAN LEGEND



1 SITE PLAN-ALT 1
1" = 10'-0"



2 EXTENDED FOOTING-WEST WATER DIVERSION -ALTERNATE 1
1 1/2" = 1'-0"



3 LOBBY SOUTH WATER DIVERSION-ALTERNATE 1
1 1/2" = 1'-0"



RAY WILLIAMSON POOL RENOVATION

8521 MADISON AVENUE N
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BID SET PHASE 2
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1	ADDENDUM 3 03.04.2026

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PROJECT MANAGER
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**SITE PLAN
ALTERNATE
1 WATER
DIVERSION**

A-0.3
2208

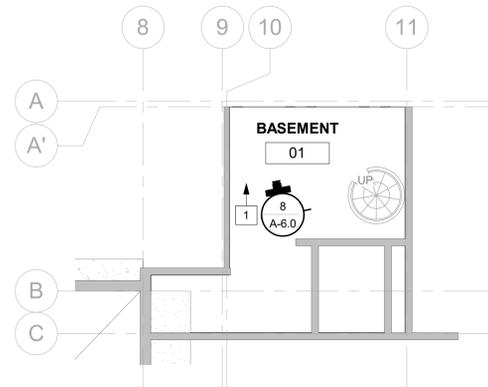
GENERAL DEMOLITION NOTES

- EXISTING DIMENSIONS SHOWN ARE FOR REFERENCE ONLY. DIMENSIONS SHALL BE FIELD VERIFIED BY GC. CONTACT THE ARCHITECT IF DISCREPANCIES ARE DISCOVERED.
- PRIOR TO ANY DEMOLITION ACTIVITIES, ALL EXISTING NATATORIUM EQUIPMENT, POOL ACCESSORIES, AND OTHER MISCELLANEOUS ITEMS SHALL BE PROTECTED, SEALED DUST TIGHT, THE PROTECTIVE WRAP SHALL BE REMOVED AND THE FIXTURES CLEANED AT JOB COMPLETION.
- NOISE AND DUST CONTROL IN AREAS OF WORK IS CRITICAL. PROTECTION OF EXISTING FACILITIES AND ANY EXISTING EQUIPMENT FROM DUST AND CONSTRUCTION DEBRIS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. DAILY CLEAN-UP OF CONSTRUCTION DUST AND DEBRIS WITHIN PROJECT SITE LIMITS AND OTHER AREAS AFFECTED BY CONSTRUCTION IS REQUIRED.
- COORDINATE TEMPORARY STORAGE LOCATION OF ALL POOL EQUIPMENT BEING SALVAGED FOR REUSE WITH OWNER.

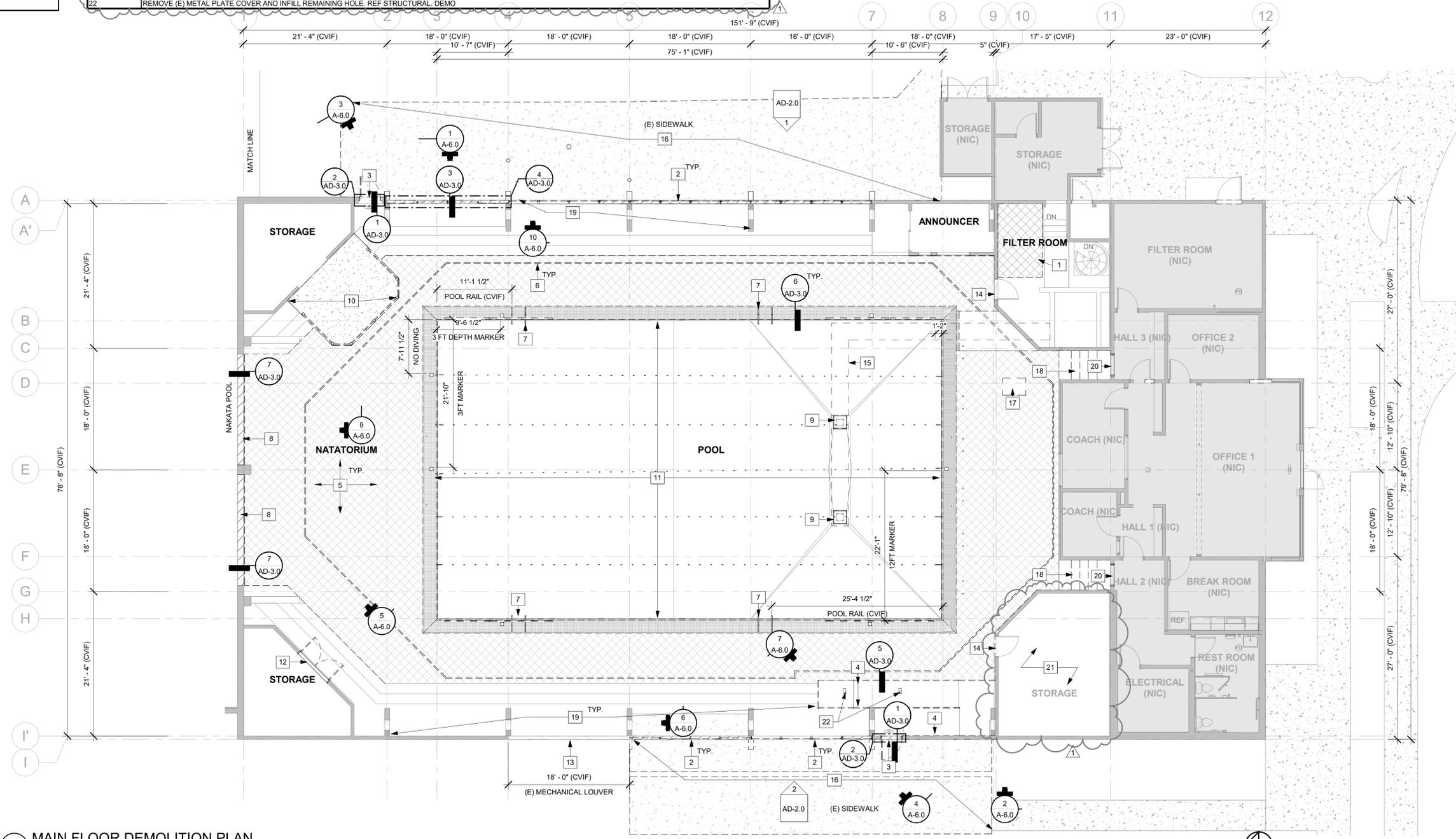
SPECIAL NOTE

- PROJECT SITE SHALL BE SECURE AT ALL TIMES AND SHALL NOT BE ACCESSIBLE TO THE PUBLIC OR USERS.
- FOR CONCRETE DEMOLITION AND CONCRETE REPLACEMENT WORK, CONTRACTOR SHALL ACCESS THE PROJECT SITE THROUGH THE EXISTING NATATORIUM STOREFRONT AREAS; DO NOT ACCESS THE SITE THROUGH THE OFFICES.
- DO NOT REMOVE ANY EXISTING STOREFRONT OR DOOR/ OPENING WITHOUT PROVIDING A SECURE, AND LOCKABLE BARRIER; OTHERWISE, EXISTING STOREFRONT CAN NOT BE REMOVED UNLESS NEW STOREFRONT IS INSTALLED SAME DAY.

DEMOLITION KEYNOTE LEGEND	
1	PREPARE FOR REPAIR OF SPALLED CONCRETE AT FILTER ROOM. COORDINATE WITH STRUCTURAL FOR PROPOSED REPAIR WORK. COORDINATE WITH MECHANICAL, AND ELECTRICAL.
2	DEMOLISH (E) EXTERIOR STOREFRONT SYSTEM; PROTECT OPENING(S) AND PROVIDE A SECURE, PLYWOOD AND FRAME BARRIER IF NEW STOREFRONT IS NOT INSTALLED SAME DAY; DO NOT REMOVE THE EXISTING STOREFRONT WITHOUT PROVIDING A SECURE LOCKABLE BARRIER IN PLACE.
3	DEMOLISH (E) EXTERIOR DOOR, DOOR FRAME, AND THRESHOLD. PROTECT OPENING(S) AND PROVIDE A SECURE, PLYWOOD AND FRAME BARRIER IF NEW STOREFRONT IS NOT INSTALLED SAME DAY; DO NOT REMOVE THE EXISTING STOREFRONT WITHOUT PROVIDING A SECURE LOCKABLE BARRIER IN PLACE.
4	REMOVE (E) WOOD HANDRAIL AND METAL POST SYSTEM IN ITS ENTIRETY.
5	REMOVE (E) CONCRETE POOL DECK IN ITS ENTIRETY. COORDINATE WITH STRUCTURAL.
6	REMOVE (E) LINEAR DRAINS AND COLLECTION BOXES. REF. STRUCTURAL AND MECHANICAL.
7	REMOVE (E) POOL LADDER HANDRAILS AND INSERTS.
8	DEMOLISH (E) INTERIOR STOREFRONT SYSTEM; PROTECT OPENING(S) AND PROVIDE A SECURE, PLYWOOD AND FRAME BARRIER BETWEEN THE NAKATA AND RAY WILLIAMSON POOL. DO NOT REMOVE THE EXISTING STOREFRONT WITHOUT PROVIDING A SECURE LOCKABLE BARRIER IN PLACE OR A NEW STOREFRONT THE SAME DAY. THE BARRIER MUST PROVIDE VISUAL BLOCKAGE BETWEEN THE TWO POOLS.
9	REMOVE (E) POOL DRAINS. COORDINATE WITH MECHANICAL.
10	REMOVE (E) PLATFORM. COORDINATE WITH STRUCTURAL FOR PROPOSED REPAIR WORK.
11	DEMO (E) POOL FIBERGLASS LINER; DO NOT DAMAGE (E) PLASTER UNDERNEATH. PREP (E) PLASTER FOR NEW PLASTER LINER. FOR BIDDING PURPOSES, ASSUME A MINIMUM OF 300 SF OF PATCH/ REPAIR REQUIRED AT THE (E) PLASTER BASIN.
12	REMOVE (E) DOORS AND FRAMES TO CREATE A CASED OPENING.
13	REMOVE (E) MECH LOUVER AND FRAME, COORDINATE WITH MECHANICAL.
14	PROTECT NEW DOOR FROM DAMAGE DURING CONSTRUCTION.
15	AT (E) POOL BASIN, SAWCUT AREA(S) AS INDICATED ON STRUCTURAL AND MECHANICAL DOCUMENTS TO ACCOMMODATE NEW VGB DRAINS AND PIPING; BE CAREFUL NOT TO DAMAGE THE EXISTING POOL BASIN NOT CALLED FOR WORK; NO OVERCUTS. COORDINATE WITH MECHANICAL AND STRUCTURAL.
16	CAREFULLY REMOVE (E) CONCRETE SIDEWALK. REF STRUCTURAL.
17	REMOVE (E) DIVING BOARD CONCRETE BASE.
18	REMOVE (E) CONCRETE STAIRS.
19	REPAIR HOLES IN CONCRETE LEFT FROM REMOVING (E) ALUMINUM BENCHES AT 88 LOCATIONS; REF STRUCTURAL.
20	REMOVE (E) HIGH-LOW METAL FRAME.
21	REMOVE (E) EPOXY FLOOR COATING.
22	REMOVE (E) METAL PLATE COVER AND INFILL REMAINING HOLE. REF STRUCTURAL. DEMO



DEMO GRAPHIC LEGEND	
	EXISTING CONSTRUCTION
	ITEMS TO BE DEMOLISHED
	KEYNOTES
	DEMOLISH DOORS
	PHOTO REFERENCE SEE PHOTO REFERENCE SHEET
	ELEVATION REFERENCE: NUMBER SHEET
	Room name
	ROOM TAG
	NIC
	EXISTING HARDSCAPE
	CONCRETE SLAB REMOVAL REF STRUCTURE
	DETAIL REFERENCE: NUMBER SHEET
	DETAIL NUMBER DRAWING SHEET
	ENLARGED DETAIL NUMBER DRAWING SHEET
	DEMO (E) 1X TILE PERIMETER
	DEMO (E) PLATFORM



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PROJECT ARCHITECT
SMS
PROJECT MANAGER
LB
DRAWN

RAY WILLIAMSON POOL DEMOLITION PLAN

AD-1.0
2208

FLOOR PLAN GENERAL NOTES

- EXISTING DIMENSIONS SHOWN ARE FOR REFERENCE ONLY. DIMENSIONS SHALL BE FIELD VERIFIED BY GC. CONTACT THE ARCHITECT IF DISCREPANCIES ARE DISCOVERED.
- CONTRACTOR IS RESPONSIBLE FOR JOB SITE SAFETY AND COMPLIANCE WITH ALL STATE OR LOCAL CODES AND ORDINANCES GOVERNING THE WORK.
- DATA/ELECTRICAL/MECHANICAL ARE SHOWN FOR REFERENCE ONLY.
- NOISE AND DUST CONTROL IN AREAS OF WORK IS CRITICAL. PROTECTION OF EXISTING FACILITIES AND ANY EXISTING EQUIPMENT FROM DUST AND CONSTRUCTION DEBRIS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. DAILY CLEAN-UP OF CONSTRUCTION DUST AND DEBRIS WITHIN PROJECT SITE LIMITS AND OTHER AREAS AFFECTED BY CONSTRUCTION IS REQUIRED.
- PROVIDE A WORK AND DUST CONTROL BARRIER AT NATATORIUM TO SEPARATE FROM THE REMAINING BUILDING IN OPERATION.
- COORDINATE TEMPORARY STORAGE LOCATION OF ALL POOL EQUIPMENT BEING SALVAGED FOR REUSE WITH OWNER.
- REFER TO A1.1 EQUIPMENT PLAN FOR TILE, FIXTURES, AND INSERTS.

SPECIAL NOTE

- PROJECT SITE SHALL BE SECURE AT ALL TIMES AND SHALL NOT BE ACCESSIBLE TO THE PUBLIC OR USERS.
- FOR CONCRETE DEMOLITION AND CONCRETE REPLACEMENT WORK, CONTRACTOR SHALL ACCESS THE PROJECT SITE THROUGH THE EXISTING NATATORIUM STOREFRONT AREAS, DO NOT ACCESS THE SITE THROUGH THE OFFICES.
- DO NOT REMOVE ANY EXISTING STOREFRONT OR DOOR/OPENING WITHOUT PROVIDING A SECURE, AND LOCKABLE BARRIER; OTHERWISE, EXISTING STOREFRONT CAN NOT BE REMOVED UNLESS NEW STOREFRONT IS INSTALLED SAME DAY.

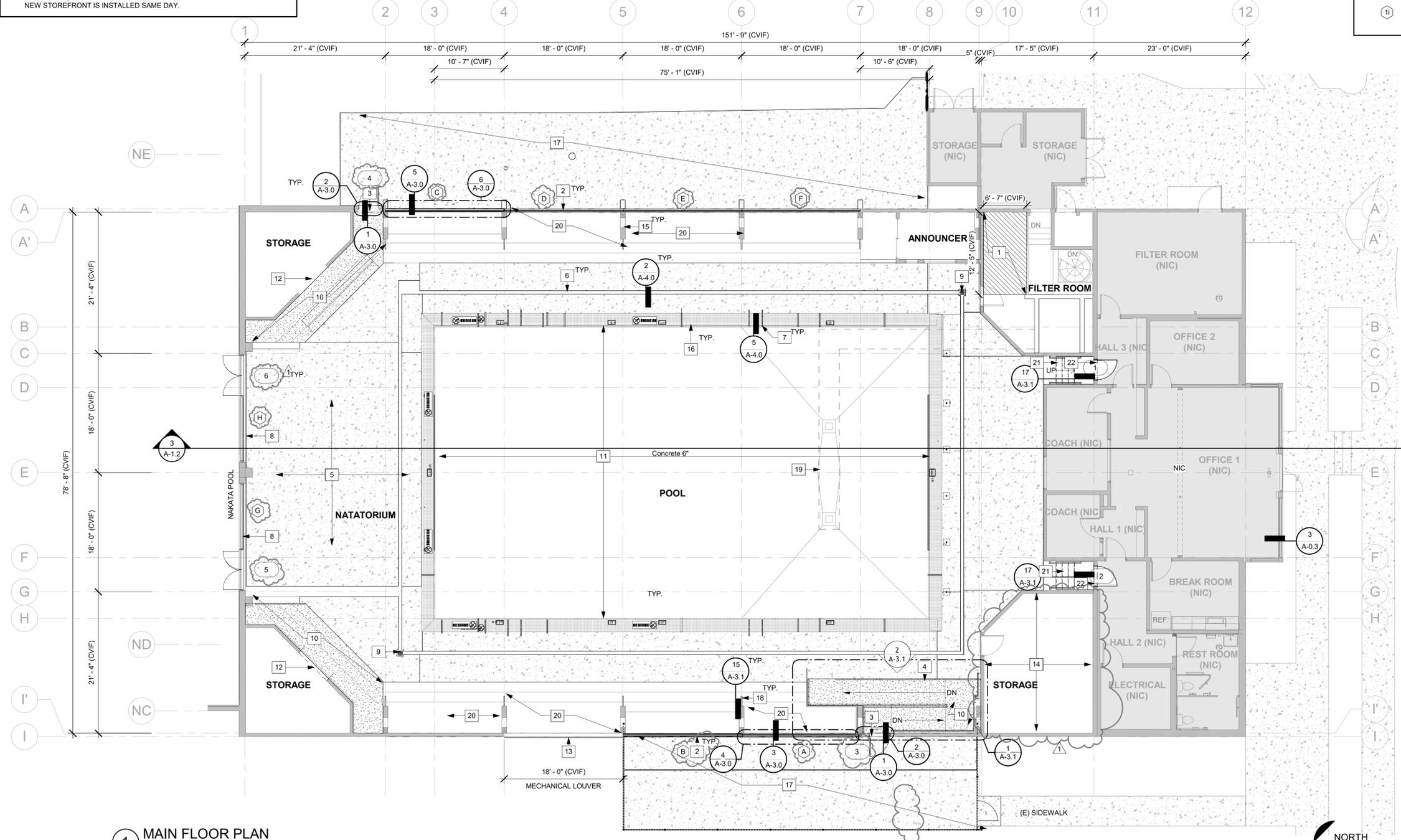
KEYNOTE LEGEND

1	REPAIR SPALLING AND DELAMINATED CONCRETE AT FILTER ROOM, COORDINATE WITH STRUCTURAL FOR PROPOSED REPAIR WORK. REF MECHANICAL AND ELECTRICAL.
2	FURNISH AND INSTALL NEW STOREFRONT SYSTEM, IN ITS ENTIRETY. REF A3.0 FOR DETAILS, TYP.
3	FURNISH AND INSTALL EXTERIOR DOOR, DOOR FRAME, ALL ASSOCIATED ADA HARDWARE.
4	FURNISH AND INSTALL NEW HANDRAILS. REF 1&2/A3.1.
5	FURNISH AND INSTALL NEW CONCRETE SLAB ON GRADE. FLOOR SHALL SLOPE TO DRAIN AND BE ADA COMPLIANT, NOT TO EXCEED 2% SLOPE IN ANY DIRECTION. NO STANDING WATER ALLOWED. REF STRUCTURAL.
6	FURNISH AND INSTALL NEW LINEAR DRAIN SYSTEM. REF STRUCTURAL AND COORDINATE WITH MECHANICAL DOCS.
7	FURNISH AND INSTALL POOL DECK EQUIPMENT INSERTS AND FIXTURES. SEE A-1.1.
8	FURNISH AND INSTALL INTERIOR STOREFRONT. ENSURE SECURE AND LOCKABLE BARRIER. PROVIDE VISUAL BLOCKAGE BETWEEN THE TWO POOLS DURING CONSTRUCTION. ANY DAMAGE AND REPAIRS TO THE STOREFRONT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR FOR REPAIR/REPLACEMENT.
9	FURNISH AND INSTALL NEW CATCH BASIN(S) PER MECHANICAL AND STRUCTURAL DOCUMENTS.
10	FURNISH AND INSTALL SLIP RESISTANT COATING AT (E) CONCRETE STEPS AND RAMPS.
11	FURNISH AND INSTALL NEW PLASTER POOL LINER. REFER TO STRUCTURAL FOR REPAIR/PATCH OF (E) POOL BASIN PRIOR TO INSTALLATION OF NEW PLASTER LINER.
12	PATCH MASONRY AT CASSED OPENING. REF. STRUCTURAL.
13	FURNISH AND INSTALL LOUVER AND FRAME WHERE OLD LOUVERS WERE REMOVED. REFER TO MECHANICAL.
14	AT STORAGE ROOM, FURNISH AND INSTALL FLOOR LEVELING COMPOUND SUCH THAT THE FINISHED FLOOR MEETS THE FINISHED FLOOR OF THE NEW POOL DECK; PREP AND CLEAN FLOOR OF DIRT, DEBRIS PRIOR TO START OF WORK.
15	REPAIR GULIELM METAL BASE CONNECTION. COORDINATE WITH STRUCTURAL FOR PROPOSED REPAIR WORK.
16	FURNISH AND INSTALL NEW TILE AT TOP AND EDGE FACE OF DECK, INCLUDE ACCENT/PATTERNED TILE AND POLO MARKERS; REF. 5/A4.0
17	REPLACE CONCRETE SLAB TO SAME EXTENT AS EXISTING. REF. STRUCTURAL
18	FURNISH AND INSTALL SAFETY RAIL BELOW (E) ARCHED GLUE LAMINATED BEAM AT NINE (9) LOCATIONS WHERE VERTICAL CLEARANCE IS LESS THAN 80" AFF. SEE DETAIL 5/A3.1
19	PATCH AND REPAIR POOL BASIN FLOOR WHERE NEW WORK OCCURRED FOR VGB DRAINS, FIBERGLASS LINER REPLACEMENT TO BE CONSOLIDATED; REF STRUCTURAL.
20	REPAIR HOLES IN CONCRETE LEFT FROM REMOVING (E) ALUMINUM BENCHES AT 88 LOCATIONS; REF STRUCTURAL
21	INSTALL NEW STAIRS. REF. STRUCTURAL. PLAN
22	PATCH MASONRY AT (E) CASSED OPENING, INSTALL HOLLOW METAL FRAME AND DOOR FINISHED WITH HIGH PERFORMANCE COATING.

PLAN LEGEND

	KEYNOTE		EXISTING WALL CONSTRUCTION TO REMAIN
	NEW CONSTRUCTION		SECTION NUMBER DRAWING SHEET
	(E) DOOR TO REMAIN		DETAIL NUMBER DRAWING SHEET
	DOOR NUMBER SEE SCHEDULE		CALLOUT NUMBER DRAWING SHEET
	Room name ROOM NAME		SLIP RESISTANT COATING AT (E) CONCRETE STEPS AND RAMP
	EXTERIOR ELEVATION NUMBER & DRAWING SHEET		CONCRETE POOL DECK/CONCRETE PATIO REF. STRUCTURAL
	STOREFRONT TAG		

2 FILTER ROOM BASEMENT PLAN
1/8" = 1'-0"



1 MAIN FLOOR PLAN
1/8" = 1'-0"



RAY WILLIAMSON POOL RENOVATION

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SMS
PROJECT MANAGER
LB
DRAWN
Author

RAY WILLIAMSON POOL FLOOR PLAN

A-1.0
2208

KEYNOTE LEGEND	
1	INSTALL NEW POOL EQUIPMENT, POOL STEP HANDRAIL AND STARTING BLOCK ANCHORS. COORDINATE WITH STRUCTURAL.
2	FURNISH AND INSTALL "NO DIVING SIGNAGE, TYPICAL; REF. 8/A-4.0.
3	FURNISH AND INSTALL DEPTH MARKER SIGNAGE AT SHALLOW AND DEEP END O.C. AND SIDES OF POOL- TYP AT TOP OF DECK AND VERTICAL EDGE OF DECK CANTILEVER; REF. A-1.2 AND 8/A-4.0.
4	FURNISH AND INSTALL NEW PLASTER POOL LINER. REFER TO STRUCTURAL FOR REPAIR/PATCH OF (E) POOL BASIN PRIOR TO INSTALLATION OF NEW PLASTER LINER.
5	FURNISH AND INSTALL POLO MARKERS; REF. A-1.2.
6	INSTALL LANE DIVIDER ANCHOR AT EACH POOL END, (10 TOTAL). SEE 1/A-1.2 FOR SPACING. REF. STRUCTURAL 2/S-3.0.
7	INSTALL LANE ANCHOR AT 24'- 10" FROM SHALLOW END OF POOL, (2 TOTAL). REF. STRUCTURAL 2/S-3.0.

EQUIPMENT SCHEDULE			
MARK	EQUIP	COUNT	Comments
A	NEW STARTING BLOCK	6	INSTALL NEW STARTING BLOCKS ANCHORS, CENTER OF EACH LANE
B	POOL LADDER RAIL	4	INSTALL NEW POOL LADDER RAIL. INSERTS TO BE INSTALLED PER MANUFACTURER.

SPECIAL NOTES

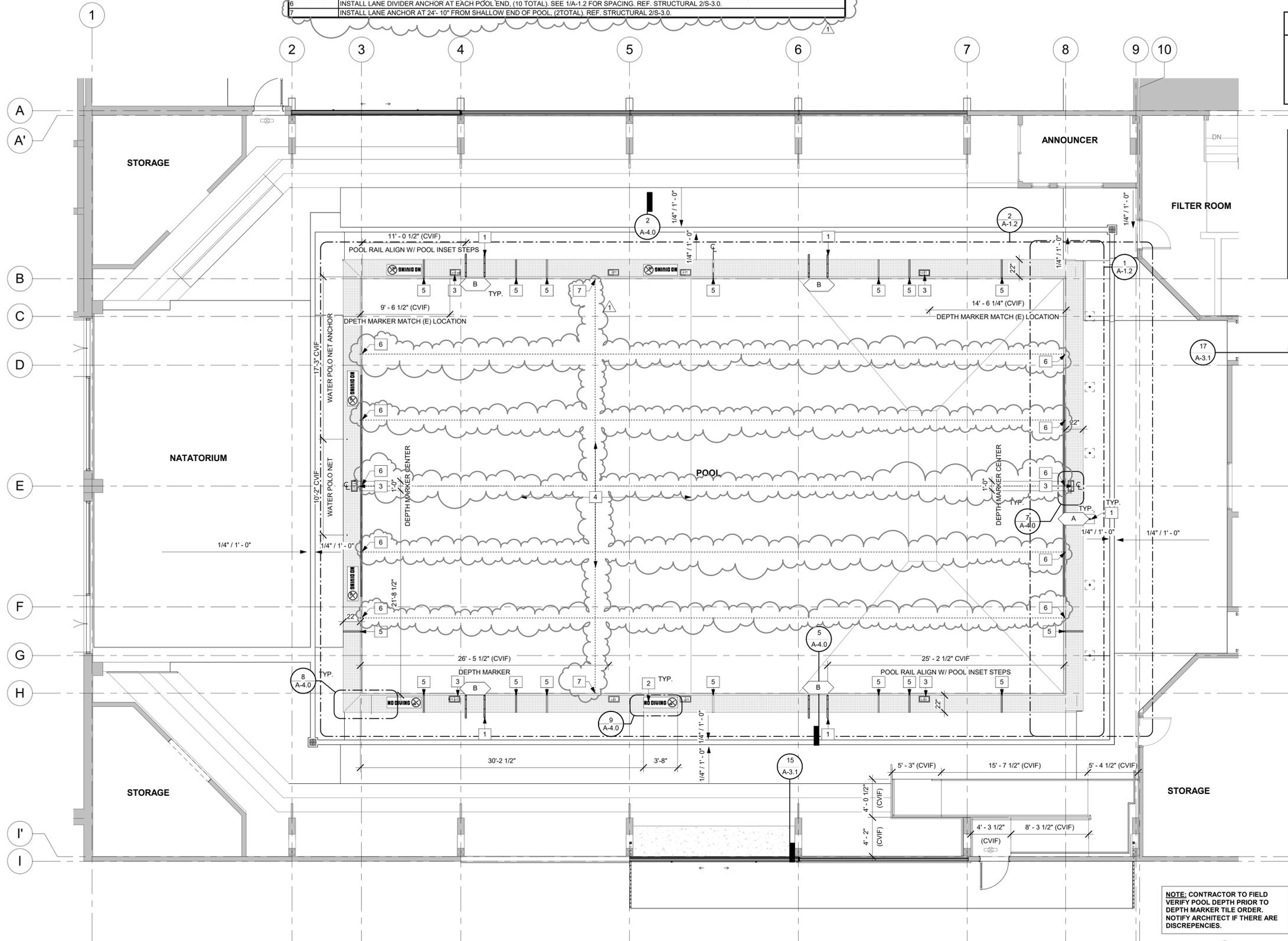
- CONTRACTOR TO FIELD VERIFY ALL (E) FIXTURE LOCATIONS; FIXTURES, INSERTS, AND ANCHORS. INSTALL BLOCKING AT (E) LOCATION FOR FIXTURES TO BE REINSTALLED IN PLACE IN NEW DECK.
- FOR ALL POOL EQUIPMENT, REQUIRED TO BE INSTALLED PER FINA AND CITY OF BAINBRIDGE ISLAND HEALTH DEPT. REQUIREMENTS; COORDINATE WITH BAINBRIDGE ISLAND PARKS REPRESENTATIVE.

GENERAL NOTES

- POOL RAIL AND POLO MARKER LOCATIONS SYMMETRICAL ON EAST AND WEST SIDE OF THE POOL. DIMENSIONS ONLY SHOWN ON ONE SIDE FOR CLARITY

EQUIPMENT LEGEND

- EXISTING CONSTRUCTION
- NEW WORK
- KEYNOTE
- SIM DETAIL NUMBER SHEET
- EQUIPMENT TAG



NOTE: CONTRACTOR TO FIELD VERIFY POOL DEPTH PRIOR TO DEPTH MARKER TILE ORDER. NOTIFY ARCHITECT IF THERE ARE DISCREPANCIES.

1 EQUIPMENT PLAN
 3/16" = 1'-0"

RAY WILLIAMSON POOL RENOVATION

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 BAINBRIDGE ISLAND, WA 98110

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RAY WILLIAMSON POOL EQUIPMENT PLAN

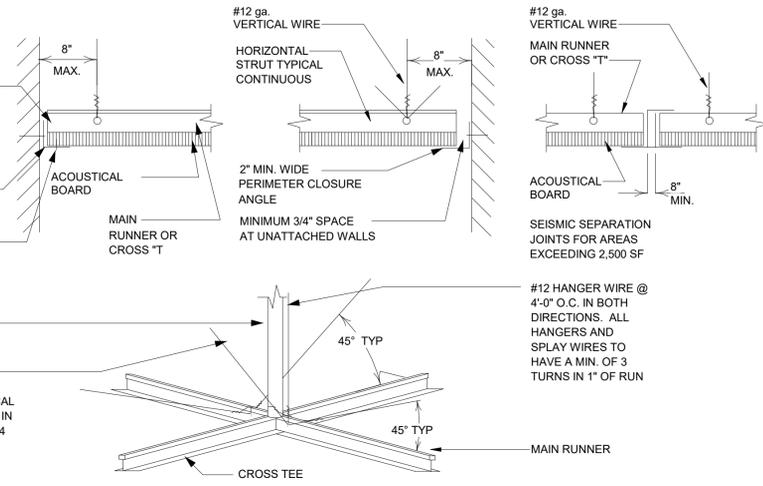
A-1.1
 2208

KEYNOTE LEGEND	
1	REMOVE AND REPLACE (E) ACOUSTICAL TILE AND GRID AND REPLACE WITH ACT AND GRID SYSTEM. (E) CONDUIT AND LIGHTING TO REMAIN IN PLACE. TEMPORARILY REMOVE (E) DUCTWORK TO ACCOMMODATE INSTALLATION OF ACT AND GRID SYSTEM; REINSTALL AFTER CONSTRUCTION IS COMPLETED. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS PRIOR TO START OF WORK.

NOTE: SEE SPECIFICATIONS FOR EDGE DETAIL INFORMATION

2" MIN. WIDE PERIMETER CLOSURE ANGLE
1/8" POP RIVET @ ALL MEMBERS ONE WALL

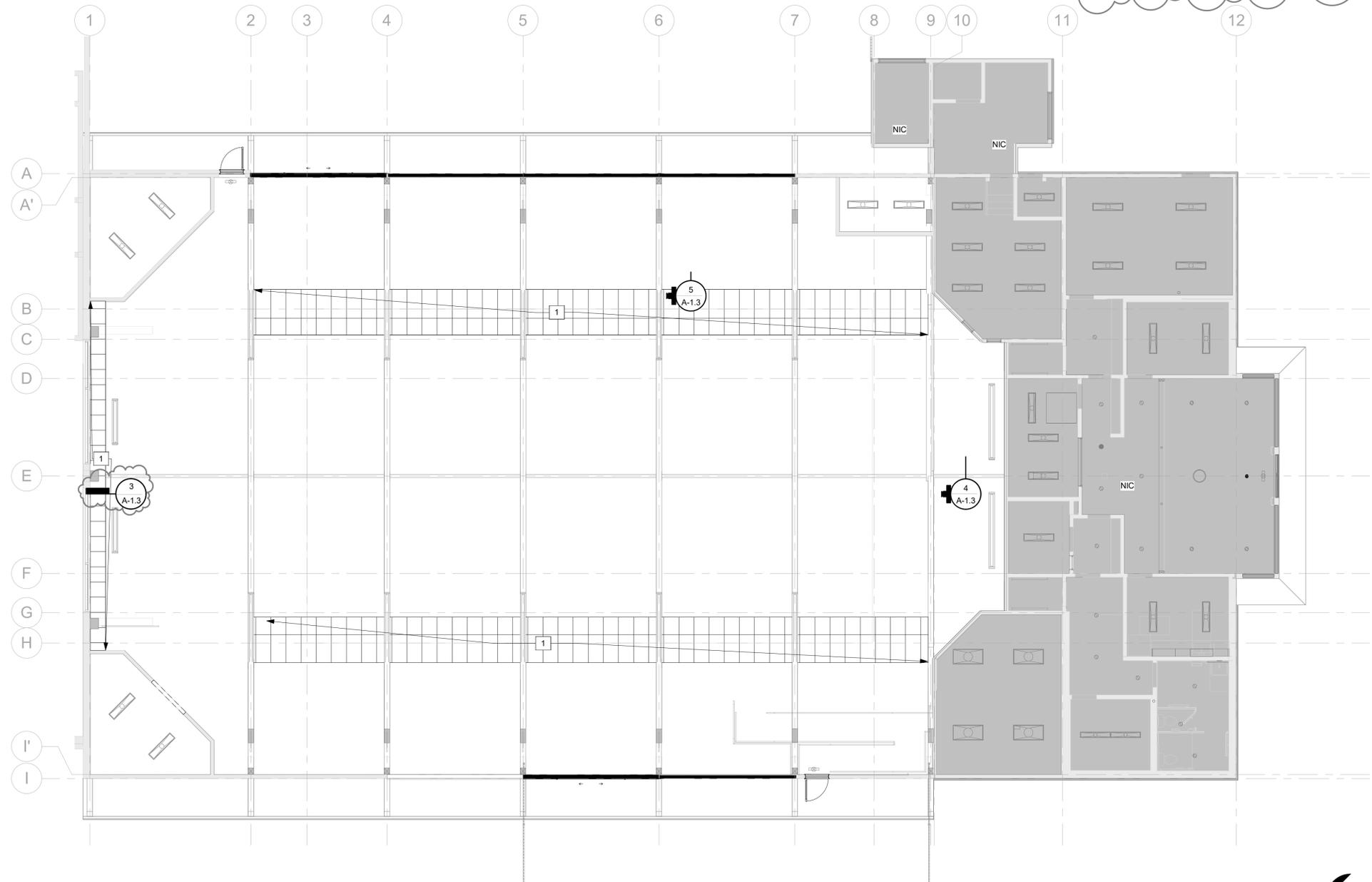
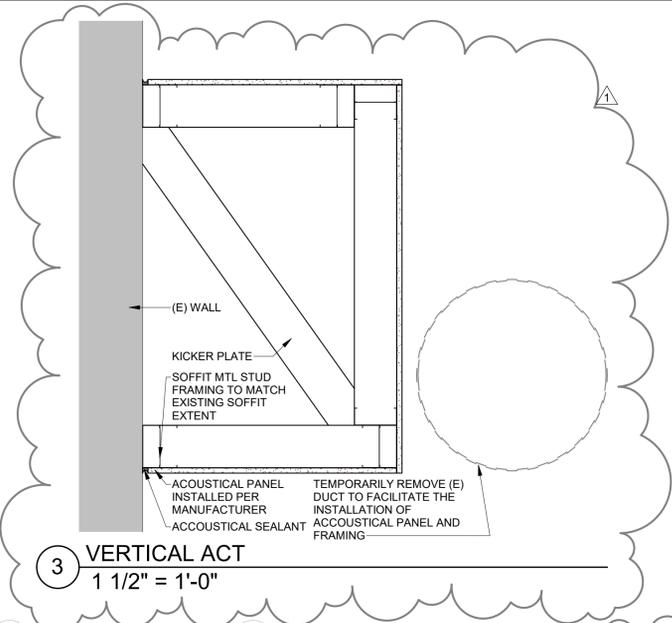
VERTICAL SEISMIC STRUT @ 12' O.C.
#12 ga. SPLAY WIRE BRACING IN PLANE OF EACH RUNNER VERTICAL ANGLE OF 45° (12' O.C. IN BOTH DIRECTIONS. 144 SQ.FT. MAX) START WITHIN 4' OF WALL



2 TYPICAL SUSPENDED GRID DETAIL.
1 1/2" = 1'-0"

3 VERTICAL ACT
1 1/2" = 1'-0"

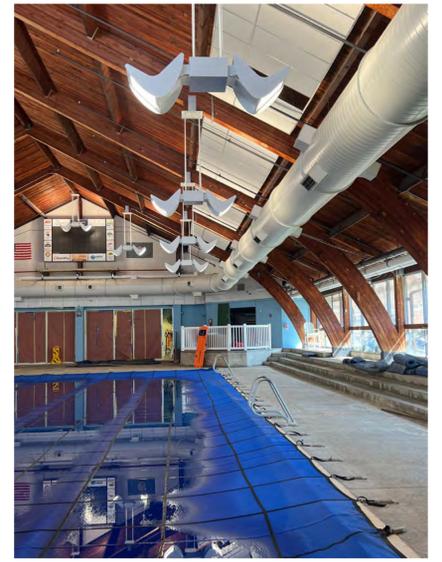
RCP LEGEND	
	EXISTING CONSTRUCTION
#	KEYNOTES
(E)	EXIT SIGN
A-#	ELEVATION REFERENCE: NUMBER SHEET
Room name	
#	ROOM TAG
	NIC
	EXISTING FIXTURES
	ACOUSTICAL CEILING TILE
	EXISTING CEILING



1 REFLECTED CEILING PLAN
1/8" = 1'-0"



4 NATATORIUM OVERALL



5 NORTH AND EAST (E) ACT

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REFLECTED
CEILING
PLAN

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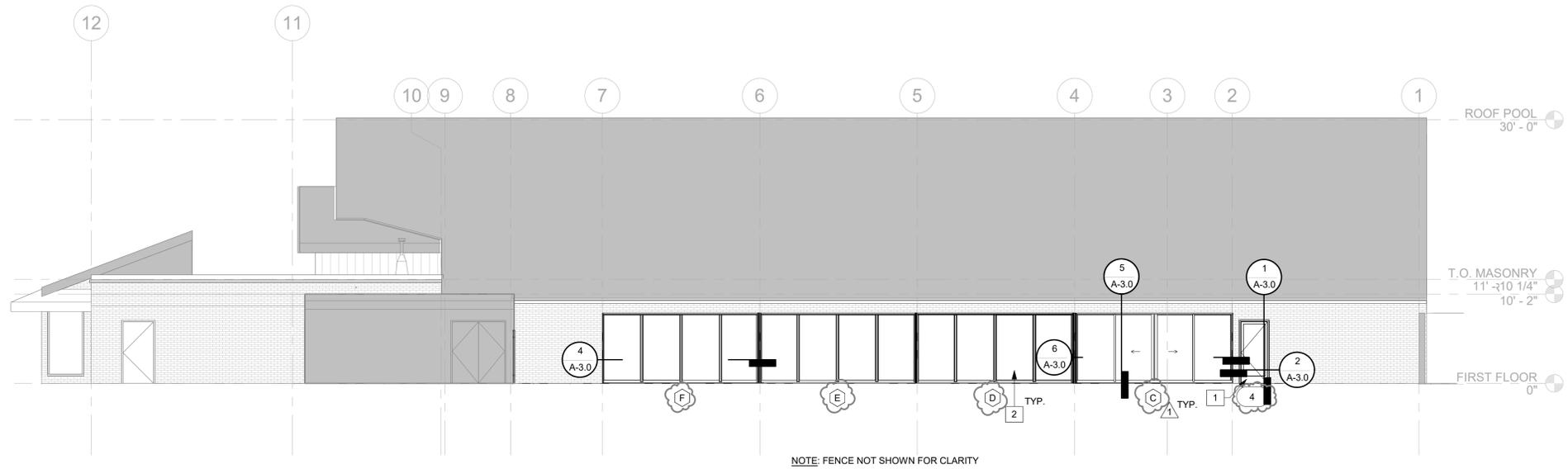
ELEVATION GENERAL NOTES	
1.	EXISTING DIMENSIONS SHOWN ARE FOR REFERENCE ONLY. DIMENSIONS SHALL BE FIELD VERIFIED BY GC. CONTACT THE ARCHITECT IF DISCREPANCIES ARE DISCOVERED.
2.	CONTRACTOR IS RESPONSIBLE FOR JOB SITE SAFETY AND COMPLIANCE WITH ALL STATE OR LOCAL CODES AND ORDINANCES GOVERNING THE WORK.

ELEVATION KEYNOTE LEGEND	
1	FURNISH AND INSTALL EXTERIOR DOOR, DOOR FRAME, ALL ASSOCIATED ADA HARDWARE.
2	FURNISH AND INSTALL NEW STOREFRONT SYSTEM, IN ITS ENTIRETY. REF A3.0 FOR DETAILS, TYP.
3	FURNISH AND INSTALL LOUVER AND FRAME WHERE OLD LOUVERS WERE REMOVED. REFER TO MECHANICAL.

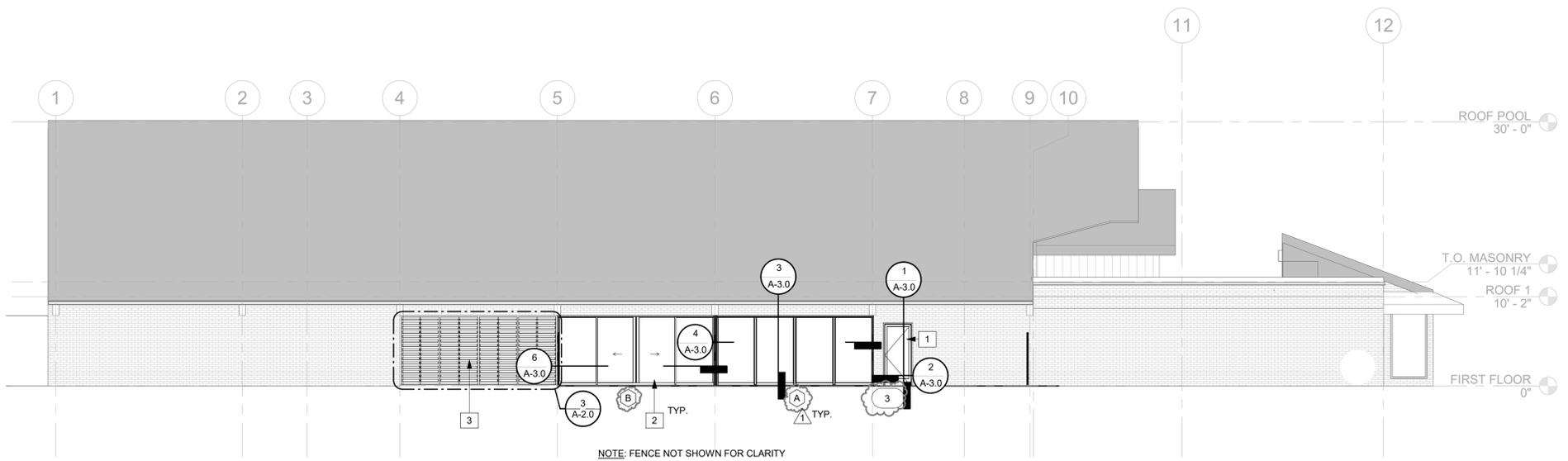
BUILDING ENVELOPE REQUIREMENTS				
C503.3.2.1 REPLACEMENT FENESTRATION PRODUCTS SHALL MEET TABLE C402.4				
PRESCRIPTIVE PERFORMANCE: 2018 WSEC TABLES C402.1.3, C402.1.4, AND C402.4)				
CLIMATE ZONE: 4C (KITSAP)				
COMPONENTS	REQUIRED MIN INSUL R-VALUE	ASSEMBLY MAX U-FACTOR	PROPOSED INSUL R-VALUE	PROPOSED U-FACTOR
VERTICAL FENESTRATION:				
FIXED (CLASS AW)		0.38		0.38
OPERABLE (CLASS AW)		0.40		0.40
OTHER VERTICAL FENESTRATION		0.30		0.30
ENTRANCE DOORS:		0.60		0.60
SKYLIGHTS:		0.50		0.50
FENESTRATION:				
PF<0.2	SEW	N		
0.2<PF<0.5	0.46	0.56		
PF>0.5	0.61	0.61		
SKYLIGHT				
		0.35		
MAXIMUM AREA C402.4.1:				
TOTAL VERTICAL FENESTRATION: MAX 30% ABV. GRADE WALL				
TOTAL SKYLIGHT: MAX 5% TOTAL GROSS ROOF AREA				
NOTES:				
1. INSULATION PRODUCTS SHALL ALL HAVE IDENTIFICATION MARKS				
2. GLAZING PRODUCTS SHALL BE LABELED WITH U-FACTOR, SHGC, VT, AND LEAKAGE RATING.				
3. WHERE TWO OR MORE LAYERS OF RIGID INSULATION WILL BE USED, EDGE JOINTS BETWEEN LAYERS ARE STAGGERED				



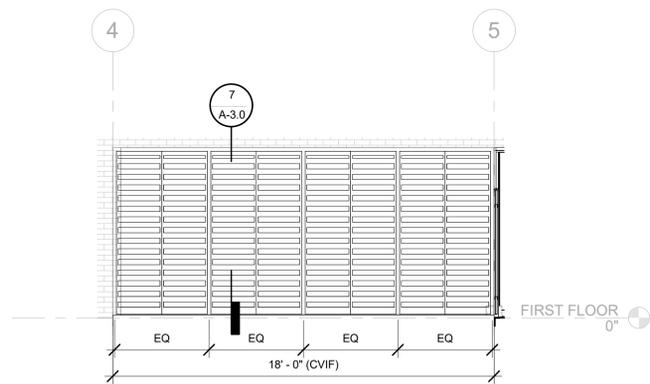
ELEVATION LEGEND	
#	KEYNOTES
■	NIC
①	STOREFRONT TAG
①	SIM
A101	DETAIL NUMBER SHEET



1 EAST ELEVATION
1/8" = 1'-0"



2 WEST ELEVATION
1/8" = 1'-0"



3 LOUVER ELEVATION
1/4" = 1'-0"

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1	ADDENDUM 3 03.04.2026

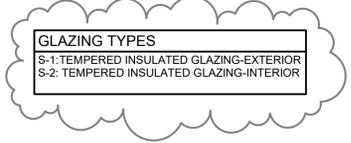
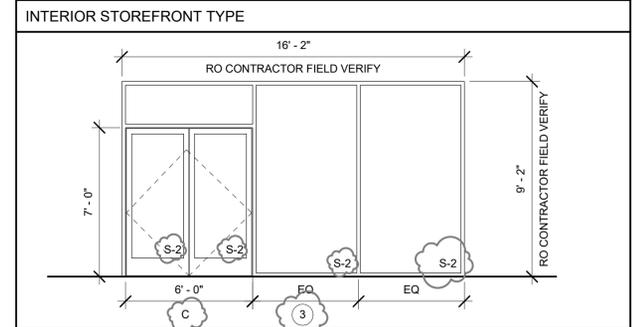
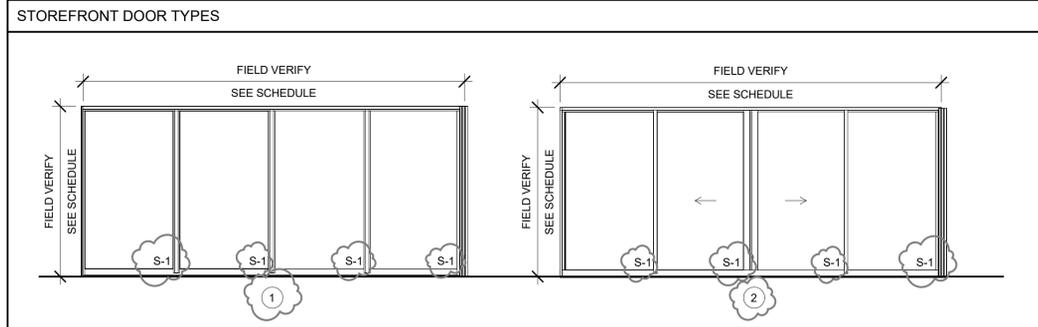
PROJECT ARCHITECT
SMS
PROJECT MANAGER
LB
DRAWN
Author

EXTERIOR ELEVATIONS

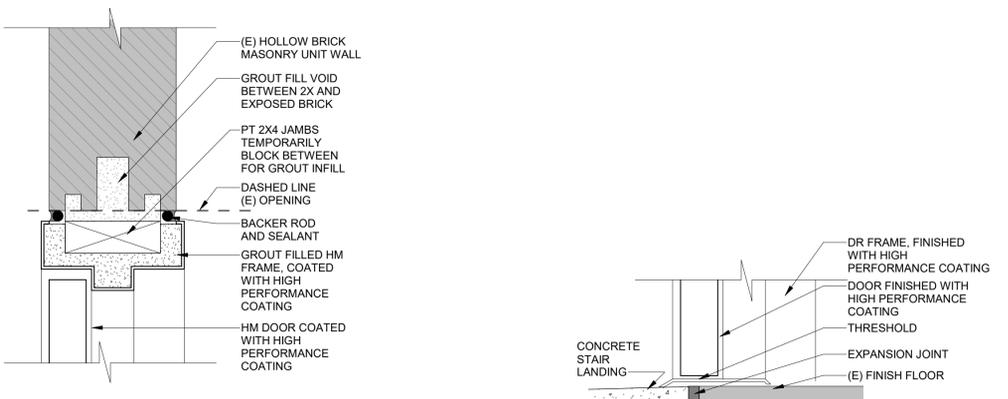
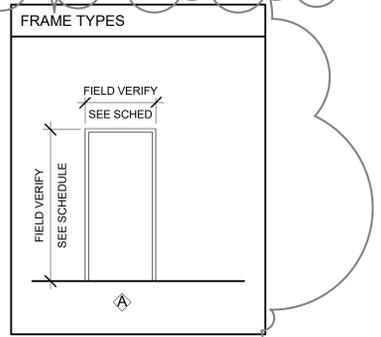
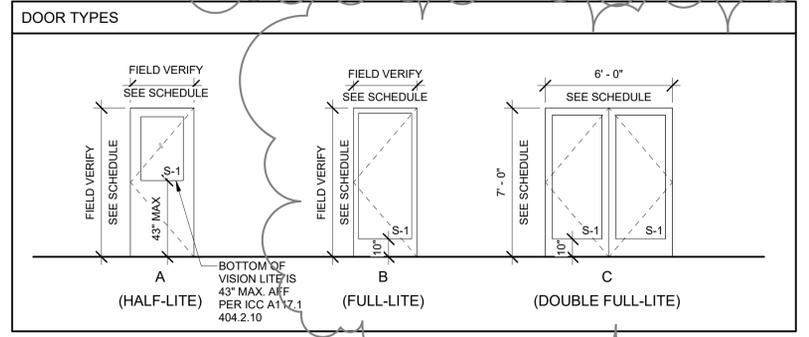
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STOREFRONT SCHEDULE												
#	TYPE	WIDTH	HEIGHT	COUNT	ROOM	U-VALUE	SHGC	FINISH	DETAILS			NOTES
									JAMB	HEAD	SILL/THRESHOLD	
A	B	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	4A&B/A3.0	3/A3.0	3/A3.0	RO FIELD VEIRFY
B	C	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	6B&C/A3.0	5/A3.0	5/A3.0	RO FIELD VEIRFY
C	B	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	6A&B/A3.0	5/A3.0	5/A3.0	RO FIELD VEIRFY
D	B	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	4B/A3.0	3/A3.0	3/A3.0	RO FIELD VEIRFY
E	B	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	4B/A3.0	3/A3.0	3/A3.0	RO FIELD VEIRFY
F	B	18'-0"	8'-0"	1	NATORIUM	0.34	0.46	FF	4A&B/A3.0	3/A3.0	3/A3.0	RO FIELD VEIRFY
G	D	16'-2"	9'-2"	1	NATORIUM	N/A	N/A	FF	11/A-3.1	9/A-3.1	9 & 10/A-3.1	RO FIELD VEIRFY-INTERIOR
H	D	16'-2"	9'-2"	1	NATORIUM	N/A	N/A	FF	11/A-3.1	9/A-3.1	9 & 10/A-3.1	RO FIELD VEIRFY-INTERIOR

- DOOR & HARDWARE GENERAL NOTES**
- CONTRACTOR IS TO FIELD VERIFY ROUGH OPENINGS WHERE DOORS AND FRAMES ARE TO BE REPLACED.
 - PER IBC 1010.1.3 DOOR OPENING FORCE: THE FORCE OF PUSHING OR PULLING OPEN INTERIOR SWINGING EGRESS DOORS, OTHER THAN FIRE DOORS, SHALL NOT EXCEED 5 POUNDS. FOR OTHER SWINGING DOORS, AS WELL AS SLIDING AND FOLDING DOORS, THE DOOR LATCH SHALL RELEASE WHEN SUBJECTED TO A 15 POUND FORCE. THE DOOR SHALL BE SET IN MOTION WHEN SUBJECTED TO A 30 POUND FORCE. THE DOOR SHALL SWING TO A FULL OPEN POSITION WHEN SUBJECTED TO A 15 POUND FORCE.
 - PROVIDE HARDWARE FOR ALL DOORS REQUIRED TO BE ACCESSIBLE PER IBC CHAPTER 10 AND ICC A117.1.
 - THE BOTTOM 10 INCHES OF ALL DOORS AND/ OR GATES SHALL HAVE A SMOOTH, UNINTERRUPTED SURFACE TO ALLOW THE DOOR OR GATE TO BE OPENED BY A WHEELCHAIR FOOTREST WITHOUT CREATING A TRAP OR HAZARDOUS CONDITION (ICC A117.1 404.2.9). EXCEPTION: SLIDING DOORS NOT REQUIRED TO COMPLY.
 - CHANGES IN LEVEL OF 1/4" MAXIMUM IN HEIGHT SHALL BE PERMITTED TO BE VERTICAL. CHANGES IN LEVEL GREATER THAN 1/2" IN HEIGHT AND NOT MORE THAN 1/2" MAXIMUM IN HEIGHT SHALL BE BEVELED WITH A SLOPE NOT STEEPER THAN 1:2. (ICC A117.1 303.2 AND 303.3)
 - PROVIDE LEVER TYPE HANDLES, MOUNTED BETWEEN 34" MIN AND 48" MAX. AT ALL SPACES SCHEDULED TO BE ACCESSIBLE PER CODE. (ICC A117.1 404.2.6.1)
 - DOOR HARDWARE WITH MORE THAN TWO LOCKING OR LATCHING DEVICES MUST HAVE A SINGLE ACTION OPENING DEVICE. DEAD BOLT AND LEVER HANDLE MUST UNLATCH AT THE SAME TIME WITH ONE MOVEMENT.
 - DOOR CLOSER SHALL BE ADJUSTED SO THAT FROM AN OPEN POSITION OF 90 DEGREES, THE TIME REQUIRED TO MOVE THE DOOR OR GATE TO AN OPEN POSITION OF 12 DEGREES SHALL BE 5 SECONDS MINIMUM. (ICC A117.1 404.2.7.1)
 - REFER TO SPECIFICATIONS FOR HARDWARE SETS.



DOOR SCHEDULE																
DOOR NO.	ROOM	WIDTH	HEIGHT	THICKNESS	FIRE RATING	DOOR			FRAME			DETAILS			NOTES	HARDWARE GROUP
						DOOR TYPE	MATERIAL	FINISH	FRAME TYPE	MATERIAL	FINISH	JAMB	HEAD	SILL/THRESHOLD		
1	HALL 3 (NIC)	3'-0"	6'-8"	1 3/4"		AAA	FIBERGLASS	FF	A	FIBERGLASS	FF	1/A 5.0	1/A 5.0	2/A 5.0		HW 4
2	HALL 2 (NIC)	3'-0"	6'-8"	1 3/4"		AAA	FIBERGLASS	FE	A	FIBERGLASS	FE	1/A 5.0	1/A 5.0	2/A 5.0		HW 4
3	NATORIUM	3'-0"	7'-0"	2"	N/A	B	ALUMINUM	FF		ALUMINUM	FF	2/A 3.0	1/A 3.0	1/A 3.0	DOOR AND FRAME TO MATCH STOREFRONT TYPE 1 AND 2	HW 1
4	NATORIUM	3'-0"	7'-0"	2"	N/A	B	ALUMINUM	FF		ALUMINUM	FF	2/A 3.0	1/A 3.0	1/A 3.0	DOOR AND FRAME TO MATCH STOREFRONT TYPE 1 AND 2	HW 1
5	NATORIUM	6'-0"	7'-0"	2"	N/A	C	ALUMINUM	FF		ALUMINUM	FF	11/A 3.1	10/A 3.1	10/A 3.1	DOOR AND FRAME TO MATCH STOREFRONT TYPE 3	HW 3
6	NATORIUM	6'-0"	7'-0"	2"	N/A	C	ALUMINUM	FF		ALUMINUM	FF	11/A 3.1	10/A 3.1	10/A 3.1	DOOR AND FRAME TO MATCH STOREFRONT TYPE 3	HW 2



1 INTERIOR HOLLOW METAL DOOR @ BRICK HEAD/ JAMB
3" = 1'-0"

2 DOOR THRESHOLD
3" = 1'-0"



RAY WILLIAMSON POOL RENOVATION
8521 MADISON AVENUE N
BAINBRIDGE ISLAND, WA 98110

BID SET PHASE 2
03-04-2026

REVISIONS	
#	DATE
1	ADDENDUM 3 03.04.2026

PROJECT ARCHITECT
SMS
PROJECT MANAGER
LB
DRAWN

SCHEDULES

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RAY WILLIAMSON POOL RENOVATION
8521 MADISON AVENUE N
BAINBRIDGE ISLAND, WA 98110

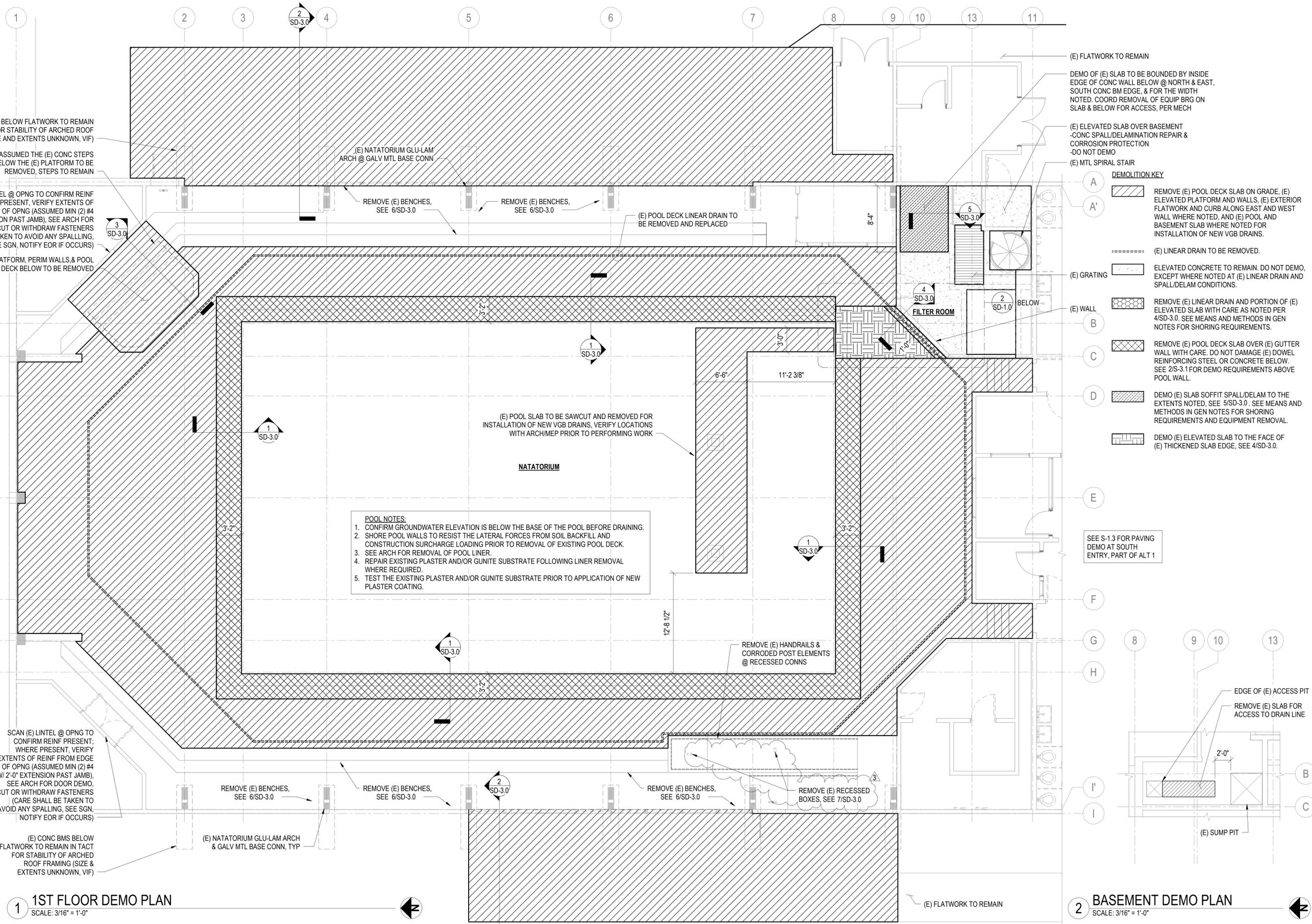
BID SET PHASE 2 01/30/2026

#	DATE
3	03/04/2026

PROJECT ENGINEER
JB
PROJECT MANAGER
ML
DRAWN BY
AB

1ST FLOOR DEMO PLAN

SD-1.0
2022.133



(E) CONC BMS BELOW FLATWORK TO REMAIN IN TACT FOR STABILITY OF ARCHED ROOF FRAMING (SIZE AND EXTENTS UNKNOWN, VIF)

IT IS ASSUMED THE (E) CONC STEPS EXTEND BELOW THE (E) PLATFORM TO BE REMOVED, STEPS TO REMAIN

SCAN (E) LINTEL @ OPNG TO CONFIRM REINF PRESENT; WHERE PRESENT, VERIFY EXTENTS OF REINF FROM EDGE OF OPNG (ASSUMED MIN (2) #4 W/ 2'-0" EXTENSION PAST JAMB), SEE ARCH FOR DOOR DEMO. CUT OR WITHDRAW FASTENERS (CARE SHALL BE TAKEN TO AVOID ANY SPALLING, SEE SGN, NOTIFY EOR IF OCCURS)

(E) PLATFORM, PERIM WALLS & POOL DECK BELOW TO BE REMOVED

SCAN (E) LINTEL @ OPNG TO CONFIRM REINF PRESENT; WHERE PRESENT, VERIFY EXTENTS OF REINF FROM EDGE OF OPNG (ASSUMED MIN (2) #4 W/ 2'-0" EXTENSION PAST JAMB), SEE ARCH FOR DOOR DEMO. CUT OR WITHDRAW FASTENERS (CARE SHALL BE TAKEN TO AVOID ANY SPALLING, SEE SGN, NOTIFY EOR IF OCCURS)

(E) CONC BMS BELOW FLATWORK TO REMAIN IN TACT FOR STABILITY OF ARCHED ROOF FRAMING (SIZE & EXTENTS UNKNOWN, VIF)

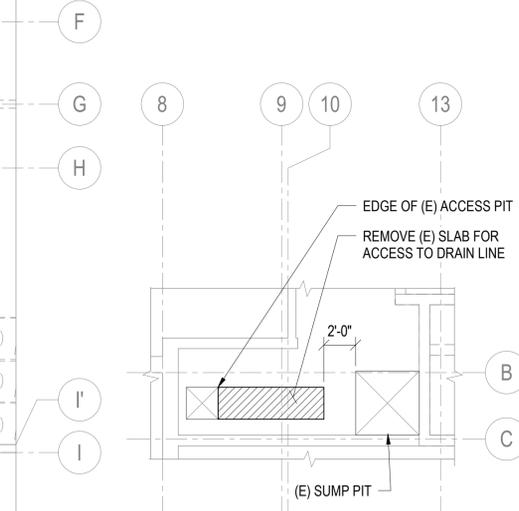
1 1ST FLOOR DEMO PLAN
SCALE: 3/16" = 1'-0"

(E) FLATWORK TO REMAIN
DEMO OF (E) SLAB TO BE BOUNDED BY INSIDE EDGE OF CONC WALL BELOW @ NORTH & EAST, SOUTH CONC BM EDGE, & FOR THE WIDTH NOTED. COORD REMOVAL OF EQUIP BRG ON SLAB & BELOW FOR ACCESS, PER MECH

(E) ELEVATED SLAB OVER BASEMENT - CONC SPALL/DELAMINATION REPAIR & CORROSION PROTECTION - DO NOT DEMO
(E) MTL SPIRAL STAIR

- DEMOLITION KEY**
- (A) [Hatched Pattern] REMOVE (E) POOL DECK SLAB ON GRADE, (E) ELEVATED PLATFORM AND WALLS, (E) EXTERIOR FLATWORK AND CURB ALONG EAST AND WEST WALL WHERE NOTED, AND (E) POOL AND BASEMENT SLAB WHERE NOTED FOR INSTALLATION OF NEW VGB DRAINS.
 - (A') [Dashed Line] (E) LINEAR DRAIN TO BE REMOVED.
 - (E) GRATING [Dotted Pattern] ELEVATED CONCRETE TO REMAIN, DO NOT DEMO, EXCEPT WHERE NOTED AT (E) LINEAR DRAIN AND SPALL/DELAM CONDITIONS.
 - (E) WALL [Cross-hatched Pattern] REMOVE (E) LINEAR DRAIN AND PORTION OF (E) ELEVATED SLAB WITH CARE AS NOTED PER 4/SD-3.0. SEE MEANS AND METHODS IN GEN NOTES FOR SHORING REQUIREMENTS.
 - (B) [Diagonal Hatched Pattern] REMOVE (E) POOL DECK SLAB OVER (E) GUTTER WALL WITH CARE. DO NOT DAMAGE (E) DOWEL REINFORCING STEEL OR CONCRETE BELOW. SEE 2/S-3.1 FOR DEMO REQUIREMENTS ABOVE POOL WALL.
 - (C) [Horizontal Hatched Pattern] DEMO (E) SLAB SOFFIT SPALL/DELAM TO THE EXTENTS NOTED, SEE 5/SD-3.0. SEE MEANS AND METHODS IN GEN NOTES FOR SHORING REQUIREMENTS AND EQUIPMENT REMOVAL.
 - (D) [Vertical Hatched Pattern] DEMO (E) ELEVATED SLAB TO THE FACE OF (E) THICKENED SLAB EDGE, SEE 4/SD-3.0.

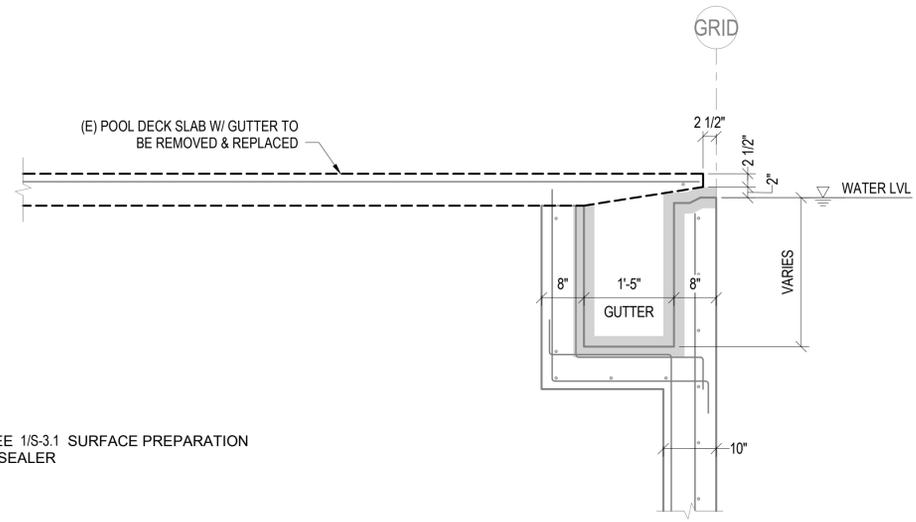
SEE S-1.3 FOR PAVING DEMO AT SOUTH ENTRY, PART OF ALT 1



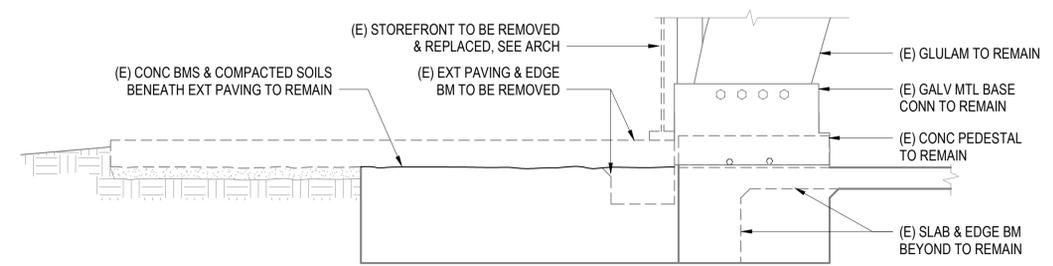
2 BASEMENT DEMO PLAN
SCALE: 3/16" = 1'-0"

POOL NOTES:
1. CONFIRM GROUNDWATER ELEVATION IS BELOW THE BASE OF THE POOL BEFORE DRAINING.
2. SHORE POOL WALLS TO RESIST THE LATERAL FORCES FROM SOIL BACKFILL AND CONSTRUCTION SURCHARGE LOADING PRIOR TO REMOVAL OF EXISTING POOL DECK.
3. SEE ARCH FOR REMOVAL OF POOL LINER.
4. REPAIR EXISTING PLASTER AND/OR GUNITE SUBSTRATE FOLLOWING LINER REMOVAL WHERE REQUIRED.
5. TEST THE EXISTING PLASTER AND/OR GUNITE SUBSTRATE PRIOR TO APPLICATION OF NEW PLASTER COATING.

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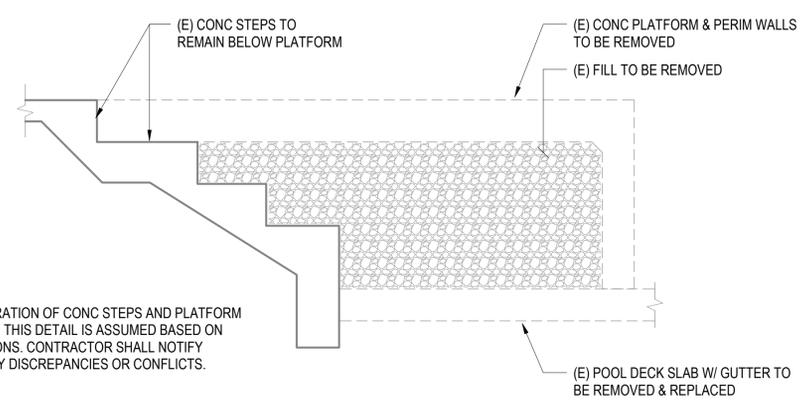


1 (E) POOL DECK SLAB REMOVAL DETAIL
SCALE: 3/4" = 1'-0"



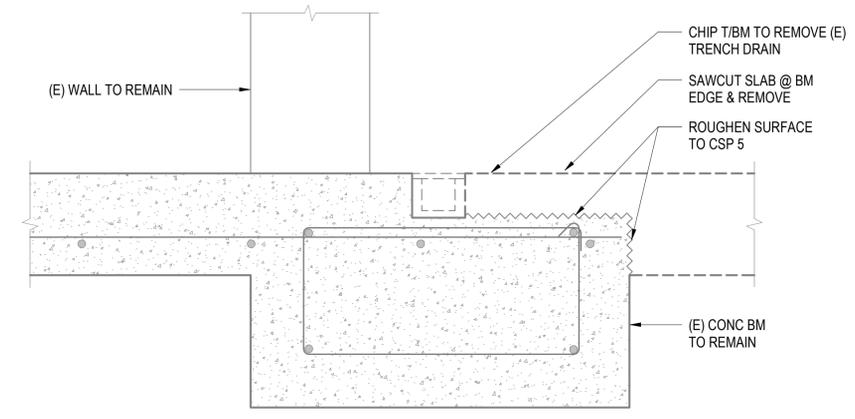
2 (E) PLATFORM, PERIMETER WALLS, AND POOL DECK SLAB REMOVAL DETAIL
SCALE: NTS

NOTE:
1. CONC BEAMS BENEATH THE PAVING ARE LOCATED AT GLULAM BEARING LOCATIONS. EXACT CONFIGURATION OF EDGE BEAMS AND CONC BEAMS BENEATH PAVING ARE NOT KNOWN, THIS DETAIL IS ASSUMED BASED ON SITE OBSERVATIONS. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONFLICTS.



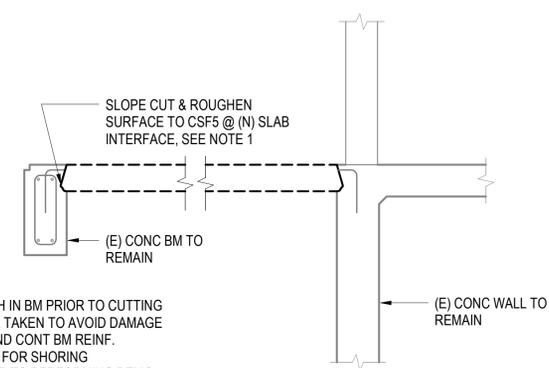
3 (E) PLATFORM, PERIMETER WALLS, AND POOL DECK SLAB REMOVAL DETAIL
SCALE: NTS

NOTE:
1. EXACT CONFIGURATION OF CONC STEPS AND PLATFORM ARE NOT KNOWN, THIS DETAIL IS ASSUMED BASED ON SITE OBSERVATIONS. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONFLICTS.



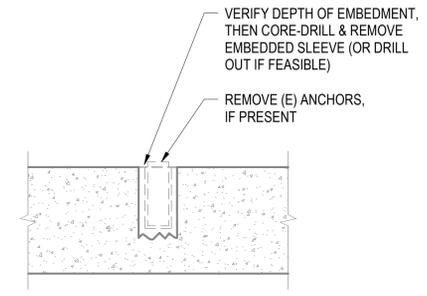
4 (E) DRAIN REMOVAL AND SLAB PREP AT ELEVATED SLAB
SCALE: NTS

NOTES:
1. SEE GENERAL NOTES FOR SHORING REQUIREMENTS PRIOR TO PERFORMING DEMO.
2. SEE TYPICAL DETAIL ON SHEET S-3.2 FOR CHIPPING OPERATIONS AND CLEANING OF REINF.



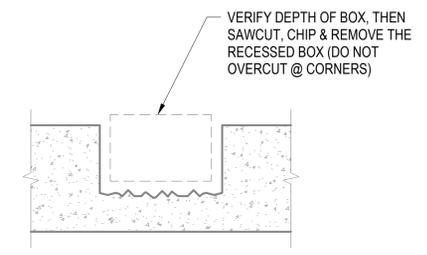
5 (E) SLAB REMOVAL
SCALE: NTS

NOTES:
1. LOCATE (E) TIE DEPTH IN BM PRIOR TO CUTTING SLAB. CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE (E) BM TIES AND CONT BM REINF.
2. SEE GENERAL NOTES FOR SHORING REQUIREMENTS PRIOR TO PERFORMING DEMO.
3. COORD REMOVAL OF EQUIP BRG ON SLAB & BELOW FOR ACCESS, PER MECH.



6 (E) BENCH ANCHORAGE REMOVAL
SCALE: NTS

NOTES:
1. USE CORE DRILL BIT (OR DRILL BIT) A MIN OF 1/2" LARGER THAN SLEEVE, MIN. 1" DIAMETER TOTAL.
2. SEE DETAIL 8/S-3.1 FOR INFILL AT SLEEVE REMOVAL LOCATIONS.



7 (E) RECESSED BOX REMOVAL
SCALE: NTS

NOTES:
1. VERIFY BOX DISCONNECT PRIOR TO DEMO.
2. SEE DETAIL 8/S-3.1, SIM, FOR INFILL AT RECESSED BOX REMOVAL LOCATIONS.

RAY WILLIAMSON POOL RENOVATION

**8521 MADISON AVENUE N
BAINBRIDGE ISLAND, WA 98110**

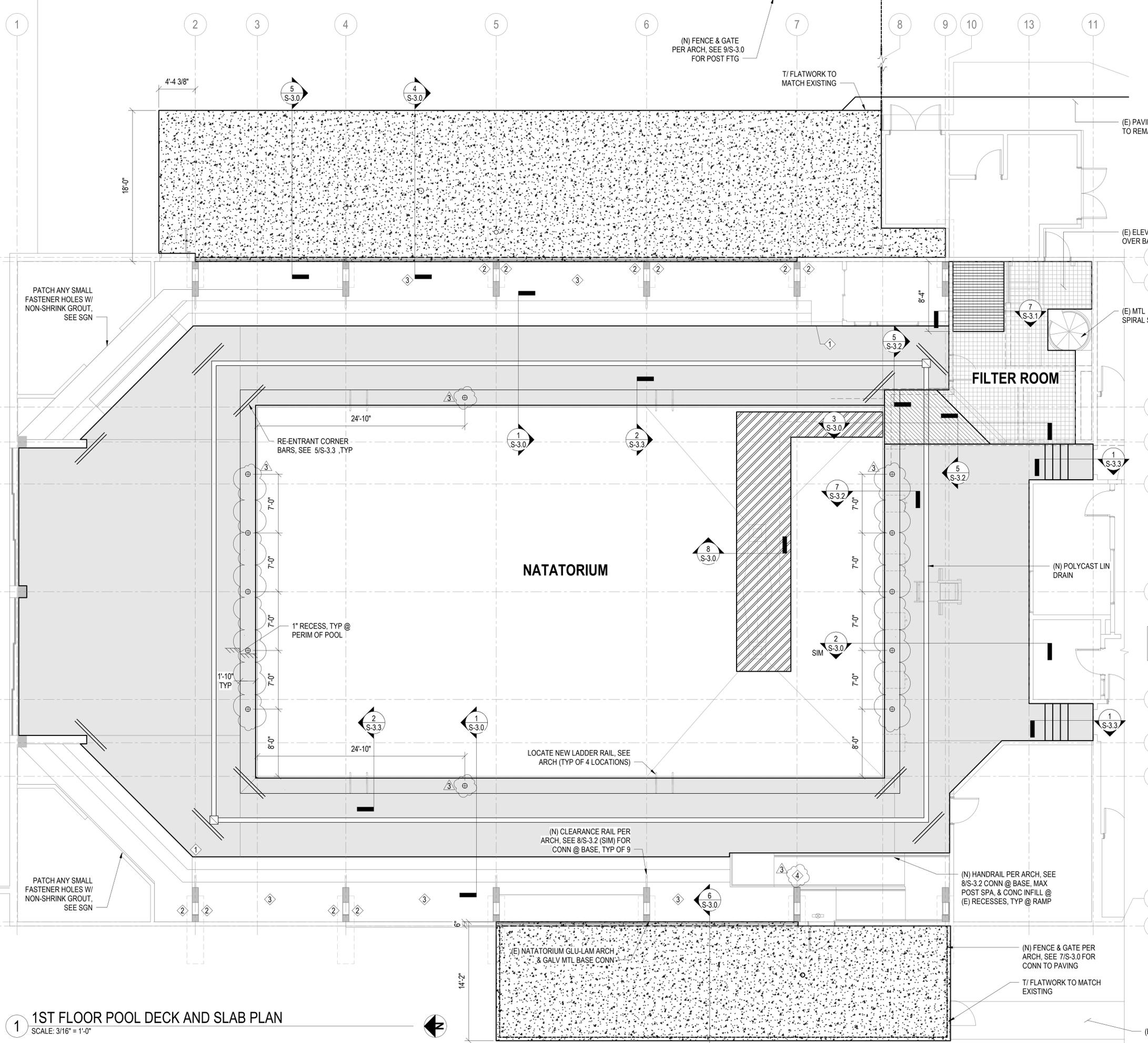
BID SET PHASE 2	01/30/2026
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#	DATE
3	03/04/2026

PROJECT ENGINEER	JB
PROJECT MANAGER	ML
DRAWN BY	AB

DEMO DETAILS

SD-3.0
2022.133



NOTES:
 1. SEE S-1.1 NEW POOL DECK DRAINAGE PLAN FOR NEW LINEAR DRAIN AND CATCH BASIN ALIGNMENT AND SLAB ELEVATIONS.
 2. SEE S-1.2 NEW POOL JOINTING AND POUR SCHEDULE.

KEYNOTES:
 ① CONC WALL SPALL / DELAM REPAIR, SEE 5/S-3.1 (SIM @ RISER, APPROX 8 SF OF REPAIR)
 ② REPAIR METAL BASE CONNECTION, SEE 7/S-3.0
 ③ INFILL HOLES @ REMOVED BENCH POSTS, SEE 8/S-3.1
 ④ INFILL (2) RECESSED BOXES, SEE 8/S-3.1, SIM

KEY

- (N) 7" POOL DECK SLAB ON GRADE W/ CORROSION INHIBITOR TREATMENT ON TOP SIDE (7" UNO)
- (N) 5" EXT. CONC SLAB ON GRADE (FLATWORK / PAVING)
- (N) 5" ELEVATED SLAB W/ CORROSION INHIBITOR ON TOP AND BOTTOM SIDES, SEE DETAIL 7/S-3.1
- (E) ELEVATED CONC SLAB W/ CORROSION INHIBITOR TREATMENT OF TOP AND BOTTOM SIDES, SEE 9/S-3.1
- (N) 8" ELEVATED POOL DECK SLAB W/ CORROSION INHIBITOR TREATMENT ON TOP AND BOTTOM SIDES, SEE 3/S-3.0
- (N) INFILL POOL SLAB, MATCH EXISTING SLAB DEPTH (6" MIN), SEE 8/S-3.0
- (N) LANE BRACKETS, SEE 1/S-3.0 & 2/S-3.0

SEE S-1.3 FOR PAVING PLAN AT SOUTH ENTRY, PART OF ALT 1



RAY WILLIAMSON POOL RENOVATION

8521 MADISON AVENUE N
 BAINBRIDGE ISLAND, WA 98110

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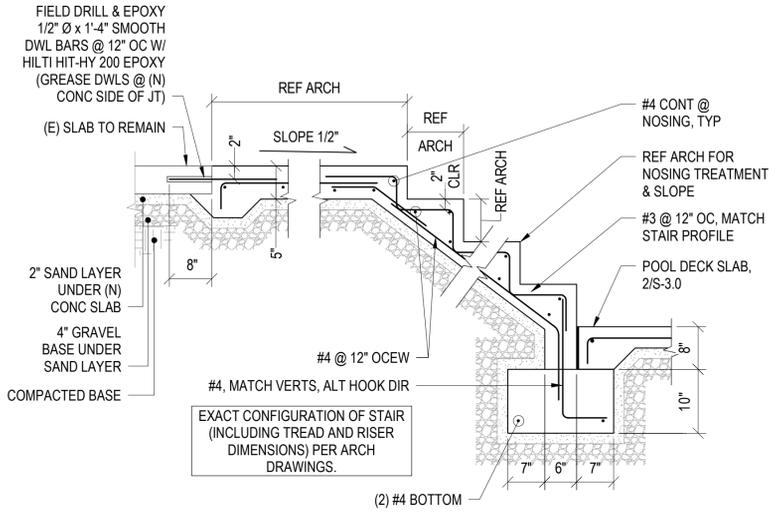
PROJECT ENGINEER: JB
 PROJECT MANAGER: ML
 DRAWN BY: AB

1ST FLOOR POOL DECK AND SLAB PLAN

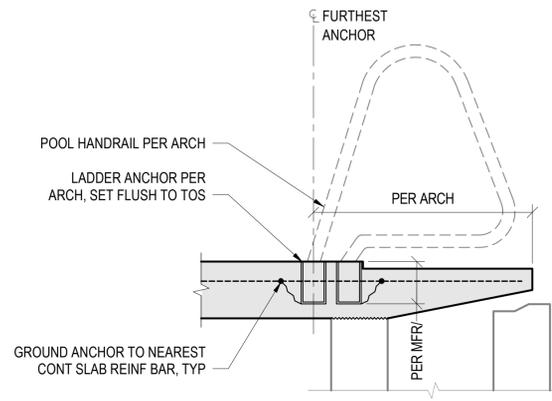
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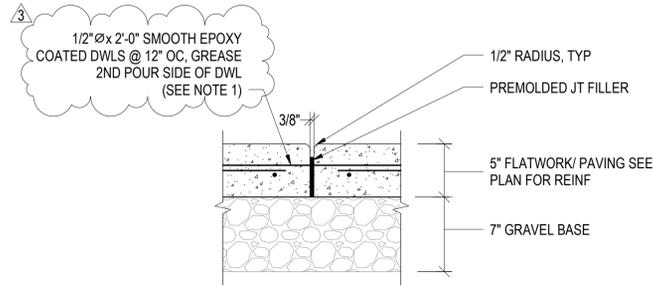
1 1ST FLOOR POOL DECK AND SLAB PLAN
 SCALE: 3/16" = 1'-0"



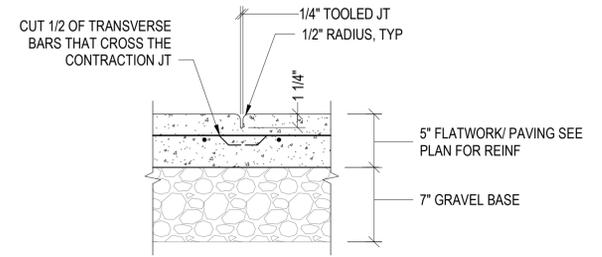
1 STAIR-ON-GRADE DETAIL
SCALE: 3/4" = 1'-0"



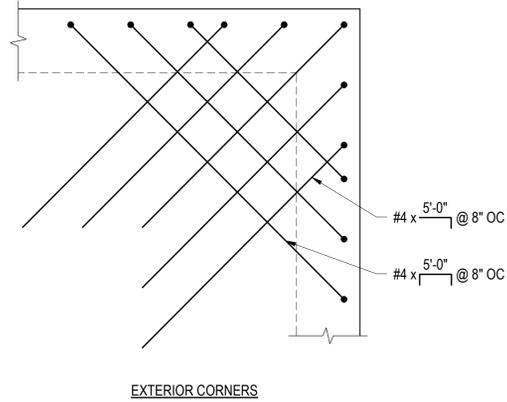
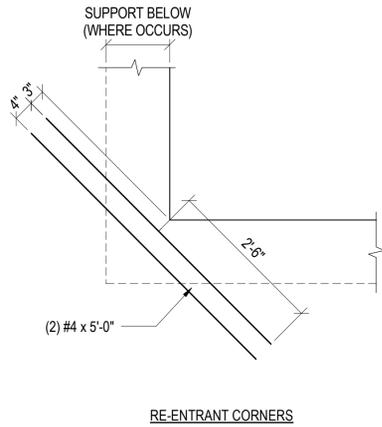
2 LADDER ANCHOR DETAIL
SCALE: 1" = 1'-0"



3 EXT PAVING EXPANSION JT DETAIL
SCALE: 1 1/2" = 1'-0"



4 EXT PAVING CONTRACTION JT DETAIL
SCALE: 1 1/2" = 1'-0"



5 TYPICAL ADDITIONAL REINFORCING AT SLAB CORNERS
SCALE: NTS

BID SET PHASE 2	01/30/2026
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PROJECT ENGINEER	JB
PROJECT MANAGER	ML
DRAWN BY	AB

DETAILS

MECHANICAL LEGEND

MECHANICAL ABBREVIATIONS:	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
AC		PIPE ELBOW DOWN		BACKDRAFT DAMPER
AFF		PIPE ELBOW UP		FIRE DAMPER
ASHRAE		FLANGE		FIRE AND SMOKE DAMPER
		FLEX CONNECTION		VOLUME DAMPER, MANUAL
BDD		TEE OUTLET UP		MOTOR OPERATED DAMPER
BFF		TEE OUTLET DOWN		DUCT OFFSET DOWN IN FLOW DIRECTION
BTUH		AUTOMATIC AIR VENT		DUCT OFFSET UP IN FLOW DIRECTION
CD		BALL VALVE		DUCT WITHOUT SOUND LINING
CFM		BALANCING VALVE		DUCT WITH INTERNAL ACOUSTICAL LINING
CIRC		BUTTERFLY VALVE		SINGLE LINE DUCT WITH INTERNAL LINING
CO		CHECK VALVE		FLEXIBLE CONNECTION OR FLEXIBLE DUCT
COND		GATE VALVE		FLEXIBLE DUCT
COORD		GLOBE VALVE		TRANSITION - RECTANGULAR TO ROUND
CW		PIPE SIZE REDUCTION		90° ROUND ELBOW (R/D OR R/W=1.5)
DEG		PIPE CAP		RECTANGULAR ELBOW WITH TURNING VANES
DIA		DIRECTION OF FLOW		SUPPLY AIR DUCT UP
DN		BREAK IN PIPE OR DUCT		SUPPLY AIR DUCT DOWN
DWG		CLEARANCE REQUIREMENT		SUPPLY DIFFUSER OR GRILLE
E		WORK TO BE REMOVED		LINEAR DIFFUSER
EA		REVISION CLOUD		SUPPLY AIR OUTLET, SIDEWALL
EAT		EQUIPMENT ITEM XX		RETURN AIR DUCT UP
EG		DIFFUSER TAG WITH CFM AMOUNT		RETURN AIR DUCT DOWN
ESP		DUCT DIMENSION TAG X PLAN OR HORIZONTAL DIMENSION Y ELEVATION OR VERTICAL DIMENSION		RETURN AIR GRILLE
EWT		FLAG NOTE		RETURN AIR INLET, SIDEWALL
EXIST		REVISION NOTE		EXHAUST DUCT UP
F		DETAIL OR SECTION CALLOUT		EXHAUST DUCT DOWN
FCO		SECTION CUT LINE		EXHAUST AIR GRILLE
FD		LINE, ARCH. BACKGROUND		EXHAUST AIR OUTLET, SIDEWALL
FD		LIGHT LINE, EXISTING		THERMOSTAT
FLA		HEAVY LINE, NEW WORK		CARBON DIOXIDE SENSOR
FOIC		COLD WATER		SENSOR
FPM		HEATING WATER SUPPLY		HUMIDISTAT
FT		HEATING WATER RETURN		SWITCH
G		REFRIGERANT SUCTION		TIMER SWITCH
GA		REFRIGERANT LIQUID		
GAL		CONDENSATE DRAIN		
GPM		COMPRESSED AIR		
GRD				
HP				
HVAC				
HWR				
HWS				
IE				
IN				
KW				
LAT				
LWT				
MBH				
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MECHANICAL GENERAL NOTES

- THE CONTRACTOR'S SCOPE OF WORK SHALL CONSIST OF ALL WORK SHOWN ON THE DRAWINGS, INCLUDING PLANS, DIAGRAMS, DETAILS, ETC., AND ALL WORK AS IDENTIFIED IN THE SPECIFICATIONS. WORK INCLUDES FURNISHING, INSTALLING SYSTEM, INTEGRATION, TESTING, TRAINING AND WARRANTY OF THE MECHANICAL SYSTEMS AS SHOWN AND SPECIFIED.
- PROVIDE A COMPLETE AND OPERABLE MECHANICAL SYSTEM. THE SYSTEM SHALL BE PROVIDED COMPLETE WITH ALL MECHANICAL WORK AS REQUIRED FOR SYSTEM OPERATION PER THE SEQUENCE OF OPERATIONS.
- ALL MECHANICAL WORK SHALL COMPLY WITH LOCAL CODES AND REGULATIONS. WHERE WORK SHOWN IS IN CONFLICT WITH THE LOCAL CODE, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING OF THE CONFLICT AND WAIT FOR WRITTEN RESOLUTION PRIOR TO PROCEEDING. WHERE WORK IS SHOWN TO BE ABOVE AND BEYOND THE REQUIREMENTS OF THE CODE, PROVIDE WORK AS SHOWN IN THE CONTRACT DOCUMENTS.
- THE DESIGN OF MECHANICAL SYSTEMS HAS BEEN BASED UPON THE EQUIPMENT AS MANUFACTURED BY THE MANUFACTURERS LISTED ON THE EQUIPMENT SCHEDULES OR IN THE SPECIFICATIONS. EQUIPMENT NAMED IN THE SPECIFICATIONS MAY BE SUBSTITUTED PROVIDED THAT THE EQUIPMENT MEETS OR EXCEEDS ALL SCHEDULED AND SPECIFIED CRITERIA AND HAS THE PRIOR WRITTEN APPROVAL OF THE ENGINEER. COORDINATE REVISIONS TO THE INSTALLATION WITH ALL TRADES AND GUARANTEE IN WRITING THAT NO ADDITIONAL COST WILL BE INCURRED DUE TO PRODUCT SUBSTITUTION.
- CONTRACTOR SHALL FIELD VERIFY ALL BUILDING AND SITE DIMENSIONS BEFORE BEGINNING CONSTRUCTION OR ORDERING EQUIPMENT. DO NOT SCALE FROM PLANS. PLANS PROVIDED ARE DIAGRAMMATIC IN NATURE AND DO NOT SHOW ALL REQUIRED OFFSETS, TRANSITIONS, OR CHANGES IN DIRECTION. PROVIDE ALL OFFSETS REQUIRED.
- DUCT SIZES SHOWN ON PLAN ARE INTENDED TO INDICATE THE REQUIRED INTERIOR FREE AND CLEAR DIMENSIONS OF THE AIR STREAM. COORDINATE ACTUAL DUCT OUTER DIMENSIONS WITH REQUIREMENTS FOR HANGERS, SUPPORTS, THERMAL AND ACOUSTICAL INSULATION.
- CONTRACTOR SHALL COORDINATE ALL MECHANICAL WORK WITH OTHER TRADES AND SUBCONTRACTORS PRIOR TO INSTALLATION OF ANY WORK BY ANY TRADES. DURING COORDINATION EFFORTS DUCT ROUTING SHALL TAKE PRECEDENCE OVER PLUMBING PIPE AND FIRE SPRINKLER WORK. PROVIDE SHOP DRAWINGS FOR REVIEW BY ENGINEER PRIOR TO INSTALLATION AND FABRICATION TO DOCUMENT THE RESULTS OF THE COORDINATION.
- PENETRATIONS THROUGH ROOF OR EXTERIOR WALLS SHALL BE SEALED WEATHER TIGHT. PENETRATIONS THROUGH CEILING OR INTERIOR WALLS SHALL BE SEALED SUBSTANTIALLY AIRTIGHT. BELOW GRADE WALLS OR SLABS SHALL BE SLEEVED AND SEALED WATERTIGHT. PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL BE TREATED TO MEET OR EXCEED THE FIRE RATINGS OF SUCH WALLS.
- CONFINE THE APPLICATION OF FLEXIBLE DUCTWORK TO LOCATIONS INDICATED BY THE CONTRACT DOCUMENTS. MAXIMUM LENGTH OF FLEXIBLE DUCTWORK SHALL NOT EXCEED SIX FEET WHERE ALLOWED BY THE CONTRACT DOCUMENTS.
- PROVIDE ALL REQUIRED ELECTRICAL POWER, MOTOR STARTERS, DISCONNECTS, MOTOR CONTROL INTERFACES, CONTROL SWITCHES, AND CONNECTIONS AS REQUIRED FOR SYSTEM OPERATION AND TO EXECUTE THE SEQUENCE OF OPERATIONS. COORDINATE LINE VOLTAGE WORK REQUIREMENTS WITH THE JOBSITE ELECTRICAL CONTRACTOR.
- PROVIDE ALL REQUIRED EQUIPMENT GUARDS AND STRUCTURAL SUPPORTS AS RECOMMENDED BY EQUIPMENT MANUFACTURERS TO SUPPORT EQUIPMENT AND TO ASSURE SYSTEM PERFORMANCE AND SAFE OPERATION. COORDINATE PRIOR TO INSTALLATION.
- PROVIDE ACCESS PANELS AS REQUIRED TO MAINTAIN EQUIPMENT, ACCESS VALVES, AND DUCT ACCESSORIES. COORDINATE FIRE RATING OF SUCH PANELS WITH THE ARCHITECTURAL DOCUMENTS. ACCESS PANELS SHALL BE MINIMUM SIZE REQUIRED TO SERVICE EQUIPMENT PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS. IF NO MINIMUM SIZE IS GIVEN THE PANEL SHALL BE NO SMALLER THAN 12" X 12" IN SIZE.
- COORDINATE LOCATION OF ALL THERMOSTATS, AND ALL WALL MOUNTED EQUIPMENT, WITH THE ARCHITECT. THE LOCATIONS AS SHOWN ON THE DRAWINGS ARE FOR REFERENCE ONLY. COORDINATE MOUNTING HEIGHT WITH ARCHITECTURAL ELEVATIONS. IF NOT SHOWN ON ARCHITECTURAL ELEVATIONS, MOUNT WITH TOP OF EQUIPMENT NO HIGHER THAN 44" ABOVE FINISHED FLOOR.
- PROVIDE UNIT SUPPORT PER MANUFACTURERS RECOMMENDATIONS. BUILDING AND STRUCTURE IS DESIGNED TO SUPPORT EQUIPMENT, BUT NOT DETAILED TO ACCOMMODATE EACH AVAILABLE EQUIPMENT CONFIGURATION OR MANUFACTURER. CONTRACTOR SHALL PROVIDE MATERIALS AND SERVICES INCLUDING BUT NOT LIMITED TO, ADDITIONAL STEEL, SUPPORT BRACKETS, HANGERS, ACCESSORIES, AND STRUCTURAL ENGINEERING AS REQUIRED TO SUPPORT EQUIPMENT.
- PROVIDE FRAMING, CUTTING, BLOCKING AND PATCHING AS REQUIRED.
- SEAL ALL DUCT JOINTS AND SEAMS WITH DUCT MASTIC. WHERE SEAMS ARE EXPOSED OR WILL BE VISIBLE TO THE OCCUPANT MASTIC SHALL BE APPLIED USING METHODS WHICH LEAVE THE RESULTING SEAL CLEAN AND TIDY. COORDINATE WITH ARCHITECTURAL SCOPE IF DUCTS ARE TO BE PAINTED AND TREAT DUCT SEALS APPROPRIATELY.
- PROVIDE MINIMUM 1" THICK ACOUSTICAL INSULATION AT THE FOLLOWING LOCATIONS: 1) DUCT WORK WITHIN 10' OF THE FAN; 2) MIXED AIR AND ECONOMIZER PLENUMS; 3) PLENUMS UPSTREAM OF RETURN FANS; 4) TRANSFER AIR DUCTS; AND 5) AS SHOWN ON THE DRAWINGS.
- PROVIDE VOLUME DAMPERS AT EACH GRILLE, REGISTER, OR DIFFUSER SHOWN ON PLAN. PROVIDE AT BRANCH DUCTS AS SHOWN ON THE PLANS. VOLUME DAMPERS SHOWN AT SOME, BUT NOT ALL, LOCATIONS ON PLAN DOES NOT WAIVE THIS REQUIREMENT. LOCATE DAMPER OPERATOR IN AN ACCESSIBLE LOCATION. PROVIDE ACCESS PANEL OR REMOTE ACTUATION IF ABOVE HARD-LID. FLAG EACH CONCEALED VOLUME DAMPER WITH MIN 12" LONG ORANGE TAPE UPON INSTALLATION SO THEY MAY BE EASILY IDENTIFIED.
- MAINTENANCE PROVISIONS: PROVIDE FLANGES OR UNIONS AT ALL PIPE CONNECTIONS TO EQUIPMENT TO ALLOW FOR REMOVAL OR DISASSEMBLY FOR MAINTENANCE.
- PROVIDE PRESSURE AND TEMPERATURE TEST PORTS AT THE SUPPLY AND RETURN OF EACH PIECE OF EQUIPMENT.
- REFRIGERANT PIPE SIZES SHOWN ON PLAN ARE FOR REFERENCE ONLY. REFRIGERANT PIPING SHALL BE SIZED AND INSTALLED PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS. REFRIGERANT PIPE SHALL BE INSTALLED INSULATED FOR ITS ENTIRE LENGTH.
- WHERE SPLIT SYSTEM EQUIPMENT REQUIRES CONTROL OR POWER WIRING BETWEEN INDOOR AND OUTDOOR UNITS THE MECHANICAL CONTRACTOR SHALL MAKE PROVISIONS TO PROVIDE THE REQUIRED CONDUIT, WIRE, AND SHALL COORDINATE AND PAY FOR THE SUPPORT OF THE JOBSITE ELECTRICIAN FOR ANY LINE/HIGH VOLTAGE WORK REQUIRED FOR A COMPLETE INSTALLATION.
- PROVIDE SELF-REGULATING HEAT TRACE TO ALL PIPE EXPOSED TO FREEZING CONDITIONS. INSULATE ABOVE HEAT TRACE WITH A MINIMUM OF 1.5" THICK INSULATION. INSULATION SHALL BE SUITABLE FOR THE APPLICATION AND ENVIRONMENTAL CONDITIONS.
- WHERE NON-METAL PIPE IS INSTALLED UNDERGROUND PROVIDE INSULATED TRACER WIRE ALONG THE PIPE'S PATH. THE TRACER WIRE SHALL BE SUITABLE FOR DIRECT BURIAL AND TERMINATE ABOVE GRADE ON BOTH ENDS OF THE PIPE RUN.

APPLICABLE CODES

- 2018 WASHINGTON STATE BUILDING CODE
- 2018 WASHINGTON STATE ENERGY CODE
- 2018 WASHINGTON STATE MECHANICAL CODE

MECHANICAL INDEX

- M0.1 MECHANICAL GENERAL NOTES AND LEGEND
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- MD2.0 BASEMENT AND POOL PLUMBING DEMOLITION PLAN
- MD2.1 FIRST FLOOR MECHANICAL DEMOLITION PLAN
- MD3.0 MECHANICAL DEMOLITION PHOTOS
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- M2.0 MECHANICAL FOUNDATION PLAN
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- M5.0 MECHANICAL ROOF PLAN
- M8.0 FILTER ROOM VIEWS AND SECTIONS
- M7.1 POOL DETAILS
- M8.0 MECHANICAL DIAGRAMS



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RAY WILLIAMSON POOL RENOVATION

8521 MADISON AVENUE N
BAINBRIDGE ISLAND, WA 98110

BID SET PHASE 2 1-30-26

REVISIONS	
#	DATE
1	ADDENDUM #2 2026.02.26

PROJECT ARCHITECT
PROJECT MANAGER
DRAWN
MECHANICAL GENERAL NOTES AND LEGEND

M0.1
2208

BID SET PHASE 2

PUMPS SCHEDULE												
EQUIP ID	LOCATION	SERVES	CAPACITY			DESCRIPTION	TYPE			BASIS OF DESIGN		REMARKS
			FLOW: GPM	TDH: FT	EFF: %		SPEED: RPM	MAX BHP	MOTOR HP	VOLT/ PHASE	MANUFACTURER	
(E) P-1	FILTER ROOM	POOL WATER LOOP	525	60	76.67	EXISTING MAIN PUMP	--	10.45	15	208/3	GRUNDFOS	LC 30957
(E) P-2	MECH ROOM	EXISTING CHLORINE LOOP	--	--	--	EXISTING CHLORINE PUMP	--	--	--	--	--	--
(E) P-3	MECH ROOM	EXISTING HEATED LOOP	--	--	--	EXISTING HEATING LOOP PUMP	--	--	--	--	--	--
P-4	FILTER ROOM	SALINE WATER LOOP	80	10	--	CL GENERATOR SYSTEM PUMP	1725	--	1/4	115/1	TACO	121 IN-LINE CIRCULATORS
(E) P-5	MECH ROOM	EXISTING SOLAR LOOP	--	--	--	EXISTING SOLAR LOOP PUMP	--	--	--	--	--	--
(E) P-6	MECH ROOM	EXISTING SOLAR LOOP	--	--	--	EXISTING SOLAR LOOP PUMP	--	--	--	--	--	--

NOTES:

CHLORINATOR SCHEDULE											
SYSTEM DESCRIPTION	MAKE/MODEL	CHLORINE PRODUCED IN 24 HR (LBS)	INLET/OUTLET FLOW RATE (GPM)	SKID DIMENSION	PIPE	MAX. RETURN LINE PRESSURE (PSI)	VOLTS	PHASE	MAX PRIMARY (AMP)	BREAKER (AMP)	REMARKS
CLGEN-1	NEXGEN 40-R	48	80	48" X 28" X 68"	SCHEDULE 40	25.0	208	1	32	60	1.0

REMARKS:
1. PROVIDE WITH A CIRCULATING PUMP. REFER TO THE PUMP SCHEDULE (P-4)

LOUVER SCHEDULE								
MARK	CFM	APPLICATION	FREE AREA (SQ. FT.)	FREE AREA AIR VELOCITY (FPM)	STATIC PRESSURE	LOUVER SIZE (IN.)	BASIS FOR DESIGN	REMARKS
L-1	26,400	INTAKE	79.80	331	0.02	204x96	GREENHECK ESD-435-204x96	1,2
L-2	100	INTAKE	0.30	330	0.02	12x12	GREENHECK ESD-403-12x12	1,2

REMARKS:
1. PROVIDE WITH MOTOR OPERATED DAMPERS FOR EACH PARTITIONED SECTION.
2. PROVIDE WITH STAINLESS STEEL BIRD AND INSECT SCREEN.

SAND FILTER SCHEDULE			
	F-1	F-2	F-3
DIAMETER, IN	34	34	34
MATERIAL	FIBER REINFORCED PLASTIC	FIBER REINFORCED PLASTIC	FIBER REINFORCED PLASTIC
CONFIGURATION	HORIZONTAL	HORIZONTAL	HORIZONTAL
STYLE	1-PIECE	1-PIECE	1-PIECE
AREA, SF	13.5	13.5	13.5
TOTAL FLOW, GPM	176.7	176.7	176.7
GPM/SF	13	13	13
WORKING PRESSURE, PSI	<5	<5	<5
CLEAN AT DIFFERENTIAL OF, PSI	10	10	10
MEDIA	SAND	SAND	SAND
PIPING	SCHE 80, PVC	SCHE 80, PVC	SCHE 80, PVC
MATERIAL	PVC	PVC	PVC
SIZE, IN	3	3	3
MODEL	PENTAIR THS 3461	PENTAIR THS 3461	PENTAIR THS 3461

FAN SCHEDULE											
MARK	TYPE	LOCATION	SERVES / INTERLOCK	AIRFLOW (CFM)	SP (IN W.G.)	WEIGHT (LBS)	SONES	ELECTRICAL			REMARKS
								HP	VOLTS	PHASE	
EF-1	EXHAUST AIR	ROOF	FILTER ROOM	120	0.25"	36	1.9	1/10 HP	115	1	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN WITH ECM MOTOR AND SPEED CONTROL. ALUMINUM HOUSING, CENTRIFUGAL BACKWARD INCLINED ALUMINUM WHEEL, DIRECT DRIVEN MOTOR MOUNTED ON VIBRATION. USE 10" GRAVITY BACK DRAFT DAMPER. ISOLATION BASIS OF DESIGN: GREENHECK CUE-070-VG
SF-1	SUPPLY AIR	ROOF MECH ROOM	VESTIBULE	100	0.25"	27	2.8	1/10 HP	115	1	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN WITH ECM MOTOR AND SPEED CONTROL. ALUMINUM HOUSING, CENTRIFUGAL BACKWARD INCLINED ALUMINUM WHEEL, DIRECT DRIVEN MOTOR MOUNTED ON VIBRATION. USE 10" GRAVITY BACK DRAFT DAMPER. ISOLATION BASIS OF DESIGN: GREENHECK SQ-70-VG

DUCT ATTENUATOR SCHEDULE							
MARK	SERVES	DUCT TYPE	MAX LENGTH	MAX STATIC PRESSURE	DUCT CONNECTION	NOTES	BASIS FOR DESIGN
ST - 1	AHU-1	RETURN	36"	0.25"	204/96	(1),(2),(3),(4),(5)	VIBRO-ACOUSTICS
ST - 2	AHU-1	SUPPLY	48"	0.40"	32/46	(1),(2),(3),(4),(5)	VIBRO-ACOUSTICS

NOTE: (1) STRAIGHT, BAFFLE TYPE DUCT SILENCER.
(2) PROVIDE STRUCTURAL SUPPORT FRAME FOR SILENCER AND ANY TRANSITIONS. MAKE DUCT CONNECTIONS WITH GRADUAL TRANSITIONS
(3) PROVIDE WITH GREATEST INSERTION LOSSES POSSIBLE WHILE MEETING THE STATED CRITERIA
(4) MATERIAL SHALL BE SUITABLE FOR USE IN A WET, CHLORINATED, AIR STREAM; WITH BAGGED PACKING AND STAINLESS OR PLASTIC FINISHES.
(5) DESIGN AND SELECTION OF THE SILENCER SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.

ELECTRIC UNIT HEATERS SCHEDULE							
EQUIP ID	FAN		ELECTRIC HEAT	OPER WEIGHT	BASIS OF DESIGN		REMARKS
	FLOW: CFM	VOLTS/PHASE	CAP: WATTS	MAX LBS	MANUFACTURER	MODEL	
EH-2	75	115 / 1	2000	9.5	KING	PAW-SS	1

NOTES:
1. INTEGRAL THERMOSTAT, SURFACE MOUNT CAN, MARINE GRILLE.

ROOF VENTILATOR SCHEDULE					
MARK	CFM	PRESSURE DROP	THROAT DIMENSIONS	WEIGHT, LBS	REMARKS
RV-1	150	0.022	12 x 12	91	PROVIDE WITH BIRD SCREEN, MOTOR OPERATED DAMPER, AND SLOPED ROOF CURB. BASIS: GREENHECK WH

DUCT HEATING COILS SCHEDULE									
MARK	AIRFLOW (CFM)	DUCT SIZE (INxIN)	AIR SIDE MAX PRESSURE DROP (IN WG)	AIR ENTERING DB TEMP (F)	AIR LEAVING DB TEMP (F)	HEATING COIL CAPACITY (W)	DESIGN NOMINAL COIL CAPACITY (W)	BASIS OF DESIGN	REMARKS
EH-1	100	10x10	0.10	20	65	1,424	2,000	TUTCO	1,2

REMARKS:
1. PROVIDE WITH DUCT-MOUNTED TEMPERATURE SENSOR, SCR PROPORTIONAL CONTROLLER, AND LOCAL DISCONNECT.
2. PROVIDE WITH AIRFLOW PROVING SWITCH.



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PROJECT ARCHITECT
PROJECT MANAGER
DRAWN
MECHANICAL POOL SCHEDULES

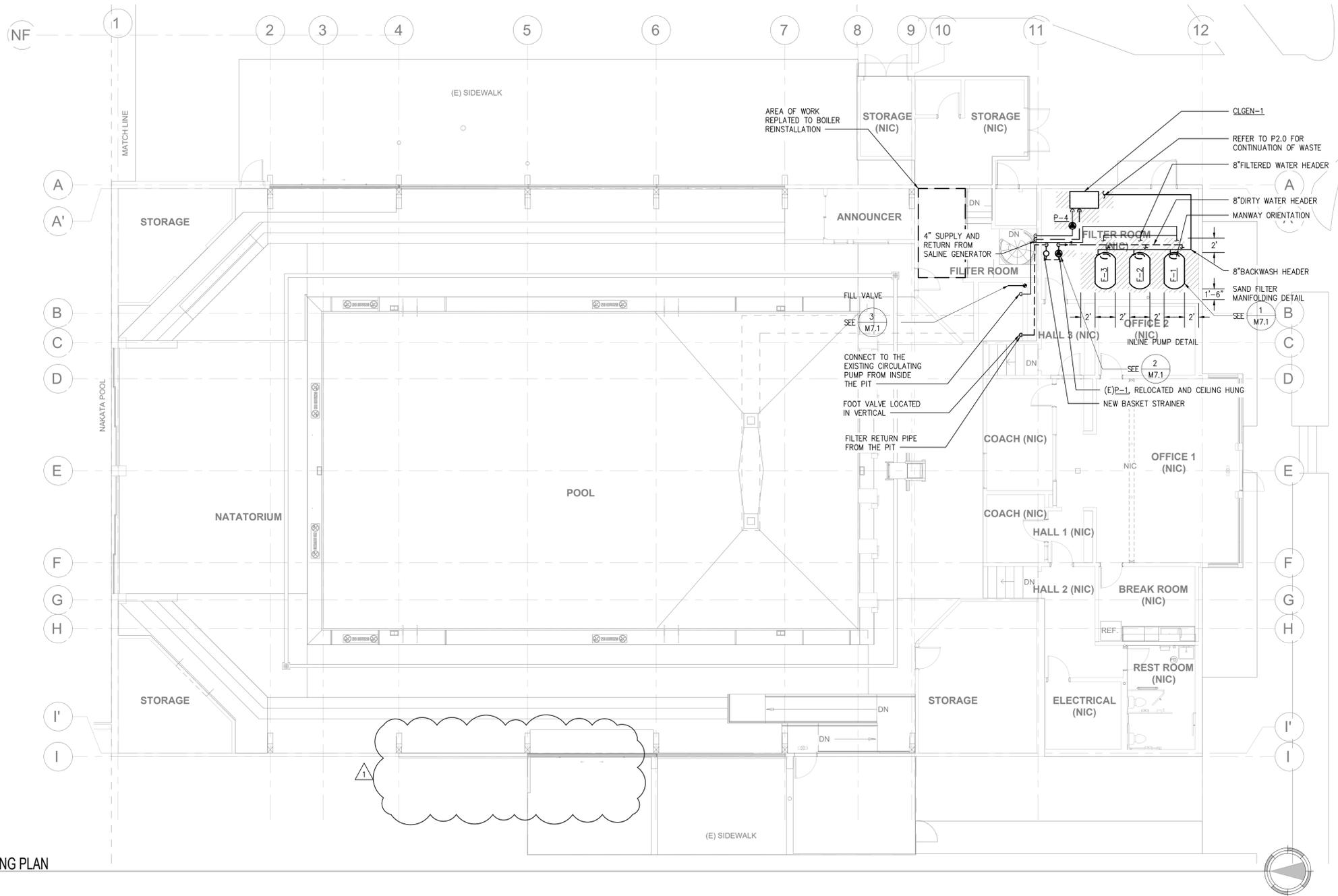
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BID SET PHASE 2



SHEET NOTES:

- PIPING IS DIAGNAMATIC. PROVIDE FITTINGS AND OFFSETS AS REQUIRED TO AVOID WORK OF OTHER TRADES AND AS REQUIRED FOR A CODE COMPLIANT INSTALLATION.



2 FIRST FLOOR PIPING PLAN
SCALE: 1/8" = 1'-0"

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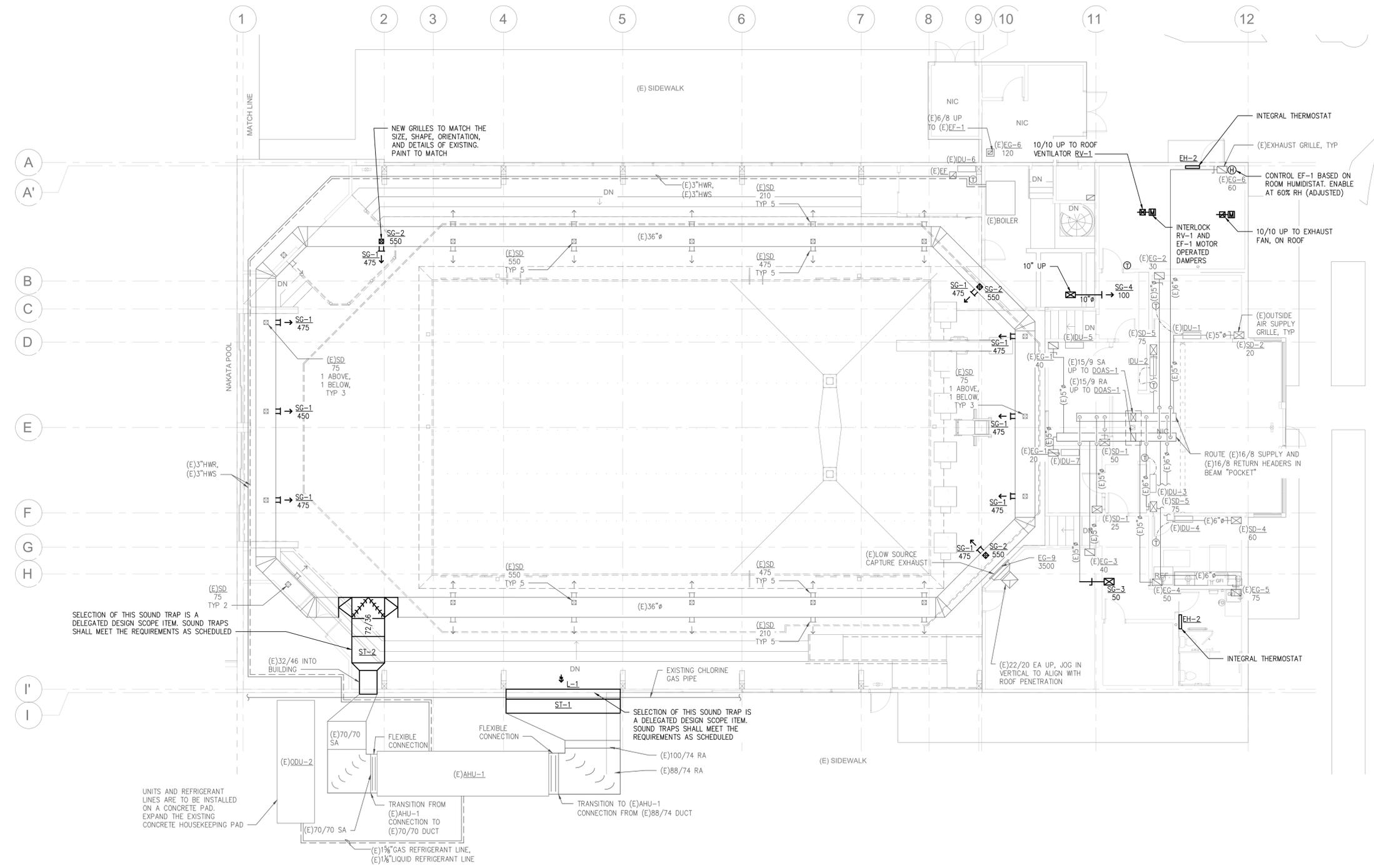
PROJECT ARCHITECT
PROJECT MANAGER
DRAWN
FIRST FLOOR PIPING PLAN

M4.0
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BID SET PHASE 2

SHEET NOTES:

- DUCTWORK IS DIAGRAMMATIC. PROVIDE FITTINGS AND OFFSETS AS REQUIRED TO AVOID WORK OF OTHER TRADES AND AS REQUIRED FOR A CODE COMPLIANT INSTALLATION.
- FOLLOW THE OLD DUCT LINE ON THE NEW DUCTWORK INSTALLATION.



1 FIRST FLOOR MECHANICAL PLAN
SCALE: 1/8" = 1'-0"

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FIRST FLOOR MECHANICAL PLAN

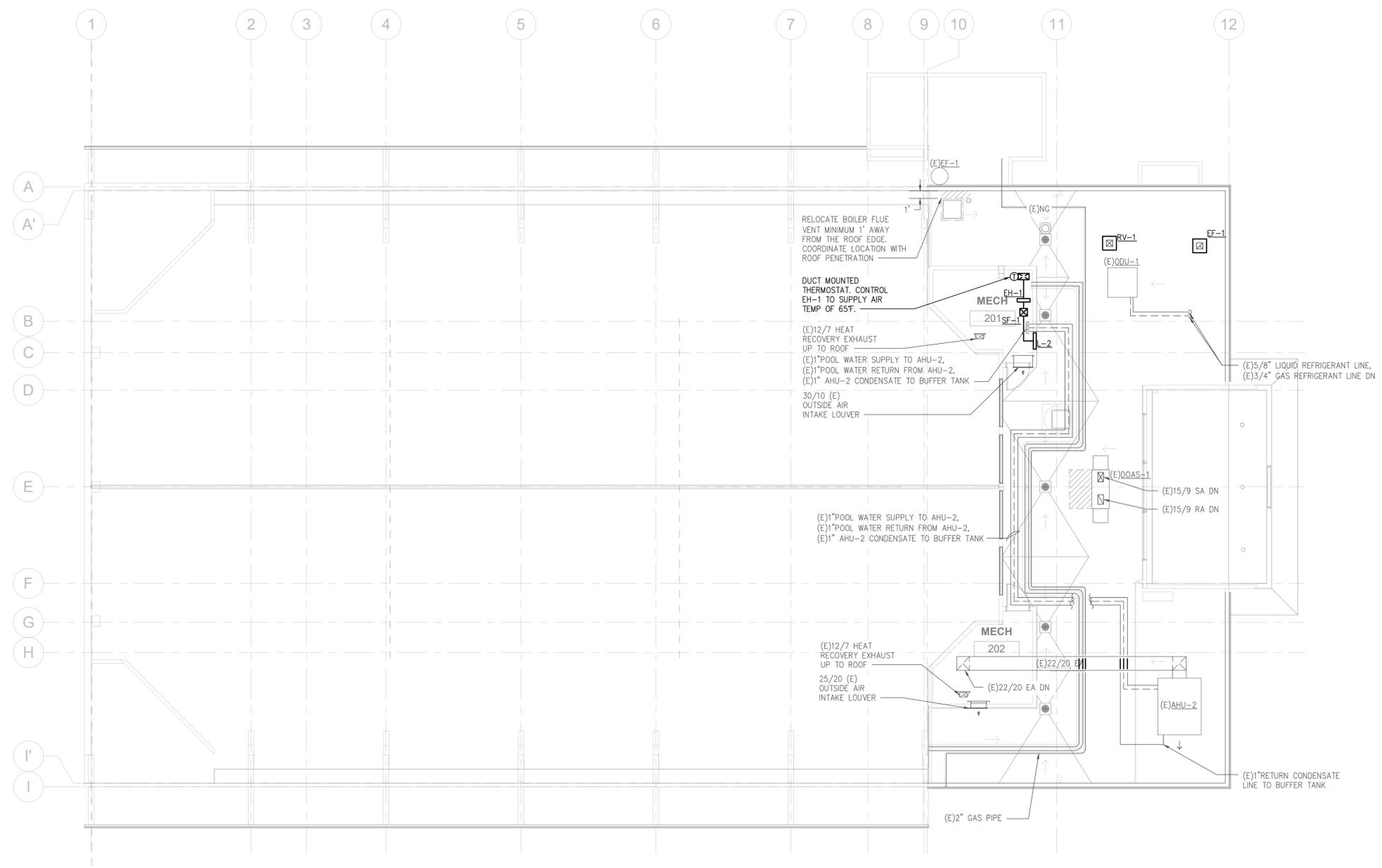
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BID SET PHASE 2



SHEET NOTES:

1. PIPING AND DUCTWORK IS DIAGRAMMATIC. PROVIDE FITTINGS AND OFFSETS AS REQUIRED TO AVOID WORK OF OTHER TRADES AND AS REQUIRED FOR A CODE COMPLIANT INSTALLATION.



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PROJECT ARCHITECT
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MECHANICAL ROOF PLAN

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

BID SET PHASE 2